Late Shri Vishnu Waman Thakur Charitable Trust's

VIVA Institute of Technology

Shirgaon, Virar (East), Dist: Palghar-401305, Maharashtra
Website: www.viva-technology.org

National Conference

on

"Role of Engineers in Nation Building"

9th & 10th March 2018

NCRENB-2018

ISBN: 978-93-5288-028-7
ISSN: 2454-132X

6th National Conference

On

ROLE OF ENGINEERS IN NATION BUILDING

(NCRENB-2018 Proceeding)

9th & 10th March, 2018

Organized by

Late Shri Vishnu Waman Thakur Charitable Trust's

VIVA Institute of Technology

Approved by AICTE New Delhi, Affiliated to University of Mumbai
Shirgaon, Virar(East), Dist: Palghar-401305, Maharashtra
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PREFACE

On behalf of VIVA Institute of Technology, I take great pleasure and pride to formally welcome you all to the sixth National Conference on Role of Engineers in Nation Building (NCRENB 2018) in cooperation with International Journal of Computer Application (IJCA) and International Journal of Advance Research, Ideas and Innovations in Technology (IJARIIT).

We are living in an age of remarkable competition of technology among the countries. In this competition we need to consider the role of Engineers in development of our nation. Looking at the immense rise in the technological area and the demands that are being placed, it is necessary for us to commence researches that will help to build a technologically advanced nation. The national/ international conferences provide common platform to contemplate the issues related to latest developments in the technology, research and development activities in this area.

We held the first national conference in 2013 with various disciplines such as Civil Engineering, Computer Engineering, Electronics & Telecommunication Engineering, Electrical Engineering, Humanities and Sciences and Mechanical Engineering. Since 2014 we have also started with Project Exhibition that will provide the students with an opportunity to exhibit their innovative ideas.

NCRENB 2018 has received total 198 papers in 6 tracks. The selected full length papers will be sent for publication in IJARIIT journal. These papers can be used as a reference for future work which will widen the horizon of technical advancement of our nation.

Dr. Arun Kumar
Chief Editor

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SECTION A

COMPARISON OF STRENGTH AND COST ASPECTS OF FIBER REINFORCED CONCRETE

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ABSTRACT

Reinforcing fibre for increasing the strength of concrete is being done for decades. The interest still continues to find an economical, environmentally low impact, good tensile strength, better impact and shrinkage resistant fibre. This manuscript deals with addition of different natural fibres and comparing it with a synthetic fibre to study the strength properties and cost aspects for future scope in concrete technology. Natural fibres used is from the waste like stem of banana, sisal leaf and coconut coir and compare it with most used synthetic fibre i.e. polypropylene

Keywords— *Natural fibres ,Synthetic fibre, Tensile strength ,Impact Resistance ,Shrinkage, Reinforcement.*

1. INTRODUCTION

The Portland cement concrete has been a boon to the construction industry making it one of the most widely used material. The drawback is that it possesses a very low tensile strength, limited ductility and low resistance to cracking. Historically, concrete member reinforced with continuous reinforcing bars to withstand tensile stresses and compensate for the lack of ductility and strength. Steel reinforcement is being used for a long time to overcome tensile stresses and shear stresses in concrete member. Even though the addition of steel reinforcement significantly increases the strength of concrete, the development of micro cracks must be controlled to produce concrete with homogenous tensile properties. The introduction of fibres is brought in as a solution to develop concrete with enhanced flexural and tensile strength, which is a new form of binder that could combine Portland cement in bonding with cement matrices. Fibres are usually used in concrete to control plastic shrinkage cracking and drying shrinkage cracking. They also lower the permeability of concrete and thus reduce bleeding of water.

2. LITERATURE REVIEW

•Mr.S.Sabarinathan et al (2017) [1] carried out experimental investigation on adding various percentages of sisal fibres such as 0.5%, 1.0%, 1.5% and 2% in M30 grade of cement. Mechanical properties such as compressive strength and tensile strength are determined Water absorption and acid attack test is done in this experiment. And concluded from the result of experiment that the compressive strength and split tensile strength of sisal fibre reinforced concrete is increased gradually when we increase the percentage of fibre. It has been clearly noted that adding fibre gives good strength with W/C ratio 0.45. They recommend that the sisal fibre reinforced concrete gives better result compared to conventional concrete.

•B.Ajitha et al (2017) [2] done the behavioural study of coconut fibre in concrete structure. The addition of coconut fibre in concrete improves various engineering properties of concrete. Coconut fibre is treated as natural fibre before using in concrete. Study shows that addition of coconut fibre improves the compressive strength, flexural strength and split tensile strength of concrete. The experiment was conducted on high strength concrete with the addition of fibre with 5 mix proportions (1%, 2%, 3%, 4%, and 5%) by the weight of cement. The compressive strength and split tensile strength of cured concrete evaluated for 3days,7days, 28days.The study found the optimum fibre content to be at 1%(by the weight of the cement).This results show coconut fibre can be used in construction.

• S. Kesavraman (2017) [3] investigates the effect of using high reactivity metakaolin on the properties of Banana fibre reinforced concrete. Compressive strength, splitting tensile strength, flexural strength, and Impact resistance test were investigated. HRM content used in this study was 5%, 10%, 15% and 20% with 0.5%, 1%, 1.5% and 2% of Banana fibres by volume of concrete. The results indicated that the reference reinforced concrete with 2% Banana fibres by volume showed a significant increase in Compressive strength, splitting tensile strength, flexural strength and impact resistance, the percentage increase after 28-day relative to reference concrete were29.6%, 30.7% and 179% respectively. The results also showed that the incorporation of 15% HRM as a partial replacement by weight of cement with 0.5% Banana fibres showed considerable improvement, the percentage increase in compressive strength, splitting tensile strength, and flexural strength and 2% of Banana fibre showed improvement of Impact resistance test after 28-day compared to reference concrete were 12.3%, 46.8%, and 46.5% respectively.

• M.S.Spoorthi et al (2017) [5] This paper enhances the experimental results of compressive strength, split tensile strength and flexural strength of fibre reinforced concrete with a partial replacement of manufactured sand with variant proportions (0%, 20%, 40%, 60%, 80% and 100%) and addition of fixed proportion(1% of weight of cement) of polypropylene fibres. Study shows that the polypropylene fibres are used in a concrete to enrich the resistance against crack. Workability of concrete decreases with increase in polypropylene fibre content. The problem of low tensile strength can be outcome by addition of polypropylene fibre to concrete.

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3. OBJECTIVES

The major objective of this thesis is to investigate and analyse the use of fibre reinforced concrete

- To provide additional material to increase strength of concrete.
- To acquire a cheap method of construction.
- To utilize the waste materials like banana stem, sisal leaf, coconut coir etc.
- To compare the strength aspects of synthetic and natural fibre.
- To perform cost estimation of different fibres used.

4. METHODOLOGY

A. Materials

The materials used for fibre reinforced concrete includes Cement, Fly ash, Sand, Aggregate, Water and Fibres. Fibres used are Polypropylene, Banana, Sisal and Coir.

Fig.1 Sisal fibre

Fig.2 Banana fibre

Fig.3 Coir fibre

Fig.4 Polypropylene fibre

- Physical Properties Of Material

TABLE I
CEMENT

Specific Gravity	3.15
Fineness	2.6%
Initial setting Time	205mins
Final setting Time	260 mins

TABLE II

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SAND

Specific Gravity	2.8
Water Absorption	4.2%
Moisture Content	2%
Compacted Bulk Density (Kg/lit)	1.86
Loose Bulk Density (Kg/lit)	1.74

TABLE III
AGGREGATE

Size	10mm	20mm
Specific Gravity	2.80	2.80
Water Absorption	1.32%	1.6%
Moisture Content	1.31%	1.57%
Compacted Bulk Density (Kg/lit)	1.75	1.78
Loose Bulk Density (Kg/lit)	1.55	1.65

TABLE IV
FIBRES

Properties	**Banana Fibre**	**Sisal Fibre**	**Coir Fibre**	**Polypropylene Fibre**
Length (mm)	40	40	40	12
Diamater (mm)	0.12	0.20	0.25	-
Specific gravity	0.69	1.056	0.8	0.91
Water absorption after 24 hours	73.47%	54.69%	43.5%	0%

B. Method

The work on M30 Grade of Concrete as per IS: 456-2000 for fibre-cement ratio 0.5% is carried out with fibre length of 40mm chopped approximately.

C. Mixing

All the materials weighed and mixed in a mixer first dry except the fibre and then water is added; mixing is continued for about 10 minutes with addition of fibre, Admixture and Retarder. Immediately the mixture was taken out for slump cone test to check the workability of the trial mix. Then the mixture is poured in moulds kept for 24 hours and then after drying it is removed from the mould and placed for curing.

Fig.5 Mortar mixer

Fig.6 Casting of cubes

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5. RESULTS

- Test on fresh mortar:
  Workability (Slump)
  A mortar mix was prepared having cement: sand ratio of 1:4 with addition of 0.5% fibre by weight of cement.

Fig.7 Slump test

TABLE V
WORKABILITY

Type of Fibres	Initial Slump in mm	Comparison with Plain Cement Mortar (% increase)
Plain Cement Mortar	50	-
Banana	50	0%
Sisal	100	50%
Coir	65	15%
Polypropylene	37	-13%

Test Results (7 days)
After 7 days of curing mortar cubes of size 70.6mm x 70.6mm x 70.6mm are tested for its compressive strength at a load rate of 0.583 MPa/sec and the test results are as mentioned below:

Fig.8 Compression test

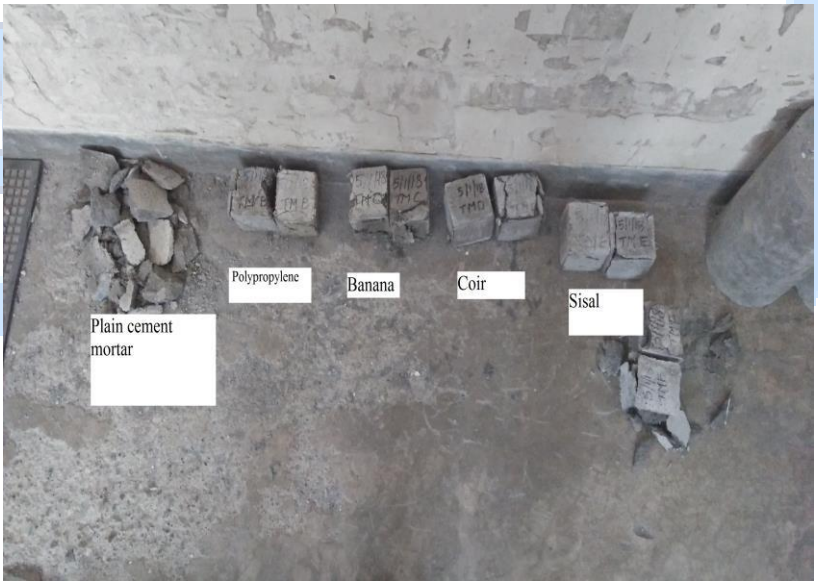

Fig.9 Condition of mortar cubes after compression test

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TABLE VI
COMPRESSION TEST

Type of Fibres	Stress (MPa)	Load (KN)	Density (Kg/m^3)
Plain Cement Mortar	11.88	59.2	2236
Banana	12.38	61.7	2242
Sisal	8.28	41.3	2037
Coir	13.07	65.1	2335
Polypropylene	12.38	61.7	2242

CONCLUSION

- Test results concludes that in mortar mix workability of banana fibre remains same as for plain cement mortar, for sisal and coir fibre it increases with addition of fibre, for polypropylene it decreases.
- Plastic Shrinkage test shows that after 7 days of casting no cracks were observed in the plaster of 20 mm thickness. This indicates fibre addition helps in reducing plastic shrinkage.
- Test results after 7 days of curing concludes that with addition of polypropylene fibre and banana fibre the compressive strength of mortar is increased by 4.05% that of plain cement mortar , for coir fibre it is increased by 9.96%.

ACKNOWLEDGMENT

The project work carried out in this paper is a part of BE research work at Viva Institute of Technology affiliated to Mumbai University under the guidance of Prof.Prerana Patil. We would like to thank our guide for her instruction and recommendation ;express gratitude towards our college civil department and nuvoco industries for their support.

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Experimental study of using waste plastic as an aggregate in self-curing concrete

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ABSTRACT

The objective of this research work is to utilize the waste plastic in self curing concrete as a partial replacement of coarse aggregate. The plastic waste is generated in a large quantity, which is difficult to dispose. In present study, the plastic is replaced by the aggregate with 20%, there are some collusion about why plastic wasn't replaced at higher quantity, like the problem of curing and heat of hydration and bonding of the plastic with the cement. In this project we are trying to study these problems and try to overcome these problems, by adding self-curing agents. The plastic used in this project is urea formaldehyde and polyethylene terephthalate. Also for self-curing purpose Chryso Serenis and LECA aggregate are used in the concrete mix. The aggregates occupy up to 60-75% of mass of the concrete. Natural aggregates are made up by crushing the stones, which can affect the surrounding environment. The waste plastic is also harmful to the environment. Thus, the problems occurring due to crushing of stones and wrong means of disposal of waste plastic will be reduced at a huge rate. The use of waste plastic material in concrete is a good disposal method over burning.

Keywords— *Concrete, Self-curing, Plastic waste, Recycle, Urea Formaldehyde.*

1. INTRODUCTION

1.1 General

India is a developing country and the generation of the waste is excessive. Our country stands in the fifth position in the generation of waste. Not all this waste can be disposed and not all the waste can be reused. Such an example can be 'plastic'. Plastic has good properties which can be put to use. This waste plastic can be re-used in the form of an aggregate. Thus, the project is about the replacement of a fraction of coarse aggregate with waste plastic. After studying some of the research papers, we came to know about the strength differences between the standard concrete and the plastic concrete. Thus we are trying to improve the results by adding a self curing agent called as "polythelyne glycol". We know that plastics resists heat of hydration and lack the bonding properties, adding an admixture may help in strengthening the concrete.

The use of plastic wastes plays an important role in the sustainable solid waste management. From different point of view, it helps to save natural resources that are not replenished, it decreases the pollution of the environment and it helps to save and recycle the energy production processes. Wastes and industrial by –products should be considered as potentially valuable resources merely awaiting appropriate treatment and application. Plastic wastes are among these wastes, their disposal has harmful effects on the environment due to their long biodegradation period, and therefore one of the logical methods for reduction of their negative effects is the application of these materials in other industries. Much research effort has focused on reusing the materials from plastic industries in concrete. The plastic waste to concrete corresponds to a new perspective in research activities, integrating the areas of concrete technology and the environmental technology.

The Indian concrete industry is today consuming about 400 million tonnes of concrete every year and it is expected, that this may reach a billion tonnes in less than a decade. All the materials require producing such huge quantities of concrete, coming from the earth's crust, thus depleting its resources every year creating ecological strains. On the other hand, human activities on earth produce solid waste in considerable quantities i.e., over 2500 million tonnes per year, including industrials wastes, agricultural waste and other wastes from rural and urban societies. Disposal of such solid waste involves economic issues as well as ecological and environmental considerations. The major ecological strain in disposal of solid waste may be due to the presence of waste plastics in it.

1.1.1 **Self curing concrete**:

Self-curing concrete is achieved by means of replacing a part of aggregate by lightweight aggregate or adding chemical admixtures. The self-curing process of concrete takes place from inside to outside, thus reducing the autogenously shrinkage and self-desiccation, especially for the high-performance concrete with relatively low water/binder ratio. The durability and the workability of self-curing concrete are improved, compared with conventional air-cured concrete, while the mechanical properties may be either enhanced or compromised due to the dual function of self-curing agent. Self-curing concrete has been widely applied mostly in bridge decks and pavements.

Self curing agents: LECA: Lightweight expanded clay aggregate (LECA) is a light weight aggregate made by heating clay to around 1,200 °C in a rotary kiln. The yielding gases expand the clay by thousands of small bubbles forming

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during heating producing a honeycomb structure. It has a round or potato shape due to circular movement in the kiln, and is available in various sizes and densities. LECA is used to make lightweight concrete products. LECA is usually produced in different sizes and densities from 0.1 mm up to 25 mm commonly 0-4 mm, 4-10 mm, 10-25 mm and densities of 250, 280, 330, and 510 kg/m3. LECA boulder is the biggest size of LECA with 100–500 mm size and 500 kg/m3 density. Some characteristics of LECA are:

- Lightness,
- Thermal insulation by low conductivity coefficient,
- Soundproofing by high acoustic resistance,
- Moisture impermeable,
- Incompressible under permanent pressure and gravity loads,
- Non–decomposition against severe condition,
- Fire resistant,
- Ph of nearly 7,
- Freezing and melting resistance,
- Easy movement and transportation,
- Lightweight backfill and finishing,
- Reduction of construction dead load and earthquake lateral load,
- Perfect sweet soil for plants,
- Material for drainage and filtration

Chryso Serenis: Chryso Serenis is a ready-to-use shrinkage reducing admixture for concrete and mortars. It reduces concrete and mortar shrinkage at early age and on the long term. It does not have a spreading effect. It reduces the capillary tensions, therefore impacting the most important mechanism at the origin of shrinkage. It does not modify the water demand of concrete, nor impacts the water/cement ratio. It is compatible with new generation super plasticizers and traditional plasticizers and super plasticizers.

Dosage: 0.5 to 3.0 kg for 100 kg of cement or binder. A 2.0% dosage of the product of the weight of cement is commonly used. It can be added to the mixing water. The optimum dosage of can only be established after trial tests, taking into account local conditions.

2. LITERATURE REVIEW

Raghatate Atul et al.(2012) [1] Many researches were conducted to use industry by products such as fly ash, silica of concrete. They suggested the use of E- Plastic particles along with fly ash to improve the properties of concrete used the coir fibres as concrete composites for disaster prone structures. Flume, glass cullet, coir fibres, e-plastic wastes are used in concrete to improve the properties of concrete. Compressive strength of concrete is affected by addition of plastic pieces and it goes on decreasing as the percentage of plastic increases addition of 1 % of plastic in concrete causes about 20% reduction in strength after 28 days curing. The splitting tensile strength observation shows the improvement of tensile strength of concrete. Up to 0.8 % of plastic improvement of strength recorded after that addition of strength of concrete decreases with addition of plastic. Thus it is conclude that the use plastic can be possible to increase the tensile strength of concrete.

Magda I. Mousa et al. (2014) [2] The mechanical properties of concrete containing self-curing agents are investigated in this paper. In this study, two materials were selected as self-curing agents with different amounts, and the addition of silica fume was studied. The self-curing agents were, pre-soaked light weight aggregate (Leca); 0.0%, 10%, 15%, and 20% of volume of sand; or polyethylene-glycol (Ch.);1%, 2%, and 3% by weight of cement. To carry out this study the cement content of 300, 400,500 kg/m3, water/cement ratio of 0.5, 0.4, 0.3 and 0.0%, 15% silica fume of weight of cement as an additive were used in concrete mixes. The mechanical properties were evaluated while the concrete specimens were subjected to air curing regime (in the laboratory environment with 25 _C, 65% R.H.) during the experiment. The results show that, the use of self-curing agents in concrete effectively improved the mechanical properties. The concrete used polyethylene-glycol as self-curing agent, attained higher values of mechanical properties than concrete with saturated Leca. In all cases, either 2% Ch. or 15% Leca was the optimum ratio compared with the other ratios. Higher cement content and/or lower water/cement ratio lead(s) to more efficient performance of self-curing agents in concrete. Incorporation of silica fume into self-curing concrete mixture enhanced all mechanical properties, not only due to its pozzolanic reaction, but also due to its ability to retain water inside concrete. The use of self-curing agents (polyethylene-glycol or saturated leca) in concrete mixes improves the mechanical properties of concretes under air curing regime which may be attributed to a better water retention and causes continuation of the hydration process of cement past resulting in less voids and pores, and greater bond force between the cement paste and aggregate. The improvement in the mechanical properties of self-curing concrete (SCUC) was superior while using self-curing agent of chemical type (polyethylene-glycol) compared to aggregate type (saturated leca). The values of 2% polyethylene-glycol and 15% saturated leca represent the optimum doses as self-curing agents in concrete, among the values examined (1–3% ch.) or (10–20%leca), respectively. In self-curing concrete, increasing the cement content and/or reducing w/c ratio markedly enhance(s) the mechanical properties of concrete. On the other hand the lowest allowable cement content and the highest allowable w/c ratio that should be used in self-curing concrete are about 300 kg/m3 and 0.5, respectively; otherwise the self-curing effect thereafter may vanish. The incorporation of silica fume (SF) in SCUC (concrete with 2% ch.) causes additional improvement in the mechanical properties of concrete.

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3. METHODOLOGY

3.1 Materials

The materials used in this study are as follows:

3.1.1 Cement: Ordinary Portland Cement of Grade 53 was used in all types of aggregate content mixtures. The physical properties of the cement are presented in Table 3.1.

Table 3.1 Properties of cement.

Physical properties	Abbreviations	Limits of cement
Standard consistency	-	29.33 %
Initial Setting Time (min)	I.S.T	205
Final Setting Time (min)	F.S.T	260
Fineness (%)	-	2.6
3 days age compressive strength (MPa)	Cs	36
7 days age compressive strength (MPa)	Cs	43

3.1.2 Sand: he sand forms important ingredient of mortar. It is the final residue of the resistant mineral grains resulting from the weathering action upon the rock, the final form of sand is obtain after many cycles of deposition and weathering.

Table 3.2 Different density of sand

Compacted bulk density	1.86	Kg/lit
Loose bulk density	1.74	Kg/lit

3.1.3 Aggregate: The aggregate was natural coarse aggregate of 10mm and 20mm maximum size obtained from Uran in India. The properties of aggregate was determined and fulfilled according to IS2386.

Table 3.3 Sieve analysis of aggregate

IS Sieve mm	Weight Retained	% Weight Retained	Cum. % wt. Retained	Cumulative % passing	IS 383 Limits
16.00	0	0.0	0.0	100	100
12.50	23	1.2	1.2	98.8	100
10	172	8.6	9.8	90.2	85-100
6.30	1566	78.3	88.0	12.0	
4.75	135	6.8	94.8	5.2	0-20
2.36	104	5.2	100.0	0.0	0-5
0.60	0	0.0	100.0	0.0	
0.30	0	0.0	100.0	0.0	
0.15	0	0.0	100.0	0.0	
0.08	0	0.0	100.0	0.0	
Pan	0	0.0	100.0	0.0	

3.1.4 Waste plastic: The waste plastic was obtained from urea formaldehyde scrap i.e blue drums. These were shredded as per the size of aggregate. The properties of this waste plastic were determined and they are as follows.

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Fig 3.1 Waste plastic

The densities of plastic, and specific gravity is calculate by Pycnometer. Also the water absorption is calculated by standard procedure.

Table 3.5 Properties of waste plastic

Parameter	Natural Aggregate	Plastic Aggregate
Compacted Bulk Density	1.78	0.44
loose bulk density	1.6	0.37
Specific gravity	2.80	0.938
Water absorption	1.62	0.86

Properties	Limits
Density (kg/l)	0.37
Specific Gravity	0.946
Water absorption (%)	0.84

The sieve analysis of waste plastic is done as per procedure for 10 mm aggregate.

Table 3.6 Sieve analysis of waste plastic

IS Sieve 'mm	Weight Retained	% Weight Retained	Cum. % wt. Retained	Cumulative % passing	IS 383 Limits
40.0	0.000	0.0	0.0	100.0	100
30.0	0.049	3.7	3.7	96.3	90-100
25.0	0.340	25.6	29.3	70.7	75-100
20.0	0.426	32.1	61.3	38.7	55-90
16.0	0.276	20.8	82.1	17.9	35-59
12.5	0.166	12.5	94.6	5.4	8-30
10.0	0.041	3.1	97.7	2.3	0-20

Table 4.1

4. RESULTS AND DISCUSSIONS

4.1 Comparison between Natural Aggregate and Waste Plastic

1. Plastic does not carry load like the natural aggregates. The stress curve is different for plastic.
2. Gradation of plastic poor than natural aggregate.
3. Following table shows the property comparison.

4.2 Comparison of Self-Curing method

The comparison of two methods of self-curing shows that cube with LECA aggregate has good result for the self-curing. The strength of concrete cube with self curing agent LECA shows comparatively better results than the concrete cube with self curing agent Chryso Serenis

CONCLUSION

1. LECA is the method which can be used for further experimental procedure.
2. Waste plastic can be the replacement for 10 mm Aggregate in further experimental procedure.

ACKNOWLEDGEMENT

I would like to thank my H.O.D. Prof. Lissy Jose & my project guide Prof. Prerana Patil for their guidance throughout the project. Also I would like to express my gratitude for the Civil Engineering Department Faculty and my classmates.

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Utilization of Iron Ore Tailings in Concrete

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ABSTRACT

Concrete is by far the most important building material used in construction industry. Globally the concrete industry consumes large quantity of natural resources which are becoming insufficient to make their increasing demand. This research is deal with reduction of construction cost up to 50% by the replacement of sand with iron ore tailing, which also gives the optimum strength results when it compare with control mix. In this study addition of iron ore tailing; silica fume and alccofine are used with their appropriate proportion to increase strength results. In this papers discuss the properties of iron ore tailing concrete.

Keywords: *iron ore tailing, cement concrete, alccofine, silica fume*

1.INTRODUCTION

1.1 General

Concrete is a composite construction material made primarily with Cement, fine aggregates, water and coarse aggregates, and may contain chemical admixtures. The overall worldwide consumption of sand as fine aggregate for production of concrete is very high, and many others developing countries have encountered some difficulty in the supply of natural sand in order to meet the increasing needs of infrastructural development in recent years, a situation that is responsible for increase in the price of sand, and the cost of concrete. To overcome the shortage problem and demand for river sand, practitioners in the construction industries have identified some alternatives.

Many researchers have made studies on the use of iron ore tailing in concrete. Iron ore industry produces large amount of waste known as Iron ore tailings. It is a very fine aggregate residue resulting from the extraction of iron from iron ore. Usually the ore tailing is disposed of in the vicinity of plant as waste material over several hectares of valuable land leading to water and land pollution. Large quantities of iron ore tailing are generated in India every year leading to environmental pollution and disposal problem.

The availability of natural sand for construction purpose is gradually depleting. To overcome this difficulty and reduce the environmental pollution arising from disposal of iron ore tailing, the possibility of replacing partially the sand by iron ore tailing is considered here.

Iron ore tailings materials left over after the process of separating the valuable fraction from the worthless fraction of an ore. Cement concrete is a processed construction material of widespread use in the field of civil engineering.

1.2 Objectives of work

- Effective disposal of iron ore tailing
- Feasibility study of iron ore tailings as a construction material.
- The effect of iron ore tailings on the property of concrete as a partial replacement of aggregate.

2.LITERATURE REVIEW

T.J. Ugama(2014) [1] The effect of tailings on the properties of concrete by replacing sand with IOT. The mix with only sand as fine aggregates served as the control mix, while sand was replaced in the other mixes by 20%, 40%, 60%, 80% and 100% Tailings. Based on the experimental investigation they also concluded that increasing percentage of tailing reduces the workability of concrete. IOT performed better in terms of splitting tensile strength in concrete than that of control mix. Hence they concluded that by limiting IOT to 20% (optimum) tailings can be used in concrete.

Mangalpady Aruna (2014)[2] The tailings as the partial replacement to the sand and quarry dust in the manufacture of paving blocks. The blocks that manufactured using quarry dust and Tailings resulted in higher compressive strength at 28 days without much change in water absorption.

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3.METHODOLOGY

3.1. .MATERIALS

3.1.1. SAND: The sand forms important ingredient of mortar. It is the final residue of the resistant mineral grains resulting from the weathering action upon the rock, the final form of sand is obtain after many cycles of deposition and weathering.

Table No3.1-Compacted / Loose Bulk Density Of Aggregate:

Volume of the Container: (V)	15.000	lit
Weight of Container: (W1)	9	Kg
Weight of Container + Compacted material (WC)	36.900	Kg
Weight of Container + loose material (WL)	35.100	Kg
Compacted bulk density	1.86	Kg/lit
Loose bulk density	1.74	Kg/lit

Table No.3.2-Sieve Analysis:

IS Sieve 'mm	Weight Retained	% Weight Retained	Cumulative % weight Retained	Cumulative % passing	IS 383 Limits
10	0	0.0	0.0	100	100
4.75	90	4.5	4.5	95.5	90-100
2.38	683	34.2	38.7	61.3	60-95
1.18	444	22.2	60.9	39.1	30-70
0.60	188	9.4	70.3	29.7	15-34
0.30	407	20.4	90.7	9.3	5-20
0.15	116	5.8	96.5	3.5	0-20
0.075	0	0.0	96.5	3.5	
Pan	70	3.5	100	0.0	
Total Wt.	1998.7			Zone:I	/

Table No3.3-Water Absorption:

Sl. No	Details	Trial No 1
1	Weight of the Saturated surface dry sample	1.265
2	Weight of the oven dry sample	1.214
3	Water absorption %	4.20
4	Water absorption %	4.20

3.1.2. AGGREGATE (10MM)

This is inert or chemically inactive material which forms the bulk of cement concrete. This aggregate bond together by means of cement. The crushed rock aggregate is obtained by crushing rock pieces into suitable size.

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Table No.3.4- Compacted / Loose Bulk Density of Aggregate:

Volume of the Container: (V)	15.000	lit
Weight of Container: (W1)	9	Kg
Weight of Container + Compacted material (WC)	35.200	Kg
eight of Container + loose material (WL)	32.200	Kg
Compacted bulk density	1.75	Kg/lit
Loose bulk density	1.55	Kg/lit

Table No.3.5-Sieve Analysis:

IS Sieve 'mm	Weight Retained	% Weight Retained	Cumulative % weight Retained	Cumulative % passing	IS 383 Limits
16.00	0	0.0	0.0	100	100
12.50	23	1.2	1.2	98.8	100
10	172	8.6	9.8	90.2	85-100
6.30	1566	78.3	88.0	12.0	
4.75	135	6.8	94.8	5.2	0-20
2.36	104	5.2	100.0	0.0	0-5
0.60	0	0.0	100.0	0.0	
0.30	0	0.0	100.0	0.0	
0.15	0	0.0	100.0	0.0	
0.08	0	0.0	100.0	0.0	
Pan	0	0.0	100.0	0.0	
Total Wt.	2000			Zone:II	

3.1.3 AGGREGATE (20MM)

These are inert or chemically inactive materials which form the bulk of cement concrete. These aggregate bonds together by means of cement. The crushed rock aggregate is obtained by crushing rock pieces into suitable size.

Table No.3.6-Compacted/Loose Bulk Density of Aggregate

Volume of the Container: (V)	15.000	Lit
Weight of Container: (W1)	9	Kg
Weight of Container + Compacted material (WC)	35.677	Kg
Weight of Container + loose material (WL)	33.689	Kg
Compacted bulk density	1.78	Kg/lit
Loose bulk density	1.65	Kg/lit

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Table No.3.7-Sieve Analysis

IS Sieve 'mm	Weight Retained	% Weight Retained	Cumulative % weight Retained	Cumulative % passing	IS 383 Limits
25.00	0	0.0	0.0	100	100
20.00	268	13.4	13.4	86.6	85-100
12.50	1625	81.3	94.65	5.35	0-20
10.00	104	5.2	99.85	0.15	0-5
4.75	0	0.0	99.9	0.15	
2.36	0	0.0	99.9	0.15	
1.18	0	0.0	99.9	0.15	
Pan	3	0.2	100.0	0.00	
Total Wt.	2000				

3.1.3. CEMENT

It is the main binder material used concrete. The cement is obtained by burning of calcareous and argillaceous material at a very high temperature. The OPC 53 grade cement is used in this trial mix. It is the main binder material used concrete. The cement is obtained by burning of calcareous and argillaceous material at a very high temperature. The OPC 53 grade cement is used in this trial mix.

Table No.3.8-Standard Consistency:

Sample No.	Wt. of cement	Wt. of water (ml)	Percent of water	Mixing start time	Mixing end time	Temp °C	Penetration (mm)
1	300g	90	30	09.00	09.05	27	4
2	300g	88	29.33	09.10	09.15	27	7
3	300g	88	29.33	09.20	09.25	27	6

Table No.3.9-Initial/Final Setting Time Of Cement:

Sample No.	Wt. of cement	Wt. of water	Ambient Temp 27+/- C	Mixing start time	Initial Setting time	Final Setting time
1	300g	75ml	27	11.00	215 min	250 min
2	300g	75ml	27	11.20	195 min	270 min
				Average:	205 min	260 min

Fineness of cement by dry sieving:

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Weight of cement =100 gms
Weight of residue = 2.6 gms
Percentage of fineness = 2.6 %

Specific gravity (density):
Le chatelier flask was used for density test
Mass of cemenet taken for test = 64 gms
Displacement of keroene volume = 20.3 cm^3
Density = 3.15

3.1.4. IRON ORE TAILINGS

Tailings are the materials left over, after the process of separating the valuable fraction from the worthless fraction of an ore. Cement concrete is a processed construction material of widespread use in the field of civil engineering. The availability of natural sand for construction purpose is gradually depleting. To overcome this difficulty and reduce the environmental pollution arising from disposal of iron ore tailing, the possibility of replacing partially or completely the sand by iron ore tailing is considered here.

Fig.1: Iron Ore Tailings

3.2 METHODOLOGY

MIX DESIGN: The experimental investigation is based on a reference concrete mix of grade M40 using IRON ORE TAILINGS. On the basis of the material properties, the proportioning of concrete mix is carried out in accordance to IS 456-2000 and as per the guidelines of IS 10262:2009 (draft 2007). The process of determining an Appropriate mix proportion involved a number of trial casting and testing. The detailed design description of the Final mix proportion is presented here.

Table No.3.10 – Mix Design for M40 (Control Mix)

MATERIAL	CEMENT	WATER	C.A.	SAND
QUANTITY	405 Kg/m^3	172	1105	532.67

RESULT:

The results shows physical properties comparisons between iron ore tailings and fine aggregates which shows 15% increments in their properties. Hence we can replace fine aggregate with iron ore tailings. In this paper we will use upto 40% replacement of sand.

Table No.3.11 – Comparison Between Sand And Iron Ore

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Properties	Sand	Iron Ore Tailings	Result
Density	**2650**	**3100**	**15 % Increased**
Specific gravity	**2.65**	**3.1**	
Water absorption	**4.2**	**3.97**	

Summary

- IOT are a waste material being dumped in open land the use of waste material makes it green.
- The sand in cement concrete replaced by IOT in concrete without compromising on the strength.
- Use of IOT greatly reduces the water & land pollution that would otherwise occur due to disposal of IOT on land.

Acknowledgement

I am using this opportunity to express my gratitude to everyone who supported me throughout the completion of this project. I am thankful for their expiating guidance invaluably constructive criticism and friendly advised, during project work. I expressed my warm thanks to Prof. PreranaPatil for giving me an opportunity to carry out project on "Utilisation of Iron Ore Tailings in Concrete" We would also like to thank Prof. Lissy Jose, Head of Civil Department and Dr. Arun Kumar, the principal for the whole hearted support. Last but not the least, I express my gratitude towards all those who directly or indirectly helped me in completion of my studies.

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"ECO-FRIENDLY BRICKS BY USING WASTE GLASS POWDER"

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ABSTRACT

The objective of the study is to explore potential of using waste glass powder as secondary material in clay bricks manufacturing. All material used in this study are locally available. Clay is to be used in this investigation with (0%, 10%, 20%, 30% and 40%) as waste glass powder of partial replacement for clay. The production of fired clay bricks incorporation of waste constitutes of a positive way for brick industry to contribute a more sustainable construction materials. The advantages are on one hand, a reduction of clay extraction and on other hand is to reduce the waste from environment and its minimization in land fillings. The main idea of this research is to focus on the ability of making fired clay bricks as alternative masonry units to concrete hollow blocks and enhancing their property using waste glass powder.

Keywords— *Glass powder, Fired clay bricks, Eco-friendly, Compression, water absorption, strength.*

1. INTRODUCTION

Masonry unit is a significant basic material of construction required in all spheres of Constructional activities and constitutes about 13 percent of the total cost of building Material required for construction (Alam, 2015). Masonry units are bonded together With mortar to yield a composite building component generally a wall. Concrete block and brick are the most common types of masonry units. These construction materials are extensively employed worldwide in both developed and developing countries. In Gaza Strip, concrete blocks, which are made from a mixture of Portland cement and aggregates, is a main construction element used to make masonry walls, may be due to long time tradition or even the good performance of masonries such as strength properties.

Worldwide, bricks are a major building material and perhaps one of the oldest. The worldwide annual production of bricks is currently about 1391 billion units and the demand for bricks is predicted to be continuously increasing (Zhang, 2013). In this respect, for the development of bricks with waste materials, further research and development is necessary. Besides, not only on the technical, economic and environmental features but also public education related to waste reusing and sustainable development is required for wide production and application of these bricks.

Clay materials are mostly used for the manufacture of bricks. waste can be added in order to enhance its properties. Solid waste is a great concern among governmental agencies, and environmentalist regarding the increasing amount of waste throughout the world.

One waste material which has potential as a brick additive is waste glass. It is not biodegradable and therefore creates a problem for solid waste disposal. The disposal into landfills also does not provide an environment-friendly solution. Hence, the use of waste glass in construction materials can be a worthy solution to the environmental problem caused by this solid waste.

The main objective of this research is to focus on the ability of making fired clay bricks as alternative masonry units to concrete blocks and to investigate the effect of the addition of waste glass on the properties of the fired clay bricks. These include firing shrinkage, bulk density, apparent porosity, water absorption and compressive strength. Also, the effect of waste glass particle size on the properties of the fired body is studied.

Different amounts of waste glass (0, 10, 20, 30 and 40%) were added to the original brick clay and fired at temperatures of 900, 1000 and 1100°C. The successful use of waste glass will aid in reducing the environmental, health problems related to the disposal of waste glass, and the scarcity of land area needed for disposal. Reducing waste is not the only reason to investigate the addition of certain residues into a clay matrix, although traditionally it has been the main purpose of research on this topic.

2. LITERATURE REVIEW

An easy way to comply with the conference paper formatting requirements is to use this document as a template and simply type your text into it.

A*."Properties of Fired Clay Bricks Mixed with Waste Glass"-Hisham H. Abdeen(2017)* [1] tells us that one waste material which has a potential as a brick additive is waste glass. It is not biodegradable and therefore it creates a problem for solid waste disposal. The disposal into landfills also does not provide an environment friendly solution. Hence, the use of waste glass as a construction material is a practical solution to the environmental problems caused by this solid waste.

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Brick samples are heated to temperatures, which varied between 900 and 1100°C for 6 hours, with a heating rate of 2.5°C/min until 650°C, and then 5°C/min until 900°C, 1000°C and 1100°C. The conclusions derived from the aforementioned experiments are as follows.

1. The firing shrinkage, bulk density and compressive strength of the fired clay bricks increased with increasing amount of waste glass content up to 30% and firing temperature up to 1100°C.
2. There was a close relationship between water absorption and apparent porosity of the fired clay bricks and both decreased with increases amount of waste glass content up to 30% and firing temperature up to 1100°C.
3. In this research and for coarse glass only, the optimal amount of waste glass that can be mixed with clay to produce good quality bricks was 30% by weight and the optimal heating temperature for overall properties was 1100°C.
4. The particle size of waste glass powder was very important and had a significant effect on the properties of fired clay brick; the finer was the particle size, the higher was the compressive strength.

B*.“Feasibility of Using Waste Glass Sludge in Production of Ecofriendly Clay Bricks”* ”-Muhammad J. Munir[2]tells us that Burnt clay bricks are commonly used in construction across the globe. The objective of this study is to explore the potential of using waste glass sludge (WGS) as a secondary material in clay brick manufacturing. WGS was collected during industrial-scale cutting and polishing of glass. Brick specimens were manufactured using various dosages (i.e., 5, 10, 15, 20, and 25% by clay weight) of WGS at an industrial brick kiln plant. A range of mechanical and durability tests were performed on the bricks thus produced to quantify their performance. Clay bricks incorporating WGS exhibited higher compressive and flexural strength as compared with that of control traditional clay bricks. The unit weight of bricks was reduced owing to WGS addition, which can lead to lighter and economical structures .Furthermore, the resistance against efflorescence, sulphate attack, and freeze-thaw was enhanced for all the clay bricks incorporating WGS. Scanning electron microscopy indicated a well-bonded and fused structure of brick specimens incorporating WGS. The findings demonstrate that WGS can enhance the physical and mechanical properties of clay bricks, leading toward more economical and sustainable construction.
Based on the experimental findings, it appears that WGS can be utilized in large-scale brick manufacturing with possibility to enhance the physical and mechanical properties of bricks, leading to more sustainable, ecofriendly, and economical masonry construction.

C. *“Effects of waste glass additions on the properties And durability of fired clay brick”*S.E. Chidiac and L.M. Federico (2007) [3] tell us that The optimization of the production of fired clay brick is essential for the sustainability of the clay brick industry. While there exist areas for improvement of these bricks’ properties when they are used in severe climates, concerns—including non-renewable resource depletion, increasing energy costs, and waste management — have become increasingly important in Canadian and global industries. One strategy to address these concerns is to use waste additives as fluxing agents in bricks. Use of these additives can decrease the dependency of the industry on non-renewable resources and can improve brick strength and durability. The effect no recycled waste glass additives have on fired brick durability and mechanical and transport properties was investigated in this study. The variables studied were waste glass particle size and percentage added by mass. Microstructure was investigated using mercury intrusion porosimetry to determine the effect on pore structure. The results yielded an optimal percentage addition of waste glass. A comprehensive experimental program was undertaken to evaluate the effects of adding waste glass to fired clay brick. Various observations and conclusions were drawn from the study, and are presented below.
(1) The compressive strengths of specimens containing 10% coarse, 15% coarse, and 15% fine waste glass increased significantly, by as much as 104% over that of the control. Percentage of waste glass was the most influential variable in the increase of the compressive strength.
(2) The particle size of the waste glass influenced the mechanical strengths less than the transport properties, as both coarse and fine particles improved strength at a comparable rate.
(3) Results of IRA testing showed direct correlations between both the increasing percentages of waste glass, which tended to decrease IRA, and the particle size of the waste glass, where fine particles tended to decrease the IRA at a greater rate than the coarse particles.
(4) Both the 24 h CWA and the 5 h BWA absorptions decreased significantly for specimens containing 10% fine, and 15% coarse and fine waste glass.
(5) There were significant decreases in the overall porosity of specimens as the percentage of waste glass increased. Waste glass particle size also influenced these decreases, as fine waste glass caused a greater rate of decreased porosity than coarse waste glass.

D. *“THE USE OF WASTE MATERIAL IN THE MANUFACTURING OF CLAY BRICK”- L.M.Federico, S.E. Chidiac(June 8 –12,2005)*[5]tells us that Fired clay bricks are produced when clay particles bond to one another at high temperatures, forming a glassy material, which, upon cooling, displays high strength and durability properties .High temperatures required to melt SiO2 mean high energy cost associated with brick production .In addition to cost, challenges facing the modern brick industry include shortages of raw material and environmental impacts of production. The feasibility of using waste material as a brick body was investigated, where several possible waste additives, including slag, biological waste, and waste container glass, were considered. A literature review was conducted in order to assimilate past work and experimental results. The results of several testing programs were compared and the

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feasibility of further work in the addition of waste additives to bricks was discussed. Due to its soda content, amorphous glassy structure, and availability, waste glass was determined to be a feasible option for addition. The specimens with glass additions exhibited an increase in compressive and flexural strength, a decrease in the initial rate of absorption, and an increase in firing shrinkage.

Review of the literature has led to the following conclusions:

Waste Glass:

1) Addition of waste glass showed an increase in strength, and decrease in C/B ratio.
2) Addition of waste glass in an industrial setting in the order of 10% to 15% by mass can be adopted to produce acceptable quality bricks.
3) Addition of glass tends to improve the quality of the bricks using lower firing temperature, thus significantly decreasing energy requirements.
4) Addition of waste glass reduces emission by lowering Hydrogen Fluoride by 33% .

3.METHODOLOGY

3.1 Brick manufacturing

3.1 Raw materials

The raw materials used in the manufacturing process of fired clay masonry units are a mixture of natural clay, silt, and sand. The surface clays (recent sedimentary formations), Shale's (clays that have been subjected to high pressures) and fire clay (mined at deeper levels) are commonly used in the production of fired clay units. Surface and fire clays have a different physical structure from shale's but are similar in chemical composition. The two main constituents of all of these clays are the silica and alumina. Some minor components are iron and other metal oxides, which are particularly responsible for giving brick its red-brown colour. White and light-colored bricks are made by using clay that is naturally deficient in metal oxides and removing whatever metal oxides are present in it. White bricks are generally more expensive than the normal (red-brown) bricks. The range of chemical component and mineralogical phases present in clay shown in Table (3.1).

Table (3.1): Range of chemical component present in clay (Walter Lee Sheppard, 1986)**.**

Property Chemical composition, wt.%	**Fireclay Brick**
SiO2	56.8 – 68.6
Al2O3	22.9 – 38.7
Fe2O3	0.8 – 3.0
K2O	1 – 3.2
TiO2	1 – 2.8
MgO	0.1 – 1.2
Na2O	0.2 – 0.5
CaO	0.01 – 0.8
Phases identified	
Quartz Trace	major
Mullite Minor	major
Cristobalite None	major
Hematite None	trace
Rutile None	trace
Amorphous Minor	major

3.2 Manufacturing process

Although modern technology has substantially changed the details of brick manufacturing, it is conceptually simple and consists of the following six operations, shown in Figure (3.1).

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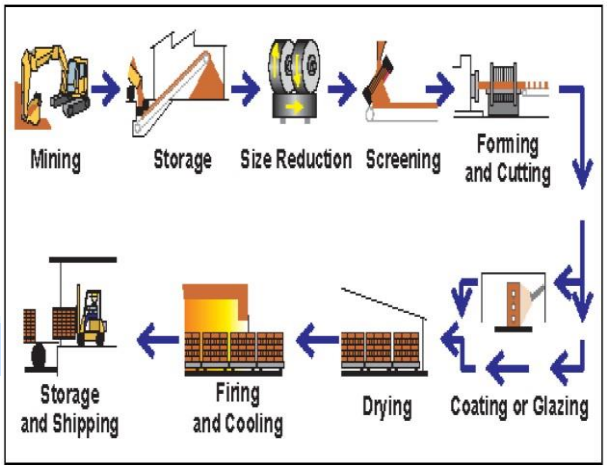

Figure (1):Diagrammatic Representation of Manufacturing Process (Brick Industry Association TN9, 2006).

3.2.1 Mining clay from the ground and storage of raw materials

Clays are mined in open pits with power equipment. Then the clay mixtures are transported to plant storage areas .Continuous brick production regardless of weather conditions is ensured by storing sufficient quantities of raw materials required for many days of plant operation.

3.2.2 Preparing raw materials

To break up large clay lumps and stones, the material is processed through size reduction machines before mixing the raw material (clay, sand, other additive materials).

3.2.3 Forming wet clay into the desired brick shape (green bricks)

Mixing, the first step in the forming process, produces a homogeneous, plastic clay mass. Usually, this is achieved by adding water to the clay in a pug mill, a mixing chamber with one or more revolving shafts with blade extensions. After pugging, the plastic clay mass is ready for forming. There are three principal processes for forming brick: stiff-mud, soft-mud and dry-press.

Stiff-Mud Process -In the stiff-mud or extrusion process , water in the range of 10 to 15 percent is mixed into the clay to produce plasticity. After pugging, the mixed clay goes through a de airing chamber that maintains a vacuum of 375 to 725 mm of mercury. De airing removes air holes and bubbles, giving the clay increased workability and plasticity, resulting in greater strength. Next, the clay is extruded through a die to produce a column of clay. As the clay column leaves the die, textures or surface coatings may be applied. An automatic cutter then slices through the clay column to create the individual brick . Cutter spacing's and die sizes must be carefully calculated to compensate for normal shrinkage that occurs during drying and firing.

Soft-Mud Process- The soft-mud or melded process is particularly suitable for clays containing too much water to be extruded by the stiff-mud process. Clays are mixed to contain 20 to 30 percent water and then formed into brick in molds. To prevent clay from sticking, the moldsare lubricated with either sand or water to produce “sand-struck” or “water-struck” brick. Brick may be produced in this manner by machine or by hand.

Dry-Press Process- This process is particularly suited to clays of very low plasticity. Clay is mixed with a minimal amount of water (up to 10 percent), then pressed into steel molds under pressures from 3.4 to 10.3 MPa by hydraulic or compressed air rams.

3.2.4 Drying green bricks

Wet brick from molding or cutting machines contain 7 to 30 percent moisture, depending upon the forming method. Before the firing process begins, most of this water is evaporate din dryer chambers at temperatures ranging from about 38 ºC to 204 ºC. The extent of drying time, which varies with different clays, usually is between 24 to 48 hours. Although heat may be generated specifically for dryer chambers, it usually is supplied from the exhaust heat of kilns to maximize thermal efficiency. In all cases, heat and humidity must be carefully regulated to avoid cracking in the brick. Drying process over time.

3.2.5 Firing dried bricks in a kiln

A. Aims of firing

Firing is a key process in the manufacture of ceramic products, as it controls many important properties of the finished ware. These include mechanical strength, abrasion resistance, dimensional stability, resistance to water and chemicals, and fire resistance.

B. Firing process

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Bricks are fired between 6 and 36 hours, depending upon kiln type and other variables, kiln is usually heated by natural gas or coal at a temperature higher than 900ºC. The kiln used in modern brick manufacturing plants is a long tunnel kiln. The firing of the clay bricks intends to improve durability through sintering, which can be seen as the bonding mechanism of clay particles.
Firing may be divided into five general stages:
1.Final Drying(Evaporating Free Water);
2.Dehydration
3.Oxidation
4.Vitrification And
5.Flashing Or Reduction Firing

All except flashing are associated with rising temperatures in the kiln. Although the actual temperatures will differ with clay or shale, final drying takes place at temperatures up to about 204 ºC, dehydration from about 149 ºC to 982 ºC, oxidation from 538 ºC to 982 ºC and vitrification from 871 ºC to 1316 ºC. The clay is fired at a fusing temperature between 871ºC to 1482ºC, depending on the type of clay. For building brick and face brick the temperature is controlled between 871ºC and 1200ºC, while the temperature ranges between 1315ºC and 1482ºC for fire brick. The key to the firing process is to control the temperature in the kiln so that incipient fusion is complete, and partial vitrification occurs but viscous fusion is avoided. The rate of temperature change must be carefully controlled and is dependent on the raw materials, as well as the size and coring of the brick being produced. Kilns are normally equipped with temperature sensors to control firing temperatures in the various stages. Near the end, the brick may be "flashed" to produce colour variations. After the temperature has peaked and is maintained for a prescribed time, the cooling Process begins. Cooling time rarely exceeds 5 to 24 hours depending on kilns type. Cooling is an important stage in brick manufacturing because the rate of cooling has a direct effect on colour.

3.3. Tests

3.3.1 Size variation

Clays shrink during both drying and firing; therefore, allowances must be made in the size of the finished product. Both drying shrinkage and firing shrinkage vary for different clays, usually falling within the following ranges:

- Drying Shrinkage 2 to 8 percent
- Firing Shrinkage 2.5 to 10 percent

Firing shrinkage increases with higher temperatures, which produce darker shades. When a wide range of colorsis desired, some variation between the sizes of the dark and light units is inevitable. To obtain products of uniform size, manufacturers control factors contributing to shrinkage. Because of normal variations in raw materials and temperature variations within kilns, absolute uniformity is impossible. Consequently, specifications for brick allow size variations.

Figure (2):Sieve analysis test.

3.3.2. Compressive strength

Both compressive strength is affected by properties of the clay ,method of manufacture and degree of firing. For a given clay and method of manufacture, higher compressive strength values and associated with higher firing temperatures. Although absorption and compressive strength can be controlled by manufacturing and firing methods, these properties depend largely upon the properties of the raw materials.

3.3.3. Water absorption

The creation of porosity leads to an increase in water absorption. The voids in the structure while immersed, are filled with water and, depending on the arrangement of the pores and the way they are linked together, this can penetrate the material more or less easily, with a preferential pathway. For water absorption, no standardized maximum value exists. However, a very large absorption capacity could be detrimental for the final brick as it may affect the durability of the product and its resistance to natural conditions. Water absorption expresses as a percent, the relationship of the mass of water absorbed to the mass of the dry specimen. Calculate the water absorption as follows:

$A = (M – D)\ D \times 100$

D: dried mass

M: saturated mass

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Figure(3):Water absorption test

4. CONCLUSION

1) Addition of waste glass showed an increase in strength, and decrease in C/B ratio.
2) Addition of glass tends to improve the quality of the bricks using lower firing temperature, thus significantly decreasing energy requirements.
3) The compressive strengths of specimens containing 10% coarse, 15% coarse, and 15% fine waste glass increased significantly, by as much as 104% over that of the control. Percentage of waste glass was the most influential variable in the increase of the compressive strength.
4) The particle size of waste glass powder was very important and had a significant effect on the properties of fired clay brick; the finer was the particle size, the higher was the compressive strength.
5) The firing shrinkage, bulk density and compressive strength of the fired clay bricks increased with increasing amount of waste glass content up to 30% and firing temperature up to 1100°C.

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Effect of Seawater on Mixing and Curing of Concrete

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ABSTRACT

Several billion tons of water is annually used in mixing, curing and cleaning around the world, in concrete industry. As there is a scarcity of fresh drinking water around the world; hence there is a need to save fresh water and hence possibilities of using seawater as mixing as well as curing water should be investigated seriously.

In this research work, the effect of seawater on the properties of concrete is investigated. For this, concrete cubes were casted for a mix design of M-40, 1:1.30:2.63 by weight and 0.5 water-cement ratio was considered

Keywords— *Seawater, Concrete Cubes, Flexural Strength, Compressive Strength, Curing, Mixing.*

1.INTRODUCTION

A large number of structures are exposed to sea water either directly or indirectly. Therefore, this project work seeks to investigate the effect of sea water during mixing and curing on compressive strength of concrete. The necessity of this research work is that, commonly water used for concreting is water from boreholes which contains number of salts and hence we are testing it for extreme case i.e. sea water case.

Now-a-days, as a progress of development, lots of engineering construction including high rise building, embankment walls, bridge etc. is going on along the coastal belt of the country. In coastal areas, there has always been a deficiency of plain water as the available water is affected by sea salts.

In the near future, fresh water will be very difficult to get and scarce. It is said that in 2025 half of the mankind will live in the areas where fresh water is not enough. Also, UN and WMO are predicting 5 billion people will be in short of even drinking water. Also, in the present, there are some areas where sea water or chloride contained sand are used as mixing water with or without intension.

So it is difficult to arrange plain water for construction works in such location. Also it is economical to use sea water that is available near the construction site instead of plain water to be transported from other areas/sources. But sea water contains large amounts of sea salts, which may have adverse effect on the properties of concrete. So it is required to investigate the effect of sea salts on strength properties of different types of concrete while using sea water for mixing and curing of concrete.

2.LITERATURE REVIEW

A. "Effect of Salt Water On Compressive Strength of Concrete"-Dr. Nagabhushana (2017) [1] tells us that there is increase in strength of cubes casted using salt water and cured using fresh water as compared to those casted and cured in fresh water and sea water.

From the further research they concluded that if the water contains less amount of salts, then there is no reduction in strength. Hence, this water can be used for casting. If reinforcement is needed to be provided, then the structures should be provided with large cover to protect it from corrosion.

From the results it is clear that, there was a marginal increase in the of concrete cubes which were casted and cured with fresh water as compared with the concrete cubes casted and cured with sea water. The rate of the strength gain in fresh water cubes is slow as compared with the salt water cubes. Although, the compressive strength of the concrete cubes which were casted using various salt contents shows slightly higher values than the cubes casted with fresh water. The surfaces of cubes casted and cured using sea water are darker in colour as compared to other cubes. Based on the result following conclusion can be drawn: -

- The strength of concrete cubes casted and cured in fresh water at 3 and 7 days was found to be 24.96 N/mm2 and 27.88 N/mm2.
- The strength of concrete cubes casted and cured in sea water at 3 and 7 days was found to be 22.43 N/mm2 and 27.31 N/mm2 respectively

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B. "Suitability of Sea Water On Curing and Compressive Strength of Structural Concrete"-Md. Moinul Islam (2011) [2] tells us that Concrete specimens made by using both plain and sea water as mixing water showed change in color from dark gray to whitish gray when exposed to sea water.

Concrete specimens made by using both plain and sea water as mixing water showed change in color from dark gray to whitish gray when exposed to sea water. On the other hand, specimens kept in plain water showed almost no color change.

It is seen that, the strength increases with the increase of exposure period for all the concretes. Almost all the concrete specimens exposed to sea water environment showed rapid increase in early strength as compared to plain water cured concrete.

Strength deterioration of concrete is observed to vary with the grade of concrete. The reduction of strength is seen to be higher for the lower grade concrete. So it can be concluded that relatively higher strength concrete showed better resistance against strength deterioration as compared to lower strength concrete.

On the other hand, the rapid gain in the early strength of sea water made concrete in sea water may be due to the accelerating effects of some of the sea salts originally introduced during the mixing of concrete. Sea water containing salts like NaCl, K2SO4 which was used in making concrete, cause a more rapid dissolution of compounds of cement particularly tricalcium silicate in water and hence facilitates more rapid hydration of concrete.

C. "A Reviev on Strength of Concrete in Seawater"– Akshat Dimri (2015) [3] tell us that There is a need of higher research to be carried out to study the effect of seawater curing in concretes. Also seawater changes its normality in billions of years, so this effect due to change in normality should also be checked experimentally. Further, there is need to check the curing effect of seawater in high strength concrete. The factors which affect the strength of concrete in marine environment are-Corrosion of the metallic bars caused by chloride ions, damage of the cement paste carried out by sulphate attack, and swelling disruption of concrete if alkali-reactive aggregates are present in the concrete.

They affirm the importance of controlling the water cement ratio and permeability of concrete in maximizing concrete durability. The study confirmed the importance of proper ratio of water to total cementitious materials and the resulting permeability as the primary factors determining performance in outdoor exposures. Furthermore, the use of low water cement ratio provides the greatest resistance to sulphate attack on concrete, and the composition of Portland cement is less important as it relates to performance in sulphate solutions.

In the case of the low water-cement ratio such as 0.27 or the use of proper mineral admixture such as BFS, the steel corrosion in concrete mixed with seawater can be avoided even in the existing reinforced concrete structures.
Following methods are recommended to prevent corrosion of reinforcement bars:

- Anti-chloride admixtures can be used in concrete production to avoid sea water effect on concrete
- Investigation can be extended for higher grade of concrete (M40, M50, etc.)
- Outer covering of un-plasticized poly vinyl chloride (upvc) tube may also be used to safeguard reinforcement against sea water.

D. "An Experimental Review of Effect of Sea Water On Compressive Strength of Concrete "Swati Maniyal (2015) [4] tell us that series of experiments were conducted on M-20 and M-25 grade of concrete. From the results it can be said that, there was an increase in the of compressive strength concrete cubes at early ages which were cast and cured with sea water as compared with the concrete cubes cast and cured with potable water. The strength increases by 4-6% at 7 days and 9-11% at 14 days.

They concluded from the test results and discussions and are confident to safely use sea water as mixing water. They also concluded that there is no reduction in compressive strength due to mixing and curing of sea water, whereas the average compressive strength arrived for designated concretes are more than the target strength.

The concrete cast with sea water and cured with sea water increases the 28 days' compressive strength dramatically and linearly beyond that obtained when cast in fresh water and cured in fresh water. They performed series of experiments on M-30 grade and said that there is marginal increase in the strength of cubes cast and cured in salt water as compared to those of cast and cured in fresh water at all ages of curing and concluded that there is no reduction in the strength if we use salt water casting and curing the concrete.
From their research they concluded the following statements:

- The average characteristic compressive strength obtained for concrete cubes using potable water and sea water was 32.062N/mm^231.747N/mm^2 respectively for M-20 grade of concrete.
- The average characteristic compressive strength obtained for concrete cubes using potable water and sea water was 37.8 N/mm^2 36.533 N/mm^2 respectively for M-25 grade of concrete.

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3.METHODOLOGY

1) Collection of Seawater Sample: Sea water (SW) is a complex solution of many salts containing living matter, suspended silt, dissolved gases and decaying organic material. The primary chemical constituents of seawater are the ions of chloride, sodium, magnesium, calcium and potassium. We will collect sea water sample from Mumbai coastal areas.

2) Mix design of M-40 grade concrete: According to "Evaluation of M35 and M40 grades of concrete by ACI, DOE, USBR and BIS methods of mix design" - Sharandeep Singh (2015) the mix design for M-40 grade of concrete on the basis if BIS (Bureau of Indian Standards) is as follows:

Contents of M-40 Grade Concrete

WC	Water Content	Cement Content	Fine Aggregates	Coarse Aggregates
0.38	164	430	533.1	1283.55

3) Testing of Sea water: Preliminary tests will be carried out on the samples. The physio-chemical analyses were performed on sea water in order to determine their chemical constituents like content of NaCl, pH of sea water, total percentage of salinity of sea water.

Preparation of Sample: Batching was done by weighing the materials for the concrete specimen using a Manual Weighing Balance. Mixing was done manually on a clean concrete floor and the materials were thoroughly mixed in the dry state twice, after which water was added gradually while thoroughly mixing the concrete. Mixing of the concrete specimen continued by turning the mixture of cement, water and aggregates until the concrete was uniform in colour and consistency.

4) This specimen is then further used for tests of fresh concrete

5) Slump Cone Test: The tool typically has an internal diameter of 100 millimetres (3.9 in) at the top and of 200 millimetres (7.9 in) at the bottom with a height of 305 millimetres (12.0 in). The cone is placed on a hard non-absorbent surface.

This cone is filled with fresh concrete in three stages. Each time, each layer is tamped 25 times with a 2 ft. (600 mm)-long bullet-nosed metal rod measuring 5/8 in (16 mm) in diameter. At the end of the third stage, the concrete is struck off flush with the top of the mould.

The mould is carefully lifted vertically upwards, so as not to disturb the concrete cone. The concrete then slumps (subsides). The slump of the concrete is measured by measuring the distance from the top of the slumped concrete to the level of the top of the slump cone

The slumped concrete takes various shapes and according to the profile of slumped concrete, the slump is termed as true slump, shear slump or collapse slump. If a shear or collapse slump is achieved, a fresh sample should be taken and the test repeated. A collapse slump is an indication that the mix is too wet. Only a true slump is of any use in the test.

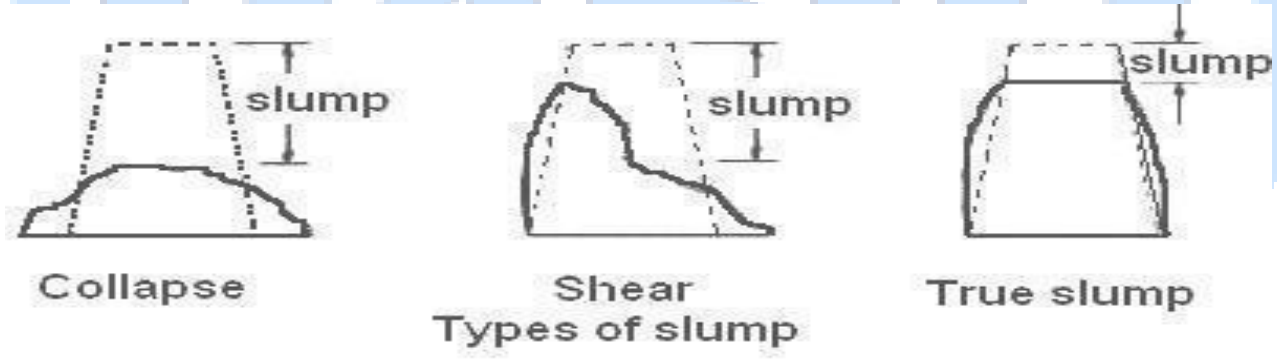

Fig 1: Types of Slump Cone

6) Casting and Curing of Concrete: The test cubes were cast inside steel mould of size 150x150x150(mm) with the mould and it's based clamped together. The inside of the mould was smear with oil so as to enhance easy removal of

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the set concrete. The fresh concrete mix for each batch was fully compacted by tamping rods, to remove trapped air, which can reduce the strength of the concrete. Concrete cubes of 150x150x150(mm) were cast and cured in two batches. Half of the cubes were made using fresh water and the remaining half cubes were made using sea water.

The cubes from the two batches were further divided into two; half cubes of the specimens from concrete cast with fresh water were cured in fresh water and the remaining half cubes were cured in sea water for 3, 7 and 28 respectively. The specimens were cured at room temperature in the curing tanks. Similar curing method was applied for concrete cast with sea water using the same curing days and environmental conditions

7) Compressive Strength of Concrete: The compressive strength is taken as maximum compressive load resisted by per unit area.

- Remove the specimen from water after specified curing time and wipe out excess water from the surface.
- Take the dimension of the specimen to the nearest 0.2m.
- Clean the bearing surface of the testing machine
- Place the specimen in the machine in such a manner that the load shall be applied to the opposite sides of the cube cast.
- Align the specimen centrally on the base plate of the machine.
- Rotate the movable portion gently by hand so that it touches the top surface of the specimen.
- Apply the load gradually without shock and continuously at the rate of 140 kg/cm^2/minute till the specimen fails.
- Record the maximum load and note any unusual features in the type of failure.

Fig 2: A Concrete cube undergoing compressive strength test

8) Flexural Strength of Concrete: Flexural strength is one measure of the tensile strength of concrete. It is a measure of an unreinforced concrete beam or slab to resist failure in bending. It is measured by loading 6 x 6 inch (150 x 150-mm) concrete beams with a span length at least three times the depth. The flexural strength is expressed as Modulus of Rupture (MR) in psi (MPa) and is determined by standard test methods ASTM C 78 (third-point loading) or ASTM C 293 (centre-point loading).

Fig 3: A Concrete beam undergoing flexural bending

9) Split Tensile Test: The splitting tensile strength is calculated using the formula Tsp = 2P/ pi DL, Where P = applied load

D = diameter of the specimen L = length of the specimen Therefore, P = Tsp x pi DL/2, Expected load = P x f.s

Fig 4: A Concrete cylinder undergoing Split Tensile Test

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4. CONCLUSION

From the above referred research work, we observed the following points:

- For this, the concrete cubes will be casted for a mix design of 1:2:4 by weight and 0.6 water-cement ratio was considered.
- The salt of various proportions like (25, 30, 35) grams/ litre of water was mixed and cured with fresh water.
- Some of the cubes were casted and cured with fresh water and other cubes were casted and cured using sea water. The concrete cubes were cured for 7,14,28 days.

From the research these are the results we observed:

- It was observed that concrete cast and cured with seawater increases gradually for all curing days beyond the strength of concrete cast and cured with fresh water.

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ABSTRACT

The objective of this research work was to produce a carbon dioxide emission free cementious material. The geopolymer concrete is such a vital and promising one. In this present study the main limitations of fly ash based geopolymer concrete are slow setting of concrete at ambient temperature and the necessity of heat curing are eliminated by addition of Ground Granulated Blast Furnace Slag (GGBS) powder which shows considerable gain in strength. The Alkaline liquids used in this study for the polymerization process are the solutions of sodium hydroxide (NaoH) and sodium silicate (Na2Sio3) solution was taken to prepare the mix.

Concrete is the world"s most versatile, durable and reliable construction material. Next to water, concrete is the most used material, which required large quantities of Portland Cement. Ordinary Portland Cement production is the second only to the automobile as the major generator of carbon di oxide, which polluted the atmosphere. In addition to that large amount energy was also consumed for the cement production. Hence, it is inevitable to find an alternative material to the existing most expensive, most resource consuming Portland Cement. Geopolymer concrete is an innovative construction material which shall be produced by the chemical action of inorganic molecules. Fly Ash, a by- product of coal obtained from the thermal power plant is plenty available worldwide. Flyash is rich in silica and alumina reacted with alkaline solution produced aluminosilicate gel that acted as the binding material for the concrete. It is an excellent alternative construction material to the existing plain cement concrete. Geopolymer concrete shall be produced without using any amount of ordinary Portland cement.

Keywords— *Geopolymer concrete,Flyash,GGBS,sodium hydroxide,Etc.*

1. INTRODUCTION

The concrete industry is the India"s second highest payer of Central Excise and Major contributor to GDP. With infrastructure development growing and the housing sector booming, the demand for concrete is also bound to increase. However, the concrete industry is extremely energy intensive. After aluminium and steel, the manufacturing of Portland concrete is the most energy intensive process as it consumes 4GJ per tonne of energy. After thermal power plants and the iron and steel sector, the Indian concrete industry is the third largest user of coal in the country. In 2003-04, 11,400 million kWh of power was consumed by the Indian concrete industry. The concrete industry comprises 130 large concrete plants and more than 300 mini concrete plants. The industry"s capacity at the beginning of the year 2008-09 was about 198 million tones. The concrete demand in India is expected to grow at 10% annually in the medium term buoyed by housing, infrastructure and corporate capital expenditures. Considering an expected production and consumption growth of 9 to 10 percent, the demand-supply position of the concrete industry is expected to improve from 2008-09 onwards. Alternative but promising gainful utility of FA and GGBS in construction industry that has emerged in recent years is in the form of Geopolymer concrete concretes" (GPCCs), which by appropriate process technology utilize all classes and grades of FA and GGBS; therefore there is a great potential for reducing stockpiles of these waste mater.
The use of alkali materials and aluminosilicates to form a concrete is broadly referred to as 'geopolymer' technology, coined by French researcher Davidovits, but is also known as alkali-activated concrete and inorganic polymer concrete in various parts of the world. Geopolymer technology provides comparable performance to traditional concreteitious binders, but with the added advantage of significantly reduced Greenhouse emissions, increased fire and chemical resistance and waste utilisation.

The use of geopolymers in modern industrial applications is a recent development, becoming increasingly popular due to its intrinsic environmental and technical benefits.

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Although Zeobond is the first mover and world leader in modern large-scale commercial geopolymer production, industrial geopolymer applications date back half a century in some East European high-rise buildings.

Geopolymers were first trialed in some concrete applications by Glukhovsky and co-workers in the Soviet Union post-world war two, known then as 'soil-concretes'. Numerous structures have been constructed in the intervening years though no commercial entities have carried this through to industrial scale. Zeobond staff members have analysed these structures, now over 50 years old, focusing on their inherent durability.

The use of alkali materials and aluminosilicates to form a concrete is broadly referred to as 'geopolymer' technology, coined by French researcher Davidovits, but is also known as alkali-activated concrete and inorganic polymer concrete in various parts of the world. Geopolymer technology provides comparable performance to traditional concreteitious binders, but with the added advantage of significantly reduced Greenhouse emissions, increased fire and chemical resistance and waste utilisation.
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The use of geopolymers in modern industrial applications is a recent development, becoming increasingly popular due to its intrinsic environmental and technical benefits.

1.1 OBJECTIVES

- To collect the materials according to their specifications as per the requirement for design of concrete.
- To conduct physical test on materials and chemicals test are to be conducted on the materials like fly ash etc.

2.LITERATURE REVIEW

Before giving details regarding research methodology used in the study, it is appropriate to present a brief overview of the research articles, case studies and books written on this particular topic.

- Review of literature helps a researcher to get acquainted with his selected research problem
- It provides some guidelines in selecting a proper research methodology.
- It is also helpful in finding out the research gaps in the existing literature.
- This will help the researcher in fine-tuning his research problem and methodology.
- A literature review helps in creating a sense of rapport with readers so they can trust that you have done your homework.
- It helps into avoid incidental plagiarism. One can tailor research in such a way that it is not replicating someone‟s original idea.
- Helps in gaining an impression about the important aspects of the research study and identify data sources that other researchers have used.
- Learn how research findings are discussed and presented in your research topic.

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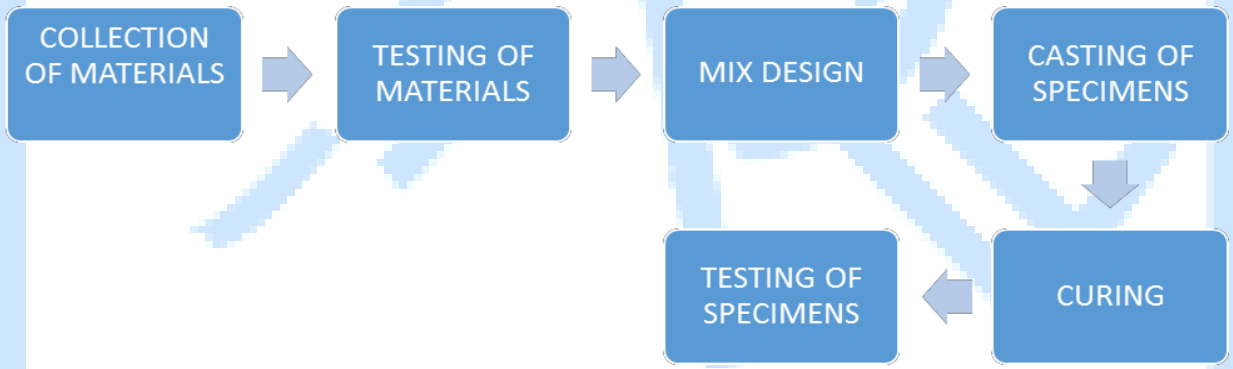
2.1 "Setting Time, Strength, and Bond of High-Calcium Fly Ash Geopolymer Concrete"PattanapongTopark-Ngarm; PrinyaChindaprasir; and VanchaiSata (IJRET) (2014) [2] In this paper, setting time, strength and bond of high-calcium fly ash geopolymer concrete were investigated. The high-calcium fly ash was from Mae Moh power plant in northern Thailand. Both sodium silicate solution and sodium hydroxide solution were used as alkali activators in every mix. Sodium hydroxide solution with 10 M, 15 M, and 20 M concentrations, sodium silicate to sodium hydroxide ratios of 1.0 and 2.0, alkaline liquid to fly ash ratio of 0.5 and two curing regimes viz., heat curing at 60 ± 2°C for 24 h and room temperature curing at 23±2°C were used. The results indicated that fresh geopolymer concrete had short setting time of 28–58 min due to the presence of high calcium content of fly ash. In general, strengths and modulus of elasticity increased with the increase in NaOH concentration. For compressive strength, the optimum Na2O content was around 12% of fly ash. The high-strength geopolymer concrete with 28-day compressive strength of 54.4 MPa was obtained for mix with 15M NaOH. The moduli of elasticity of geopolymer concrete were related to the compressive strengths and comparable to those of Portland cement concrete. The tensile splitting strength and bond strength were also related to the compressive strength and the values were higher than those of Portland cement concrete. In particular, the bond strengths were significantly higher than those given by the current design code.

2.1.1 METHODOLOGY AND MATERIALS



We have collected the materials from nearby sellers and also have conducted the various test for determining the physical properties. We will be using concrete of M30 grade as per the mix design. The specifications of the specimens to be casted will be as follows:

Cubes150mm*150mm*150mm,Cylinder200mm*100mm,100mm*100mm*500mmBeams were cast out of which 18 cubes each were used to determine the compressive strength and 18 cylinders each were used to determine the split tensile strength of M30 grades of Geopolymer Concrete and Beams are used to determine the flexure strength. All geopolymer concrete were made with mix design procedure using IS 10262-2009 . It is recommended to have necessary precaution on workers because of acidic nature of the concrete. The aggregates were prepared in saturated-surface-dry (SSD) condition. Geopolymer concrete can be manufactured by adopting the conventional techniques used in the manufacture of Portland cement concrete.

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Sr.no.	Specimen	Dimension (mm)	No. of Specimen	Curing period
1	Cubes	150mm*150mm*150mm	18	7 and 28 days
2	Cylinder	200mm*100mm	18	7and 28 days
3	Beams	100mm*100mm*500mm	3	After 28days

3.2 Mix Design for Concrete Mix

The standard mix design for M-30 grade concrete is taken for preparation of cubes for testing of compressive strength in the laboratory as per prescribed method.
Cement = 315kg/m3,flyash=79kg/m3,Water=197kg/m3,Fine aggregate =720kg/m3,Coarse aggregate =1121kg/m3,water-cement Ratio =0.50.

3. RESULT

- And as per the IS specifications we have also conducted various physical tests on the materials viz. cement, fine aggregate, coarse aggregate, and Standard mix of M30 grade Concrete we have prepared and done the compressive strength test of prepared standard size cube and we have also obtained the results.

Sr.No	ID mark of specimen	Age of Specimen (Days)	Cross-sectional area	Weight,(kg)	Maximum load,KN	Crushing strength,N/mm2
1	Cube	7	22846.7	8.496	547.97	24.0
2	Cube	7	22820.2	8.943	587.16	25.7
3	Cube	7	22796.1	8.643	539.54	23.7
Average value=24.5N//mm2						

4. CONCLUSIONS

- We have collected the materials of specific requirements as per the need of our project from the nearby sellers.

- And as per the IS specifications we have also conducted various physical tests on the materials viz. cement,fine aggregate, coarse aggregate. And we have also obtained the result

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5. ACKNOWLEDGMENT

We as the author of this paper are thankful to our project guide Prof, Miss. Purva P. Awari faculties in the department of civil engineering of Viva Institute of Technology for their constant encouragement and valuable guidance.

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DESIGN OF WASTE-WATER TREATMENT PLANT ON MITHI RIVER

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ABSTRACT

This project report entitled "Design Of Waste-Water Treatment Plant On Mithi River" By Deeksha Naik, Kumar Vellakaran, Swapnil Shinde And Prithviraj Sawant Is Approved For The Degree Of Civil Engineering.

Keywords— *Electro Flocculation,Coagulation,Wastewater Treatment,Primary Treatment,Secondary Treatment*

1. INTRODUCTION

Waste-water treatment consists of different processes which protect the environment and human health through cleansing the water pollutants. In the past people used to have different methods for this treatment which has been passed over or developed through history, due to the advancement of technology and the growing needs of society. Wastewater treatment is a vital process in the modern industrial world, alongside this, more than 97% of water is stored in Saline (Oceans) and only 3% in fresh water, however only less than 1% is available for consumption.. As time goes by, there will be population growth for which the government would have to provide more useable water for society. Wastewater treatment uses chemical, physical, and biological processes to cleanse wastewater in order to protect the environment and public health.. Wastewater is the water which has been released to the environment that is defined as a combination of the water plus wastes that have been added to the water from a variety of uses, such as industrial, commercial, residences and there are two sources which release the wastewater into the environment.MITHI river in Mumbai city, is a confluence of tail water discharges of Powai and Vihar lakes. Mithi river originates at Powai and meets Arabian sea at Mahim Creek flowing through residential and industrial complexes of Powai, Saki Naka, Kurla and Mahim over a distance of about 15 km. This river is treated like an open drain by the citizens who discharge raw sewage, industrial waste and garbage unchecked. Besides this, illegal activities of washing of oily drums, discharge of unauthorized hazardous waste are also carried out along the course of this river. The organic waste, sludge and garbage dumping has reduced carrying capacity of the Mithi river. The water with mixture of sewage and Industrial waste is a threat to marine life and the river is showing sign of total loss of such support system. Therefore it is necessary to design a waste-water treatment plant and implement the conditions prevailed by the Indian Government for maintaining a cleaner eco-system.Although this assignment paper explains the methods of designing a wastewater treatment plant, the factors which have to be considered before and during the design, relation between these factors and finally answers to some common questions in this field.

2.METHODOLOGY

SEWAGE TREATMENT

Sewage treatment is the process of removing contaminants from waste water, primarily from household sewage.it includes physical, chemical and biological process to remove this contaminants and produce environmentally safer treated waste-water (or treated effluents). A byproduct of sewage treatment is usually a semisolid waste or slurry, called sewage sludge that has to undergo further treatment before being suitable for disposal or land application.

Sewage treatment may also be referred as waste-water treatment, although the latter is a broader term which can also be applied to purely industrial waste-water. For most cities , which has usually received the pre-treatment at the factories themselves to reduce the pollutant load. If the sewer system is a combined sewer then it will also carry urban run-off (storm water) to the flow added by gravity and pumps. The first part of filtration of sewage typically includes a bar screen to filter solids and large objects which are then collected in dumpsters and disposed off in landfills.

SEWAGE TREATMENT PROCESS

Sewage treatment generally includes three stage, called primary treatment, secondary treatment and tertiary treatment.

Primary treatment consist of temporarily holding the sewage in a quiescent basin where heavy solids can settle to the bottom while oil, grease and lighter solids float to the surface. The settled and floating materials are removed and the remaining liquid may be discharged or subjected to secondary treatment. Some sewage treatment plants that are connected to a combined sewer system have a bypass arrangement after the primary treatment unit. This means that during a very heavy rainfall events, the secondary and tertiary treatment system can be bypassed to protect them from hydraulic overloading, and the mixture of sewage and storm-water only receives primary treatment.

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Secondary treatment removes dissolved and suspended biological matter. Secondary treatment if typically performed by indigenous, water-borne micro-organisms in a managed habitat. Secondary treatment may require a separation process to remove the micro-organisms from the treated water prior to discharge or tertiary treatment.

Tertiary treatment is sometimes defined as anything more than primary and secondary treatment in order to allow injection into a highly sensitive or fragile eco-system (estuaries, low flow rivers, coral reefs,…). Treated water is sometimes disinfected chemically or physically (for eg.:by lagoons and micro filtration) prior to discharge into a stream, river, bay, lagoon or wet land, or it can be used for the irrigation a golf coarse, green way or park. If it is sufficiently clean, it can also be used for ground water recharge or agricultural purposes.

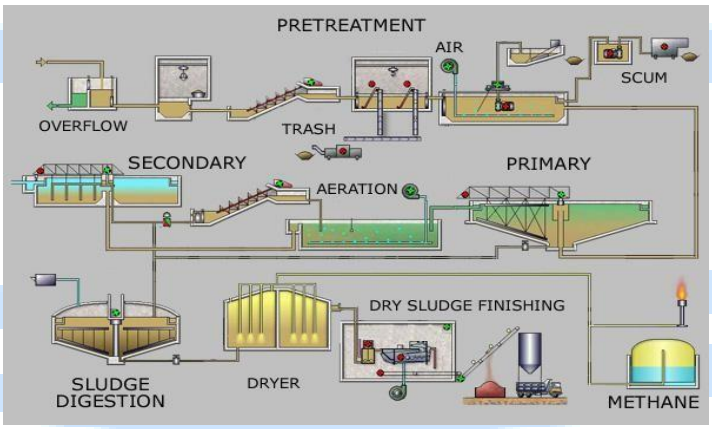

Fig no.:01 Simplified process diagram for typically large scale treatment plant

Pretreatment

Pretreatment removes all materials that can be easily collected from the raw sewage before they damage or clog the pumps and sewage lines of primary treatment clarifiers. Objects commonly removed during pretreatment include trash, tree limbs, leaves, branches, and other large objects.The influent in sewage water passes through a bar screen to remove all large objects like cans, rags, sticks, plastic packets etc. carried in the sewage stream. This is most commonly done with an automated mechanically raked bar screen in modern plants serving large populations, while in smaller or less modern plants, a manually cleaned screen may be used. The raking action of a mechanical bar screen is typically paced according to the accumulation on the bar screens and/or flow rate. The solids are collected and later disposed in a landfill, or incinerated. Bar screens or mesh screens of varying sizes may be used to optimize solids removal. If gross solids are not removed, they become entrained in pipes and moving parts of the treatment plant, and can cause substantial damage and inefficiency in the process.

Grit removal

Pretreatment may include a sand or grit channel or chamber, where the velocity of the incoming sewage is adjusted to allow the settlement of sand, grit, stones, and broken glass. These particles are removed because they may damage pumps and other equipment. For small sanitary sewer systems, the grit chambers may not be necessary, but grit removal is desirable at larger plants. Grit chambers come in 3 types: horizontal grit chambers, aerated grit chambers and vortex grit chambers. The process is called sedimentation.

Flow equalization

Clarifiers and mechanized secondary treatment are more efficient under uniform flow conditions. Equalization basins may be used for temporary storage of diurnal or wet-weather flow peaks. Basins provide a place to temporarily hold incoming sewage during plant maintenance and a means of diluting and distributing batch discharges of toxic or high-strength waste which might otherwise inhibit biological secondary treatment (including portable toilet waste, vehicle holding tanks, and septic tank pumpers). Flow equalization basins require variable discharge control, typically include provisions for bypass and cleaning, and may also include aerators. Cleaning may be easier if the basin is downstream of screening and grit removal.

Fat and grease removal

In some larger plants, fat and grease are removed by passing the sewage through a small tank where skimmers collect the fat floating on the surface. Air blowers in the base of the tank may also be used to help recover the fat as a froth. Many plants, however, use primary clarifiers with mechanical surface skimmers for fat and grease removal.

Primary Treatment

In the primary sedimentation stage, sewage flows through large tanks, commonly called "pre-settling basins", "primary sedimentation tanks" or "primary clarifiers". The tanks are used to settle sludge while grease and oils rise to the surface and are skimmed off. Primary settling tanks are usually equipped with mechanically driven scrapers that continually drive the collected sludge towards a hopper in the base of the tank where it is pumped to sludge treatment

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facilities. Grease and oil from the floating material can sometimes be recovered for saponification (soap making).

Secondary treatment

Secondary treatment is designed to substantially degrade the biological content of the sewage which are derived from human waste, food waste, soaps and detergent. The majority of municipal plants treat the settled sewage liquor using aerobic biological processes. To be effective, the biota require both oxygen and food to live. The bacteria and protozoa consume biodegradable soluble organic contaminants (e.g. sugars, fats, organic short-chain carbon molecules, etc.) and bind much of the less soluble fractions into floc.

Secondary treatment systems are classified as fixed-film or suspended-growth systems.

Fixed-film or attached growth systems include trickling filters, constructed wetlands, bio-towers, and rotating biological contactors, where the biomass grows on media and the sewage passes over its surface. The fixed-film principle has further developed into Moving Bed Biofilm Reactors (MBBR) and Integrated Fixed-Film Activated Sludge (IFAS) processes. An MBBR system typically requires a smaller footprint than suspended-growth systems.

Suspended-growth systems include activated sludge, where the biomass is mixed with the sewage and can be operated in a smaller space than trickling filters that treat the same amount of water. However, fixed-film systems are more able to cope with drastic changes in the amount of biological material and can provide higher removal rates for organic material and suspended solids than suspended growth systems. Some secondary treatment methods include a secondary clarifier to settle out and separate biological floc or filter material grown in the secondary treatment bioreactor.

Tertiary treatment

The purpose of tertiary treatment is to provide a final treatment stage to further improve the effluent quality before it is discharged to the receiving environment (sea, river, lake, wet lands, ground, etc.). More than one tertiary treatment process may be used at any treatment plant. If disinfection is practised, it is always the final process. It is also called "effluent polishing."

Filtration

Sand filtration removes much of the residual suspended matter. Filtration over activated carbon, also called carbon adsorption, removes residual toxins.

Lagoons or ponds

Lagoons or ponds provide settlement and further biological improvement through storage in large man-made ponds or lagoons. These lagoons are highly aerobic and colonization by native macrophytes, especially reeds, is often encouraged. Small filter-feeding invertebrates such as Daphnia and species of Rotifera greatly assist in treatment by removing fine particulates.

Biological nutrient removal

Biological nutrient removal (BNR) is regarded by some as a type of secondary treatment process, and by others as a tertiary (or "advanced") treatment process.Wastewater may contain high levels of the nutrients nitrogen and phosphorus. Excessive release to the environment can lead to a buildup of nutrients, called eutrophication, which can in turn encourage the overgrowth of weeds, algae, and cyanobacteria (blue-green algae). This may cause an algal bloom, a rapid growth in the population of algae. The algae numbers are unsustainable and eventually most of them die. The decomposition of the algae by bacteria uses up so much of the oxygen in the water that most or all of the animals die, which creates more organic matter for the bacteria to decompose. In addition to causing de-oxygenation, some algal species produce toxins that contaminate drinking water supplies. Different treatment processes are required to remove nitrogen and phosphorus.

Nitrogen removal

Nitrogen is removed through the biological oxidation of nitrogen from ammonia to nitrate (nitrification), followed by de-nitrification, the reduction of nitrate to nitrogen gas. Nitrogen gas is released to the atmosphere and thus removed from the water.De-nitrification requires anoxic conditions to encourage the appropriate biological communities to form. It is facilitated by a wide diversity of bacteria. Sand filters, lagooning and reed beds can all be used to reduce nitrogen, but the activated sludge process (if designed well) can do the job the most easily.

Sampling

The purpose of this procedure is to document both general and specific procedures, methods and considerations to be used and observed when collecting wastewater samples for field screening or laboratory analysis.Wastewater sampling studies focus primarily on collecting wastewater samples of the influent or effluent at domestic and non-domestic facilities. Sampling activities are usually conducted for National Pollutant Discharge Elimination System (NPDES) compliance, compliance assistance, civil and criminal investigations, and water quality studies. Collection of wastewater samples is necessary in order to obtain reliable data that can support compliance or enforcement activities. The main considerations in developing a wastewater sampling strategy are:

- Type of study (Compliance Sampling Inspection, Diagnostic Evaluation, etc.).

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• Regulated or target pollutants in the wastewater stream to be sampled.
• Selection of the projected sampling locations to satisfy the study objectives.
• Quality control criteria of the parameters to be sampled (oil and grease samples need to be collected as grab samples, trip blanks are taken into the field for the collection of samples for volatile organic compound analyses, etc.). Depending on the sample analysis the following treatment procedure are planned. The sampling analysis gives readings about the characteristics of the waste-water. The characteristics of waste-water are further divided into different types, they are as follows:

Physical parameters

The physical characteristics of wastewater include those items that can be detected using the physical senses. They are temperature, color, odor, and solids.

Temperature,Color,Odour **,**Total suspended solids,**Turbidity**

Chemical parameters

Sewage contains both organic and inorganic chemicals in addition to various gases like H_2S, CO_2, CH_4, and NH_3 etc. that are formed due to the decomposition of sewage. The chemical characteristics of wastewater of special concern are pH, DO (dissolved oxygen), oxygen demand, nutrients, and toxic substances.

PH,Dissolved oxygen (DO),Oxygen Demand,BOD(Biochemical oxygen demand),COD(Chemical oxygen demand),Toxic Chemicals

3.Details on Mithi River

Topography of Mithi River

Originating at Powai, Mithi river flows through Saki Naka, Safed Pool, around Santacruz airstrip, passing through thickly populated and industrial area like Jarimari, Bail Bazar, old airport road, Kalina (CST road), Vakola, Bandra Kurla Complex, Dharavi and ends at Mahim creek. It serves as combined sewer for the area carrying sewage as well as storm water to sea. River bed is narrow in the initial stretch and is about 10 meters wide but at Bandra Kurla complex it is much wider. The river passes through congested residential colonies including hutments, which let out raw sewage in the river and also throw garbage in it. Due to this reason, the river bed is full of sludge, garbage and vegetation growth like Hyacinth in many parts as can be seen from photographs enclosed for various locations. Cattle sheds in areas like Bail bazar, Jarimari, Andheri Kurla road etc. contribute animal waste. At CST road junction and on the road from Lal Bahadur Shastri Marg (LBS Marg) to Santacruz airport there are many unauthorized industries like Oil refiners, Barrel cleaners, scrap dealers etc who dump sludge, oil, effluent and garbage in the river.

In order to assess water quality of Mithi river, the topography of area through which river flows was studied.

Fig no.:02 Growth of hyacinth seen in the Mithi River

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4. Use of new and advanced treatment techniques

Electro-Flocculation and Coagulation

Coagulation and flocculation are traditional methods for the treatment of polluted water. Electrocoagulation presents a robust novel and innovative alternative in which a sacrificial metal anode doses water electrochemically. This has the major advantage of providing active cations required for coagulation, without increasing the salinity of the water.Electrocoagulation is a complex process with a multitude of mechanisms operating synergistically to remove pollutants from the water. A wide variety of opinions exist in the literature for key mechanisms and reactor configurations. A lack of a systematic approach has resulted in a myriad of designs for electro-coagulation reactors without due consideration of the complexity of the system. A systematic, holistic approach is required to understand electrocoagulation and its controlling parameters.Coagulation and flocculation are traditional methods for the treatment of polluted water. In these processes, coagulating agents (e.g. alum or ferric chloride) and other additives (e.g. polyelectrolytes) are dosed to produce larger aggregates, which can be separated physically. This is a multi-stage process that requires considerable land area and a continual supply of chemicals. A more cost-effective method to clean a wide range of polluted water, on-site, and with minimal additives, is required for sustainable water management. Electrocoagulation treatment of water fits this description.Electrocoagulation involves dissolution of metal from the anode with simultaneous formation of hydroxyl ions and hydrogen gas occurring at the cathode. Electrocoagulation has been proposed since before the turn of the century in 1909, in the United States, J.T. Harries (1984) received a patent for wastewater treatment by electrolysis with sacrificial aluminium and iron anodes. Matteson et al. (1995) described a device of the 1940's, the "Electronic Coagulator" which electrochemically dissolved aluminium (from the anode) into solution, reacting this with the hydroxyl ion (from the cathode) to form aluminium hydroxide. The hydroxide flocculates and coagulates the suspended solids purifying the water. A similar process was used in Britain in 1956 (Matteson et al., 1995) for which iron electrodes were used to treat river water.It is clear that electrocoagulation has the capability to remove a large range of pollutants under a variety of conditions ranging from: suspended solids, heavy metals, petroleum products , colour from dye- containing solutions, aquatic humus and defluoridation of water. Electrocoagulation has successfully treated a wide range of waste streams.

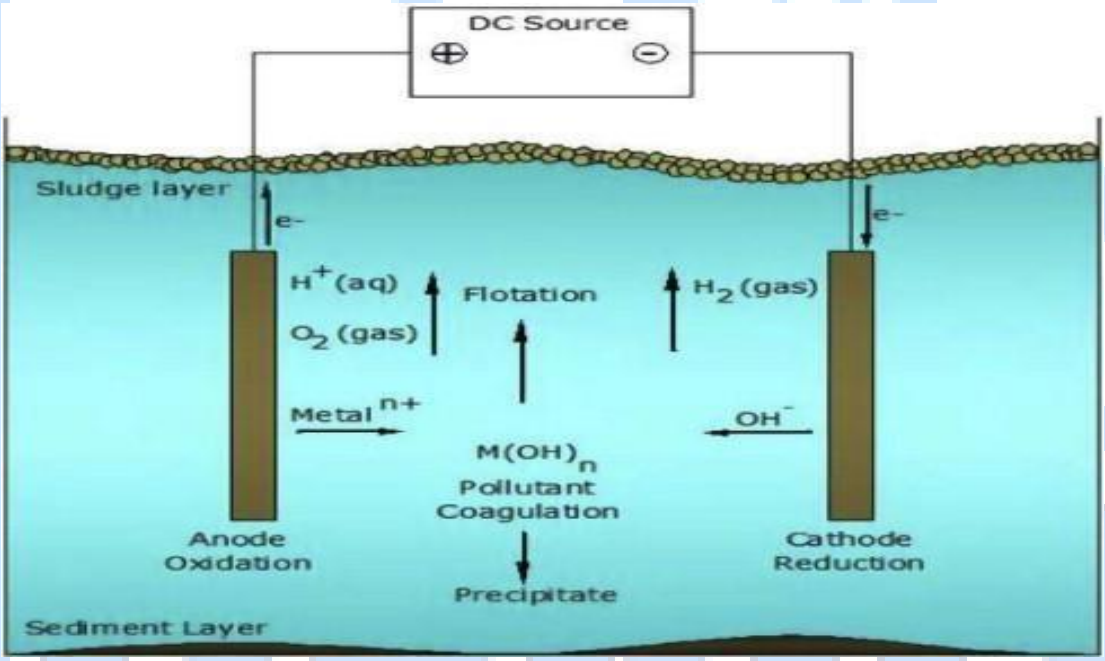

Fig no.:04 Process of electro-coagulation

This chapter explains the methods which are to be used in our research. Our main aim is to build & design a waste-water treatment plant on the Mithi river which is getting polluted and is also affecting the Arabian sea where the river is being disposed off with untreated sewage and sludge. In order to overcome this problem we are going to propose a plant based on the readings of the samples taken. The samples will be collected and tested in the Government lab located at Dadar.Based on these results the process of further treatment will be decided and many other factors will also be taken into consideration such as :

(i) Discharge of the river
(ii) Location of the treatment plant
(iii) Economical budget
(iv) Effect of rainfall during rainy season
(v) High tide & low tide level etc.
(vi) Effect on the nearby loacality

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After this the treatment plant will be designed which will thereafter be represented on the STAAD PRO.

5. CONCLUSIONS

Today The World Is Under The Effect Of Pollution Which Is Causing A Boon To The Society. Problems Such As Global Warming, Extinction Of Animal Species And Plants, Effect On The Environment Etc Are Being Caused Which Are Because Of Such Problems Such As Waste Disposal Into The Sea, Incineration Etc.Hence It Is Necessary To Treat These Wastes. We Have Taken An Initiative To Treat The Mithi River. The Present Project Work Emphasis On The Construction And Design Of Waste Water Treatment Plant Using Advanced Techniques Such As Electro-Flocculation And Coagulation. So Here By We Conclude That We Are Going To Work On Experimental Investigation And Sample Test Readings For The Project And From That Readings We Are Going To Design Sewage Reatment Plant For Mithi River On Staad Pro.

6. ACKNOWLEDGMENT

It gives me immense pleasure to express my deepest sense of gratitude and sincere thanks to my highly respected and estimated guide Prof. Prashant Gondane & Prof. Akshay Naik, Civil department, VIVA Institute of Technology, Virar, for their valuable guidance, encouragement and help for completing this work. Their useful suggestions for these whole work and co-operative behavior are sincerely acknowledged.
I would like to express my sincere thanks to Dr.Arun Kumar, Principal for giving me opportunity and whole hearted support. I also wish to express by gratitude's to Mrs. Lissy Jose, HOD (CIVIL) for their constant guidance.
I also wish to express my indebtedness to my parents as well as my family members whose blessings and support always helped me to face the challenges ahead.
At the end, I would like to express my sincere thanks to all my friends and classmates, others who helped me directly or indirectly during this project work.

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Recharging of ground water table using spreading method

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ABSTRACT

Ground water recharge or deep drainage or deep percolation is known as hydrological process. Recharge is the primary method through which water enters in an aquifer. This process usually occurs in the vadose zone below plant roots and is often expressed as a flux to the water table surface. Recharge occurs both naturally (through the water cycle) and through anthropogenic processes (i.e., "artificial groundwater recharge"), where rainwater and or reclaimed water is routed to the subsurface. Groundwater is recharged naturally by rain and snow melt and to a smaller extent by surface water (rivers and lakes). Recharge may be impeded somewhat by human activities including paving, development, or logging. These activities can result in loss of topsoil resulting in reduced water infiltration, enhanced surface runoff and reduction in recharge. Use of groundwaters, especially for irrigation, may also lower the water tables. Groundwater recharge is an important process for sustainable groundwater management, since the volumerate abstracted from an aquifer in the long term should be less than or equal to the volumerate that is recharged. Recharge can help move excess salts that accumulate in the root zone to deeper soil layers, or into the groundwater system. Tree roots increase water saturation into groundwater reducing water runoff. Flooding temporarily increases river bed permeability by moving clay soils downstream, and this increases aquifer recharge

Keywords— *deep percolation, aquifer, anthropogenic processes, water infiltration, water saturation*

1. INTRODUCTION

The artificial recharge to ground water important aims at augmentation of ground water reservoir modifying the natural movement of surface water utilizing suitable civil construction techniques. Artificial recharge techniques normally address to following issues –

(i) To enhance the sustainable yield in areas where over-development has depleted the aquifer.
(ii) Conservation and storage of excess surface water for future requirements, since these requirements often changes within a season or a period.
(iii) To improve the quality of existing ground water through dilution.
(iv) To remove bacteriological and other impurities from sewage and waste water so that water is suitable for re-use. The basic purpose of artificial recharge of ground water is to restore supplies from aquifers depleted due to excessive ground water development

Source Water Availability

The availability of source water, one of the primary requisites for ground water recharge, is basically assessed in terms of non committed surplus monsoon surface run off, which as per present water resource development scenario is going unutilised. This component can be assessed by analysing the monsoon rainfall pattern, its frequency, number of rainy days, maximum rainfall in a day and its variation in space and time. The variations in rainfall pattern in space and time, and its relevance in relation to the scope for artificial recharge to sub-surface reservoirs can be considered for assessing the surplus surface water availability

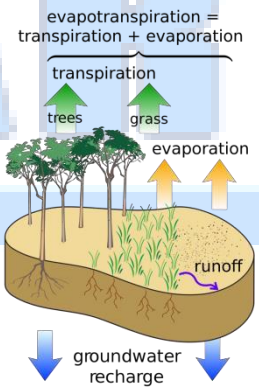

Fig.1 cycle of ground water recharge

REVIEW OF LITERATURE

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General

Groundwater is an important source of water supply for municipalities, agriculture and industry. Therefore the capability to predict the behavior of chemical contaminates in flowing groundwater is of vital importance for a). the reliable assessment of hazardous or risks arising from groundwater contamination problems, and b) the design of efficient and effective techniques to mitigate them. There are several studies reported in this filed. Reliable and quantitative prediction of contaminant movement can be made only if we understand the processes controlling the transport of contaminants. These include a) advection, b) hydrodynamic dispersion and c) physical, chemical and biological reactions that affect their soluble concentrations in groundwater.

The most challenging problems associated with groundwater contamination are:

a) To prevent the introduction of contamination in an aquifer;

b) To predict their movement if they are introduced; and

c) To remove them, to some extent in order to protect the biosphere effectively. Groundwater contamination studies generally include

i. The scientific understanding of physical, chemical, and biological processes controlling the fate and movement of contamination in the subsurface environment;

ii. The mathematically representation in the transport models to predict the contaminant movement; iii. The determination of different model parameters in the field and the laboratory using different methods;

iv. The development of transport models to predict contaminant movement if they are introduced;

v. The development of management models to control and/or prevent the introduction of contaminants in the aquifer and to determine the methodology for the safe disposal of hazardous wastes, and

vi. the development of methodology for the removal of contaminates to the extent necessary to effectively protect the biosphere

Recharge Process

Number of processes occurring at the soil surface, in the vadose zone and in the aquifer itself affects the rate of recharge directly or indirectly. Lerner (1997) put forth three processes by which recharge occurs. These are,

i. Diffusation percolation, as unsaturated flux or a saturated front (Piston-type flow),
ii. Macro-pore flow through root channels, desiccation cracks and fissures, and
iii. Preferential flow caused by unsaturated wetting fronts and different soil physical characteristics within the soil.

Rainfall supplies the land surface with water, soil allows the water to infiltrate to the water table, and a deeper geologic framework provides the permeability necessary for the deeper flow

Infiltration Rate

Infiltration is the first and the foremost process that has its great influence on quantity and rate of recharge, particularly in the situations when surface methods of groundwater recharge are followed. Infiltration is associated largely with the land surface. A natural depression with good infiltrating soils underlain by transmissive aquifers constitutes good sites for the percolation ponds.

2.STUDY AREA INFORMATION

Identification Area

The artificial recharge projects are site specific and even the replication of the techniques from similar areas are to be based on the local hydrogeological and hydrological environments. The first step in planning the project is to demarcate the area of recharge. The Project can be implemented systematically in case a hydrologic unit like watershed is taken for implementation. However, localized schemes are also taken to augment ground water reservoir. The artificial recharge of ground water is normally taken in following areas:

1. Areas where ground water levels are declining on regular basis.
2. Areas where substantial amount of aquifer has already been desaturation.
3. Areas where availability of ground water is inadequate in lean months.
4. Areas where salinity ingress is taking place.

Hydrological Studies

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Before undertaking any artificial recharge project, it is a basic prerequisite to ascertain the availability of source water for the purpose of recharging the ground water reservoir. For determining the source water availability for artificial recharge, hydrological investigations are required to be carried out in the Watershed/Sub-basin/basin where the artificial recharge schemes are envisaged. Four types of source water may be available for artificial recharge viz.

(i) In situ precipitation on the watershed.
(ii) Surface (canal) supplies from large reservoirs located within basin
(iii) Surface supplies through trans basin water transfer.
(iv) Treated municipal and industrial wastewaters.

'In situ' precipitation will be available almost at every location but may or may not be adequate to cause artificial recharge but the runoff going unutilized outside the watershed/ basin can be stored/ transmitted through simple recharge structures at appropriate locations. In addition none, one or both of the other two sources may be available in any of the situations, the following information will be required:

a) The quantity that may be diverted for artificial recharge.
b) The time for which the source water will be available.
c) The quality of source water and the pretreatment required.
d) Conveyance system required to bring the water to the recharge site. Hydrological studies are undertaken to work out surplus monsoon run off which can be harnessed as source water for artificial recharge.

Soil Infiltration Studies

In case of artificial recharge through water spreading methods, soil and Land use conditions which control the rate of infiltration and downward percolation of the water applied on the surface of the soil assume special importance. Infiltration in its most narrow and precise sense can be defined as "The process water entering into a soil through the soil surface". Although a distinction is made between infiltration and percolation (the movement of water within the soil) the two phenomena are closely related since infiltration cannot continue unimpeded unless percolation removes infiltrated water from the surface soil. The soil is permeated by noncapillary channel through which gravity water flows downward towards the ground water, following the path of least resistance.Capillary forces continuously divert gravity water into pore spaces, so that the quantity of gravity water passing successively lower horizons is steadily diminished. This leads to increasing resistance to gravity flow in the surface layer and a decreasing rate of infiltration as a storm progresses. The rate of infiltration in the early phases of a storm is less if the capillary pores are filed from a previous storm. There is maximum rate at which water can enter soil at a particular point under a given set of conditions, this rate is called the infiltration capacity

3.METHODOLOGY

3.1 Percolation Tanks (PT) / Spreading Basin

These are the most prevalent structures in India as a measure to recharge the ground water reservoir both in alluvial as well as hard rock formations. The efficacy and feasibility of these structures is more in hard rock formation where the rocks are highly fractured and weathered. In the States of Maharashtra, Andhra Pradesh, Madhya Pradesh, Karnataka and Gujarat, the percolation tanks have been constructed in plenty in basaltic lava flows and crystalline rocks. A typical design of PT. The percolation tanks are however also feasible in mountain fronts occupied by talus scree deposits.

These are found to be very effective in Satpura Mountain front area in Maharashtra. The percolation tanks can also be constructed in the Bhabar zone. Percolation tanks with wells and shafts Percolation tanks are also constructed to recharge deeper aquifers where shallow or superficial formations are highly impermeable or clayey with certain modification. Recharge wells with filter are constructed in the Percolation Tanks and the stored water is Moti Ranjan and Bhujpur, Mandvi Kutch district, Gujarat.

3.2 Important Aspects of Percolation Tanks:

a. A detailed analysis of rainfall pattern, number of rainy days, dry spells, and evaporation rate and detailed hydrogeological studies to demarcate suitable percolation tank sites.
b. In Peninsular India with semi arid climate, the storage capacity of percolation tank be designed such that the water percolates to ground water reservoir by January since the evaporation losses would be high subsequently.
c. Percolation tanks be normally constructed on second to third order stream since the catchment so also the submergence area would be smaller.
d. The submergence area should be in uncultivable land as far as possible.
e. Percolation tank be located on highly fractured and weathered rock for speedy recharge. In case of alluvium, the bouldary formations are ideal for locating Percolation Tanks.
f. The aquifer to be recharge should have sufficient thickness of permeable vadose zone to accommodate recharge.
g. The benefitted area should have sufficient number of wells and cultivable land to develop the recharge water.
h. Detailed hydrological studies for run off assessment be done and design capacity should not normally be more than 50% of total quantum of rainfall in catchment.

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i. Waste weir or spillway be suitably designed to allow flow of surplus water based on single day maximum rainfall after the rank is filled to its maximum capacity.
j. Cut off trench be provided to minimize seepage losses both below and above nalla bed.
k. To avoid erosion of embankment due to ripple action stone pitching be provided upstream upto HFL.
l. Monitoring mechanism in benefitted as well as catchment area using observation well and staff gauges be provided to assess the impact and benefits of percolation tank.

3.3 Basin Spreading Recharge

1. Water is recharged by releasing it into basins formed by excavation or by the construction of containment dikes or small dams of dimensions varying from few meters to several hundred meters.
2. The most common system consists of individual basins fed by pumped water from nearby surface water sources.
3. Silt-free water avoids the problem of sealing basins during flooding.
4. Basins require periodic scraping of the bottom surface when dry to preserve a percolation surface.
5. Basins, because of their general feasibility and ease of maintenance, are the most favored method of artificial recharge from the surface.
6. Gradients of major feeder ditches should be sufficient to carry suspended material through the system since deposition of fine grained material clogs soil surface openings.
7. The primary purpose of water spreading is to extend the time and the area over which water is recharged.

3.4 Advantage and Disadvantage

Artificial recharge has several potential advantages, namely:
- The use of aquifers for storage and distribution of water and removal of contaminants by natural cleansing processes that occur as polluted rain and surface-water infiltrate the soil and percolate down through the various geological formations.
- The technology is appropriate and generally well understood by both the technologists and the general population.
- Very few special tools are needed to dig wells.
- In rock formations with high structural integrity, few additional materials may be required (concrete, soft stone or coral rock blocks, metal rods et cetera) to construct the wells.
- Groundwater recharge stores water during the wet season for use in the dry season, when demand is the highest.
- The quality of the aquifer water can be improved by recharging with high-quality injected water.
- Recharge can significantly increase the sustainable yield of an aquifer.
- Recharge methods are environmentally attractive, particularly in arid regions.
- Most aquifer recharge systems are easy to operate.
- In many river basins, control of surface-water run-off to provide aquifer recharge reduces sedimentation problems.
- Recharge with less-saline surface waters or a treated effluent improves the quality of saline aquifers, facilitating the use of the water for agriculture.

3.5 **Artificial Recharge has some disadvantages too, namely:**
- In the absence of financial incentives, laws, or other regulations to encourage landowners to maintain drainage wells adequately, the wells may fall into disrepair and ultimately become sources of groundwater contamination.
- There is a potential for contamination of the groundwater from injected surface-water run-off, especially from agricultural fields and road surfaces. In most cases, the surface-water run-off is not pre-treated before injection.
- Recharge can degrade the aquifer unless quality control of the injected water is adequate.
- Unless significant volumes of water are injected in an aquifer, groundwater recharge may not be economically feasible.
- The hydrogeology of an aquifer should be investigated and understood before any future full-scale recharge project is implemented. In karst terrain, dye-tracer studies can assist in acquiring this knowledge.
- During the construction of water-traps, disturbance of soil and vegetation cover may cause environmental damage to the project area.

3.6 Benefits

(1) Storing water in underground reservoirs which may be recovered for beneficial use
(2) Raising the water table to increase water supply from shallow wells, to reduce pumping costs in wells, and to maintain and steady water levels
(3)Decreasing runoff, thereby directly reducing damages from flooding, erosion, and sedimentation
(4)Creating fresh water barriers against the intrusion of salt water along coastal areas, or against the intrusion of undesirable water in inland areas

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Conclusions

As demand for water increases, water managers and planners need to look widely for ways to improve water management and augment water supplies. The Committee on Ground Water Recharge concludes that artificial recharge can be one option in an integrated strategy to optimize total water resource management, and it believes that with pretreatment, soil-aquifer treatment, and post treatment as appropriate for the source and site, impaired-quality water can be used as a source for artificial recharge of ground water aquifers.

when higher-quality, economically feasible sources are unavailable or insufficient, artificially recharged ground water may be an alternative for potable use.

Artificial recharge of ground water using source waters of impaired quality can be a viable way to augment regional water supplies—primarily for nonpotable purposes but for potable purposes under appropriate conditions—and at the same time provides an avenue for wastewater management.

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Study of Groundwater Qualities at Nallasopara Region

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1.INTRODUCTION

Water is the most important in shaping the land and regulating the climate. It is one of the most important compounds that profoundly influence life

Groundwater is used for domestic and industrial water supply and also for irrigation purposes in all over the world. In the last few decades, there has been a tremendous increase in the demand for fresh water due to rapid growth of population and the accelerated pace of industrialization. According to WHO organization, about 80% of all the diseases in human beings are caused by water

Once the groundwater is contaminated, its quality cannot be restored back easily and to device ways and means to protect it. Water quality index is one of the most effective tools to communicate information on the quality of water to the concerned citizens and policy makers. It, thus, becomes an important parameter for the assessment and management of groundwater. The greater part of the soluble constituents in ground water comes from soluble minerals in soils and sedimentary rocks. The more common soluble constituents include calcium, sodium, bicarbonate and sulphate ions. Another common constituent is chloride ion derived from intruded sea water, connate water, and evapotranspiration concentrating salts, and sewage wastes for example. Nitrate can be a natural constituent but high concentrations often suggest a source of pollution. Water quality standards are needed to determine whether ground water of a certain quality is suitable for its intended use. Guidelines for Drinking Water Quality have been published by IS: 10500- 2012. For Drinking water, quality is commonly expressed by classes of relative Suitability, although most classification systems include units on specific conductance, sodium content and boron concentration.WQI is an important technique for demarcating groundwater quality and its suitability for drinking purpose. It is computed to reduce the large amount of water quality data to a mere numerical value that expresses the overall water quality at a certain location and time based on several water quality parameters. In this index a mathematical equation used to transform large number of water quality data into a single number which is simple and easy to understandable for decision makers about quality and possible uses of any water body.

2. LITERATURE REVIEW

1. *Assessment of water quality in terms of water quality index at Uttarakhand "Shweta Tyagi, Bhavtosh Sharma, Prashant Singh, Rajendra Dobhale"*

   Shweta Tyagi, Bhavtosh Sharma, Prashant Singh, Rajendra Dobhal3 carried out Water quality assessment in terms of Water Quality Index at Uttarakhand (India). The study states that Water quality index (WQI) is valuable and unique rating to depict the overall water quality status in a single term that is helpful for the

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selection of appropriate treatment technique to meet the concerned issues. However, WQI depicts the composite influence of different water quality parameters and communicates water quality information to the public and legislative decision makers.In spite of absence of a globally accepted composite index of water quality, some countries have used and are using aggregated water quality data in the development of water quality indices. Attempts have been made to review the WQI criteria for the appropriateness of drinking water sources. Besides, the present article also highlights and draws attention towards the development of a new and globally accepted "Water Quality Index" in a simplified format, which may be used at large and could represent the reliable picture of water quality. Initially, WQI selecting 10 most commonly used water quality variables like dissolved oxygen (DO), pH, coliforms, specific conductance, alkalinity and chloride etc. and has been widely applied and accepted in European, African and Asian countries.

2. *Characteristics of ground water and Water Quality Index "Shivasharanappa, Padaki Srinivas and Mallikarjun S Huggi"*

Shivasharanappa, Padaki Srinivas and Mallikarjun S Huggi5 carried out research work on Bidar city (Karnataka) for their characteristics of ground water and Water quality index (W.Q.I.). This research work deals with revaluation of W.Q.I. for ground water for the residential and industrial area of bidar. In the city there are 35 wards, samples collected from all wards and tested for 17 parameters. The parameters are pH, total hardness, Ca (Calcium), Mg (magnesium), chloride (Cl), NO3 (Nitrate), SO4 (sulphate), T.D.S., Fe+3 (Iron), F (Fluoride), sodium (Na),potassium (K), alkalinity, manganese (Mn), D.O., total solids and Zinc (Zn).

3. METHODOLOGY

The overall methodology which was applied for the realization of the project concerning the monitoring of ground water was based on protocols methods and techniques developed over the years.

1. ***Parameters to be Analyzed:***

For the assessment of groundwater quality of the bore well of the Indore city, Taking in view the following drinking water parameters are analyzed

(1)pH (2) Turbidity (3) Total Dissolved Solids (4) Elec. Conductivity (5) Total hardness (6) Calcium (7) Magnesium (8) Sulphate (9) Nitrate (10) M.P.N. (11) Total alkalinity (12) Chloride (13) Fluoride,(14) Boron (15) Phosphate (16) C.O.D.(17) Iron (18) Cadmium (19) Chromium (20) Nickel (21) Zinc (22)Manganese (23) Sodium (24) Temperature.

2. ***Water Treatment***

Water treatment is the process of converting raw water from surface or sub-surface source into a potable form that is suitable for drinking and other domestic uses (Hofkes, 1981). It also entails the removal of pathogenicorganisms and toxic substances listed earlier, but do not necessarily make the drinking water pure or sterile in the analytical sense (Oluwande, 1983).

The convection methods by which water is made potable are namely; aeration, coagulation, flocculation, sedimentation, filtration and other means of disinfection which make use of physical processes to achieve their objectives.

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- *Aeration*

  In Aeration, water is brought into intimate contact with air in order to increase their oxygen content to facilitate precipitation and result in the removal of iron and manganese in their ferric and manganese forms, and organic compounds. Aeration reduces the carbon dioxide content of water and thus decreasing the solubilization tendencies of water, which causes corrosion and leaching of plumbing materials into water. Ground high is iron and manganese benefit from aeration (Sangodoyin,1987).

- *Coagulation and Flocculation*

  This is the addition of Alum (Al2 (SO4)3. 14H2O, thus forming colloids with size similar to those of bacteria (Sangodoyin, 1987). Coagulation ensures the gathering together of small size particles into bigger ones with higher setting velocity or sedimentation. The sludge formed can than be disposed off. Coagulation reduces load on filters, thereby reducing costs through the extension of the life of the filter.

- *Sedimentation*

  This is known as clarification and is the unit process where particles heavier than the liquid they are in are removed by gravitational settling. Sedimentation affects the chemical quality of water, through the settling of complexes formed between heavy metals and flocs (Sangodoyin, 1987).

- *Filtration*

  This is a process designed to remove bacteria, debris and organic matter. It is often considered as the final polishing operation in water treatment. When sand is used as a medium, it is called slow sand filtration, which is often employed in developing nations. It does not work for high turbidity water since it can get clogged easily (Sangodoyin, 1987). In sand filtration there is complete physical, chemical and biological treatment in one unit. The demerit in slow sand filters is that of requirement of extensive bed areas and non-availability of graded sand and labour intensive clearing operation. Recent studies have showed the workability of ground coconut shells and rice husks to arrest the problem of sand (Sangodoyin, 1987). Other type of filters includes; rapid pressure filter and gravity filters.

- *Storage*

  Sangodoyin and Osuji (1990) observed experimentally that 7 days of storage can kill about 90% of coli form in contaminated water which is reasonably clear and on which ultra-violent light is incident deeply. The storage facilities also lead to improvement in turbidity. This is accomplished during storage through sedimentation process, leading to excessive accumulation of solids for which pressure must be for removal. Storage facilities must have a screen at the inlet to remove snails and other like objects thereby ensuring adequate detention time, without short-circuiting. Providing bafflers ensure this

- *Pot Chlorination*

  This refers to the disinfection of well water by placing a vessel containing a mixture of chlorine powder and sand in the well, a 1.5 kg of chlorine will provide satisfactory disinfection for one week (Hofkesi, 1981). Pot chlorination might be either single or double pot where the single pot is found to give too high a chlorine content to the water. The double pot is effective for 2 weeks, in a well with a 4,500 L capacity drawn at a rate of 400 to 500 L day-1.

- *Disinfection*

  Disinfection is simply the killing of potentially harmful organisms. Its objective is to obtain microbiologically clean water, which contains no pathogenic organisms and is free from biological forms that may be harmful

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tohuman health or aesthetically objectionable (Kootapep etal., 1980).Chemical disinfections employ the use of chemical called disinfecting agents, for example chlorine, ozone, potassium permanganate and chlorine dioxide.

4. TENTATIVE CONCLUSION

- Groundwater treatment can make the water for drinking purpose and it will helpful for development of that region.
- When site of research is use for agricultural activity or indusrial activity there are chances of water contamination from industrial waste and pesticides.
- We can estimate the loss of some strategic aquifers by knowing the quality of groundwater, by physical, chemical and biological characteristics.

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Review Paper On Manufacturing of Concrete Canvas

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ABSTRACT

The cost as well as the time taken by the construction works has always attracted attention of civil engineering to be supplemented by some cheaper and fast settling construction materials. This paper focuses the advantage of using concrete canvas and concrete cloth for rapid and fast construction of structure like canal and many other which are made of temporary purpose. Concrete is a mixture of cement, aggregate, water and sometime admixture is required in proportion. Sometime, the strength, durability, and other characteristics of the concrete depend to the properties of its ingredients.Concrete is freshly mixed material which can be used by giving required shape to the concrete. There are many advantage of concrete, but there is one drawback is that, it is not flexible when it is hardened.

Keywords—*Concrete canvas, Durability, Flexible. Admixture, Rapid*

1. INTRODUCTION

Concrete Cloth is a flexible, cement-impregnated fabric that hardens on hydration to form a thin, durable, waterproof and fire resistant layer. Worldwide there is increasing demand for construction and construction materials, for that concrete is the most extensively used material in construction. These days concrete is being used for so many purposes in many different adverse conditions. Concrete cloth (CC) is a unique proprietary material. It has a very wide range of applications throughout the building & civil engineering industry. Concrete cloth is a flexible; cement impregnated fabric that hardens when hydrated to form a thin, durable, water & fire proof concrete layer. CC allows concrete construction without the need for plant or mixing equipment. Simply position the canvas & just add water. CC has a design life of above 10 years and is significantly quicker and less expensive to install compared to conventional concrete.

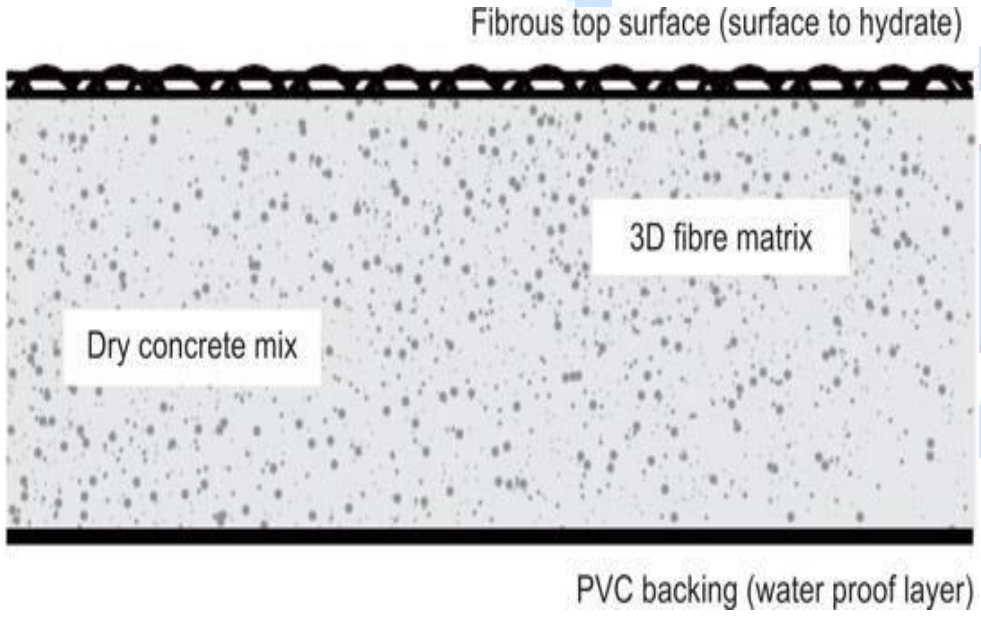

Fig. Concrete Canvas

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2. OBJECTIVES

1. The objective of development of concrete canvas can be said as an approach to use concrete in a more effective manner.
2. To make a product which is economical and easy to use during construction.
3. To develop a material which is time as well as material saving and easy to place and use.
4. The concept of concrete canvas can be one step further more in the same direction.

3.LITERATURE REVIEW

Since a very long time, Construction has followed conventional methods. And there is no provisions for very rapid and emergency workable concrete installation methods. A private company and its R&D department has taken the initiative to introduce a ground breaking product called as Concrete Cloth. The original idea was to create a rapidly deployable emergency shelter, so as to enter a design competition run by British Cement Association. The designer had no idea that their entry for a rapidly deployable emergency shelter would result in the launch of their own technology development company involving research trips to disaster zones around the world, and the concept has matured into a technology that has applications far beyond emergency shelter. Following development, funded through a combination of private equity investment and grants, and the company is setting up the volume production facility for concrete canvas shelters (CCS) and concrete cloth. Manufactured by a private organization Milliken, Concrete canvas is a ground breaking material technology that allows concrete to be used in completely new ways. Concrete cloth was originally developed for award winning concrete canvas shelter, a building in a bag that requires only water and air for construction.

4.PROPOSED WORK

A. Methodology:

The process starts from selection of material and collection, laboratory testing, data analysis, preparation of concretecloth, tests on concrete cloth and finally analysing the results.
Locally available materials : Gunny bag, OPC (53 grade), wire mesh (1.5mmx1.5mm size), polypropylene fibre, M sand, fibre glass weaving thread, Glass fiber mesh, cotton canvas
were collected. The collected materials were tested and compared with the standard one. Two trials were conducted. After curing various test were conducted.

B. Procedure:

1st Trial:
Materials used :
Gunny bag, OPC (53 grade) ,polypropylene fibre, M sand, fibre mesh and fibre glass weaving thread.

Preparation:
This trial gives primary requirement of the product such as good flexibility. The main difficulty in this trial is that the pore size of the gunny bag is larger than what we required. So during folding some amount of cement was escaping through these pours. It will affect the various properties of modified Concrete Cloth. So in the next trial replaced the gunny bag with a Hydrophilic fabric.

2nd Trial:
Materials used :
Hydrophilic fabric, OPC (53 grade) ,glass fibre, Alcofine, fibre mesh and fibre glass weaving thread.

Preparation:
The pore size of Hydrophilic fabric is very small so cement retained in the product. And also it gave good flexibility. Also it is a fire resistant material and provides greater flexibility. By replacing polypropylene fiber with glass fiber, fire resistance as well as tension carrying characteristic increases. In dry mix, alcofine is added to aid water proofing.

5. CONCLUSIONS

After reading various research papers, theories and collecting data it helps us to understand how our project can be evaluated and other necessary details that we need to follow while executing the real work. Modified Concrete cloth is the latest and extremely useful innovation in field of construction. It is time and material saving technique. It is durable, flexible, economical and time saving. It allows concrete construction without the need of plant and mixing equipment.

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Simply position the modified concrete cloth and add water. It is less expensive to install compared to the conventional concrete.

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A Review on Experimental Approach Of Synthesizing Carbon Nanotubes For Improving Concrete Properties

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ABSTRACT

Nowadays, one of the greatest problems that the world facing is environmental pollution, which is causing grave and irreparable damage to the natural world and human society with about 40% of deaths worldwide being caused by water, air and soil pollution. India is the fourth largest country in the world generate nearly about 2,454,968 Kilo tonnes of carbon dioxide per year. In order to reduce the carbon emission we have come up with a material named as carbon Nanotubes (CNT's). Carbon Nanotubes (CNT's) are special materials with great potential in various civil engineering Structure. Herein we convert the waste gases coming out from the industrial and automobile (Vehicular) exhaust and furnaces into a Nano-material called Carbon Nanotubes which is three thousand times stronger than steel and one sixth of its weight. This Carbon Nanotubes are uniformly mixed in concrete mix which will improve the physical, chemical and mechanical properties of the concrete and develop high performance, multifunctional, high strength, and ductile, crack free, durable construction material. This paper will provide a momentum to the running wheels of the construction industry and will minimize the effects of global warming to save the environment. Our project will discuss in detail the synthesis processes of Carbon Nanotubes and also its successful application in concrete.

Keywords— *Carbon Emission; Carbon Nanotubes; Nanomaterial; Durability; High Strength; Synthesis.*

1. INTRODUCTION

Nanotechnology is one of the most up-to-date and the fastest growing fields of science. Huge potential has been predicted for nanotechnology applications in construction. Even minor improvements in materials and processes could bring large benefits for concrete. Concrete is a multi-phase composite material that is known to age over time. Improving its performance has been a major goal for many researchers. A relatively new field of study is the use of nanoparticles in concrete to improve its workability, durability and strength in addition to adding new functionalities. The outstanding mechanical properties of carbon Nanotubes (CNTs) highlight them as potential candidates for concrete reinforcement. The strength of the CNTs is directly related to the strong C=C bond and the relatively small number of defects present in the tubes. It is said to possess "a hundred times the strength of steel at one sixth of the weight". The CNT are characterized by thermal stability up to 2800°C .However, their surfaces have very low friction, so it is very difficult for them to bind together or with the cement matrix material. In addition, carbon Nanotubes are packed together by Van der Waals attraction forces during production and high cost of production prevent the implementation of these materials in construction market mainly concrete. The process of production of Carbon Nanotubes from carbon dioxide (co2) emission of the industrial outlet is beneficial from the environmental as well as economical point of view. It will reduce the carbon emission of factories like Rice Mill, Steel or metal or cement plant etc. The paper comprises of preparation of Catalytic substrate (Cement Sand Substrate) and its installation on industry exhaust or chimney. As it develops a large-scale production of the CNT, the costs associated will tend to decrease and its application in the construction will start occurring more naturally.

2. LITERATURE REVIEW

The following are the previous research review based on carbon nanotubes (CNTs) in construction.

2.1 Sumio Lijima (1991)

Discovered hollow nanometer size tubes composed of graphitic carbon and offered first conclusive proof of single walled CNT. True identity of discoverers of CNT is subjected to controversy as it was observed that multi walled CNT was discovered in 1952.

2.2 Yakovlev, Keriene, Gailius, Girniene (2006)

Investigated CNT synthesized from hydrocarbons, possibilities of production and properties of foam concrete reinforced by CNT. The CNT were used as high strength dispersed reinforcement for production of cement foam concrete produced on basis of Portland cement which allow to decrease its heat conductivity and increase compressive strength.

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2.3 Mathew Brenner, Arjun Kavi, Michael Guan YuLi (2008)

Disclosed a method for increasing the strength of concrete comprising the steps of admixing CNT and plasticizers with cement, aggregates and water for hydration.

2.4 Giuseppe Ferro, Jean-Marc Tulliani, Simone Musso (2011)

Reviews the current state of art of carbon Nanotubes cement based composite and the possible applications to improve performance of concrete and to lead to development of sustainable, advanced cement based composite.

2.5 Saurav et al (2012)

Analysis stated that application of nanotechnology in building materials for various civil engineering works. The properties of nano materials were seriously affected strength, durability and other properties of materials. The use of nano technology makes concrete stronger, durable and more easily placed.

2.6 Vivek nair (2012)

Specified a highly economical process for large scale production of carbon filaments by a low temperature synthetic method from industrial and auto mobile flue gas emission

2.7 Saptarshi sasmal, B. Bhuvaneshwari, Nagesh R Iyer (2013)

Explained geometry and mechanical properties, synthesis process and limitations of usage of CNT in construction materials like steel and concrete and also explained few pre-proof of concepts where CNT play the pivotal role to redefine scope and ability of civil engineering.

2.8 U Abhinaya, D Chetha, S Chathuska, N Praneeth, R Vimantha, K K Wijesundara (2014)

Summarized the past experimental data on the properties of concrete with carbon Nanotubes and present methodologies and results obtained from experiments. With increase in multi wall CNT, the rate of increase of tensile strength is greater than that of compressive strength.

2.9 Kazi Fattah, Noha Hassan, Adil Tamimi (2015)

Investigate the effect of adding polar impurities to dispersion of CNT in cement matrix and examining its influence on concrete strenght. Using CNT with functionalized groups not just add to dispersion but also enhance bonding strength with concrete mix.

2.10 Ratton A, Sachdeva P, Chaudhary A (2016)

Concrete is a macro material strongly influenced by its nano properties. CNT increase the compressive strength of cement mortar and change their electrical properties. The addition of small amount of CNT have great potential in improving properties of concrete.

3. CARBON NANOTUBES

Carbon Nanotubes (CNTs) take the form of cylindrical carbon molecules and have novel properties that make them potentially useful in a wide variety of applications in nanotechnology, electronics, optics, and other fields of materials science. They exhibit extraordinary strength and unique electrical properties, and are efficient conductors of heat. Inorganic Nanotubes have also been synthesized. Carbon Nanotubes (CNTs) are allotropes of carbon with a cylindrical nanostructure. Nanotubes have been constructed with length-to-diameter ratio of up to 132,000,000:1, significantly larger than for any other material.

Nanotubes are members of the fullerene structural family. Their name is derived from their long, hollow structure with the walls formed by one-atom-thick sheets of carbon, called graphene. These sheets are rolled at specific and discrete ("chiral") angles and the combination of the rolling angle and radius decides the Nanotubes properties; for example, whether the individual nanotube shell is a metal or semiconductor.

3.1 Definition

Basically, a carbon Nanotube is a graphite sheet (i.e. carbon atoms arranged in hexagons) rolled into a cylinder of about 1 nanometre (1 nm = 10^{-6} m) diameter and up to several millimetres long. It can be geometrically visualized as a hair, but 100,000 times smaller. In the hexagon shape, two consecutive carbon atoms are separated by 0.144 nm (vs. 0.142 in graphite), and two opposite atoms are separated by 0.283 nm. There are many different types of Nanotubes. The most common distinction is on the number of layers, so called "walls." Nanotubes are categorized as single-walled Nanotubes (SWNTs) and multi-walled Nanotubes (MWNTs).

3.2 Types Of Carbon Nanotubes

1) Single Wall Nanotubes (SWNT): Most Single-Walled Nanotubes (SWNT) have a diameter of close to 1 nanometre, with a tube length that can be many millions of times longer. The structure of a SWNT can be conceptualized by wrapping a one-atom-thick layer of graphite called graphene into a seamless cylinder. The way the graphene sheet is wrapped is represented by a pair of indices (n,m) called the chiral vector. The integer‘s n and m denote the number of unit vectors along two directions in the honeycomb crystal lattice of graphene. If m = 0, the Nanotubes are called "zigzag, which is named for the pattern of hexagons as we move on circumference of the tube. If n = m, the Nanotubes are called "armchair", which describes one of the two confirmers of cyclohexene a hexagon of carbon atoms. Otherwise, they are called "chiral", in which the m value lies between zigzag and armchair structures. The word chiral means handedness and it indicates that the tubes may twist in either direction.

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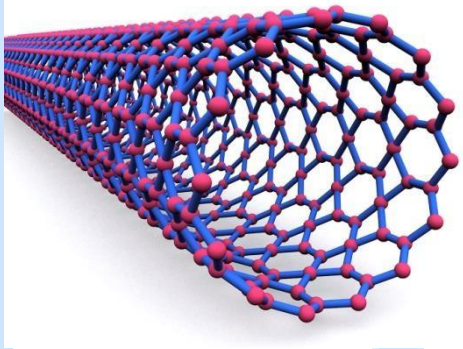
3.3 ***Multiple Walled Carbon Nanotubes (MWNT)***: There are two models which can be used to describe the structures of multi-walled nanotubes. In the Russian Doll model, sheets graphite are arranged in concentric cylinders, e.g. a single-walled nanotube (SWNT) within a larger single-walled nanotube. In the Parchment model, a single sheet of graphite is rolled in around itself, resembling a scroll of parchment or a rolled newspaper. The interlayer distance in multi-wall nanotubes is close to the distance between graphene layers in graphite, approximately 3.3 A (330 pm). The special place of double-walled carbon nanotubes (DWNT) must be emphasized here because their morphology and properties are similar to SWNT but their resistance to chemicals is significantly improved. This is especially important when Functionalization is required (this means grafting of chemical functions at the surface of the nanotubes) to add new properties to the CNT. In the case of SWNT, covalent Functionalization will break some C=C double bonds, leaving "holes" in the structure on the nanotube and thus modifying both its mechanical and electrical properties. In the case of DWNT, only the outer wall is modified. DWNT synthesis on the gram-scale was first proposed in 2003 by the CCVD technique, from the selective reduction of oxide solutions in methane and hydrogen.



Nanotube

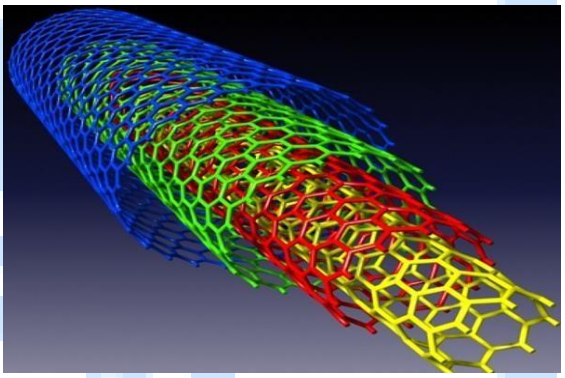


Fig.2. Multi Walled Nanotube

1.3 Traditional Method To Synthesis Carbon Nanotubes

Techniques have been developed to produce nanotubes, including arc discharge, laser ablation and chemical vapor deposition (CVD). Most of these processes take place in vacuum or with process gases. CVD growth of CNTs can take place in vacuum or at atmospheric pressure. Large quantities of nanotubes can be synthesized by these methods; advances in catalysis and continuous growth processes are making CNTs more commercially available.

SWNTs and MWNTs are usually made by carbon-arc discharge, laser ablation of carbon, or chemical vapour deposition (typically on catalytic particle). Nanotube diameters range from 0.4 to 3 nm for SWNTs and from 1.4 to at least 100 nm for MWNTs. Nanotube properties can thus be tuned by changing the diameter. Unfortunately, SWNTs are presently produced only on a small scale and are extremely expensive. All currently known synthesis methods for SWNTs result in major concentrations of impurities. These impurities are typically removed by acid treatment, which introduces other impurities, can degrade nanotube length and perfection, and adds to nanotube cost.

MWNTs produced catalytically by gas-phase pyrolysis, like the Hyperion nanotubes, have high defect densities compared to those produced by the more expensive carbon- arc process.

Following are the methods to synthesis CNT's:

1) Arc Discharge Method
2) Laser Ablation
3) Chemical Vapor Deposition (CVD)

3.4 Properties Of Carbon Nanotubes

1) Strength: Carbon Nanotubes are the strongest, flexible and stiffest materials yet discovered in terms of tensile strength and elastic modulus respectively.

2) Hardness: The hardness (152 GPa) and bulk modulus (462–546) of carbon nanotubes are greater than diamond, which is considered the hardest material. (that of diamond is 150GPa & 420GPa).

3) Kinetic Property: Multi-walled Nanotubes, multiple concentric nanotubes precisely nested within one another; exhibit a striking telescoping property whereby an inner Nanotubes core may slide, almost without friction, within its outer Nanotubes shell thus creating an atomically perfect linear or rotational bearing, the precise positioning of atoms to create useful machines.

4) Electrical Properties: Because of the symmetry and unique electronic structure of graphene, the structure of a nanotube strongly affects its electrical properties.-Very high current carrying capacity.

5) Thermal Properties: All nanotubes are expected to be very good thermal conductors along the tube, but good insulators laterally to the tube axis. (Measurements show that a SWNT has a room- temperature thermal conductivity along its axis of about 3500 W·m−1·K−1;] compare this to copper, a metal well known for its good thermal conductivity, which transmits 385 W·m−1·K−1.).

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3.5 Comparison of Carbon Nanotubes (CNTs) Properties

TABLE 1- PROPERTIES OF MATERIALS

Material	Young's Modulus (GPa)	Tensile Strength (GPa)	Density (g/cm^3)
Single Wall Nanotubes	1054	150	N/A
Multi wall Nanotubes	1200	150	2.6
Steel	208	0.4	7.8
Epoxy	3.5	0.005	1.25
Wood	16	0.008	0.6

4. EXPERIMENTAL

After studying a lots of research paper and various case studied we came to know that there was a used studies done on concrete and CNT's, but what we found is something really interesting. We understand that from past so many years people used various solid waste material or end product from industrial process to improve the strength and durability of concrete and results are positive in many researches. But what everyone missed is, the fuel or waste gases emitting from the industry or factories outlets which are not physically present on the earth but they equally harm the environment as other solid waste. The idea is to convert this waste gases into the valuable product called carbon nanotubes and use it as a additive into a concrete. But as we gone through the research on various journals and reference we understood lots of researches had done work upto a great extent and the results are very much good. But simultaneously what we understood that the CNT'S use in other research paper was prepared from fresh raw material into the laboratories under the controlled condition with traditional synthesising methods of CNT's.

So, that is the something inventory thing which we are doing is capturing the CNT's from factory chimney by converting the carbon dioxide CO_2. And making a concrete specimen by adding the CNT's by percentage of mass or weight of concrete to study the development of strength and other factors (durability, workability, etc.).

Other than traditional method various scientist worked out and found some other methods to prepare Carbon Nanotubes and researches are still going on. But for our aim of converting the CO_2 into CNT we referred an ecofriendly as well as economical method developed by Dr. Vivek Nair during his graduate studies. Dr.Nair practise in his experiment to find the economical alternative off Chemical Vapour Deposition Method. According to CVD method the basic requirement for CNT's production are large furnace, high temperature (around 700 to 800 degree Celcius), Carbon containing gases, catalyst and substrate. So in this paper will discuss the whole method of synthesising of Carbon Nanotubes.

4.1 Materials

As we discussed about requirements in experiment section, based on that material consist of following which required to make catalyst and substrate or we can say catalytic substrate; which are Ordinary Portland cement of 53 grade of ULTRATECH cement was used in used conforming to I.S. 269- 2015 having specific gravity 3.15 and Silica sand (SiO2) composed solely of silicon and oxygen. Found most commonly in the crystalline state, was broken down into fine granules having colour varying from brown to grey and sieve size less than 2.36mm is used. Along with this Ferrous oxide (Fe_2O_3) and Ferric Oxide (Fe_3O_4) is coated over the cement sand substrate by the action of heat.

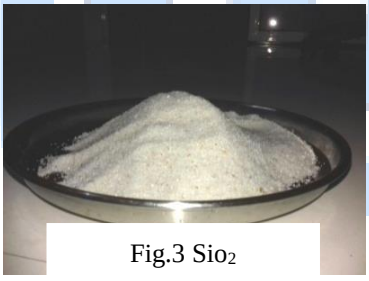

Fig.3 Sio_2

Fig.4 Cement

Fig.5 Fe_2O_3

Fig.6 Fe_3O_4

4.2 Preparation of Catalytic Substrate

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Before preparing the catalytic substrate the field study should be done to understand the design of chimney and placement arrangement at site, where we are going to place the setup. Accordingly the size and shape of substrate must be decided. In our project we prefer circular shape having diameter of 8cm. The below method is based on "Chemical vapor deposition" method or commonly known as "CVD" method. So, at early stage we required is catalytic substrate which we can prepared by the steps stated below

Firstly, Cement substrate is covered with the layer of SiO2.Than Cement substrate which is covered with sand is coated with the catalyst Ferrous oxide and Ferric oxide in various ratios as per the concentration of specimen. The whole cement sand substrate along with the coating of catalyst is kept in the muffle furnace at 500 degrees till catalyst is impregnated in the SiO2 pockets. Proper arrangement to hold the substrate is made during the preparation work of substrate. The substrate is kept at the centre of the muffle furnace to increase the quantity of sample by welding a long rod inbuilt in substrate. Care is taken to minimize human errors.

4.3 Production Of CNT's by Catalytic Substrate

As we discussed that we required the same arrangements as in case of CVD. For the place of Catalytic Substrate for Capturing Carbon Nanotubes the big furnance and high temperature ranging from 700 to 800 degree Celsius and carbon containing gases are available in any industry.

But for efficient and large production the exhaust of industries such as Rice mills, Petrochemical industries, sugarcane industries etc. are more beneficial and used in our project. The gases from exhaust of these industries consists of carbon dioxide , carbon monoxide , methane , ethane , hydrocarbons, petroleum gases ,nitrogen, hydrogen, water vapour, sulphur dioxide , other carbon particles etc.

After identifying the source the steps are very simple and can be performed easily.

The setup of catalyst-substrate prepared in laboratory is placed in the opening of industrial exhaust consisting and emitting the flue gases at different temperature zones ranging from 700 to 800 degree Celsius for 5-6 minutes. The Carbon Nanotubes get collected on this setup as during process. The whole process is repeated to test the consistency and to produce large amount of Carbon Nanotubes.

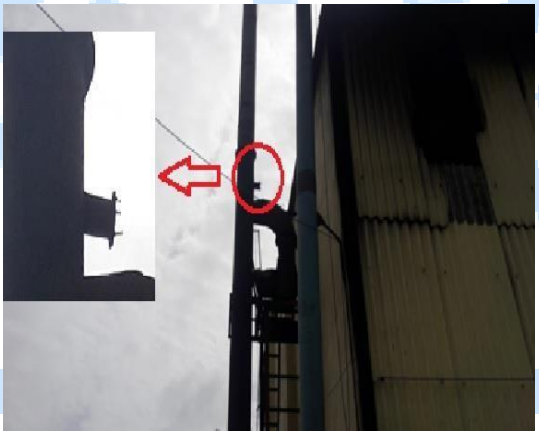

Fig.7 Opening In Chimney To Install Catalytic Substrate

4.4 Purification of Carbon Nanotubes

Nanotubes usually contain a large amount of impurities such as metal articles, amorphous carbon, and multi-shell. There are different steps in purification of Nanotubes :

1) Air Oxidation
2) Acid Refluxing
3) Surfactant aided sonication, filtration and annealing

Since we are not purifying the carbon Nanotubes because we want to perform our experiment on industrial grade CNT's.

4.5 Carbon Nanotubes In Concrete

Carbon Nanotubes can be used in cement concrete to improve the strength of the cement composites. Carbon Nanotubes have extraordinary properties, they have excellent young's modulus , elastic behavior and high tensile strength and also extraordinary thermal strength. Carbon Nanotubes significantly improve the hardness of concrete. Also it will increase the compressive strength by 50% almost 600% increase in hardness at early age of hydration and greater than 200% increase in young's modulus. CNT's can be added to the conventional type of concrete used on the construction sites like M30, M35 and M40.According to various research CNT's can fill the voids in the conventional concrete, because of these cracks the concrete can break so by adding CNT's to concrete will avoid the cracking in concrete structure too. Addition of carbon Nanotubes will not only increase the strength but also increase the durability of the structure to sustain for a longer period of time.

4.6 Dispersion Carbon Nanotubes

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Carbon Nanotubes can be functionalized to attain desired properties that can be used in a wide variety of applications. The two main methods of carbon Nanotubes fictionalization are covalent and non-covalent modifications. Because of their hydrophobic nature, Carbon Nanotubes tend to agglomerate hindering their dispersion in solvents or viscous polymer melts. The resulting nanotube bundles or aggregates reduce the mechanical performance of the final composite. The surface of the carbon Nanotubes can be modified to reduce the hydrophobicity and improve interfacial adhesion to a bulk polymer through chemical attachment.

4.7 Preparation of specimen

A powder form Carbon Nanotubes obtained from the experimental setup of catalytic substrate on chimney is taken and mixed thoroughly with the cement. Three different percentage of CNT's are used i.e. 0.015%,0.030% and 0.045% by weight of cement. Firstly, a layer of course aggregate was placed in pan mixture above which a layer of fine aggregate. Again a layer of fine and course aggregate were placed. Later, Dry mixing of aggregate was carried out for a period of 2 minutes. Then cement containing Carbon Nanotubes and water added together in the specified quantity along with admixture by 1.2% by weight of cement. Thus the wet mixing of mixture was carried out for a period for 3 minutes. After mixing, concrete was placed in mould into three layer and by tamping each layer 35 times. For the development of strength of CNT's Reinforced Concrete, curing is most important stage. The cubes were demoulded after a period of 24 hours of casting and then place in an curing pond for a period of 3days,7days, 14days and 28 days.

H. Testing of specimen

The compressive strength of the specimen was tested with Hydraulical Mechanical Testing System (MTS) Compression Testing Machine. The specimen was placed flat faced horizontal and axial load was applied at a uniform rate till failure occurred.

5. ADVANTAGES

1. The production process of CNT is highly economical process for large scale production of CNT.
2. It is a low temperature synthetic process where temperature varies from 90degC - 150degC.
3. The waste heat and flue gases are used as raw materials.
4. The production process is highly efficient and reproducible process.
5. The process reduces manufacturing cost of production of CNT.
6. The process reduces carbon emission and environmental pollution by more than 40% and thus reduces global warming.
7. It results in high yield and purity of CNT.
8. The catalyst used in the process is recyclable.

6. CONCLUSION

The Carbon Nanotubes which are directly harvested from the exhaust of the industries will have tremendous effect on the environment. As due large amount of harmful greenhouse gases that are being emitted in the atmosphere and also a large amount of these pollution comes from cement industries which accounts for about 5% of the total pollution. Due to this the temperature of the planet is increasing. Moreover the amount of oxygen is also reducing if this issue is not solved then there might be serious consequences in future. So, use of CNT's in this manner will not only have a good environmental impact but will also increase the strength and performance of concrete manifolds. These gases coming from the factories are just the waste but if harvested properly then can proved to be the best product.

7. ACKNOWLEDGEMENT

We have taken efforts in this project, however it would not have been possible without the kind support and help from the many individuals and organization. We would like to extend our sincere thanks to all the professors of Vidyavardhini College Of Engineering And Technology, Vasai Road (west). We would like to express my special gratitude and thanks to professor Tarannum Khan and professor Deepika Bhulla for giving us such attention and time.

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RECHARGING OF GROUND WATER TABLEBY USING NATURAL RESOURSES AND IDENTIFICATION OF GROUNDWATER POTENTIAL ZONE USING GIS

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ABSTRACT

In the past years drought has been one of the biggest natural disaster on the earth which has substantial impact on agricultural, ecosystem and harmful to human kind in affected areas. In such affected regions various drought prevention methods like natural ground water recharge, artificial ground water recharges are implemented. The purpose of this study is to examine the feasibility and effect of artificial round water recharge on irrigation system. Maharashtra is one of the most dearth affected region of India in past few years and its impact on agriculture is huge. Typical goals of this study and survey conducted at drought affected region in Maharashtra include profile leveling for artificial ground water recharging , evolution of water resources, identify ground water potential and examine geological parameters to make ground water recharge process more effective using GIS.

keywords—*Aquifers, Topographical, Drainage Density, Dykes, Rainfall Pattern, Slope Gradient, Soil Texture, Profile Leveling*

I. INTRODUCTION

The recharge of ground water occurs both naturally and artificially. The natural recharge occurs through the process of infiltration where the water percolates from the surface to the bed of the aquifer. But due to rapid development and stupendous growth of population in the recent past the areas for natural infiltration have been lessening day by day, hence the scope for natural recharge of the groundwater is also declining. In contrast to natural recharge artificial recharge is the use of water to replenish artificially the water supply in an aquifer. Of all the factors in the evaluation of groundwater resources, the rate of recharge is one of the most difficult to derive with confidence. Estimates of recharge are normally subject to large uncertainties and spatial and temporal variability.

The increasing demand for water has increased awareness towards the use of artificial recharge to augment ground water supplies. Stated simply, artificial recharge is a process by which excess surface water is directed into the ground either by spreading on the surface, by using recharge wells or by altering natural conditions to increase infiltration to replenish an aquifer. It refers to the movement of water through man made systems from the surface of theearth to underground water bearing strata where it may be stored for future use. Artificial recharge (sometimes called planned recharge) is a way to store water underground in times of water surplus to meet demand in times of shortage. Some applications of artificial recharge are in wastewater disposal, waste treatment, secondary oil recovery, prevention of land subsidence, storage of freshwater within saline.

Geographic information system (GIS) have become a useful and important tool in hydrology and to hydrologists in the scientific study and management of water resources. A geographic information system (GIS) is a system designed to capture, store, manipulate, analyze, manage, and present spatial or geographic data. GIS as a whole can be described as conversion to a vectorial (slope and aspect, rainfall amount, geographic information, hydrological information, map overlay, geostatic, etc) representation or to any other digitization process. This can be used for locating ground water.

II. AIM OF RESEARCH

1. Avoid excess flow of water
2. To make Gulumb free from supplyingwater by tankers
3. Water table of Gulumb area maybe increase in future so that ground water can be used for irrigation purpose
4. LOCATING PROPER POSITION OF GROUND WATER TABLE
5. To finds the higher potential ground water compares to ret of the wells.

III. METHODOLOGY

A. Methodology for Recharging of ground water table

First Stage Recharge Basins
Artificial recharge basins are either excavated or enclosed by dykes or levees. The water contact area inthis method is quite high which typically ranges from 75 to 90 percentage points of the total recharge area. In gulumb there is already one percolation reservoir which we going to use as a recharge basin.

Second Stage Run-off Conservation
Structures they are suitable in areas receiving low to moderate rainfall mostly during a single monsoon season. Adjacent village of gulumb named chandak having yearly rainfall around 2000mm having more than sufficient water so excess water gets runoff.

Third Stage Stream-channel Modification
Artificial recharge through stream channel modifications could be made more effective if surface storage dams exist upstream of the recharge sites as they facilitate controlled release of waters. The runoff water from chandak bandhara is been diverted to the reservoir in gulumb by pipeline of length 1.13km of 50mm dia. And spillway for that reservoir is also provided.

Fourth Stage Profile Leveling
It is a method of surveying that has been carried out along the central line of a track of land on which a linear engineering work is to be constructed/ laid. The operations involved in determining the elevation of ground surface at small spatial interval along a line. It is use for the determining the elevation of pipe line from steam. The operation of taking level along the line of any alignment at regular interval is known as latitudinalleveling. In this operation the back sight, intermediate sight and foresight reading are taken at regular interval at every set up of instruments. Thechaining the points are noted in the level book.

For calculating the reduce level there are two types

- The collimation system or height of instruments system (HI)
- The Rise and Fall method

Recharging of ground water described in following Fig. 1.

Green- Excess water from chandak

Blue- Reservoir of gulumb

Red- Location of pipeline
Yellow- Excess water overflows from Gulumb reservoir

Fig. 1 Satellite View

B. Methodology of GIS and remote sensing technology

The first stage is GIS and remote sensing technology is applied to prepare various thematic maps with reference to groundwater like Drainage density, contour, and stream length. Additionally, the Land Utilization Survey Database, geologic maps andon site investigation are adopted to quantitatively and qualitatively describe the hydro-geo- logical conditions of the area.

The second stage involved preparation of digital elevation model (DEM) by interpolating contour map that is digitized. From SOI toposheet DEM is used to prepare slope, aspect, flow accumulation and stream order. Methodology is widelyused for preparing runoff potential map for small to medium size engaged drainage basin.In the third stage, digital image processing of the satellite data is done for geo-referencing & geometric correction. Thisis followed by creation of different thematic layers using supervised classification technique. All the attributes from thecollected data then summed to create the buffer map for agriculture area & settlement area. It is then followed bycreation of other important data which is used to determine the ground water potential at the later stage like land Use/land cover map, geological/lineament map, geo-morphological map and hydro-geo-morphological.

In the fourth stage all above themes are further processed and analyzed in overlay and ranking is given to evaluate suitable groundwater potential zone. All the thematic layers will overlay by using GIS to find the final integrated outputof groundwater potential zones in the present study, geomorphology, slope, drainage density, Land use and land cover,geology and lineament density are considered for the identification of groundwater potential.The study area (gulumb,Wai taluka) is one the eleven talukas in Satara district in Maharashtra. The geographical extension of the study area is (Latitude of 12º7´N to 12º27´N and Longitude of 76º28´E to 76º50´E) which consists of 1000 hectors of irrigation area.The calculated average of thirty years rainfall data shows that, the rainfall ranges from 250 mm to 2500 mm, and major part of the study area has covered black cotton soil.The surface of study area maximum covered by agricultural activities which is 80 per cent of total study area.By using this map we get the values of coordinates, watersheds, latitude, longitude, contours around the research area. These fields are required to create GIS map for finding the depth of the ground water table. By using data from soil investigation, data from toposheet of that area like contours, watershed and borehole data of proposed area we are going to derive a map so that it will be convenient for farmers to locate exact location of ground water table below ground. This GIS method has been implemented in the area shown in the following toposheet Fig. 2.

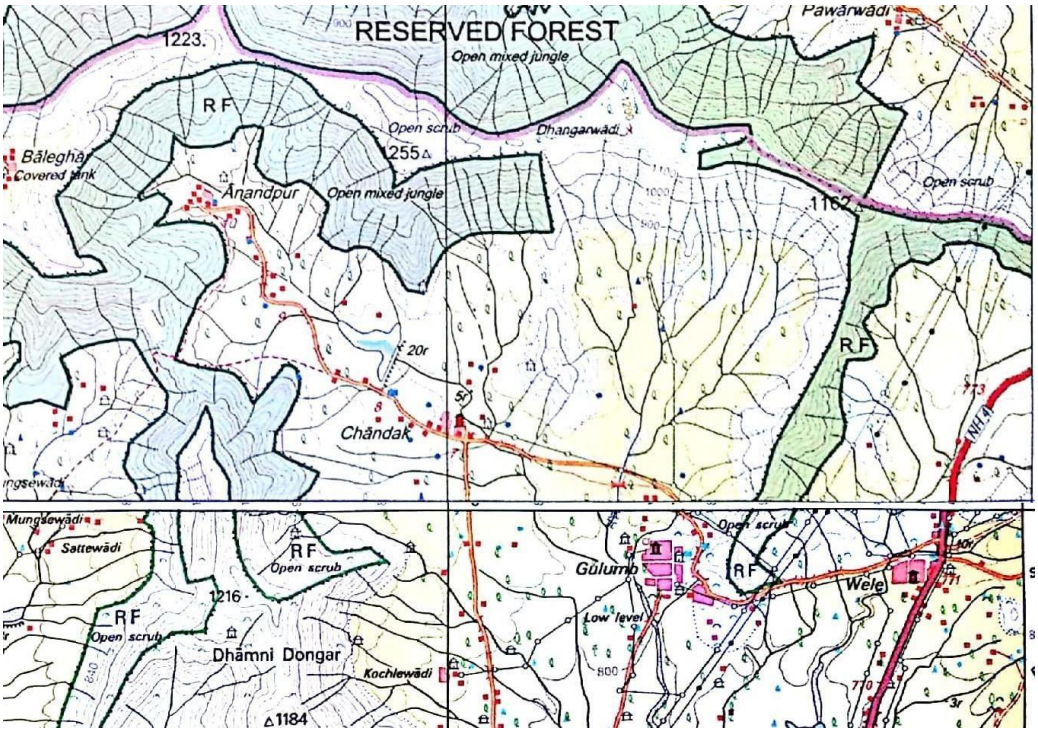

Fig. 2 Toposheet

CONCLUSION

- The ground water level near the project area will be increased.
- Geographical information system and remote sensing has proved to be powerful and cost effective method for determining groundwater potential in parts of satara district.
- The drinking Water requirement of peoples will get fulfilled from wells.
- Nearly 1000 hectors of area will get irrigated and gulumb village will get free from supplying water by tankers.
- By using GIS map of water table people will get help in finding that where to excavate a well or boreholes.
- This groundwater potentialinformation will be useful for effective identification of suitable locations for extraction of water. Further, it is felt thatthe present methodology can be used as a guideline for further research

ACKNOWLEDGMENT

We would like to thank our guide Prof. Lissy Jose, Head of Department, Department of B.E Civil, Viva Institute of technology, for her guidance and help throughout our project.

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Partial Replacement of Fine Aggregate by Crumb Rubber

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ABSTRACT

Recycling of non-degradable wastes, particularly discarded rubber tires has become a major issue since these materials have been banned from landfills and also incineration of these wastes is not environmental friendly. The adoption of light weight concrete gives an outlet for industrial waste such as scrap rubber tires, flash, clinkers etc. which otherwise creates problem for disposal of waste. Scrap tire rubber and flash are two major industrial wastes which are accumulating in huge volume every year.

Keywords— *Crumb rubber, Partial replacement, Strength, Tires, Concrete cubes*

1.INTRODUCTION

In recent years, light-weight concrete composite has become more popular constructional material owing to low density, reduction of dead load and low handling costs. The strength, durability and other characteristics of concrete depend upon the properties of its ingredients, size and proportions of mix, method of compaction and curing. the adoption of light weight concrete gives an outlet for industrial waste such as scrap rubber tires, flash, clinkers etc. which otherwise creates problem for disposal of waste. Scrap tire rubber and flash are two major industrial wastes which are accumulating in huge volume every year. Disposal of these organic and inorganic wastes is a serious problem due to severe environmental problems. With the development of technology, construction industry has opened a gateway for handling these industrial wastes.

Recycling of non-degradable wastes, particularly discarded rubbers tire has become a major issue since these materials have been banned from landfills and also incineration of these wastes is not environmental friendly. Crumb Rubber is recycled rubber from automotive and truck scrap tires. During the recycling process steel and tire cord (fluff) is removed leaving tire rubber with a granular consistency. Continued processing with a granulator and/or cracker mill, possibly with the aid of cryogenics or mechanical means, reduces the size of the particles further. The particles are sized and classified based on various criteria including color (black only or black and white). Since last few years, many attempts have been made to utilize scrap tire rubber after some processing, in composite concrete materials such as asphalt pavement, water proofing systems, and membrane liners. When dealing with asphalt overlays, reflection cracks can arise and cause an unwanted crack pattern beneath the pavement.

Used scrap tire rubber in cement based materials, after recycling it in coarse or fine rubber particles. Results showed that the rubberized composite concrete possesses lower density, higher toughness and ductility, lower compressive and tensile strength and more effective insulation. Mechanical behavior of concrete containing rubber particles has been investigated.

2.LITERATURE REVIEW

A. TUSHAR R MORE, PRADIP D JADHAO AND SM DUMME[1]:

In their study the aim was to study of waste tyre as partial replacement of fine aggregate to produce rubberizes concrete in M25 grade of mix. Different partial replacement of crumb rubber i.e., 0%, 3%, 6%, 9% and 12% by volume of fine aggregate are casted and tested for flexural strength and split tensile strength. The result shows that there is a reduction in all type of strength for crumb rubber mixture, but crumb rubber content concrete become more lean due to increase in partial replacement of crumb rubber as fine aggregate ie. 3%, 6%, 9% and 12%. Flexural strength of concrete decreases with 3% replacement of sand and further decrease in strength with the increase in percentage of crumb rubber. For split tensile strength decreases with 3% replacement of sand and further decrease in strength with their increase in percentage of crumb rubber. This is mainly due to lower bond strength between cement paste and rubber tire aggregate.

B. Prof. M. R. Wakchaura and Mr. Prashant. A. Charan[2]:

In this study they did partial replacement of fine aggregate as crumb rubber as 0.5%, 1%,1.5% and 2% in M25 grade of concrete and its effects on concrete properties like compressive strength, flexural strength were investigated. Addition to this combination of glass fiber at ratio 0.4% and 0.5% addition to the weight of cement are used to regain the reduced strength due to use of waste tire crumb rubber particle. Results indicate that replacement

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Of waste tire crumb rubber particle to the fine aggregate in concrete at ratio 0.5% and 1% there is no effect on the concrete properties would occur, but there was a considerable change for 1.5% and 2% replacement ratio. On the other hand, the rapid gain in the early strength of sea water made concrete in sea water may be due to the accelerating effects of some of the sea salts originally introduced during the mixing of concrete. Sea water containing salts like NaCl, K2SO4 which was used in making concrete, cause a more rapid dissolution of compounds of cement particularly tricalcium silicate in water and hence facilitates more rapid hydration of concrete.

So it can be concluded that relatively higher strength concrete showed better resistance against strength deterioration as compared to lower strength concrete. Thus from the study it is clear that such investigation should be carried out over a longer exposure period to get clear idea about strength deterioration of sea water mixed concrete.

C. Dr. B. Krishna Rao[3]:

In this investigation he did casting and testing of cubes, cylinders, and prisms for M20 grade of concrete and added 5% and 10% of rubber fiber by volume of concrete. There the specimens are tested for compression, split tensile and flexural strength. The test results were done and noted that due to addition of rubber fiber, strength of concrete decreases, but as observing ductility is improving. Hence it is used for medium grade of concrete. The various rubberized concrete mixes were designed in accordance with standard mix design procedure for normal concrete with grade of M20. As expected the target strength were not achieved for the mixes incorporating rubber fiber.

D. Nithiya P and Portchejian G[4]:

It this research paper the mix design was done as per IS: 10262-2009 to achieve the target strength. The concrete mixes were made by replacing fine aggregate with 5%, 10%, 15% and 20% for M20 grade concrete. So they founded that compressive strength decreases with the replacement of crumb rubber increased and 5% replacement of crumb rubber proves exceptionally well in compressive strength and tensile strength. So they founded that compressive strength decreases with the replacement of crumb rubber increased and 5% replacement of crumb rubber proves exceptionally well in compressive strength and tensile strength. It also gives more strength at 28th days for 5% replacement for M20 grade of cement and split tensile strength decreases at the maximum at the maximum of 25% when crumb rubber is replaced up to 10% of fine aggregate. Thus by replacing fine aggregate by crumb rubber safeguards the environment

E. S. Selvakumar and R.Venkatakrishnaiah[5]:

They did concrete mix as per IS:10262-2009 for M30 grade of concrete for their investigation. The specimen was casted and used to determine the compressive strength, split tensile strength and flexural strength of concrete. They were tested for 7 and 28 days with replacement of fine aggregate with 5%, 10%, 15%, and 20% of crumb rubber. Finally, they concluded that compressive strength of crumb rubber concrete with 5% replacement is 38.66 N/mm2, it is higher than the strength of normal concrete ie. 36.73 N/mm2 on the 28 days. The compressive strength of crumb rubber concrete with 10% replacement it gives acceptable strength of 33.47 N/mm2. In flexural strength of crumb rubber is lower than the strength of normal concrete and it was seen the same lowering of strength as compared to normal concrete in splitting tensile strength. So crumb rubber possess less bonding ability which effected on the strength of the concrete

F. A Mansour Ali and A. Sarvanan[6]

This paper is the experimental study on waste rubber tire concrete. The mechanical and durability properties of concrete withcomposition of crumb rubber replacing part of the fine aggregate and cement with silica fumes were investigated for M25 grade as per IS:10262-2009. Compressive strength, flexural strength and split tensile strength was conducted for each sample by these authors. Finally they concluded that there was a reduction in compressive strength and split tensile strength and increase in flexural strength when the rubber content is increased. But the target strength was achieved by addition of silica fume and rubber in the concrete as compared to the addition of rubber without silica fumes. Therefore, this study has been focused on strength and durability requirement which shows that the concrete is sustainable and use for non-structural element where the low strength is required.

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3.METHODOLOGY

Materials:

The basic ingredients of rubberized concrete and its products, which were used in this research work, are:

1- OPC (ordinary Portland cement) 43 grade.
2- Natural Coarse aggregate (sedimentary rock source).
3- Natural Fine aggregate (sand).
4- Water (fresh drinkable water).
5- Fine crumb rubber.

Concrete mix design:

In the present investigation the existing method as per IS: 10262-2009 has been used for selecting the reference mix (M30) i.e. (1:1:1), however new information given in IS 456 -2000 have been incorporated, procedure is modified to the extent. In order to get the final mix proportion for the reference mix design.

In this work an experimental study was conducted on the development of the rubberized concrete mixtures with sugar and the basic engineering properties were investigated. Totally 5 designated mix contain 5, 10,15 and 20 % of partial replacement of crumb rubber with fine aggregate and 5, 10,15 and 20 % of partial replacement of sugar with cement finally compared with conventional concrete.

Mix proportions

The mix proportions of different types of percentages of replacement mixes and obtained quantities for mixes. The mix proportions for the percentage replacement of fine aggregate with crumb Rubber and cement with sugar for the grade of concrete. Mix design procedure followed according to IS 10262: 2009. All mix proportions are designed with a slump ranging from 50-75mm, keeping the water content constant at 192 kg/m3. The water – cement ratio of 0.42 is kept constant for all mixes. Fine aggregate was replaced by crumb rubber varying from 5% to 20% by weight. Cement was replaced by Silica fume varying from 5% to 20% by volume of cement.

Casting of specimens

In the mixing process the concrete was dry mixed using hand mixing after then water was added gradually and mixed till the homogenous mix obtained. Crumb rubbers mixed with cement and then with aggregate finally mix the water. To prevent the crumb rubber initially mixed with sugar aggregate because of low specific gravity of rubber to float at the top of mixture.

Various tests to be performed on concrete mix

i. *Particle Size Distribution*

Particle size distribution for the fine aggregates; coarse aggregates and rubber were carried out in accordance with BS 812-103.1:1985.

ii. Specific gravity & Water Absorption

The specific gravity and water absorption of the fine aggregates, coarse aggregates and rubber were determined according to in BS 812: Part 2:1995.

iii. Workability

The workability was determined by means of the slump test and was conducted according to with BS EN 12350-2:2000

iv. Slump test

The slump factor is used to measure the horizontal free flow known as workability of concrete. The test has been carried out for M30 grade concrete and results are shown that it has been identified all the rubber replaced with fine aggregate concrete might behaved low value compared with conventional concrete. Hence it is preferred to make use of workability with 0.45 water cement ratio.

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Fig 1: Slump Cone

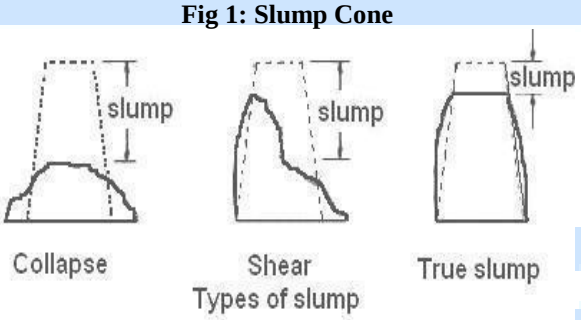

Fig 2: Types of Concrete Slump

v. Compressive strength

The purpose of compression test is to determine the crushing strength of hardened concrete. Compression test was carried out on cube. The compressive strength test is carried out in compression testing machine of 3000 KN capacity. The ultimate strength is recorded

After the specimens fail to resist more loads. The compressive strength can be calculated by using formula:-

Compressive strength = failure load/ crosssectional area.

Fig 3: CTM

vi. Durability property test

In crumb rubber concrete most of the research work shows that rubber treated with chemicals like sulphuric acid, hydrochloric acid, and sodium hydroxide etc. gives roughness to the material and are easily bonded with concrete to gain strength. Based upon this point of view durability property with acid curing for 28 days compressive strength is to be done instead of treatment of rubber with solutions.

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4. CONCLUSION

- According to various theory's and case study of different professors it is clear that, there is a decrease in compressive strength with a replacement of fine aggregates by crumb by more than 5%.
- But a clear study by then refers that the flexural strength and durability of concrete increases with the replacement of fine aggregates by crumb rubber.
- In replacement of fine aggregates by crumb rubber by 5% there is a slight change in compressive strength Decreases And as we increase the replacement the compressive strength goes on decreasing simultaneously.
- The decrease in compressive strength is due to weak bonding that is formed between cement and rubber. Thus addition of rubber makes the water cement ratio bit lower compare to the one with 0% replacement of rubber.

5. ACKNOWLEDGEMENT

We would like to acknowledge Dr. Arun Kumar, principal of VIVA Institute of Technology and Prof. Lissy Jose, HOD of Civil Department for helping us out in this project. Their contribution in this project is invaluable. We would also like to express our gratitude to our fellow students who helped in the completion of this project.

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"Design and Analysis of Forest Research Centre"

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ABSTRACT

The basic principle behind this project is to construct a building which is energy efficient in nature in the premises of a forest area. The building comprises of various technologies such as solar lighting, street light generation on solar and wind energy, green walls, rain water harvesting, green pavers, coffered ceilings, smart glass, cross roofing solar panels. The main objective is to enrich the natural environment in such a manner that neither of the resources are degraded and the outcome gives us a better future in the field of civil engineering.

Keywords— coffered ceilings, smart glass, cross roofing solar panels, solar lighting, street light generation on solar and wind energy.

1. INTRODUCTION

The Indian Council of Forestry Research and Education (ICFRE) is an autonomous organization or governmental agency under the ministry of environment and forests, government of India. headquartered in Dehradun.
Its functions are to conduct forestry research; transfer the technologies developed to the states of India and other user agencies and to impart forestry education.The council has 9 research institutes and 4 advanced centres to cater to the research needs of different bio-geographical regions.These are located at Dehradun, Shimla, Ranchi, Jorhat, Jabalpur, Jodhpur, Bangalore, Coimbatore, Allahabad, Chhindwara, Aizawl, Hyderabad and Agartala.

2. AIM OF PROJECT

1.To encourage participation of the people and institutions in plantations related activities.
2.To enhance sustainable forest management systems.
3.To develop the Socio-economic and policy research strategies towards attracting people's participation in forest management.
4.To research on improved utilization, recovery and processing of forest produce for value addition and employment generation.

3. OBJECTIVES OF PROJECT

1.To study the literature review regarding FRC.
2.To perform case study on previously built FRC.
3.To perform a preliminary survey for FRC in our State
4.To understand the requirements of the proposed FRC
5.To perform survey of land to get exact area location and dimensions
6.To study various technologies that can be used in the proposed FRC
7.To carry out invention of new technology for proposed FRC based on drawbacks of previous case study.
8.To make a proper layout of components to be built in proposed FRC in AutoCad software.
9.To make basic model of the proposed FRC.

4. LITERATURE REVIEW

Our project Design and Analysis of Forest Research Centre has its base confined on various papers and case studies published in the journals. A quick review of the same is given as follows.

A: "Green Building Architecture: a Literature Review On Designing techniques" "kushagravarma, mayankchaurasia, tariqahmed" (February 2014) [1]: Green building are today the most widely used form of architecture. Creating green building is an important focus of building owners and even governments worldwide. In India some world class Green Buildings have constructed in past few years, but still the concept of Green Buildings for general masses is in infancy stage. Present work is an attempt in the direction to make people,communities and general public aware about the advantages of Green Buildings for sustainable environment development and management.

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B:"Towards the implementation of the Green Building Concept in agricultural building" "M.Samer" (july 2013) [2]: According to the issues raised in this study, it can be concluded that: 1) The existing livestock barns and greenhouses do not comply with the green building concept as they miss some or most of the properties that formulate the green building aspect. Hence, the implementation of the green building concept in agricultural buildings is still limited; and, therefore, should be conceptualized and initiated. 2) In order to make the construction of green buildings cost-effective, the agricultural wastes, e.g. plant residues, should be used as green building materials. 3) The green building and agriculture are interdependent. Precisely, the agricultural wastes and the biowastes can be used to make sustainable and recyclable green building materials on the one hand and green buildings provide sustainable agricultural structures on the other hand. 4) An agricultural green building assessment and rating system should be developed in order to be implemented in assessing and rating the livestock barns and the greenhouses. 5) Most of the green building materials should enter the natural cycle i.e. originate from the nature and turn back into the nature where it will break down.

C:"Review on Intelligent Street Lighting System""Kavita A. Bajaj, Tushar S. Mote" (IJSR 2013) [3]: This project describes an intelligent street lighting system using LED supplied by solar energy and with a control system for efficient management. This features switching on the lights only when necessary increasing the energy saving and Lamps lifetime. The wireless nature of the control system using ZigBee offers very less maintenance and flexible, extendable and fully adaptable user needs in rural and urban areas. The simplicity of ZigBee, the reliability of electronic components, the feature of the sensor network,the processing speed, the reduced costs, and the ease of installation are the features that characterize the proposed system, which presents itself as an interesting engineering and commercial solution as the comparison with other technologies.

D: "Sustainable Building Material for Green Building Construction, Conservation and Refurbishing","Usman Aminu Umar , M. F. Khamidi and Hassan Tukur", Management in Construction Research Association (MiCRA) Postgraduate Conference,(December2012).[4]: Sustainable building materials by definition are materials which are domestically created and sourced which decreases transportation costs and CO2 emissions, they could consist of reused materials, they possess a lower environmental effect, they are thermally effective, they need less energy than conventional materials, they make use of renewable resources, they are lower in harmful emissions and they are economically sustainable. A sustainable building material needs to be used properly and contextually in every community development. The application of sustainable building materials not just minimizes transport costs, carbon emissions, and in most cases materials costs, it also offers employment and skills development opportunities for community members. Sustainability as an alternative criterion for building materials are generally chose through functional, technical and economical specifications. Nevertheless, with sustainability as a crucial challenge in the past decades, particularly in developed nations, the environmental load of building materials additionally become a more significant requirement. The construction sector, directly or perhaps indirectly creating a substantial portion of the annual environmental destruction, may take up the obligation to promote sustainable development by finding more environmentally kind approaches to construction and building. Among the directions for solutions is to be seen in new material applications, recycling and reuse, sustainable manufacture of products, or use of green resources.

5.METHODOLOGY

To commence with the procedure adopted in designing and planning of forest research centre, there are a various steps to be followed. They are as follows:

A.Survey

Fig.1 Entrance gate of SGNP

Amongst the four National Parks in Maharashtra State, Sanjay Gandhi National Park (previously known as Krishnagiri Upawan and later as Borivali National Park) is a beautifully preserved green oasis withing the confines of Mumbai Metropolis and the adjacent Thane Dist. Sanjay Gandhi National Park (SGNP) is situated at about 25 kms north of Mumbai city and is only 8 Ions from the shores of Arabean Sea. The park exhibits unbelievable diversity of terrain from 30 m to almost 500 m above mean sea level and presents varied habitats ranging from coastal to typical dry and mixed deciduous forests of northern western ghats. It boasts of two large water bodies (Tulsi and Vihar lakes) (Fig. 1) with a combined water spread area of about 8.62 sq. kms and also ofa number of 2000 years' old Buddist caves (104 caves) popularly known as Kanheri caves. The two lakes form one of the major sources of drinking water for Mumbai

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Metropolis, while Kanheri caves attracts huge masses of tourists every year. Besides, the National Park has been a heaven for field biologists and naturalists since its inception in 1952. Due to its proximity to Mumbai city, SGNP is one of the most highly visited National Parks in India. SGNP spreads over 103.97 sq. kms and lies at the northern part of the rich forest belt of the Western Ghats. The entire park is hilly and undulating with a few stretches of plain lands. The salient features of SGNP are as follows :

1. Location Mumbai, Maharashtra State.
2. Longitude 72°53 'E to 72°58"E
3. Latitude 19°5.S'N to 19~ 1 'N
4. Distance from CST About 35 km Rly. Stn., Mumbai.
5. Distance from CST About 20 km Aiport, Mumbai
6. Distance from Borivali About 3 km Rly. Stn.
7. A tribal community named "Warlis" resides in this region.

The population is distributed in well-separated small hamlets. However, the park is under heavy and serious pressure of deterioration by the urban population encroachments and' huge masses of visitors particularly in the recreation sector and Kanheri Caves Zone. This results in exceeding of the tourist carrying capacity of the Park ecosystem leaving behind the deleterious effects.

6.QUESTIONS ASKED TO VILLAGERS DURING SURVEY

Hello sir, we are students from Viva Institute Of Technology belonging to department of civil engineering and we are here to do a basic survey of this area for our final year project. Would you please help us do the same.

1. So to begin with, will you please tell us your good name?

Sorry, but we cant disclose our identity as we are residing in government quarters and if our name gets leaked, it would create problems to us.

2. Since how many years are you people residing over here?

We are residing here for almost 50 to 80 years.

3. What is the main source of income of people living in this national park?

Mainly people living in this national park prefer going out for job purpose and women go to do household work and in case of income within national park, women do gardening and men do forest security guard work.

4. Is agricultural activities practiced over here?

No. This is a land under forest department and they do not allow to do any sort of cultivation. And this land is sort of barren land, nothing has grown over here since many years.

5. What are the facilities provided by government?

They provide us basic water supply and electricity with considerably high cost. As in we have only a Bulb in our hut to provide light. No fans or any such equipment and still we pay a sum of Rs. 1000 to 2000 to the government for electricity.

6. Is there any school for the small children in this national park?

No. Either the children stay uneducated or they go out of the national park for education on daily basis.

7. What is the mode of transportation for the local villagers?

The villagers often go walking wherever they want to go. As there is no such facilities provided.

8. Is the government providing enough safety to the villagers?

Well ! You must have heard about the wild animals eating the small kids of our Village and this happens so frequent from that you may assume how safe we actually are. We are not provided with any kind of arms and ammunitions. Our ancestors used to reside here and so we are entitled to stay here with a constant fear in mind.

9. As we stated earlier we are here for our final year project and as we are students from civil branch, we aim to build a forest research centre in this vicinity which would prove beneficial to both the government and the local residents. So if there is a structure constructed here, what facilities would you wish for within that structure?

The main facility which we require are medical services. The gates of national park closes at 7 pm and even in case of emergency we stay helpless as there is no medical equipments or services inside the national park. Majorly the residents are of Adivasi tribe and they are already afraid of the modernized medical facilities and this results into a number of prematured deaths. The second need is basic education to the young generation as that is the need of the hour. It would be really great if your structure would provide some kind of occupation or income to the local bodies.

10. And what about the safety?

According to me, if your structure would generate electricity by its own and if our streets get illuminated by that then we would have a sense of safety. Thank you for helping us to do the survey for our project. We hope to see you soon for futher considerations.

B. REPORT

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Fig.2 Vacant Plot In The Premises Of Sanjay Gandhi National Park

STUDY REPORT FOR FOREST RESEARCH CENTRE

On 30thjuly 2017, we visited sanjay Gandhi national park to do a preliminary survey on our project topic "design and analysis of forest research centre" for the same purpose we did survey of the vacant plots in the vicinity of sanjay Gandhi national park and based on our observation we found a vacant plot near the entrance of the national park. And for the same plot we enquired the local bodies who are habited there for around last 40-50 years. The said plot is neither an agricultural plot nor forest covered plot. It remained vacant for year with no considerable productive activity. The co-ordinates of the plot are 19.2227221,72.8737645.After which we performed a plane table survey of the plot to get exact parametres within which we can build our forest research centre.After enquiring with the local bodies and adivaasis who areliving there for years the main problems faced by them are as follows:

1. No proper distribution of Electricity- Even though the huts only have 1 bulb to illuminate their entire housing area but still they pay average amount of Rs. 1000/month for electicity usage.
2. Often encounter with wild animals- Due to lack of streetlights there is always a danger to the villagers to roam freely in the dark. Every month cases of children killed by wild animals are registered.
3. Lack of safety to the villagers- the villergers are unsafe from the attact of wild animals, they don't have any arms and ammuniation for their safety.
4. Lack of transportation- during night time there is no transport facility available for villagers.
5. Lack of medical services- no medical service is available for the villagers even at the day time, they have to travel around 2 km for clinic/hospital.
6. No street light- authority has not provided any street light, so the villagers who go on duty in jungle has to carry their own torch, which is not safe at all.

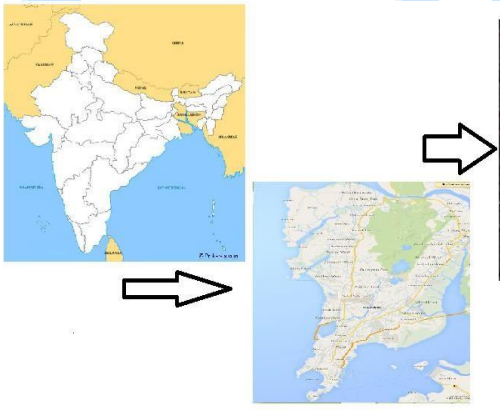

Fig. 3.Location Of The Plot on Map

Fig. 4. Proposed Plot

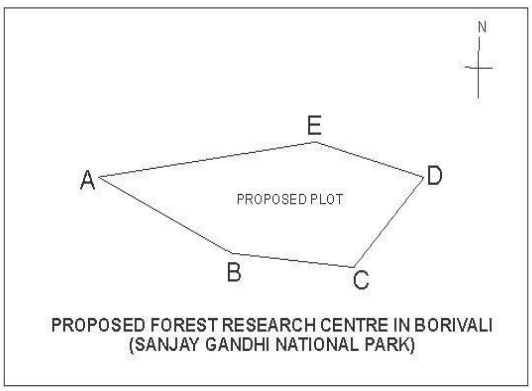

Fig. 5 Proposed plot

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7. SUMMARY

1. To begin with the project named Design and Analysis of Forest Research Centre, we studied what actually a forest research centre is.
2. We had a overlook of various forest research centres in our nation.
3. From that study we came to know the major aim and objectives of our project.
4. Further on the same topic we did detailed study on the basis of case study of various Forest Research Centres.
5. We referred various papers published by different authors and also with the help of internet we found out many more interesting technologies that can be used within the structure for the betterment of the people.According to the previous study we did a preliminary survey to get proper land for our project, we performed proper land survey for the same. And based on all the above results we did a basic planning of how the structure would finally look like, what components should be added or what technologies that can be used.

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Partial Replacement of Bitumen by Rubber Crumbs in Flexible Road Pavements

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ABSTRACT

The use of four wheeler vehicles, two wheeler vehicles etc. is increasing day by day. As a result amount of waste tyres also increasing. Waste tyres in India are categorized as solid or hazardous waste. It is estimated that about 60 percent of waste tyres are disposed via unknown routes in the urban as well as rural areas. This leads to various environmental problems which include air pollution associated with open burning of tyres (particulates, odour, visual impacts, and other harmful contaminants such as polycyclic aromatic hydrocarbon, dioxin, furans and oxides of nitrogen) and aesthetic pollution. Therefore, it is necessary to utilize the wastes effectively with technical development in each field. The waste tyres can be used as well sized aggregate in the various bituminous mixes if it is cut in the form of aggregate and can be called as rubber aggregate. This not only minimizes the pollution occurred due to waste tyres but also minimizes the use of conventional aggregate which is available in exhaustible quantity

Keywords: *Waste tyre, Bituminous material, Flexible pavements, Crumb rubber, Modified bitumen, Quieter roads.*

1. INTRODUCTION

Nowadays, only a small percentage of waste tyres are being land-filled. The Recycled Tyre Rubber is being used in new tyres, in tyre-derived fuel, in civil engineering applications and products, in moulded rubber products, in agricultural uses, recreational and sports applications and in rubber modified asphalt applications. The benefits of using rubber modified asphalts are being more widely experienced and recognized, and the incorporation of tyres into asphalt is likely to increase. The technology with much different evidence of success demonstrated by roads built in the last 40 years is the rubberized asphalt mixture obtained through the so-called “wet process” which involves the utilization of the Recycled Tyre Rubber Modified Bitumen’s (RTR-MBs). Since 1960s, asphalt mixtures produced with RTR-MBs have been used in technologies and specifications related to the production, handling and storage of RTR-MBs and on their current applications within road asphalt mixtures. Furthermore, considering that RTR-MBs technologies are still struggling to be fully adopted worldwide, mainly because of poor information, lack of training of personnel and stakeholders and rare support of local policies, the present work aims to be an up-to-date reference to clarify benefits and issues associated to this family of technologies and to finally provide suggestions for their wide-spread use.

The increasing number of vehicles on the roads of industrialized and developing nations generates millions of used tyres every year. About 1.4 billion tyres are sold worldwide each year and subsequently as many eventually fall into the category of end of life tyres (ELTs). Moreover, the amount of ELTs in Europe, US and Japan are about to increase because of the projected growing number of vehicles and increasing traffic worldwide. These tyres are among the largest and most problematic sources of waste, due to the large volume produced and their durability. The US Environmental Protection Agency reports that 290 million scrap tyres were generated in 2003 (EPA, 2007). Of the 290 million, 45 million of these scrap tyres were used to make automotive and truck tyre re-treads. In Europe every year, 355 million tyres are produced in 90 plants, representing the 24% of world production. In addition the EU has millions of used tyres that have been illegally dumped or stockpiled. The inadequate disposal of tyres may, in some cases, pose a potential threat to human health (fire risk, haven for rodents or other pests such as mosquitoes) and potentially increase environmental risks.

2. Waste Scenario in India

The consumption of plastics have increased from 4000 tons/annum (1990) to 4 million tons/annum (2001) and it is expected to rise 8 million tons/annum during the year 2009. Nearly 50 to 60% of the total plastics are consumed for packing.[2] Once used plastic materials are thrown out. They do not undergo bio-decomposition. Hence, they are either land filled or incinerated. Both are not eco-friendly processes as they pollute the land and the air.

Waste tyres in India are categorized as solid waste or hazardous waste. It is estimated that about 60% of (retreaded) waste tyres are disposed via unknown routes in the urban as well as rural areas. The hazards of waste tyres include- air pollution associated with open burning of tyres (particulates, odor, visual impacts, and other harmful

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contaminants such as polycyclic aromatic hydrocarbon, dioxin, furans and oxides of nitrogen), aesthetic pollution caused by waste tyre stockpiles and illegal waste tyre collecting and other impacts such as alterations in hydrological regimes when gullies and watercourses become waste sites.

Objectives of Using Rubberized Bitumen

- To increase the strength and durability of flexible road pavements by adding rubber tyre crumbs
- To minimize the pollution caused by the disposal of rubber tyres

Advantages of Rubberized Bitumen

The advantages of modified bitumen can include one or more of the following for road works.

- Lower susceptibility to daily & seasonal temperature variations.
- Higher resistance to deformation at elevated pavement temperature.
- Better age resistance properties.
- Higher fatigue life of mixes.
- Better adhesion between aggregates & binder.
- Prevention of cracking & reflective cracking.
- Can help reduce highway noise.

3. METHODOLOGY

Materials

1) Aggregate and Binder Assessment

Trials mixes were prepared, a range of different aggregate and bitumen types were assessed to determine their physical, mechanical and rheological properties. The compatibility of aggregate and bitumen pairings was also determined using the Net Adsorption test.

2) Aggregate

Crushed rock is used as coarse aggregate with crushed rock fines, natural sand or a mixture of both used as fine aggregate. Aggregate grading and shape are also important factors as these can affect both porosity and durability.

3) Bitumen

Bituminous materials or asphalts are extensively used for roadway construction, primarily because of their excellent binding characteristics and water proofing properties and relatively low cost. Bituminous materials consists of bitumen which is a black or dark coloured solid or viscous cementitious substances consists chiefly high molecular weight hydrocarbons derived from distillation of petroleum or natural asphalt, has adhesive properties, and is soluble in carbon disulphide. Tars are residues from the destructive distillation of organic substances such as coal, wood, or petroleum and are temperature sensitive than bitumen. Bitumen will be dissolved in petroleum oils where unlike tar

3.1 Process of Making Rubberized Bitumen

This terminology is related to the system of producing RTR-MB with the original wet process proposed by Charles McDonald in the1960s.[5] The McDonald blend is a Bitumen Rubber blend produced in a blending tank by blending Crumb Rubber and bitumen. This modified binder is then passed to a holding tank, provided with augers to ensure circulation, to allow the reaction of the blend for a sufficient period (generally 45–60 min). The reacted binder is then used for mix production. Continuous Blending-reaction Systems: This system is similar to the McDonald process of blending, the difference is that CRM and bitumen are continuously blended during the mix production or prepared by hand and then stored in storage tanks for later use. Therefore, it consists of a unique unit with agitators, in which the reaction occurs during the blending.

Bitumen of grade 60/70 or 80/100 is usually used for construction of pavements. Rubber Crumbs are obtained from waste rubber tyres used by heavy transportation vehicles. These rubber crumbs are obtained by shredding the rubber tyres to a size of 1mm – 0.75mm.

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The material is usually mixed in the following ratio:-

1) Bitumen- 72-82%
2) Extender Oil- 0-4% (It may or may not be necessary to use)
3) Rubber Crumbs- 18-24%

These materials are mixed in a mixer at 3000 rpm for 45-60 mins at a temperature range of 180-220º C. The mix obtained has a usable life of around 4-6 hours.

Table No. 1

Tests to be Performed on Bitumen

Sr. No.	Name of Test	IS Code Number
1	Penetration Test	IS:1203-1978
2	Ductility Test	IS:1208-1978
3	Softening Point Test	IS:1205-1978
4	Specific Gravity Test	IS:1202-1978
5	Viscosity Test	IS:1206-1978
6	Flash and Fire Point Test	IS:1209-1978
7	Float Test	IS:1210-1978
8	Determination of Water Content	IS:1211-1978

4.CONCLUSION

Our projects relies on partial replacement of bituminous materials which are extensively used for roadway construction, primarily because of their excellent binding with crumbled rubber so as to enhance its strength characteristics and to improve its water proofing properties. It is seen that rubberized bitumen has low temperature susceptibility and better age resisting properties. Thus based on our study of various papers we expect an increase in strength and durability of rubberized concrete by about 20%.

5.ACKNOWLEDGMENT

This research was supported/partially supported by Viva Institute of Technology. We are thankful to our Prof. Ashish Shetty who provided expertise that greatly assisted the research, although they may not agree with all of the interpretations provided in this paper.

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Strengthening of RCC structures by NSM Technique

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Abstract— ***Near surface mounted (NSM) FRP reinforcement has recently emerged as a promising technology for strengthening concrete structures in both flexure and shear. This technique has numerous potential advantages over externally bonded FRP strengthening systems, and is typically able to more fully employ the strength of FRP materials because of superior bond performance. Research to date has focused primarily on overall member behaviour and/or the various parameters that affect the bond performance of available NSM systems. FRP strengthening systems are known to be susceptible to deterioration of mechanical and bond properties. An experimental program was conducted to investigate the shear and flexural performance of NSM FRP beams. This technique consists of placing FRP in a groove cut into the surface of the member being strengthened. The FRP bar may be embedded in an epoxy- or cementitious- based paste, which transfers stresses between the substrate and the bar. The study was carried out up to the failure load.***

Keywords— Glass Fiber Reinforced Polymers, Strengthening, Concrete, Beams, Flexural, Shear, Bond

1. INTRODUCTION

Infrastructure throughout the industrialized world is showing significant and worrying signs of increasing deterioration. With these huge infrastructure deficits, novel approaches for the design, construction and repair of infrastructure must be developed. The experimental work confirms the fact that continuous FRP reinforcement column wrapping increases ultimate displacement and ultimate strength.

The use of fiber reinforced polymers (FRPs) in civil engineering applications has emerged over the past 15 years, and FRPs are now providing a number of novel approaches for both new construction, and particularly for repair and strengthening of existing structures. Fibers are typically made of carbon, glass or aramid. However, the use of FRPs in NSM applications is a relatively new idea. Basic characteristic of FRP materials and method of mounting FRP bars within the concrete i.e. near surface mounted techniques is presented. In this newer technique, FRP bars or strips are used as reinforcement with either epoxy or cement-based adhesives. Externally bonded FRP laminates have been successfully used to increase the flexural and/or the shear capacity of reinforced concrete (RC) and masonry members. The use of near- surface-mounted (NSM) FRP bars is an attractive method for increasing flexural and shear strength of deficient RC members. Near-surface mounted (NSM) glass fiber reinforced polymer (GFRP) laminate strips are used to increase the load-carrying capacity of concrete structures by inserting them into slits made in the concrete coverof the elements to be strengthened and gluing them to the concrete with an epoxy adhesive. This method is often able to utilize a greater proportion of the full strength of the bonded FRP prevent premature debonding failures. NSM techniques have become popular due to its specific bond characteristics which can enable more use of FRP.In order to take full advantage of ductility of RC member it is desirable to ensure that flexure rather than shear governs the ultimate strength.

1.1 NSM BACKGROUND

NSM reinforcement for strengthening concrete structures is not a new idea; the basic technique can be found in literature dating as far back as 1948 (De Lorenzis 2000), although these older applications used steel bars or rods as reinforcement and cement mortar as adhesives.

The available literature in this area encompasses two broad testing categories, bond tests and member tests. These two areas have arisen because, in flexural strengthening applications with NSM reinforcement, as is the case with externally-bonded FRP sheets, members can typically be analyzed using the same assumptions that are used for conventional reinforced concrete members.

Bond Tests

Previous researchers have noted that in NSM FRP applications “bond is of primary importance, since it is the means for the transfer of stress between the concrete and theFRP reinforcement in order to develop

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composite action". It can also be found that the larger the groove size the higher the bond strength, except in cases with cement-based adhesive and spirallywound bars, for which pull-out failure at large groove sizes lowered the bond strength because of large

Member Tests: Flexural Strengthening Several authors have studied the overall performance of reinforced concrete beams strengthened in flexure with NSM FRP bars. Experiments on four full-scale NSM FRP strengthened reinforced concrete T-beams tested in four point bending

were reported. Strength gains between 25.7% and 44.3% were observed when strengthened beams were compared to the unstrengthened control beam.

1.2 STRENGTHENING PROCEDURE

The NSM technique consists of the installation of FRP reinforcing bars in slots grooved in the masonry surface . The strengthening procedure can be summarized as: (1) grooving of slots having a width of approximately one and a half times the bar diameter and cleaning of surface, (2) application of embedding paste (epoxy-based or cementitious-based) (3) encapsulation of the bars in the groove and (4) finishing.

There would be an increase in both flexural strength (10%-98%) stiffness and yield

Strength (10%-47%) for all NSM FRP strengthened specimens Usage of NSM techniques is suitable in the following cases:

1. If the reinforced is susceptible to damage
2. If the concrete has low tensile strength
3. If the surface of concrete is rough

Due to concrete casting conditions, under the tensile longitudinal bars exist a concentration of voids and defects on the microstructure of the material.

2. STRENGTHENING TECHNIQUE

2.1 PRELIMINARY REMARKS

In this research methodology the specimens of beams would be casted and their shear strengthening would be checked when the GFRP are used; the aim is to find out the mechanical and physical properties of GFRP and their interaction with concrete. A detailed analysis related to the compressive strength of concrete when subjected to such fibers will be done in addition to the check of flexural strength of concrete by using near surface mounted techniques.

2.2 DESIGN TECHNIQUES

In this technique's grooves would be cut on the specimen of beams and GFRP would be induced in it. Also the minimum clear cover at which the desired grooves need to be cut should be specified and be used accordingly. The groove filler is a medium of transfer of stresses between GFRP and concrete . The given specimen of beams would be tested under one point loads and two point loads using pull out tests .The mechanism of cover splitting bond failure in NSM system is very much similar to splitting bond failure of steel deformed bars in concrete. Along with GFRP carbon fibers can also be used to increase the strength of concrete . Several fiber materials are available e.g.: glass, aramid , carbon etc. as fibers have linear elastic behavior until failure. The type of filler material used can change the failure mode and the old concrete and filling material could be a weak point.

2.3 ASSUMPTIONS USED TO SIMPLIFY THE CALCULATIONS

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2.3.1 Concrete and GFRP behaves elastically and isotropically. (ii)No slip is allowed at the interface of bond. (iii)Bending stiffness of the concrete beam to the strengthened is much greater than the stiffness of composite plate. Here the study of interaction between the flexural- shear cracking and bonded stress is very crucial.

3. MATERIALS PROPERTIES

Glass fiber reinforced polymer (GFRP) rods of 8 mm in diameter were used The properties of the hardened concrete (compressive strength, tensile strength and instantaneous elastic modulus) were measured at 28 days on concrete cylinders. The specimens were stored for 28 days in a

confined room (T = 250C). The tensile strength was obtained from splitting tests A total of 10 beams, 1.0 m long and of rectangular (230 x 450 cm) cross-section, were cast and tested under a monotonically increasing one point and two point load. Installation of the NSM GFRP began by cutting grooves with specified dimensions into the concrete cover in the longitudinal direction at the tension side of the specimen beam .The grooves were cleaned using airbrushing pressure to remove debris and fine particles so as to ensure proper bonding between the filling material and the concrete.

Cement, fine aggregates, coarse aggregates, water, glass fibers, and conventional skeletal steel used throughout the investigation.

Sr No	Test	Results	Requirement as per IS:1489 (part1)
1	Fineness Specific Surface (m^2/kg)	329	Not less than 300
2	Setting time Initial Final	150 210	Not less than 30 Not less than 150
3	Soundness Le-chatelier Expn Drying shrinkage	1.0 0.004	Not more than 10mm Not more than 0.15%
4	a)Normal Consistency b)Temp. during testing (degree.C)	27.5 27±2	

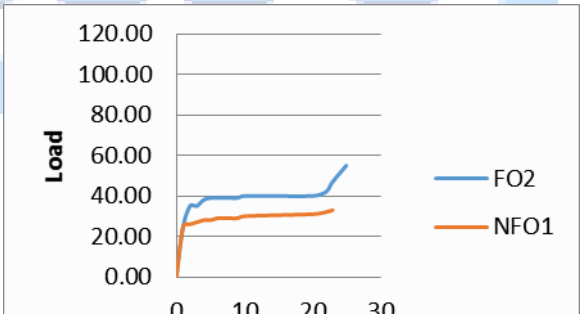
a. EXPERIMENTAL PROGRAMME

The experimental programme consists of casting and testing of 11 simply supported beam specimens.

The specimens are classified into two sets of beams. The first group of beam consists of 1nonfibrous beams and 8 fibrous beams and second group consists of one fibrous and one none fibrous beams having conventional steel reinforcement

Testing was done using hydraulic jack with single point load (UNIVERSAL TESTING MACHINE….1000KN) . Two point loading is used to study flexural behavior of beams corresponding to the depth at loading points.

Shape	Cylindrical(glass fibre)
Fiber length	12mm
Packaging	85gmsor as per requirement



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Form	Filament(Coated with special Dispersive agent for crack prevention)

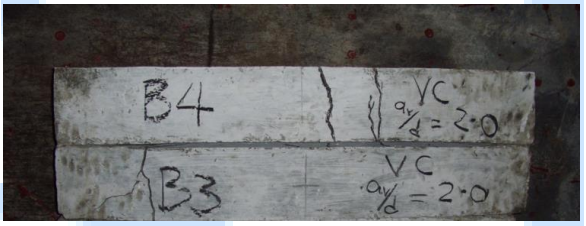
Characteristics

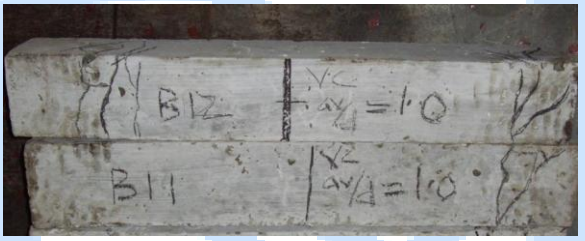
Fiber density	0.0000091 N/mm^3
Specific area	200 m^2/kg
Melting point	160 ^{0}C
Water absorption	Less than 0.1%

b. TEST RESULTS SINGLE

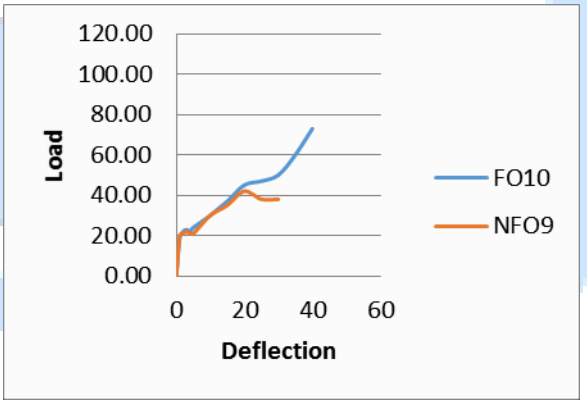
POINT LOAD TESTING

FO- FIBROUS BEAMS NFO-NON FIBROUS BEAMS LO -LONGITUDINAL LAYER TR -TRANSVERSE LAYER (BY making use of NSM techniques). Beam FO1 to FO 8 failed in shear, whereas NFO9 & FO10 failed in Flexural





Beam	*Mcr* (kNm)	Shear strength	Midspan deflection	WRAPPING LAYERS	DISTANCE FROM NEUTRAL AXIS IN TENSION ZONE (mm)
NFO1 230X450	20.4	32	25	NONE	NONE
FO1	29.5	58	30	LO	25
FO2	32.3	55	25	LO & TR	50
FO3	35.2	60	28	LO	100
FO4	36.5	75	35	LO	175
FO5	38.2	60	32	LO	150
FO6	40.6	80	34	LO & TR	100
FO7	34.1	55	37	LO	75
FO8	33.9	65	33	LO	50
NFO9	25.6	39	30	none	None
FO10	34.5	73	40	LO	125



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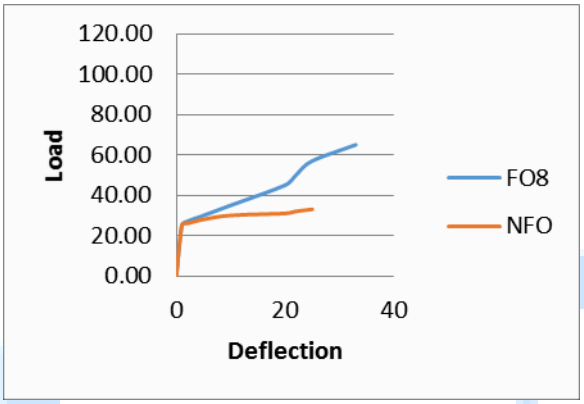

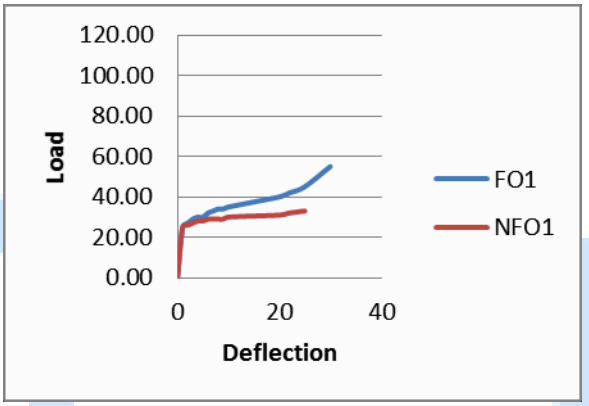

4. CONCLUSION

The NSM technique using GFRP is very effective in enhancing the flexural and shear strength of reinforced concrete beams whatever the filling material (resin or mortar) used(as seen in graphs) .The effectiveness of NSM shear strengthening may be influenced by the position of steel stirrups. Results of this parametric study has shown that the strengthening efficiency depends upon the groove depth and the types of fibers explanation to the features of above failure mechanisms affecting the behavior shear strengthening of RC beams using NSM GFRP strips has been proposed. In future more extensive research work can be carried out to solve the problems caused by, fatigue damages of concrete and bonding interface of GFRP strengthened concrete structures .The reinforcement with NSM FRP has enhanced the performances of the strengthened. beams both in terms of failure load and ductility;. In future effect of existing steel transverse reinforcement ,span to depth ratio by applying glass or carbon fibers needs to be considered

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Review on Risk Analysis Using Fuzzy Logic

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ABSTRACT

Construction projects are always unique which may undergo risks at each stage as per the progress of work compared to other industries. Risk Management in projects is the art and science of managing risks. Risk may be defined as the measure of consequence and probability of occurrence of uncertain events which may lead to delay in achieving project goals. For effective risk management, risks should be identified and evaluated in a systematic manner. Risk analysis is a part of risk management which shall help to avoid risks by systematic process of estimating the level of risks. Risk analysis involves the ranking of risks with qualitative risk assessment and quantifying the risk exposures for mitigating high exposure risks. In this paper, the risk analysis of risks which may occur in construction projects is carried out by using RII method which helps to determine the relative important indices of various risk factors. The construction of respective risk assessment model in fuzzy logic interference system of MATLAB software is also discussed.

Keywords: *Risk, Risk Analysis, Risk Management, Fuzzy Logic, Relative Importance Index (RII)*

1. INTRODUCTION

Construction projects are facing uncertain environments, which increase the size and complexity of the project, degree of impact of environmental issues, level of involvement of external agencies, complexity of financing, delay and cost overrun of project and level of impact of currency fluctuations. Uncertain environment is the unexpected or expected risks, which is a measure of consequence of uncertain event, situation, or condition which may occur. Compared with many other industries, the construction industry is subjected to more risk due to the unique features of construction activities, such as long period, complicated processes, abominable environment, financial industry and dynamic organizational structure [3]. In most major projects, there is some critical element, the lateness of which would results in costs to the owner that were far in excess of the value of the projects. [4]. A reliable way to analyse the associated risks is vital to make the project successful. Fuzzy system having the ability to explain its reasoning process and having definite applicability within the field of risk analysis. Risk analysis using fuzzy logic can provide an effective, systematic and a natural way to analyse the associated risks.

2. RISK MANAGEMENT

Risk is a measure of probability and consequence of not achieving a defined project goal. [2] Risk itself is traditionally described as an uncertain event [12,16,17] A good project management to be structured to identify hazard and to allow safeguards to be developed to overcome them. [2] The two primary components of risk are the probability of occurrence of the event and impact of the event occurring. That means risk is a function of probability and impact. Risk exposure is quantified by multiplying the probability of occurrence of the risk with its impact over the project. Project Risk Management is the art and science of managing risks caused by unforeseen changes (uncertainties) which may require deviations from the planned approach and may therefore affect the achievement of the project objectives. [1] Risk management becomes an integral part of project management and plays such an important role that its application goes beyond the traditional scope which normally centers on the construction phase. [13,14] An effective risk management method can help to find out and analyses the risk which may occur during the construction period and also help to manage them during the stages of construction. High quality risk management in construction projects requires, full specification of the project, a clear perception of the risks being borne by each party, sufficient experience to manage risks, good co-ordination and mutual understanding between each party. The quality of project risk management is improved if risks are identified and evaluated in a systematic way, risks are allocated to the parties best able to control them and parties who are expected to bear risk receive adequate reward for doing so. [4] A systematic approach to risk management has five stages which are as follows:

1. Plan Risk Management
2. Risk Classification
3. Risk Identification
4. Risk Analysis and assessment
5. Risk Response

2.1. Plan Risk Management

Plan of risk management or risk planning is the process of developing and documenting an organized, comprehensive and interactive strategy. It includes the methods for identifying and analysing risks, developing risk response plans and monitoring and controlling how risk have change. Therefore, risk planning is the detailed formulation of action for the management. Risk planning includes the entire risk management process, with activities to identify, analyse, respond, monitor and control risks.

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2.2. Risk Classification

Construction projects usually considered as a high-risk business due to the lack of environmental information and construction experience. Similar construction projects may have totally different risk factors which depends on the type, the characteristics of the work site and the project team, and many other conditions. A systematic frame work for classifying the risks in construction projects is necessary, because risk factors in construction projects cover such huge areas. Sources of risks are generally independent and mutually exclusive.

2.3. Risk Identification

Risk factors are also known as risk sources and they are divided into risk events. Risk factors do not affect project activities directly but do so through risks [6]. Analysing critical causes of failure and success in construction projects is one of the useful methods in identification of risk factors [8]. Risk factors and risk events are varying from project to project. Risk identification includes the various risk sources and the risk events.

2.4. Risk Analysis

Risk analysis is a systematic process to estimate the level of risk, which involves the overall ranking of risks using qualitative risk assessment approach and qualifying the risk exposures for mitigating high exposure risks. Risk analysis is the process to estimate the probability of occurrence and the consequence of the risk and to convert the risks to a corresponding risk level. The approaches or methods of risk analysis vary with the purpose project and the data available. The choice of technique for risk analysis is dependent on the nature of the problem being modelled, the amount and reliability of information available and the nature of the output required. [1] The nature of the output that required is decided by the nature, need of client and the type of the decision to be made. As the result of risk analysis, the project may be rejected, if it is unacceptably risky [7].

Methods of Risk Analysis

1. Delphi Method
2. Nominal Group Techniques
3. ABC Analysis
4. PERT/PDM
5. Monte Carli Simulation
6. Sensitivity Analysis
7. Break-Even Analysis
8. Decision Tree Analysis
9. Fuzzy Logic

Risk Analysis by Fuzzy Logic

The construction of risk assessment model is done on the basis of the relative importance index value of each risk factor. The formula of relative importance index is

$$\text{RII} = \sum W_i/(A * N) \quad \text{where } i = 1, 2, \ldots, N \qquad \ldots\ldots(3.1)$$ [9]

Where, RII - Relative importance index, Wi-weighting given to each factor by respondents (ranging from 1 to 5), A-highest weight (i.e. 5 n this case), N-total no. of participants. The RII value has a range from 0 to 1(0 as not inclusive); and the higher RII, the more important risk factor. In this case RII for probability of occurrence and impact of each factor has find out and by multiplication of both get the RII of each factor. Based on these values of each factor the ranking has been done.

The quantification of the parameters involved and the capturing of their uncertainty could be best represented by an approach which is both scientific and artistic [10] [11]. Fuzzy set theory has been used to solve uncertainty problems, especially when probability information is limited and when the boundaries of variables are not obvious [3]. This method of analysis is more systematic and practical approach than other traditional project risk assessment strategy.

Fuzzy Set: Fuzzy logic can be beneficial to describe real world relationships that are inherently fuzzy. [5] The difference between traditional set and fuzzy set theory lies in the degree of membership which elements may possess in a set. [3] The membership values of a traditional set theory is defined as 1 or 0, while any real value between 0 and 1 can be used to define the membership in fuzzy set theory. Imprecise, complex phenomena are described with fuzzy sets in order to arrive at a conclusion through fuzzy logic operation. The fuzzy set theory is a convenient mathematical tool that can process linguistic terms, and it can be utilized to process an efficient and systematic uncertainty modelling method. [9,19]

Fuzzy Number and Linguistic variables: Fuzzy number is a fuzzy subset of real numbers, which can be viewed as an extension of confidence interval. [5] To avoid the difficulty to present the degree of performance experts use linguistic variables which are merely approximate. The traditional quantification methods had difficulty reasonably expressing the conditions that were overly complicated or hard to define, and thus linguistic sentiment offered a practical means of describing such situations. Linguistic variables have an important role in fuzzy logic. Linguistic variables such as age,

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quantity et. Whose variables are words or sentences in a natural or synthetic language like small, medium, large, right quantity etc. can be interpreted as fuzzy set. The linear triangle membership functions are good enough to capture the vagueness of the linguistic assessment with fuzzy modelling mechanism. [3]

Membership function: Membership functions can be developed using different methods such as heuristics (based on knowledge extracted from interviews or questionnaire survey) and statistics, making use of available data. Heuristics based methods, which are commonly used, clearly have the advantages in the absence of quantitative data. [20] The advantage of statistically based membership functions is that they directly capture the physical properties of the set. [20,21] The membership function of triangular fuzzy number denoted with three limits lower, modal and upper value for the defined range. Membership function of fuzzy set are having different sets having different shapes like triangular, trapezoidal etc. are shown in Figure 1.

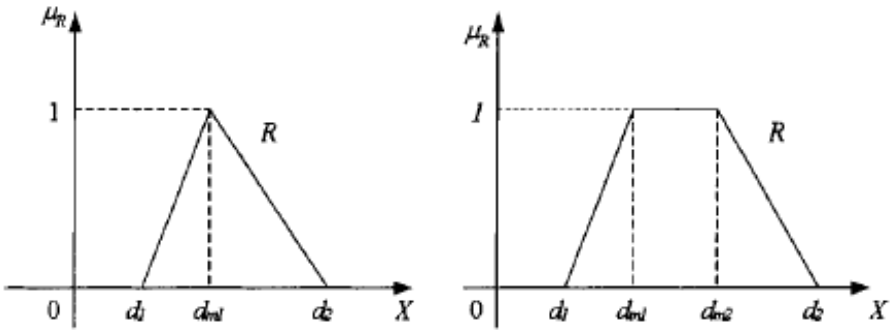

Fig 1: Membership Function

Fuzzy Rules: Fuzzy rules define the value scale or levels of preference of a decision maker of a decision maker facing uncertain results. These rules play a role similar to that of the utility function n utility theory. In developing fuzzy rules, a decision maker exercises his or her subjective preference to determine the standing of various uncertain outcomes for the conditions of an operation without considering any particular options [12].

Defuzzification: The result of the fuzzy synthetic risk assessment reached by each alternative is a fuzzy number. Therefore, it is necessary that a nonfuzzy ranking method for fuzzy numbers be used for during the project risk assessment for each alternative. In other words, the procedure of defuzzificztion is to locate the Best Nonfuzzy Assessment (BNA) value. Methods of such defuzzified fuzzy ranking generally include mean of maximal (MOM), Center of Area (COA), and α-cut [15,18]. To utilize the COA method to find out the BNA is simple and practical method, and there is no need to bring in the preferences of any evaluators. [15]

The effects and occurrence probability of risk factors in construction projects should be integrated to evaluate the overall project risk. This integrated computation is presented as

Risk value = Impact x Probability

The project risk value is defined as the product of the impact of the factors and the probability of occurrence. The results of the project value application are mainly used for comparison, either for preparation of the bid for project selection or initiation or for the allocation of more resources for risker item.

5. Risk Response: **[1]**

Risk response is done by risk mitigation strategy. Risk mitigation measures plan to minimize the loss, damage or disruption in a project due to unforeseen events. The mitigation measures are listed below.

i. Risk Transfers
ii. Risk deferred
iii. Risk Reduction
iv. Risk acceptance
v. Risk avoidance
vi. Risk sharing

3. SUMMARY

The importance of risk management and the different stages were discussed in this report. Different methods of risk analysis also mentioned. Fuzzy logic approach to risk analysis is one of the best methods of analysis of risk which is applicable for vague conditions. The different ways to mitigate the risk also given.

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REVIEW PAPER ON ANALYSIS CHECK OF VARIOUS MATERIALS

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ABSTRACT

The disposal of various materials from the industry is one of the environmental problems today. Various materials is produced from processing plant during the sawing and polishing of marble blocks and about 20 – 25% of the processed marble is turned into powder form. Disposal of the various materials from the industry is one of the environmental problems worldwide today. The replacement is done partially in various proportions and its effect on properties of concrete is studied. The optimum percentage for replacement of various waste materials to attain the maximum strength is 50% replacement where as in tensile strength the optimum strength is achieved by 10% replacement by cement. As the percentage replacement of various materials increases the workability reduces. The use of waste materials reduces the cost of construction as it is used in mixing with concrete for building of floors and other structures and it also reduces the proportion of water cement ratio.

Keywords—*compressive strength, tensile strength, w/c ratio.*

1. INTRODUCTION:

Civil engineering is a professional engineering discipline that deals with the design, construction and maintenance of the physical and naturally built environment, including works like roads, dams, parks and recreation, bridges etc. It is broken into several sub- disciplines including environmental engineering, geotechnical engineering, infrastructure and construction techniques and many more. Development of city is governed by its infrastructure. This project deals with the advanced construction technique by concrete technology replaced by different waste materials.

Concrete is an essential building material that is widely used in the construction of infrastructure such as buildings, bridges, highways, dams and many other facilities. The production of ordinary Portland cement produces 7% approximately of the total greenhouse gas emitted to the atmosphere. Waste various materials is generated as a byproduct during cutting of marble. The waste is approximately in the range of 20% of the total marble handled. The waste generated every year is in tones, which is dumped in open space. This leads to serious environmental and dust pollution. This may also lead to contamination of underground water reserves[2].The environmental problems attributed by waste various materials imposes threat to ecosystem, physical, chemical and biological components of environment. It is therefore very important to reuse the waste various materials which shall solve most of the problem. This report describes the feasibility of using the waste various materials as a partial replacement of cement.

2. SCOPE AND OBJECTIVE:

1. To find economical solution for high cost construction material.
2. To study the effect of use by partial replacement of cement by various materials.
3. To compare the compressive, flexural and tensile strength.

3. LITERATURE REVIEW:

Aalok D et al.,2014 studied the "Experimental study on use of marble dust in concrete" and concluded that for M25 grade concrete the compressive strength of cubes is increased when 50% of various materials is added and further any addition of waste various materials the strength gradually decreases. The split tensile strength of cylinders are increased with addition of waste various materials up to 25% and decreases on further addition. The flexural strength is obtained at 50% of various materials mix.

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Rakesh Gupta et al.,2014 studied the "Partial replacement of cement with various materials" and concluded that for M20 grade concrete the compressive strength of cubes are increased with addition of waste various materials up to 10% replace by weight of cement and further any addition of waste various materials the compressive strength decreases. The split tensile strength of cylinders are increased with addition of waste various materials up to 10% replace by weight of cement and further any addition of waste various materials the split tensile strength decreases.

Amit kumar et al., 2015 studied "Use of rice husk ash in concrete" it concludes that the workability of fresh concrete mix decreases as the RHA replacement percentage in concrete increases. The partial replacement of cement by RHA improves the compressive strength of hardened concrete whereas the optimum replacement percentage varies in the study.

Piyush Raikwar et al., 2014 reported on the "Improvement on mechanical properties of rice husk ash concrete with super plasticizer". Without super plasticizer RHA concrete attained lower compressive strength than that of the control due to the higher amount of water for similar workability. RHA concrete improves the durability of concrete. It is concluded from the paper that by adding super plasticizer to the RHA mixes, higher replacement levels are possible. Concrete containing up to 30% RHA can attain strength of 30N/mm^2 at 28 days.

D. Gowsika et al., 2014 studied "Experimental investigation of egg shell powder as partial replacement with cement in concrete". It concluded that Egg shell powder obtained from industrial wastes is added in various ratios for cement replacement and it was found that replacement of 5% Egg shell powder with 20 % Micro silica can be added without any reduction in compressive strength properties of conventional cement. And replacement of 5% Egg shell powder with 10% Micro silica replacement in cement yields similar flexural strength as in conventional concrete. And replacement of 5% Egg shell powder with 10% Micro silica replacement in cement yields higher Split Tensile strength as compared to other compositions.

Praveen Kumar et al., 2015 studied "Experimental Study on Partial Replacement of Cement with Egg Shell Powder". It concluded that concrete compressive strength with egg shell powder as cement replacement material increases up to 15% without silica fume. Addition of silica fume also enhances the strength but in economical point of view only the egg shell powder replacement is sufficient enough for getting higher strength. The split tensile strength of the egg shell powder concrete decreases with the addition of egg shell powder. This can be increased if the concrete is used with reinforcement. The flexural strength of the egg shell concrete increases with the addition of egg shell powder up to 15%.From the experimental work result it is clear that egg shell powder alone can be replaced as cement which increases the strength parameters meanwhile reduces the cement usage.

Dr.L.B.Zala et al., 2012 studied "Experimental investigations on partial Replacement of cement with fly ash in design Mix concrete". Compressive strength reduces when cement replaced fly ash. As fly ash percentage increases compressive strength and split strength decreases. Use of fly ash in concrete can save the coal& thermal industry disposal costs and produce a 'greener' concrete for construction. The cost analysis indicates that percentage cement reduction decreases cost of concrete, but at the same time strength also decreases. This research concludes that fly ash can be innovative supplementary Construction Material.

P.S. Pajgade et al., 2015 studied "Effect of partial replacement of natural sand with supplementary cementing materials (fly Ash& GGBS)". Replacements of cement by fly Ash have resulted in considerable variation in the properties of fresh concrete. In corporation of fly ash in concrete increased the cohesiveness of the mix, prevented segregation and resulted in reduced bleeding. Fly Ash concretes have been found to be amiable to compaction than the mixes without fly ash. The percentage reductions in strength of fly ash concretes with respect to control concrete have been observed to be remarkably high up to 7 days and there after reduced drastically. At early ages fly ash behaves more or less as an inert material, fly ash replacement will call for reduction in primary cementitious material and hence strength reduces. When fly ash was used, it was observed that there was a reduction in water demand by concrete, probably due to the fact that fly ash helps to increase the workability of concrete very similar to the action of water reducing admixture.

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Dhanaraj Mohan Patil et al., 2013 studied "Experimental investigation of waste glass powder as partial replacement of cement in concrete" and concluded that concrete with using waste glass powder has a very high workability from control sample. This result achieved from the slump test that use of waste glass powder will increase the workability of concrete. In term of strength, concrete with using waste glass powder averagely have higher strength at 14 days but once the concrete reached at 28 days the control mix give more higher value compare to mix that contained waste glass powder but still give high value of the grade 30. From this research, using waste glass powder is giving positive value even though the value compare to standard mix it just less about 1N/mm.2 Concrete become lighter when mix with waste glass powder. The average cube density of concrete with using more percentages of waste glass powder averagely gives lowest value compared to control sample. Therefore, concrete mix that using glass powder is giving lightweight concrete.

Nova John, 2013 studied the "Strength properties of Meta kaolin admixed concrete" and concluded that the inclusion of Meta kaolin results in faster early age strength development of concrete. The strength of all Meta kaolin admixed concrete mixes overshoot the strength of OPC. The increase in Meta kaolin content improves the compressive strength, split tensile strength and flexural strength up to 15% replacement. The results encourage the use of Meta kaolin, as pozzolanic material for partial cement replacement in producing high strength concrete. The utilization of supplementary cementitious material like Meta kaolin in concrete can compensate for environmental, technical and economic issues caused by cement production.

D. Dutta et al., 2013 studied "Influence of Silica Fume on normal concrete" and concluded that by increasing the dosages of super plasticizers the strength is not hampered and is good for using concrete in the field in control system. Higher compressive strength resembles the concrete incorporating silica fume is high strength concrete as per IS code recommendations. Improved pore structures at transition zone for silica fume concrete resembles that it may led to as high performance concrete but experiments for durability are yet to be investigated. During the testing of cubes at 28 days the failure plane of cubes cut the aggregates but not along the inter facial zone which is concluded that the interfacial zone attained much higher strength than control concrete i.e. concrete without silica fume.

S. Arivalagan studied "Sustainable studies on concrete with GGBS as a replacement material in cement" and concluded the replacement of Portland cement with GGBS will lead to a significant reduction of carbon dioxide gas emission. GGBS is therefore an environmentally friendly construction material. It is observed that GGBS-based concretes have achieved an increase in strength for 20% replacement of cement at the age of 28 days. Increasing strength is due to filler effect of GGBS. From the experimental results, it is proved that GGBS can be used as an alternative material for cement, reducing cement consumption and reducing the cost of construction.

Dr. S.L Patil et al., 2012 studied on "Fly ash concrete: A technical analysis for compressive strength" and concluded that fly ash can be successfully used in the cement concrete in minor amount as an additive. Considering the intangible cost of disposal problem of fly ash and hidden cost of environmental protection, the methodology appears to be indeed successful. Fly ash is actually a solid waste. So it is priceless, if it can be used for any purpose then it will be good for both environmental and economy. Use of fly ash as a raw material in Portland cement is an effective means for its management and leads to saving of cement & economy consequently. The rate of strength development is less hence fly ash finds specific application in mass concreting.

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4. COMPARATIVE CHARTS ON STRENGTH OF CONCRETE:

Variation in compressive strength: The compressive strength is checked by varying the percentage of partial replacement of cement by different waste materials with respect to water cement ratio.

Optimum Compressive Strength Achieved By Proportion of Replacement

Sr. no.	Material	Mix proportion	w/c	% Replacement	Compressive Strength N/mm^2	
					7 days	28 days
1	Various materials	M_{20}	0.48	50	23.11	35.54
		M_{20}	0.5	10	20.88	28.44
2	RHA	M_{35}	0.35	15	20.17	33.28
3	Fly Ash	M_{25}	0.5	10	21.33	34.67
		M_{40}	0.5	10	29.33	38.22
4	Glass Powder	M_{30}	0.48	20	19.28	34.33

Variation in Tensile strength: The tensile strength is checked by varying the percentage of partial replacement of cement by different waste materials with respect to water cement ratio

Optimum Tensile Strength Achieved By Proportion of Replacement

Sr. no.	Material	Mix proportion	w/c	% Replacement	Tensile Strength	
					7days	28 days
1	Various materials	M_{20}	0.5	0	5.35	8.12
		M_{20}	0.5	10	2.92	3.73
2	Fly Ash	M_{25}	0.5	10	-	3.52
		M_{40}	0.5	10	-	4.10

5. CONCLUSION:

1. Based on the study of different waste materials and the variation in compressive and split tensile strength of concrete, the following conclusions are drawn:
2. Compressive strength increases as the percentage of various materials replaced increases up to 50%, while its workability decreases.
3. Tensile strength decreases as the percentage of various materials increases by 10%.
4. Various materials minimizes the cost of construction as it is easily available.
5. Various materials is used in manufacturing of white cement which is widely used while construction of flooring.

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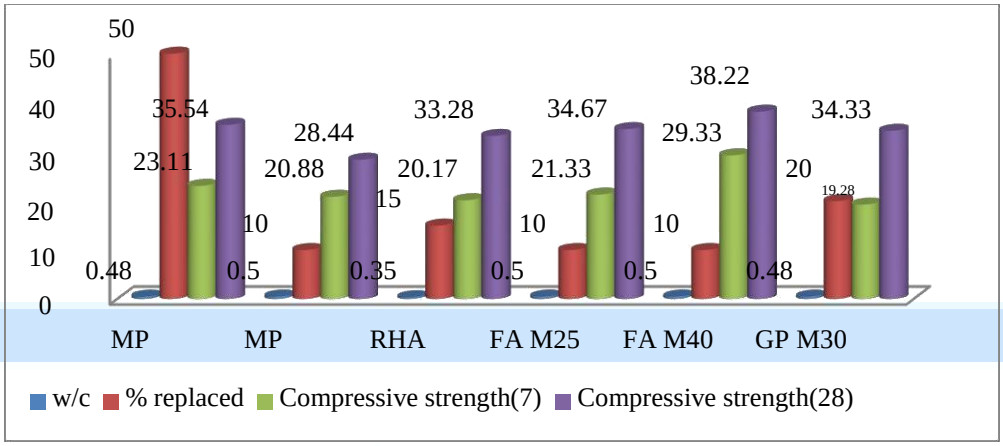
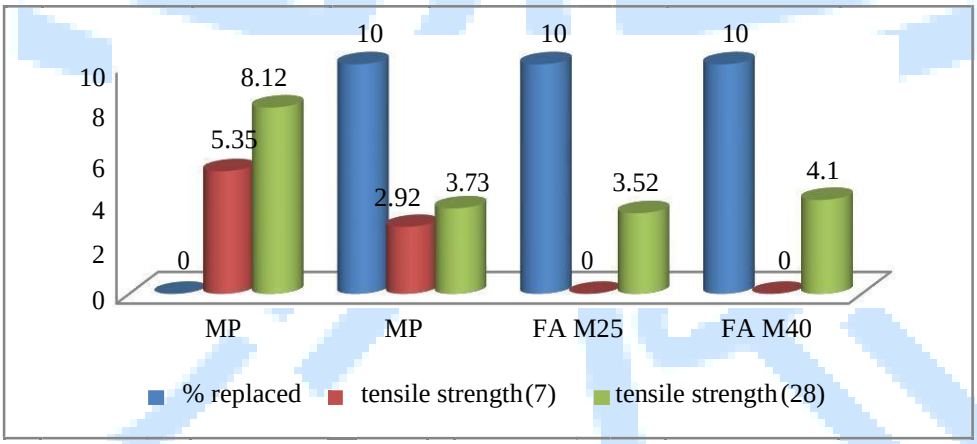


Graphical representation of % replacement by different materials by compressive strength



Graphical representation of % replacement of different materials by tensile strength

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ARTIFICIAL RECHARGE OF GROUND WATER

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ABSTRACT

Artificial groundwater recharge is a process by which the groundwater reservoir is augmented at a rate exceeding the augmentation rate under natural conditions of replenishment. In some parts of India, due to over-exploitation of groundwater, decline in groundwater levels resulting in shortage of supply of water, and intrusion of saline water in coastal areas have been observed. In such areas, there is need for artificial recharge of groundwater by augmenting the natural infiltration of precipitation or surface-water into underground formations by methods such as water spreading, recharge through pits, shafts, wells et cetera The choice of a particular method is governed by local topographical, geological and soil conditions; the quantity and quality of water available for recharge; and the technological-economical viability and social acceptability of such schemes. This paper discusses various issues involved in the artificial recharge of groundwater.

Keywords— *artificial,groundwater,recharge,infiltration,soil.*

1.INTRODUCTION

Water is most essential fuel of life; clean and safe water for daily use is the basic need of human being. increasing demand for water, particularly in arid and semi arid region of the world, has shown that the extended groundwater reservoir formed by aquifer are invaluable for water supply and storage. artificial recharge is a way to store water underground in times of water surplus to meet demand in times of shortage.

This report discusses types of source waters having very different characteristics of treated municipal wastewater,(waste water from kitchen and bath basin) storm water runoff that have been proposed for use in artificial recharge .Normally, each of these source waters needs to be subjected to some kind of pre treatment before being introduced into the soil. The exact pre treatment operations required depend on the type of source water

Water availability from streams varies seasonally due to climate differences. During low-flow periods, many streams may not possess enough water to sustain the aquatic ecosystem .in rural or semi rural areas having defficiency of water in season of summer .so the basic treatment and economical methods we can used for recharging the ground.

The different methods of recharge of groundwater:

1. Spreading basins:
2. Recharge Pits and Shafts*:*
3. Infilteration *:*
4. tube wells:
5. Check Dams

2.LITERATURE REVIEW

2.1 Introduction:

Urbanization can be an important source of health problems. Thirty to sixty percent of the urban population lack adequate housing with sanitary facilities, drainage systems, and piping for clean water.

2.1.1 Soak pits and soak wells at Mundaka and Sakarpuri, in Mewat district, Haryana

Soak-pit and soak-wells were designed by irrad in 2012 in mundaka and sakarpuri villages. The major focus of this plan was to manage wastewater of these villages. For years, wastewater (kitchen and bathroom) from houses had been flowing out to kachha streets making the area water-logged.

2.1.2 SOAK pit revolution: two villages in Mewat treat their own wastewater

It is a common sight that greets those visiting the villages in the semi-arid mewat district of Haryana—streams of waste water emerging from doorsteps of homes, running through streets, and forming puddles here and there. Village rawli is one such village. It has no sanitation facilities or sewers. Children play in these puddles while their parents watch them without any. Two villages situated near Rawli, however, present a somewhat different picture. When this correspondent visited the place,

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there was no wastewater flowing though the unpaved streets of Mundaka and Sakarpuri villages. The streets look clean. The residents inform they were able to clean up the environs by installing wastewater treatment systems in their homes with assistance of a Gurgaon -based non-profit, institute of research and rural development (irrad).

2.2.3 SOAK PIT CONSTRUCTION FOR COLONY IN RAIPUR, CHHATISGARH.

We live in a small colony in Raipur with about 25 families. The drainage of our colony was discharged in to a big open plot. Now construction has been started and our sewer is blocked. As there are no connected municipal Nala or sewage system, we are facing a serious problem. Particularly, in my house, the outlet of our sewer is at a very low level adjoining the colony sewer. The discharged waste consists of all types including kitchen waste, bathing and washing waste water.

2.2.4 A REVIEW ON MANAGED AQUIFER RECHARGE BY CHECK DAMS: A CASE STUDY NEAR CHENNAI, INDIA

Dependence on groundwater is ever increasing especially in regions where surface water resources are limited and rainfall is scarce or erratic. Over-exploitation of groundwater for various purposes results in rapid decline in groundwater table in several parts of the world. It is necessary to increase the rainfall recharge in such regions in order to balance the overdraft of groundwater. Human intervention can lead to increase in rainfall recharge, which will eventually improve groundwater storage and water quality. Gale et al. (2006) describes managed aquifer recharge (mar) as intentional storage and treatment of water in aquifers. Methods of mar include aquifer storage and recovery (asr), aquifer storage, transfer and recovery (astr), infiltration ponds, infiltration galleries, soil aquifer treatment, percolation tanks and check dams (Dillon et al. 2009).

Construction of check dams across rivers is one of the methods of mar to impound the surface runoff so as to increase the groundwater recharge. In arid or semi-arid regions such as southern part of India, the rivers flow only for a few days in a year (non perennial rivers) during the monsoon. Hence, large quantum of rainfall reaches the sea as runoff and also results in flooding during peak monsoonal rains.

Impact Study of a check dam on Ground Water Recharge in Tiruvannamalai district, Melmuthanur village. The main source of water is rainfall which runs through the river as surface water source. Those rivers are connected to the oceans, partial amount of water in the river collected in ocean and get wasted. To reduce that, we need to stagnate the running water in the river. Check dams are used for that purpose. The stagnated water can be used during the non-monsoon periods. Now as we all know the use of check dam, in our project we analysis the effect of check dam on ground water recharge. We have chosen a check dam constructed in tiruvannamalai district, melmuthanur village. Rainfall data and water level in well data are collected from nearby rain gauge station and well data station for the analysis of the impact of check dam on ground water recharge.

Artificial Groundwater Recharge through Recharge Tube Wells in North-East Haryana.

Overexploitation of groundwater resources and as a consequence decline in water table are the causes of serious concern in some parts of Haryana, Gujarat, Rajasthan, Tamil Nadu , Andhra Pradesh, Maharashtra and punjab1 . In the state of Haryana , present availability of water is 2 m ha m, which includes 1.1 m ha m surface water and 0.9 m ha m groundwater.

The non-availability of fallow lands in north-east region of Haryana restricted the adoption of different recharge techniques like surface spreading or other methods. Therefore, the recharge tube well was identified as suitable recharge technique. Lithology of region favoured the artificial groundwater recharge through tube wells. The recharge tube wells can be easily constructed at places like topographical depressions, abandoned canals and canal escapes, where excess surface runoff either accumulates or it is conveyed for disposal.

2.2.5 Groundwater Recharge through Infiltration Process AT Umudike, Southeastern Nigeria

Although water is a renewable resource for sustaining life and environment, excessive pumping of groundwater results in the ground water table being depleted. The major natural source of groundwater recharge is rainfall. In umudike just like many other areas, the rate of natural recharge is lower than pumping rate. This is due to increasing economic and agricultural activities and also urbanization. Over exploitation of groundwater is a threat to the water quality and table and creates hydrological imbalance. This imbalance includes degradation in hydrological and hydro-chemical characteristics of the aquifer. Artificial recharge of water table aquifers becomes necessary to improve the hydrodynamic conditions of groundwater. A drop in piezometric level can be remedied by artificial recharge of groundwater through

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infiltration process using water from dams, lakes, rivers, runoff and sewage effluent. Results of water table survey conducted at umudike show that it peaks at 85 m (above sea level) before recharge and 95 m after recharge. The recharge of groundwater is basically through rainfall and river water.

MEHSANA AQUIFER, GUJRAT, INDIA

The most common method of extraction of the ground water in India is the tube wells dug into the aquifer. Due to the increasing demand for the water these tube wells were drilled deeper and deeper into the aquifers, reaching the deep seated aquifers as well. This has led to the overexploitation of these aquifers and thus decreases in their yield. This heavy exploitation of the water sources, generally takes place in the areas where the drawn water is utilized for irrigational purposes [Abdul-Aziz 1991]. The 'Mehsana alluvial' aquifer in the western India is an excellent example for such case of over exploitation of the aquifer for the sake of irrigation. The earlier dug wells were substituted with tube wells for drawing more water. This initially improved the yield from the aquifer, but resulted in a steady decline in the piezo metric levels of the aquifer.

2.2.6 Estimating rainfall infiltration for groundwater recharge using infiltration method in Rajshahi District, Bangladesh

Infiltration rate in soil is a measure at which the soil is able to absorb rainfall. It replenishes the soil moisture deficiency and the excess moves downward by the force of gravity called deep seepage or percolation and builds up the groundwater table. The study was conducted in three large upazilas under rajshahi district from 2002 to 2013 to estimate the rainfall infiltration for groundwater recharge which are the pre-condition to meet the large demand of irrigation supplies that are the key to economic growth. Rainfall data was collected from upazila agriculture office dae, rajshahi. The data were analyzed to show the rainfall variations, runoff, infiltration rate and percentage of infiltration from total rainfall for different years. In this paper, w-index method was used for better and quick assessment of rainfall infiltration in study areas. The result illustrate that the average annual rainfall infiltration rate were found 80.61, 79.12 and 72.20 cm/year for godagari, paba and puthia upazila respectively and the average percentage of annual infiltration from total rainfall were found 58.3%, 58.76% and 58.80% for three study areas respectively.

3. METHODOLOGY

All the methods mentioned above are innudation methods (seasonal) but soak pit method can be carried out through out the year.Hence we have adopted the soak pit method for the increasing ground water level.

A soak pit , also known as a soakaway or leach pit, is a covered, porous-walled chamber that allows water to slowly soak into the ground. Pre-settled effluent from a collection and storage/treatment or (semi-) centralized treatment technology is discharged to the underground chamber from which it infiltrates into the surrounding soil.

The area which has been selected should be first surveyed and the total amount of houses present in the selected region are calculated, calculated then the amount of water which has been used by every houses per day in the village according to their needs is calculated. Once we got the total amount of water used from one house. Now we can calculate the total amount of waste water which is being released daily. Now accordingly we can construct the soak pit combinedly for 3-4houses.

The water which is coming out from the houses is further passed through a constructed container through which oil/grease can be reduced. After the oil is removed from the water, we have to check the Ph and turbidity of water. And further the water is passed through the soak pit. This water can be used for agriculture and domestic purpose.

3.2 DESIGN CONSIDERATION OF SOAK PEAK: -

The soak pit should be between 1.5 and 4 m deep, but as a rule of thumb, never less than 2 m above the ground water table. It should be located at a safe distance from a drinking water source (ideally more than 30 m). The soak pit should be kept away from high-traffic areas so that the soil above and around it is not compacted. It can be left empty and lined with a porous material to provide support and prevent collapse, or left unlined and filled with coarse rocks and gravel. The rocks and gravel will prevent the walls from collapsing, but will still provide adequate space for the waste water. In both cases, a layer of sand and fine gravel should be spread across the bottom to help disperse the flow. To allow for future access, a removable (preferably concrete) lid should be used to seal the pit until it needs to be maintained.

3.3 How to check pH of the water

1. Calibrate the probe and meter following the manufacturer specifications.
2. Collect a sample (waste water from kitchen and bathroom`-) of the water in a clean container.
3. Adjust the meter to match the sample temperature.
4. Put the probe into the sample.

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5. Read the pH measurement of the sample.

3.4 How to check turbidity of water.

1. Take a sample of water from the water source. .
2. Hold the tube in one hand near the bottom and look into the open end with your head about 10 to 20 centimetres above the tube, so that you can clearly see the black circle, fact sheet 2.33
3. Cross or other murk on the bottom of the tube.
4. Slowly pour the water sample into the tube, waiting for air bubbles to rise if necessary, until the mark on the bottom of the tube just disappears.
5. Stop pouring the water sample into the tube and look at the level of water in the tube. For turbidity tubes which have a turbidity scale marked on the side, read the number on the nearest line to the water level. This is the turbidity of the water. I f the tube does not have a scale marked, measure the distance from the bottom of the tube to the water level with a tape measure and look up or calculate the turbidity of the water sample using the instructions provided with the tube.
6. After use wash the tube in clean water and store the two parts of the tube where they cannot be damaged.

4. CONCLUSION

Artificial recharge is the planned, man-made increase of groundwater levels. By improving its natural replenishment capacities and percolation from surface waters into aquifers, the amount of ground water available for abstraction is increased. This is particularly useful in area where water and groundwater resources are heavily utilised and acute problems. There are various method adopted to increase the groundwater level, there are various case study were done for some of the method, but the method which we have adopted is the soak pit method. This method will be carried out in the area where there are water problems and also not proper drainage system .In this method the used water which discharges out from particular house are treated and passes through the ground which help to increase the ground water level. It also help to control the disease cause from the waste water discharging from the particular house and getting percolate. So this is one of the economical method and can be done even in a small villages.

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STORM WATER MANGEMENT

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ABSTRACT

stormwater management (SWM) is a widely used tool for drainage design and planning. Hundreds of peer-reviewed articles and conference proceedings have been written describing applications of SWM. This review focuses on collecting information on rainfall data and stormwater management methods with respect to calibration and validation in the peer-reviewed literature. The major developmental history and applications of the methodology are also presented. The results provide utility to others looking for a quick reference to gauge the integrity of their own unique SWM application.It is concluded that the level of detail underlying the conceptual method of SWM versus its overall computational parsimony is well balanced making it an adequate methods for large and medium-scale hydrologic applications. However, embedding a new mechanistic algorithm or providing user guidance for coupling with other methods will be necessary to realistically simulate diffuse pollutant sources, their fate and transport, and the effectiveness of GI/LID implementation scenarios. Shared from Google Keep.

Keywords— stormwater management method, rainfall data, study area planning, applicability

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1.INTRODUCTION

Stormwater management means to manage the surface runoff. The overall objective of stormwater management is the control of rainwater to ensure minimum impacts with regards to flooding, erosion and the dispersal of pollutants within the urban environment and downstream. This management process encompasses the interaction between the amount of rainfall, the urban environment and orography, the existing infrastructure and the water bodies into which the water finally ends up. In filing an application for general development plan, preliminary major subdivision or preliminary major site plan, the Applicant shall comply with the following stormwater management requirements: Flood control, groundwater recharge, and pollutant reduction through non-structural or low impact techniques shall be explored before relying on structural Best Management Practices (BMPs).

Structural BMPs should be integrated with non-structural stormwater management strategies and proper maintenance plans. Non-structural strategies include both environmentally sensitive site design and source controls that prevent pollutants from being placed on the site or from being exposed to stormwater. Source control plans should be developed based upon physical site conditions and the origin, nature, and the anticipated quantity or amount of potential pollutants. Multiple stormwater management BMPs may be necessary to achieve the established performance standards for water quality, quantity, and groundwater recharge.

Purpose:

To protect the public health, safety and welfare of the citizens of the Borough of Riverdale and the surrounding communities by establishing minimum stormwater management requirements and controls for “major development”. The SWM Master Plan integrates aspects of flood control, groundwater and surface water quality, natural environment and system drainage issues into a cohesive City-wide strategy.

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2 .WORK FLOW

The project followed a task-based work plan with the following primary tasks:

Task 1: Study Area Profile

The Project Team conducted an assessment of the Study Area in an effort to better understand the environmental features potentially influencing the selection and implementation of various management solutions, as well as the problems and areas of concern which underpin the purpose of the Master Plan. The following provides a brief overview of Study Area Profile and Areas of Concern: Aquatic Habitat, Vegetation Communities, Sediment Quality, River/Creek Bank Erosion, Flooding

Task 2: Site Planning

Site planning that integrates comprehensive stormwater management into the site development process from the outset is the most effective approach to reduce and prevent potential pollution and flooding problems. Early stormwater management planning will generally minimize the size and cost of structural solutions. Applicants may select the methodology to meet the Stormwater Management Standards. This approach will result in a well-designed development plan and associated stormwater management system that suits land constraints and minimizes costs.

Task 3: Rainfall Analysis

A single Hyetogram shows cumulative rainfall over a day. The plot can be subdivided into a number of continuous segments during which rainfall is present. The segments of the plot when there is no rainfall or negligible rainfall can be omitted. Thus a single plot of Hyetogram for a day will yield a number of individual's storms of various durations.

Task 4: Stormwater Runoff

Runoff is a natural part of the hydrologic cycle. The volume and speed of runoff depends on the size of the storm (how much water falls in what amount of time) and the land features at the site. In a natural, undeveloped setting, the ground's surface often is pervious, meaning water can percolate down into the soil. In developed areas, ground surfaces are often asphalt, concrete, and other materials which are impervious and prevent water from infiltrating into the soil. Water which cannot be absorbed into the ground becomes runoff. Water that falls during and immediately after a storm and flows over impervious surfaces or otherwise cannot be absorbed into the ground is called stormwater runoff.

Stormwater runoff that flows into and is discharged through a pipe, ditch, channel, or other structure is considered a point source discharge; contaminated stormwater runoff that flows over land and is not directed into a defined channel is considered nonpoint source pollution. Both point and nonpoint source pollution significantly degrade water quality and aquatic habitat. The difference between nonpoint and point source types of pollution becomes less clear when stormwater flows over land and then into storm drains and other types of collection systems before it is discharged through a pipe to a water body. In these cases, stormwater runoff begins as a nonpoint source and becomes a point source discharge

Task 4: Stromwater Management System

Following are some of the green infrastructure and LID practices EPA uses to reduce stormwater runoff and pollution:

1. Green Roofs
2. Detention basin
3. Infiltration trenches
4. Bio retention Areas
5. Dry Swales
6. Drainage channel
7. Constructed Wetlands

Task 5: Design and Planning

In the design phase, various stormwater management facilities and techniques useful in achieving required design objectives are presented and grouped by generic function as follows: Conveyance, Ponding, Infiltration, Filtration and Treatment a number of examples with diagrams and additional design information, data sources and references are provided in this task. Once the planning phase process has developed a conceptual stormwater plan for the site, there is need for a design phase that develops site and context specific design of the stormwater management system. This section provides design guidelines to inform appropriate stormwater design for a development. Various stormwater management facilities and techniques are presented and evaluated in terms of engineering, ecological, health, and safety, aesthetic, social, construction and maintenance design objectives.

Task 6: Implementation Plan

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The development of this Master Plan has been directed and reviewed by a Project Team, which has been comprised of representatives from various departments at the City of Guelph and the Grand River Conservation Authority. A total of sixteen meetings have been convened with this Project Team during the course of this three-year study regarding the review and comment of the analyses completed for this study as well as the updates to the stormwater management policies.

Task 7: Result

Task 8: summary:

1. Stormwater management means to manage surface runoff. It can be applied in rural areas (e.g. to harvest precipitation water), but is essential in urban areas where run-off cannot infiltrate because the surfaces are impermeable.
2. Traditional stormwater management was mainly to drain high peak flows away.
3. Unfortunately, this only dislocates high water loads. Modern approaches aim to rebuild the natural water cycle, i.e. to store runoff water (e.g. retention basins) for a certain time, to recharge ground water (e.g. infiltration basins) and to use the collected water for irrigation or household supply. Costs depend on technology and the size of the systems.
4. Planning, implementation and operation and maintenance require expert knowledge.
5. Cities are unlikely to ever use entirely distributed stormwater management infrastructure, as central services offer economies of scale and reliability, particularly for larger storms.

3. CONCLUSIONS

Strong stormwater management policies can protect one of our most important natural resources. The reduction of impervious surfaces can increase groundwater recharge and water quality. New strategies such as stormwater utilities can help fund much needed infrastructure repair and stormwater management projects. Conservation design and smart growth make open space and natural resource preservation a design priority rather than an afterthought. The recommended strategies in this paper can help strengthen the existing successful stormwater management ordinances.

4. ACKNOWLEDGMENT

On this occasion of presenting our semester report, we express our deep sense of gratitude and personal regards to few people who helped us during our project and shared their knowledge and pervious time. It is indeed with most pleasure and pride; we extend our deepest gratitude and thanks to Dr. Arun Kumar, Principal, VIVA Institute of Technology for their immense help and support during our course. Our sincere thanks to Prof. lissy jose, H.O.D of civil Department,VIVA Institute of Technology for their immense help and support during our course. We would like to express our gratitude to Prof. Pratibha patil our project guide and all our faculty members for enlightening and guiding us throughout our course and helping us to cope up with problems we faced during our project. Our reverence to all our friends for being a constant source of inspiration and encouragement.
Thank you all!

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INTERLINKING OF RIVERS

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ABSTRACT

The interlinking of rivers involving inter basin water transfer has canals, tunnels or water lifts, for water to flow from one river basin to another and making use of excess water. In India rainfall is dependent on the south-west and north-east monsoons or on the shallow cyclonic depressions and disturbances and on violent local storms which form regions where cool humid winds of the sea meet the dry winds from the land and occasionally reach cyclonic dimension. Hence some areas are affected by the droughts while other areas are affected by seasonal floods. There is a general perception that with growing human population and rising standards of living, the available supplies of fresh water on the planet are becoming insufficient to meet demand. It will be scarce, expensive to develop and maintain and valuable in use.

Keywords: *Interlinking, Rivers, canals, drought, irrigation*

1. INTRODUCTION

1.1 General

Water is one of the principle elements which not only governs life on earth but also influences economic, industrial and agricultural growth of mankind. There is a general perception that with growing human population and rising standards of living, the available supplies of fresh water on the planet are becoming insufficient to meet the demand. India has a monsoon climate. Except for a small coastal area in the South, almost the entire rainfall occurs during three to four monsoon months. Thus cultivation during non-monsoon months is irrigation dependent. A characteristic of the monsoon climate is variability of rainfall from year to year. India has an average of one in five below-normal rainfall years. India is basically an agricultural country, and all its resources depend on agricultural output. In India, 55% of agricultural output is from irrigated lands. Moreover, average farm incomes have increased from 80-100%as a result of irrigation, while yields have doubled compared with those achieved under the former rain-fed conditions. Water will no longer be cheap and plentiful. It will be scarce, expensive to develop and maintain and valuable in use. At this point interlinking of Indian rivers will open new avenues for developing new supplies. But we are at cross roads, creating new supplies when we face problem leads to bad management of resources. So there is also a need to develop strong policies for efficient use of water resources. The main aim of present research work is to interlink the Godavari River of length 1465km and Manjira River of length 724km passing through Beed district and thus increasing water availability and agricultural yield of the region.

1.2 Objectives

The project aims to equitably distribute water and to resolve water scarcity for drinking and irrigation purposes by linking various water channels. Its specific objectives are to:

- Divert water from water surplus areas to arid and semi-arid parts of the district.
- Conserve water by channelling it through canals ducts, drains, nallahs, natural drains etc. into drought-prone areas.
- Carry out qualitative and quantitative assessment of water resources.
- Establish and evaluate long-term research on monitoring, measuring and planning for sustainable development in the area under benefit.
- Assess the socio-economic impact of the river connectivity initiative

1.3 Scope of the project

Irrigation by linking of the rivers vast amount of land areas which does not have otherwise irrigated and unusable for agriculture become fertile. Flood Prevention By creating network of rivers flood and drought problem can be greatly avoided by taking excess water to the areas that are dry. Generation of Electricity with new canals built, feasibility of new dams to generate hydroelectric power becomes a possibility.

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1.4 Organization Of Project

The project was developed with the goal of completing the task within the limited time period of two to three years to ensure that the surplus rainwater from the monsoon was used in time. The project entails a combination of rain water conservation and utilization of flood water run-off to replenish natural and artificial water bodies through natural drainage channels. . This project deals with the connection of the Godavari River with Manjira River by constructing canals and transfers the surplus water from Godavari to Manjira with gravitational flow.
To create the linkage architecture, the administration first took the following steps to assess on the ground scenario:

- A detailed field level survey (undertaken by the irrigation department) to investigate water scarce areas and to study the efficiency of the groundwater recharge structure.
- Identification and assessment of existing infrastructure to minimise construction of new canals.
- An evaluation to understand the natural contours of the region that could be exploited to divert water.
- Discussion with beneficiaries to understand the needs of the local population.

2. LITERATURE REVIEW

2.1 ***Sonali A. More****, 2014 studied on* 'Interlinking Of Rivers' And Concluded that, this river linking project in Maharashtra, India, is based on innovative methods of linking of natural and artificial water drainage for inter-basin and intra-basin water transfer. This is a unique technique of rain water conservation; utilization of flood water run-off and replenishing natural and artificial water bodies through natural and artificial water drainage channels. The excess water in a river is utilized to recharge the ground water bodies and dry wells in its command areas.
The project is designed for the optimum utilization of rainfall-runoff for inter-basin and intra-basin water transfer through innovative technologies of both surface water transfer and ground water recharge. The principle of watershed management within the command area is used not only for agriculture purposes, but also for drinking water and industrial purposes.

2.2 ***Upali A. Amarasingh et.al****, 2015, studied On* 'Interlinking of Rivers' And Concluded that, increasing reliance of groundwater and declining area under surface irrigation is the prominent recent trends in Indian irrigation. Given this changing face of irrigation, many issues in groundwater and surface irrigation require immediate attention. Groundwater recharging is immediate requirement for sustaining present groundwater economy and for distributing irrigation benefits to a larger part of the population. Empowering local institutions on watershed development programs, combining several micro-watersheds within a radius of 400 m with meso-watersheds for development, recharging groundwater through millions of dug wells, converting small tanks to percolation ponds and changing irrigation scheduling in canal commands to increase conjunctive water use are some measures for sustaining groundwater irrigation. Water productivity improvements could significantly reduce the requirement for additional water development. Crop yield is increased by providing supplemental irrigation in major rainfed districts with low consumptive water use, reducing yield gap in many irrigated areas without increasing the total consumptive water use (325-475 mm), deficit irrigation to provide deficit consumptive water use in irrigation districts with large consumptive water use (more than 450 mm). Demand management strategies can reduce the widening gap between supply and needs. If implemented with stronger policy backing, water pricing, formal and informal water markets, water rights and entitlement systems, energy-based water regulations, water saving.

3. METHODOLOGY

3.1 Introduction:

The river interlinking project in Maharashtra is based on innovative methods of linking of natural and artificial water resources. This is a unique technique of rain water conservation utilization of flood water runoff and replenishing natural and artificial water bodies through natural and artificial water drainage channels. The excess water in a river is utilized to recharge the ground water bodies and dry wells in command areas. The project is designed for the optimum utilization of rainfall-runoff.

3.2 Proposed Methods:

The methods used for the interlinking of rivers are Using canals:-

River interlinking project can be done by linking two or more rivers by creating a network of manually created canals; it providing land areas that otherwise does not have river water access and reducing the flow of water to sea using this means. Assumptions is based on that surplus water in some of the rivers can be diverted to Deficit Rivers by means creating a network of canals to interconnect the rivers. In this project we are going to connect the Godavari River with Manjira River by constructing canals and transfer the surplus water from Godavari to Manjira with gravitational flow.

3.2.1 **Required data**:

The list of data required for the study is as below:

- Profile levelling*:* is a method of surveying that has been carried out along the central line of a track of land on which a linear engineering work is to be constructed/ laid. The operations involved in determining the elevation of ground surface at small spatial interval along a line.
- Meteorological data: rainfall
- River data: length, discharge, velocity, slopes.
- Contour data for the selected route.
- Drainage data obtained from Survey of India Topographical map.

4. CONCLUSION

The interlinking of our rivers to transfer the floodwater from the surplus rivers to deficit areas is one of the most effective ways to increase the irrigation potential, for increasing the food grain production, mitigate floodwaters and reduce regional imbalances in the availability of water. Godavari River originating from the Western Ghats is found to be surplus in water. If we could build canals in the Godavari River and connect to Manjira River with less water Imbalances could be removed significantly. The project will eliminate drought conditions, transformed desert waste lands into agricultural productive areas by bringing irrigation and vegetation. The project will miraculously change the living conditions and the socio-economic conditions of the people

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CONSTRUCTION OF ROAD UNDER BRIDGE BOX PUSHING TECHNIQUE

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ABSTRACT

Under bridges are required to be provided under earth embankment for crossing of vehicular/ road traffic, railway traffic across the level crossing of railway line, etc. The under bridges are also required in urban area where the busy business location street crossing to railway line etc. Present day intensity of traffic, both rail and road due to the fast development of industries & other infrastructures, is very heavy and so it cannot be disturbed for construction of under bridges or drainage etc. By conventional i.e., open cut system. So to construct under bridges without disturbing the existing roadway embankment / railway we chosen to construct the "RCC BOX CELL BRIDGE" by BOX PUSHING TECHNIQUE, where in R.C.C. Boxes in segments are cast outside and push through the heavy embankments of rail or road by jacking.

The required thrust is generated through thrust bed, as well as line and level of precast boxes are also controlled further my thesis work is to design & analysis part. Analysis part is done by using the computer software STADPRO and design part is done by manually as per IRS bridge rules IRS……..1997

The box segment design and analysis part is very simple and not critical to push the box into the embankment of railway is also not major problem, the required thrust can be generated from thrust bed by jacking. After completion of work thrust bed can be used as the protection work in hydraulics structure and rigid pavement work in highway structures. The required bearing capacity of soil is very little. Safest method of crossing underground/embankment, without disturbing overhead traffic/ structures for R.U.B.

Keywords— *box,jacking,embankment,bridge,rcc*

1.INTRODUCTION

1.1 General

Apart from being an embryonic source of accidents & fatalities level crossing are the costly affairs for the nation. This fact has been understood by one & all railway man.

As such, as an alternative for the compliance of the Codal/Railway Act provision of facilitating the public to cross track, IR has decide to construct a RUB/ROB to eliminate the LC Gates.

As the volume of work is quite hefty, a strategy has to be decide for the implementation of the decision taken by the MR in his budget speech, (and the Railway Board accordingly).Major chunk of the work is the constructed of RUB.

1.2 Defination

Jacked box tunnelling is non-intrusive method for construction a new under-bridge, culvert or subway beneath existing surface infrastructure, for example railway and highway.

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The method enables traffic flow to be maintained throughout the construction period and maintained with only minor restriction du1ring the brief period of tunnelling.

The inconvenience and cost of disruption to infrastructure and traffic flows experienced with traditional construction method can be avoided.

1.3 Objectives

- To provide adequate road width below railway track.
- To reduce travel time.
- Accidents at level crossing are a serious safety concern for Indian Railways.
- Construction of subway is effective way to avoid accidents at railway crossings.
- Indian Railway has planned to replace maximum no of level crossing by subways.
- This method is achieved without disrupting the busy overhead railway traffic moment.
- To design a precast box segment.

2.PLANNING & METHODOLOGY

Collection of data

- Topography of area
- Detail cross section considering
- Rail level
- Formation level
- Width of embankment
- Ground level
- Route of signaling cables, electric and telecom cables
- Nearest river or Nallah course

Stages in execution work

- Excavation for thrust bed and auxiliary bed
- Concreting of thrust bed & pin pocket
- Casting of box segment
- Protection of track & embankment
- Arrangement of adequate capacity jacks with power pack
- Pushing operation
- Construction of wing wall/toe wall/return wall

Advantages of box pushing technique

- No disruption of traffic
- Better quality control
- Economical
- Saving in man power & machinery
- Time of completion is less
- No involvement of crane and heavy equipment
- Less involvement of other department

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Pre work for box pushing technique

- All the S and T cables where protected before starting box pushing work.
- Imposed 20kmph speed restriction + OES & stop dead if required.
- Isolation of track by cutting rail at 10 m away from center line of box either side.
- Soil to be removed which is accumulated adjacent to the box.
- Proper lightning arrangement with DC set at 10 KV kept ready at site.
- Making rail cluster.
- Marking center line on top of box.
- 1500nos of ballast bags and 500no of sand bags kept ready by the side of track.
- Wooden chalk/wooden sleeper 20no kept ready at site.

Methods of box pushing

- Jack is fitted between trust wall and base of the box with packing plates and sleepers.
- A 20mm thick plate is provided at front of jack to avoid damaging of concrete surface.
- Uniform pressure is applied in jack and Earth is removed in front of cutting edge.
- Pressure increase till box is moved.
- After complete push (maximum 300mm) the jack are released and they are again packed with packing plates and spacers.
- Process is repeated till front box is pushed to required position.
- Then 2nd box segment is slewed and brought in position behind 1st box segment.
- 8 nos. Jacks, each of 200 Tons capacity, are housed between two box segments in addition to 8 nos. Jacks already provided between thrust bed and 2nd box segment.
- 3 nos. Jacks, each of 100 Tons capacity, are provided in 3 slots made in each side walls to facilitate correction of line and level of box during pushing.
- Earthwork is now done in front of 1st box segment and it is pushed. Protruding nails are gas cut/driven and anchor plates are refixed in position.
- Thereafter, jacks housed between two box segments are released and then 2nd box segment is pushed.
- Process is repeated till both the box segments are pushed to required position.
- Cutting Edge is dismantled & front face of 1st box segment is cast in plumb.

General safety precautions taken at site

1500 nos. of ballast bags and 500 nos. of sand bags was kept at by the side of track suitable before taking up the pushing Ensuring cutting edge always burried in the earth

Alignment and level of box checked daily. Any correction required for immediately carried out in the next push by suitable adjusting the pressure in jacks and by ensuring the proper bottom level of excavation Excavation in front of the cutting edge and jack operation for pushing of box was done during block

After completion of day to day work the formation near cutting edge was protected with sand bags & C.C. cripes During train passing, pushing not allowed

After passing every trains, track parameter to be recorded up to work completion

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Protection equipment detonator, banner flag and for night tri colour lamp also provided at site Gas cutter to be provided in case of emergency

3.CONCLUSIONS

1. Box pushing work means at least partly working in blind, so problems usually come up during execution of work
2. Box pushing work require close supervision & monitoring and quite often the unsafe condition develop at these sites

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Utilisation and Distribution of Treated Domestic Waste Water

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Abstract

A system which provides the supply of water to the whole residential building from the water that is supplied by the government and then collecting and transferring the waste water generated from the proposed building. The sewage treatment plant treats the generated waste water and makes it usable for various domestic purposes. The stormwater collected due to the rain is also reused. Correct and timely decisions made based on this knowledge have helped organizing proper management of waste water from residential buildings. In this method, the new methods of plumbing that are economical and beneficial are used. The sewage treatment plant with modern technologies is installed in the project. From the various resources and proper management systems it is expected that the use of domestic water will be reduced by using the treated waste water.

Keywords*—Waste water, Plumbing system, Sewage Treatment Plant, Rain Water Harvesting, Storage tank.*

I. INTRODUCTION

The project highlights the brief information on the planning and design of the water supply of the proposed building structure as well as the planning and design of a suitable sewage disposal technique. The sewage disposal technique also involves the treatment of the waste water/sewage generated in the proposed building structure and supplying the treated water for various purposes like flushing for the water closets in the whole structure, gardens and lawns, car washing. Along with supply and treatment of water, there is also storing of rainwater and its utilization is same as that of waste water.

II. OBJECTIVES

The principal objective of plumbing is to provide an obstruction less flow for clear water as well as for waste water without causing problem to the people living in the building. The sewage treatment plant main objectives are:

1. To reuse the wastewater for Domestic purpose
2. To provide adequate storage for treated waste water and storm water for future purpose.
3. Economic reuse of waste water.

Storing of excess rainwater which mostly goes to waste is also a top priority of the project along with its economical use.

III.LITERATURE REVIEW

This paper contains three main aspects and they are: Plumbing system which elaborates the details about the planning of the water distribution system as well as drainage. Rainwater harvesting provides us the information for collecting the rainwater. The discharge of wastewater to environments caused adverse condition and this led to the development of intensive methods of sewage treatment[9]. Sewage Treatment Plant treats the waste water generated in the residential building.

Plumbing System: Plumbing is the system which conveys fluids for a wide range of applications. For this uses the pipes, valves, plumbing fixtures, tanks, and other apparatuses to convey fluids. Heating and cooling (HVAC), waste removal, and potable water delivery are among the most common uses for plumbing, but it is not limited to these applications[3].

Sewage Treatment Plant: Sewage treatment is the process of removing contaminants from wastewater, primarily from household sewage. It includes physical, chemical, and biological processes to remove these contaminants and produce

environmentally safer treated wastewater (or treated effluent)[7]. Wastewater or sewage treatment is one such option, wherein numerous procedures are planned and worked keeping in mind the end goal to imitate the normal treatment procedures to diminish the contamination burden to a level that nature can deal with[5].
Storing of Rainwater or storm water: It is the accumulation and deposition of rainwater for reuse on-site, rather than allowing it to run off[1].

IV. PROPOSED WORK

Data Collected

A. *Study Area:*

The proposed site for the project is at Tardeo. It is in Mumbai Central, Mumbai. Tardeo or Tardeo Road is a residential and commercial locality of South Mumbai, from Nana Chowk to Haji Ali Junction. It is at sea level and the average altitude ranges from 10-15 metres. Its co-ordinates are 18.9681° N, 72.8122° E. The maximum average temperatures is about 32 °C (90 °F) in summer and 30 °C (86 °F) in winter. It's climate can be best described as moderately hot with high level of humidity. Its coastal nature and tropical location ensures temperatures won't fluctuate much throughout the year. The mean average is 27.2 °C and average precipitation is 242.2 cm (95.35 inches).[11]

B. *Methodology:*

Plumbing:
Plumbing is a structure of networks which deals with the supply of water throughout the building. In the case of multistory buildings especially for residential apartments, tall commercial structures like hotels, hospitals and office complexes the interface between plumbing installations and the structure definitely requires an indepth analysis[6]. The proposed water flow of the project is described through a flowchart given below in fig no.1. The water is supplied to the building which is than collected in the underground water storage tank from where it is pumped to the overhead tank 1 of the building and supplied to the building flats through gravity.

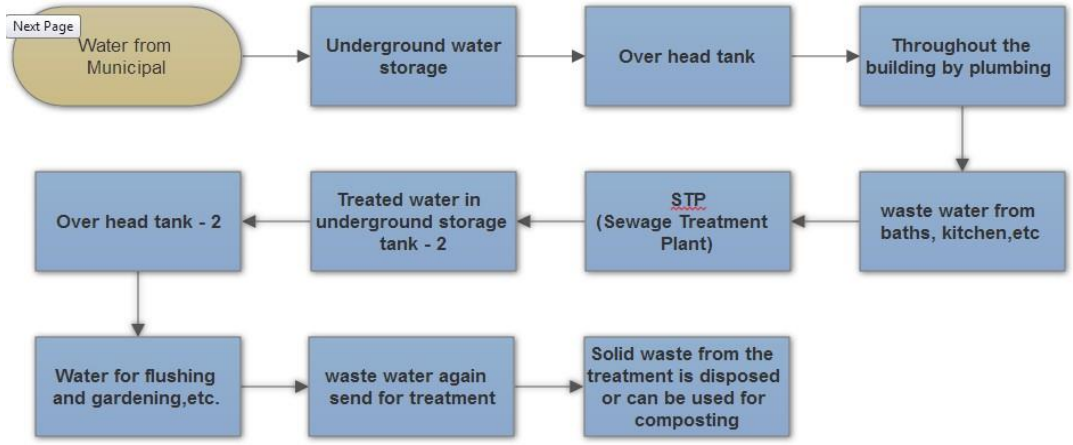

Fig No. 1 Water flow of the project

Sewage Treatment Plant:

The below fig no.2 explains the sewage treatment plant process. The sewage generated during the operation phase will be treated up to the tertiary level in Sewage Treatment Plants (STP)[4].The waste water generated from the building is passed through greese trap and collected in holding tank and further it is transferred to the equilisation tank where the waste water is homogeneously mixed which reduces the BOD and COD content of waste water[2]. Aeration tank is used for increasing the dissolved oxygen content of waste water. The suspended particles of the waste water are settled in the primary clarifier tank and secondary clarifier tank and the clear water is further transferred for purification in Ro filter. About 31000 litres treated water is generated throughout the day and it is stored in underground water tank 2.From which the treated water is further transferred to overhead tank 2 and then supplied for flushing and gardening purposes[2].

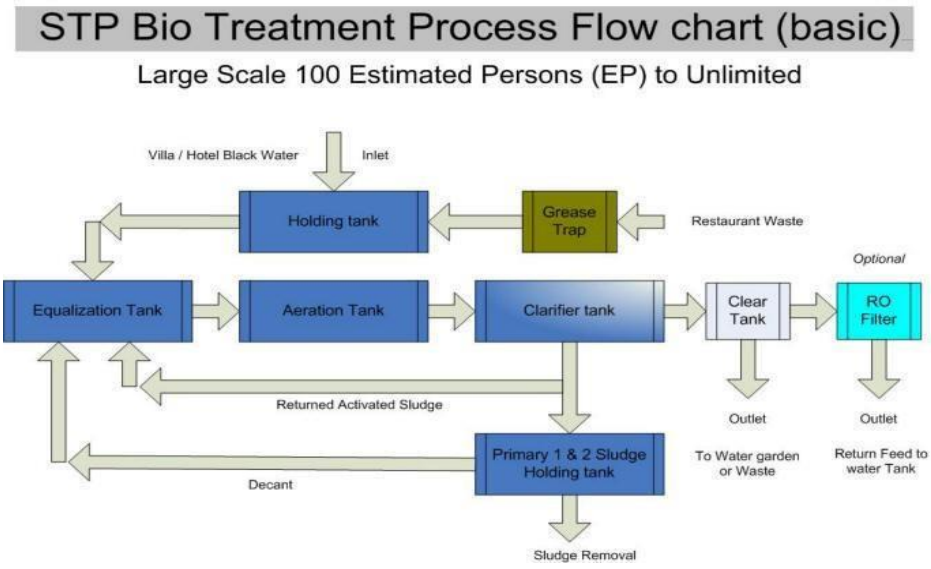

Fig no. 2 Sewage Treatment Plant Process

Rainwater Harvesting:
The rainwater collected from the terrace is brought down to the open wells through the pipes[8]. The pipes are provided with two outlets one is kept open and second is connected to the underground tank 2.

C. Proposed Work
The proposed structure is of G+22 storeys. It consists of 4 flats per floor. According to NBC there are minimum 5 members in per flat and it is proposed to supply 135 litres/day/person. For residential complex 90 litre/day is used for domestic purposes and 45 litre/day for flushing. Thus 675 litre/day water is supplied to per flat, therefore overall about 62100 litre /day water is supplied to the building. So the design capacity of overhead tank and underground water tank is 15.52 cubic meter and 46.58 cubic meter.

V. SUMMARY

After reading various research papers, theories and collecting data it helps us to understand how our project can be evaluated and other necessary details that we need to follow while executing the real work. As the weather is humid and also the rainfall is not appropriate for overall area, the implementation of this project is beneficial in Maharashtra as well as in other states. The use of clean water and its use in flushing purposes can also be reduced. The remaining rain water can be used in dry period and excess water can be transferred to nearby locality.

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Replacement of Inactive Concrete by Waste Plastic

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ABSTRACT

Now a day a cost for construction of any structure is booming tremendously so to compensate the cost of project the number of new methods and innovative techniques are used, voided slab is also one of them. Voided slab is nothing but a slab in which some excess concrete is replaced with any other material which should be beneficial for construction and effective for cost. waste plastic which have less cost as well as less weight so voided slab using waste plastic can attempts the negative attributes of solid slab by lightening them without any structural disability

Keywords: Inactive Concrete, Waste Plastic

1. INTRODUCTION

The slab is most pricy or costly RCC member of structure which consumes the largest amount of concrete. When the amount of concrete increases in slab the self-weight of member increases so it tends to high load which limits the span for horizontal slab and increases the stress on structure which consumes more amount of steel, concrete etc. which affects on design as well as on cost.

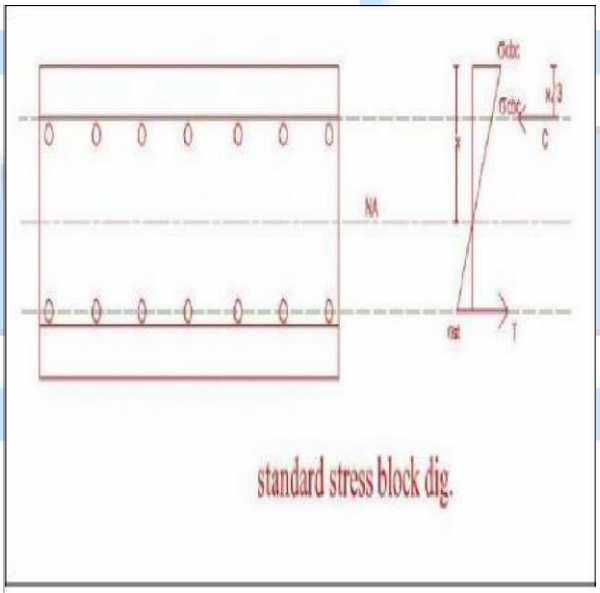
As we know the concrete is very weak in tension so if we replace the amount of concrete present in tension zone with another material like plastic having less weight as well as cost as compare to concrete. The weight of slab reduces then simultaneously the excess steel and concrete required will be reduced which makes project some much economical.

The inventory concept of voided slab is idealized by concept of pre casted hollow core slabs which are introduced in 1950s.

The hollow portion of hollow core slab is replaced with high density polythene or plastic casted monolithically it results as voided slab which can be constructed as precast or cast in situ.

2. CONCEPT

The concept of voided slab comes from an inactive concrete



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The amount of inactive concrete is removed from slab interior while maintaining over all depth of section in which the section modulus (Z) & stiffness (K) are roughly equivalent to solid slab.

Fig. Shows the stress distribution of slab section in this the portion above neutral axis (NA) shows compression zone and below NA there is tension zone, in solid slab there are two forces which are equals i.e. compression force & tension force.

Comp.force = Area of concrete in comp. zone X cbc = A (LN) X cbc
Tensile force = Area of steel in tension zone X st

A. Compression Zone:

As per equilibrium condition the compression force acts at CG of compression zone therefore force C (comp. force) act at x/3 distance from top as shown in stress dig.∴ Total compression taken by an area = Y2 * cbc * x. And from

cbc = 1.5 cbc'

Normally area above and below the CG is consider as equal so the 50% or half area takes an half amount of total stress i.e. 1/4th the total area of section (comp. + tension).

B. Tension Zone:

As we know concrete is very weak in tension so total amount of concrete in tension zone i.e. Y2 of total area.so there is nearly 3/4th area of total amount of concrete is not resisting any compressive stress i.e. 75% of total area so if we consider area of steel used on slab and concrete used for covering or bonding takes an amount of 20% of concrete of that area.

∴ total excess amount of concrete = (excess concrete) – (20% of excess concrete) = 3/4 of conc. - 20% *(3/4 of conc.) = 3/5 of conc.
i.e. 60% area of total concrete

so nearly 60% amount of total concrete used for slab can be replaced but in that some amount of concrete is from compression zone so it affects the strength of slab up to 25 % (50% area from compression zone i.e.ΔPQO)

III. USE OF WASTE PLASTIC

Now to accelerate the 25% strength which is reduced due to removing of concrete with well-treated recycled polythene with high density can be used as a filling material in place of that removed concrete area. From the application of high with high density can be used as a filling material in place of that removed concrete area. From the application of high density polythene the strength can accelerate up to 40 to 60 % of the required strength which is nearly 10 to 15 % of the total strength but the self-weight is reduced by 99% i.e. 1kg. Polythene or plastic replaces 100 kg. of concrete.

IV. MATERIAL

For s construction of voided slab with use of plastic required following materials

Steel- HYSD bars or steel above the grade Fe415

Concrete- a regular concrete with 20mm coarse agg. , sand , cement ,water (no additives are used which reacts with polythene)

Plastic- recycled high density polythene or plastic (HDPE), non-porous blocks having enough strength & rigidity, also doesn't react chemically with concrete & steel.

V. PLACING OF PLASTIC

For a better handling and binding the polythene or plastic is used in various shapes like sphere, box, elliptical sphere etc. And also it is placed with various techniques as per required condition, some inventory techniques are used mostly for construction of voided slab are as follows

Bubble deck system Airdeck

U-boot system Cobiax

Polystyrene voiding blocks.

VI. ADVANTAGES

Reduces dead weight (35% concrete removed allowing smaller foundation sizes). i.e. 1kg. Polythene or plastic(HDPE) replaces 100 kg. of concrete.

Longer span between column – up to 50% further than traditional structure

Environmentally green and sustainable – reduces energy and carbon emission or less energy consumption.

Plastic is recycled Potential cost saving for construction

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Impact of Demonetization on Real Estate in India

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ABSTRACT

The paper Investigates the effect of demonetization of higher currency notes by prime minister Shri Narendra Modi and the heavy liquidity challenges and unsold Inventory leading to crumbling of Indian Economy (business) mainly involving secondary market in real estate and hence calculating the merits and demerits of the process.

Keywords— Demonetization, Real Estate, Indian Economy, Sales, Black money.

1. INTRODUCTION

Major analysts & commentators have argued demonetization as a bold move which can bring significant reduction in black money and hoarding of cash in future days to come. There has also been concern & criticism emanating from various quarters about the rising inconvenience for the public. Most of India's business environment has been tremendously shaken up by the recent demonetization of the higher currency notes by Prime Minister Narendra Modi government. This is the third demonetization exercise undertaken by the Indian authorities, if we include the one done just before independence in 1946. It is still too early to accurately measure the depth of the turbulence this has caused, but its impact on the real estate sector is immediately visible. Since Modi's surprise announcement, the ripples have been spreading through the already disturbed sector, which has been experiencing excruciatingly slow growth in recent times.

The real estate sector is one of the most globally recognised sectors. In India, real estate is the second largest employer after agriculture and is slated to grow at 30 per cent over the next decade. The real estate sector comprises four sub sectors - housing, retail, hospitality, and commercial. The growth of this sector is well complemented by the growth of the corporate environment and the demand for office space as well as urban and semi-urban accommodations. The construction industry ranks third among the 14 major sectors in terms of direct, indirect and induced effects in all sectors of the economy. It is also expected that this sector will incur more non- resident Indian (NRI) investments in both the short term and the long term

The real estate sector will definitely be affected by the demonetisation exercise, as it has traditionally seen a very high involvement of black money and cash transactions. However, almost all such incidences have been in the secondary sales market, where cash components have traditionally been a veritable 'must'. In other words, the resale properties segment will take a big hit. However, short-term pain is inevitable when we look for any eventual long-term cure for the disease. There has for long been a strident demand to bring transparency in the sector so that the it becomes more organized, and cash dealings must necessarily be the first symptom of the disease to be dealt with

.

2. WHAT IS DEMONETIZATION?

Demonetization means that Reserve Bank of India has withdrawn the old 500 and 1000 notes as an official mode of payment. According to Investopedia, demonetization is the act of stripping a currency unit of its status as legal tender.

3. IMPACT OF DEMONETIZATION ON INDIA IN GENERAL

Black Money

Black money stored in the form of 500 and 1000 notes will be taken out of our system. As predicted by ICICI Securities Primary Dealership the government's plan to scrap 500 and 1,000 notes will uncover up to 4.6 lakh crore in black money.

Terror Fundin Fake Indian Currency Notes (FICN) network will be dismantled by the demonetization measures. Taking out 500 and 1000 rupee notes out of circulation will have a lasting impact on the syndicates producing FICN's, thus affecting the funding of terror networks in Jammu and Kashmir, North- eastern states and Naxalite hitstates.

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Real Estate

The demonetization decision is expected to have far reaching effects on real estate. Resale transactions in the real estate sector often have a significant cash component as it reduces incidence of capital gains tax. Black money was responsible for sharp appreciation of properties in metros.

Political Parties in crisis ahead of polls

With nearly five state elections in 2017, demonetization has stunned political parties. Especially, in large states like Punjab and Uttar Pradesh, cash donations are a huge part of "election management". In one stroke, big parties will find themselves hamstrung as cash hoards are often undeclared money. Parties will have to completely campaign strategies in light of expected cash crunch.

Digital Payment

Demonetization will likely result in people adopting virtual wallets such as Paytm, Ola Money etc. This behavioral change could be a game changer for India. Govt. is also introducing schemes of discounts for digital transactions. E.g.: Fuel stations/Railway tickets/Life Insurance etc.

Reduction of Interest rates

With rise in deposits with banks, there is increased likelihood that interest rates would fall in the near future Public will face minor problem for a few days owing to the scarcity of lower denomination notes in the system.

4. MARKET SIZE OF REAL ESTATE

The Indian real estate market is expected to touch US$ 180 billion by 2020. The housing sector alone contributes 5-6 per cent to the country's Gross Domestic Product (GDP).

In the period FY2008-2020, the market size of this sector is expected to increase at a Compound Annual Growth Rate (CAGR) of 11.2 per cent. Retail, hospitality and commercial real estate are also growing significantly, providing the much-needed infrastructure for India's growing needs.

Private Equity (PE) investments by domestic and international investors in the Indian realty market declined 30 per cent year-on-year to US$ 2.5 billion across 48 deals during January-September 2016. Over April-June 2016, India's office space absorption grew 46 per cent year-on-year to over 10.2 million sqft, primarily led by Delhi National Capital Region (NCR) and Bangalore, which accounted for almost 50 per cent of the total space take-up. On the supply front, over 7 million sqft of fresh office space was added during April-June 2016, led by Hyderabad and Mumbai, accounting for more than 65 per cent of the total supply of fresh office space across leading cities during the quarter. Mumbai is the best city in India for commercial real estate investment, with returns of 12-19 per cent likely in the next five years, followed by Bengaluru and Delhi-National Capital Region (NCR)

The sudden ban on Rs 500 and Rs 1000 currency notes has resulted in a situation of limited or no cash in the market to be parked in real estate assets. This has subsequently translated into an abrupt fall in housing demand across all budget categories in the short term. While a share of this dwindled demand could be attributed to distractions caused by the move, many industry experts opine that this is a result of a trust deficit in the market. Money has become dearer, leading to cautious spending and minimal transactions. The slowdown owing to this announcement has been more severe in NCR particularly Gurgaon, Mumbai Metropolitan Region (MMR) and certain Tier II markets such as Surat and Vadodara. Minimal impact of demonetisation has been felt in markets such as Bangalore, Pune and Chennai, which are primarily end-user driven and rely on bank funding. Liquidity has been severely impacted and this would result in a deflation with limited sales over the next three months.

In short, the move has taken the real estate sector by a storm, and it would take time for all stakeholders in the sector – brokers, buyers, owners and developers - to assess its repercussions on their businesses and decisions. In particular, transactions in the premium housing sector and the residential land category – overtly dependent on the cash component - would come to a standstill in the short term. In the short term, buyers and sellers in the middle of transactions might be impacted as cash component would be involved in such deals. There would be intermittent delays in the execution of ongoing residential and commercial projects primarily owing to the massive cash crunch and minimal trading in the economy

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Midterm Impact

Reduced inflation, better home ownership appetite, and improved rental landscape with limited money floating in the economy, the inflation rates are expected to fall in the next 2-3 quarters. This, coupled with key policy developments such as speculative repo rate cuts by the Reserve Bank of India (RBI), could mean a better home ownership appetite. However, this could be restricted to the affordable housing category. The heavily cash-dependent secondary market could bear a colossal brunt of the demonetization move. With the gap between circle rates and market rates bridging, owners would reduce 'ask' prices, impacting the average housing prices across cities. Resale properties would, thus, become cheaper and this could pressurize the primary market, as well. Developers might offer new projects at discounted rates or propose incentives to magnetize buyers. The dwindling demand for housing could benefit the rental market across metros but the change might take a year or so to manifest its impact on the rental price points. Both commercial and residential markets could see rentals going north by 10-20 percent. In the midst of all these developments, affordable housing will remain largely unaffected due to their non-dependence on the cash component. In fact, the demand for this category might witness an uptrend due to improved purchasing power.

Long term Impact

Transparency, revived trust and capital inflows in the realty sector The real estate sector is expected to get cleansed of its ailments in the due course of time owing to the elimination of black money clubbed with multiple regulatory changes such as the Goods and Services Tax Act, Real Estate (Regulation and Development) Act and amendment of the Benami Transactions (Prohibition) Act. Subsequently, project approvals will be quicker, resulting in a substantial reduction in the total cost of construction, thereby, the 'per unit' cost. Fair pricing would mean a revived demand for new projects in the market. Demonetisation could also mean fresh sources of funding for developers to complete their projects. Some of the alternate sources may include the following:

- Developers will be forced to clean up their balance sheets so that they can avail funding from legitimate sources, however, this may come at extremely high costs from the Non-banking financial companies (NBFC) segment.
- Developers can avail short-term loans from their existing buyers at market price with a promise to deliver the project on time and at an interest rate as per the agreement in the sales deed.
- Investments from private equity firms would usher positive sentiment across the market, helping developers to source funding and strengthen end-user demand. The real estate sector could witness a major revolution with cash transactions getting eliminated and a major share of trades going online with the penetration of alternative forms of payment such as E-wallets, apps and plastic money. To sum it up, the demonization of old currency has ushered a new era for the real estate industry in India that would be transparent, corruption-free, organised and veracious.

5. SEGMENTS IN REAL ESTATE

Real Estate Investments can be broadly divided into 3 segments

a. Primary Sales b.

Resale

c. Land Transaction

Impact on Primary Sales: NO, because the new property market which is primarily driven by home loans usually has minimal cash component in its transactions. Chances of prices coming down in the new property market as a result of demonetization are very low. Primary real estate in simple terms is the fresh inventory sold out to buyers directly by developer or builder. It is called primary because it represents the first sales cycle. As and when a resale of t he property happens, it goes into the secondary market zone

Black Money and Real Estate

Although black money does find its way in the primary real estate, it is very insignificant part of the payment system. This is majorly because builders and developers have their own obligations with banks and financial institutions. They would always prefer a payment by cheque rather than cash. Also, many realty companies are public limited, listed entities which have extra oversight on their finances. So, it leaves very little incentive for them to accept cash.

There have been little talked about incidents regarding bribery for getting clearances making builders indulge in cash payments. However, very less of this has been proven or clarified by government agencies.

Although property prices are expected to fall but we do not expect a significant decline in the primary real estate in major markets. This is because, the prices are already at quite reasonable levels, with grade A developers pushing through volume sales. The primary real estate also attracts a larger share of end users who are buying homes to live and reside in. That demand will still stay on especially with the salaried class eager to add real estate in to their portfolios.

A major shift also could be seen from unorganized players to organized projects. Volumes thus would increase at this level as people look for quality real estate investments which have clear and known payment structure. Many small players who have black money exposure will struggle, encouraging people to look for known brand names.

Primary Real Estate will also see more transparency and clear pricing something which has been sort of work in progress. Also, many developers have tie-ups with lenders which makes it easy for buyers to make the payments. A fair amount

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of transactions take place through mortgage route in the primary market, further cushioning the impact of currency demonetization.
Overall, it only bodes well for the primary real estate market in India as it is a step forward in the right direction.
Resale and Land transactions
Impact on Resale and Land transaction: Yes, because resale & land transactions have always had cash as a major component in their transactions and are likely to see a price correction. These segments will see some distress sale happening in short & medium term. High value properties are likely to see a higher price correction in short term.

6. POSITIVE IMPACT ON REAL ESTATE

1. Realtor's body CREDAI said real estate prices has a chance to rise by about 20% in the next one year post demonetization as builders go slow on new launches, introduction of the new regulatory bill and higher input cost.

2. New launches are expected to dry up rapidly as realtors adopt a wait and watch approach and customers anticipate a further drop in housing prices. The situation will be aggravated as new approvals will be slow and builders will have to be more compliant with the Real Estate Regulatory
Act (RERA) which comes into effect next year.

3. "The idea of a drop-in housing prices by about 20-30% is far-fetched. Builders, at least in Bengaluru, are working on wafer thin PAT (profit after tax) margins of 8-10%. There is no scope of further decline," Credai chairman Irfan Razack.

4. "The RERA will put a lot of unorganised players out of the market as they will not be able to start any project before they have all requisite certificates with them. Moreover, approvals have been slow and input cost, including labour cost, is set to go up," said Razack.

5. Sobha Managing Director J C Sharma said the move by the government would result in lowering of lending rates thus making housing more affordable to all. "We require about 4.2 million homes in the next four years and with supply shortage, prices can only go up,"

7. SUMMARY

Demonetization has signaled an end of an era of cash transactions in Indian Real Estate. Sure, cash
can still be used, but it seems that use of cash will decrease drastically in real estate transactions, perhaps a first in India's modern history. Black Money, experts say will disappear (most of it anyway) from real estate markets across India. So, what does future look like for the Indian Real Estate?
1) (End) Consumer is the king again – With the reduction of unaccounted cash, the end user would be the prime focus of attention for builders and developers. Small time investors, with large cash at hand, hoping to make quick bucks often ended up inflating prices. There have been instances of apartments being sold to multiple people even before possession was handed over. This was because of investors cashing on even a slight increase in price. Now, end users will be direct beneficiaries as a whole class of investors disappears. Sure, there would be investors too but only serious investors with long-term investment horizon.

2) Black Money out, technology in – Over the years, start Ups like Square Yards have been developing propriety technology to bring in a fair and easy payment system for real estate transactions. Now with cash playing a minor role, technology will be used big time. Take, for example, the booking engine developed by Square Yards where prospective buyers can pay booking amount online, through cards from the comforts of their home.
3) Correction in prices – A correction in prices is expected across property segments. However, it is yet to be seen how much it could be. Going forward, one can expect more stability in prices as black money used to have the power to disrupt prices. Clean markets are more stable, secure, and transparent.
4) Transformation of brokers – Brokers and consultants have a pivotal role in real estate. The removal of black money from the system will move brokers towards consolidation. Brokers would have to get adjusted to the new money order and tie up with larger consultants to be more formally organized.
5) Status rise for Indian Real Estate – At present India is not considered as a major real estate market globally. It is very opaque and not at all easy to invest in. With the economy going clean and transparency coming in, India is now inching towards global standards and best practices in real estate transactions.

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"Analysis And Design Of Multi Level Car Parking Buliding"

Kasim Rathod **Ryan Shaikh** **Yash Vaiti**

CIVIL ENGINEERING **CIVIL ENGINEERING** **CIVIL ENGINEERING**

ABSTRACT

The population of the world is continuously on the increase and towns and cities have grown up around their public transport system. The increasing population and expanding urban centers has been accomplished by increasing car ownership and increasing demand for movement for various purposes. Regardless of income or social status, the conditions under which people travel have become more and more difficult and sometimes absolutely intolerable. Demand for transport and travel intensity tends to increase sharply with the growing size of a city and town especially when the city center or major centers of activity continues to grow in terms of both size and employment. Parking in public areas can be very tasking with little or no form of security because it is fraught with all sorts of hazards created by either humans or lack of parking structures. In order to reduce the stress of parking and any form of danger or insecurity to cars and owners, adequate parking facilities must be provided to meet up for the demand of parking. Multi-level parking has come with a number of reliefs since they come with a number of advantages such as optimal utilization of spaces, for comfort for drivers since the stress of struggling for parking space is taken off, more security and environmental harmony. This research present the design of a multi-storey car park for the mitigation of traffic challenges in public areas using various case studies. Various design aspect which are considered are arrangements of deck and ramp, planning the dimensions, the bay width, aisle width, ramp dimensions, planning grid, alignment paths to exit barriers, means of escape distances, travel distances from the car to the destination, security, visibility, space allowances and lift provision

1. INTRODUCTION

Now-a-day there is an increase in the number of vehicles on road. It is very easy to park vehicle on road or when vehicle are moving. But, when the vehicle stops, we cannot leave vehicle on road or unsafe place. For proper storage of vehicle when not in use „parking space" is needed. For any person or cargo moving in a vehicle, a terminal facility is essential both at the origin and the destination. When the person has to stop en route for some purpose other than traffic related, the vehicle needs some halting facility, without disturbing traffic flow otherwise on the street. Such a facility is called parking.

It is also noteworthy that a personal vehicle is on the move hardly for 2 to 3 hours in a day, while for the remaining period it is „parked" at the residence or destination and sometimes en route . Even commercial vehicles will be found to be parked for about 60% of time on an average.

With the increased ownership and usage of private vehicles in the form of automobiles and motorized two-wheelers, parking has become an essential fact of this age, particularly in urban areas Thus, due to increase in population there is increase in vehicle demand and we require more parking space thus in control by constructing multi parking building or road street.

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1.1 AIM:

To analyse Multi-level parking building using STAAD- Pro software

1.2 OBJECTIVES:

1) To survey and measurement of existing site for parking and prepare an architectural drawing of multistoried car parking

2) To analyze multi-storied parking building

3) To design multi-storied parking building by using software to promote sustainable building

4) Estimation and costing of parking building

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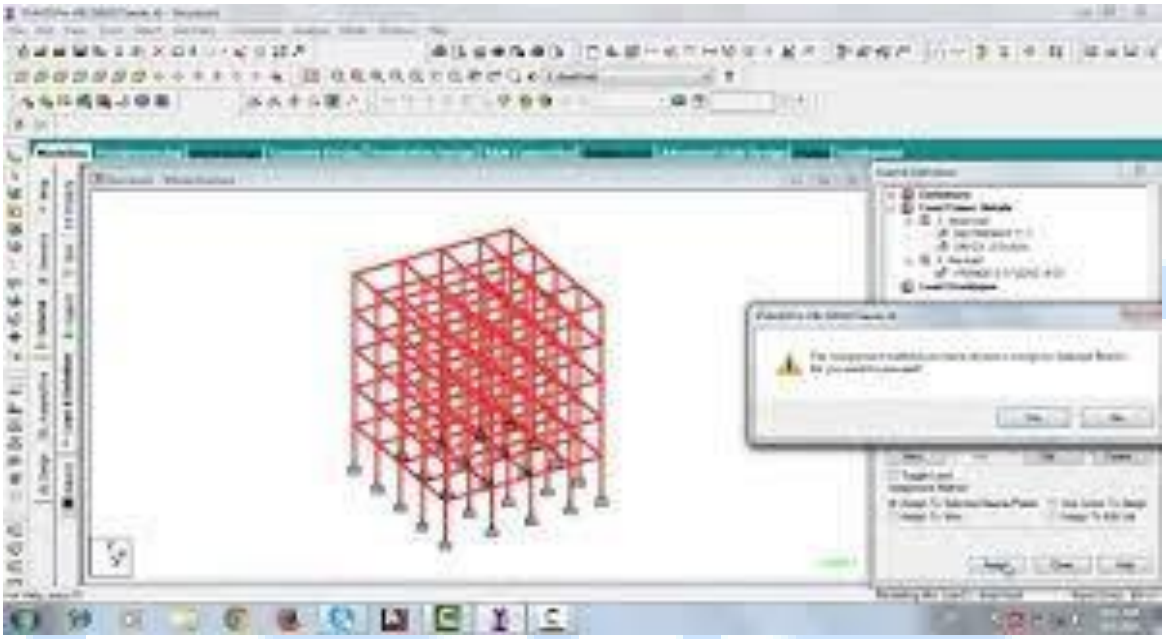

2 LITERATURE REVIEW

2.1) DR. P. S. PAJGADE (2016)

Multi-storey car parks have a number of unique features that distinguish them from other buildings or structures. A lack of understanding and recognition of these distinct characteristics by designers and those responsible for inspection and maintenance is believed to be the major cause of many of the common problems identified in these structures. Parking structures are generally classified as either “static” or “automated.” The automated parking are more common in Europe while static is the most prevalent type of parking structure in the United States. The two types of ramps that can be used are straight ramp and curve ramp. Five types of layout that can be used in traditional parking structure includes parallel packing, perpendicular/ angle 90o, angle 60o, angle 45oand angle 30o. The floor level system can be flat on the same floor, can be split level or staggered floor systems or sloping floor systems. For the design aspect, there are numerous configurations of multi-storey car parks featuring different arrangements of deck and ramp.

2.2) DR. MD. SUBHAN (2012)

In this paper the peculiarity of Lagos in terms of shortage of land for expansion purposes cannot be overlooked, hence the congestion in terms of housing, shops and markets, traffic and other land uses competing for limited land space hence a multi-storey car park complex is proposed. Fig.1 below, probably from the 1930s, shows a new parking system in Detroit: the lane of cars against the curb to the right is parked, but those cars in the lane next to it must have the driver at the wheel. Few works exist in this division when contrasted with other sort of outlines, for example, buildings and bridges. The challenges range from some unmistakable qualities that have prompted some fizzled multi-story auto parks, to the uniqueness of some fundamental elements to be considered, to the set number of utilitarian cases on which to take after and make more creative models and so on. Because of the uniqueness of this structure, the static and element loads going ahead the chunks must be viably transmitted to the pillars, sections and to the establishment as shown in.In this manner, components of the edge must be fit for opposing the most exceedingly bad load cases material. The section on the last floor must be especially strengthened to have the capacity to oppose the muddled burden case getting from the arrival of helicopters. The demonstrating, examination and configuration must be precisely executed in accordance with the material properties, basic points of interest and diverse burden blends.

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2.3) DR. TOM V. MATHEW, IIT BOMBAY (2014)

In This Paper Providing suitable parking spaces is a challenge for traffic engineers and planners in the scenario of ever increasing vehicle population. It is essential to conduct traffic surveys in order to design the facilities or plan the fares. Different types of parking layout, surveys and statistics, Parking requirements, Ill effects of parking, Parking system. Parking is one of the major problems that is created International Journal of Modern Trends in Engineering and Research (IJMTER) Volume 04, Issue 3, [March– 2017] ISSN (Online):2349–9745; ISSN (Print):2393-8161 @IJMTER-2017, All rights Reserved 213 by the increasing road traffic. It is an impact of transport development. The availability of less space in urban areas has increased the demand for parking space especially in areas like Central business district. This affects the mode choice also. This has a great economical impact.

2.4) M.D. REZZA , M.F.ISMAIL (2013)

Smart parking system obtains information about available parking spaces process it and then places the car at a certain position. A prototype of the parking assistance system based on the proposed architecture was constructed here. The adopted hardware ,software and implementation solution in this prototype construction are described in this paper the effective circular design is introduced here having rack pinion special mechanism which is used to lift and place the car in certain position .The design of rack pinion mechanism is also simulated using AUTODESK INVENTOR software.

3 METHDOLOGY

3.1 GENERAL

This chapter deals with the line of action of project study i.e. the methodology need to contribute for the achievement of desired goals of it. These methodologies basically have number of steps or set of procedures discussed in this section. The modeling is done using finite element software STADD-Pro. The software is based on the finite element method. The seismic analyses methods so far used in estimating the demand on the structure can be classified

STAAD-Pro V8i SS5 STAAD or (STAAD-Pro)

It is a structural analysis and design computer program originally developed by Research Engineers International at Yorba Linda, CA in 1997. In late 2005, Research Engineers International was bought by Bentley Systems.STAAD-ProV8i is a comprehensive and integrated finite element analysis and design offering, including a state-of the-art user interface, visualization tools, and international design codes. It is capable of analyzing any structure exposed to static loading, a dynamic response, wind, earthquake, and moving loads. STAAD-Pro V8i provides FEM analysis and design for any type of project including towers, culverts, plants, bridges, stadiums, and marine structures.

PROBLEM STATEMENT

In the present study the seismic load analysis and lateral load analysis as per the seismic code IS 1893 (Part 1): 2002 are carried out. For Buildings, asymmetric in plan for building height G+2 for comparison criteria is that numbers of columns buildings and an effort is made to study the effect of seismic loads on them also determine torsion moments, base shear,

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displacement and time period by using response spectrum method.A G+1 storied bare RC Ordinary Moment Resisting Frame has plan as shown in fig. following dataType of building: single storied building (ground floor +2 floors)

- Thickness of Slab - 150 mm thick
- Thickness of outer wall - 300mm (external wall only)
- Material - M 20 and Fe 415
- Column size - 300*600 mm
- Beam size - 300*600mm
- No. of column - 87 no.
- Types of column - Square
- Strata- Rocky and Hard Soil
- Type of frame – SMRF (special RC moment resisting frame)
- Zone - III (Moderate Zone)
- Zone factor (Z) =0.16(table 2 page 16 IS 800 : 2007
- Height of each floor-3m Importance factor(i)-1(table 6 page 18 IS800:2007
- Centre to centre distance between columns - 8m Live load – 3.5KN/m2

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Planning And Designing Of Heavy Traffic Road

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ABSTRACT

The mixed traffic conditions in third world countries like India on urban roads pose safety problems. The high increase in the number of vehicles on the roads has caused a major social problem-the loss of lives through accidents. The appalling human misery and the disastrous economic loss caused by road accidents demands for the attention of the society and calls for the need of the solution of the problem. A multidisciplinary approach is required in understanding the problem and providing the required solutions The accident condition in India is serious because of rapid growth of motor vehicles over the past few years and the inadequacy of many of the roads and streets to cope up with the traffic.

Keywords : Appaling , Disastrous, Multidiscilinary, Inadequacy

1. INTRODUCTION

As population increase the numbers of vehicles planning of road in congested area is the engineering concept related to the planning of road for providing ease to the traffic to move out. It is very essential factor to be considered during the design of the road.

In our country, traffic problems are fast coming up, especially in the big cities like Mumbai,Delhi, Kolkata and Chennai etc. with the development of country, there is fast increase in the number of vehicles on the road and thus it is necessary to replan and redevelop the road.

Long term development plans are to be prepared for country as a whole for a region of the country. Land use planning, transportation need and road network planning are closely interlinked. It is desirable to decide the hierarchy of road system and develop the road network well in advance before the land development take place. In such situation several problems of acquisition of development, rehabitation, resettlement, etc. could be minimized. Rising trends in growth of population and traffic around urban centers and the steady growth of national productivity create a continuing demand for improvements in highway facilities. The problems of traffic accidents and congestion on urban roads are being viewed with a grave concern in the recent years. The main causes for his problem are improper land use development planning, inadequate road network and other roadway facilities and proper traffic panning.

The residence of Nallasopara east has been facing problems on regular basis due to long traffic jams in their locality. Several complaints have gone unheard as during the pedestrians too are unable to walk freely.

For the last six months residents living near the flyover in Nallasopara are troubled a lot, with the as motorist fail to follow the lane leading to congestion below the bridge. While rouge auto drivers continue to flout traffic norms and block the entire stretch by parking autos on the stands.

As per traffic volume study the road carrying very heavy traffic as per the IRC classification because the site is located beside the railway station the roads at intersection carries heavy traffic. Therefore planning of junction is must.

As the population growth rate of town is very fast therefore vehicle rate growth rate is increase very rapidly. Due to the fast growth rate the current intersection planning is became outdated. New planning is required to avoid heavy traffic.

2.LITERATURE REVIEW

SHEKHAR K. RAHANE has studied that traffic congestion is a major urban transport problem .Due to traffic congestion, there is possibility of accidents because of poor traffic management. To eliminate road accidents and to save precious human life it is essential to find proper solution for traffic congestion. In this paper traffic congestion problem in ***Talegaon Dabhade ,Tal-Maval***. Dist-Pune is identified and studied for finding out the causes and proposed solution of it. In the recent years there has been a considerable loss due to the accidents to the precious human life and to the vehicles to some extend in Talegaon Dabhade

In Talegaon, traffic congestion is a common issue like Mumbai. different infrastructural and managerial projects are granted for reducing traffic jam. However in Talegaon this type of policy is not addressed yet. Traffic congestion constraints can be ameliorated by embarking on various strategies such as road capacity expansion, improved road infrastructures, restricting routes for Rickshaw, financial penalty to the traffic law breakers and application of Fly over. Most importantly, proper traffic management system along with appropriate implementation of traffic rules is necessary to mitigate the problems of traffic congestion in Talegaon Dabhade.

In Azeem Uddin project study the aim was to study among the strategies that address congestion, reduce unexpected delays, and make the most of the nation's existing investments, continued advancement of better transportation operations plays a critical role. It will not happen by one single act. The transportation community can accelerate the solution to congestion by being more

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aggressive in championing the need for transportation systems management and operations, more aggressive in showing the benefits of management and operations, and more aggressive in the deployment and use of traffic engineering, transportation management, and traveler information tools.

According to ***M. Absar Alam*** and ***Faisal Ahmed*** Traffic congestion is a public policy issue and solicits a policy response which can strike a balance between urbanization and urban mobility. In the case of India, several policy initiatives have been undertaken but have not yielded desired outcomes. This is primarily because the focus has only been on public transport improvement measures, while traffic demand management measures have largely been neglected. This paper studies the traffic scenario in select Asian cities and the policy measures undertaken by their respective governments. It revisits relevant policies in India and assesses the gaps that deter the desired impact of such policies on reducing traffic congestion. It also suggests policy measures to overcome these gaps and the way ahead.

Due to increasing levels of urbanization, public transport in Asian cities is characterized as that of high dependency and low availability. It also suffers from huge deficiencies both in terms of infrastructure availability as well as operational efficiency. Considering the policy gaps in Indian cities, the following measures are recommended to reduce congestion in mega cities. These recommendations are in addition to those related to congestion pricing and other charges, which may be levied to reduce personal vehicle travel.

- There is a need for integrated transport policies to address problems of urban transport and urban infrastructure development through an integrated institutional mechanism. For example in India, a National Transport Development Policy Committee was set up to formulate such policies. The committee also recommends developing effective institutional frameworks at centre/state and city level.

- A national policy needs to be designed to address more environmentally sustainable and urban growth. Alienated sectoral policy frameworks do not have the desired impact on urban transportation. For instance, if India wants to reduce personal vehicles in cities like Delhi, Mumbai, Hyderabad and Bangalore, then policies to address issues related to manufacturing of automobiles also need to be formulated. In the case of NTDPC, the Working Group on Urban Transport speaks about urban transport tax, green cess, increase on diesel prices; while on the other hand, the Working Group on Automobiles Sector speaks about emerging as the world's 5th largest car producer and largest 13 Revised guidelines for JNNURM 14 Colliers International (2011) - CBD daily parking charges (in US $) Transport and Communications Bulletin for Asia and the Pacific No. 82, 2013 manufacturer of three-wheelers, with the automotive sector expected to increase its share of India's GDP from 5% in 2006 to 10% in 2016.

- Urban transportation needs strict parking policy and uniform parking charges at national level for mega cities. There is also a need to increase parking charges as it has an impact on parking demand as well. It is also important to link parking rates with the commercial viability of parking structures in mega-cities.

- There is a need for exclusive lanes for public transport in Indian cities. For instance, in Delhi, land availability for transport infrastructure is less. In this context, integrated approach of land use is important for different transport modes.

- State transport undertakings need to be strengthened to ensure safe and reliable public transportation.

- There is a need for driving manuals for drivers at both municipal and state levels.

As per study of ***S. B. Raheem1, W. A. Olawoore1, D. P. Olagunju1, E. M. Adeokun*** due to increase in population and the attraction of human activities into urban region which in turn leads to the growth of vehicle ownership and use, there is demand for road space which has led to increase in the number of public transport operation. Consequently, the demand for road space is greater than the supply because the rate of provision of transport facilities is less than the rate of growth of vehicle ownership and use which result into traffic congestion. Traffic congestion is the impedance of vehicles imposed on each other due to speed-flow relationship in conditions where the use of transport system approaches capacity. Traffic congestion in Nigeria, taking Basorun-Akobo Road in Ibadan Oyo State as a case study has been analysed using experimental and theoretical approaches. These involve traffic counting and delay survey. In order to carry out effective research work on the case study road, the method adopted were traffic counting and traffic delay survey. The effect of traffic congestion on the study area are Waste of time, Delay movement, Accident, Inability to forecast travel time, Fuel consumption, Road rage and environmental pollution. Possible solutions to traffic congestion on the case study area is to: Dualize the Road, Provide Adequate Parking Space, Construct proper Drainage and Install Traffic Control Devices.

Take an alternate route. Modern technology has made it easier than ever to predict traffic patterns. There are several web-based services that can provide you detailed, real time data about the current traffic conditions.

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The paper of Amudapuram Mohan Rao, Kalaga Ramachandra Rao gives an overview and presents the possible ways to identify and measure metrics for urban arterial congestion. A systematic review is carried out, based on measurement metrics such as speed, travel time/delay and volume and level of service. The review covers distinct aspects like definition; measurement criteria followed by different countries/organizations. The strengths and weaknesses of these measures are discussed. Further, a short critique of measurement criteria is presented.

3.METHODOLOGY

As population increase the numbers of vehicles are also going to be increase so causing more problems on the road. Traffic problem is causing more problems such as noise pollution and air population due to vehicles horn and poisonous gases emitted by vehicles to resolve this traffic related issues by studying reasons for the traffic and road intersection by designing the road with appropriate engineering solutions and provide ease for the function of intersection at road.

1. Traffic volume study

For the planning of the road it is necessary to study the number of vehicles running at the region. To study the traffic flow it is suggested to adopt traffic volume study of the region and decide the types and number of vehicles running through the road.

It may also provide the details of the inflow and outflow of traffic which give proper details for the design of the desired factors.

2. Signals Timings

As per the present traffic conditions the timings of the signals are to be decided as per the data of the traffic volume study. The number of traffics post are to be positioned as per the requirements.

3. Use of appropriate signs

One other best way to reduce traffic is to follow proper traffic signs and symbols.The various signs and symbols will be used which results in reduction of traffics jams.

4. Parking facility

Improper parking on the roads leads to traffics jams and collision of the vehicles, the proper parking place should be provided for the parking of the vehicles of the visitors of the place.

5. Road segment junction

As the region is of T junction there is need of designing the proper junction which may result in reduction of traffics jams.

6. Lane design turns

As per the road width and future expansion of road the proper number of lanes should be designed for proper functioning of the vehicles which may reduce the collision of vehicles and traffic jams.

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7. Design of appropriate structure to reduce traffic problems

As the main problem of traffic jam is the street vendors and improper parking of vehicle hence there is need of constructing a desired structure where the street vendors and parking facilty may be provided. The aim of this project is to plan the intersection to avoid the traffic congestion, in this staggered intersection type road intersection is taken to plan where the traffic issue are occurs due to the inappropriate planning of road. To avoid this re-planning of the intersection is necessary now.

4. CONCLUSION

The most important decisions concerning the design of intersections are (often implicitly) made in the network planning process. Generally, once a less favorable choice has been made in this planning phase, the negative consequences cannot easily be reversed in the geometric design phase. Safe intersection planning is therefore an important aspect in the network planning phase.

Decisions in the network planning phase generally affect one or more of the following elements:

- Optimum spacing: - number of intersections - intersection spacing.
- Safe configuration:-intersection types (for instance, once the choice for a cross intersection has been made in the planning phase, this choice cannot easily be converted to the safer T-intersection) - general lay-out of the intersection - intended use of the intersection (priority regulations, signalization).

The scope includes construction of co-centric widening and eccentric widening of road. There are eight flyovers and four major bridges and culverts in the scope of work. Service Roads will be constructed on both sides of the carriageway, in urban areas. The total length of road is 32 km, including both sides.

The overall traffic management plan is designed and intended to specify adequate safety measures in advance against identified hazards and stipulated implementation of the said safety measures to ensure safe movement of traffic during the construction operations of Nallasopara station road project. The objective of safety standards is to provide safe travel to the drivers of vehicles plying on the Project Highway at all times of the day, throughout the year and provide protection to the Project workers when they are on the work. This overall traffic management plan delineates the safety standards in terms of Construction zones, Signs and Safety measures in work zones and during normal operations.

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"USE OF PAPER SLUDGE AS A CONSTRUCTION MATERIAL"

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ABSTRACT—

The rapid increase in construction activity leads to active shortage of conventional construction material such as fine aggregate, coarse aggregate, bricks etc. This will lead to increase in initial cost of primary construction material. Many researches are searching cheaper material as that can be used as substitute for this material. In our project we are using sludge, fly ash as a partial substitute to cement in concrete. We will be performing test on specimen as per Indian Standards to get required result which will be beneficial to building construction material product. The aim of our project is to maintain environmental balance, avoid problems of disposal, and minimize health hazards and to develop new construction material using industrial waste (paper sludge) which is useful to provide a potential sustainable source.

Keywords— *Paper sludge,concrete,fly ash,compression Test, Slump cone Test*

1. INTRODUCTION

1.1 General

Human activities on the earth produces inconsiderable quantity of waste more than 2500 million tonnes per year including industrial and agricultural waste from ruler and urban societies. There are various waste material like rice husk, quarry dust, crumbled rubber, sewage sludge ash, fly ash, fly ash based geo polymer, ground granulated blast furness slag, pumice fine aggregate and also concrete waste which can be use as a replacement to cement-concrete. This provides us the low cost light weight and eco friendly construction product. The use of waste material in place of natural material is one of the best approach. In our project we are going to use paper mill sludge and fly ash as a material which can be used as a replacement since it contains aluminum (Al), magnesium (Mg), silica (Si) and calcium (Ca) whose oxides are largely used in concrete industry. Thus to reduce disposal and pollution problems emanating from industrial waste, It is essential to develop profitable building material from this sludge.

1.2 Problem Statement

The use of alternative industrial waste as raw material in the field of civil engineering is increasing nowadays because of the solid waste disposal and environmental regulations. Their method of disposal is not well defined. The byproduct remains unused and unutilized, worse yet some of the wastes are land spread on the agricultural land or running off in to area, lakes and streams. some companies burn their sludge in incinerators contributing to our serious air pollution problems, to reduce disposal and pollution problems emanating from these industrial wastes is most desire to develop it in to more profitable materials from them .availability of consistent quantity of sludge across the country is requisite for change of perception of sludge from a waste material to resource material. Fly ash and sludge together offers environmental advantage it also improves the performance and quality of concrete.
In the context of low availability of nonrenewable energy resources coupled with requirement of large quantities of building material like cement the importance of using industrial waste cannot be underestimated

1.3 Objectives

We have decided to work on "Use Of Waste Paper Sludge As A Construction Material" because aim of the project is to reduce pollution and disposal problems emanating from industrial waste and also for the economical concrete production.
In the project we are basically concentrating on following sections:
1. Production of paper around the world is about 8.4 to 11.2 metric tonnes and paper producing industries produce large amount of solid waste about 40 ton per industry per day.
2. Hence use of paper sludge in bricks or other concrete production can save the paper industry disposal cost
3. To reduce the land spread caused by the paper sludge
4. Also this research study helps to develop low cost rural roads using the hypo sludge as an innovative supplementary cementitious material in construction of rigid pavement
5. To achieve economy by replacing cement by hypo sludge and fly ash as they are byproducts and available in masses.

1.4 Scope of project

There are many problems related to the disposal of waste from industries. If those waste are used as a substitute for construction material then it can have a lot of scope for the construction product development. In this project we are using paper sludge to develop low cost construction product.

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2. LITERATURE REVIEW

Abdulllashahabaz Khan, Ram Pantha, Ganga Krishna and Suresh G .Patil in their published paper "Structural Performance Of Concrete By Partial Replacement Of Cement With Hypo Sludge", discuss hypo sludge (paper waste) behaves like cement because of silica and magnesium properties. It is difficult to point out another material of construction which is as variable as concrete. Concrete is the best material of choice where strength, durability, impermeability, fire resistance and absorption resistance are required. Compressive strength is considered as an index to assess the overall quality of concrete and it is generally assumed that an improvement in the compressive strength results in improvement of all other properties. Hence strength investigations are generally centered on compressive strength. Even though concrete mixes are proportioned on the basis of achieving the desired compressive strength at the specified age, flexural strength often play a vital role in concrete making. Hypo sludge (paper industry waste) has a tremendous potential in this context and it is well documented that the use of hypo sludge in concrete results in a significant improvement is the rheological prosperities. From paper manufacturing process three types of sludge are obtained namely lime sludge (Hypo sludge), ETP sludge and De-Inking sludge. In their project they have utilized lime sludge as a replacement for cement.

They all concluded in their paper that the compressive strength increases as the curing period increasing for M20, M30 grade concrete, compressive strength of 20% replacement are approximately same but it increase with 10% replacement and finally it starts decreasing in strength with 30% replacement. It is observed that in split tensile strength of M20 and M30 grade concrete. The strength of concrete has increased with 10% replacement of hypo sludge with cement as compare to conventional concrete and with 20% replacement it is slightly more or we can say it as equivalent but with 30% its start decreasing in strength. It is observed that in flexural strength of M20 and M30 grade concrete the strength of concrete has increased with 10% replacement of hypo sludge with cement as compare to conventional concrete and with 20%replacement it is slightly more or we can say it as equivalent but with 30% its start decreasing in strength.

Erlinda L. Mari, Ma. Salome R. Moran, and Cesar O. Austria in their research paper "Paper Mill Sludge as Fiber Additive for Asphalt Road Pavement" has studied and evaluated the properties of stone mastic asphalt (SMA) mixtures made with paper mill sludge from four paper mills, as well as wastepaper, as fiber additive for road pavement. A good road is paved or covered with a structure to supplement the natural strength of the soil foundation. SMA is a dense, gap-graded bituminous mixture with high contents of stone, filler and bitumen, modified with a suitable binder carrier such as cellulose fiber. The cellulose fiber additive used in SMA is said to prevent drainage of asphalt binder and thus improve binding with aggregates. Cellulose fiber can be derived from any lignocellulosic plant material by pulping. There is, however, an unavoidable residue also called sludge that goes into the wastewater stream of the pulping and papermaking processes. Paper mill sludge still has fiber in it together with some inorganic matter. This study used paper mill sludge from four paper mills and also of wastepaper as fiber additive in SMA to determine their effects on the stability, flow and volumetric properties of Marshall specimens.

They concluded in there paper that the wide range of data obtained to assess the effects of paper mill sludge from four paper mills and also of wastepaper as fiber additive in SMA mixtures for road pavement indicates that any of the fibers can serve as asphalt fiber additive at 0.3 to 0.5% additions. The optimum asphalt content is within 5 – 6%.Recovery of the fibers after extraction indicates that these can withstand the harsh processing, including the high temperature for mixing with asphalt. Further study is recommended on pelletizing the sludge fibers for better handling. Thereafter, an upscale study, from processing of sludge to road application of sludge-asphalt mixtures, is necessary to verify the technical and economic viability of the technology to broaden raw material base for the very expensive currently available asphalt fiber additive.

Carsten H. Floess ,Thomas F. Zimmie Horace K. Moo-Young Jr. and Warren A. Harris in there paper "A Municipal Landfill Cover With A Paper Sludge Barrier Layer" demonstrate the feasibility of using paper sludge as barrier layer material, extensive research was conducted to evaluate the physical properties of the sludge, primarily hydraulic conductivity. In their paper they summarizes the geotechnical properties of IP's paper sludge obtained from the feasibility studies, primarily hydraulic conductivity. It includes the effects of freeze-thaw and biologic degradation on sludge hydraulic conductivity. Design and construction considerations for a landfill cover using paper sludge as the barrier layer are discussed. Construction quality assurance/quality control (QA/QC) data arc also included.

They concluded in their paper that paper sludge has been successfully used as the barrier layer Locap the Corinth, NY, municipal landfill. Paper sludge has a high water content and is highly compressible. It behaves similar to highly organic peat soils. The hydraulic conductivity of paper sludge decreases as the organic content decreases. To achieve a hydraulic conductivity less than 1 x J0-7 cm/s, paper sludge should have an organic content Jess than about 50 percent. As the paper sludge biodegrades v, age .Its hydraulic conductivity decrease.

Freeze-thaw cycles tend to increase the hydraulic conductivity of iP paper sludge by one to two orders of magnitude. 8ecause it is highly compressible, the paper sludge barrier layer was thickened from the normal 0.45m(l S") to 0.76m (30"). The barrier layer was also protected from frost action. Paper sludge as placed and rolled at its natural water content. The sludge as compacted using a paper mill roller to eliminate voids between clods and smooth the surface. QA/QC testing during construction included hydraulic Conductivity tests of shel by tube samples plus measurement of water content, organic content, and specific gravity. The average water content was about 150 percent; the average organic content was about 45 percent; and the average specific gravity was about 2.0. The average measured hydraulic conductivity was about 4 x JO•' cm/s. Paper sludges vary from mill to mill. Each sludge material needs to be evaluated to determine its suitability for cap material.

ToivoKuokkanen, HannuNurmesniemi, RistoPöykiö, KaukoKujala, JuhaniKaakinen&MattiKuokkanen in their paper "Chemical And Leaching Properties Of Paper Mill Sludge" discuss paper mills produce large amounts of paper mill sludge in the treatment of process water. The amount and chemical composition, as well as the geotechnical properties of paper mill sludge depend on the paper grade being manufactured, specific fresh water consumption, the wastewater cleaning technique applied and the type of raw materials (e.g. wood, fillers). Thus, the chemical composition of paper mill sludge produced by one mill is often significantly different from that of another. The main organic components in the paper mill sludge are wood and cellulose fibers of different lengths, lignin and to some extent also organic binders. The main inorganic components in the paper mill sludge are kaolinite (clay) and calcium carbonate, which are paper additives, as well as heavy metals present as impurities, which mainly originate from the wood raw material Paper mill sludge is usually disposed of in landfills. Several studies have shown that paper mill sludge can be compacted in such a way that it has a very low hydraulic conductivity (permeability). Paper mill sludge can substitute the use of natural clay in the

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construction of the landfill hydraulic barrier layer, and the substitution can reduce the cost of disposal and is an excellent alternative in areas that do not have a local source of clay. Natural and anthropogenic environmental changes greatly influence the behavior of metallic pollutants in sludge, as the form in which they occur may be change. Such external factors can include pH, temperature, the redox potential, organic matter decomposition, leaching, ion exchange processes and microbiological activity. The aims of their work was to study the most important chemical and geotechnical properties (i.e. nutrient content, loss-on-ignition, dry matter content, neutralizing and reactivity values, pH, electrical conductivity, hydraulic conductivity, internal friction angle and cohesion), as well as the leachability of trace elements (Cd, Cu, Pb, Cr, Zn, Fe, Mn, Ni, Co, As, V, Ba and Ti), in the paper mill sludge derived from the chemical wastewater treatment plant at the paper mill of Stora Enso Oyj Oulu Mill leaching techniques allow us to obtain information about the mobility of major and trace elements under different environmental conditions, such as acidic or alkaline, oxidizing or reducing behaviour, the action of chelating agent. It is essential that the materials used in landfill barrier layers are not subjected to significant decompositio. Although the sludge is rich in cellulose fibres, the biodegradation tests carried out by the manometricrespirometric.

Therefore they all concluded that, if the paper mill sludge is used as a hydraulic conductivity layer material in landfills. According to the overburden studies, the hydraulic conductivity of the paper mill sludge originating from Stora Enso Oyj Paper mill at a pressure of 30 kPa was 4.4610_10m s_1, and 1.7610_10m s_1 at a pressure of 100 kPa. These values well meet the generally required values of between 1.0610_7ms_1 and 1.0610_9m s_1 for a geological barrier in the base and sides of landfills for hazardous waste, non-hazardous waste and inert waste in the European Union. Paper mill sludge can also be used in the artificially constructed geological layer of the landfill cover structure. The angle of internal friction of the paper mill sludge was 34.8_ and the cohesion of interparticle adhesion 23 kPa, which are important measures for assessing the shear strength of the sludge and thus the biodegradability, i.e. the ratio of biological oxygen demand (BOD) and theoretical oxygen demand (ThOD), of the paper mill sludge in soil, in groundwater and under the OECD 301F standard conditions. stability of the landfill layer in which it is used. During a 28 day period, the biodegradability of the sludge in soil was ca 0.4% and in ground-water under 1%, whereas under the OECD 301F standard conditions it was ca 8%. The total, as well as the leachable trace element concentrations in the sludge were very low, which is a favorable situation when the sludge is utilized. The results obtained in this study showed that the highest concentrations of most of the trace elements (i.e. metals) in the sludge were in the residual fraction. From the environmental point of view, this fraction is not likely to be dissolved under the conditions normally found in nature, and it is therefore called the ‘‘inert phase’’.

Prof. JayeshkumarPitroda, Dr. L.B.Zala, Dr.F.S.Umrigar in their research paper “Innovative Use Of Paper Industry Waste (Hypo Sludge) In Design Mix Concrete.” To save energy and to earn carbon credit is very much essential for the betterment of mankind. Paper fibres can be recycled only a limited number of times before they become too short or weak to make high quality paper. It means that the broken, low- quality paper fibres are separated out to become waste sludge. By earning carbon credit by using industrial waste (hypo sludge) for Building Materials like cement, the energy & environment can be saved. To reduce disposal and pollution problems emanating from these industrial wastes, it is most essential to develop profitable building materials from them. Keeping this in view, investigations were undertaken to produce low cost concrete by blending various ratios of cement with hypo sludge.

They are concluded that, as hypo sludge percentage increases compressive strength and split strength decreases. Use of hypo sludge in concrete can save the paper industry disposal costs and produces a ‘greener’ concrete for construction. Environmental effects from wastes and residual amount of cement manufacturing can be reduced through this research. This research concludes that hypo sludge can be innovative supplementary cementitious Construction Material but judicious decisions are to be taken by engineers.

Sharipudin, S.S., Ridzuan, A.R.M, and MohdSaman, H. in their research paper “Performance Of Foamed Concrete With Waste Paper Sludge Ash (WPSA) And Fine Recycled Concrete Aggregate (FRCA) Contents.” Foamed concrete is a Portland cement paste with a homogeneous void created by introducing air in the form of small bubbles. The production of foamed concrete consumes an abundance of cement which is associated with sustainable and environmental issues. For example, one ton of green gas is emitted for every one ton of cement produced. Therefore, it is essential to replace the utilization of cement in foamed concrete production. In view of that, tremendous research on utilizing of wastes such as silica fume , fly ash , rice husk ash, palm oil fuel ash (POFA) , and ground granulated blast slag (GGBS) in foamed concrete production have been reported. The generation of a large amount of ash has led to the high cost of disposal and the shortage of landfill space. Therefore, the use of waste paper sludge ash (WPSA) has attracted the author to explore the potential of WPSA as a cement replacement material in foamed concrete. It is known that WPSA possesses the main constituent elements of Al2O3, SiO2 and CaO. The use of WPSA as a pozzolanic material for partially replacing cement is not well known in producing lightweight foamed concrete. Although the consumption of recycled concrete aggregate (RCA) has become more attention, limited findings have been found for the use of fine recycled concrete aggregate (FRCA) (i.e, < 1.18 mm) and much less in foamed concrete production. Therefore, this research aimed in correlating the strength response to the contribution of these substitution materials in the manufacturing of foamed concrete.

They are concluded that the WPSA at 30% replacement had produced higher compressive strength rather than those of other replacements. The addition of FRCA does significantly increase the compressive strength in which the maximum replacement level is 10% replacement by mass to sand content. Incorporation of WPSA and FRCA into the foamed concrete mixes is favorable, giving the improvement in compressive strength at all curing age. The compressive strength obtained is accepted to be produced as non-load bearing structure since compressive strength results obtained from all mixes are higher than 3.45 Mpa at 28 days.

Prof. Digambar S. Chavan, Riyaj K. Mulla, Vikas V. Lengare in their research paper “Use Of Paper Mill Sludge And Cotton Waste In Clay Bricks Manufacturing.” India is basically an agricultural country. Around 70 % people make their living on agricultural related work. But in past few years there is a rapid migration of population from villages towards big cities. This has caused social imbalance along with crowding of cities thereby putting thrust on basic amenities in big cities, namely food, cloth and shelter. Demand of shelter has given rise to demand of building materials like bricks, cements, steel, etc. Since, the production of building materials is limited, their prices are sky touching and due to fast production, quality is being also suffered bricks made up from paper mill sludge and cotton waste can reduce the above problem to some extent by using this composite bricks. This will also produce economical building material since the waste is reused which would otherwise have been wasted. An attempt has been made to produce durable and economical bricks from clay added with varying proportions of paper mill sludge & cotton waste.

They are concluded that, compressive test on bricks is 3.529 N/mm2 so, this brick comes under class designation 3.5 under Indian Standard. Water absorption test on bricks is 9.765% so, this brick comes under higher class.

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Dhiraj Agrawal, Pawan Hinge, U. P. Waghe, S.P. Raut in their research paper "Utilization Of Industrial Waste In Construction Material." the demand of the concrete and the required raw materials are very high. This causes the hike in the costs of cement, fine and coarse aggregates. Quite often the shortage of these materials is also occurred. To avoid the problems like cost hike and cuts in supply of concrete and mortar, the alternate material or the partial replacements for the cement and aggregate should be developed by recycling of waste materials. This provides us the low cost, lightweight and eco-friendly construction products. Use of the waste materials also reduces the problem of land-filling, environmental and health concern. The present paper covers the review on the use of various waste materials like rice husk ash (RHA), quarry dust (QD), crumb rubber, sewage sludge ash (SSA) as mineral additive, paper mill sludge ash (PA), fly-ash, fly-ash based geo-polymer, ground granulated blast furnace slag (GGBF), pumice fine aggregate especially in mortar and concrete. Utilization of the widely spread industrial wastes in the civil construction practice may lead to a real possibility of significant decrease in the environment pollution by paper and lime production wastes and perceptibly economize the price of civil construction.

They are concluded that, the various methodologies for the use of industrial waste products by partial replacements of cement and fine aggregates in concrete and mortar have been reviewed. Various physico-mechanical and chemical properties of the concrete and mortar incorporating different waste materials are studied in accordance with the reviewed literature and the standards. It is seen that waste materials like fly ash, rice husk ash, GGBF, were used extensively and sufficient research have been done on them. The study in turn is useful for various resource persons involved in using industrial or agricultural waste material to develop sustainable construction material.

Mohammad Ismail, M.A. Ismail, S.K. Lau, Bala Muhammad, and Zaiton Majid in their research paper "Fabrication of Bricks From Paper Sludge And Palm Oil Fuel Ash" Paper recycling and utilization of palm oil wastes as fuel source in palm oil mills for instance were currently exercised. recycling paper and combustion of palm Paper sludge mainly consists of cellulose fiber and inorganic materials. The moisture content normally present in paper sludge may vary from 60-75% oil waste will produce wastes such as paper sludge and palm oil fuel ash. this value can be reduced to as low as 35% by dewatering processes. In the production of the masonry bricks for instance, only 5% fine aggregate replacement by paper sludge acting as mineral filler was achieved. Although, the result shows that such a replacement can yield compressive strength of 8 N/mm2. Chemical composition indicated presence of high mount of silica, thus considered to possess high potentials of serving as a cement replacement. Experimental parameters involved include compressive strength, density, water absorption and leaching.

They are concluded that, bricks fabricated by incorporating 20% paper sludge and 20% POFA into cement provide adequate compressive strength, tolerable water absorption and acceptable heavy metals leachate, thereby depicting significant potentialities to serve as masonry unit elements.Paper sludge-POFA brick has about 26.1% weight reduction when compared with normal brick. This characteristic could be of advantage especially in masonry partition works for high rise buildings where substantial amount of cost can be saved.

Prof. MamataRajgor, Apurva Kulkarni, SamruddhaRaje, JunedPeerzada in their research paper " A Miniscule Endeavour for Accomplishing Hypo Sludge Fly Ash Brick in Indian Context" production of paper all around world is about 8.4 to 11.2 metric tons per annum. Paper producing industries produce a large amount of solid waste. Uses of hypo sludge in brick can save the paper industry disposal costs and produce a 'greener' bricks for construction. An innovative supplementary cementious construction material formed through this study.

They are concluded that, use of hypo sludge in brick can solve the disposal problem; reduce cost and produce a 'greener' ecofriendly bricks for construction. Hypo sludge bricks reduce the seismic weight of building. Study helps in converting the non valuable hypo sludge into bricks and makes it valuable. Environmental effects of wastes and disposal problems of waste can be reduced through this research. It reduces the cost of material per unit.

Prof. JayeshkumarPitroda, Dr. L.B.Zala, Dr.F.S.Umrigar in their research paper "Utilization of Hypo Sludge By Eco-Efficient Development Of Rigid Pavement In Rural Roads" paper mill sludge is a major economic and environmental problem for the paper and board industry. The material is viscous, sticky and hard to dry. The innovative use of hypo sludge in concrete formulations supplementary cementitious material was tested as an alternative to conventional concrete.

There research study concludes that hypo sludge can be an innovative supplementary cementitiousaterial useful for construction of rigid pavement in development of low cost rural roads.

Prof. Sajad Ahmad, M. Iqbal Malik, Muzaffar Bashir Wani, Rafiq Ahmad in their research paper "Study Of Concrete Involving Use Of Waste Paper Sludge Ash As Partial Replacement Of Cement" Paper mill sludge is a major economic and environmental problem for the paper and board industry. The moisture content is typically up to 40%. The material is viscous, sticky and hard to dry and can vary in viscosity and lumpiness. Paper sludge ash is therefore potentially suitable as an ingredient in: - the cement kiln feed, contributing calcium, silica and alumina. - the manufacture of blended cements. This research will summarize the behavior of concrete with the waste paper sludge ash by replacement of cement in the range of 5%, 10%, 15% and 20% which may help to reduce the disposal problem of sludge and enhance the properties of concrete. As wastepaper sludge ash contains higher percentage of silicon dioxide SiO2, it may provide extra strength to concrete.

They are concluded that, use of waste paper sludge ash in concrete will preserve natural resources that are used for cement manufacture and thus make concrete construction industry sustainable and waste paper sludge can be used as fuel before using its ash in concrete for partial cement replacement and also the disposal problem for paper industries for this waste material is fully solved.

1.METHODOLOGY

In our project we will estimated to take paper sludge and fly ash, will be connected from processing unit. The paper sludge, fly ash will be mixed with water in proper proportion and other ingredients. It is estimated to make specimens for testing with coarse aggregate and without course aggregate. Proper test will be carried out in next phase of project.

III.I Materials use

(a) Supplementary cementitious material

1. Paper sludge
2. Fly ash

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(b) Cement
(c) Course aggregate
(d) Fine aggregate
(e) Water

3.1 Experimental investigation

(a) Slump cone test

Slump Test The workability of all concrete mixtures was determined through slump test utilizing a metallic slump mould. The difference in level between the height of mould and that of highest point of the subsided concrete was measured and reported as slump. The slump tests were performed according to IS 1199-1959.

(b) Compression test

From each concrete mixture, cubes of size 150mm x 150mm x 150mm and 150mm x 300mm cylinders have been casted for the determination of compressive strength. The concrete specimens were cured under normal conditions as per IS 516-1959 and were tested at 7 days and 28days for determining compressive strength as per IS 516-1959 and splitting tensile strength as per IS 5816-1999.

(c) Water absorption test

The average dry weight of cube specimens after removing from moulds was measured and the average weight of cube specimens after submerging in water for curing was measured at 28 days of age . The percentage of water absorption was measured for each concrete specimen and it gave indirect measure of durability.

4. CONCLUSION

From the previous research paper we have concluded that the importance of industrial waste in the context with construction industries to use as a economical construction material.
In are project we are using fly ash & paper sludge as a partial replacement to cement.
In next phase of we will collect all the necessary material required and test will be carried out as per Indian Standard.

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PARTIAL REPLACEMENT OF CEMENT, FINE AGGREGATE WITH HIGH LIME FLY ASH AND LCMS FILING IN CONCRETE: OPTIMIZATION

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ABSTRACT

LOW CARBON MILD STEEL (EN1A) Filing, here after addressed as "LCMS Filings" is a solid waste product from the steel industry in India. LCMS Filing includes a certain scale mineral such as EN1A which is a very popular grade of low carbon-manganese free cutting steel, the recycling of LCMS Filing will inevitably become an important measure for the environment protection and therefore can lead to great social significance the manufacturing of Portland cement is a highly energy-intensive process.

Fly Ash is mixed with concrete, the performance of concrete can be improved further due to the synergistic effect and activation of each other. Our project targets to study the use of large volumes of High Lime Fly Ash in concrete & LCMS filings. During the project we propose to use High Lime Fly Ash obtained from a local power plant & LCMS filings.

The result presented in our project address the compressive strength, bond strength, durability. The tests on concrete cubes showed a general increase in the strength of concrete with addition of High Lime Fly Ash and LCMS filings. The test results indicate that replacing proportions of cement with High Lime Fly Ash and LCMS filings would provide improved strength and a most cost effective solution

Keywords— *High Lime Fly Ash, Concrete, Compressive strength, LCMS filing.*

1.INTRODUCTION

One of the most significant activities stressed by the engineers and scientists related to concrete industry aims at a high percentage of replacement of clinker in cement with secondary raw materials, with the possibility of improvement of cement characteristics and durability of concrete. The less energy intensive and easily available industrial by-products with little or no pyro-processing and have inherent or latent cementitious properties together with the reduced of CO2 emissions being most sought after, such industrial by-products are commonly called as supplementary cementitious materials or admixtures. Admixtures are usually available in large quantities and can be used to replace Portland cement in green concrete, which include Fly Ash (Fly Ash is a solid waste product dumped in large quantities by thermal Power Plants the in India.). These admixtures are added to the concrete as extra binding materials, and the benefits of using these materials in terms of workability are well established.

Our project targets to study the use of large volumes of High Lime Fly Ash in concrete & LCMS filings. During the project we propose to use High Lime Fly Ash obtained from a local power plant & LCMS filings. Varying amounts of Fly Ash & LCMS filings will be used in given mixes of concrete as a partial replacement of the cement and sand. Several design mixes will be prepared, cured and tested for their compressive and bond strengths, and durability properties. Each compressive strength sample will be tested at 7 and 28 days. The results will be analyzed and compared with standard concrete and conclusions made on how best the Fly Ash & LCMS filings can be utilized to give optimum results.

2.CONCLUSIONOF LITERATUE REVIEW

1) Partial Replacement of cement with Fly Ash has been studied.
2) Partial replacement of Fine Aggregate with 1% of iron filings has been studied.
3) Behavior of concrete till 90 days only have been studied.

3.NEED AND SCOPE OF POTENTIAL AREA FOR RESEARCH:

1) Combination of Fly Ash and LCMS filing as a replacement has not been studied.
2) Parametric study involving different combinations of Fly Ash and LCMS filing is the need of the hour.

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4.OBJECTIVES

The Objectives of the projects are:-

1) To find optimum quantity of cement and Fly Ash in concrete mixture.
2) To find optimum quantity of natural sand and LCMS filings in concrete mixture.
3) To determine the crushing strength for a specified combination of cement, Fly Ash, crushed sand and LCMS filings.
4) To study the workability of concrete due to addition of Fly Ashand LCMS filings at the same time.

5.METHODOLOGY

The project is carried out in four major steps & they are:-

1) Designing M30 mix as per IS 10262:1982 & fixing the mix proportion cement, Fine aggregate, coarse aggregate, Fly Ash, LCMS filing and water.
2) Casting of concrete cube, beam & cylinders as per IS, without using Fly Ash, LCMS filing & testing it for compressive strength, flexural strength & split tensile test respectively.
3) Casting of concrete cube, beam & cylinders as per IS, with using various proportion
4) (10%, 20%, 30%, 40%,…. 50% partial replacement of Fly Ash with cement & 5%,10% and 15% iron filing with fine aggregate) of Fly Ash & LCMS filing and testing it for compressive strength, flexural strength & split tensile test respectively.
5) Comparing the results.

6.RESULT

1) Compressive Strength Test Result after 7 Days

Type of mix	No. of cube	Weight(kg)	Load (KN)	Strength(MPa)	Avg. strength
Plain concrete.	1	8.22	640	28.44	28.22
	2	8.32	630	28	
	3	8.41	635	28.22	
10% F.A& 10% LCMS	1	8.4	710	31.56	33.06
	2	8.47	750	33.33	
	3	8.5	770	34.22	
20% F.A& 10% LCMS	1	8.21	800	35.56	36
	2	8.47	750	33.33	
	3	8.16	810	36	
30% F.A & 10% LCMS	1	8.76	870	38.67	37.93
	2	8.6	860	38.22	
	3	8.55	830	36.89	
40% F.A & 10% LCMS	1	8.81	990	44	42.67
	2	8.89	940	41.78	
	3	8.77	950	42.22	
45% F.A & 10% LCMS	1	8.2	700	31.11	31.70
	2	8.5	710	31.56	
	3	8.54	730	32.44	
50% F.A & 10% LCMS	1	8.45	910	27.11	27.56
	2	8.48	630	28	
	3	8.47	620	27.56	

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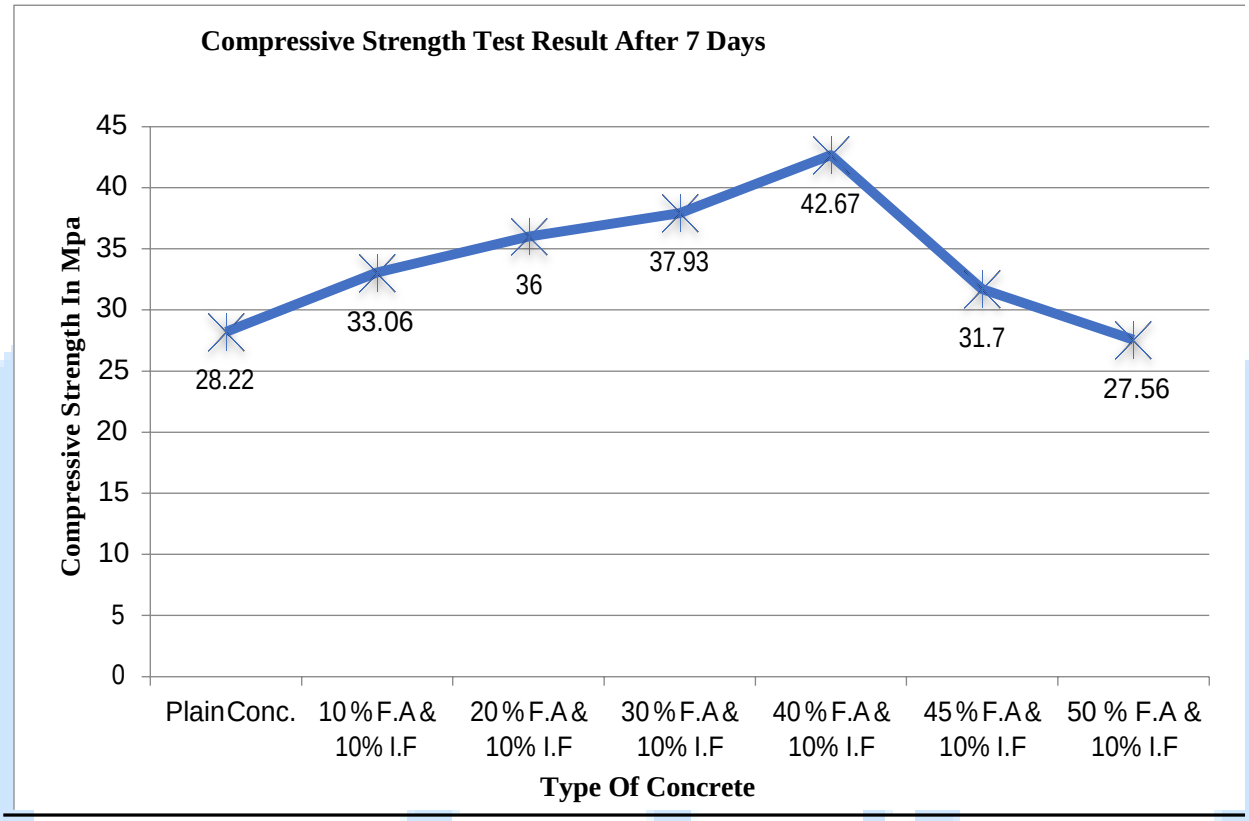

2) Compressive Strength Test Result after 28 Days

Type of mix	No. of cube	Weight(kg)	Load (KN)	Strength(mpa)	Avg. strength
Plain concrete.	1	8.57	870	38.67	38.22
	2	8.52	860	38.22	
	3	8.49	850	37.77	
10% F.A & 10% LCMS	1	8.22	950	42.22	41.47
	2	8.26	940	41.77	
	3	8.19	910	40.44	
20% F.A & 10% LCMS	1	8.34	1050	46.67	48.14
	2	8.39	1110	49.33	
	3	8.41	1090	48.44	
30% F.A & 10% LCMS	1	8.85	1220	54.22	53.62
	2	8.93	1210	53.77	
	3	8.62	1190	52.88	
40% F.A & 10% LCMS	1	8.78	1430	63.55	62.51
	2	8.69	1390	61.77	
	3	8.71	1400	62.22	

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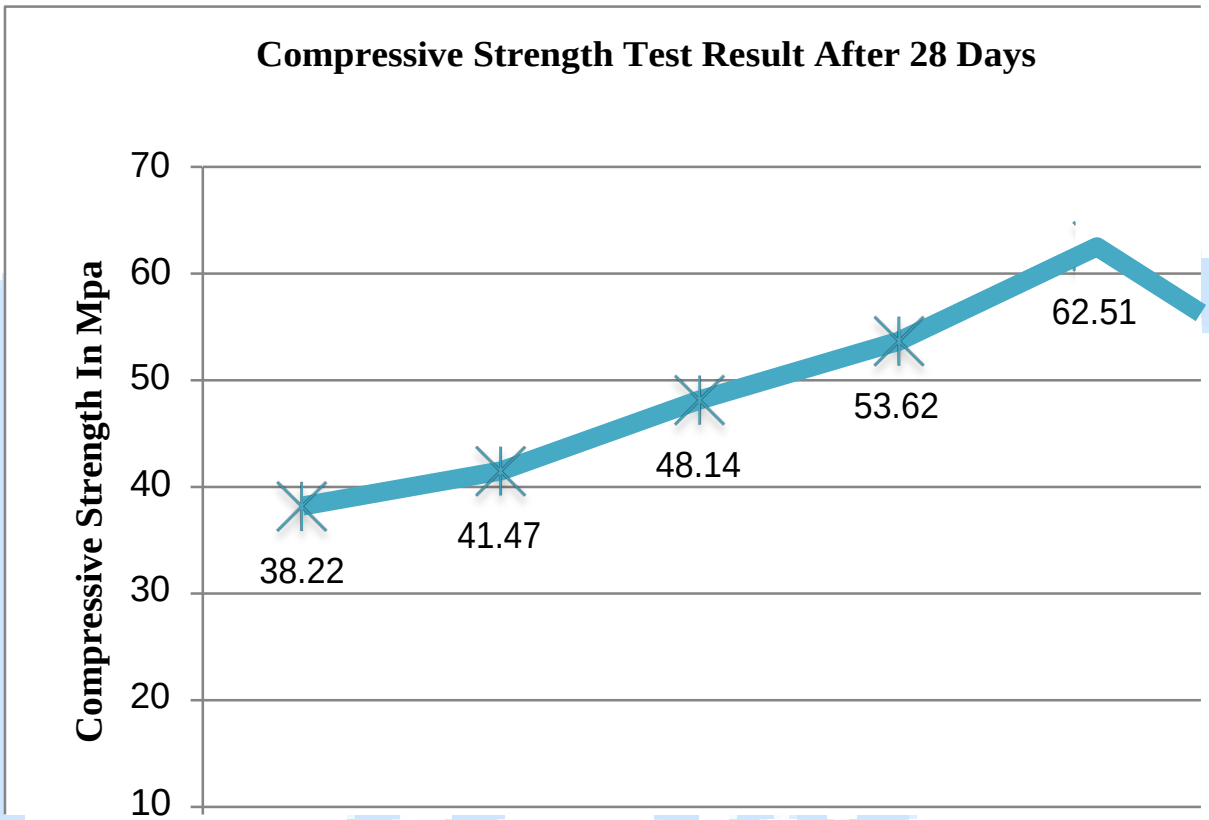

7.CONCLUSION

10%,20%30% and 40%replacement of Fly Ash and 10% Iron Filings replacement in each trial resulted increase in all strength parameters**.**

Fly Ash and Iron Filings replacement in concrete offers several economic benefits over Portland cement concrete.

The Cost of one ton of Fly Ash is Rs.500 in India. Cost of M60 grade concrete with OPC is estimated per metre cube to be about Rs.6000 to 7000 and cost analysis by replacement of Fly Ash and Iron Filings gives compressive strength of 62.51Mpa shows the cost to be about Rs.3000 to 4000. Thus it shows that the cost by partial replacement of Fly Ash and Iron Filings in concrete and OPC concrete there is a vast difference and strength is almost same for both(high grade concrete).

In addition, the Fly Ash is finer thus concrete will be impermeable. Cement concrete requires repairing after every 10-15 years if situated in coastal areas due to permeability of salts which corrode the reinforcement. The Fly Ash being finer it prevents the permeability of salts giving a high durable concrete.

In this project we prepared the optimum mix for different percentage by partial replacement in concrete and gave light to its different salient features.

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Efficiency of GGBS in concrete

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ABSTRACT

The utilisation of supplementary cementitious materials is well accepted because of the several improvements possible in the concrete composites and due to the overall economy. The present paper is an effort to quantify the 28-day cementitious efficiency of ground granulated blast furnace slag (GGBS) in concrete at the various replacement levels. It was observed that this overall strength efficiency of GGBS concretes can also be defined through a procedure adopted earlier for other cementitious materials like fly ash and silica fume. The overall strength efficiency was found to be a combination of general efficiency factor, depending on the age and a percentage efficiency factor, depending upon the percentage of replacement as was the case with a few other cementitious materials like fly ash and silica fume reported earlier. This evaluation makes it possible to design GGBS concretes for a desired strength at any given percentage of replacement.

Keywords— *Concrete; Mixture proportioning; Granulated blast furnace slag; Compressive strength; Efficiency*

1. INTRODUCTION

Blast furnace slag cements are in use for a reasonably long period due to the overall economy in their production as well as their improved performance characteristics in aggressive environments. Also, the use of pozzolans as additives to cement, and more recently to concrete, is well accepted in practice. Ground granulated blast furnace slag (GGBS) is one such pozzolanic material (termed by a few as a supplementary or complimentary cementitious material) which can be used as a cementitious ingredient in either cement or concrete composites. Research work to date suggests that these supplementary cementitious materials improve many of the performance characteristics of the concrete, such as strength, workability, permeability and durability and corrosion resistance. To assess the effectiveness of GGBS in cementitious composites, some of the parameters like chemical composition, hydraulic reactivity, and fineness have been carefully examined by many earlier It was seen that among these, the reactive glass content and fineness of GGBS alone will influence the cementitious/ pozzolanic efficiency or its reactivity in concrete composites significantly. Some of the earlier researchers tried to express this reactivity of GGBS in terms of slag activity index (SAI) or hydraulic index, considering its chemical composition.

2. SLAG ACTIVITY INDEX

ASTM C989 defines SAI as the percentage ratio of the average compressive strength of slag cement (50±50%) mortar cubes to the average compressive strength of reference cement mortar cubes at a designated age

Based on this slag was classified into three grades Ð Grade 80, Grade100, and Grade 120, depending on the relative compressive strength. Hooton and Emery

observed that the properties of GGBS influencing its reactivity to be the glass content, chemical composition, mineralogical composition, fineness of grinding and type of activation provided. Researchers have suggested different compositional moduli to assess the reactivity of GGBS. However, Mantel came to conclusion that hydraulic formulae for GGBS proposed in the literature do not adequately predict the strength performance of slag.

He stated that there is no correlation between the chemical composition of cement or that of a slag and the hydraulic activity of a blend made from that cement and slag. He also reported that the slag activity, tested as per ASTM, depends on the particle size distribution (fineness) of slag and the cement used and showed that this ranges from 62% to 115% at 28 days. He observed that cement with high alkali content has not affected the hydraulic city of the slag. In contrast, Hogan and Rose have said that high alkali cement blends yield an appreciably greater SAI value than the low alkali cement blends. It is to be noted that all the above tests on SAI were conducted on mortar cubes only. Although it is well known that the behaviour of mortar is different from that of concrete and, in particular, the reactivity of GGBS in mortar cannot directly be correlated to its performance in concrete, concrete mix proportioning based on the reactivity of slag is not looked into by many.

The above discussion shows that there is a need to look at the possibility of proportioning mixes based on the reactivity of GGBS in concrete.

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3. EVALUATION OF EFFICEINCY

For this evaluation of the efficiency, the data available from research efforts in the recent past [11±21] were collected and summarised in . It is to be noted that this was to ensure that the results of these investigations are representative of the cements and slags manufactured presently.

It was made sure that these will form a fairly representative group governing all the major parameters that influence the behaviour of GGBS in concrete and present the complete information required for such an evaluation. During the evaluation, it was seen that some of these mixes do not form a part of normal concretes, due to variations resulting from air entrainment, different curing conditions and high fineness of slag, etc. and these were not considered for evaluation.

4. CONCLUSIONS

This study was primarily concerned with the evaluation of the efficiency of GGBS in concretes containing normal Portland cements from the results of the investigations reported in recent years. The replacement levels in the concrete studied varied from 10% to 80% and the strength efficiencies at the 28 days were calculated. The primary conclusions can be listed as follows.

(1) The earlier proposed method for evaluating the efficiency of pozzolans like fly ash and silica fume was also found to be appropriate for the evaluation of GGBS. This method recognises that the ``overall strength efficiency factor (k)" of the pozzolan is a combination of the two factors-the ``general efficiency factor (ke)" and the ``percentage efficiency factor (kp)."

(2) The evaluations have shown that at 28 days, the ``overall strength efficiency factor (k)" varied from 1.29 to 0.70 for percentage replacement levels varying from 10% to 80%.

(3) It was also seen that the ``overall strength efficiency factor (k)" was an algebraic sum of a constant ``general efficiency factor (ke)," with a value of 0.9 at 28 days, and a ``percentage efficiency factor (kp)," varying from +0.39 to -0.20, for the cement replacement levels varying from 10% to 80% studied.

(4) Overall, the prediction of the strength of concretes varying from 20 to 100 MPa with GGBS levels varying from 10% to 80% by this method was found to result in a regression coefficient of 0.94, which was also the same for normal concretes.

(5) Finally, it was observed that for obtaining equal strength in concretes at 28 days, by adopting the efficiencies evaluated in the present investigation, it will be required to have an additional 8.5% and 19.5% increase in the total cementitious materials at 50% and 65% cement replacement levels, agreeing well with the values 10% and 20% additional material reported earlier.

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Hedonic Pricing Method

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ABSTRACT

The objective of this concept paper is to introduce one of the techniques for valuation of environmental goods and services. The paper is structured as follows. There is a brief overview of various techniques to value environment goods and services is discussed. It discusses the hedonic price method in particular. The overview looks into applications of hedonic price method and finally the paper concludes with limitations of hedonic price technique

Keywords— hedonic price technique, Surrogate Market, market based method, WTP (willing to pay), WTA(willing to accept)

1. INTRODUCTION

Environmental protection is one of the principal concerns in the 21st century and is likely to dominate political interest in the coming years. Environment is a good, which belongs to "everybody" but belongs to "nobody". The two important features "nonexcludability"and "jointness of production" leading to "non-enforceability" of property rights are the main causes of environmental degradation resulting in increased air, water, noise pollution etc. They can be the silent killers if unchecked now. This supports the concern why we need to protect the environment. But as costs of protecting the environment can be quite huge for some environmental programmes, the next issue that comes to our mind is who pays for these costs and how to raise resources for protecting the environment? This is clearly the job of Environment minister. However, due to limited budget and competing priorities, before investing in environment protection he has to ascertain that the costs incurred is worth the benefits that the citizens receive. If the net benefits are not positive the resources can be directed somewhere else.

The costs are clearly measurable but how do we measure the benefits of protecting the environment? Environment provides several goods and services, many of which cannot be measurable. How can we have a meaningful measure for the benefits of environmental protection? If individuals want to buy a consumer good say "car". The benefit derived from using a car will be at least equal to or more than what the individuals are willing to pay for the car, which is revealed through the market price. In this case the individual is expressing his willingness to pay for the benefits he will derive for using the car through the market price. Suppose, after some years he decides to sell the car. He would be willing to sell the car only if he receives in compensation some value for the car, which is not less than some reservation price. In this case he is expressing his willingness to accept as compensation for foregoing his utility from the car. Thus in this case the market price can be used to calculate the individual's willingness to pay or willingness to accept, and hence the economic value of the good to that individual. In case of environmental goods and services, there are no well-enforced property rights and hence, we cannot have well-established markets and market clearing prices. We need to have some market or nonmarket valuation techniques, which can be based on the same principle of individual's willingness to pay for the environmental gains or willingness to accept compensation for some environmental losses.

The objective of this concept paper is to introduce one of the techniques for valuation of environmental goods and services. The paper is structured as follows. In section 2, a brief overview of various techniques to value environment goods and services is discussed. Section 3 discusses the hedonic price method in particular. Section 4 looks into applications of hedonic price method and Section 5concludes with limitations of hedonic price technique.

2. Brief Overview Of Method For Valuing The Environment

A number of techniques are available to value the environmental goods and services. These can be categorized into revealed preference and stated preference techniques. In revealed preference methods individuals indirectly reveal the willingness to pay for environmental good through market and surrogate market prices. In stated preferences, the individuals are directly asked what their willingness to pay is. These techniques can be classified according to the method used for valuation i.e. market based, surrogate market or non-market based. A very brief description of different methods is given below

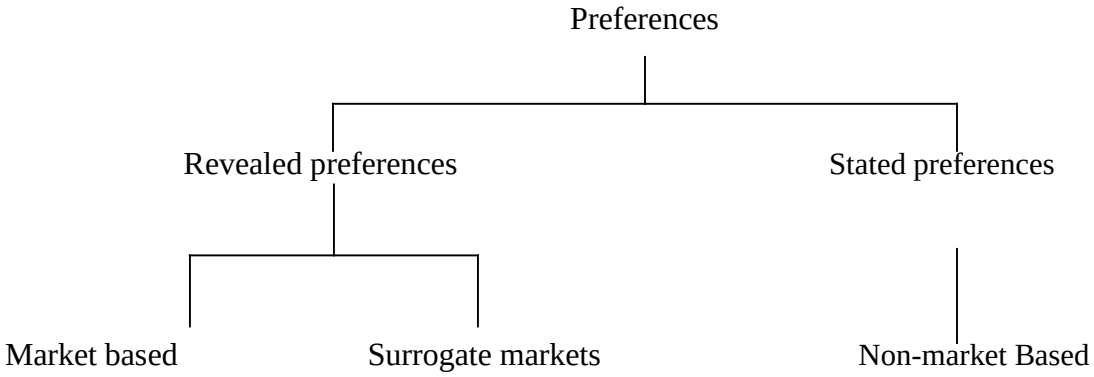
Market Based Methods:

These methods are based on direct observable market interactions. For example, soil is a natural asset. However, the soil is integrated in land and no separate market exists for soil alone. However, if we want to know the value of fertile soil (to know whether or not to invest in some soil conservation project), then we can use market-based method called as production function approach. Here soil is treated as input into the production function and the impact of soil degradation will be reflected in loss in output. Similarly, the amount individuals spend to defend themselves (known as defensive expenditures) from adverse health impacts can also be used as a proxy.

Non-market based methods

In certain cases it is not possible to use any market or surrogate market based methods. For example, if we want to estimate the non-use values and just value the environment for its existence, we need to have some alternative way to do it. In such cases people are directly questioned to determine their willingness to pay to preserve the environment or species. Such method is referred to as contingent valuation method. A detailed description of the good under consideration is provided and interviewees are then asked what they would be willing to pay (WTP) for a hypothetical environmental improvement or to accept (WTA) as compensation for an environmental deterioration. The contingent valuation approach may in principle at least capture the total economic values (use and non-use components) whereas other techniques may only provide estimates of direct or indirect use value. However, CVM also has a number of shortcomings through biases of preferences, questionnaire design and survey practices. Figure 2 presents some of these techniques and classifies them according to the basis of the monetary valuation, either market-based, surrogate market, or non-market-based.

Figure 1: Techniques to value environmental goods and services



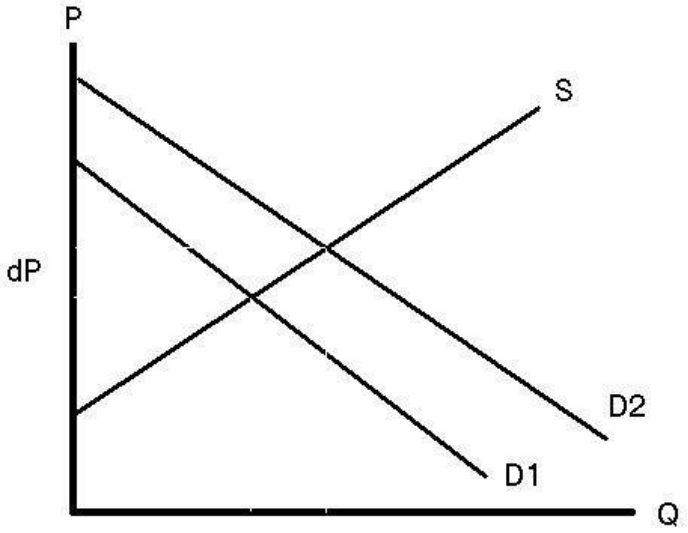
3. Hedonic Price Method

The Hedonic Price Method (HPM) is a revealed preference method of valuation. The hedonic price method of environmental valuation uses surrogate markets for placing a value on environmental quality. The real estate market is the most commonly used surrogate in hedonic pricing of environmental values because the word “hedonic” comes from a Greek origin, which means, “pleasure”. Hence, the hedonic pricing method relies on information provided by

households when they make their location decisions. People derive pleasure by living in nice places. As the demand for land and housing increases, the price of housing increases (e.g., the cost of living in nice places is relatively high). The method can also be used in to estimate the premium placed in nice 'jobs'. The higher housing prices reveal how much people are willing to pay for the amenities in nice places. Air, water, and noise pollution have a direct impact on property values. By comparing properties with otherwise similar characteristics or by examining the price of a property over time as environmental conditions change and correcting for all nonenvironmental factors, information in the housing market can be used to estimate people's willingness to pay for environmental quality.

For example, consider two houses located in localities A and B. Locality A is located near an industrial complex and highly polluted. Locality B is a residential area and is less polluted. Demand 1 represents the demand for housing in polluted area and Demand 2 represents demand for housing in a clean area. After considering all other factors, which influence the price of a house, the house in locality A will fetch a higher price than the house in locality B. The price differential, dP, is the marginal willingness to pay (in higher housing prices) for the difference in air quality.

Figure 2. Figure showing the differential price between the localities with different environmental quality



Another example can be to know the welfare losses of an airport expansion project due to increased noise to the residents in that locality. Suppose our objective is to estimate the value of this nuisance so that the residents staying around the airport can be compensated for their discomfort. As there are no markets to trade quietness, how do we know the value of quiet surroundings? Though quietness does not have explicit markets, they are implicitly traded along with one marketed good i.e. house. Individuals express their preference for quietness by purchasing a house in a quiet locality, which may have a different price compared to an identical house in very noisy locality. The extra premium paid to the house in a quiet surrounding can be taken as the value of quietness. So the residents in the locality may be offered this extra premium so as to compensate them for bearing the nuisance. Similarly, we can also apply this to estimate the value of scenic beauty, beaches, watching sunrise, national park etc. Houses by the side of beach or lake fetch higher value because of their scenery than identical house three or four lanes away from a beach/lake. Such price differentials have been detected in the property market for road traffic noise; air pollution; aircraft noise; and proximity to land fill sites. The hedonic price method can also be used to estimate the value of avoiding risk of death or injury by looking for price differentials between wages in risky and non-risky jobs.

Hedonic price method can also be used to estimate the value of fresh water in a coastal region. In coastal regions, the location of house with respect to its proximity to the sea, defines the quality of ground water supplies accessible to residents of the house. Over extraction of ground water beyond a particular extent would result in instability of the interface between the saltwater and freshwater, resulting in salt water replacing the fresh water. As ground water sources are contaminated, if other sources of drinking water are not readily available (which often happens in

summer season in India), new wells must be drilled, or the residents in that house have to buy water for their needs etc, which imply an additional cost and inconvenience to the residents. However, if the house is further away from the sea, the quality of ground water may be better. Thus, in this case the salinity in ground water supplies can influence household's preferences to reside in that house or not. In this case the structure of house rents and prices will reflect these preferences. Hence, by using data on house rent/value for different properties the contribution made by water quality to the value of (willingness to pay for) the traded good, i.e. land or house can be identified.

Let us illustrate the application of hedonic price method using ground water in a water scarce city. Suppose our objective is to find the value of ground water. As the price paid by the individuals does not reflect the total value, we need to find individuals' willingness to pay for Getting ground water.

We make an assumption that the price of a house is determined by the particular combination of characteristics it displays, i.e. properties possessing larger quantities of goods qualities command a higher price and those with larger quantities of bad qualities command lower price. This function known as the Hedonic Price Function, explains a house price in terms of the quality and quantity if these features. This involves collecting information on the actual sale/rental prices of individual properties and detailed characteristics of the house. When we describe a house it is usually described by the quality or characteristics of its structure, environment and locality. The structural attributes can be the number of rooms, number of bath rooms, area of the house, age of the house, the floor in which house is located, the type of the house (whether it is independent, flat, bungalow or a hut), area for car parking etc. The environmental attributes can be the quality of air in the locality, whether the house is located by the side of the beach /national park/airport/highway/dumping yard, or the quality and availability of water etc. The location variables include whether the area is posh (i.e. if it belongs to high income group, middle income or low income), quality of roads, schools, how far it is from hospital, bus stop, city center, railway station, airport etc.

The analysis proceeds through two stages. In the first stage, regression techniques are employed to estimate the hedonic price function of the property. This function relates the selling prices of a large number of properties in the same housing market with the characteristics of the houses, including the availability of good quality ground water i.e. assume that the price of housing is a function of its attributes P = f(s1. s2. s3. … si; n1, n2. n3… nj; e1, e2, e3 .. ej) where s1, s2, s3 are the structural variables of the house; n1, n2, n3 are the neighbourhood variables and e1, e2, e3 are environmental variables. The functional form can be linear or non-linear. Using regression analysis it is possible to estimate the relationship between the level of any one housing characteristic and the price of the property. Differentiating the hedonic price function with respect to any one of the characteristics yields the

implicit price function for that characteristic. It is termed implicit price because it is revealed to us indirectly through the amounts the people are prepared to pay to get good quality water.

In the second stage, these implicit prices are regressed against the actual quantities/qualities of water chosen by households and different socio-economic characteristics of the household to obtain marginal willingness to pay for water. As is well know the relationship between price and quantity is the demand curve (see Figure 1). These demand curves trace how much the individuals are willing to pay for a given quantity/quality of water. Or it can be thought as how much a household is willing to pay for getting extra unit of water/extra quality water.

The HP method has also been used to estimate the value of selected water resources such as Bays, lakes and reservoirs, building of a new harbor, river views, restoration of urban stream, noise, landfills, dumping sites etc. on nearby property values. In India, hedonic price method has been employed in evaluating the relation between land prices and surface and ground water access (both in quality and quantity) (see Gundimeda and Kathuria, 2005) and benefits if air quality improvement in India (see Murty and Gulati, 2006).

4. Application of hedonic price method

Ridker (1967) and Ridker and Hening (1967) provided the first empirical evidence that air pollution affects property values by regressing median census tract property values on a measure of sulfate air pollution. Since then Hedonic price (HP) technique has been used for estimating the effect of air quality on residential prices and is used in numerous settings to estimate the value of different attributes. Based on the literature review, the application of the method can be categorized under three heads: 1) wage-amenity studies 2) housing prices; 3) valuation of health risks using differences in wages.

5. Some Important issue in Hedonic Price Method

1) The hedonic price method is very data intensive. In order to estimate hedonic price function for a particular market, one requires a large number of observations describing both the selling prices and numerous characteristics of properties in that market.

2) One of the fundamental assumptions of the HPM is that households have perfect information. If households are not aware of the prices and characteristics of all the properties in the market then it is likely that the prices and the implicit prices they pay for properties with different characteristics will vary from sale to sale.

3) Transaction costs in the property market are varied and not inconsiderable.

4) Given the prevailing market prices, a household may want to live in a property with a different set of characteristics than their current residence. However, if the transaction costs are sufficiently high, they may negate the benefits of moving. The household will stay where it is and the housing market will remain out of equilibrium.

5) The hedonic price schedule does not adjust instantaneously to changes in demand or supply conditions in the housing market. In the real world many factors like imperfect information and transaction costs will result in the process of adjustment taking some time.

6) One problem with the estimation procedure is multicollinearity. Frequently, environmental characteristics will be collinear (e.g. properties near to roads have greater noise pollution and higher concentrations of air pollutants). This means it is frequently difficult to separate the independent effect of these two forms of pollution on the price of the property.
7) More serious problems occur if data used in the hedonic analysis is taken from more than one property market.
8) All the above factors tend to violate the assumption that housing market is in equilibrium.

It is unlikely that a housing market will be in a state of perfect equilibrium at any one point in time.

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GREEN CONCRETE

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ABSTRACT

Global warming is one of the major threats to the environment till date. Production of concrete is one of the vital factors for global warming as it accounts for 30% of the total CO2 released in the atmosphere. This can be minimized by eco-friendly substitute known as green concrete. In this post we have discussed about all the raw materials for the substitute of conventional concrete to go green. The Green Concrete is a recycled and light weight substances obtained from demolished site and waste of industries. The other one is green cement like fly ash, silica fume and high reactivity met kaolin (HRM). The widely used is fly ash. These green materials have almost same mechanical properties and fire resistant factor as conventional concrete. It has better thermodynamic, environmental and durability properties. It is also cost effective and the construction is faster. This post also has a clear report of advantages and disadvantages of the green concrete

Keywords— Green concrete, Suitability, Environmental aspects etc

1. INTRODUCTION

Green concrete is a revolutionary topic in the history of concrete industry. This was first invented in Denmark in the year 1998. Green concrete has nothing to do with the colour. It is a concept of thinking environment into concrete considering every aspect from raw materials manufacture over mixture design to structural design, construction and service life. Green concrete is a very cheap to produce, because, for e.g. waste products are used as a partial substitute for concrete materials, the charges for the disposal of waste are avoided, energy consumption in the production is lower and durability is greater. Green concrete is a type of a concrete which resembles the conventional concrete but the production or usage of such concrete requires minimum amount of energy and causes least harm to the environment.

2. WHAT IS CONCRETE?

The word concrete comes from the Latin word "concretus" (meaning compact or condensed). Concrete is a composite construction material made primarily with aggregate, cement, and water. There are many formulations of concrete, which provide varied properties, and concrete is the most used man-made product in the world. The environmental impact of concrete is a complex mixture of not entirely negative effects; while concrete is a major contributor to greenhouse gas emissions and creates problem for the disposal of waste concrete from demolished sites which in turn effects the environment. Therefore recycling of concrete waste is the need of hour. Concrete is also interesting in relation to other environmental problems than those related to CO2 emission. Due to all these above mentioned reasons civil engineers have come up with a new concept of concrete, named "GREEN CONCRETE".

3. WHAT IS GREEN CONCRETE?

Today the word green is not just limited to colour. It represents the environment, which is our surrounding. Concrete which is made from concrete wastes that are eco-friendly are called as "Green concrete". Concrete wastes like slag, power plant wastes, recycled concrete, mining and quarrying wastes, waste glass, incinerator residue, red mud, burnt clay, sawdust, combustor ash and foundry sand. Green Concrete is a term given to a concrete that has had extra steps taken in the mix design and placement to insure a sustainable structural long life cycle with a low maintenance surface.
e.g. Energy saving, CO2 emissions and waste water.
The central goal of Green Concrete is to reduce the environmental impact of conventional concrete. The Green Concrete satisfies major properties of conventional concrete such as the following:

1) Mechanical properties (strength, shrinkage, creep, static behavior etc.)

2) Fire resistance (heat transfer)

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3) Workmanship (workability, strength development, curing etc.)

4) Durability (corrosion protection, frost, new deterioration mechanisms etc.)

5) Thermodynamic properties (input to the other properties)

6) Environmental aspects (CO2-emission, energy, recycling)

Img. 1 construction process

4.THE PROPERTIES OF GREEN CONCRETE ARE:-

1.) Workability, which is basically the ease with which concrete can be compacted fully without segregating or bleeding.
2.) Segregation, which is basically separation of coarse particles from the green concrete.
3.) Bleeding, which is the appearance of water along with cement particles on the surface of freshly laid concrete.
4.) Harshness, which is the resistance offered by the concrete to its surface finish.

5.SUITABILITY AND ADVANTAGES OF GREEN CONCRETE

By adopting green concrete, the dead weight of a structure reduces from 5 tons to 3.5 tons. The panels are large in size and come ready to be installed with a perfect fit. After the concrete is poured the forms stay and the structure is done. Thus reduces the crane age load which allows better handling. These lighter weight structures bring more flexibility in lifting. Green Concrete has good thermal and fire resistance i.e. the structures built with green concrete are safe as the conventional concrete. It has good sound insulation than the traditional granite rock. Also the damping resistance of the building gets improved. So it reduces the amplitude of vibrations. The main suitability is the overall construction period is less as compared to the conventional concrete.

The following are the advantages of using green concrete:

- Reduction of the concrete industry's CO_2-emmision by 30 %.
- Increased concrete industry's use of waste products by 20%.
- NO environmental pollution and sustainable development.
- Green concrete requires less maintenance and repairs.
- Green concrete having better workability than conventional concrete.
- Good thermal resistant and fire resistant.
- Compressive strength behavior of concrete with water cement ratio is similar to conventional concrete.
- Flexural strength of green concrete is almost equal to that of conventional concrete.

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5.1 ENVIRONMENTAL BENEFITS TO USING GREEN CONCRETE

Lasts Longer:

Green concrete gains strength faster and has a lower rate of shrinkage than concrete made only from Portland cement. Structures built using green concrete have a better chance of surviving a fire, as it can withstand temperatures of up to 2400°F. It also has a greater resistance to corrosion, which is important with the effect pollution has had on the environment. Acid rain greatly reduces the longevity of traditional building materials. All of those factors add up to a building that will last much longer than one made with ordinary concrete. Similar concrete mixtures have been found in ancient Roman structures. This material was also used in the Ukraine in the 1950s and 1960s. Over 40 years later, those Ukrainian buildings are still standing. If buildings aren't constantly having to be rebuilt, fewer construction materials are needed. The impact on the environment is reduced.

5.2 REDUCES ENERGY CONSUMPTION:

If you use less Portland cement and more fly ash when mixing concrete, then you will use less energy. The materials that are used in Portland cement require huge amounts of coal or natural gas to heat. Fly ash already exists as a byproduct of another industrial process, so you are not expending much more energy to use it to create green concrete. Another way that green concrete reduces energy consumption is that a building constructed from it is more resistant to temperature changes, thus saving heating and cooling costs.

5.3 Reduces Carbon Dioxide Emissions:

Among the main ingredients in ordinary cement are pulverized limestone, clay, and sand which are heated to a high temperature. This process is responsible for between 5 and 8% of all Carbon Dioxide emissions worldwide. The manufacturing of green concrete releases up to 80% fewer Carbon Dioxide emissions. As a part of a global effort to reduce emissions, switching completely to green concrete for construction will help considerably.

6 LIMITATIONS

- Green Concrete has very few limitations. The following are the limitations of using green concrete:
- The main limitation or disadvantage of using green concrete is that the structures which are constructed using green concrete have less life than the structures constructed by the conventional concrete. As they have less life span they cannot be used for important structures like dams, bridges, etc. For the use is
- Dams and bridges special air-entraining agents are mixed in the concrete which increases the overall cost of the structures.
- The split tensile strength of the green concrete is less than the conventional concrete. Thus more reinforcements are needed, which increases the construction cost of the structure.
- Sometimes corrosion in the steel bars can also occur if the aggregates used are not free from corrosion leading agents.
- The cost of the reinforcement increases with the use of stainless steel.

7. SCOPE IN INDIA

Green concrete is a revolutionary topic in the history of concrete industry. As green concrete is made with concrete wastes it does take more time to come in India because of industries having problem to dispose wastes and also, having reduced Environmental impact with reduction in CO2 e mission

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8.CONCLUSIONS

Green concrete having reduced environmental impact with reduction of the concrete industries co_2 –emissions by 30%.

- Green concrete is having good thermal and fire resistant.
- In this concrete recycling use of waste material such as ceramic wastes, aggregates, so increased concrete industry's use of waste products by 20%. Hence green concrete consumes less energy and becomes economical.
- So definitely use of concrete product like green concrete in future will not only reduce the emission of co_2 in environment and environmental impact but also economical to produce.
- Green concrete requires less maintenance and repairs.
- Green concrete having better workability than conventional concrete.

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Encroachment-
A threat to urban Development

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ABSTRACT

Encroachment can be defined in numerous ways, whether power, natural resources or property (public & private) but it has a similar meaning in all the context i.e. illegal usage of resources which you don't have legal rights. This paper investigates the effects of encroachment on Urban Development (VVCMC) and wishes to put light on pitiful situation of urban encroachment so that country comes out strongly for urban encroachment before working on the idea of smart cities

Keywords— Urban encroachment, VVCMC, Real Estate

1. INTRODUCTION

The city of Virar is encircled by a green belt area, instituted as an urban growth boundary to contain sprawl, ensuring equitable growth and preserving lung spaces. Urban growth boundaries world over are typically known to drive land prices higher in the inner city area. Virar has witnessed significant increase in land prices over the last decade, making it increasingly unaffordable. In this context, this paper examines whether the green belt in Virar has had a significant impact on land prices, through an analysis of price differentials within and outside the urban growth boundary. This study also debates the relevance of green belt as an urban containment tool in regimes characterized by ineffective provision of infrastructure and lax implementation of zoning regulations. Enclosing an urban area within a growth boundary has its supporters as well as detractors. The positive aspects are the reduced cost of haphazard extensions to infrastructure and improvements in the aesthetic quality of life by reducing sprawl. However, this also means that the supply of land for residential uses is artificially restricted, leading to issues of housing affordability, pricing the city out of range to people and firms and making it non-competitive. It also imposes huge costs in terms of monitoring conformance to planning regimes.

2. Current Situation

The metropolitan strategy for many cities in the world, and specifically the city of Bengaluru, India is based on the concept of urban growth boundaries. The city is encircled within a green belt with significant zoning restrictions, as a measure to limit sprawl. At the same time, land prices have increased substantially within the city centre, leading to densification in the periphery where land prices are cheaper. So while the green belt has been a planned response to limit sprawl in a burgeoning city, it may equally be responsible for the land price increase within the city. There is thus a need to rethink and review the green belt policy- is it acting as an urban containment policy? Is it creating an artificial supply constraint leading to increasing land prices in the city? This paper studies the policy framework of the green belt in Virar from a planning and an enforcement perspective. Using price trends of real estate within the city contiguous to the green belt, it examines whether the urban growth boundary policy has limited land supply within the city and has effectively contained urban sprawl. Understanding the impact of green belt policies on residential real estate prices is essential from a policy perspective and has large implications on housing affordability in rapidly urbanising cities. The motivation for this study stems from the dialogue on affordable housing in India. Indian cities are considered unaffordable and the onus of this allegedly rests with the state which restricts land supply, through provisioning of infrastructure. The green belt is simply another hard supply constraint by nature of its zoning. How the green belt impacts prices of land, and how the green belt itself is impacted by the rising prices of land is an interesting, and topical study.

3. Debates on the Urban Growth Boundary as a Planning tool.

A Urban Growth Boundary (UGB) is loosely defined as an "officially adopted and mapped line that separates an urban area from its surrounding greenbelt of open lands, including farms, watersheds and parks, for a set period of time." and with an intent "to contain urban development within planned urban areas where basic services, such as sewers, water facilities, and police and fire protection, can be economically provided." (Sayer, 1997, 1:5). An urban growth boundary is typically a "written agreement" to map the area within which growth will be contained, for a certain pre-determined period of time. (Daniels 2010). Growth boundaries are used by the city administrators to plan for infrastructure provisions to a contained urban area. An important corollary of fixing the urban growth boundary is that urban services will not be extended beyond the said boundary. On the other hand, an urban growth boundary is not expected to be static. Knaap and Lewis (2001), using an inventory approach to land management, state that boundaries need to be revised on a

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continuous basis reacting to the available supply and price of vacant land, taking into account the relative price differential of land inside and outside the boundary. Growth boundaries are envisaged to embrace a residential land supply for 20 years, with projected changes in population and net-urban migration as well as anticipated increase in income levels. Residential land market assessments and land inventories are undertaken to document vacant, underutilized and re-developable lands and exclude severely constrained land. The growth boundary is settled upon after consideration of density and land use requirements. To be effective, zoning regulations are needed in conjunction with growth boundaries, else rural sprawl and leapfrogging would replace urban sprawl. (Daniels, 2010). The effectiveness of the growth boundary as a containment strategy depends on two factors - the accuracy of the projections and the enforcement of the growth boundary. If the planning authority has released enough developable land to account for changes in population there will be little or no speculation beyond the growth boundary. If it is perceived that the projections are static and the city is growing beyond the planned population and/or land use levels, development beyond the growth boundary is likely. If enforcement is lax, the growth limit may be circumvented, and the objective of the growth boundary may be defeated. Internationally, there is substantial literature on whether the growth boundary is the best way to contain the growth of the city, and this is intertwined with the debate on the undesirability of sprawl. Arnott, (1979), Kanemato (1977) and Pines and Sadka, (1985) show that in a standard monocentric city, urban growth boundaries are the second best option to congestion pricing. Dissenting views by Anas and Rhee (2006, 2007) show that real-world polycentric cities with low travel costs, high congestion and high cross- commuting between polycentric nodes, sprawl should be allowed to reduce aggregate travel costs. Breuckner (2007) extends the model to indicate that if the excessive expansion occurs due to congestion externality, then the growth boundary may not be an effective containment policy. The use of the growth boundary as a containment strategy leads to higher prices due to land development activity: increasing densities emerge because on the production, higher densities within the city are incentivized; on the consumption side, as the cost of land rises, houses tend to be built on smaller lots given a constant budget constraint. (Mildner et al., 1996). However, studies also reveal that there may be negative externalities to the growth boundary strategy. The supply of land for residential uses is artificially restricted, leading to issues of housing affordability, pricing the city out of range to people and firms and making it non-competitive. This also imposes huge costs in terms of monitoring conformance to planning regimes and transfers wealth from renters to home owners. Knapp and Hopkins (2001) show that when boundaries are not revised on a continuous basis as a function of land demand and supply, growth boundaries will lead to inefficiencies in land markets. A large body of literature supports the claims of increase in land prices due to growth control systems. A study by Knapp (1985) on the urban growth boundary of Portland, Oregon, showed that there is significant increase in land price within the city due to imposition of the growth boundary.

4. Illegal Constructions

Illegal construction or building is construction work (or the result of such) without a valid construction permit. Besides the potential technical hazards on uncontrolled construction sites and in finished buildings, illegal building activity can be a major environmental violation when the works encroach upon preserve areas like nature reserves. Likewise, illegal building can have serious political implications when it is practiced as landgrabbing or for illegal settling in foreign territories (see e.g. International law and Israeli settlements). Illegal building can be the consequence of a combination of urbanization, overpopulation, homelessness and poverty in which case expanding slums, Shanty towns or similar will result. On the other hand, illegal building activity may be due to profitable speculation with and exploitation of valuable real property. Demand for mass tourism accommodation (hotels, etc.) as well as its counterpart, individualistic luxury retreats for the very rich are visible drivers of such speculation. Similar motivation may come from incentives connected with the illegal construction of great shopping malls or similar on greenfield land.Even construction works with apparently valid permits can of cause be a result of briberyIn some cases it can be observed that legal or tolerated settlements are later declared illegal by governmental institutions in order to make room for more lucrative investments or simply for political demonstration purposes (see e.g. Operation Murambatsvina) sometimes under the pretext of beautification.

5. VCMC Current Scenario

The Vasai-Virar City Municipal Corporation, (VVMC) is the civic body that governs and villages in Vasai-Virar tehsil areas in Maharashtra state, western India comprising the most populated part of Palghar district. It is an extended suburb of Mumbai.

According to the 2011 census, it is the fifth largest city in Maharashtra with a population of more than 1.3 million.[1] The city is located 50 km north of Mumbai, on the north bank of Vasai Creek, part of the estuary of the Ulhas River. It was formed on 3 July 2009 by combining four municipal councils and 53 gram panchayats.

5.1 Towns and villages in VVCMC

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- **Towns under VVMC**

1. Virar
2. Nalasopara
3. Vasai
4. Navghar-Manickpur

- **Villages under VVMC**

1. Agashi
2. Bapne
3. Bhuigaon (BU)
4. Bhuigaon (KH)
5. Bilalpada
6. Bolinj
7. Chandansar
8. Chandeep
9. Chikhal Dongare
10. Chinchoti
11. Chobare
12. Dahisar
13. Dhaniv
14. Deodal
15. Gass
16. Gaskopari
17. Giriz
18. Gokhiware
19. Juchandra
20. Kaman
21. Kane
22. Khardi
23. Khardi
24. Karmale
25. Kasrali
26. Kashid Kopar
27. Kaular (BU)
28. Kaular (KH)
29. Kiravli
30. Kofrad
31. Kolhi
32. Koshimbe
33. Mandvi
34. Mardes
35. Mulgaon
36. Naigaon
37. Nale
38. Navale
39. Nirmal
40. Pelhar
41. Rajwali
42. Rajodi
43. Saloli
44. Sandor
45. Sasunavghar
46. Sativali
47. Shirgaon
48. Shirshad

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5.2 VVCMC Population Stats.

The table given below shows the total population of Vasai Virar Municipal Corporation, further segregated into Rural and Urban, as well as, Male and Female numbers in the total population.

	Population	**Rural**	**Urban**
Total	**1,343,402**	**113,262**	**1,230,140**
Male	709,771	57,562	652,209
Female	633,631	55,700	577,931

6. Conclusion

Numerous attempts have been made to define sprawl in urban settings. While some authors attribute the phenomenon only to metropolitan areas, others prefer broader definitions. A common thread in the various approaches, according to Frumkim & Frank (2004) [19], is that sprawl is characterized as a form of occupation incorporated to the pattern of land use and occupation and to urban transport. In addition to these, other authors include in this definition the high activity in central areas; accessibility to the public transport network; residential density; and the variety of residences, jobs and services at the neighborhood level. Each of these categories influence the urban shape, which may be compact (according to density); of mixed use (residential, commercial, etc.); the perception of the place (the strength and vibrancy of activity in the central areas) and connectivity (access between one region and another). These characteristics of the phenomenon of urban sprawl, which initially concentrated in American citiesand later spread to the compact cities of Europe, also occur in Brazil and bring up pertinent questions: Why does sprawl matter? How can it be controlled? In addition to the impacts described earlier herein, the European Environment Agency (2006) states that sprawl matters principally due to the high cost of electricity and land, as well as high greenhouse gas emissions, which may, above all, cause public health problems, especially in urban agglomerations. The question is: how can dispersed urbanization be controlled? How can one control the spatial fluidity of social groups that are not aligned with the spatial fluidity of the capital and seek their reproduction and survival? What mechanisms should be employed to develop effective urban environmental management? Notwithstanding the similarity of Brazil's urban shapes with others around the world, the search for solutions to control urban sprawl in Brazil based on international cases would obviously be misguided, considering the numerous differences in the organization of federal and finance systems and the availability of resources for urban policies.

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Structural Audit

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ABSTRACT:

In a framed structure building, frame which is the heart of building. This frame is design by structural engineer taking in to consideration of factors and various codes which necessary. Different techniques used to assess of frames of old structure. Visual inspection non destructive test are used to access frame of structure is made.

Keywords: Framed Structure, Load bearing Structure, Structural Audit, NDT Test.

1. Introduction

Before going in detail about the structural audit it is necessary to know about the structure. A structure is a system of inter connected elements to carry loads safely to underground earth.
If we consider an example of "table". The structural engineer will call legs of table as columns, the battens as beams and the ply sheet as slab. When series of tables are joined vertically and horizontally you get a building structure. As the material changes to concrete and steel instead of timber as heavier loads are to be sustained.
The health examination of concrete building called as "Structural audit" or structural audit is an overall health and performance checkup of building like a doctor examines a patient.
Structural Audit is an important tool for knowing the real status of the old buildings. The Audit should highlight & investigate all the risk areas, critical areas and whether the bldg. needs immediate attention. It should also cover the structural analysis of the existing frame and pinpoint the weak structural areas for static, wind & earthquake loads. If the bldg. has changed the user, from residential to commercial or industrial, this should bring out the impact of such a change.

2. Present Study

Now a day in different locations in India building collapses are occurs. Very few months ago in Mumbai in India near Dockyards 5 storey building was collapse. More than 50 peoples were died and about 30 peoples are injured. Also one of in Mumbra at Mumbai three years old building was collapse.

After building collapse incident at Taljai Pathar, Municipal Corporation has decided to carry out structural audit of all buildings erected at Taljai Pathar.

As municipal corporation survey, there are around 200 dangerous buildings at this location which structural audit is necessary. Now municipal corporations are make compulsory for 30 years old building for structural audit.
Structural Audit is necessary to improve structural health by maintenance recommended in structural audit.

3.Purpose of Structural Audit

- To know the health of building.
- To proactively assist the residents and the society to understand the seriousness of the problems and the urgency required to attend the same.
- To comply with Municipal requirement

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4. Methodology

Structure audit performed by the different methods or the test recommended by structural consultant.
Generally for

4.1. Assessment of structure is done by the visual inspection.

During visual inspection all component parts of structure are visually inspected like is there any wall cracks, length and width of cracks , condition of column , condition of beam ,condition of toilets, condition of flooring tiles, condition of internal and external plaster etc. Visual inspection form is prepared and giving the rating as per the importance of damages. After interpreting the result which gives the structural condition, following points related to structure are detailed visually inspected as:

- Any settlements in the foundations.
- Visual cracks in columns, beams and slabs.
- Concrete disintegration and exposed steel reinforcements – photographs can be helpful.
- Slight tapping with hammer can reveal deterioration in concrete.
- Extent of corrosion in reinforcement.
- Status of Balconies – sagging, deflection, cracks?
- Status of Architectural features viz. chhajjas, fins, canopies etc.
- Cracks in walls indicating swelling in R.C.C. members or distress or deflection or corrosion.
- Leakages from terrace & Toilet blocks.
- Leakages & dampness in walls resulting into cracks and corrosion.
- Changes carried out affecting structure.
  Toilet blocks - Added or changes made?
  .
- Status of electrical wiring from meter room to all the flats. Substation status. Any explosion in the meter room, substation?
- Status of overhead & underground water tanks - capacity. Leakages, cracks & frequency of cleaning, status of pumps.
- Plinth protection in the compound including status of drainage, water pipes & pumps. How much the Ground was flooded during recent monsoons?
- External paint – When last painted and type of paint.
- Status of repairs & last repaired.
  What was repaired?
  Who was the Agency?
  How much was spent for repairs?
- Bldg. plans available? When approved?

- Last Structural Audit prepared?

4.2. Another methodology is by conducting the non destructive test on various components of the structure as column, beams, slabs and wall. Comparing the results with the standard results which give the condition of structure

5. Visual inspection method

By visual inspection survey findings the Health Rating Index of structure by following rating forms. For this study make visual inspection for old existing frame structure and mark ratings as per condition. At the same time taking the photographs of structure as given in figure1 to figure4.

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S.No	Description	VB	B	F	G	VG
A	**External building faces & stilts:**					
1	Columns & Beams Cracks,Bulging,Corrosion in RCC				8	
2	Walls & Plaster (especially west & south) Cracks, Hollowness, Dampness,				8	
3	Chajjas, porch, Balconies Cracks, Bulging, corrosion in RCC		4			
4	Drainage & Rainwater pipes Leaking, Broken			6		
5	Water supply pipes Corrosion, Low			6		
6	Paint Weathering, Fading, Absence			6		
B	***Staircase, Lobby & Passage:***					
7	Column, beams, Slabs, Parapets Cracks, Hollowness, Dampness, Vegetation				8	
8	Walls & Plaster Cracks, Hollowness, Dampness, Vegetation				8	
9	Jali,Cracks, broken	2				
10	Flooring Loose, Cracks				8	
11	Paint Weathering, Fading, Absence			6		
C	***Terrace:***					
12	Terrace Slab Seepage into flats below		4			
13	Waterproofing Cracks, Roughness, absence	2				
14	Staircase Cabin, Lift Room Cracks, Bulging, corrosion in RCC			6		
15	RCC Water Tank Cracks, Bulging, corrosion in RCC			6		
16	Parapet Wall & Plaster Cracks, Hollowness, Dampness, Vegetation	2				
17	Loading Overloading		4			
D	***Flats:*** (especially ground floor & top floor)					
18	Columns, Beams Cracks, Bulging, corrosion in RCC				8	
19	Slabs, Lofts Cracks, Bulging, corrosion in RCC				8	

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A R.C.C. Framed structure as visually inspected and giving the ratings as Very Bad- 2, Bad – 4, Fair – 6, Good – 8, Very Good – 10. Inspected building giving ratings in between 2 to 10 as mentioned above. Add the scores and divide it by 29 to get Health Rating Index (HRI).

6. Result

As per above rapid survey or by visual inspections HRI becomes 6.2068, i.e. fair. That means over all structural condition of existing building under inspection is fair. The said G+4 structure is about 23 years old. The plaster of beam and slab spall out above 3rd floor. Ground floor to first floor building is in good condition. General maintenance required above 3rd floor. Our structural opinion says that the whole structure is safe for occupants but he has to do the general routine maintenance.

6.1 Limitation of Present study

Present study about structural audit is done on the basis of visual inspection method. This is the initial step to carry out the structural audit. By visual inspection only visual damages or defects in components of building should be observed. For detection of technical damage or defect for a particular component of building at particular place non destructive tests are necessary. By this test results and comparing with standard results, get the condition of structural components. It is very useful to decide repair and maintaince method.

6.2 Future Scope

By visual inspection HRI of structure is finding. This is the initial stage of structural audit of buildings. To get more specific reasons for damages and defects, Non Destructive Tests (NDT) is necessary. By these test results the strength of different components of existing old buildings can be work out.

7. Conclusion

- For any load bearing or framed structure structural audit is necessary. From structural audit overall inspection of structure carried out and it beneficial to decide remedial measures to any type of structural defects and damages.
- For every structure once in five years structural audit is necessary.
- If building older than 15 years, once in a 3 years structural audit should be done. However it is advisable to carry out structural auditing every 3 years regularly as many harmful modifications self inflicted damages get also checked during auditing.
- Government also make compulsory for structural audit for buildings which are more than 30 years old in Maharashtra.

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Overview Of Use Of Shredded Tyres In Highway Engineering

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ABSTRACT

Waste tyres are currently available in large quantities around the world causing adverse environmental impact. Significant research is currently underway to investigate possible options for the reuse of waste tyre, particularly in civil engineering applications. One such option is to utilise waste tyre in the form of tyre shreds. Utilising waste tyre in civil engineering projects has multiple benefits, including effective recycling of the waste tyre easing the strain on natural fills, reducing material costs and enhancing the geotechnical properties of the soil. Several researches have indicated that shredded tyres do not show any likelihood of being a hazardous waste material or of having adverse effects on groundwater quality. This paper reviews the benefits and impacts of scrap tyre use in geotechnical engineering.

Keywords— *Waste tyre, Tyre shreds,Natural fill,Geotechnical engineering,Scrap tyre.*

1. INTRODUCTION

1.1. General

The growth in various types of industries together with population growth has resulted in enormous increase in production of various types of waste materials. The creation and disposal of non-decaying waste material such as scrap tyres has been posing environmental problems in India. The globalization of Indian economy and consequent development process of infrastructure has lead to an increase in the number of vehicles on road. The total number of registered buses, trucks, cars/jeeps/taxis and two wheelers upto 31st March 2003 were 0.644 million, 3.176 million, 6.494 million and 35.457 million. And these numbers are expected to increase 8% annually. Such an alarming growth apart from causing noise and air pollution has begun to cause pollution in terms of stock piles of discarded tyres. Considering the average life of the tyres used in these vehicles as 10 years after retreading twice, the total number of waste tyres will be of the order 112 million per year. The previous use of waste tyres as fuel is now prohibited by the Indian Government due to its environmental impact.

The manufacturing process for tyres combines raw materials into a special form that yields unique properties such as flexibility, strength, resilience and high frictional resistance. If tyres are re used as a construction material instead of being burnt, the unique properties of tyres can once again be exploited in a beneficial manner. In this context, the use of tyre chips in rural road construction is considered a potentially significant avenue.

1.2. Shredded tyres:

Tyre shreds are waste tyres that have been cut into pieces by a shredder cutter. The product of shredding is referred as 'tyre chips' when they are generally between 12mm to 50mm in size and are generally uniform. The term 'tyre shreds' is used when particles are larger. Tyre chips are generally made from a mixture of steel and glass belted tyres. The specific gravity of the tyre shreds/chips varies from 1.02 to 1.27 depending upon the quantity of steel belting used.One cubic yard of tyre chip fill contains about 75 tyres, so 14 cubic yard truck would contain about 1000 tyres. 600 ft of a town road would require 20,000 tyres, a two lane highway would require 1,00,000 tyres for 400 ft, a four lane highway would require 2,00,000 tyres for 400 ft of road.

1.3. Scrap tyres, an environmental problem:

Progress in the area of recycling thermosetting polymers has not been successful since these materials, by definition, can only be formed once. The largest volume of thermosetting polymers in the waste stream is generated by scrap tyres. One approach to the successful reuse of recycled tyre rubber is its use as light fill in civil engineering and highway projects. An environmentally friendly method of scrap tyre disposal has been unavailable for decades. Much effort has been put into highly gas-efficient vehicles, and battery and body recycling. The investment seems to have paid off. In comparison, more than three quarters of the scrap tyres (around three billion tires in the USA) have been paid in the form of tipping fees by the auto-owner to dispose of in land fills.

The tyre pile fires are dangerous and highly polluting; and clean up afterwards is very expensive. A discarded tyre has 75 percent void space which makes the fire very difficult to extinguish. Recycled Rubber if catches fire emits clouds of noxious black smoke, carbon black, volatile organics, semi-volatile organic, poly nuclear aromatic hydrocarbons, oil, sulfur oxides, nitrogen oxides, carbon oxides, and airborne particulates, such as arsenic, cadmium, chromium, lead, zinc, iron, lead, etc which pose serious environmental problems to air, water and soil. Spraying water on tyre fires often increases the production of pyrolytic oil, provides a mode of transportation to carry oils off site, and aggravates contamination of soils and water. The subsequent clean-up for tyre fires is very costly. The shape of a tyre allows for easy entrance and containment of rainwater. This creates an ideal breeding habitat for mosquitoes. In addition to the nuisance caused by clouds of mosquitoes generated by scrap tyre piles, mosquitoes can carry some serious diseases. These diseases include yellow fever, La Crosse virus, Sepik fever, Ross River fever, St. Louisencephalitis, and Japanese

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encephalitis. In addition to the two major concerns mentioned above, scrap tyre piles also decrease landfill life because they are non-biodegradable and bulky. They also affect the beauty of the landscape as discarded tyres, whether scattered or piled up, do not have an agreeable appearance.

Hence use of tyres in road construction can help solve a significant environmental problem.

2. TYRE CHIP PROPERTIES AND USES IN CONSTRUCTION

1. Lightweight (40 TO 60 pcf)
2. Free draining (permeability greater than 10 cm/s)
3. Low earth pressure (example: 50% lower at base of a 16 ft high wall)
4. Good thermal insulator (8 times greater than gravel)
5. Durable
6. For many applications they are the cheapest solution.

1.Lightweight fill:

The unit weight of tyre chips is low varying from 3kN/m³ to 5.5kN/m³ which depends on size of the tyre chip and degree of compaction. Tyre chips as lightweight fill could be advantageous in embankment construction in terms of slope stability and reduction in settlement. A successful case of such use was an improvement project on U.S. highway 42 in southern Oregon. An existing 3.3 m high highway embankment was widened to 6.1 m and raised by 1.2 m in conventional manner. The additional embankment load has remobilized an ancient landslide which moved progressively down the slope perpendicular to the highway. Shredded tyres were hence used as light weight fill above this landslide in conjunction with a counter weight of soil at the downward slope to increase the factor of safety for slope stability as shown in Fig. Deflectometer tests indicate the pavement section over the shredded tyre fill meets 20-year design life criteria, however it deflects more than a similar pavement section over earth embankment.

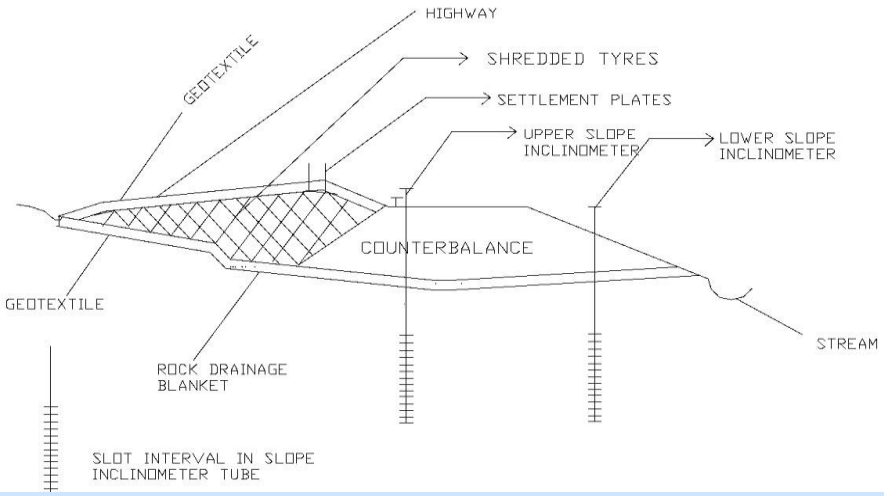

Fig.No.2.1.Cross-section through a landslide repair in oregon

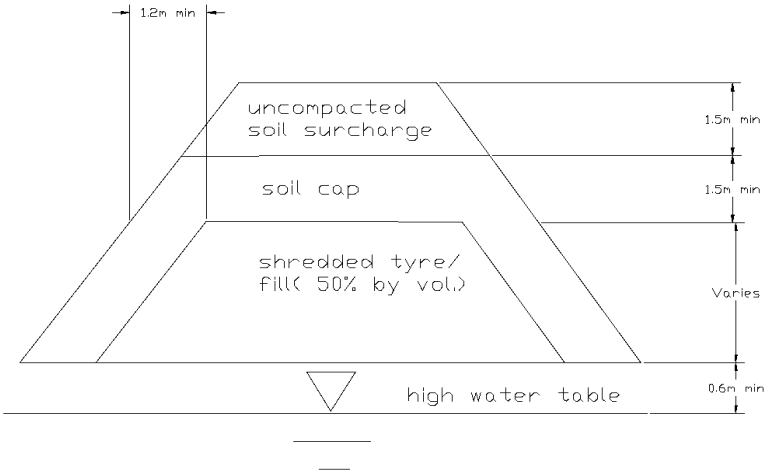

Fig.No.2.2.Cross-section through lightweight tyre chip/soil fill used to reduce settlement of embankment constructed in virginia

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2. Backfill:
Tweedie et al (1998 tested a 4.88 m full scale retaining wall with tyre shreds as a backfill. They found that the measured average at rest earth pressure with tyre shreds was about 35% less at the base than the conventional granular backfill.

3. Insulation to limit frost penetration:
Frost penetration beneath the roads causes frost heave which can create a bumpy road surface and crack the pavement. The most critical time of a year for a road to lose strength is when subgrade soils thaw. Tyre chips are about 8 times better than gravel for reducing frost penetration.

4. Tyre shreds in French drains and drainage layers:
The hydraulic conductivity of tyre shreds/ tyre shreds-soil mixture is greater than most of granular aggregates. The range of hydraulic conductivities reported in literature for tyre chips varied from .58 cm/s to 23.5cm/s. Edil and Bosscher (1994) used mixtures of tyre chips with 7.62 cm maximum size and a clean uniform sand. Surcharge pressures were varied from 0 to 137.89 kPa. Ahmed (1993) used mixtures of tyre chips with either 1.27 cm or 2.54 cm maximum size and two soil types i.e. Ottawa sand and Crossby Till. No surcharge pressure was applied. The hydraulic conductivities varied from 1.6 * 10 exp-4 cm/s to 8.7 * 10 exp-3 cm/s with Crossby Till. The tyre shreds can be used as French drains along roadsides or drainage layers beneath roads as shown in Fig.

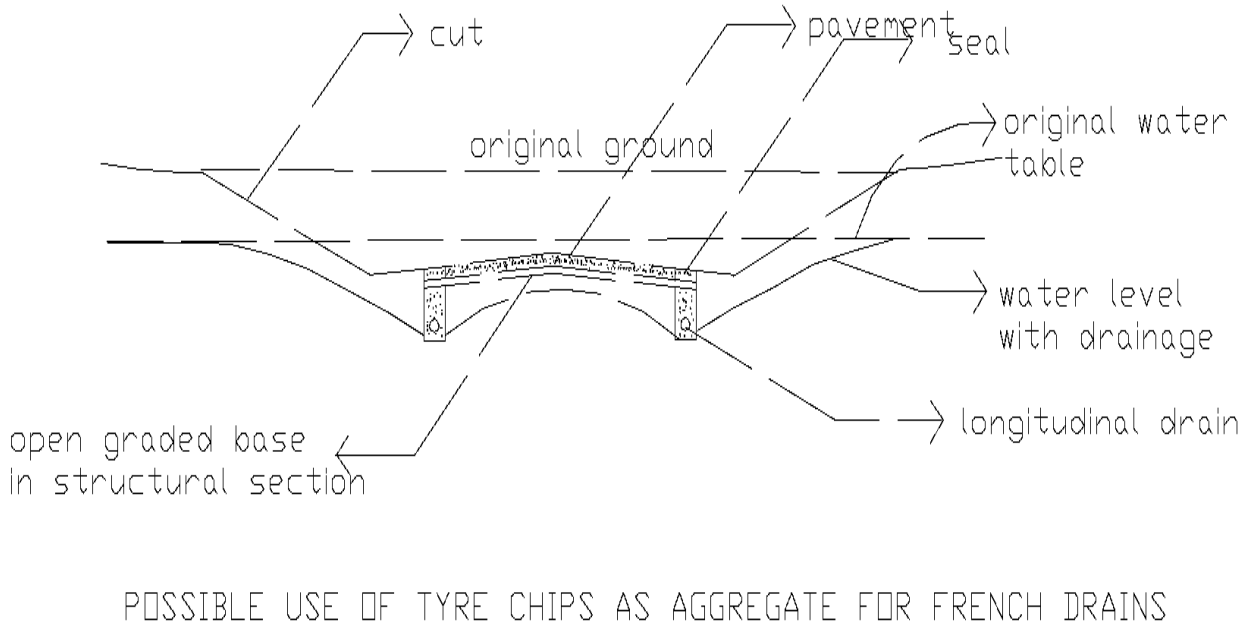

Fig.No.2.3.Possible use of tyre chips as aggregate for french drains

3. LITERATURE REVIEW

Laboratory Leach Test (Wisconsin, Department of Transportation Study, 1992) yielded the following results. The shredded tyres do not leach base-neutral regulated organics. Most substances that were detected showed declining concentrations with continued leaching. However, barium, iron, manganese, and zinc showed increasing concentration with continued leaching.
Field tests conducted by Ohio Department of Geology, Kent State University, 1997,the leachate analyses showed that the concentration of trace elements from soil-tyre mixtures was less than the maximum allowed contaminant levels specified in U. S. Environment Protection Agency (EPA)'s regulations. These researchers concluded that soil-tyre mixtures can be safely used as a light-weight fill material and in situations where improvement in drainage characteristics is required University of Maine, 1997, conducted field trials to investigate the effect on water quality for the tyre chip fills placed above the groundwater table. Control wells were used to distinguish the substances naturally present in groundwater from those that leached from tyre chips. These experimental controls make the results from this study more significant than those from the Wisconsin investigations. There was no evidence that tyre chips increased the level of substances in the primary drinking water standard. In addition, there was no evidence that tyre chips increased the levels of aluminum, zinc, chloride or sulphate which have secondary (aesthetic) drinking water standards.

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Minnesota Pollution Control Agency Biological Surveys, 1990, The objective of this study was to serve as a qualitative indicator of environmental impact from the use of scrap tyres at existing sites. Two study areas with scrap tyre fill were chosen: a minimum maintenance road and a gravel road. At the minimum maintenance road site, a general vegetation survey was conducted by lowering a pick and recording the first vegetation type encountered at twenty-nine randomly placed points. At the gravel road site, a similar general vegetation survey was conducted. The results of the biological survey indicated no observable difference in either of the study areas when compared to the control areas. Based on these results, Toxicity Characteristics Tests (TCT) concluded that future biological surveys would likely indicate no observable differences at tyre sites when compared to background sites.

4. ENGINEERING PROPERTIES OF TYRE CHIPS

1. Gradation: Tyre chips are generally uniformly graded and their maximum size varies according to the manufacturing process. It may be determined using the same process as used for soils i.e. sieve analyses.
2. Specific gravity and water absorption capacity: The specific gravity is the ratio of unit weight of solids (γs) of the tyre chips divided by the unit weight of water (γw). In equation form the apparent specific gravity (S) is S = γs/γw. The specific gravity of tyre chips range from 1.02 to 1.27. The specific gravity of soils range from 2.60 to 2.80.Absorption capacity is the amount of water adsorbed onto the surface of the particles; it is expressed as the percent water based on the dry weight of the particles. Water absorption capacities of tyre chips range from 2 to 4.3%.The specific gravities and water absorption capacities of tyre chips reported by several investigators are summarized in the table below. The table is sorted by chip categories such as glass belted, steel belted and mixture of glass and steel belted.

Table.No. 4.1.Summary Of Specific Gravities And Water Absorption Capacities

Tire chip type	specific gravity			water absorption capacity %	reference
	bulk	saturated	apparent		
glass belted			1.14	3.8	Humphrey et al(1992)
glass belted	0.98	1.02	1.02	4	Manion & Humphrey(1992)
steel belted	1.06	1.01	1.1	4	
mixture	1.06	1.16	1.18	9.5	Bressette(1984)
mixture (pine state)			1.24	2	Humphrey et al(1992)
mixture (palmer)			1.27	2	Humphrey et al (1992)
mixture (sawyer)			1.23	4.3	Humphrey et al(1992)
mixture	1.01	1.05	1.05		Manion &Humphrey 1992)
mixture		0.88-1.13		4	Ahmed(1983)

3. Compacted unit weight:Compacted dry unit weights of tyre chips vary from 6.087*10exp -4 kg/cm²to 6.888*10exp -4 kg/cm². The compacted dry unit weights of soils is typically 2.002*10exp -3 kg/cm². Thus the dry unit weight of soils is about 1/3 that for soils.
4. Compressibility:Compressibility of tyre chips should be more for two reasons:
a) Settlement that will occur during construction and in the first month or two after fill is placed due to weight of overlying tyre chips and soil even though it can be large for tyre chips, this is something that should be planned and accommodated with the design.
b) Settlement or deflections caused by a temporary load after construction is completed; an example of this is deflections of pavement underlain by tyre chip fill every time a vehicle drives over it.

The compressibility of tyre chips or tyre chip-soil mixtures have been measured by placing tyre chips in containers with diameters ranging from 15.24 cm to 73.66 cm and then measuring the vertical strain caused by an increasing vertical stress (Nickels and Humphrey).

5. Lateral earth pressure:The lateral earth pressure of tyre chips is important for earth retaining structures; it is characterized by the coefficient of lateral earth pressure at rest K which is the ratio of the horizontal stress divided by the vertical stress; a related parameter is Poisson's ratio μ which relates horizontal deformation to vertical deformation.The coefficient of lateral earth pressure at rest K and Poisson's ratio have been determined from the results of confined compression tests where the horizontal stresses were measured. K and μ are calculated from:

$$K = \sigma h / \sigma v$$
$$\mu = K / (1+K)$$

where,

σh = measured horizontal stress,
σv = measured vertical stress,

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K varies from 0.47 to 0.26, and
μ varies from 0.17 to 0.32.

6. Hydraulic Conductivity (permeability):The hydraulic conductivity of tyre chips is much greater than most granular soils. The hydraulic conductivity in several investigations is summarized in the table below. Hydraulic Conductivities vary from 0.58 cm/s 23.5 cm/s.

Table No.4.2.Summary Of Reported Hydraulic Conductivities Of Tyre Chips

Particle Size (cm)	Void Ratio	Dry Density (kg/cm³)	Hydraulic Conductivity (kg/cm³)	Reference
		(10exp -4)	(kg/cm³)	
6.35		4.65	5.3 to 23.5	Bressette (1984)[4]
6.35		6.07	2.9 to 10.9	
5.08		4.69	4.9 to 59.3	
5.08		6.1	3.8 to 22.0	
3.81			1.4 to 2.6	Hall (1990)
1.91			0.8 to 2.6	
5.08	0.925	6.44	7.7	Humphrey, et al.(1992, 1993)[1][3]
5.08	0.488	8.33	2.1	
7.62	1.114	6	15.4	
7.62	0.583	8.03	4.8	
3.81	0.833	6.22	6.9	
3.81	0.414	8.07	1.5	
3.81		0.11	0.58	Ahmed (1993)

7.Shear Strength:The shear strength of tyre chips may be determined in a direct shear apparatus or using a triaxial shear apparatus.The large size of tyre chips typically used for civil engineering applications requires that specimen sizes be several times greater than used for common soils. Because of the limited availability of large triaxial shear apparatus this method has generally been used for tyre chips 2.54 cm in size and smaller. Extrapolation of results on small size chips to the 7.62 cm and larger size chips used for civil engineering applications is uncertain since small chips are nearly equidimensional while larger chips tend to be long and flat.The shear strength of tyre chips has been measured using direct shear by Humphrey, et al (1992). Results from the test are shown in Fig.

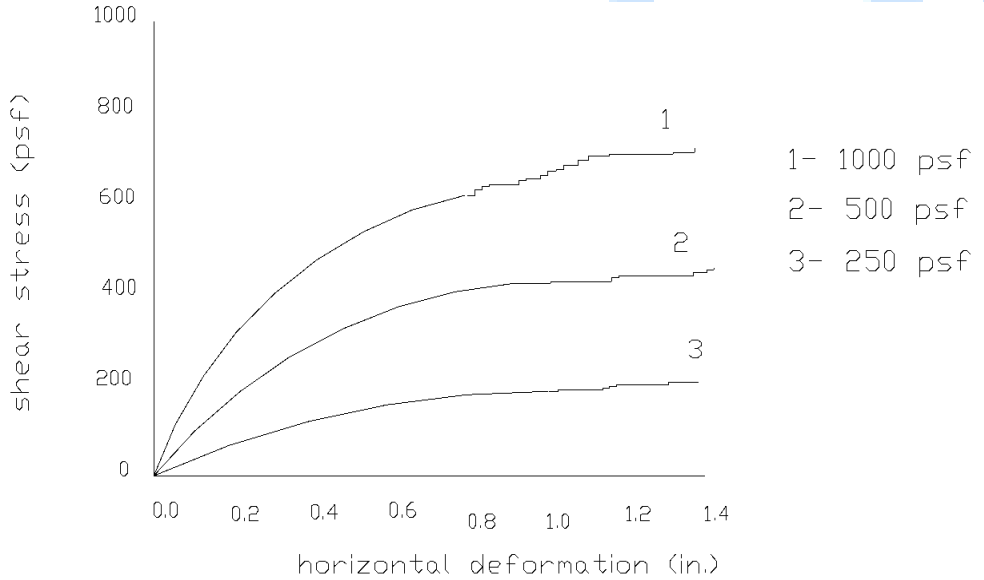

Fig.No.shear stress vs. horizontal deformation of tyre chips by direct shear test (humphrey, et al, 1992)

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5.CONCLUSION

Experience the world over, conclusively demonstrates that scrap tyres can be successively utilized in highway construction, from which we infer that

1. Compressibility of tyre chip-soil mixtures under static and repeated loads is nearly similar to that of soil.
2. Tyre chips are 8 times better than gravel in the insulation to frost penetration and in thermal insulation.
3. Scrap tyres cause environmental hazards if burnt, so their use in road construction prevents the environment from being polluted.
4. Their use in road construction provides a useful way of disposing them.
5. Review of the studies conducted on tyre chips reveals that they do not affect groundwater in any way.
6. Their use in combination with geosynthetics produces very good results as in the case of drainage.

With this in view, it is recommended tyre chip-soil mixtures can be of use in Indian situation too, keeping in view the alarming growth in scrap tyres compiled with environment issues.

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Advancement in flexible pavement by using Steel Slag

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ABSTRACT

The large amount of Industrial wastes as increased year by year and disposal becomes a very serious problem. It is necessary to utilize the steel slag waste affectively with technical development in each field. Commonly murrum soil has been used for construction of all categories of roads in our country. Although murrum is a good construction material, due to scarcity they increase the construction cost at some parts of the country , several types of murrum soils are found to be unsuitable for road construction in view of higher finer fraction and excessive plasticity properties. Such as used industrial material like steel slag in construction of road pavement. Its disposal causing severe health and environmental hazards in road construction industries is gradually gaining significant importance in India considering the disposal, environmental problems and gradual depletion of natural resources like soil and aggregates. Steel slag is a waste material generated as a by-product during the manufacturing of steel from steel industries. The quantity of generation is around 24 lacs MT per year from (Ref.Report.CRRI-2010) different steel industries in the India. Presently, it has no applications and dumped haphazardly on the costly land available near the plants. In this study, a typical steel slag was collected from an M/s Jindal Steel Iindustry Pvt.Ltd Sinnar MIDC, (M.S) in India and its feasibility for use in different layers of road construction was investigated. To improve its Geotechnical engineering properties, the Steel Slag material was mechanically stabilized with locally available soil in the range of 5 – 25%. Geotechnical parameters of these stabilized mixes were evaluated to investigate their suitability in the construction of different layers of road Technical specification of steel slag is developed for utilization in the construction of embankment, sub grade and sub base layer of Flexible pavement..

Keywords— Compaction test, CBR test, Index Properties, Moisture Absorption test.

1.INTRODUCTION

The iron and steel slag that is generated as a by-product of iron and steel manufacturing processes can be broadly categorized into blast furnace slag and steel making slag. Blast furnace slag is recovered by melting separation from blast furnaces that produce molten pig iron. It consists of non-ferrous components contained in the iron ore together with limestone as an auxiliary materials and ash from coke. Depending on the cooling method used, it is classified either as air-cooled slag or granulated slag. Steel making slag consists of converter slag (Basic oxygen furnace slag) that is generated by converter and electric arc furnace slag that is generated during the electric arc furnace steel making process that uses steel-scrap as the raw material. In the present study, solid waste which is generated as a by-product, during the melting process of mixed materials viz. steel scrap, sponge iron, pig iron, ferro-silicon, silico-manganese and Al-shots is termed as granulated blast furnace slag. The waste material is neutral and nonhazardous in nature as per chemical analysis report of Central Pollution Control Board India (CPCB) (Hazardous waste rules, 2008, Ref. No-19). The quantity of generation of this slag is around 24 lacs MT per year from different steel industries in India (CRRI, 2010). Steel slag may be used as a land fill cover liner (Inga, 2010, Ref. No-18.) Pazhani and Jeyaraj (2010, Ref. No-20) studied feasibility of Granulated Blast Furnace slag (GBFS) for production of high performance concrete. Use of steel slag in asphaltic concrete minimizes potential expansion and takes advantage of the positive features in giving high stability, stripping resistant asphalt mixes with excellent skid resistance (Emery, 1994 and Mullick2005, Ref. No-21).

Presently, this Steel Slag is not utilized and is dumped on the costly land available near the plants. Study was carried out to utilize the slag in different layers of road construction. Being cohesion less material, it was mixed with local soil in the range of 5-25% and their geotechnical characteristics were evaluated. Technical specifications of slag were developed for utilization in the construction of embankment, sub grade, sub base layers of road pavement. Slag was investigated for its feasibility in bituminous layers.

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Pictorial View of Steel Slag Sample
(Ref. from M/s.Jindal Steel Industries MIDC Sinnar,)

2. MATERIAL

Slag sample was collected from M/s Jindal Steel Pvt .Ltd Industry in Sinnar MIDC Nashik, State of Maharashtra, India. It was selected from different locations of the heap and mixed thoroughly before using it for laboratory study. Local soil was also collected from Field National Highway No-6`,Use of local soil should be collected and different layers in field to check Geotechnical properties of Local soil and Steel Slag in various percentage mixes.

3. GEOTECHNICAL CHARACTERISATION OF SLAG, LOCALLAY AVAILBALE SOIL AND THEIR MIXES

Mix Designation	Mixes
100LS	100% Local soil
5S+95LS	5 % Steel Slag + 95 % Local Soil
10S+90LS	10 % Steel Slag + 90 % Local Soil
15S+85LS	15 % Steel Slag + 85 % Local Soil
20S+80LS	20 % Steel Slag + 80 % Local Soil
25S+75LS	25 % Steel Slag + 75 % Local Soil
100S	100% Steel Slag

4. EXPERIMENTAL WORK

A. Specific Gravity Test

Specific gravity test was carried out as per IS 2720 Part 3 (1980). Specific gravity of steel slag and local soil was observed to be 4.28 and 2.10 respectively.

Grain Size Analysis

Grain size analysis was carried out of slag and local soil as per IS 2720 part 4 (1985). Slag and local soil samples were observed to be coarse grained materials. Slag was crushed by roller and grain size analysis was also carried out. Cu and Cc Values find out.

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Table-2.Values of Cu and Cc

Coefficient of uniformity (Cu)	12.87
Coefficient of curvature (Cc)	1.94

E. Modified Proctor Compaction Test

To assess the compaction properties of selected materials, their mixes and effect of varying relative proportion of two materials, modified Proctor compaction test was carried out as per IS:2720-part 8 (1983). The Maximum Dry Density (MDD) of slag and local soil was found to be 23.5 kN/ $M^3$and 19 kN/M^3 respectively and OMC of 8% and 12%respectively**.**

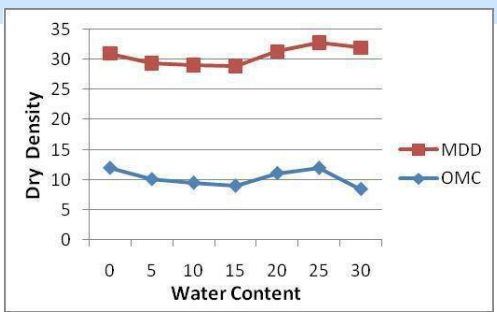
B. ***Atterberg Limit Test*** *Atterberg limit test was carried out as Part 5 (1985). Oven dried samples (Passing 4 micron) were used to determine the Liquid Limit (LL) and Plastic Limit (PL). Slag and their mixes were observed to be non plastic in nature. The Liquid Limit (LL) and Plastic limit (PL) of local soil were determined as 51% and 29% respectively.*

C. ***Moisture Absorption Test*** *To know the voids in slag, moisture absorption test is carried out as per BIS 2386 Part3 (1997). Moisture absorption value of Steel Slag was obtained as 10%.*

E. Modified Proctor Compaction Test To assess the compaction properties of selected materials, their mixes and effect of varying relative proportion of two materials, modified Proctor compaction test was carried out as per IS:2720-part 8 (1983). The Maximum Dry Density (MDD) of slag and local soil was found to be 23.5 kN/ M3and 19 kN/M3 respectively and OMC of 8% and 12%respectively**.**

Table .3 Values of OMC and MDD for various Mixes

Type of Mix	OMC (%)	MDD (KN/m^3)
100LS	12.0	19.00
5S+95LS	10.10	19.30
10S+90LS	9.50	19.63
15S+85LS	9.00	19.90
20S+80LS	11.12	20.20
25S+75LS	12.00	20.80
100S	8.45	23.50



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5. CONCLUSION

The feasibility of utilizing of Steel Slag and Local soil in construction of flexible pavement with variation of Percentage in soil. The following conclusions have been drawn.

1 Local soil is a material having specific gravity of 2.10 and Steel Slag having specific gravity 4.28.

2 Steel Slag was found to be non plastic in nature and liquid limit 42% and Local Soil is plastic Limit 29% and Liquid Limit 53% and The plasticity index the soil is determined as PI 24% indicating medium plastic in natureAccording to IS classification, soil is classified as GC i.e. Gravel with clay content. According to IS: 1498 (1970) classification Steel Slag is classified as GP i.e. Poorly graded gravel

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Early Termination of Public Private Partnership Projects

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ABSTRACT

Public Private Partnership (PPP) bring private and public sectors together in long-term contracts to produce a required infrastructure like roads, airports, water systems, hospitals etc. In PPP a private entity, usually a consortium responsible for financing, design, construction, operation and maintenance of the facility for agreed duration known as concession period and at the end of the period transfers the ownership of the operational facility to the government at no cost. In return, the private entity generates revenue either from the levying of tariffs on users or the receipt of periodic service payments from the government over the life of the BOT agreement. The Private Participation in Infrastructure (PPI) database of the World Bank (2011) shows that 334 out of 4,874 PPP projects (6.85%) from 1984 to 2010 were terminated early.

Keywords— *Public Private Partnership (PPP), Agreement, Build Operate Transfer (BOT), private sector Reasons of termination.*

1. INTRODUCTION

1.1. General

Development of infrastructure projects with private capital through Public Private Partnership (PPP) route has become one of the commonly adopted procurement strategies in developed and developing countries. All over the world where PPP procurement has been used in one form or another, the way in which it is carried out has become an important issue. There is no standard method of PPP implementation as each country adapts the process as appropriate for its own culture, economy, political climate and legal system. It is therefore essential that all parties likely to be involved have a common understanding of the principles underlying PPP structures and an appreciation of the key issues from the stand points of the private as well as the public sectors. The quantum of investment in the infrastructure projects by the private sector entities depends on the position of the project on the continuum between service contract and divestiture. PPP projects with substantial private investments such as Build Operate Transfer (BOT) and its variants. Public-private partnerships (PPP) in infrastructure development involve private sector participation in any or all of the design, construction, financing and operation phases of a public utility infrastructure, service or both. Infrastructure financing through PPP: Financing this level of investment will require larger outlays from the public sector, but this has to be coupled with a more than proportional rise in private investment. Private and PPP investments share shall have to be around 50 percent in this Plan. Clearly, for want of resources, a lot of this infrastructure has to be built through private-public participation, like BOT projects.

1. 2 Significance of study:

The success of the ongoing twelfth five-year plan critically depends on the success of PPPs in infrastructure. Government authorities are calling bids to cover the mammoth targets of Road building, private sector is hurriedly bidding for the projects at low price, and the issues of project structuring to reduce overall risk is still not being looked into. Lenders are overcautious over PPP project financing; projects are being withdrawn prematurely due to land acquisition and Environmental clearance issues and General public is suffering due to poor performance of ongoing PPP projects. In fast changing social, economical, political and legal environment, BOT projects are moving towards uncertain future.

1.3 Objectives:

The PPP involves large number of parties, the Parties bear different risks over various phases of life. The BOT Road project life is quite long in which things may go in undesired way and may impair the successful delivery of the PPP Project.

1. To study the impact of public private partnerships on infrastructure.
2. To examine and analyze the various challenges & issues before PPP.
3. To explain various kinds of challenges and problems that PPP are facing or likely to face in future.
4. To explore the various types of specific opportunities so the early termination of projects is avoided.

2. LITERATURE REVIEW

Public Private Partnership

PPP is a joint collaboration between public and private units so as to meet the lack of invested capital to fulfill the requirement of development of infrastructure. The term PPP refers to a long-term, contractually regulated cooperation between the public and private sector. One of the main reasons governments are opting to use PPPs for infrastructure development is to increase the efficiency of infrastructure projects through a long-term collaboration between the public

sector and private business. The level of adoption of PPPs across the world differs widely. Typically, in industrialized countries, PPPs are used in areas of public service provision including education, health services, water management and public buildings. While in industrialising countries with enormous needs for basic infrastructure, PPPs are often seen in the power, water or road sectors in order to sustain the countries' rapid economic growth. There is a great variety of definitions for PPP available worldwide. PPP is an agreement between the govenent and the private sector for the purpose of provisioning of public services or infrastructure with a common vision, the enterprise of both the sector is blended in a platform for accomplishment of mutual benefits.

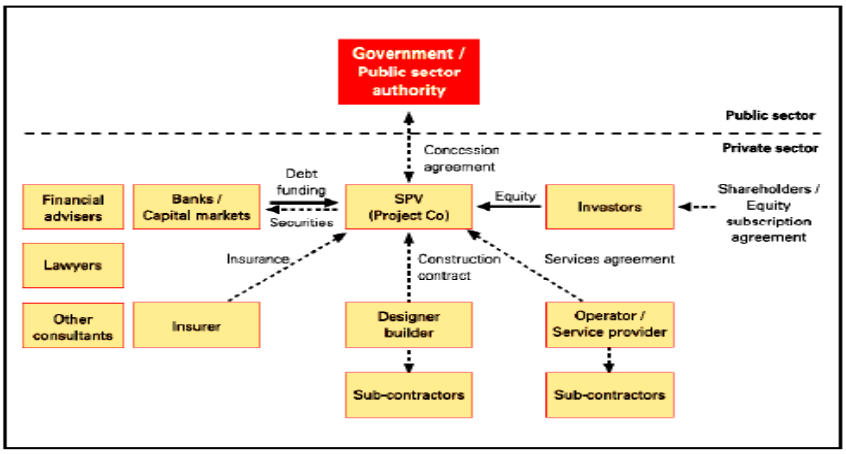

fig (1) Agreements Between PPP Participants

3. CASE STUDY

Table 1. Completed Public – Private – Partnership (PPP) Projects in India

S.No	Project	Sector	Committed Investment	Year of Financial Closure
1	Mumbai Metro	Transport	134 Cr	2014
2	Bandra-Worli Sea Link	Transport	110 million	2010
3	Mumbai-Pune Expressway	Transport	16.3 billion	2012

Table 2. Cancelled Public – Private – Partnership (PPP) Projects in India

Sr. No	**Project**	**Sector**	**Committed Investment**	**Year of Financial Closure**	**Year of Cancellation**
1	Dabhol LNG-Fired Power Plant – phase (I and II)	Energy	29.31 billion	1996	2001
2	Kaman Paygon BOT Project	Transport	15 billion	1998	2009
3	Pune water Supply & Sewerage Project	Water Sewerage	22 billion	1996	1998

(1) Dabhol Power Project (Phase-I & II)-

Project Overview- Dabhol power plant is a massive combined-cycle power plant (largest Gas- fired power plant) of capacity 2184 megawatts spread over two phases on the western coast of India's Maharashtra state. The Dabhol power plant was initiated in 1992 and took nine years to commence operation. A 20-year Power Purchase Agreement (PPA) was signed in 1993 between DPC and the Maharashtra State Electricity Board (MSEB) with guaranteed off-take through a take-or-pay contract. The Phase-I was of capacity 740 megawatts and Phase-II of 1,444 megawatts. The total project cost

is $2.9 billion. Enron owns 65%, Bechtel Enterprises owns 10%, General Electric owns 10%, and the Maharashtra State Electricity Board owns 15%. The project was cancelled in 2001 as MSEB stopped drawing the expensive power from the project: total tariff payments by MSEB from May 1999 to December 2000 were Rs.29.31billion.

(2) Kaman Paygon BOT Project

Project Overview- The Strengthening of Chinchoti Naka - Kaman - Paygaon - Bhiwandi Road (SH No. 4) Km from 0/00 to 22/600 in Vasai and Bhiwandi Talukas, Dist :Thane with Private Financing and Toll Collection on Build,Operate and Transfer (BOT) basis was conducted by IRB. This project was oprerated by Ideal Road Builders Private Limited (IRB).

(3) Pune water Supply & Sewerage Project

Project overview- In1996, the Pune`s Water supply and Sewerage project of value $185 million was initiated under the FIRE (D) program. The project was an integral part of a 25- year strategic plan which aimed to gradually extend, to the total population, a 24 hour water supply and sewerage service through construction and management contracts with a private sector firm.

Reasons of Termination Dabhol Power Project (Phase-I & II)

The main reasons of cancellation of project are as follows:

1. The project had lost the support of newly formed State Government of Maharashtra.
2. There was a contract dispute between the Government and plant owners.
3. The company was associated with allegations of fraud, mispresentation, violation of human rights, malfeasance and corruption at highest level.
4. Lack of transparency and competition in the bid process.
5. The project was not financial viable according to World Bank because it denied to finance the project.
6. Cost of the project was greater than comparable projects
7. Enron cost Rs 4.49 Cr per MW
8. Comparable projects cost Rs 3.6 Cr per MW
9. The power generated by plant was more expensive than that from domestic power purchaser therefore the MSEB stopped drawing the expensive power from the project.
10. The MSEB was not paid an amount of Rs.29.31 billion to company.
11. The process and content of original and revised agreement were criticized by Government.

Reasons of Termination Kaman Paygon BOT Project

The main reasons of cancellation of project are as follows:

1. Dispute on widening of road between IRB Pvt, Ltd and Government of Maharashtra, PWD
2. Violation of contract agreement by both the company and PWD.

Reasons of Termination Pune water Supply & Sewerage Project

The main reasons of cancellation of project are as follows:

1. The critical reason of project cancellation was loss of political support from local and state Government.
2. The project was left without a local champion by municipal commissioner of Pune.
3. Lack of transparency in process to award the tenders.
4. There was a doubt related to viability of scheme.
5. There was a 25% increase in tariffs (Rs 2/cum to Rs2.5/cum).
6. There was a 43% increase in annual fees (Rs.175 to Rs250).
7. The project cost was too high
8. Estimated cost was $106 million
9. Actual cost was $185 million
10. There was an opposition to high debt burden.

4. CONCLUSION

A good practice to evaluate the payoffs is to involve a third party. In addition, exploring ways to create value in renegotiations also increases the payoffs for both partners. Making an atmosphere of problem solving and joint-gain negotiation is an efficient way to create value events, compensation events, force majeure, default events, change-in-law, change-in-service, refinancing, and change-in-control. Renegotiations and early terminations are usually caused by a combined effect of some risk events. A well-developed protocol for renegotiations and early-terminations is critical for both the government and the concessionaire. This study has developed a standard procedure for renegotiations and early-terminations based on PPP practices. In general, it is recommended to consider renegotiation first and take early-termination as the last resort in dealing with various risk events.

The following points may be followed in order to effectively tackle problems in renegotiations and early terminations: building good relationships between public and private partners, preparing clear contract clauses, minimizing opportunistic behaviour, involving
Competition, and looking for win-win solutions.

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Eco And Smart Use Of Solid Waste(Plastic)

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ABSTRACT

High density polyethelene (HDPE) and polyethelene bags, bottles, etc are available in huge quantity. High strength bricks, paver blocks, sheets, manholes covers, etc can be manufactured using these bags with addition of crushed sand at various proportions. They have thermal and sound insulation properties. These type of bricks help to reduce overall cost of construction by providing conventional building materials which is easily affordable. The advantages of these kind of interlocking plastic bricks are to reduce the accumulation of non-degradable plastic waste. They provide more compressive strength than normal clayey bricks. These bricks are economical since plastic bricks being dangeours pollutant which is easily available as core raw material. In this project an attempt has been made to study the properties of standard size plastic interlocking brick, paver blocks, sheets, roofing tiles, etc. Colouring agents can be added to the mixrure to attain any desired shades. The manufactured bricks,tiles,etc have the properties such as neat and even finishing with negligible water absorption and which has greater compressive strength. The main objective of this work is to develop an efficient way to effectively utilize the waste plastic which is great threat for the ecological balance.

Keywords: High density polyethelene, polyethelene bags, High strength, more compressive strength, negligible water absorption,light weight,etc.

1. Introduction:

Building materials like bricks, concrete block, tiles, etc. are popularly used in construction. However, these materials are expensive and hence common people find it difficult to easily afford them. Moreover, these building materials require certain specific compositions to obtain desired properties. Plastic is one of the recent engineering materials which have appeared in the market all over the world. It is a material consisting of a wide range of synthetic or semi-synthetic organic compounds that are malleable and can be molded into solid objects.

Accumulation of such wastes can result into hazardous effects to both human and plant life. Therefore, need for proper disposal, and if possible, use of these wastes in their recycled forms arises. Plastic waste is increasing day by day throughout the world. Where proper garbage collection system is not available, waste plastics are strewn everywhere which becomes eyesore.It also pollutes the environment.

A large amount of waste plastic are discarded or burned which leads to the contamination of environment and air. The large volume of materials required for infrastructure construction is potentially a major area for the reuse of waste materials.

Recycling the plastics has advantages since it is widely used worldwide and has a long service life, which means that the waste is being removed from the waste stream for a long period [1]. Reuse of waste plastics has environmental benefits not only related to the safe disposal of bulk waste, but also to the reduction of environmental impacts that arises due to burning of plastics. Use of waste plastics in infrastructure construction has been tried and reported [2,3]. The present research is performed to study the properties of bricks manufactured by mixing sand and waste plastics. This study is expected to provide some information regarding the suitability of such sand plastic bricks for use in construction industry.

2. Literature Reviews:

According to a Technical newsletter “Focus on PET”, Poly eth-ylene terephthalate belongs to the polyester family of poly-mers, one of the largest and most diverse of the polymer fami-lies. This family of polymers is linked by the common feature of having an ester (-COO-) link in the main chain shown in figure 1.1, but the range of polyester materials is probably the largest of all the polymer families. And also the chemical structure of the PET is having only

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atomic species that are carbon, hydrogen and oxygen. Therefore melting of PET won't result in release of noxious gases and also its properties reveal that a melting temperature of 260 ºc is required. Also from the properties of the PET it can be understood that it has got good chemical resistance and better resistance to UV rays [9]. In a paper "An review on waste plastic utilization in asphalting of roads" [1], the tech-niques to use plastic waste for construction purpose of roads and flexible pavements, which were developed by various re-searchers has been reviewed. And collectively emphasises the concept of utilization of waste plastic in construction of flexible road pavement. In the construction of flexible pavements, bi-tumen plays the role of binding the aggregate together by coating over the aggregate. It also helps to improve the strength and life of road pavement. But its resistance towards water is poor. A common method to improve the quality of bi-tumen is by modifying the rheological properties of bitumen by blending with synthetic polymers like rubber and plastics. This bitumen mix show better binding property, stability, density and more resistant to water.

The monomer structure of PET.

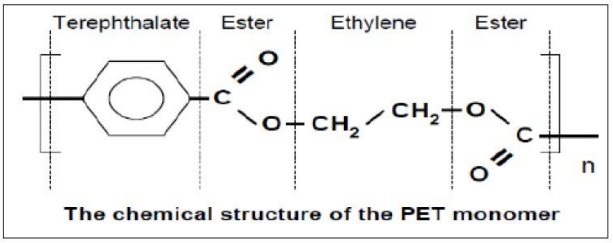

Figure No. 2.1- The chemical structure of the PET monomer

TABLE NO-2.2 The list of plastic available in various forms.

Waste Plastic	Available As
Poly ethylene terephthalate (PET)	Drinking water bottles etc.
High Density Poly ethylene (HDPE)	Carry bags, bottle caps, house hold articles etc.
Low Density Poly ethylene (LDPE)	Milk pouches, sacks, carry bags, bin linings, cosmetics and detergent bottles.
Poly propylene (PP)	Bottle caps and closures, wrappers of detergents, biscuit etc.
Urea formaldehyde	Electrical fittings ,handles and knobs

3. Material Specification:

3.3.1 Cement:

Cement is made by heating limestone (calcium carbonate) with small quantities of other materials (such as clay). In this project Ordinary Portland cement of 53 grade conforming to IS456-2000 was used. Tests were carried out on various physical properties of cement and the results are shown in test data of materials.cement will act as a binding material.

3.3.2 Sand :

Natural river sand was used as a fine aggregate. The properties of sand were determined by conducting tests as per IS: 2386 (Part-1). The results are shown in test data of materials. The results obtained from sieve analysis are furnished. The results indicate that the sand conforms to zone 11 of IS: 383-1970.

3.3.3 Water:

Water used for mixing and curing of concrete shall be clean and free from oils, acids, alkalies, salts and organic materials or other substances the may be deleterious to concrete or steel. Portable water shall be used for mixing of concrete. Suspended solid matter in the water shall not exceed more than 200mg/l. The ph value of the water shall not be less than 6.

3.3.4 Waste plastics :

Plastics are commonly used substances which play an important role in almost every aspect of our lives. The widespread generation of plastics waste needs proper end-of-lifemanagement. The highest amount of plastics is found in containers and packaging's (i.e. Bottles, packaging, cups etc.), but they also are found in durables (e.g. Tires, building materials, furniture, etc.) shown in figure 2.2. And disposable goods (e.g. Medical devices). Diversity of plastics applications is related with their specific properties, low density, easy processing, good mechanical properties, good chemical resistance, excellent thermal and electrical insulating properties and low cost (in comparison to other materials). Post-production and post-consumer plastics are utilized in a wide range of applications.

2.3.5 Bitumen :

Bitumen is primarily used to improve the binding property of molten plastic and also it serves the purpose of transforming a thermoplastic into thermosetting plastic.The various tests are conducted on the bitumen.

4. Objectives:

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The overall objective of the project is to reduce plastic in waste steams and providing conventional building materials for affordable housing.
More specifically,the project aims at:

- To reduce the plastic wastes in landfills
- To produce conventional building materials
- To provide higher strength bricks
- To manufacture ECO&SMART interlocking-bricks.
- To provide affordable housing
- To protect the environment

4.2. Scope of the project:

In this work an attempt has been made to manufacture the bricks by using waste plastics in range of 60 to 80% by weight of crush sand and 60/70 grade bitumen will be added in range of 2 to 5% by weight of soil in molten form and this bitumen- plastic resin was mixed with crushed sand to manufacture the bricks. The bricks manufactured will possess the properties such as neat and even finishing, with negligible water absorption and satisfactory compressive strength in comparison with clay brick to satisfy the increasing demand of conventional building materials.

An attempt is made to conduct an experimental programme to study the strength and other engineering properties like durability, energy absorption capacity,water absorption and ductility of plastic building bricks.

5. Procedure for casting:

In order to find the plastic soil bricks that they possess high compressive strength with various mix proportions are made and they are tested using compressive testing machine. The mix proportion were in the ratio of (1:2, 1:3, 1:4,) These are the ratio which represent the plastic, crused sand respectively.Process is shown in figure 5.1

5.1.1 Batching:

The measurement of materials for making brick is termed as batching. Use of weigh system in batching facilitates accuracy, flexibility and simplicity.

5.1.2 Mixing:

Mixing of materials is essential for the production of uniform and strengthens brick. The mixing should ensure that the mass becomes homogeneous, uniform in color and consistency. Generally there are two types of mixing, Hand mixing and machine mixing. In this project, we adopted hand mixing.

5.1.2 Moulding:

The mould is used for preparing brick in uniform shape. The size of mould is 230×100×75 mm. The mould were assembled and placed on the base plate.The faces must be thinly coated with mould oil to easily demould after casting.

5.2.3 Melting:

After batching the plastic bags were taken for melting in which the plastic bags are thrown one by one into the drum and allowed to melt. The first step of melting process includes the arrangement of stones, drum and the required firewood. The stones are arranged to hold the drum and the firewood is placed in the gap between stones and it is ignited. The drum is placed over the setup and it is heated**:** to remove the moisture present in it.

5.3. Expected experimental results are as follows:

The expected results of experiments conducted for various percentages of plastic mixed with crushed sand with varying per-centage of plastics, bitumen,etc are discussed.

5.3.1. Compressive strength of plastic-soil bricks:

This test is done to know the compressive strength of brick. It is also called crushing strength of brick. Four specimens of brick were taken to laboratory for testing and tested one by one. In this test, a brick specimen is put on crushing machine and applied pressure till it breaks. The ultimate pressure at which brick is crushed is taken into account.

For manufacturing of plastic-soil bricks a minimum of 60% of plastic by weight of soil was required as determined by trial and error method, so 65% of plastic by weight of soil should be considered as a starting proportion. Compression strength conducted on bricks of size 20x10x10cm.The compression strength test results range is given :
Expected Compressive strength :7MPA to 8MPA – After 28 days

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The compressive strength test results of plastic-soil bricks for 65 and 70% of plastic containt by weight of soil with constant binder content of 2% by weight of soil, gives same compres-sive strength(8.16 N/mm2), but 70% plastic containt is consi-dered as optimum in the view of workabality criteriaduring manufacture. From the test results it will be observed that the water absorption also decreases with increase in percentage of plastic. The plastic-soil brick containing 70% plastic & 2% bitumen gives negligible water absorption will be 0.9536%.

5.3.2. Water absorption test:

In this test, bricks are weighed in dry condition and let them immersed in fresh water for 24 hours. After 24 hours of immersion,

Those are taken out from water and wipe out with cloth. Then, brick is weighed in wet condition. The difference between weights

Is the water absorbed by brick. The percentage of water absorption is then calculated. The less water absorbed by brick the greater

Its quality. Good quality brick doesn't absorb more than 20% water of its own weight.

5.3.3. Efflorescence test:

The presence of alkalis in bricks is harmful where it forms a gray or white layer on brick surface by absorbing moisture. To find

Out the presence of alkalis in bricks, this test is performed. In this test, a brick is immersed in fresh water for 24 hours. Then, it is taken out from water and allowed to dry in shade. If the whitish layer is not visible on surface, it proofs that absence of alkalis in

Brick. If the whitish layer visible about 10% of brick surface, then the presence of alkalis is in acceptable range. If that is about 50% of surface, then it is moderate. If the alkali's presence is over 50%, then the brick is severely affected by alkalis

5.3.4. Fire resistance test:

The Plastic is highly susceptible to fire but in case of Plastic sand bricks/Paver blocks the presence of sand imparts insulation. There is no change in the structural properties of block of bricks up to 180oc above which visible cracks are seen and the blocks/bricks deteriorate with increase in temperature.

6. Conclusion:

- Material used in building construction are expensive which are not affordable to low income group. Recently plastic is considered as engineering material which we are going to use.
- Growth of plastic is increasing day by day and it became hectic to ecology which increases the growth of rats and flies which creates germs and pathogen. Large amount of plastic can be reduced if used in construction works.
- This will leads to reduction of plastic waste in landfills. Mixing in proportion 60 to 80% of crush sand and 60/80 grade bitumen will be added in range of 2 to 5%by weight of soil. From the various literature review we understood the use of plastic waste in different way.
- Plastic waste used in road construction proves us that plastic can be a good binding materials. The plastic get sustain in concrete mixer.
- The Plastic sand bricks possess more advantages which include Cost efficiency, Removal of waste products thus abolishing the land requirement problem for dumping plastic, Reduction in the emission of greenhouse gases by the conversion of flue gases into synthetic oil etc.
- This method is suitable for the countries which has the difficult to dispose /recycle the plastic waste. The natural resources consumed for the manufacturing of Plastic sand bricks and Paver blocks are very much less when compared to its counterparts.
- The manufacturing cost could be reduced further by replacing the river sand with fly ash/quarry dust or other waste products.
- Owing to the numerous advantages further research would improve the quality and durability of plastic sand bricks and paver blocks.

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Feasibility Study of Demolished Brick Masonry Rubble As Course Aggregate In Concrete

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ABSTRACT

One of the significant problems now a day is the accumulation and management of construction and demolition wastes, which increases along with continuous spreading of urbanization of industrialization. Recycled brick aggregates recovered from demolished masonry structures can be utilized in manufacture of new concrete mixtures. In order to insure a sustainable waste management it is necessary to predict its properties and to specify it's utilization. An overview of investigation of properties of recycled clay bricks as an aggregate in production of new concrete is presented in this paper work.

Keywords— *Construction and demolition waste, recycled brick aggregate, masonry structures, recycled clay bricks*

1. INTRODUCTION

During the last many decades, it has been recognized with growing concern that wastes from a construction are of large volume and that this volume is increasing year by year. The problem of waste accumulation exists worldwide. Most of Waste materials are left as a landfill material or illegally dumped. Environmental Impact can be reduced by making more sustainable use of this waste. The fine recycled brick aggregates recovered from demolished masonry structures can be utilized in the manufacture of new Concrete mixtures. At this way, it is possible to reduce the problem of construction and demolition waste storage, and to reduce the consumption of natural materials. The utilization of brick masonry waste as an aggregate in mortar and concrete would have a positive effect on the economy also.

According to a study commissioned by Technology Information Forecasting and Assessment Council (TIFAC), 70% of the construction industry is not aware of the various recycling techniques, which are in use in developing nations. Burnt clay brick units are very versatile medium for construction of buildings. The making of burnt clay brick is an energy-intensive process. In consequence of its brittleness, a large number of these units are probably damaged in production and handling. . The utilizing of the damaged brick units was performed successfully as aggregate in concrete. In addition, this concrete has an acceptable load capacity, gives better thermal insulation and has less density than ordinary concrete.

In the research work demolition waste sample comprising of brick masonry works from live buildings, which have been demolished in the recent past are taken for case studies. These big pieces of demolished wastes are broken to small pieces in general. Thereafter, the pieces of brick masonry waste are separated and prepared for making the concrete.

2. LITERATURE REVIEW

The overview of the project revealed that there is more information available on the use of recycled brick as an aggregate in new concrete. Being waste materials brick available from demolition site are not be used further for preparation of concrete. They are hardly used as recycled material in some concreting works. But if such type of recycled brick materials are used in preparing the concrete it will have its effect of fine materials on the following mentioned properties.

2.1 Porosity and absorption of recycled clay brick: The porosity of most common natural aggregates such as granite has been looked into, but very little is known about the porosity of recycled brick aggregate except that it has a relatively high value. Usually Porosity and water absorption of recycled brick aggregate is higher than concrete aggregate. The absorption of recycled crushed brick is estimated to a value between 22 % and 25 % by weight in relation to the material in its dry state. It was concluded that recycled crushed brick becomes almost totally saturated with water after just 30 min of submission in water. Submersion for a further 24 h produces only an increase of about 2 % water absorption

2.2 Properties of Concrete which are affected by use of recycled brick aggregate are:

1) Compressive Strength: This characteristic can be attributed to the higher water absorption of recycled crushed brick aggregate compared to natural aggregate. . Increasing of the rate of substitution natural aggregate with brick decreases in compressive strength. After 28 days the decreasing in compressive strength was in order of 10-35% for the recycled coarse aggregates concrete in comparison with an ordinary concrete. It can be concluded also that the compressive strength of concrete with recycled clay brick as an aggregate is between 20 and 40 MP a after 28 days.

2) Flexural Strength: Flexural strength is the stress at which a material breaks or permanently deforms. The angular shape of the crushed brick and its surface roughness are generally beneficial for a good bond between

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the aggregates and the cement paste. Flexural strength of the concrete with crushed brick as an aggregate is about 8% - 15% lower than the one of the ordinary concrete.

3) Water absorption: The main problem of using the recycled brick as an aggregate for concrete is its high water absorption. The water absorption of recycled crushed brick aggregate concrete is significantly greater than the one of the natural aggregate concrete.

4) Modulus of Elasticity: .The modulus of elasticity of concrete with crushed brick as an aggregate is about 30 - 40% lower than the one of a normal concrete. From various studies of researchers it can be concluded that the modulus of elasticity of fine and both fine and coarse crushed bricks concrete is lower up to 30% 40% and 50% in a comparison with modulus of elasticity of a natural aggregates concrete. Replacing 100% of the natural aggregate with recycled brick increases the deformations about 30%.

3. METHODOLOGY AND MATERIALS

In the project work demolition waste sample comprising of brick masonry works from live buildings, which have been demolished in the recent past are taken for case studies. These big pieces of demolished wastes are broken to small pieces in general. Thereafter, the pieces of brick masonry waste are separated and prepared for making the concrete. The site details from which the various samples are collected is given below in tabular format.

TABLE I
DETAILS OF COLLECTION OF DEMOLISHED SAMPLES

Site No.	Name Of Owner	Address	Year Of Construction	Year Of Demolition	Date Of Collection Of Sample	Type Of Construction
1	Mr. T. Kate	Wadgaon-Maval	1986	2016	8th Dec 2016	Frame Structure
2	Mr. S. Tupe	Wadgaon-Maval	1986	2016	8th Dec 2016	Frame Structure
3	Mr. S. Pawale	Wadgaon-Maval	1972	2016	12thDec 2016	Frame Structure
4	Mr. M. Darekar	Talegaon-Dabhade	1967	2016	18th Dec 2016	Load Bearing Structure
5	Mr. T. Yewale	Talegaon-Dabhade	1972	2016	23rdDec 2016	Load Bearing Structure

3.1 Materials used for this research work are given below.

The recycled type of concrete is prepared by using recycled brick aggregates in addition to normal aggregate used in concrete.

A. Cement

The Ordinary Portland Cement of 53 grade of make – Binnani is purchased from the local market conforming to BIS:383-1970. All the Physical tests are carried out in accordance with procedure laid down in BIS: 12269-1987 and BIS: 8112-1989.

B. Water

The water used for the purpose of experimentation is collected from the municipal water connection. The same water is being used in the Institute for the drinking purpose Fresh and Clean water is used for casting and curing the specimens.

C. Fine and coarse aggregate

The fresh aggregate of 20 mm size are collected from work site. The fine aggregate is a locally available sand.

The preliminary test on the freshly obtained aggregate and recycled brick aggregate is conducted by performing sieve analysis of both coarse and fine aggregate. The sieve analysis of the samples from prepared brick masonry coarse aggregates, prepared concrete aggregates and fresh crush stone aggregates is done in the laboratory. The observations are shown in TABLE II

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TABLE III
OBSERVATION OF SIEVE TEST FOR COARSE AGGREGATE

Size of Opening (mm)	WEIGHT RETAINED	
	Brick Coarse Aggregate	Fresh Coarse Aggregate
	GRAMS	GRAMS
40	0	0
20	1348	1187
16	310	382
12.5	98	370
10	54	48
6.3	49	13
PAN	141	0
	2000	2000

The observations of the sieve test and the sieve analysis of fine aggregate, which is locally available sand, and is used for making the cement concrete is shown in TABLE III.

TABLE IIIII
SIEVE ANALYSIS OF FINE AGGREGATE

Size of Opening	Fine Aggregate (Locally Available Sand)				
	Weight (GRAMS)	Weight (GRAMS)	Cumulative % Retaining	Cumulative % Passing	Cumulative % Passing's per BIS 383-1990
4.75 mm	137	137	6.85	93.15	90-100
2 mm	626	763	38.15	61.85	60-95
1 mm	750	1513	75.65	24.35	30-70
600 µm	277	1790	89.50	10.15	15-34
425 µm	99	1889	94.45	5.55	5-20
300 µm	60	1949	97.45	2.55	0-10
150 µm	34	1983	99.15	0.85	0
90 µm	8	1991	99.55	0.45	0
PAN	9	2000	100	0.00	0
	2000				

3.2 Mix Design for Concrete Mix

The standard mix design for M-15 grade concrete is taken for preparation of cubes for testing of compressive strength in the laboratory as per prescribed method.
Cement : Fine Aggregate : Coarse Aggregate = 1 : 2 : 4 (By Weight)
Weight of Cement Cube = Density of Concrete x Volume of Concrete Cube.

The general results of same for making six cubes of concrete with brick masonry aggregate, concrete aggregate and stone crushed fresh aggregate as coarse aggregate are shown in Table IV.

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TABLE IVV
CONCRETE MIX PROPORTION

Sr. No.		**1**	**2**
Types of coarse aggregate		**Demolished Brick Masonry**	**Fresh crushed stone**
Density Of Concrete (from literature)	Kg/m^3	1950	2400
Size Of Cube	M	0.15	0.15
Volume Of Cube	m^3	0.003375	0.003375
Weight Of One Cube	Kg	6.58	8.01
No. Of Cubes to Cast	No.	6	6
Total Weight Of Concrete Cubes	Kg	39.4875	48.6
Wastages Of Material @ 20%	Kg	7.8975	9.72
Total Weight Of Cement, Fine Aggregate & Coarse Aggregates (Rounded up) for six Cubes i.e."TW"	Kg	48	59.00
Cement = TW x (1/7)	Kg	6.856	8.429
Fine Aggregates =Total Weight x (2/7)	Kg	13.714	16.857
Coarse Aggregates =Total Weight x (4/7)	Kg	27.429	33.714
Water Cement Ratio (from Literature)	WC Ratio	0.687	0.500
Water= WC Ratio x Cement	Kg (Liters)	4.71	4.21

4.RESULT

The above mentioned mix proportion is used to prepare concrete cubes for testing of compressive and average stress failure strength of concrete. The newly prepared concrete from such mixture will be recycled concrete including brick and fresh aggregate. The three number of concrete cubes of each type of the coarse aggregates used are prepared and tested for 7 days and 28 days compressive strength. The results of which are shown in Table V and Table VI respectively. These cubes of size 150 X 150 X 150mm were prepared.

TABLE V
COMPRESSIVE STRENGTH RESULT AFTER 7 DAYS

Cube No. & Mix Type	**Cube No.**	**Weight of cube**	**Density of cube**	**Average density**	**Load at failure**		**Stresses at failure**	**Average stress at failure**
		Grams	**Kg/m^3**	**Kg/m^3**	**TONNE**	**N**	**N/mm^2**	**N/mm^2**
1(BRICK AGGREGATE)	1/1	6990	2071.12	2069.432	19	186390	8.284	8.502
	1/2	6985	2069.63		19.5	191295	8.502	
	1/3	6978	2067.56		20	196200	8.720	
3(FRESH AGGREGATE)	3/1	8150	2414.81	2433.679	29	284490	12.644	13.080
	3/2	8190	2428.68		31	304110	13.516	
	3/3	8301	2459.56		30	294300	13.080	

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TABLE VI
COMPRESSIVE STRENGTH RESULT AFTER 28 DAYS

Cube No. & Mix Type	Cube No.	Weight of cube	Density of cube	Average density	Load at failure		Stresses at failure	Average stress at failure
		Grams	Kg/m^3	Kg/m^3	TONNE	N	N/mm^2	N/mm^2
1(BRICK AGGREGATE)	1/4	7110	2106.67	2085.235	27.5	269775	11.990	12.208
	1/5	7005	2075.56		28	274680	12.208	
	1/6	6998	2073.48		28.5	279584	12.426	
3(FRESH AGGREGATE)	3/4	8210	2432.59	2445.432	40	392400	17.440	17.731
	3/5	8205	2431.11		40	392400	17.440	
	3/6	8345	2472.59		42	412020	18.312	

The density of the concrete prepared from three different types of coarse aggregate is estimated. The variation in density with different types of aggregates is shown in the form of a bar chart in fig.1.

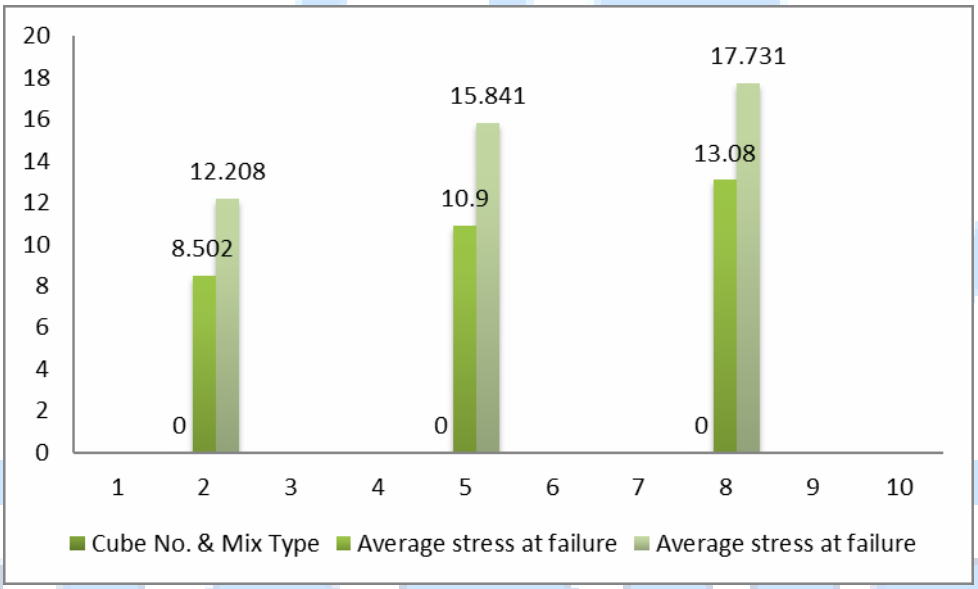

Fig. 1: 7 and 28 days Strength of Concrete Cubes

The density of the concrete cubes made from brick masonry aggregate is lowest i.e. 2069.35 Kg/m^3, among all different types of aggregates used. It is 14.97 % less than the density of concrete made from fresh aggregate (2433.679 Kg/m^3) considered for experimentation. Average failure stresses for different types of concrete cubes are examined, out of which 8.502 N/mm^2 was found to be of concrete made of brick aggregate and 13.080 N/mm^2 for concrete made of fresh stone crushed aggregate. The compressive strength of cubes made of brick aggregate is lesser by 35 % as compared to the concrete made of fresh stone crushed aggregates. The average failure stresses for different types of concrete cubes are 12.208 N/mm^2 for concrete made of brick aggregate and 17.731 N/mm^2 for concrete made of fresh stone crushed aggregate. The compressive strength of cubes made of brick aggregate is lesser by 10.66 % as compared to the concrete made of fresh stone crushed aggregates

5. CONCLUSIONS

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The results of compressive strength of cubes made from bricks as aggregates are comparable with the concrete made with fresh aggregate. The concrete made from the demolition waste (brick) can be used for the purpose of construction of elements of buildings of less important area such as PCC, boundary wall, flooring etc. The results of compressive strength after 7 days and 28 days evaluated that the strength gaining process of concrete cubes made from demolition waste (brick) is slower than the concrete cubes made with the fresh stone crushed aggregates. And hence if the preparation of concrete and its strength testing can be delayed by some days it may show marginal effect in strength gain.

6. ACKNOWLEDGMENT

We as the author of this paper are thankful to our project guide Prof. B S. Patil, faculties in the department of civil engineering of Pd Vasantdada Patil Institute of Technology for their constant encouragement and able guidance.

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Mono Mast Reinforced Concrete Structure

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ABSTRACT

The design and analysis of RCC structure supported on a mono mast is done in this project. In single storey buildings, the vertical loads on the columns are generally small, while the overturning moments clue to wind forces are relatively large. To reduce the cantilever span for the structural beams converting two-third of the length as simply supported by providing the two L-shaped column beams. The structure is analyzed and designed using Staad Pro. For aesthetic appearance we create our building supported by a mono mast. Satisfying the requirement of stability conditions for a mono masts structures will be a complicated one, compare with the structures supporting in all the sides depends upon their configuration, mono mast structure is a critical one when it is being to symmetrical and eccentric loading condition.

Keywords— *Mono mast, E-tabs, Load calculations, R.C.C, Column.*

1. INTRODUCTION

The rapid increase in population and scarcity of land tends to the development of construction technology and high-rise commercial structures. A structure is said to be stable when it satisfies all stability requirements. Structures will be more stable when all the sides of the structure are supported and there is no eccentric loading. A normal building has a number of columns. What sets this building apart is that is consists of just one column. For aesthetic appearance we create our building supported by a single column. Modular planning of this building would also be very simple, as the interior walls have no longer any hindrances. Satisfying the requirement of the stability conditions for a single column structure will be complicated one, compared with the structures supported in all sides depending upon their configuration. Single column structure is a critical one when it is subjected to unsymmetrical and eccentric loading conditions. Eccentric loading will cause the structure to twist in any direction and may cause failure of structure.

The main inspiration of this daunting project is the structure of a TREE. The weight of the leaves and branches is transferred into the bark and then distributed into the soil by the root. By the project, we want to explore a new dimension of the existing construction techniques. This project describes planning, structural analysis and design of the single column building. The building consists of a square central core which transfers the load of the super structure to the ground surface. Since a single column is supporting the whole structure, all the other members will act as cantilevers. The structure is analysed and designed using E-TAB software which is based on finite element method and it is analysed and designed for the critical condition. The introduction of software usage in the civil engineering industry has greatly reduced the complexities of different aspects in the analysis and design of projects, as well as reducing the amount of time necessary to complete the designs. Concurrently, this leads to greater savings and reduction in costs. More complex projects that were almost impossible to work out several years ago are now easily solved with the use of computers. In order to stay at the pinnacle of any industry, one needs to keep at par with the latest technologies advancements which accelerate work timeframes and accuracy without decreasing the reliability and efficiency of the results

RCC stands for Reinforced cement concrete. AN RCC Framed structure is an assembly of slabs, beams, columns and foundation connected to one another so that it behaves as one unit. IN an RCC framed structure, the load is transferred from a slab to the beams then to the columns and further to lower columns and finally to the foundation which in turn transfers it to the soil. The walls do not carry any load on them. Majority of urban structures and multi-storeyed buildings are built as RCC framed structures.

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2. Importance and Need for the study

Buildings tie up a lot of resource mass for decades. Buildings have much more longer life than most products. Buildings have multiple functions which makes performance measurement more important. Thus building design forces us to think in the most rigorous and creative ways about resource performance.

A building's design is the primary factor that determines its ongoing resource use. In addition to the mass embodied in buildings, we have to consider ongoing resource like that of fuels and water. We need to keep asking the most fundamental questions about what functions with opportunities for mass reduction, both initially and throughout the life of the building.

Building's influence how efficiently organizations of people work. They influence behaviour by affecting the kinds of activities that can be efficiently conducted with in them. And they influence

how easy it is to perform different kinds of tasks, to recycle, to communicate, and to get jobs done. This in turn influences resource use. So, for example highly specialized buildings are harder to adapt for re-use, or they may restrict activities or make improving performance over time more difficult. Flexibility, therefore, is an important consideration.

Fig. 1.1: Inspiration

3. Aims And Objectives

- To develop an in-depth appreciation of theoretical concepts used in structural analysis.
- To learn the process of systematically creating and developing engineering software applications.
- To create a project that has continuity, i.e. one that can be worked on and improved by students and other users while being put to good use, not merely shelved away.
- Determining the effects of earthquakes and wind on the building model.
- To ensure the stability and design of the building to resist all the structural loading.
- Establishing a conclusion on the effectiveness of the building based on safety and service ability.

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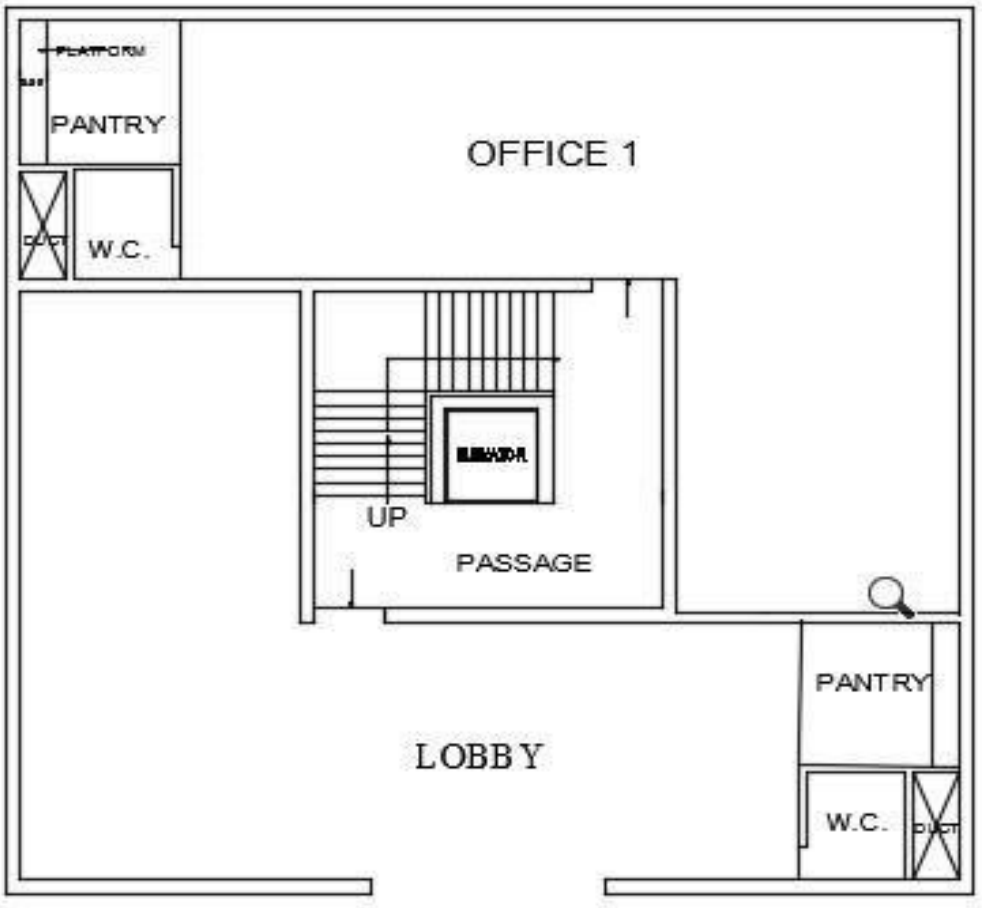

GROUND FLOOR PLAN

4. Methodology

Methods of Design

The following design methods are used for the design of reinforced concrete structure:

- Working stress method
- Ultimate load method
- Limit state method of design

For our project we shall be only considering the design by **Limit state method.**

4.1 Limit state method of design

In the method of design based on limit state concept, the structure shall be safely design to withstand safely all loads liable to act on it throughout its life. It shall also satisfy the serviceability requirements, such as limitation on deflection and cracking. The acceptable limit for the safety any serviceability requirements before failure occurs is called Limit State. The aim of design is to achieve acceptable probabilities that the structure will not become unfit for the use for which it's intended, that is, it will not reach a limit state.

All relevant limit state shall be considered in design to ensure an adequate degree of safety and serviceability. In general the structure shall be designed on the basis of most critical limit state and shall be check for other limit states. For ensuring the above objectives, the design should be based on characteristic values for material strengths and applied loads, which take into account the values should be based on experience. The design values are derived

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from the characteristic values, the gibe of partial safety factors, one for material strength and other for loads. In the special considerations, those factors should have the values according to material, the type of loading and the limit state being considered.

4.2 Types of Loads

While designing a structure, all the probable load combinations in general are required to be considered and the structure is designed for the most critical of all. The loads acting on the structure that are to be consideration in design are as follows:

4.3 Dead load [IS: 875(part-I)-1987]:

A dead load is essentially a permanent load such as the weight of the permanent parts of building construction. It includes

Dead Load Table

No.	Material	Unit weight (KN/m^3)
1	Light weight concrete block	6
2	Concrete mortar plaster	20
3	Soil	18
4	Plain Cement Concrete (P.C.C.)	24
5	Reinforced Cement Concrete (R.C.C.)	25
6	Steel	78.5
7	Water	10

Self-weight of Members

No. Component Formula (KN/m)		
1	Beam	25xbxd
2	Column	25xbxd
3	Slab	25xd

4.4 Imposed Dead Loads

The self-weight of various building components confirming to IS: 875 (part-n-1987 clause 3.1, table II are formulated in following table:

a) Administrative floors:

Loads on administrative floors

Load Components	Thickness (mm)	UDL (KN/m^2)
Finishes/ False Floor Loads	50mm finishes or 300mm false floors	1

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b) Staircase

Loads on staircase

Load Component	UDL (KN/m^2)
Dead Load	10

c) Terraces (Normal):

Loads on terraces (normal)

Load Component	UDL (KN/m^2)
Live Load	5

CONCLUSIONS

The design and analysis of RCC structure supported on a mono mast is done in this project. In single storey buildings, the vertical loads on the columns are generally small, while the overturning moments clue to wind forces are relatively large. To reduce the cantilever span for the structural beams converting two-third of the length as simply supported by providing the two L-shaped column beams.

ACKNOWLEDGMENT

This research was supported/partially supported by Viva Institute of Technology. We are thankful to our Prof. Akshay Mistry who provided expertise that greatly assisted the research, although they may not agree with all of the interpretations provided in this paper.

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SECTION B

SECURE APPROACH FOR ENCRYPTING DATA

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ABSTRACT

In today's world it has become a necessity to maintain very high security for any online transaction data. For many years Rivest, Shamir and Adleman (RSA) algorithm, have contributed to provide strong online security but the basic disadvantage of this algorithm is that two large prime numbers which can be easily guessed by the attacker or an intruder by brute-force approach or any other method. Many solutions are given by different people but most of them are inefficient in solving the problem in an effective way. So in this paper we have proposed a method which provides more strength to original RSA algorithm by doing some minor change in it. Our task is to eliminate the need of transferring n, the product of two random prime number, in the public key which make an intruder difficult to guess the factors of n and which hence forth safeguard encrypted message from any attack. Hence forth this method will provide safer path for transmitting and receiving message through public key cryptography. The proposed method will be more efficient and secure than original RSA algorithm.

Keywords— *Public key, Security, Encryption, RSA, Decryption, Private Key, Cryptography, Cryptosystem.*

1. INTRODUCTION

In cryptosystem of asymmetric key involve the use of two distinct but also related to each other namely, the public and private key [1]. Plaintext is changed over to figure content utilizing the general public key so this procedure is known as encryption which is performed by the sender. So the translating of the figure content is perform by collector by private key. This procedure is known as decryption and is performed by the recipient. The information of the private key have just by beneficiary. The general population key is just revealed to the general population with the goal that the classification of the private key is kept up. Here the correspondence of messages is completed in a secured way as knowing general society key isn't sufficient for decoding the figure content. We are following the topsy-turvy key cryptography procedure as a result of the above advantage, in our proposed calculation. In RSA encryption procedure between the keys there exist a scientific connection. With this reality, it is more probable conceivable that somebody finds the connection amongst them and effectively determines the private key. Here we have connected a numerical change over 'n' to get a trade for 'n' which make harder for gatecrasher to get the components to assault.

2. RELATED WORK

Ritu Patidar and Rupali Bhartiya had given a new method to modify RSA algorithm so that it can be implemented during data exchange across the network and more fast. They described the design of architecture, which makes better form of RSA algorithm by using third prime number, which in turn make a modulus n, very difficult to find by any attack. At the starting of algorithm RSA cryptosystem key parameters where store in database system. Comparative analysis gives better security was found with proposed one. [2] Rohit Minni and Kaushal Sultania had given technique, which gives better security to original RSA algorithm by minor mathematical changes in algorithm. In RSA, the 2 keys make use a number n, which is the multiplication of two prime numbers. So, if the attacker is able to get the factors of the variable n then there will be problem. So, in their algorithm, they tried to remove the use of n which is the large number whose factors if found compromises the security of RSA algorithm. [3] Alaa Hussein Al-Hamami and Ibrahem Abdallah Aldariseh had given technique which helps in making safer keys using extra third prime number. This will increase the factoring complexity of the variable (n), which can be easily find by making use of today most advance technology. The presence of 3 prime nos will provide security to the enhanced encryption method and will make factoring of the variable more complicated. They have performed experiments on

a set of numbers randomly, which gave the proof that their method for RSA Cryptosystem Algorithm works much faster than the original algorithm. Also it shows that for getting value of the variable (n) will be difficult also the time require shall be much more in the Enhanced version of Algorithm and hence forth this increase complexity in the analysis method.

3. RSA ALGORITHM

RSA is a cryptosystem that is simply based on the belief that it is difficult to find the factors. It distributes of public and private key to sender and receiver. So that they could encrypt and decrypt the message respectively. [4] It involves Key generation of keys and then encryption and decryption of message.

The algorithm is as follows: -

A. Key generation –

1. Get two prime numbers p and q
   (p & q:- random and distinct)
2. Then get n = p x q.
3. Calculate φ(n) = (p - 1) x (q - 1)
   (φ - Euler's totient function).
4. Calculate e :
   •1 < e < φ (n)
   •GCD (e, φ (n)) = 1
   (e & φ(n) are coprime).
   Now, the Public Key contain (e, n) and the Private Key comprises of (d, n).

B. Message Encryption -

The sender encrypt the message T:

Cipher text C = Te Mod (n) where C is the cipher text

C. Message Decryption -

The receiver then decode encrypted C:

The original text T = Cd Mod (n).

4. LIMITTION

Many limitation are there in original RSA algorithm.
Some of which are stated below:

- In public key as n transmitted, factors can be found easily by hit and trial, due to which the security factor get reduced.
- After encryption of plain text using the public key, and then if any encrypted text gets matched to it, the text can get easily seen.

5. APPROACH

The additional 2 more steps are introduced in this algorithm to remove use of n from the key so the risk of tracing back to the factors p and q by mathematical factorization of n is eliminated so makes more immune to attacks. [5]. This algorithm includes: Prevention of key generation inside n, encryption of message and decryption of message.
The modification, which we have done, are as follows-

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5.1. Key generation

Generate two distinct random prime numbers U and V.

Find value N = U * V.

And then calculate φ (N) = (U - 1) * (V - 1)

(φ - Euler's function)

Calculate e:

√N < e < N

GCD (e, φ (N)) = 1

(e & N - coprime value).

Compute X (To remove N)

If V < U then consider X such that:

(N – U) < X <N

GCD (X, N) = 1

If U < V, then consider X such that:

(N – V) < X < N

GCD (X, N) = 1

Find d such that d * e Mod(X)) = 1

Public Key => (e, X) and

Private Key => (d, X).

5.2. Message Encryption –

The sender encrypts the plain text message T using the below stated method using public key (e, X):

C = Te Mod(X)

Where C is the cipher text.

5.3. Message Decryption –

Decode encrypted **C** using private key **:**

(d, X) by T = √(Cd Mod(X)).

Description

The keys consist of the big value of 'n', which can get break into into prime numbers 'p' and 'q'. As public key is available to all the private key can be found if someone can guess the factors of 'n'. In order to get rid of this problem, in our algorithm we are trying to eliminate the distribution of 'n' in both the keys.

So understanding the above approach by an e.g –

We have to send a plaintext message whose value is 4

=> T = 4

STEP 1: Take two prime numbers p and q randomly

p = 7 and q = 5

STEP 2: Find the value of n as

n = p * q

n =7 * 5

n = 35

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STEP 3: Find φ(n)

φ(n) = (p-1) * (q-1)
φ(n) = 6 * 4
φ(n) = 24

STEP 4: Compute e:

√n < e < n
In our example-
√35 < e < 35
5.916 < e < 35
e = 6

STEP 5: Compute g:

So if p > q
(n-p) < g < n
g is co-prime to n
If p < q
(n-q) < g < n
g is co-prime to n
Find d :
d* e mod g = 1
In our example -
q>p
So, 35 – 7 < g < 35
28 < g < 35
Let g = 29
d * e mod 29= 1
d * 6 mod 29 = 1
d=5.

STEP 6: Send the following public and private keys:

Public key: (e, g)
Private Key: (d, g)
So here we get public key = (6,29)
And Private key = (5,29)

STEP 7: Encrypt message, T=4:

So here Encrypted message, $C = T^e \bmod (g)$
$C = 4^6 \bmod (29)$
$C = 4096 \bmod (29)$
C= 7

STEP 8: Decrypt C:

$T = [\ C^d \bmod (g)\ ]^{1/2}$
$T = [\ 7^5 \bmod (29)\ ]^{1/2}$
$T = [16807 \bmod (29)\ ]^{1/2}$
$T = 16^{1/2}$
T= 4

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6. CONCLUSION

So we have presented a better version of Rivest Shamir Adleman algorithm with improvement in security. The technique here is to the demolish n from the original algorithm and addition of a new number g in place of n. The replacement of n i.e. g is used in both private and public keys. The RSA algorithm is not immune to brute force attacks. Since we have hide n with g, which makes it much harder to factorize it and get the random numbers i.e. p and q. This boost algorithm security but with a little increase of time complexity.

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DIMINUTION OF SHILL BIDDING EFFECT IN REAL TIME ONLINE AUCTION SYSTEM

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ABSTRACT

online auctions are the latest flourishing and booming technology in the electronic marketplace. Although various malpractices that can sell or buying during an auction. Since period of last ten years ecommerce system not established because of human negligent professional behaviour. In an online sell which is increase by bids usually the transaction occurs between two anonymous users hence faith is difficult to establish and maintain. Shill bidding eventuate when bidders "bid" particularly to puffed up (increase the auction price) or flatten (decrease the auction price) amount in online auction. Currently shill bidding is the severest and persistent way of cheating in "online auctions" reason being that small no of prominent technique for defending shills bidding at run-time. But by referring bidding behaviour and user background our present auction system, turn aside, invigilators shill activities in real-time. So to identify the problem like this we are using shilling behaviour IP tracking technique. This system also executes imperative step against shill activities at run-time. The under review shows that by obviate, perceive and mechanisms the present auction system hold on to the sell secure from all types of fake bidding and gains the trust of e-commerce customers.

Keywords— *Online auction, shill bidding, e-commerce, data mining, fraud detection.*

1. INTRODUCTION

Data mining predicts future inclination and habits, making businesses proactive, knowledge-based decisions. Data mining help us with abstraction and mechanism so developing and introduce fraud detection methods or technique for online auction user. We are started work on the history or database of the bidders according to that system will decide whether he she is shill bidders or not.

1.1 Related Work

Internet has derived the globalization which addresses the interaction and integration among the people, different business institutes, government bodies, and many more. Nowadays humans have infinite choices or availability of different products or items. They have multiple shopping website also different auction website are available, so that it excludes the need of physical presence of customer or buyer at any particular place. This system gives the information or we can say overview of issues like designing, effectiveness, frauds faces by auction system which is currently available in marketplace. Our systems motive to focus on main type of shill bidding is fraud among different frauds found in the auctions. This paper represents our implementation and methods of removing shill bidders.

At present, there is some of little useful literature on auction system design. This paper discussed our experiences in developing a fake bidding detection system. Some of existing auction software literature is dated and is of limited usefulness to researchers. [1]

Author of this paper trying to say that online auction is an emerging technology and is enjoying popularity mainly due to its capability to overcome drawbacks due to geographical distances time of auctions and small target bidders, affecting traditional offline mode. Based on this study architectural software has been designed and implemented. This architecture is used for bid on any commodity available on the site. Present work describes design of one e-auction system which is an improved version of some of the existing system of that type. [2]The author proposes a method for detecting colluding shill bidders, which is referred to as the collusion score. [3]

1.2 Problem motivation

After studying the several research papers on auction and it's frauds we have designed a homeshopee auction website. Our main focus is to make website fraud free means we block the shill bidder at run time only so that only genuine user

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can buy products.This paper's aim is to describe our knowledge and experiences with developing a web-based auction model. The reasons for developing this auction system are as follows:

To fully understand online auction system requirements

To gain experience with administering an auction server and participating in online auctions

To enable testing of fraud detection/prevention techniques

To educate auction users about fraud/auctioning behaviours.

2. PROPOSED SYSTEM

A seller lists an item (or collection of items) for sale. Sellers aim is to sell their product at highest possible money. A bidder place a bid whichever he is interested in from the list of item. For the amount of bid bidder place, it's the amount he is willing to pay for that particular product. The bidders aim is to obtain the product in less amount of price to win the auction. All the responsibilities of auction like providing resources and conducting the auction proceedings according to the auction rules. The auctioneer is usually started with the listing fee by the seller. In some cases, the auctioneer may receive a commission based on the winning price. In this case, the auctioneer will typically want the item to sell for the highest price possible.

3. FLOW DIAGRAM OF THE SYSTEM

The system flowchart figure 3.1 illustrates system flow gives a brief idea about how the user has to register and then login so as to get into a system. The auctioneer is responsible to check the valid user. If it is a valid user then allows access else permission is denied. Then seller can view or update the profile land list the item which he wants to auction. Next is bidders, they can also update profile and checks the item for sell if he likes the item then they can bid on that item. And the main part of system is auctioneer he halve all the rights of system he can update or delete profile ,checks the running auction ,checks bidders status .If he find the bidders status is fake then he dismiss that particular bidder. So that legitimate user can buy the product at significant prize.

Fig 1: Flow of the system

4. EXPERIMENTAL RESULTS AND ALGORITHM

4.1 Algorithm

After studying database of bidders' behaviour we have found out the different patterns of their shilling. These patterns are shilling behaviour of bidders in order to increase the price of product. With the help of this pattern we are going to decide their status.

P1: bidder himself bid on their last bid without giving chance to other bidders and unnecessary increases or decreases price of that item.

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P2: a shill bidder bids within a minimum interval of time to outbid his own bid or others' and gives less time to think for legitimate bidder.
P3: a shill bidder passes an unnecessarily large bid change to increase or decrease the price swiftly.
P4: a shill bidder place more bids than given number of allowed bid than another bidder.

User interface:

There will be two types of user interface are available for the system. One is for user like seller or bidder (front end) and other will be auctioneer that is back end of the system. Figure 1 shows that in the system both the user i.e. seller and bidder should first login to the system if there already registered user then system can authenticate him to the site if not then first they have to register themselves. After that they can see the home page of the system. In figure no 3 we can see that if user is a bidder then he/she can see the various categories of products they are interested in if they like particular item then they can click on that item and checks the description about the product and can place a bid on item. Figure no 4 shows that bidder can also see the other bidder's last biding amount of that product and according to that bidder can place their own bid on item.

Fig 2: login page for user

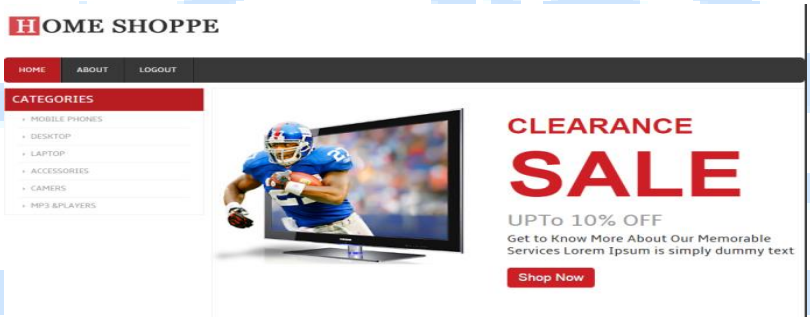

Fig 3: Home page of the site

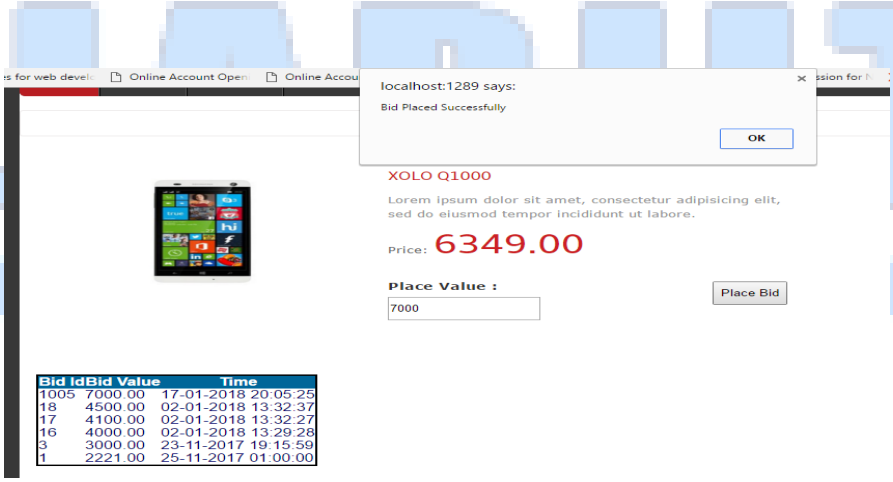

Fig 4: Bid page for user

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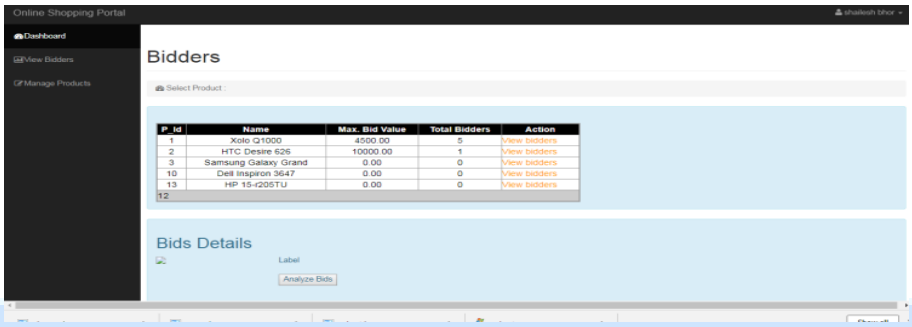

Fig 5: page of bid details

5. CONCLUSIONS

Fraudulent activities like shill bidding are damaging the reputation of online auctions, and have already become a serious problem in e-commerce in terms of security and trust. All the existing system does not have functionality that detects shill bidding or any kind of fraud in live auctions. And do not take any action until a report is made by an auction user. Since the damage occurs during the auction .So to overcome these drawbacks of existing system we have proposed this system to detects and prevent authorised users from frauds like shill bidding.

6. ACKNOWLEDGMENT

Our special thanks to the professor who guided us and motivated us to write paper and the experts who have contributed towards of the template .Also a coordinal thanks to my parents for their support.

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SECURITY ENHANCEMENT ON WEB SERVER FOR PREVENTING DOUBLE ATTACK

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ABSTRACT

Elliptical curve cryptography has emerged as an alternative to traditional public key cryptosystem. ECC along with scalar multiplication gaining popularity for providing high level security with smaller key sizes. ECC is very efficient in terms of key length, key processing speed but it cannot avoid the doubling attack which can be counter by point multiplication and sign authentication. Montgomery ladder algorithm is performed on ECC for point multiplication that will overcome the doubling attacks. The proposed system will enhance the security and it will reduce the work load of web server by using ECC in SSL protocol during communication between client and server. Scalar multiplication of ECC provide security from doubling attack.

Keywords— *Cyber Security, SSL protocol, scalar multiplication, Elliptical curve cryptography, doubling attack*.

1. INTRODUCTION

Now a day's IT industries moving towards web based technology from software applications. Users on the internet exchanging financial, business or personal information, want to know whether the transmission is secured or not and they wish to ensure that the information is during transaction is not modified and disclosed [11]. One can say web security is one of the crucial topic in technology. In web communication, security is maintained by SSL (Secure Socket Layer). SSL protocol provide security in network layer by using cryptographic algorithms. Any application that can runs over TCP will support SSL protocol.

SSL is the most widely used security protocol on the Internet today. Secure Socket Layer can provide the Encryption, source authentication and integrity protection for data. SSL can undertake various cryptographic algorithms for key agreement, hashing and encryption. The particular algorithms, which has been used in cryptography of data is described in cipher suites. Today, Web banking, Stock trading, and e-commerce such sensitive application is secured by SSL [11]. Unfortunately, the use of SSL applies a highly significant increase in performance time on web servers. The speed of web server is decreased by 3.4 to 9 times slower compared to regular web servers on equivalent platform. Normally RSA encryption is being used by SSL to transmit data over a connection by choosing secret keys for data authentication and encryption. After encryption, decryption operation also takes large amount of computation time in SSL transaction to provide high security on web server.

To reduces the intensive computation or load on web server, ECC is more suitable in SSL. ECC provides a unique property in mathematical structure which is we get by adding two points on an elliptical curve and getting the resultant point on the same curve [5]. This specific feature provides us benefits to use ECC in the cryptography due to the high difficulties level for finding our private key and breaking this protocol requires the advanced mathematics. The strength of security by 1024bit RSA key can be provided by 163bit key of ECC. Wireless communications, like mobile phones, PDAs, smart cards and sensor networks are every much compatible with ECC. But the level of security RSA gives can be achieved by ECC with much smaller key size that will reduced the server load and accessing the data will get faster [8].

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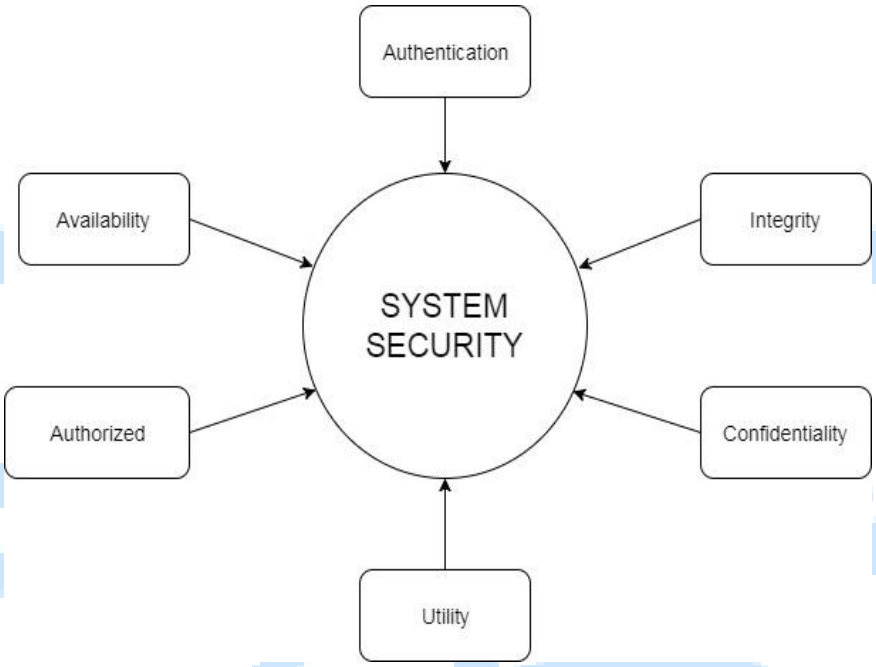

Fig 1.1: System Security

2. REVIEW OF LITERATURE

Both the Encryption algorithm is compared with their key size, key generation, bandwidth and efficiency RSA key generation is significantly slower than ECC key generation. ECC is 10 time than that of RSA computational speed. Encryption in ECC is much footer than RSA.ECC generate smaller key size. The original operation efficiency and safety performance can be increased by dot product optimization and finally transformation to the private key. ECC is used in OpenSSL security protocol for increasing the level of security and speeding the access of information on web server.

SSL normally used RSA algorithm but enchaining OpenSSL by ECC will decrease the load of web server. SSL protocol increases the work load and response time of web server but it is valuable for security reason for that we have RSA in SSL with ECC which gives least response time of HTTPS. Comparison has a been done between RSA and ECC using file HTTPS transaction on different sizes of file the result concludes the ECC HTTPS request handing time is less [11].

3. WORKING METHODOLOGY

Cryptographic algorithms is basically used to ensure security in communication channels and networks. The Combination of algorithm which is been used for particular encryption or decryption process, is called as cipher suites, which have well understood security properties. Therefore, Communication systems security is met by using these algorithms.

ECC cryptographic algorithm has been considered in cipher suite for encryption between two needs. There is combination of algorithm is included in cipher suites for handshake between client and server. The client and server decided the particular cipher suit for secure communication. Instead of Diffie Hellman and DSA algorithm, ECDH key exchange and ECDSA is used in cipher suite. Entire security depends on algorithms used in SSL. For betterment of the security and preventing double attack scalar multiplication of ECC is performed.

In SSL various combinations of public-key and symmetric-key encryption algorithm is used for providing security at high standard level. Secure Socket Layer Protocol is mainly divided into two components Handshake protocol and Record protocol. These protocols are very much important in working of SSL. The most important features like

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deciding the common cipher suit between client and server, Authentication of client and server with each other and finally preparing the master secret public key is performed by Handshake protocol.

Further Symmetric key is extracted from Master secret public key for large encryption of data is performed by Record Layer protocol. As we aware of computation time of public-key operations are expensive in term of computation, so Secure Socket Layer Protocol uses the concept called "session resumption". The Session reuse concept provided the facility of using same master secret key again [11].

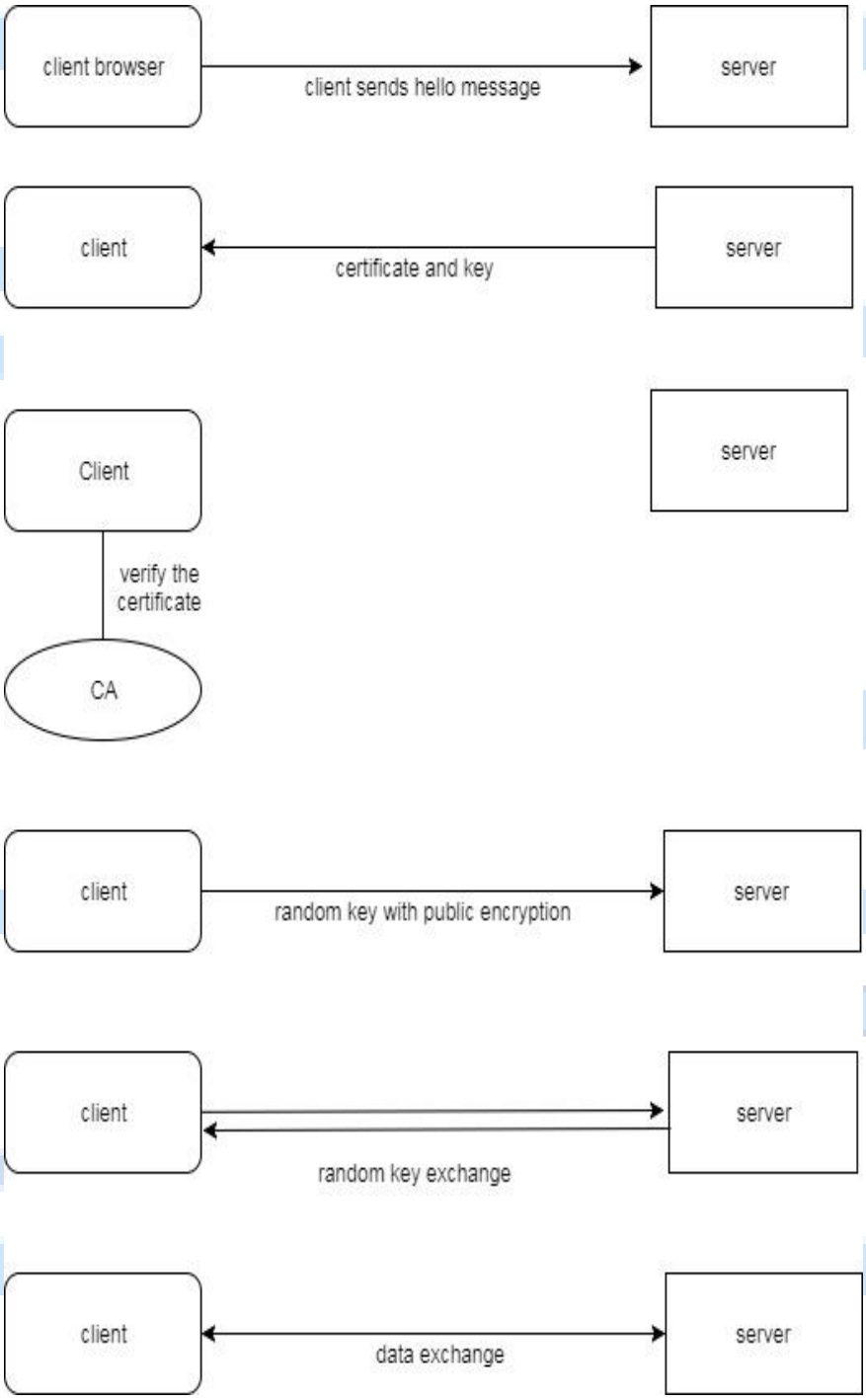

Fig 3.1 System Flow Diagram

SSL handshake contain the following steps

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1. The specification of client cipher suit is being shared from client to server for communication between them. Specification of Cipher suit consists of information like version number, cipher setting, session key and information.

2. In second step, Now its time for server to share his specification of cipher suit with the client so that client can authenticate the server. Specification of Cipher suit consist of information like SSL version number, cipher settings, session data, and other information. Along with cipher suit specification, certificate for authentication is also provided to client. The authentication of server is done by the client by cross checking the certificate with certificate Authorizer. If server want to authenticate the it can repeat the above process again.

3. In process of authentication of client and server suppose the authentication fails then the client gets the warning message and get the information about server is not authenticated and asked user whether he want to visit the server or not. Otherwise authentication of server is successful.

4. The random number is pre-master secret key which is generated by client during the handshake, which is send to server by encrypting it with public key of server.

5. The pre-master secret key is send by client to server which is further decrypted by using private key of server. After decrypting random number is undergoes particular steps for generation of master secret key at both the ends.

6. To verify the integrity between the transmission session key is used which is nothing but the symmetry key. With the help of master key, Session key is generated.

7. After Session key generation a secret message is send to notify the completion of SSL handshake. SSL handshake is completed then finally transmission of data can take place with the use of session key.

This is how secure channel operations are carried out.

4. RESULTS & CONCLUSION

Scalar multiplication is performed through a combination of point additions and point-doublings using Montgomery ladder to improve the security level. ECC 160bit key provides the same level of security which RSA provide by 1024 bit key and ECC-224 matches RSA-2048. ECC can provide high level of security using smaller key that results in reducing the workload of server during handshake.

There is significant increase in term of security and performance of web server by using ECC Cipher Suit which is found out by overall analysis of system. The devices which has limited power, storage and processing capacity can use ECC that provides equal security like others cryptographic system but with less key size. Drawback which occur in ECC is double attack that has been overcome by Scalar multiplication. Using point addition and point doubling reduce the possibility of error and interruption of system As key will be encrypted at least single time during the system failure. Further enhancement can be improved by removing the Y co-ordinate of point in ECC curves.

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A SURVEY ON DATA SECURITY USING COMPRESSED CLASSICAL TECHNIQUE

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ABSTRACT

Throughout the time of years, an elaborate set of rules and mechanisms has been created to deal with cyber security. Cryptographic algorithm assumes an imperative part in the vast domain of cyber security systems. While transmitting the information to outsider it is possible to be victim of being hacked by an attacker.

The proposed survey is a new security model study which utilizes the model of different encryption and decryption algorithms to provide a secure and protected environment. In the survey, data owner has performed some mechanism and encrypts the data to make it hidden from attacker and provide only authorized user with the corresponding decryption key to retrieve the original data.

The utilization of cryptographic algorithm is utilized as it is more efficient and makes data more protected from any malicious activity. The survey contributes in the area of classical cryptography by providing a modified and expanded version of some cryptographic algorithms with the knowledge of mathematics and computer science. To build the quality of the traditional encryption method.

Keywords— *Cyber Security, Cryptography, Encryption, Decryption, Keys.*

1. INTRODUCTION

In today's world technology is growing at very fast pace and offers the user with different services which are paperless and available online such as e-billing, e-mail, e-message, e-transaction etc. Thus, to shield this kind of secret data from unauthorized discloser, there is an extraordinary need of digital security strategies and in this manner, there is a need to build up a plan that guarantees to shield data from an attacker [2]. There is a need of security to guarantee that the data stays confidential and just access to approved client and it guarantees that nobody has possessed the capacity to change the data, and so it provides full security to data. Now-a-days communication is blooming fast as well as reliable and it becomes part of daily life. The main concern related to reliable transmission of data is security [11]. Cyber security additionally refers to advanced protective defensive measures that are connected to avoid unapproved access to PCs, databases and sites. One of the principal tool utilized as a part of data security is the distinctive cryptographic algorithms. It is a building block for some different administrations, for example, non-renouncement, information birthplace confirmation, recognizable proof, and seeing [3].

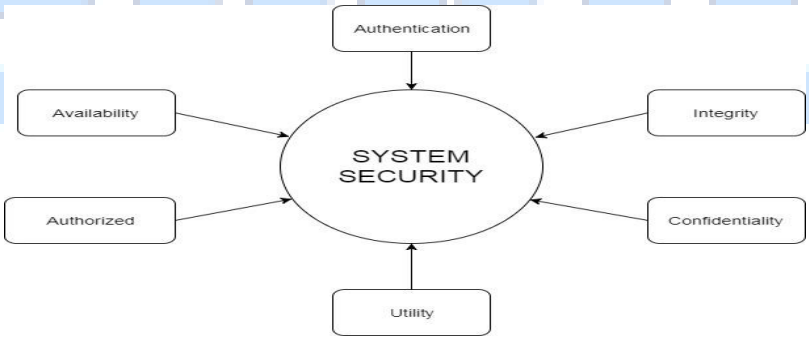

Fig 1.1: Overview of System Security

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The above Figure 1.1 gives an overview of cyber security. The figure itself describes that how many features is been given by cyber security.

1. Confidentiality: It includes an arrangement of guidelines or a guarantee that breaking points access or places confinements on specific kinds of data.
2. Integrity: It prevents changes from unauthorized user.
3. Authentication: It means to verify the character of a user.
4.Availability: The System should have ability to use information any time.
5. Authorized: To have a authority to access the data.
6. Utility: These give you the fixed line solution for a problem.

2. BASIC FLOW

The aim of the survey is related to Cyber Security and being part of cyber security cryptographic algorithm is being referred to be implemented as the practice and study of hiding and securing information. Distinctive ways incorporate utilizing figures, codes, substitution, and so forth with the goal that lone the approved. The craftsmanship and investigation of making no meaningful data or figure with the objective that lone expected individual is just ready to peruse the information is called Cryptography [1]. Encryption is a procedure by which we change over our information in non-readable format. Decryption is reverse of encryption process. Plaintext is the intended original message. Cipher text is the coded message.

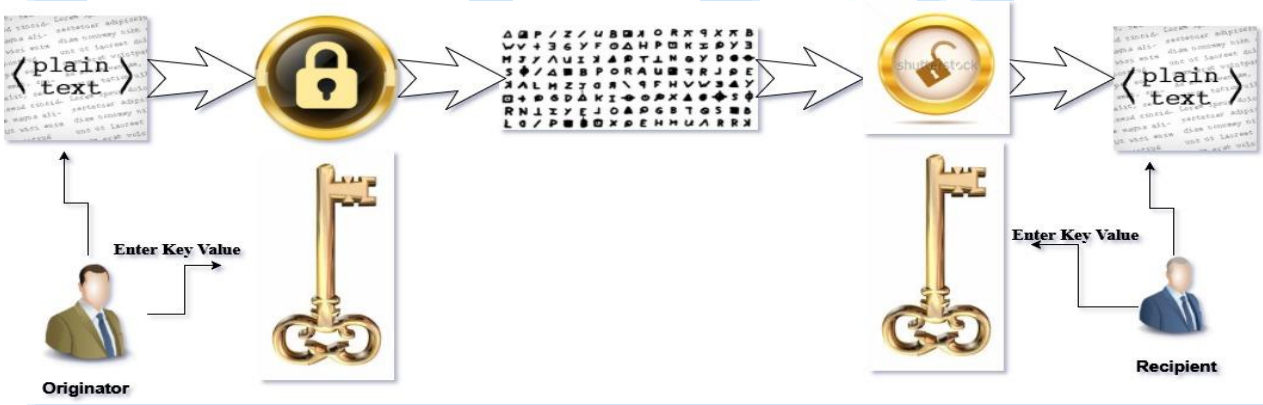

Fig 2.1: Basic Flow of Cryptography

The above figure 2.1 shows the basic flow of cryptography. This figure gives the description about how work of cryptography is done. The Sender will send the plain text to perform encryption. So, for these users will enter key values along with plain text and then some algorithm will be applied on plain text and generates Cipher text. This cipher text is a encrypted plain text [6]. Now again for decryption receiver will enter cipher text which is to be decrypted. So, for this receiver will enter key value and enter cipher text. The decryption algorithm will be applied and generates plain text again [4].

3. SYSTEM DESCRIPTION

The existing system used for encryption/description is not very secured as only single step algorithm is being used. The system also does not provide high level security for Key values as these key values can be easily hacked by an attacker during transmission of key values. So, the existing system provides security for either cryptography of document or security of keys. So, in the existing system it does not support both security together.

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4. REVIEW OF LITERATURE

Following are some of the contents, which have been reviewed for the system.

1. Enhancing Security of Caesar cipher using different methods

   This paper describes a Classical cryptographic technique which includes Transposition and Substitution technique for encryption/decryption. In this paper, multiple level Row Transposition technique is being used for doing cryptography. Here the two-level encryption is done with plain text which makes data more secure. The most beneficial advantage of this paper is that cipher text generated by this method can be easily reconstructed. But due to its algorithm these technique is hard to implement as complexity is also high [1].

2. Cloud data security with hybrid symmetric encryption

   This paper portrays another security show for Data security. In these it uses Hybrid algorithm which makes use of Symmetric key for encryption/decryption. In these two different algorithms are used for increasing the security level. In this security is given to data which is to be store on Cloud. Due to hybrid algorithm, it gives extra security to data. And due to this processing time is more as compared to others. In these the Values are put into a matrix and then it just divides the matrix as upper diagonal, middle diagonal and lower diagonal [2].

3. Cryptography Based Security for Cloud Computing System

   This paper describes cryptographic algorithm for hiding and securing information. It uses a symmetric key to provide secrecy for communicating between two parties. Due to cryptographic algorithm, it minimizes the data intrusion and data theft in transmission. But here only text file can be encrypted. These cannot encrypt audio and video files. It describes that in future audio and video can also be encrypted using algorithms in these it performs in these for security they have used advance Caesar cipher algorithm for providing more security to data [3].

4. An Improved RSA Cryptographic System

   This paper describes speed improvement on decryption by RSA algorithm. This algorithm helps to prevent common modulus attack and chosen cipher text attacks. The level of security increases but the processing time of encryption is also increased. These security by RSA algorithm makes more improvement as some modification is also done for increasing security level [4].

5. Integrating Classical Encryption with Modern Technique

   This paper describes the generation of two sub keys from one key and then performs some mechanism and provides security. It also describes about avalanche effect that how it affects the security to data. Conventional encryption is being marked by its usage of single key for both process of encryption/decryption. In these my merging classical and modern technique, it provides more security. It describes that Caesar cipher technique is less secure than Vignere cipher technique. The Avalanche effect is more due to which security level is high [5].

6. Enhancing the security of Caesar cipher substitution method using a randomized approach for more secure communication

   This paper uses classical encryption by providing modified version of Caesar cipher. Here complex key generation generates two keys from a single key that is used to enhance security. It overcomes all the weakness of

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traditional Caesar cipher. The single key is asked from user and then that keys binary number is generated and then these key values are divided into sub keys [6].

Table 3.1: Analysis Table

SR.NO	TITLE OF PAPER	TECHNIQUE	ADVANTAGES	OPEN CHALLENGES
1.	Enhancing Security of Caesar cipher using different methods [1]	Multi-level row transposition cipher method	Brute force attack is not possible	To perform two level encryptions
2.	Cloud data security with hybrid symmetric encryption [2]	Symmetric Hybrid approach	Data is secured without any access of intruders	To perform operation in matrix.
3.	Cryptography Based Security for Cloud Computing System [3]	Basic cryptographic mechanism used	It minimizes data intrusion and data theft in transmission	To apply Cryptographic technique on larger files.
4.	An Improved RSA Cryptographic System [4]	Hamami and Aldariseh method used for key improvement	It prevents common modulus attack	Encryption Time
5.	Integrating Classical Encryption with Modern Technique [5]	Integrates Play fair and Vignere cipher	The Avalanche effect is more	To handle the avalanche effect.
6.	Enhancing the security of Caesar cipher substitution method using a randomized approach for more secure communication [6].	Substitution & Permutation box technique	It overcomes all weakness of traditional Caesar cipher	Matrix Handling and Key generation

5. CONCLUSION

Privacy and Security of data is a prime concern in field of Computer Science. There is a wide range of applications in field of cyber security like End-to-End Transmission, Authentication of Identity, Digital Signature, Cashless Economy etc. These all fields are secured due to some cryptographic algorithms. The classical cryptographic algorithms were not very secure so new methods new algorithms were developed to solve the security issues. Later on, more new hybrid algorithms have been developed which includes Substitution and transposition methods. But every algorithm gives some kind of results based on Avalanche effects, Performance measures, Speed and level of security. In the Future as growth of Internet will increase, more new algorithms will be generated and will give contribution in field of Cyber security.

6. ACKNOWLEDGEMENT

We would like to thanks our Family for supporting us in this endeavor. We would also like to thanks our guide Mrs. Pallavi Vartak who is the Asst.Professor of Computer Engineering department in VIVA Institute of Technology. We thank for her for her constant encouragement and valuable suggestions. The Survey that we have been able to present is possible because of her timely guidance and support.

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AN APPROACH FOR VULNERABILITY ASSESSMENT

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ABSTRACT

Cybercrime threats has become an important threat in today's modern world. It is difficult for small working organizations to buy a security assessment tools which are quite expensive. Outbreak of huge security vulnerability can cause major damage to organization and cause loss of vulnerable data. As of March 2016, 87% of world population users use windows operating system and remaining are Mac OS and Linux distros. So most of security breaches occur in windows Operating System, so our main focus is windows Operating System and generating security report of Operating System level security. The System provides information of security like hotfixes, patches, etc. and about registry and Operating System files, at Operating System Level, which can be fixed so as to achieve optimal performance and improved security.

Keywords— *Cybercrime, Vulnerability Assessment, Operating System, Security, Port.*

1. INTRODUCTION

Vulnerability Assessment has always been a very challenging task in the area of Cyber Security. The system is a tool for Vulnerability Valuation and Port scanning and blocking vulnerable Port. Cyber Security is a versatile field of computer science. It is the form of knowledge, procedures and practices made to protect networks, machines, softwares and data from attack, damage or unauthorized access. It is one of the supreme problematic fundamentals of cybersecurity is the swiftly and persistently evolving nature of security risks. The actual Cyber security job is the analysis of Vulnerability of data. This usually involves using various tools. The tools would generate reports which would be utilized for patching system vulnerability.

The System is a windows program which makes use of deep PowerShell coding and other language. The System is able to provide the client more secure environment on a computer system. The System along with PowerShell and other language will be able to block vulnerable ports and malicious activity happening on system. The tool is also able to extract the information from the System registry.

2. LITERATURE SURVEY

1 Windows Forensic Investigations using PowerForensics Tool [1].

In this paper author says a system in which the author uses the Power forensic tools to analyse the security artefacts in the computer System. The authors try to extract the information from the computer system by various experiments using registry, disk and from operating system and try to explore the limitations.

2 Vulnerability Assessment and Penetration Testing as a Cyber Defence Technology [2]

In this paper author says a system in which author says that, finding flaws in the system may it be Access Control Vulnerability, Boundary Condition Vulnerability, etc. After different vulnerabilities are assessed we then try penetration testing. It tries to misuse the system in approved means to catch out possible exploits in system. The different techniques which are used are Manual testing, Fuzz testing, Different techniques used in penetration testing are - White box testing, Blackbox testing, Grey box testing.

3 Security Hardening Your Computer [3]

Hardening of computer involves forming layer of protections. Performing disabling server ports, disabling file sharing helps increase security from outside networks. Other steps include: Patch Microsoft Windows automatically, Using different passwords or passphrases, Restrict sharing software.

4 A Study of Open Ports As Security Vulnerabilities In Common User Computers [4].

In this paper the author says that in today's digital world internet is accessible everywhere. With it many cyber-attack may occur from internet. For analysis of such attacks nmap is used. Nmap does port scan and provided analysis data. Port numbers and different types of ports are discussed.

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5 Ethical Hacking and Network Defense[5].

In this paper the author says about vulnerabilities assessment and if one needs to be concerned about security. Various network vulnerability analysis tools and their functions are provided. Tools like nmap, nessus, kali linux are discussed.

6 Basics of vulnerability assessment and penetration testing [6].

Cyber-attacks are growing each time with the higher usage of mobile and Web applications. Worldwide, statistics display that more than 70% of the applications either have vulnerabilities that could possibly be exploited by a hacker, or eviler, they have previously been changed. The data losses due to this are characteristically of two types. One or the other data is private to the organisation or it is private to an individual.

7 Taxonomies of Attacks and Vulnerabilities in Computer System [7].

In this paper the author explains about the Security Assessment of system. Explains how difficult it is to do a security assessment. It explains that Characteristic of vulnerability can be improved by examining known vulnerability. Thus, the knowledge can be used as a framework in systematically examining unknown vulnerability.

8 Threat/Vulnerability Assessments and Risk [8].

Risk management platform is a threat assessment. A threat assessment reflects the entire band of threats for a given facility/location. The ISC standard only reports man-made threats, but separate agencies are permitted to enlarge upon the threats they consider. The evaluation ought inspect associate data to assess the virtual likelihood of occurrence for every threat.

3. METHODOLOGY

In Fig 1, the working of System is shown. For this vulnerability assessment is done of the system. The Tool will scan the system for vulnerability. It will then process and filer out forensic data for vulnerability assessment. Reports will be generated about detected vulnerability and system details. These vulnerabilities will be on Disk, File and O.S. level along with it for network security it will scan and allow for blocking of ports and malicious services.

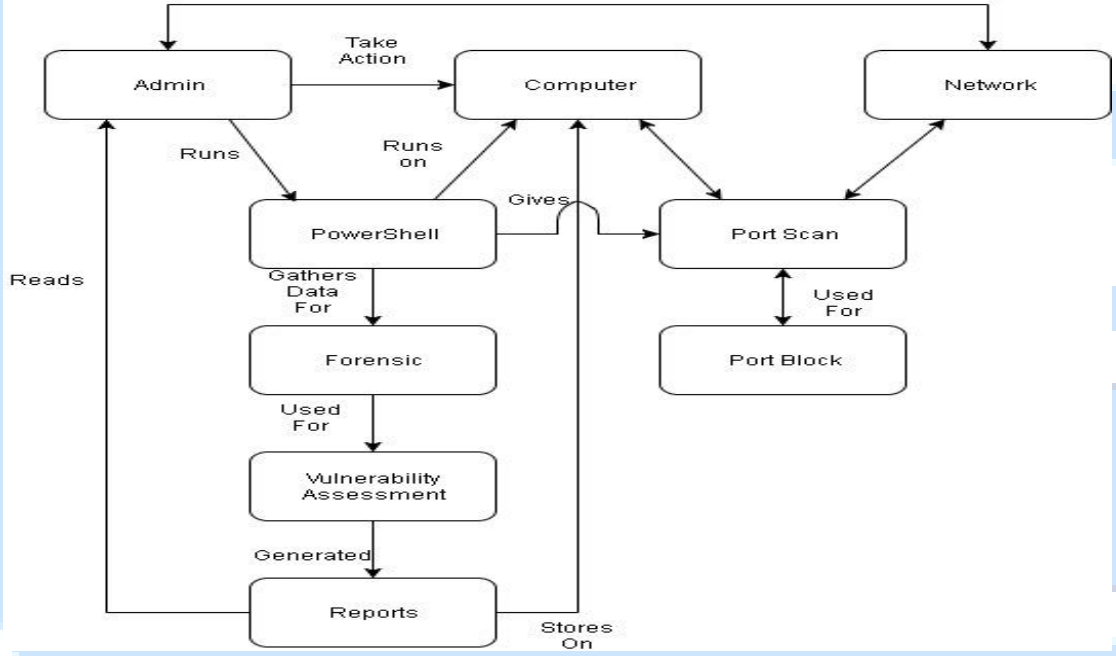

Fig 1. System Flow Diagram

3.1 PowerShell:

In the proposed system, the tool runs via PowerShell. PowerShell (including Windows PowerShell and PowerShell Core) is a job automation and scripting language developed in .NET framework by Microsoft.

3.2 Vulnerability Assessment:

Vulnerability monitoring, also known as vulnerability assessment, is a protocol that expresses, recognizes, and categorizes the security vulnerability in a computer, network, or communications organization. Numerous security

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vulnerabilities are exposed. The tool discovers several unhandled security issues in the system. Automated Vulnerability assessment is done via the developed tool which can help to detect any schedule task in computer.

3.3 Port scan and Port Block:

The Port scan is used to discover the vulnerable port on the System. The various port such as port 445, 139, are most vulnerable port on the system. The recent security exploit eternal blue used SMB and RDP for spreading the malware. The Port blocking is done on the O.S level by the System administrator by the tool which discover the vulnerable ports.

Following is example of how the port can be block using PowerShell.

New-NetFirewallRule -DisplayName "Disabling Port 1521" -Action Block -Direction Outbound -Profile Any Protocol tcp -RemotePort 1521

Set-NetFirewallRule -DisplayName "Disabling Port 1521" -Action Allow

Set-NetFirewallRule -DisplayName "Disabling Port 1521" -Action Block

Remove-NetFirewallRule -Name "{751a86cb-2ef3-4eba-8c95-68aa7e4bde18}"

Parameters:

- Host-name
- IP-Config
- Drive Permission
- Account Configuration
- Guest Account Status
- Password Requirement
- Password Expiration
- Logon Time
- System Settings- Services
- Password Auditing
- User Right Policy
- Hotfixes
- Port Scanning
- Port Blocking

Password auditing helps with checking if password is strong. Strong password help deter many attacks as password are the first line of defence in any operating systems. Hotfixes are the second line of defence of any operating system. An updated operating system has vulnerabilities patched, which helps in long term as patching makes those vulnerable loop holes to be blocked, which increases security. Information about IP which is needed for management of connected devices. Evidence extracted from services and processes help find unknown service or process running as they might even harm the system or cause loss of data or even theft. Logon time determines how time the user have been active. The Port scanning helps in determining the open ports in the System.

```
PS C:\WINDOWS\system32> netstat -ant

Active Connections

  Proto  Local Address          Foreign Address        State           Offload State

  TCP    0.0.0.0:135            0.0.0.0:0              LISTENING       InHost
  TCP    0.0.0.0:445            0.0.0.0:0              LISTENING       InHost
  TCP    0.0.0.0:5040           0.0.0.0:0              LISTENING       InHost
  TCP    0.0.0.0:7680           0.0.0.0:0              LISTENING       InHost
  TCP    0.0.0.0:17729          0.0.0.0:0              LISTENING       InHost
  TCP    0.0.0.0:49664          0.0.0.0:0              LISTENING       InHost
  TCP    0.0.0.0:49665          0.0.0.0:0              LISTENING       InHost
  TCP    0.0.0.0:49666          0.0.0.0:0              LISTENING       InHost
```

Fig 2: Listening Ports

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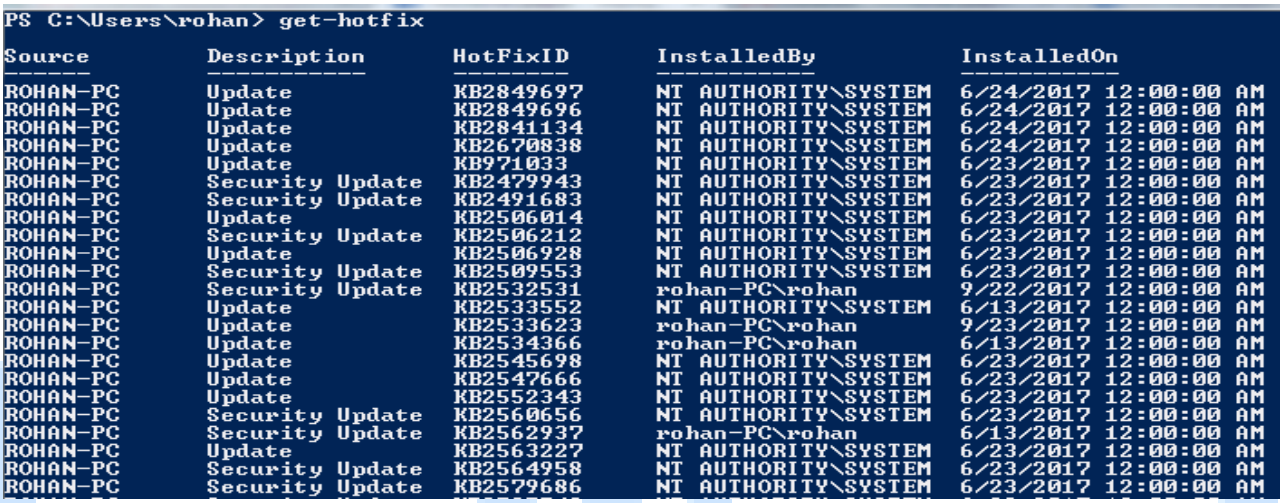

```
PS C:\Users\rohan> get-hotfix

Source        Description       HotFixID      InstalledBy          InstalledOn
------        -----------       --------      -----------          -----------
ROHAN-PC      Update            KB2849697     NT AUTHORITY\SYSTEM  6/24/2017 12:00:00 AM
ROHAN-PC      Update            KB2849696     NT AUTHORITY\SYSTEM  6/24/2017 12:00:00 AM
ROHAN-PC      Update            KB2841134     NT AUTHORITY\SYSTEM  6/24/2017 12:00:00 AM
ROHAN-PC      Update            KB2670838     NT AUTHORITY\SYSTEM  6/24/2017 12:00:00 AM
ROHAN-PC      Update            KB971033      NT AUTHORITY\SYSTEM  6/23/2017 12:00:00 AM
ROHAN-PC      Security Update   KB2479943     NT AUTHORITY\SYSTEM  6/23/2017 12:00:00 AM
ROHAN-PC      Security Update   KB2491683     NT AUTHORITY\SYSTEM  6/23/2017 12:00:00 AM
ROHAN-PC      Update            KB2506014     NT AUTHORITY\SYSTEM  6/23/2017 12:00:00 AM
ROHAN-PC      Security Update   KB2506212     NT AUTHORITY\SYSTEM  6/23/2017 12:00:00 AM
ROHAN-PC      Update            KB2506928     NT AUTHORITY\SYSTEM  6/23/2017 12:00:00 AM
ROHAN-PC      Security Update   KB2509553     NT AUTHORITY\SYSTEM  6/23/2017 12:00:00 AM
ROHAN-PC      Security Update   KB2532531     rohan-PC\rohan       9/22/2017 12:00:00 AM
ROHAN-PC      Update            KB2533552     NT AUTHORITY\SYSTEM  6/13/2017 12:00:00 AM
ROHAN-PC      Update            KB2533623     rohan-PC\rohan       9/23/2017 12:00:00 AM
ROHAN-PC      Update            KB2534366     rohan-PC\rohan       6/13/2017 12:00:00 AM
ROHAN-PC      Update            KB2545698     NT AUTHORITY\SYSTEM  6/23/2017 12:00:00 AM
ROHAN-PC      Update            KB2547666     NT AUTHORITY\SYSTEM  6/23/2017 12:00:00 AM
ROHAN-PC      Update            KB2552343     NT AUTHORITY\SYSTEM  6/23/2017 12:00:00 AM
ROHAN-PC      Security Update   KB2560656     NT AUTHORITY\SYSTEM  6/23/2017 12:00:00 AM
ROHAN-PC      Security Update   KB2562937     rohan-PC\rohan       6/13/2017 12:00:00 AM
ROHAN-PC      Update            KB2563227     NT AUTHORITY\SYSTEM  6/23/2017 12:00:00 AM
ROHAN-PC      Security Update   KB2564958     NT AUTHORITY\SYSTEM  6/23/2017 12:00:00 AM
ROHAN-PC      Security Update   KB2579686     NT AUTHORITY\SYSTEM  6/23/2017 12:00:00 AM
```

Fig 3: Patches Applied

4. EXPECTED RESULTS

The system will become more secure as the administrator will know about the vulnerabilities which were used on the machine by the vulnerability assessment using evidence extraction.

Today's modern era computers are more vulnerable than ever before. For this vulnerability assessment is done of the system. Many tools are available in market, but there are separate tools for Operating System level and Network level and also the tools are expensive, so small organization are not able to purchase the tools. Hence, combining the Operating System level vulnerability assessment and Network Assessment would be extremely helpful to any organization. Network Assessment could be only deal with open ports are they are most common way to attack a machine or to attach to a machine. Hence a tool with basic network assessment that is only dealing with ports and system vulnerability assessment tool combines would be beneficial which is done by our tool.

Table- 1: Comparison table

Name	Type	File system	Operating system	Port blocking
Live response	Method	No	Yes	No
Intrusion analysis	Method	No	Yes	No
Kansa	Tool	No	No	No
Proposed System	Tool	Yes	Yes	Yes

5. CONCLUSIONS

The system will be used to extract data, which will be forensic data. This data will be used for vulnerability detection and report will be generated. The report generated will be used for patching the system as per the detected vulnerability. The system shall be beneficial for organization as it secures the computer by detecting vulnerabilities and preventing theV exploits and also prevent corruption and loss of sensitive.

6. ACKNOWLEDGMENT

We would like to express a deep sense of gratitude towards our guide Ms. Reshma Chaudhari, Department of Computer Engineering for her constant encouragement and valuable suggestions. The work that we have been able to present is possible because of her timely guidance and support.

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LOSSLESS IMAGE COMPRESSION USING HYBRID ALGORITHM

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ABSTRACT

Digital image format is very difficult to handle. These image files contain large amounts of data, which needs economical storage and transfer ways. There's demand of investigation of quality problems, transfer ways, and storage mechanisms for such giant size of those image files. Medical and Satellite images contains large amount of data with minor detailing. These files need to be compressed to manipulate over a network. Every day, a large quantity of knowledge of digital image is made from completely different medical imaging devices. Storage and transmission of this information becomes a tedious job, wherever information measure constraints are a serious issue. To reduce size of such data is important. The two types of compression techniques first is Lossy and second is Lossless. Lossy compression reduces the data from image which isn't an optimal technique. The motive of this paper is to make hybrid algorithm using Lampel-Ziv-Welch (LZW), Run Length Encoding (RLE) and Huffman Encoding. These are all lossless compression techniques RLE and LZW used to compress image and Huffman Encoding will be for faster accessing. Using these techniques compression ratio should be increase is expected.

Keywords: *Image Processing, Lossless image compression, Run Length Encoding, Lampel-Ziv-Welch, Huffman Encoding.*

1. INTRODUCTION

Lossless Image Compression and Decompression has always been a very difficult task in Image Processing domain. The system is an algorithm for lossless image compression to achieve better compression ratio. Image processing is the field of image manipulation and image data processing. Image data is also widely used data on any type of media. Digital image requires very large amount of data to represent on physical media.

Image applications are widely used, driven by recent advances in the technology and breakthroughs in the price and performance of the hardware and the firmware. This leads to an enormous increase in the storage space and the transmitting time required for images. This emphasizes the need to provide efficient and effective image compression technique [12].

Digital images are usually encoded by lossy compression methods due to their large memory or bandwidth requirements. The lossy compression methods achieve high compression ratio at the cost of image quality degradation. However, there are many cases where the loss of information or artefacts due to compression needs to be avoided, such as medical, prepress, scientific and artistic images. As cameras and display systems are going high quality and as the cost of memory is lowered, it may also wish to keep our precious and artistic photos free from compression artefacts. Hence efficient lossless compression will become more and more important, although the lossy compressed images are usually satisfactory in many cases [6].

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2. SYSTEM DESCRIPTION

The existing techniques for compression use very complex algorithms. They provide more compression with the combination of lossy algorithms. But for important uses like medical and satellite imaging lossy data isn't be considered. This algorithm uses very simple but efficient algorithm to provide higher compression.

3. LITERATURE SURVEY

Following are some of the content that has been reviewed for proposed system.

1. The Role and Challenges of Compression in Medical Image Communication [1].

This paper presents Hybrid method is used to achieve more efficiency in compression. The 'count' variable is defined which would store the values according to the changes in the image pixels (randomness). Depending on the count value, suitable algorithms can be used for compression of images for efficient compression. The threshold value is calculated considering different sizes of images. Thus, one can apply the most suitable compression algorithm to an image so as to get maximum compression.

Huffman coding does not give good results as compared to RLE and LZW coding. Also, it is seen that as randomness of planes decreases, Huffman coding gives better results.

The paper gives brief idea about how different algorithm works on random and less random data.

2. Hybrid Algorithm for Lossless Image Compression using Simple Selective Scan order with Bit Plane Slicing [2].

In this paper the proposed lossless image compression consists Bit plane slicing method adopted for getting the eight binary layers (bit Plane-0 to bit plane-7) of given eight bit image. Run length of binary bits is calculated through the so called Run Length Encoding (RLE) method, which is used for reducing the bits in the current bit plane. The modified Huffman variable length coding is applied for compressing the data based on the run lengths found data.

The proposed HALIC (Hybrid Algorithm for Lossless Image Compression) lossless coding algorithm obtains the good results when compared to the JPEG-LS (Joint Photographic Experts Group Lossless) and CALIC (Compression Algorithm for Lossless Image Compression)

Paper presents new approach towards lossless compression and better way of using RLE and Huffman.

3. Implementation of Hybrid Algorithm for Image Compression and Decompression [3].

Paper presents the hybrid technique applied to different sets of images for compression and decompression. It also includes various benefits such as minimizing the size in bytes of a graphics file without degrading the quality of the image to an undesirable level. This devaluation allows more images to be stored in a given amount of memory space. Image compression involves the identification and removal of redundant and unnecessary elements of source image.

The simulation results shows that the proposed scheme has better efficiency. The compression ratio lay between 43% to 52%.

Paper will be helpful for implementation of different algorithm in hybrid approach.

4. A New Algorithm for Monochromatic Image Compression [4].

This paper presents a new algorithm for image compression which makes use of a variation of run length encoding and Huffman codes. For monochromatic images they are using run length encoding. Run length encoding gives acceptable results but this result will not be the best results. To overcome this, application of Huffman code is done after the implementation of RLE. In this a variation in run length encoding is used to increase the compression ratio. This new algorithm gives a better compression rate than the other for file formatting for image storing. It has given a gain of 53%

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over the GIF (Graphical Interchange Format) file format. In this, the paper states that system can make new attempts to get better results. Our system will make variation in the use of run length techniques on the direction of reading files.

5. Image Compression Using Proposed Enhanced Run Length Encoding Algorithm [5].

In this paper, it presents proposed enhanced process of image compression using RLE algorithm. The proposed system is used to decrease the size of compressing image. Digital image can be stored in different formats. JPEG's purpose is to achieve high compression ratio with the images. RLE is the simplest compression technique; it searches for the sum of bits or pixels of same value and encodes the length and value of the sum. In this proposed system uses enhanced run length encoding. The comparison ratio differs from image to image and between the values of adjacent pixels. In this the enhanced RLE gives best result for images with contiguous colour and monochromatic images.

In this RLE algorithm is good when images having less varies between the values of adjacent pixel, but it fails when images have high varied between the pixels. In this when increasing the values of threshold in the proposed enhanced RLE it gives increasing compression ratio and vice versa. Compression ratio depends on the value of threshold and the type of image used.

4. IMPLEMENTATION

This algorithm has been developed for lossless image compression of medical, satellite and high definition artistic image. Lossless image compression is necessity in such type of data in the term of storage space and transmission, so for lossless image compression system is having three algorithms. Algorithms which have been used in this system are RLE, LZW and Huffman encoding. RLE is a simple algorithm but yet effective on data which contains large run lengths, so it will be first phase in algorithm. The output of RLE will be the input to Huffman. String that is generated by Huffman will then go to LZW encoding scheme. It will find repeating character block in data and replace them by unique symbols and dictionary will be maintained. The binary tree will be form for given string. Binary tree will make easy access to the string while decompression. Fig 1 shows System flow diagram for proposed system.

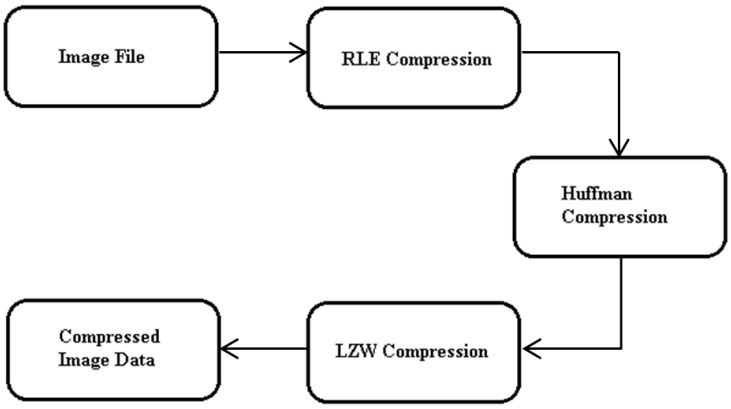

Fig 1: System flow diagram

A. RLE Compression:

RLE works by lessening the physical size of a rehashing series of characters. This rehashing string, called a run, is ordinarily encoded into two bytes. The principal byte speaks to the quantity of characters in the run and is known as the run check. By and by, an encoded run may contain 1 to 128 or 256 characters; the run consider for the most part contains the quantity of characters less one (an incentive in the scope of 0 to 127 or 255). The second byte is the estimation of the character in the run, which is in the scope of 0 to 255, and is known as the run esteem. RLE will take every array value of image and generate output string which contains the data and its runs. Like that all three arrays will be the output of first phase and input to next phase.

B. Huffman Encoding:

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In this phase Huffman encoding scheme will read the input strings and generate the table with is in increasing order with character and their frequencies. From that frequency table Huffman algorithm will generate binary tree and doing this the frequent character will get lowest binary no to fast retrieval of that character. Resulting strings will be output of phase 2. Now this output will be handover to phase 3.

C. LZW Compression:

The output of RLE phase is now input to current phase so LZW algorithm will be applied to all three algorithms. LZW will find the repeating block of substring and that substring will be replaced by unique character. The dictionary of that repeating block character and one unique new character is stored. After completing all three phases the compressed file of image will be generated.

5. EXPECTED RESULT

In the system use of hybrid algorithms for lossless image compression (Run Length Encoding, Lampel-Ziv-Welch algorithm and Huffman Encoding) takes place.

Using the RLE for more frequent data which occurs continuously will be easy to compress also computational time won't be much more. As RLE, LZW and Huffman working together will be providing more compression with better efficiency. The frequent blocks are compressed by LZW and frequent characters are compressed by Huffman. Using Huffman encoding algorithm the access time will be faster.

6. CONCLUSION

The use of hybrid algorithm is increasing the compression ratio and improves the efficiency. This system describes the lossless data compression with universal algorithms merging together. The advantage of such technique is that it compresses more data without losing single bit information and no effect on image resolution. It gives more compression in terms of storage space. Less number of calculations will be done in order to save computational time.

This system is intended to increase compression ratio. Till now many researchers have focused on lossy image compression but not given much priority for lossless image compression so this algorithm highly concentrates on lossless compression.

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A HYBRID CONCEPT OF KEYLESS ALGORITHM AND COMPRESSION SCHEME FOR ENCRYPTED STEGO-IMAGE

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ABSTRACT

Cryptography is a methodology of storing and transmitting data in a form so that it will no more be interpreted or understood. It converts the readable (plain text) to non-readable (cipher text) and vice-versa. The main purpose of cryptography is used not only to provide confidentiality, but also to produce solutions for different issues like: data integrity, authentication, non- repudiation. Steganography is the way toward concealing a mystery message inside a bigger one such that somebody can't perceive the nearness or substance of the shrouded message. To make the transmission of information secure over the network, Cryptography is the best answer. The calculation gives security at both character and in addition bit level. The quantity of rounds should be performed is rely on the span of the information and are figured at sender side and recipient side autonomously. The system is proposed with the motive to provide security level with minimum execution time in terms of encryption and decryption. The encrypted data is compressed by using LZW compression scheme which enables an individual to hide approximately two times more data in a cover image. Also LZW is a lossless compression technique. Therefore at the receiver side after decompression receiver gets the original size of the data. Image steganography is performed by using LSB technique that must be capable enough to produce better quality stego-image with a high data hiding capability. This approach's stego-image is accurate as the original image.

Keywords: *Cryptography, Steganography, Keyless, LZW, Stego- image.*

1. INTRODUCTION

Cryptography is almost associated with the orders of cryptography and cryptanalytics. Individuals who apply this field are called cryptographers. Procedures and traditions that meet a couple or most of the over criteria are known as cryptosystems. Cryptography is that the curve of encoding and cryptography procedure. Encryption is a procedure inside which data is rebuilt in an extremely arrange known as figure message or scrambled content. Unscrambling is a procedure changing the figure message back to the underlying kind. To interpret the figure content, one ought to have mystery key (for key situated calculation) or unraveling calculation (for keyless calculation). Encoding is precisely vital when transmission vital data over unsecure mediums simply like the net.

In keyless calculations there's no overhead of key age and sharing. Just simple possible coherent activities are connected in such a way so data can't be taken by the interloper though sending over an uncertain media. Keyless calculations additionally can be named symmetric and hilter kilter.

LZW pressure is that the pressure of a document into a littler records utilizing a table-based task calculation made-up by Abraham Lempel, Jacob Ziv, and Terry Welch. LZW pressure is utilized for packing content documents. LZW pressure plot is utilized to enhance the size of mystery data; it'll adjust a private to cover approx. Two times a considerable measure of data in a cover-picture. It utilizes LZW pressure conspire for decreasing the size of mystery data and Key-pixel figure for basic level security.

Steganography is the covering of a mystery message inside a photo. Steganography makes cryptography a stride more by camouflage relate scrambled message that exclusive partner valid client can ready to peruse. Presently a-days, in advanced steganography introductory changes are made utilizing fitting algorithmic lead then it is encoded additionally spared in (picture). The littlest sum vital Bit (LSB) inclusion procedure might be a typical, simple way to deal with installing data amid a graphical picture record. In LSB inclusion technique the LSB every pixel is supplanted by each message bit. Probability the message may coordinate with the LSB's of the cover picture. Likewise, the change happens just inside the bit that is slightest imperative, so keeping the other more critical bits unaltered. Along these lines,

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this doesn't affect the underlying picture detectable quality. Thusly it's an extremely famous system. Be that as it may, it's exceptionally powerless to assaults. Any picture controls like trimming, power changes for any improvements like refinement extending, histogram leveling, expansion of commotion and so forth will annihilate the implanted message.

1.1 Problem Definition

In existent system, keyless algorithm is enforced. Within which keyless algorithm first converts shuffled character information to ASCII price and this ASCII value is converted into binary format. Additionally there's block size of 128 bits for acting one round of binary operations. This will contains less number of bits in one block.
Require to perform same operations more number of times. Whereas sending the information it'll takes more time, since the size of the encrypted information is big. If the information is hacked by the hacker, then he will simply obtained the key information because the encrypted information as it is send to the receiver. Also it'll simple for attacker to guess the corresponding decimal value and ASCII value.

2. LITERATURE SURVEY

The proposed framework speaks to another strategy for utilizing data itself to shape an ensuring shield. The calculation gives security at each character level additionally at bit level. The framework is arranged with the intention to supply most abnormal amount of security with least encoding and deciphering time. The simulation results of projected algorithm and its comparison with the normally used JS keyless algorithm. Needs minimum execution time and also saves memory. Encryption at block level along with character level and binary level in keeping with the protection level required isn't done [1]

In planned system a half and half approach of cryptography, information pressure and steganography has been planned. In this framework LZW conspire is utilized for lessening the size of mystery information and LSB approach is utilized to shroud the data. Proposed strategy exhibitions superior to anything Kekre's plan as far as data concealing capacity and nature of stego-picture. Framework is secure against the RS location assault [2]

In planned system a mixture of cryptography and steganography for improving the security is used. In planned system is basically to secure communication technique furthermore, it will take less time if the record estimate is substantial. It is nearly impractical to break the encoding algorithm without knowing the precise key value. If receiver forget the key value then v it's impractical to recover the initial message [3]

The planned system describes various aspects of cryptographic techniques and numerous issues related with cryptography. Together with it, a planned work is there that addresses a number of the core problems with cryptography together with their solutions. Two level of security is implemented. Algorithm is predicated on hybrid cryptography because it uses the DES and RSA hybrid cryptographic algorithm that makes the system comparatively more secure and easier. If receiver forget the key value then it's not possible to retrieve the initial message [4].

3. PROPOSED SYSTEM

The proposed framework upheld keyless calculation along these lines no need of key age and key administration and also no need of key exchange through outsider. Likewise ASCII to BCD transformation is done as opposed to normal double change. For encoding of data piece estimate has been improved to 256 bits, which diminishes the measure of rounds performed on data and lessens the encoding and deciphering time.
For pressure the proposed framework utilizes LZW pressure plot which is lossless in nature and enables a person to hide} around two times extra data in a cover picture. For steganography this system} utilizes LSB based data concealing technique. This stego picture is send to the Receiver through channel. At the recipient side arranged framework performs same technique however in switch request to get the mystery data.

3.1 Encryption Algorithm:

Stage 1: The data is dealt with in organize and columnar transposition is performed.

Stage 2: The characters are recovered into ASCII esteems then ASCII to BCD change is finished.

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Stage 3: The measure of BCD data is noted and partitioned by 256 to get the total number of rounds then parallel plain content is splitted into 256 piece squares.

Stage 4: Partition 256 piece obstruct into 124-8-124 piece three sub squares.

Stage 5: For even round-Perform 1's supplement of the middle 8 bits and for odd round-Get the dark code of the inside 8 bits.

Stage 6: Perform XOR activity of last 8 bits of left 124 piece square and center 8 bits.

Stage 7: Right roundabout move is performed on center 8 bits and last 124 piece sub-square. Number of movements equivalent to the aggregate number of squares. At that point dim code is gotten of the last 132 bits. Stage 8: Left Circular move is performed between center 8 bits and the underlying 124 piece sub square. At that point dark code is acquired of beginning 132 bits.

Stage 9: initial 124 bits are added to last 132 bits.

Stage 10: Repeat same stages 4-9 for the general number of rounds as ascertained in stage 3.

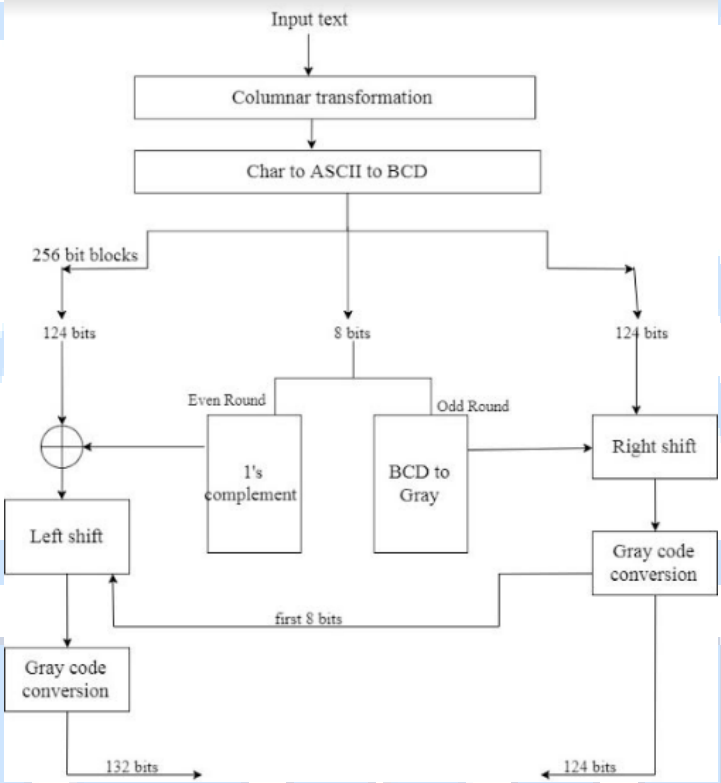

Fig 3.1: Encryption Algorithm

3.2 Decryption Algorithm:

Stage 1: The general number of bits inside the figure content is isolate by 256 to get the general number of rounds and after that parcel encoded bit stream into 256 piece squares.

Stage 2: Then separation each 256 piece figure content square into 124-8-124 piece three sub pieces.

Stage 3: For left 132 bits, dark to twofold code transformation is performed then right roundabout move is finished on this data.

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Stage 4: For last 124 bits, dim to parallel code transformation is performed then round left move is finished on this data.

Stage 5: left eight bits of sub square got in step-2 are XOR'd with the 132 piece sub square got in step-3.

Stage 6: For even round-Perform 1s supplement of the inside eight bits and for odd round-Get the dark code of the middle eight bits.

Stage 7: Repeat the means 3-6 for number of rounds ascertained by the calculation.

Stage 8: From the paired data, twofold to BCD and BCD to ASCII transformation is finished.

Stage 9: Character level translating is performed to create the first data.

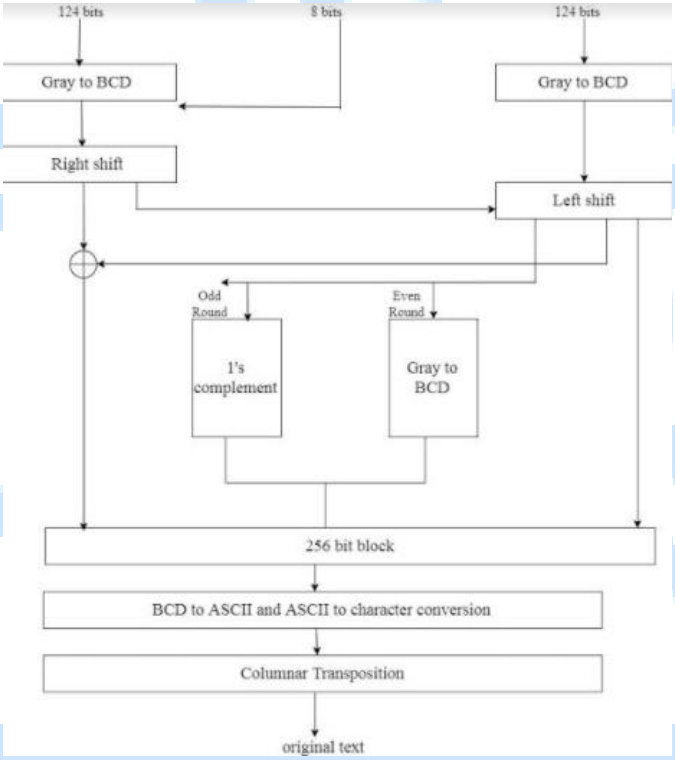

Fig 3.2: Decryption Algorithm

4. EXPECTED RESULTS

The objective of the task is to give security amid delicate information transmission. Expected outcome from proposed framework is it requires less investment to encode and decode the mystery message.
This system uses keyless so no need of key age and key administration and furthermore no need of key exchange through outsider. Also ASCII to BCD conversion is completed rather than binary conversion. The amount of rounds is made information dependent therefore the value keeps on changing according to the information. The number of rounds in proposed system is calculated in each encoding and decoding section independently by using length of the text that provides security. The algorithm has been enforced over 256 bit blocks where the previous system uses 128 bit block size. Hence, block size has been enhanced that has directly reduced the encoding and decoding time.

5. CONCLUSION

The system provides a mechanism to encrypt, compress and hide information in image and send stego image over the network without producing external key. The simple logical operations have been applied on the data to transform it into another form which can be understood only by the recipient by using decryption algorithm. It is keyless algorithm so time and memory gets saved which is consumed in key generation and management mechanism.

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In proposed system encrypted data is compressed by using LZW compression scheme, which is lossless in nature. So that after decompression receiver gets original size of the data. If stego image is break by suspicious user and get encrypted data but attacker is unable to decrypt the data, since the information is in the compressed form.

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AN ANALYSIS OF DECISION TREE PRE-PROCESSING TECHNIQUES FOR DATA MINING: A LITERATURE STUDY

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ABSTRACT

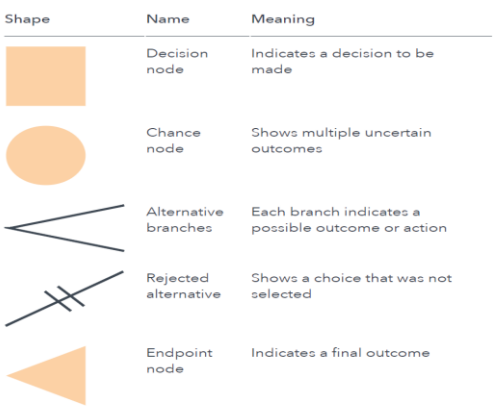
Data mining is an important aspect of today's world as huge amount of data is being generated every day. This large data can be used to find patterns and make it useful for various companies using data mining. Data mining can be combined with machine learning to obtain better results for companies and organizations. Data mining can be made easier using various pre-processing techniques. These techniques can help in improving the performance of Data mining methods, one of the pre-processing technique is Decision tree formation [1]. In this paper, various techniques for formation of Decision tree and their comparative study are stated. The comparison of various techniques is discussed here. This paper revolves around the techniques such as ID3 [10], C4.5 [14], C5.0 [15]. A comparison of different aspects of these techniques can be learned from this paper.

Keywords: - *Data mining, ID3, decision tree, pre-processing, C4.5, C5.0, pruning.*

1. INTRODUCTION

A huge amount of data is generated around the world every day. Different organizations and industries like hospitals, schools, colleges, commercial websites and many more produces large amount of data. An organized study of this content can lead to crucial data and statistics. Data mining is the process of sorting through large data sets to identify patterns and establish relationships, that is, to solve problems through data analysis. The use of Data mining to handle the large data can lead to yield important relations and increase performance measure. Data mining is also called the extraction of hidden predictive information from large databases, since it attempts to find the relations and patterns edged in that big data. Data mining includes various stages such as Data collection, pre-processing and Data mining algorithms. This paper focuses on pre-processing and especially on the technique of Decision tree generation [1]. Decision tree generation is a common form of pre-processing type in data mining, as it analyses entire data and creates a tree like graph which has possible outcomes in its leaves.

Chart-1. Decision Tree symbols [9]



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In this paper, various techniques used for formation of decision tree are stated. Various aspects of decision tree are decision node, chance node and end point node. These nodes have specific job allotted to it from indicating decision to be made to showing multiple options available and also indicating a final outcome. This paper checks on the various techniques of decision tree generation such as ID3 [10], C4.5 [14], C5.0 [15]. Here, different features of these techniques are studied and how these techniques can be used for pre-processing. This paper studies multiple research papers related to decision tree and focuses on the accuracy of different techniques.

2. LITERATURE REVIEW

This section presents an analysis of a variety of decision tree making techniques and variations thereof, summarizing the methodologies used and results obtained.

2.1. Decision Tree Classifier using Theme based Partitioning [1].

This paper proposed a variant of a decision tree classifier to construct decision tree. In this paper the researcher proposed a partition based decision tree which creates sub-objects of each data objects using themes, construct multiple local decision trees and combines these decisions based on the neighbor rule. Researcher gives an empirical result on teacher data sets and proves that partitioning decision tree improved the classification rates over other classifiers (CART, C4.5, C5.0).

Theme based partitioning (PDT) divides the data objects into sub-objects. This sub-objects contains some feature and user can partition an object based on the theme of their choice. For instance, patient data can be partitioned based on themes such as treatment-taken, test-conducted, diseases, etc. Researcher have proved that PDT gives better classification as compared to other decision tree classifiers such as CART, C4.5 and C5.0 classifier. The PDT showed superior classification of 9.2% higher with college-1 and 3.5% higher with college-2.

The researcher conclude that the novel partitioning approach decision tree shows much improved classification then other classifier methods. The proposed method proved to be efficient with varied number of partitions in terms of classification and can be implemented in parallel environment for improved computational efficiency.

2.2. Improving the Prediction Accuracy of Decision Tree Mining with Data Preprocessing [2].

This paper evaluates and compares the performances of the popular C4.5 decision tree algorithm, on the same dataset, with and without preprocessing applied. It is found that preprocessing improved prediction accuracy as well as the time required to construct the decision tree. An open-source implementation of the C4.5 algorithm, J48, was used to construct the decision tree. The preprocessing technique used was the Fayyad-Irani discretization method [10], which is a supervised discretization method.

The authors implemented their comparison in the open-source software, Weka. The dataset was from a real-world leukemia experiment, containing each patient's particular of the disease and their gene expression values. The authors split their research into two phases. In the first phase, the continuous-valued features are converted to discrete values using the entropy-based Fayyad-Irani method. The second phase consists of comparing the J48 classifiers with and without this preprocessing. The researchers found that the accuracy of prediction was higher when discretization was performed: accuracy increased by 2.63% on the training dataset, and by 10.53% on the testing dataset. A side benefit was that visualization and interpretation of the decision tree became clearer and easier after discretization.

2.3. A Novel Decision-Tree Method for Structured Continuous-Label Classification [3].

The paper proposes an approach to constructing decision trees from datasets which contain structured decision labels. According to the authors, a satisfactory solution did not exist for the problem of data classification using continuous labels which exhibit a natural hierarchical structure. The authors propose a hierarchical continuous-label classifier (HCC) to fill this research gap [12] and [13]. This approach to constructing decision trees can be used for datasets which contain structured continuous-labels, for example, in domains such as functional genomics and supply chains.

The algorithm concentrates on three areas: to split the node; to stop splitting the node; and to label a leaf node. A heuristic called the goodness value, consisting of four parameters, is used for the selection of attributes. The proposed algorithm, HCC, was compared with C4.5 over eight real datasets; it was claimed to outperform C4.5 in terms of accuracy, and require fewer leaves to produce the same accuracy as C4.5.

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2.4. C5.0 Algorithm to Improved Decision Tree with Feature Selection and Reduced Error Pruning [4].

In this paper, ID3, C4.5 and C5.0 are compared against each other. In all the decision trees, C5.0 proves to be most accurate and efficient. Here, low memory usage and high accuracy is obtained when C5.0 is used as a base classifier. Since this classification techniques generates fewer rules compared to other techniques, the proposed system has lower memory usage.

The C5.0 classifier is used in this paper which performs reduced error pruning and feature selection. Feature selection technique assumes that the dataset has redundant features and attempts to remove those features which provide no useful information in any context. The proposed system achieves 1-3% accuracy increase. Here, also error rate is reduced and decision tree is construed within less time.

2.5. Addressing Data-Complexity for Imbalanced Data-sets: A Preliminary Study on the Use of Pre-processing for C4.5 [5].

The research attempts to predict whether pre-processing would increase the performance of the decision tree constructed using the C4.5 algorithm over a given dataset, before any pre-processing is performed. This is especially relevant in the context of imbalanced datasets, in which the class which contains the concept to be learnt is under-represented in the data. For pre-processing, the authors implement the hybridization of the Synthetic Minority Over-sampling Technique (SMOTE) [16] with Wilson's Edited Nearest Neighbour Rule (ENN) [11], referred to as SMOTE-ENN. Forty-four datasets were used, all with varying degrees of imbalance.

Two measures of data complexity are used: the maximum Fishers discriminant ratio (F1), and the nonlinearity of 1NN classifier (INN). The researchers constructed "rules" based on intervals of the F1 and the N4 scores compared with AUC. It was found that C4.5 with SMOTE-ENN pre-processing increases the support for the rules obtained using c4.5 without pre-processing. The authors also found the imbalance ratio (IR) of the dataset, is not enough to conclude that pre-processing that dataset would be useful.

2.6. Improved C4.5 Decision Tree Algorithm Based on Sample Selection [6].

In this paper the researcher claimed that while various algorithm are available for generating Decision tree, C4.5 with sample selection proves to be the better algorithm with improved classification of accuracy and reduce training time.

The researcher stated that decision tree is fast and efficient algorithm for data mining in classification and prediction. The system first compare all attribute values of the object, select optimal attribute as root node, then depending on this attribute it determine the leaf nodes.

This paper aims of sample and problem's classification that c4.5 has high correlation with initial training set. System uses sample selection to fetch the best set, in order to improve the accuracy. The partition similarity overcomes the instability of information gain rate. Researcher simplified the entropy computing, brought the reduction of operation.

2.7. Implementation of Network Intrusion Detection System using Variant of Decision Tree Algorithm [7].

The authors compare the performance of the C4.5 algorithm, with and without pruning applied, to an intrusion detection system (IDS). This is a classification problem: to detect whether the activity is normal or abnormal, and is thus a good fit for decision trees. Two datasets are used: the KDDCup'99 and the NSL_KDD datasets. The attributes are pruned on the basis of their information gain ratio.

For the KDDCup dataset, the pruned C4.5 tree was 2.28% more accurate than the full C4.5 tree. It produced dramatically better results for the NSL_KDD dataset: while the full C4.5 tree managed only 28.45% accuracy, the pruned C4.5 tree produced 98.45% accuracy. These results suggest that decision tree nodes must be carefully selected to eliminate noisy features from the constructed tree. Pruning the decision tree to increase accuracy is shown to be a worthwhile consideration by the authors.

2.8. Comparative Analysis of C4.5 and C5.0 Algorithms on Crop Pest Data [8].

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The researcher proposed a comparative study of c4.5 and c5.0 algorithm on crop pest data of the agriculture sector. It stated that data mining is quite finding the hidden data and correlation between all this massive data; Decision tree can be generated from this information. The decision tree is one of the most popular predictive modelling approaches for representing this type of data.

In this paper research was performed on agriculture crop pest data set which composed of 16 attribute and 1000 instances. Using R Tool c4.5 and c5.0 was implemented and according to the result decision tree is generated. Researcher proved that C5.0 is comparatively most powerful and preferred method in data mining and generating decision tree as to that of C4.5 algorithm. C5.0 gave 99.49% of accuracy prediction where C4.5 gave 98.48% of accuracy. Time taken to build the model by C5.0 and C4.5 was 0.01 seconds and 0.02 seconds.

3. ANALYSIS

Following table is a summary of studied research papers on Decision tree pre-processing techniques used.

Table-1. Analysis Table

Sr. No.	Title	Technique Used	Dataset	Accuracy
1.	Decision Tree Classifier using Theme based Partitioning [1].	Theme based partition. PDT divides the data object into sub object.	College-1 and college-2 dataset.	Increased performance of 9.2% and 3.5% in college-1 and college-2 from CART, C4.5 and C5.0.
2.	Improving the Prediction Accuracy of Decision Tree Mining with Data Preprocessing [2].	C4.5 tree algorithm. Fayyad-Irani discretization method.	Real-world leukemia experiment dataset.	Increased by 10.23% on testing dataset after discretization.
3.	A Novel Decision-Tree Method for Structured Continuous-Label Classification [3].	Hierarchical continuous-label classifier (HCC algorithm)	Structured continuous-labels dataset	Better than C4.5 algorithm.
4.	C5.0 Algorithm to Improved Decision Tree with Feature Selection and Reduced Error Pruning [4].	ID3, C4.5 and C5.0 classifying algorithms.	Weibo dataset	C5.0 is better by 1-3% than C4.5 and ID3.
5.	Addressing Data-Complexity for Imbalanced Data-sets: A Preliminary Study on the Use of Pre-processing for C4.5 [5].	Synthetic Minority Over-sampling Technique (SMOTE) along with C4.5.	Different dataset including Wisconsin, Glass1, Ecoli1.	C4.5 with SMOTE-ENN produces better result than C4.5
6.	Improved C4.5 Decision Tree Algorithm Based on Sample Selection [6].	C4.5 with sample selection.	Nursery Database. Magic04. Bank Marketing. Posture Reconstruction.	C4.5 with sample proves better than C4.5 alone.
7.	Implementation of Network Intrusion Detection System using Variant of Decision Tree Algorithm [7].	Pruning along with C4.5.	KDDCup'99 dataset. NSL_KDD dataset.	Pruned C4.5 tree is 2.28% more accurate than full C4.5. Entire accuracy of 98.45%.
8.	Comparative Analysis of C4.5 and C5.0 Algorithms on Crop Pest Data [8].	C4.5 and C5.0 algorithms.	Agriculture crop pest data set	C5.0 better than C4.5 by 1.01%.

Thus, we compare and evaluate different meyhods to construct decision trees. It is apparent that variations can occur at different phases in the construction of the decision tree. Methods used involve pruning the decision tree, while others pre-process the dataset to increase accuracy. Most enhancements are performed using the popular C4.5 or its successor, C5.0

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decision tree as the base algorithm. In general, it is observed that combining these decision trees with dataset pruning or another hybrid algorithm yields improved results.

4. CONCLUSIONS

In this paper, we have performed extensive research in the field of Data Mining. Here, huge data is collected and processed to obtain hidden patterns in the data which can prove to be helpful for analysis. Sentiment analysis plays a major part in development of a product or service.

In this approach, extensive study of various decision tree pre-processing techniques used for data mining is done. Different methods such as ID3, C4.5, C5.0 and SMOTE are studied in this paper. Each method holds its unique ability and is proved to be better at different stages. ID3 and C4.5 methods were used some years back, but with C5.0 introduced, it has the better accuracy rate than any other method. In this paper, the use of C4.5 or C5.0 along with supplements are proved to produce better results. Pruning, Synthetic Minority Oversampling Technique (SMOTE) and sample selection are the methods used along with decision tree generating algorithms. The methods stated in this paper have their advantages and disadvantages and can be used according to the system.

5. ACKNOWLEDGMENT

We would like to express a deep sense of gratitude towards Prof. Tatwadarshi P. N., Department of Computer Engineering for his constant encouragement and valuable suggestions. The work that we have been able to present is possible because of his timely guidance and support.

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APPROACHES FOR DE-DUPLICATION IN CLOUD COMPUTING: A SURVEY

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ABSTRACT

Cloud computing enables users, and enterprises, with numerous computing capabilities to store and process information in either private cloud, or on a third-party server placed in a data center so as to create data accessing process more economical and reliable. However, in enterprise data centers the laborious job is to move, protect and store the huge amounts of data they need within and between them. If user intends to move giant amounts of data over a network and supply access to that data as a service, he or she would like to be cognizant of network information measure necessities. Data de-duplication could be a technology that allows firms to save lots of plenty of cash on storage prices to store the information and on the bandwidth prices to move the information once replicating it offsite for data recovery. If files are de-duplicated then the existing space for storing the files might save the cost as well as work efficiently. This system further emphasizes on increasing privacy for data of clients which can be accessed in de-duplication process. Various attacks may be carried out by adversary during data de-duplication. To prevent these attacks the system works very much efficiently without compensating with the quality of data de-duplication process.

Keywords: - Cloud Storage, Deduplication, Hashing, Privacy, Re-encryption

1. INTRODUCTION

Data de-duplication is a technique to eliminate duplicate files from cloud storage. It can be also termed as data compression technique as it saves storage space in cloud computing This system is initiated for efficient storage deployment. Even it can be applied to network data transfers to scale back the quantity of bytes that has to be sent. Data de-duplication will occur at 2 level that's at supply primarily based and target based.

Data de-duplication typically operates at the file or block level. File de-duplication eliminates duplicate files, however isn't associate in Nursing economical means that of de-duplication. File-level knowledge de-duplication compares a file to be protected or archived with copies that area unit already keep. This can be done by checking its attributes against associate in index. If the file is exclusive, it's kept and also the index is updated, if not, solely a pointer to the prevailing file is kept. Block-level de-duplication occurs inside a file and saves distinctive iterations of every block [1]. All the blocks area unit broken into chunks with identical mounted length. every chunk of information is processed employing a hash algorithmic rule, like MD5 or SHA-1.

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2. LITERATURE SURVEY

Following are some of the content that has been reviewed for proposed system.

In Bucket Based Data De-duplication Technique For Big Data Storage System [1] authors have projected bucket based mostly information de-duplication technique for giant information storage system. In huge information storage, information is simply too massive and with efficiency storing information is troublesome task. To resolve this downside hadoop tool is provided. Hadoop tool provides HDFS that manages the information de-duplication. Huge information stream is given to mounted unitization algorithmic rule to make mounted size chunk. Chunk share given to MD5 to get hash worth for every distinctive file.

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In Secure Auditing and De-duplicating Data in Cloud [2] the authors suggests that outsourced clouds are not trustworthy. Integrity auditing and secure de-duplication are the major goals in these systems. Aiming at achieving every data integrity and de-duplication in cloud, SecCloud maintains MapReduce and gives cloud auditing entity, that helps shoppers create data tags before uploading. SeeCloud+ ensures data integrity and secure de-duplication.

In A Proposal for Improving Data De-Duplication With Dual Size Fixed Chunking Algorithm [3] the authors have improved mounted size unitization algorithmic rule. A replacement algorithmic rule that's twin sized mounted unitization algorithmic rule is projected to attain high de-duplication magnitude relation over existing mounted size unitization algorithmic rule. Reduced storage necessities can lead to lower storage management and energy value. It shows that if n contiguous chunks area unit changed in an exceedingly file exploitation twin sized mounted unitization algorithmic rule we tend to area unit sure to determine these changes in (n+1) chunks.

In Privacy Preserving Cross User Source Based Data De-duplication In Cloud Storage [4] the authors have said that the volume of data increases, so does the demand for online storage services, from simple backup services to cloud storage infrastructures. By analyzing de-duplication's security issues they have proposed a simple mechanism that allows cross-user de-duplication while reducing the risk of data leakage. In this paper Harnik's randomized solution is used to protect data from attacks performed using de-duplication techniques.

In Reliable Re-encryption in Unreliable Clouds [5] the authors have hold on the info on cloud in encrypted type and issued cryptography key to licensed key to user. If user is revoked, the owner re-encrypts the info to stop the revoked user to decode the info. during this paper, this downside is solved by proposing time based mostly re-encryption theme, that allows the cloud servers to mechanically re-encrypt knowledge supported their internal clocks. during this paper, R3 theme is planned that could be a new methodology for managing access management supported cloud server internal clocks. The data stay secure while not excellent clock synchronization therefore the time distinction between the servers and data homeowners are often sure.

In Cloud iDedup: History Aware In-Line De-Duplication for Cloud Storage to Reduce Fragmentation By Utilizing Cache Knowledge [6] the authors have suggested that due to large demand for the cloud storage there is high chance of data de-duplication hence redundancy can cause problem and so storage cost may increase while restoring data failure problem may create some problem. In this paper, it is proposed about eraser coding which can be used for encoding and storing the data on multiple servers. It is used to generate encoded hash value for recovery purpose. It reduces the chances of database failure. A result shoes that system uses less space and decreases the cost.

In De-duplication Based Storage and Retrieval of Data from Cloud Environment [7], the authors have proposed system in which user has to login using IP address. Then over their user can upload or access the file. To remove duplication cloud, generate RSS key which is unique for specific file. If duplicate file is uploaded to the cloud to the cloud by user then the user need to send request to the owner of the file for the key to access the file. User also need to login and register to private cloud. If no duplication occurs then RSS key is generated else it gives alert to the owner of the file about duplicate file.

In Dynamic Data De-Duplication in Cloud Storage [8] the authors proposed to save storage on disk. Data de-duplication is a technique in which cloud storage is used in an efficient way. It aims to store one copy and thus reducing the disk space. In this paper it is proposed that with the help of dynamic de-duplication the balance between varying storage efficiency and fault tolerance is maintained. Also, the performance of cloud storage is increased.

In Improving Accessing Efficiency Of Cloud Storage Using De-duplication And Feedback Schemes [9] the authors have proposed file distribution and storage in cloud environment is handled by storage devices providers or physical devices rented from third parties. When amount of data increases the condition of storage cannot be guaranteed by manager. It will result in wasted hardware resources, complexity also increases. To reduce work load it has been proposed index name servers (INS). It helps in optimization of node selection, file compression. It helps to increase performance as well.

In Secure Distributed De-duplication System With Improved Reliability [10] the authors have stated system which can improve security of users data without performing encryption on the given data. File level and fine grained block level data deduplication which can be supported by four construction that are proposed in this paper. In this paper RSS key is used for de-duplication which can reduce encoding and decoding overheads.

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In Heterogenous Data Storage Management With De-Duplication In Cloud Computing [11] the authors suggest that the Backup systems are owing to its incontestable ability of rising storage potency. In general, tiny and variable-sized chunks are managed at a bigger unit known as instrumentality that's a fixed-sized structure. The fragmentation comes in 2 types, thin containers and out-of-order containers. The fragmentation decreases the efficiencies of restore and trash pickup in de-duplication based mostly backup systems. The hybrid theme is useful to additional improve restore performance in datasets.

In paper To Develop Secure De-Duplication of Data Using Hybrid Cloud Methodology [12] The authors have stated authorized data de-duplication to maintain trustworthiness by including different user benefits in the duplicate check. Proof of ownership (POW) has to be set while user uploads file. Only owner has the authority to upload or check the duplicate file. Before uploading the duplicate file first user needs to submit the proof of ownership as well.

3. ANALYSIS

Following table is a summary of studied research papers on Data De-duplication techniques used.

Table -1: Analysis Table

Sr. No.	Title	Technique Used	Dataset	Accuracy
1.	Bucket Based Data De-duplication Technique For Big Data Storage [1]	MD-5 Algorithm. Bucket Based technique.	DATA.GOV	De-duplication Ratio 0.5538 Better Than Fixed Size That 0.4461.
2.	Secure Auditing and De-duplicating Data in Cloud [2]	Integrity auditing protocol. Proof of ownership.	Files With Different Sizes	For data of 130 block Response Time is 70% less.
3.	A Proposal For Improving Data De-Duplication With Dual Size Fixed Chunking Algorithm [3]	Dual Size Fixed Chunking Algorithm	Meta Data Of Chunk Size 1000 byte Each	Optimal Chunk Size Is Improved To 2000 From 1000 In Fsc.
4.	Privacy Preserving Cross User Source Based Data De-duplication In Cloud Storage [4]	Harnik's randomized solution	Not Applicable	This paper offers better security than existing systems.
5.	Reliable Re-encryption in Unreliable Clouds [5]	Basic R3. Extended R3	Not Applicable	Provides better confidentiality.
6.	Cloud Idedup: History Aware In-Line Deduplication For Cloud Storage To Reduce Fragmentation By Utilizing Cache Knowledge [6]	History aware in-line de-duplication check algorithm. Sparse container.	Two Cloud Servers Having Verious Files Having Various Size.	Two Files Of Size 10 Kb Uploaded. The 19.5 Kb Is Size Of Files In Existing System While 14.4 Kb Is Size Of Files.
7.	De-duplication Based Storage And Retrieval Of Data From Cloud Environment [7]	Convergent Encryption Method. RSS Key Method. AES Encryption Method.	Not Applicable	Efficiency Of Data De-duplication Is Increased Than Previous Systems

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8.	Dynamic data de-duplication in cloud storage [8]	Sha-1(Secure Hash Algorithm).	File present in metadata server.	For 100 files upload % using 5 duplicators-94% while using 10 duplicator - 97%.
9.	Improving Accessing Efficiency Of Cloud Storage Using De-Duplication And Feedback Schemes [9]	Index Name Server.	Files Transferred In P2P Structure.	Performance Of Data Transmission Is Enhanced By 20 To 50%.
10.	Secure Distributed De-duplication Systems With Improved Reliability [10]	Secret splitting technique. Tag generation algorithm. Message authentication code.	Not Applicable	Average Time For Generating Hash Value Is Improved to 25.196 uSec Than Previous Systems.
11.	Heterogenous Data Storage Management With De-Duplication In Cloud Computing [11]	History Aware Rewritting Algorithm. Container Marker Algorithm.	Kernel. Vmdk. Rdb. Synthetic. Public dataset.	Higher De-dupliction Ratio By 27.43%
12.	To Develop Secure De-duplication Of Data Using Hybrid Cloud Methodology [12]	MD-5 algorithm AES encryption Proof of ownership(POW)	Not Applicable	Minimal Overhead Than Previous Systems.

4. PROPOSED SYSTEM

The proposed system is a hybrid system which is developed for performing de-duplication and protecting file stored on the cloud storage form the attacks performed using de-duplication technique. De-duplication is techniques of removing copy of files. To implement de-duplication, MD-5 algorithm is used which will remove duplicate of the file present on the cloud storage. And to protect from different attacks performed by attackers using the de-duplication techniques we have used Harnik's randomized solution which will hide whether the data is duplicate or not. Encryption and decryption of file can be performed using AES algorithm which will make system more secure. In proposed system to access the file we need to have key to access the file which will be unique for each file. The key can be generated using blowfish algorithm which will prevent the unauthorized access to that file.

5. CONCLUSION

Many approaches are there for data de-duplication. But the loophole in these approaches is that by knowing whether the data is duplicate or not the attacker can get access to sensitive data. Not only the proposed system will allow firms to save lots of plenty of cash on storage prices and bandwidth prices due to data de-duplication but also the goal of the system to ensure that the data of users remains private is achieved. The system will show that uploading data to the cloud has a very less effect on what an unwanted person can learn about those data files. The proposed system increases data privacy for cross user source –based de-duplication and also data integrity is maintained. AES algorithm is used to improve further security by encrypting the file and blowfish is used to improve access control over de-duplicated files stored on cloud storage.

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6. ACKNOWLEDGEMENT

We would like to express a deep sense of gratitude towards our guide Mrs. Reshma Chaudhari, Department of Computer Engineering for her constant encouragement and valuable suggestions. The work that we have been able to present is possible because of her timely guidance and support.

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TWITTER SENTIMENT ANALYSIS USING DATA PRE-PROCESSING AND EXPLOITING EMOTICONS: A SURVEY

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ABSTRACT

Sentiment analysis is an important research area that identifies the people's sentiments and emotions underlying a text. As the use of social media is increasing day by day, it plays an essential role in communication through technology. Twitter, which is one of the popular and largely used social media platforms for communication has more than 200 million tweets per day. Tweets are short in length and due to limited size of tweets people generally commit some mistakes while tweeting so pre-processing is necessary. The use of modern emoticons which are known as emojis that is largely used in social media communications that conveys variety of emotions. The purpose of this paper is to survey N-gram method and Hidden Markov Model for Spell-Checking and Correction of tweets and also Emoji Sentiment Ranking method which is used to evaluate sentiment mapping of emojis by using sentiment polarity such as negative, neutral, or positive.

Keywords— *Classification of Emoticons, Emoji Sentiment Ranking, Sentiment Bar, Sentiment labels, Sentiment score.*

1. INTRODUCTION

Sentiment analysis is the branch of study in which user opinions are analysed at individual level or group level about any specific services and situations using different approaches and techniques in Data mining. Sentiment analysis is an important research area that identifies the people's sentiment underlying a text and helps in decision making about the product.

Twitter, which is one of the most popular social media platforms, have more than 200 million tweets per day [9]. Tweets are generally short in length. Due to limited size of tweets, people generally commit some mistakes while tweeting so pre-processing is necessary. The process of spell checking and correction involves detection of error words and then giving correct words for incorrectly spelled words in text as suggestion. There are generally two types of Spelling errors: Non-word spelling errors: These errors are the unacceptable words in the dictionary. Example: the >>the Real-word spelling errors: These are the legal words in dictionary but used incorrectly. Example: piece of cake >> peace of cake. This survey aims and focuses much of the work for pre-processing of text in twitter in English language.

The use of social media platforms is increasing day by day and along with texts the emoticons also plays a significant role in communication with increase in technology, and various applications and devices have given different types of pictures and emoji that uses graphical language representation. The use of emoticons in chatting, tweets and comments is more popular and is increasing day by day. Some social network sites and micro blogging tools such as Twitter allows individuals to express their feelings/opinions to specific results. Emoticons can be classify in two categories such as positive and negative emotions. Positive emoticons consist of love and joy whereas negative emoticons consist of sadness and anger. Here, different features of these techniques are studied and how these techniques can be used for data pre-processing and exploiting emoticons

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2. LITERATURE REVIEW

In following paper, different techniques used for Sentiment analysis are specified. For spell checking dictionary lookup approach is used in which each word is compared with word in the dictionary. The N-gram algorithm based on similarity coefficient for spell checking and HMM algorithm based on Observation matrix and state transition matrix for correction are used for data pre-processing. For exploiting emoticons, tweet feature extraction algorithm and lexicon approach is used for classification and sentiment analysis.

2.1Machine Learning based technique: Machine-learning approach (ML) uses different learning algorithms that are used for predicting different sentiments from the given datasets. Supervised learning consists of labelled data, therefore target value is present and the algorithm learns under supervision and gives the desired output. Unsupervised learning does not consists of labelled data, therefore target value is not present and the algorithm derive the characteristics of the data on its own.

2.2Lexicon Based technique: These algorithms uses the unsupervised learning approach, were large amount of training data set and labelling rules is not maintained. Which makes whole process is much faster and easy as compared to other unsupervised technique. Two approaches are as follows:

a. *Dictionary Based approach:* The main strategy of dictionary based is it's working on manually created set of opinion that are repeated and then finding their synonyms and antonyms by reiterations and save these word in a form of list in database and then these iterations repeat until no synonyms and antonyms are found. After that, errors are corrected and removed manually.

b. *Corpus-Based approach:* Corpus approach overcomes the limitations of dictionary technique and finds opinion in particular field. Limitation of this approach is that its cannot show high quality result in big amount of data, such that to analyse the movie review comments that posted online this can't analyse well but this approach is good for small review data set like Facebook post comments or tweets.

2.3Hybrid approach: This technique is uses the combination of various machine learning approaches and techniques. For initial sentiment analysis sentiment lexicon is constructed. These sentiment analysis reviews are different types in machine learning method.

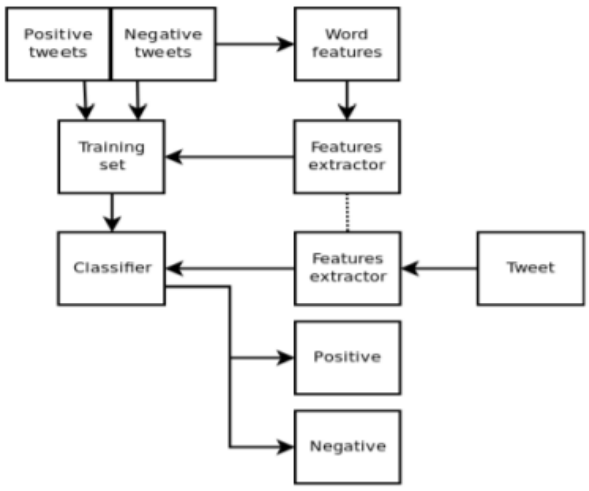

Fig-1: Sentiment Analysis Architecture [1]

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Following are some of the contents, which have been reviewed which focuses on the accuracy of different techniques.

1. Spelling Error detection and correction Techniques [1].

The paper focuses on dictionary lookup techniques for spelling checking. Dictionary Lookup Techniques were used for spell checking process. In this technique, every word of the input text is checked with the words present in dictionary. If it is present in dictionary, it is correct otherwise it is incorrect. In N-gram technique, n-gram is collection of characters of the length N. It includes precompiled table of n-gram words. Then input word is compared with this n-gram table or dataset. Based on this word is detected as correct or incorrect. If N=1 then it is unigram, N=2 then it is bigram and so on. In dictionary lookup approach, each word is compared with word in the dictionary.

2. Parallel spell-checking Algorithm based on Yahoo n-gram dataset [2].

This paper focuses on algorithm, which uses shared memory model for execution of threads. The algorithm which is developed in this paper is for executing the threads on machines that supports multi-processor or multi-core systems. In this algorithm= {w1, w2, wn} text containing words are been checked in parallel fashion to detect the errors using threads. The n-gram datasets are accessible to all the threads and then using 2-gram technique it will generate candidates E= {e1, e2, en} where E is the candidate. This candidate generated is useful for correction process. As this approach uses candidate technique which uses bi gram technique for detection of errors in sentence.

3. HMM based error Correction mechanism [4].

This paper proposed an algorithm in which HMM model describes a system in any one of the state Sn=S1, S2, Sn. and system can change the state from one state to another at any time. P(the|the) =P(t|t)PSpAdd P(h|h) P(e|e) this is the type of adding space. In this it uses, initial state probabilities, which are, actually word frequency. It includes transition probability of word given its predecessor and emission probability to type word x when word y was intended. It includes four steps for states substitution-if the word is incorrect then it is substituted with the correct one, merging-if the space between two words is not required the merging of words is done, splitting-splitting the merged words, null-if there are no changes in the sentence.

4. Detection and correction of non-word spelling errors in Hindi language [6].

The paper focuses on static based algorithm, which is N-gram algorithm. New algorithm that is Multispell algorithm that is based on N-gram technique, is used. It is the improvement of n gram model. Multispell algorithm uses two steps for spell checking that are lexical Resources and similarity scores. Lexical resources provide information about the words of natural languages. These resources will be useful for checking and correcting the words. Initially the similarity scores are calculated by the n-gram algorithm and then the identification of correct word is done based on similarity scores. If the count of that similarity coefficient is more then it detects that entered word is incorrect.

5. Exploiting emoticons in Sentiment Analysis [7].

The paper proposed focuses on techniques for twitter sentiments. As twitter, have text message limitations to 140 characters. So people uses emoji's instead of big texts to express their sentiments. Emoticons are ASCII art emoticons are also called as smiley's. Emojis, which are used along with text, gives more sentiment or meaning to plain text, which can can express joy, sadness, laughter or cheekiness. To understand emoji's in automated system first need to analyse that emoticons can typically relate to sentiments of the data in which they occur. They affect sentences or paragraphs. Some

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paragraphs contain only one emoticon, which shows different sentiments, but in other paragraphs there are multiple use of emoticons so it will affect the sentence where it take place.

6. A framework for emoticon mining from text in online social network [8].

The paper states a system in which the interest is in mining emotion from text shared OSN in form of posts and comments. It identifies the correct emotions from the post or tweets. This system predicts the relationship among many individuals which is based on the content of the text that is being shared online for identification of each individuals communications with their emotions in the text or not. Keyword identifying which is based on lexicon dictionary grouping approach.

7. Sentiment Analysis using emoticon and keyword [12].

This paper focuses on study and draw conclusion about subjectivity, polarity and the feelings that expressed in user generated content, which mainly consist of free text document. The approach involves detection and use of self-defining features that available within the data, take accounts two emotionally rich features: -a] emoticons b] list of emotionally intense keyword. From this paper it has been studied that there is machine learning approach on collection of training data using evaluating and comparing the result of two separate elements that is emoticons & keywords. There is graphical comparison between keyword and emoticons on subjectivity level, polarity level. In this paper, proposed system integrates and automates all tasks associated with semi-supervised emotion detection.

8. Social network user's content personalization based on emoticons [11].

This paper develops an approach for multiple contents and then perform sentiment analysis for it.. The social networks helps sharing user multidimensional context, which include text, image, audio and video at any time. A decision tree based user's context classifier and prediction model is designed to classify tweets according to emoticons expressed through the emoticons. There are nine basic emoticons, which is being proposed by Unicode group. These emotions are mandatory part of human nature that can be considered along with text.

3. ANALYSIS

The following Table-1 gives the analysis of literature papers on spell checking, correction and exploiting emoticons which focuses on N-gram, Hidden Markov Model and Emoji Sentiment techniques that uses different datasets and have different accuracy.

Table-1: Analysis Table

No	Title of Paper	Techniques	Dataset	Accuracy
1.	Spelling Error detection and correction Techniques [1].	Dictionary lookup. N-gram	n-gram dataset	Efficiency-number of searches relatively less in n-gram.
2.	Parallel spell-checking Algorithm based on Yahoo n-gram dataset [2].	Spell checking algorithm using parallel technique.	Using Yahoo dataset.	Total errors corrected is 94%

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3.	HMM based error Correction mechanism [4].	Spell correction algorithm based on HMM	Google books corpus	Error rate has been reduced 10.00% to 1.27%
4.	Detection and correction of non-word spelling errors in Hindi language [6]	Dictionary lookup. N-gram.	n-gram dataset and Twitter API	Accuracy for recall-23% to 50% Precision 18.25%
5.	Exploiting emoticons in Sentiment Analysis [7].	Machine Learning Lexicon based	Twitter API	Sentence level yields accuracy of 59%
6.	A framework for emoticon mining from text in online social network [8].	Lexicon based	Facebook Dataset	87% Accuracy for emoticon mining.
7.	Sentiment Analysis using emoticon and keyword [12].	Machine Learning	Multi-lingual dataset and twitter dataset	Automation of all tasks related to emoticon detection
8.	Social network user's content personalization based on emoticons [11].	Tweet features extraction algorithm	Twitter datasets and API	83% accuracy for sentiment analysis.

From the analysis of all above papers, paper [8], which uses twitter dataset using tweet feature extraction for sentiment analysis of multi-dimension content based on decision tree, which gives better accuracy of 83%.

4. CONCLUSIONS

The use of N-gram and HMM model for spell checking and correction reduces mistakes and improves the performance. The construction of an Emoji Sentiment Lexicon and the Tweet feature extraction algorithm for different emoticons in tweets based on their occurrence is necessary for efficient sentiment analysis. The emoji sentiment lexicon approach can be used in combination with a sentiment behaviour text. In this paper various techniques has been viewed and analysed in depth using the sentiment properties of the emojis and gives some interesting conclusions for both text and emoticons. It is expected that the use of emoticons will increase and how the analysis of both text and emoticons will be done. Until now, many researchers have focused on text based sentiment analysis but have not given much priority for emoticon sentiments so the proposed system focuses on emoticon sentiments. In future, more research is needed in improving the performance measures for both text and emoticons sentiments. Sentiment analysis has wide scope and can be applied for new applications and many other social media platforms. One of the important challenges that exist is analysis of sentiments in other languages that deals with various expressions, and also on the basis of product features or attributes.

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5. ACKNOWLEDGEMENT

We would like to express a deep sense of gratitude towards our guide Mr. Tatwadarshi P.N., Professor of Computer Engineering Department for his constant encouragement and valuable suggestions. The work that we have been able to present is possible because of his timely guidance and support.

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EFFICIENT APPROACH FOR IDENTIFYING PHISHING WEBSITES

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ABSTRACT

The usage of web is increasing with the number of web users increasing day by day and so are the malicious activities. Phishing is one such activity. It is an online criminal act in which a malicious webpage impersonates as a legitimate one to acquire information from user. It takes the advantage of human ignorance and their naïve nature with regards to their interaction with Electronic Communication Channels. Applying appropriate methods can prove to be helpful in detecting these Phishing Websites. Various techniques have been proposed for the purpose of Phishing Detection with the help of Machine learning algorithms. The problem with this is that not all of these systems provide the accurate results that are required. For providing greater accuracy in Detecting Phishing websites we use URL features along with a Decision Tree Algorithm. Among various Decision tree algorithm C4.5 can be considered as an appropriate one. The proposed system will provide better accuracy as when compared with the system that uses the method of Naïve Bayes. The System will provide better accuracy in terms of Processing time and other Evaluation metrics.

Keywords: *Phishing, URL, Classifier, Machine Learning, Phishing Site*

1. INTRODUCTION

In modern times as the techniques for Phishing Detection have advanced, various methods present some advantages as well as issues. Data mining techniques have been used in Phishing Detection since early time and its usage can never go obsolete. Hence, there are many systems implemented in this field. As a result, we need a system with, 1. Appropriate methodology 2. Less processing time 3. Good value of evaluation metrics. The proposed system focuses on yielding accurate results regarding the decision about Phishing site or legitimate site, improving the value of various evaluation metrics, less processing of time and fast retrieval of data.

Heuristic based approach along with decision tree algorithm is used in the system to enhance the accuracy of the system. For Classifier used C4.5 algorithm is used. This algorithm is the incremented version of ID3 algorithm. For heuristics various URL features, AlexaRank, etc. are used.

The proposed system aims to increase the accuracy of phishing detection systems that aim to differentiate between phishing sites and legitimate sites with the help of URL features using Heuristic Approach. The proposed technique extracts features in URLs of user-requested pages and applies those features to determine whether a requested site is phishing site. This technique can detect phishing sites that cannot be detected by blacklist-based techniques; therefore it can help reduce the damage caused by phishing attacks. The proposed system uses efficient C4.5 algorithm which accurately predicts phishing sites and takes less processing time than Naïve Bayes algorithm and also uses memory more efficiently.

The use of web is growing at a pace that is hard to slow down. The malicious activities are too growing, phishing is amongst one such malicious activities. It is necessary not only to have systems that can detect the phishing websites but also have systems that provide accuracy at this job. The proposed system does this task of identifying phishing websites and uses techniques that can provide greater accuracy and efficiency at its work.

This paper has proposed the website phishing detection model. The rest of the paper is organized as follows: Section 2 provides the literature review of related studies. Section 3 gives detail about relevant and important phishing website features which will be used in the model to distinguish website between legitimate and phishing. Section 4 provides proposed system for detecting phishing sites. Section 5 gives detail about work and its future direction.

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2. RELATED WORK

Heuristic system and listing system for detection is used. Here black-list method stores phishing sites and checks for given site, whether site is present in list or not, if present than it is phishing site else legitimate, whereas the white-list method is opposite of it. Both are not most effective in detecting phishing sites because of their short lifespan. Heuristic method is a privileged way, efficient to classify sites. So, by checking out both methods, heuristic approach can be selected for implementation since it is more efficient than listing method. The drawback is that heuristic approach consumes more processing time for prediction than listing approach [7].

Various approaches for detection of phishing websites and overview of machine learning based approaches are present. CANTINA, comparison of machine learning techniques, classification mining techniques, comprehensive architecture for detecting phishing web pages, etc are also mentioned in studied paper. Some of updated, new phishing features are introduced. Machine learning based techniques require a high computational power to extract and compute the features in real time environment. Overview of various features based machine learning approaches for phishing detection is provided thus, selection of appropriate number of features for detection of phishing sites needs to be done. The drawback in this paper is training machine learning algorithm and even studying them is a challenging task [11].

In one more system Clustering is done using K-means and Naïve Bayes Classifier Clustering is applied to URL features. Naive Bayes is applied to both HTML & URL features. A database is created with three sets: Valid Phish, Suspicious Phish, and Invalid Phish. This system generates output faster. The drawback of this system is that accuracy is compromised. K-Means Clustering is able to generate output at higher throughput but it lacks efficiency. It is inefficient while working on large data and improving the algorithm is necessary. Solution is needed so that large data sets can be handled efficiently [9].

Algorithm ID3 and C4.5 both produce reasonable decision trees. C4.5 is an extension of algorithm ID3. It is more efficient than ID3.Comparison is done between both of them where C4.5 improves a few features of ID3 behaviour. ID3 is not capable of predicting most of the phishing sites but C4.5 is more reliable. It is capable of using unknown values, attributes with different weights, continuous data, pruning the tree after being created. Thus, Naïve Bayes algorithm could have been replaced by ID3 but because of its lack in performance C4.5 algorithm can be taken into consideration. Thus, the efficient C4.5 algorithm can be chosen for implementation [5].

Important characteristics that identify illegitimate websites from original sites are discussed and an implementation of C4.5 algorithm is used for classifying illegitimate websites. It aims to improve the performance by combining with boosting algorithms, reduced feature set maintaining the classification accuracy without compromising on true positive rates. Datasets were prepared in such a way to measure the variation of accuracy rate with 9 respects to dataset size. Implementation of C4.5 with AdaBoost algorithm in WEKA tool gives us higher classification accuracy against the tested training dataset. The drawback in this system is, performance of AdaBoost depends on data and weak learner and Consistency with theory. AdaBoost can cause over-fitting problem or if weak classifiers are too weak means under fitting problem, it is sensitive to noisy data [12].

3. PROPOSED SYSTEM

In this System, admin will upload a dataset which will contain a list of URLs (List of Legitimate and list of phishing sites). The admin will train the system using C4.5 and Naive Bayes Algorithm. Using C4.5 algorithm, the admin will generate rule set which will be saved onto the user system. After training the system, admin tests the system by giving input as URL to the system .The system will predict whether the site is phishing or legitimate site. The Result will be stored in the database retrieved. The extracted features are given as input to previously generated classifier. This classifier will predict whether the URL is phishing or legitimate site. Same flow of system executed by using Naïve Bayes algorithm. The admin can compare the accuracy of the system by comparing both the algorithm results in graphical format.

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A. System Components

1) List of URLs

List of URLS of phishing sites and legitimate sites are stored in database with their URLs address, Ids, online status and result individual URL that URL is phishing site or legitimate site.

2) Feature Extractor

There are several features which will be helpful to determine phishing websites from legitimate ones. In proposed model non content based features such as URL and domain name features are extracted. Length of URL, number of dots & slashes, presence @ symbol, Special Character; HTTP & SSL check, IP address, Age of Domain etc. such features are extracted from list of URLs of dataset or from requested single URLs.

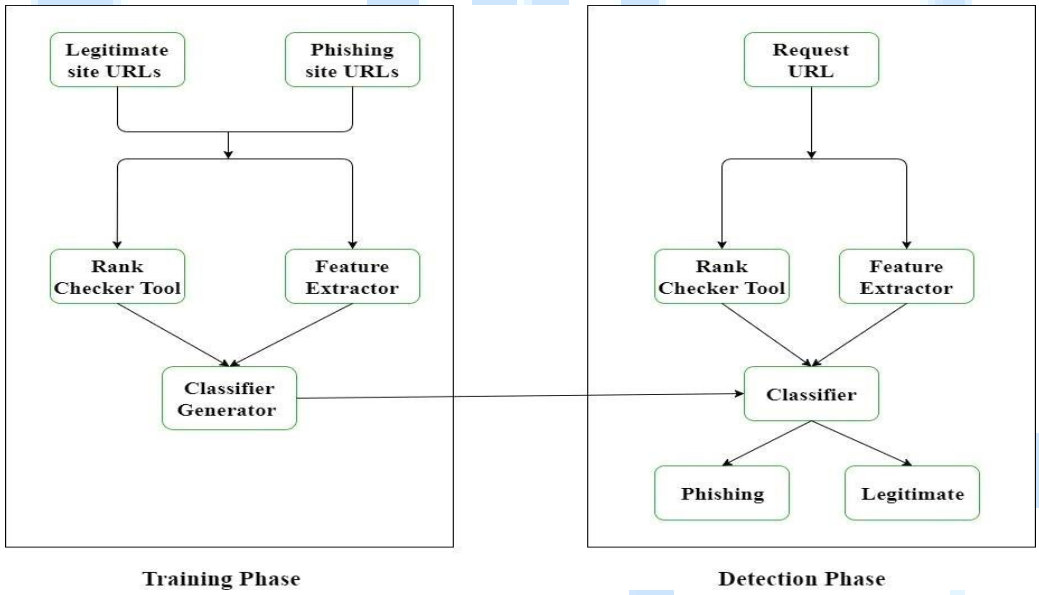

Fig. 1: System Flow Diagram

3) Rank Checker Tool

By using Alexa Rank Checker Tool at runtime, we can obtain page rank of URL or list Of URLs. Rank Checker tool is used for feature regarding to website traffic analysis.

4) Classifier Generator

From dataset of extracted features of URLs, by applying machine learning algorithms on it rule set is generated to determine whether websites are phishing or legitimate websites. Here C4.5 decision tree algorithm and Naïve Bayes algorithm are used separately to the proposed.

5) Testing URLs

To test model, single URL or list of URLs are passed.

6) Classifier

Previously rule set generated in Classifier generator is used as classifier to determine whether phishing sites or legitimate sites.

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7) Result of URLs

Requested URLs are phishing site or legitimate site are successfully classified. Also comparison of efficiency of both C4.5 algorithm and Naïve Bayes algorithm for proposed system is also displayed.

The System Flow diagram is explained as follows:

B. Training Phase

In the Training Phase a list of URLs of legitimate sites and Phishing sites are collected and stored in advance. The collected list of URLs is transmitted to the feature extractor. Extraction of URL features is done and from rank checker tool the traffic rank of websites is retrieved. These extracted features are stored as input and passed to the classifier generator which will then generate rule set of phishing site by using machine learning algorithm.

C. Detection Phase

Testing URL is entered for verifying whether it is phishing or legitimate site. From testing URL, extraction of URL features is done and from rank checker tool, traffic rank of website is retrieved. These extracted features are given as input to previously generated classifier. This classifier will predict whether the URL is phishing or legitimate site.

Algorithms used

1) C4.5 Algorithm

It is a supervised learning algorithm, it needs a set of training examples and each example can be seen as a pair: input object and a required output value (class). The algorithm analyzes the training set and builds a classifier that able to precisely classify both training and test examples. A test example is an input object and the algorithm must predict an output value the example must be select to a class. The inputs for the algorithm consists of a set S of examples interpret by continuous or discrete attributes, each example belonging to one class. The output is a decision tree or/and a set of rules that assigns a class to a new case.

2) Naïve Bayes

It is a classification method based on Bayes' Theorem. Naive Bayes classifier expects that the presence of a particular feature in a class is unrelated to the existence of any other feature. Even if features depend on each other or upon the continuity of the other features, all of the properties independently contribute to the probability of desired decision or result. Naive Bayes model is easy to build and especially useful for very large data sets. With simplicity, Naive Bayes is known to exceed even highly refined classification methods.

4. EVALUATION MATRIX

In order to calculate the accuracy of proposed system using C4.5 and Naïve Bayes Algorithm respectively following evaluation parameters are used.

A. False Positive (FP):

This determines the rate of legitimate sites (L) wrongly classified as phishing sites (P).

$$\mathbf{FP} = \frac{\mathbf{L \rightarrow P}}{\mathbf{L \rightarrow P + L \rightarrow L}}$$

B. False Negative (FN):

This determines the rate of phishing sites (P) wrongly classified as legitimate sites (L).

$$\mathbf{FN} = \frac{\mathbf{P \rightarrow L}}{\mathbf{P \rightarrow L + P \rightarrow P}}$$

C. True Positive (TP):

This determines the rate of phishing sites (P) correctly classified as Phishing sites (P).

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$$\mathbf{TP} = \frac{\mathbf{P \rightarrow P}}{\mathbf{P \rightarrow P + P \rightarrow L}}$$

D. True Negative (TN):

This determines the rate of legitimate sites (L) correctly classified as legitimate sites (L).

$$\mathbf{TN} = \frac{\mathbf{L \rightarrow L}}{\mathbf{L \rightarrow L + L \rightarrow P}}$$

E. Accuracy:

Accuracy is the total ratio of the prediction that a determined phishing site is actually a phishing site, and that a determined legitimate site is indeed legitimate.

$$\mathbf{Accuracy} = \frac{\mathbf{TP + TN}}{\mathbf{TP + TN + FP + FN}}$$

5. CONCLUSION

Previous system used listing method and Naive Bayes classifier to classify phishing sites. In this project, we proposed a URL based phishing attack technique that employs URL based features. To make feedback for each URL more meaningful, a heuristic system that gives potent URL classification feedback is implemented. The method combines URL based features used in previous studies with new features by analyzing phishing site urls. Additionally, we generated classifiers through several machine learning algorithms and determined that the best classifier was C4.5. Various heuristics are used to obtain a classifier that would be able to achieve high accuracy, while maintaining a minimal false positive rate. Training machine learning algorithm enabled the classifier to learn new trends in the characteristics of urls over time in a quick manner .The proposed technique can provide security for personal information and reduce damage caused by phishing attacks because it can detect new and temporary phishing sites that evade existing phishing detection techniques, such as the black-list based technique and white-list based technique.

6. EXPECTED RESULT

The aim of our system is that it should consume less or minimum processing time, should deliver more accurate results and should use memory more efficiently. Previous system used naïve bayes classifier which was not capable of predicting most of the phishing sites accurately. Moreover, Naïve bayes consumes more processing time for predicting phishing sites than C4.5. The proposed system uses efficient C4.5 algorithm which accurately predict phishing sites and takes less processing time than Naïve Bayes. Also, C4.5 is decision tree mining algorithm, which in turn uses memory more efficiently than Naïve Bayes. Proposed C4.5 algorithm is better than Naïve Bayes will be proved in final results by plotting a graph of C4.5 Naïve Bayes in terms of above parameters.

7. ACKNOWLEDGMENT

Our thanks to the faculty and principal for giving this opportunity to express our work.

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ANALYSIS OF ANTI-SHOULDER SURFING ATTACK TECHNIQUES

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ABSTRACT

Security may be a paramount factor. Every user of computer system gives primary preference to security. Authentication is process which provides security to user system. for authentication different methods are available. Of which the textual password and graphical secret key are most normally utilized methods, but this techniques undergo from shoulder surfing assault. Shoulder surfing is a sort for attack in which whatever the entity or any person can observe the password of user directly by watching over the victims shoulder or by using any gadget such as hidden cameras and secret megaphones that permit the assailant to record the complete login process of user. In shoulder surfing, the assaulter retrive the sensitive information of the victim, which eventually leads to commercial passing or data fraud. In this paper analysis of anti- shoulder surfing strategies for example such that pass shapes, watermark algorithm, grid selection, painting album mechanism, etc. has been performed to identify advantages and disadvantages of different techniques.

Keywords— *shoulder surfing, security, text based password, graphical password.*

1. INTRODUCTION

Verification is the important factor over data and computer security. In the current state, various confirmation schemes need been created by the researchers to resist shoulder surfing strike. The shoulder surfing assault could a chance to be done by unauthorized individual to acquire users password by watching over users shoulder as he enter his password. The conventional and most widely utilized verification scheme is Text based verification plan called as alphanumeric validation scheme. In alphanumeric authentication scheme, client needs to submit username and text password. This may bring about susceptibility such as secret key is troublesome to recall in case of long and difficult password otherwise passwords are easily guessed or hacked by attacker in case of short and easy password. Textual password is susceptible to shoulder surfing, concealed-camera and spyware assaults. To conquer the downside of alphanumeric secret key, techniques graphical secret key have been created by the researchers. This paper analyzes the various techniques which are used for opposing the shoulder surfing assault. The paper is arranged in the emulating sections, section II discusses the various techniques which are used for opposing shoulder surfing assault, section III is the analysis table which analyze the techniques and their pros and cons, and finally section IV concludes the paper.

2. METHODOLOGY USED

In this section, we illustrate various techniques which are used for opposing the shoulder surfing assault.

1. A Simple Text based Shoulder Surfing Resistant Graphical Password Scheme[7].

This paper relies upon content and hues which is productive shoulder surfing safe graphical secret key plan. The letters in order utilized as a part of this proposed conspire are 64 characters.In registration phase the client needs to set his textual password K of length L($8 \leq L \leq 15$) characters, and pick one shading as his pass shading from 8 hues consigned by the framework. The remaining of the 7 hues not chosen by the client are his decoy hues. When client requests to login the system, then the system displays a circle made out of 8 similarly measured sectors. In that login screen shades of the

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curves of the 8 areas are extraordinary, and every segment is distinguished by the shade of its bend. At first, 64 characters are set averagely and arbitrarily among these areas. All the showed characters can be simultaneously rotated into either clockwise or against clockwise course by using the clockwise button once or anticlockwise respectively. It is secured than many other graphical password techniques. Rotating the hues and bringing the user to specific character takes time.

2. An Anti-shoulder surfing mechanism and its memorability test[6].

In this paper painting album system is proposed. This framework having attributes of both acknowledgment and review graphical methods.In painting album system, swipe plan and shading plan and space plot are the techniques for secret word creation. Each info plot is non identical and it is user's option to pick the information plot they lean toward. It is important that the selected pictures, colored boxes are in same sequence as in registration phase. Any mistake in choosing the correct pictures leads to authentication failure. In this scheme users are able to recall their passwords under acceptable duration of time. the period of the secret key ought to be greater than eight.

3. Authentication Schemes for session password using color and special characters[4].

In this paper they have suggested two strategies to make session secret key utilizing content and shading which are impervious to bear surfing. Unexpected upon the rating given to hues, user gets the session password. In this paper they have suggested two techniques to make session secrete key using content and hues which are impervious to bear to shoulder surfing. During registration client submits password (least length of password is 8). During login client enter username an interface is shown based on hues picked by client. The lattice is of 8*8 size and holds digits 1-8 put haphazardly in lattice cells. The hue lattice comprises of 4 sets of hues in which each couple of hues represents the line and sector of the lattice. The number in the crossing of the line and sector of the grid is piece of session secrete key. Session secrete key gives preferred security against lexicon What's more beast drive assault as secrete key changes for each session. The secrete key should be of 'even' length It doesn't worth of effort. for the secrete key of odd length.

4. Defense against Shoulder Surfing Attack for Recognition based Graphical Password[3].

In this paper a technique is proposed for acknowledgment based graphical secret key which depends on lattice of pictures, where firstly client needs to enter username then it presents two lattice. lattice which contain pictures are longer and the blank lattice is smaller so the mapping is not specifically done. The client is solicited to pick many pictures from a set of pictures and in the authentication process client is needed to percived the preselected pictures. In these system client has to eliminate that lines and sections from the larger lattice which don't have a password. Again the same technique is rehashed and at last client has to map the secret key in the smaller lattice. it is simple for client to recall. It requires much storage space; a huge number of pictures must be kept up in a centralized database.

5. Graphical Authentication Using Region Based Graphical Password[9].

This paper uses a strategy for confirmation which depends on movements of mouse on a picture called mouse signals for choosing locales in image. Mouse gestures should be in a direct sequence with clear start and end. An arrangement of motion are placed in database, client are permited to pick an strategy of arbitrary images and a gesture for image while signing in, if user draw correct gesture he will be dealt with as authenticated user. Gestures are need aid catch through bounding box and corner detection algorithm. It causes the client to recall the secret key. It may be not safe on shoulder surfing

6. Graphical password authentication using pass faces[8].

This paper uses passface system. It uses its usability features and had developed a graphical secret key that uses combination of graphic and text password. The framework needs client to initialise the Graphical secret key verification process. System goes through Registration phase, Password Creation phase and Authentication phase. In Registration phase, user chooses 'Register' option from showed Homepage. In Password creation stage, three images gave by user are misshaped using distortion technique. The first and misshaped images alongside those text are then saved or preserved in database. Valid users are shown lattice of misshaped images. The client at that point require to perceive the right distorted picture and after that enter the content related with that picture .This strategy is done 3 times and on entering the

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right information client accesses the framework. It is invulnerable to shoulder surfing. Because of one of a kind picture and text, memory size increases and more time is consumed to login.

7. Grid based Authentication Password using Hash technique[11].

The paper depends on generation of session watchword utilizing writings and hues which are impervious to bear surfing and dictionary attacks. Confirmation strategy comprise of 3 stages: registration stage, login stage and verification stage. During registeration client enter as much secret key in first technique or selects the hues in the second technique. During login stage, the client will enter the watchword in view of the interface showed on the screen to the client. The client rate the hues and remember the ratings. And that rating is used as a password. It is safe on shoulder surfing assault. Memorizing the hues ratings is hectic.

8. Passaction: A New User Authentication Strategy Based on 3D Virtual Environment[12].

The system proposed in the paper is a virtual password validation framework in light of on virtual 3D environment. 3D objects are propagated in the virtual environment. The client camwood explore through the 3D environment and perform a succession of activities with the objects and these objects are called passactions. The sequence of interactions will create a virtual 3D password. The outline of 3D environments and the kind of object selected will figure out the secret key space. There are various unique objects for each client so that there is no confusion. It is somewhat protection from bear surfing as it replaces plain text based secret key with 3D virtual secret key. It is still defenseless against bear surfing.

9. Passshape Utilizing Stroke Based Authentication[2].

In this paper a novel validation strategy called passshapes is used. in this framework client authenticate to a figuring framework by drawing basic geometric shapes developed of a self-assertive blend of 8 distinct strokes. The passshape idea can expand the recognizibility when client practices the passshape several times. A passshape itself may comprise of a few stroke succession (several disconnected shapes) that are showned by an alphanumeric string for inward processing and storage. Each stroke has corresponding character representation. Each letter indicates stroke direction. For authentication the client has to replicate his passshape. The important aspect is that the strokes of a passshape are always drawn in the same order. Passshape offers better memorability and thus the mistake rate is less. Due to common usage entering pin will make insignificantly quicker than passshape.

10. Shoulder surfing resistant password authentication mechanism using convex hull click scheme[1].

In this paper they have used images/icons for password, instead of simple text password. The system suggested in this paper not just replaces the content based watchword entry with icons but also allows for making a convex hull with the selected icon. There are two phases, registration phase and login phase. During registeration the user should select images/icons which he/she wants to select. while login the client should select the same icons which were choosen at the time of registration. The system suggested in this paper not just replaces the content based watchword entry with icons but also allows for making a convex hull with the selected icon. It replaces text based password with images/icons. As pictures are not hard to memorize than text password it is a big advantage. Though it replaces text password with icons it is not resistant from bear surfing.

11. Securing Web Accounts using Graphical Password Authentication through Watermarking[5].

In this paper researchers proposed a new graphical secret key scheme for accessing web accounts called “Secure Web Account Access through acknowledgment based graphical secret word by Watermarking”. Here client chooses number of images as a secret key and while login client enter the random code generated below each image is set as secret key. Here client has to select number of images as a secret key and while login client will enter the random code generated below each image which has been set as a password. It is a transform about embedding an sort aboutmark in a multimedia images. The implanting process utilizes a mystery key that determines the area of watermark placed in multimedia images. Each time new password gets generated making dictionary, Brute power assault infeasible. Watermarked interactive objects are as yet powerless against assault on the grounds that advanced substance can be carefully altered.

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12. Two Level Authentication System Based On Pair Based Authentication and Image Selection[10].

The proposed framework makes the utilization of textbased secret key in the primary level of verification in a way which is depends on recalling capacity of the human mind. The primiary layer of authentication is combined based verification plot where modules are separated into three sections those are user registration process, system login process and session password selection. At the session of registeration client presents his client name and secret word. the period of secret key ought to be 8. The session secret key should contain 4 characters. amid the login stage when client enter his username and interface comprised of a grid will displayed. The size of grid is 6x6 and it comprises of digits and alphabets. These are arbitrarily produced and the lattice interface changes each time. The crossing of the selected lines and section of the lattice is the secret key. It resists, dictionary attacks, guessing and brute force. Time taken for login process is more than a normal login process. The following analysis table shows the pros and cons of various anti shoulder surfing assault techniques.

3. ANALYSIS TABLE

The following analysis table shows the advantages and disadvantages of various anti shoulder surfing attack techniques.

Sr. No.	Paper Title	Advantages	Disadvantages
1	Passaction: A new User Authentication Strategy based on 3D Virtual Environment [12].	It replaces content based secret key with 3D virtual secre key so it is difficult for shoulder surfer to detect the secret key.	It cannot bear shoulder surfing.
2	Securing Web Accounts using Graphical Password Authentication through Watermarking [5].	Brute power assault is infeasible.	Watermarked media Questions need aid even now defenseless on strike on account of advanced substance might be digitally altered.
3	Defense against Shoulder Surfing attack for Recognition based Graphical Password [3].	It is easy for client to recall the password.	Memory management is a issue.
4	An Anti-shoulder Surfing Mechanism and its Memorability [6].	It is easy for client to memorize and recall the secret key.	The period of the secret key should be always greater than eight characters.
5	Grid based Authentication Password using hash Technique [11].	It resistant to shoulder surfing.	Memorizing the hues ratings is hectic.
6	Passshapes – Utilizing Stroke based Authentication [2].	Passshape offer better memorability and thus mistake rate is low.	It cannot oppose shoulder surfing and spyware attack.
7	Authentication schemes for session password using color and special characters [4].	Better security is provided against Lexicon and brute power assault.	The secret key should be of even length only; it don't work for odd length.
8	Graphical Authentication using Region based Graphical Password [9].	It is easy for client to memorize the password.	Because of providing images to user for selection, memory increases in database. It cannot resist shoulder surfing.
9	Graphical Password Authentication using Passfaces[8].	It is invulnerable to shoulder surfing.	Due to unique image and text, memory increases as well as time taken to login is more.
10	A simple Text based Shoulder Surfing Resistant Graphical Password schemes	It resistant to shoulder surfing.	Time consuming.

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	[7].		
11	Two level Authentication System based on Pair based Authentication and Image Selection [10].	It resists, dictionary attacks, guessing and brute force.	Time taken for login process is more than a normal login procedure.
12	Shoulder Surfing Resistant Authentication Mechanism using Convex Hull Click scheme [1].	It replaces text based password with images/icons. As images are not difficult to recall than text password .	It is impervious to bear shoulder surfing assault.

4. CONCLUSIONS

From this survey we need range of the decision that how the authentication security is important, but at the period of concering on the security we also have to think about the convenience, by the client point of view. The preliminary analysis recommend that graphical secret key techniques accomplish preferred security than traditional text based secret key. They are additional accurate Furthermore trustworthy over printed passwords. Around these mulled over strategies DAS may be a large portion pertinent what's more not difficult to utilize not with standing not secure due to its lesquerella watchword space. Grid selection strategy defeats the issue of less secret key space of DAS however not difficult to utilize due to its multifaceted nature similarly as a long way concerning illustration Déjà vu is viewd as the login and registration phase becomes tedious due to handling of more images. Considering Passpoint and grid selection method, they are very protective and dependable, but Grid selection strategy is not applicable. Pasquinade focuses need the security playing point of a substantial secret key space in alphanumeric passwords. It additionaly has an benefit in secret key space over Blonder-style graphical passwords and acknowledgment-based graphical password, for example Déjà vu. The disadvantage of Passspoint is that it doesn't give protection from Spyware attacks. Some solution to this problem has to be given to achieve most reliable authentication system.

5. ACKNOWLEDGMENT

We hereby take the privilege to present our project report on "Analysis of Anti-Shoulder Surfing Attack Techniques". We are very grateful to our Project Supervisor Mr. Tatwadarshi P.N.for contributing his valuable moments in the Project from his busy and hectic schedule right from the Project's inception. We are very thankful to him whose guidance and support was an immense motivation for us to carry on with our Project. He has been a constant source of inspiration to us. His suggestions have greatly contributed for the betterment of our project. Our special thanks to the Head of Department Ms. Ashwini Save, staff members and lab assistants for their co-operation**.**

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A SURVEY ON INTERNET OF THINGS BASED SMART CITY

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ABSTRACT

To address the issues of urban open and the city progression cleverly, the use of IoT devices, for instance, sensors, actuators, and mobile phones, et cetera. The sharp system is the snappy and imperative source. Interconnecting with different IoT devices which communicate with each other over the internet for the smart system, which results to the generation of a very large amount of data. To get the real-time data of the smart city in an efficient way. In this paper, the sensors includes of smart home sensors, vehicle sensors, water sensors, weather sensors, etc. This system will use Big Data and hadoop for gathering the data of the smart city. With the help of IoT in smart city it will prevent accidents, individual tracking, inventory control, conserving energy, etc. In basic words a brilliant city consolidates data assembled from occupants, devices, and assets that is arranged and researched to screen and manage action and transportation structures, control plants, water supply frameworks, waste organization, law prerequisite, information systems, schools, libraries, recuperating offices, and other gathering organizations.

Keywords-- *Urban areas, Smart buildings, Monitoring, Smart homes, Business, IEEE 802.15 Standards, 6lowPAN, Constrained Application Protocol (CoAP), Efficient XML Interchange (EXI), network architecture, sensor system integration, service functions and management, Smart Cities, testbed and trials.*

1. INTRODUCTION

The Internet of Things (IoT) is a present correspondence perspective that envisions a not all that removed future, in which the objects of consistent everyday presence will be outfitted with microcontrollers, handsets for automated correspondence, and sensible tradition stacks that will influence them to prepared to talk with each other and with the customers, transforming into a fundamental bit of the Internet [1]. The IoT idea, thus, goes for making the Internet significantly more immersive and inescapable. Besides, by empowering simple access and collaboration with a wide assortment of gadgets, for example, for example, home machines, observation cameras, checking sensors, actuators, presentations, vehicles, etcetera, the IoT will cultivate the improvement of various applications that make utilization of the possibly gigantic sum and assortment of information created by such protests give new administrations to subjects, organizations, and open organizations. This worldview without a doubt discovers application in various spaces, for example, home robotization, modern mechanization, therapeutic guides, portable human services, elderly help, canny vitality administration and shrewd lattices, car, movement administration, and numerous others [2].

The goal of this paper is to talk about a general reference system for the outline of an urban IoT. We portray the particular attributes of urban IoT, and the administrations that may drive the appropriation of urban IoT by neighbourhood governments. We then review the online approach for the outline of IoT administrations, and the related conventions and advancements, talking about their reasonableness for the Smart City condition. At long last, we substantiate the discourse by detailing our involvement in the "Padova Smart City" venture, which is a proof-of-idea sending of an IoT island in the city of Padova (Italy) and interconnected with the information system of the city region. In such manner, we depict the specialized arrangements received for the acknowledgment of the IoT Island and report a portion of the estimations that have been gathered by the framework in its first operational days

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2. SMART CITY CONCEPT AND SERVICES

Under the political measurement, the essential impediment is the attribution of basic leadership energy to the diverse partners. A conceivable method to evacuate this barricade is to standardize the whole choice and execution process, thinking the key arranging and administration of the brilliant city viewpoints into a solitary, committed office in the city [7].

On the specialized side, the most important issue comprises in the non interoperability of the heterogeneous advancements as of now utilized as a part of city and urban improvements. In this regard, the IoT vision can turn into the building square to understand a bound together urban-scale ICT stage, in this way releasing the capability of the Smart City vision [8], [9].

In whatever remains of this area, we diagram a portion of the administrations that may be empowered by a urban IoT worldview and that are of potential enthusiasm for the Smart City setting since they can understand the win– win circumstance of expanding the quality and improving the administrations offered to the subjects while bringing a sparing preferred standpoint for the city organization regarding decrease of the operational expenses [6].

TABLE 1- Services Specification for the Padova Smart City Project

Service	Network type(s)	Traffic rate	Tolerable delay	Energy source	Feasibility
Structural health	802.15.4; WiFi and Ethernet	1 pkt every 10 min per device	30 min for data; 10 s for alarms	Mostly battery powered	1: easy to realize, but seismograph may be difficult to integrate
Waste management	WiFi; 3G and 4G	1 pkt every hour per device	30 min for data	Battery powered or energy harvesters	2: possible to realize, but requires smart garbage containers
Air quality monitoring	802.15.4; Bluetooth and WiFi	1 pkt every 30 min per device	5 min for data	Photovoltaic panels for each device	1: easy to realize, but greenhouse gas sensors may not be cost effective
Noise monitoring	802.15.4 and Ethernet	1 pkt every 10 min per device	5 min for data; 10 s for alarms	Battery powered or energy harvesters	2: the sound pattern detection scheme may be difficult to implement on constrained devices
Traffic congestion	802.15.4; Bluetooth and WiFi; Ethernet	1 pkt every 10 min per device	5 min for data	Battery powered or energy harvesters	3: requires the realization of both air quality and noise monitoring
City energy consumption	PLC and Ethernet	1 pkt every 10 min per device	5 min for data; tighter requirements for control	Mains powered	2: simple to realize, but requires authorization from energy operators
Smart parking	802.15.4 and Ethernet	On demand	1 min	Energy harvester	1: Smart parking systems are already available on the market and their integration should be simple
Smart lighting	802.15.4; WiFi and Ethernet	On demand	1 min	Mains powered	2: does not present major difficulties, but requires intervention on existing infrastructures
Automation and salubrity of public buildings	802.15.4; WiFi and Ethernet	1 pkt every 10 min for remote monitoring; 1 pck every 30" for in-loco control	5 min for remote monitoring, few seconds for in-loco control	Mains powered and battery powered	2: does not present major difficulties, but requires intervention on existing infrastructures

3. URBAN IOT ARCHITECTURE

From the examination of the organizations depicted, it clearly builds up that most Smart City organizations rely upon a united designing, where a thick and heterogeneous course of action of periphery devices sent over the urban zone deliver unmistakable sorts of data that are then passed on through suitable correspondence advancements to a control center, where data accumulating and getting ready are performed.

An essential normal for a urban IoT framework, henceforth, is its ability of coordinating distinctive innovations with the current correspondence foundations keeping in mind the end goal to help a dynamic development of the IoT, with the interconnection of different gadgets and the acknowledgment of novel functionalities and administrations. Another basic perspective is the need to make (some portion of) the information gathered by the urban IoT effortlessly available by specialists and subjects, to expand the responsiveness of experts to city issues, and to advance the mindfulness and the interest of nationals in broad daylight matters [9].

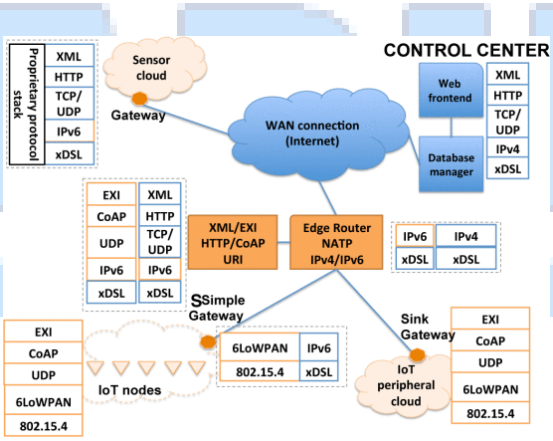

Fig. 1. Conceptual representation of an urban IoT network based on the web service approach.

Despite the fact that in the IoT space a wide range of models are as yet attempting to be the reference one and the most embraced, in this segment we center particularly around IETF guidelines since they are open and eminence free, depend on Internet best practices, and can rely on a wide group.

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The IETF models for IoT grasp a web benefit engineering for IoT administrations, which has been generally reported in the writing as an extremely encouraging and adaptable approach. Truth be told, web administrations allow to understand an adaptable and interoperable framework that can be reached out to IoT hubs, through the reception of the electronic worldview known as Representational State Transfer (ReST) [18]. IoT administrations planned as per the ReST worldview display extremely solid similitude with customary web administrations, in this way significantly encouraging the reception and utilization of IoT by both end clients and administration engineers, which will have the capacity to effortlessly reuse a great part of the information picked up from conventional web innovations in the advancement of administrations for systems containing shrewd items. The web benefit approach is likewise advanced by global institutionalization bodies, for example, IETF, ETSI, and W3C, among others, and in addition European research extends on the IoT, for example, SENSEI, IoT-A, and SmartSantander.

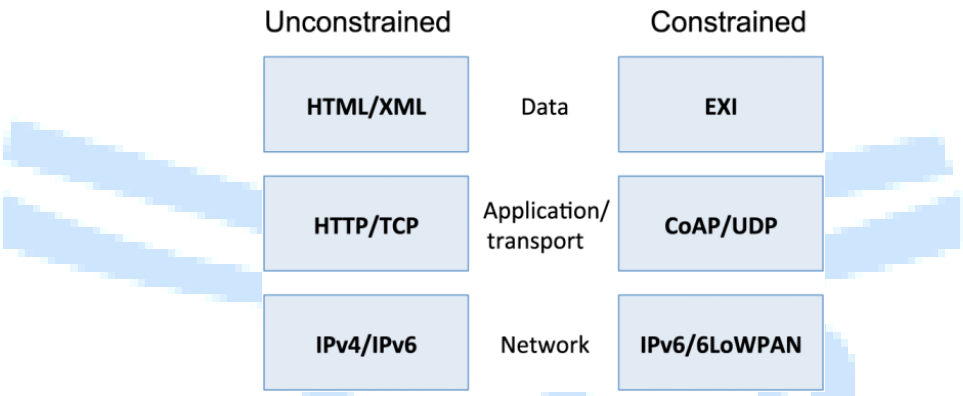

Fig. 2. Protocol stacks for unconstrained (left) and constrained (right) IoT nodes.

In the protocol architecture shown in Fig. 2, we can distinguish three distinct functional layers, namely (i) Data, (ii) Application/Transport, and (iii) Network, that may require devoted elements to work the transcoding amongst obliged and unconstrained arrangements and conventions.

4. AN EXPERIMENTAL STUDY: PADOVA SMART CITY

The structure talked about in this paper has just been effectively connected to various diverse utilize cases with regards to IoT frameworks. For example, the exploratory remote sensor organize testbed, with more than 300 hubs, sent at the University of Padova, has been composed by these rules, and effectively used to acknowledge verification of-idea showings of keen lattice and human services administrations.

The essential objective of Padova Smart City is to advance the early selection of open information and ICT arrangements in general society organization. The objective application comprises of a framework for gathering ecological information and observing the general population road lighting by methods for remote hubs, furnished with various types of sensors, set on road light posts and associated with the Internet through a portal unit. This framework should make it conceivable to gather fascinating ecological parameters, for example, CO level, air temperature and dampness, vibrations, commotion, et cetera, while giving a straightforward however precise instrument to check the right operation of the general population lighting framework by estimating the light force at each post. Regardless of whether this framework is a basic utilization of the IoT idea, despite everything it includes various distinctive gadgets and connection layer advancements, accordingly being illustrative of the majority of the basic issues that should be dealt with when outlining a urban IoT. An abnormal state review of the sorts and parts of the gadgets engaged with the framework is given from now on.

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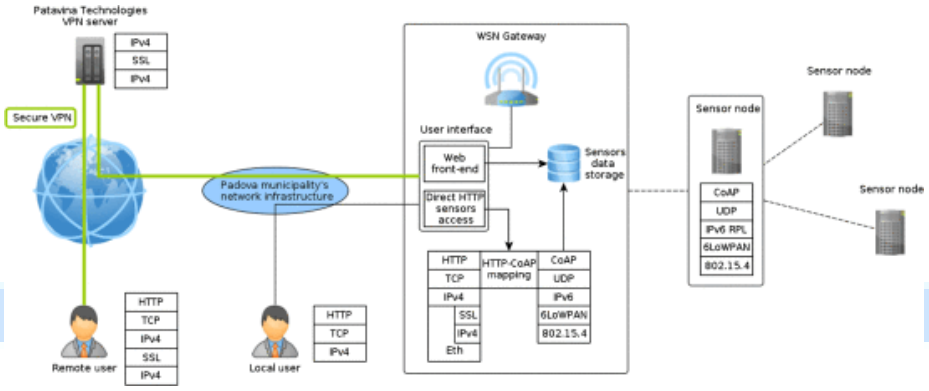

Fig. 3. System architecture of "Padova Smart City.

5. CONCLUSION

In this paper, we examined the arrangements presently accessible for the usage of urban IoTs. The talked about innovations are near being institutionalized, and industry players are as of now dynamic in the generation of gadgets that exploit these advancements to empower the uses of intrigue, for example, those portrayed in Section II. Truth be told, while the scope of outline alternatives for IoT frameworks is fairly wide, the arrangement of open and institutionalized conventions is fundamentally littler. The empowering advances, besides, have achieved a level of development that takes into consideration the viable acknowledgment of IoT arrangements and administrations, beginning from field trials that will ideally help clear the vulnerability that still keeps a gigantic appropriation of the IoT worldview. A solid verification of-idea execution, conveyed in a joint effort with the city of Padova, Italy, has likewise been depicted as a pertinent case of utilization of the IoT worldview to savvy urban areas.

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HYBRID TECHNIQUE FOR INTELLIGENT TEXT MINING

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ABSTRACT

In today's world with the advancement of technology, more and more data is available in digital form. Among which, most of the data is in unstructured textual form. So it has turned out to be basic to grow better systems and calculations to separate helpful and intriguing data from this substantial measure of printed information. The significance tends to increment as the measure of information develops and the preparing energy of the PCs increments. Here the issue is recognized, detailed and explained utilizing mixture calculation. The proposed cross breed calculation tries to defeat the issue of bunching and attempt to acquire the yield in insignificant time. By thinking about the disadvantage of existing frameworks, the mix of this calculation can be utilized as a part of other framework. MWO and Consensus calculation will frame a profound grouping at the worldwide level and furthermore help to expel the commotion exhibit in the information to get effective outcome. The working of MWO calculation is it will utilized for finding the ideal way of grouping. The Swarm insight is one of the new powerful worldwide enhancement system. It plans to locate an ideal arrangement by utilizing or altering Mussels restful motion conduct and the working of agreement calculation is it utilized as a part of which each discrete element is seen as straightforward grouping of the information. The in addition to purpose of this calculation is it evacuate the clamor display in information.

Keywords— Data mining, Text mining, MWO, Consensus, Information, Hybrid algorithm, Patterns.

1. INTRODUCTION

Text mining is the process of deriving high-quality information from text. To derived this high quality information some parameter and algorithms are used. From the earlier year numerous calculations are produced in this field however there are a few downsides so we propose another calculation in light of Consensus and mussels meandering advancement (MWO).Based on the writing review we come to know the different favorable circumstances and a few disadvantages about the MWO, Consensus calculation. In this paper we attempt to clarify this two calculations and to defeat this calculation we create mixture of this two calculations. Which is further clarify in more detail.

2. MUSSELS WANDERING OPTIMIZATION

Novel meta heuristic calculation called mussels meandering streamlining "MWO" is motivated by mussels relaxed motion conduct when they framed bed designs in their natural surroundings.

MWO underline rivalry and partnership among mussel thickness in the natural surroundings and irregular walk. A standout amongst the most noteworthy benefits of MWO is it give open structure to handle hard advancement issue by using research in spatial bed arranging scene level example assessment and restful motion conduct of mussels in their habitant. to achieve an ideal arrangement by numerically demonstrating mussels relaxed headway conduct when they organize their bed design in habitant. MWO calculation initially introduce 'N' mussels and afterward assess every mussel wellness by utilizing squared total mistake, as indicated by the wellness esteem we locate the best mussels and refresh their position in database. The benefits of MWO calculation is it work at worldwide level and acquire best ideal arrangement.

Algorithm of MWO:

1. Initialization:
2. Set t = 0;
3. FOR (mussel mi, i = 1 to N)

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4. Uniformly randomize initial position xi(0)for the mussel mi;
5. Calculate the initial fitness value of the mussel : f (xi(0));
6. END FOR
7. Find the global-best mussel and record its position as xg;
8. Iteration:
9. WHILE (t ≤ G, or f (x*) > ")
10. FOR (mussel mi, i = 1 to N)
11. Calculate the distance from mi to other mussel;
12. Calculate the short-range reference rs and long-range reference rl ;
13. Calculate short-range density Csi and long-range density CH;
14. Compute the moving probability Pi(t) of mi according to ;
15. IF Pi (t) = 1
16. Generate step length Li(t) Le´vy distribution of mi;
17. ELSE IF Pi (t) = 0
18. Li(t) = 0
19. End IF
20. Compute the new position coordinate Pi (t);
21. Evaluate the fitness value of the new position f(xi(t))
22. END FOR
23. Rank mussels according to the their fitness, find the global-best mussel and update the xg position;
24. Set t = t+1;
25. END WHILE
26. Output the optimized results and end the algorithm.

3. CONSENSUS CLUSTERING ALGORITHM

Consensus clustering combines separate clustering results starting with a same dataset under a single clustering result for better quality. For example if document may be lost Clinched alongside a few clustering solution, those same documents may be not fundamentally lost Over different clustering solutions, thereby consensus clustering could yield will better last results (data partitions). Further, our consensus clustering can even significantly get subject hierarchies for nature comparable will other non-incremental routines. This effect demonstrates that the Suggested consensus clustering strategy will be guaranteeing alternative, especially for decreasing those effort for support for subject hierarchies in real and progressive situations.

A Consensus calculation it is a strategy in software engineering used to achieve agreed upon around single information esteem among appropriated strategies or structures. Agreement calculation are arranged with achieve reliability to a framework coordinating, including different temperamental hubs. Illuminating that issue - known as the accord issue is noteworthy to passed on registering and multi-specialist framework. To suit this reality accord calculation in a general sense expect that some procedure and systems will influence detachment and that a few interchanges to will an opportunity to be lost. Thus, accord calculation should an opportunity to be blame tolerant.

Uses of accord calculation include:

Choosing if to present an appropriated exchange to a database.

Assigning hub as a pioneer for precisely appropriated task.

Synchronizing state machine copies and ensuring consistency among them.

Agreement bunching can give benefits past single grouping calculation can achieve. Accord grouping calculation regularly deliver prevalent or better bunching locate a Joined bunching unattackables toward single bunching Algorithm are less touchy to commotion, anomalies or test Variations and have the capacity should consolidated outcomes beginning with various disseminated wellsprings of data or characteristics.

Step of Consensus Clustering algorithm:

The K-Means algorithm is a partitioning algorithm where the number of clusters ‘k’ is provided a priori. The algorithm initializes k elements as cluster centroids and iteratively adds elements to the nearest centroid. The centroids are updated and the steps are repeated until centroids stabilize.

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1. Input: Gene Expression Array G (double [][])
   Number of clusters k
   Output: Set of Clusters C (int [])

2. Best cluster algorithm is a 2-approximation algorithm.
   Given k input clusterings where any clustering can have at most m cluster
   Input: Sets of clustering solutions S (int [][])
   Output: Set of Clusters C as best solution (int [])
   Generate Similarity Matrix
   Calculate cumulative distance of each solution to rest of solutions in S.
   Return the solution with least cumulative distance as best set.

3. Input: Sets of clustering solutions S (int [][])
   Output: Set of Clusters C as consensus solution (int [])
   Generate distance matrix D using dissimilarity metric for each generation pair of S.
   Initialize solution C such that each gene is in its own cluster.
   If the proportional dissimilarity distance of a pair < 0.5, merge the pair into one cluster.
   Merge in the increasing order of dissimilarity distances.
   Recalculate proportional dissimilarity distance to merged cluster
   Stop when no more merge possible i.e. each cluster at distance.

4. Input: Sets of clustering solutions S (int [][])
   Output: Set of Clusters C as locally optimal solution (int [])
   Generate Similarity Matrix
   Obtain initial solution Cloc using Best Cluster
   Do Forever
   For each element in nxn Similarity Matrix
   For each cluster in Cloc
   Move element to next cluster
   Accept move if cumulative distance reduced
   Terminate if cumulative distance cannot be improved.

5. Input: Sets of clustering solutions S (int [][])
   Output: Set of Clusters C as greedy optimal solution (int [])
   Generate Similarity Matrix
   Obtain initial solution Cgreedyusing Best Cluster
   For each element in nxn Similarity Matrix
   For each cluster in Cgreedy
   maxImprovement=0
   If curImprovement>maxImprovement
   maxImprovement= curImprovement
   If maxImprovement> 0
   Move element.

6. Input: Gene Expression Array G (double [][])
   Output: Set of Clusters C (int [])
   For each Base Clustering Algorithm i=1 to K
   *Bootstrapping Step: Resample G using perturbation
   Substitute missing values using average
   Execute using G as input and construct clustering solution Si
   Union with comprehensive clustering soln S
   Using S as input construct dissimilarity matrix M for each pair of genes (See agreement criteria)
   Generate distance matrix D based on proportion of disagreement between sets in S

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Execute consensus clustering algorithm using D as input and output solution C.

7. Input: Gene Expression Array G (double [][])
Output: Set of Clusters C (int [])
For each Base Clustering Algorithm i=1 to K
Using S as input construct dissimilarity matrix M for each pair of genes.
Generate normalized kappa coefficient for each clustering solution.

4. HYBRID OF MWO AND CONSENSUS

Step 1: For each sequence, find the quality of trace data, Q, within a small window centered on the column. Q = (Q1 + Q2 + … + Qn) / n

Step 2: Initialize a population of mussels and the algorithm parameters. At the beginning, N mussels are generated and uniformly placed in space Sd. Set the maximum generation G, coefficients of range references a and b, space scale factor d, moving coefficients a, b, and c, and walk scale factor c. Evaluate the initial fitness of mussel mi by computing the objective function f(xi). Find the best mussel and record its position as xg.

Step 3: Sum Q for each sequence with a gap in the column and compare it to the sum of Q for the remaining sequences. If the gap sum exceeds the non-gap sum, return gap. Qi = Si ● Wt

Step 4: Calculate the short-range density ns and long range density nl for each mussel. Using all mussels' coordinate positions, compute the distances Dij; i; j 2 NN between any two mussels by using Eq. (2), and then compute the short-range reference rs and long-range reference rl by (5). For all mussels, calculate their nsi and nli; i 2 NN by using (3) and (4), respectively

Step 5: Determine S, the 4 x 6 (six scores for each of for traces) matrix of Tarace - Data Classification scores for each sequence.

S = {S1 , …, Sn }

Step 6: Determine the movement strategy for each mussel. Calculate the moving probability Pi of mussel mi according to the short-range density nsi and long-range density nli by Eq. (6); If Pi = 1, calculate its step length by 'i = c[1 - rand()]-1

Step 7: Reduce each S to a vector, E, of four values that summarize the evidence for each trace.

Step 8: Multiply each value in E by its corresponding Q to produce a vector E' that has been adjusted by data quality.

E' = E x Q

//Hybrid

Step 9: Update the position for all mussels Compute the new position coordinate x0 i of mussel mi in Sd by using Eq. (7).
Step 10: Sum each of the corresponding E's to produce a vector, T, of the total evidence for each of the four bases.
T=Ti , TA = EA1' + EA2' + … + EAn'

Step 11: Evaluate the fitness of mussel mi after position updating. Calculate the objective function f(x0) for the new positions. Rank the solutions so as to find the global best mussel mg, and update the best record [best position xg and optimal fitness f * (xg)].

Step 12: Find the highest evidence (leading evidence) in T its corresponding base is the leader.

Step 13: Multiply leading evidence by the threshold to compute the maximum ignorable competing evidence

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Step 14: Examine if the termination criteria is satisfied? If it is true, stop the algorithm and output the optimized results; otherwise, go to step 4 to start the next iteration.

5. CONCLUSIONS

However the proposed algorithm presents a new hybriding of clustering of algorithms. This is motivated by the past success in improving the clustering results by combining traditional clustering methods with swarm intelligence. The proposed one is an algorithm that well combines a recent MWO algorithm with consensus clustering method for better performance than other algorithm.

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A SURVEY ON THE IMPACT, EVOLUTION, AND THE FUTURE OF CRYPTOCURRENCIES

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ABSTRACT

A number of cryptocurrencies have emerged within the last few years. Cryptocurrencies like Bitcoin, Ethereum, Monero etc. now exist simultaneously alongside physical currencies. The decentralized nature of these currencies gives them a natural advantage over fiat currencies. In this paper the impact of these currencies on consumers, organizations and governments is discussed. This paper also examines the evolution of these cryptocurrencies. Finally, the issues related to cryptocurrencies such as its security, and regulation are reviewed. The paper also ponders upon the future of cryptocurrencies and discuss whether it would be globally accepted or not.

Keyword—*Blockchain, Mining, Cryptocurrency, Ledger, Hashing, Cryptography.*

1. INTRODUCTION:

The history of currencies can be traced back to the era of barter system. Currencies have evolved from the traditional goods to gold and silver coins to today's paper currency. These currencies require some way to control supply and to impose different security properties to prevent fraud. In fiduciary currencies, typically the central bank or the government controls the money supply and takes anti-counterfeiting measures to protect the currency. Cryptocurrency first emerged in the year 2009 when the world's first decentralized currency 'Bitcoin' was created. Bitcoin was anonymously created by the sobriquet Satoshi Nakamoto who had developed the electronic payment system and based on this built a mathematical proof around it. This resulted in the formation of currencies which were independent from centralized authority and instantly transferable with an effectively low transfer fee.

2. IMPACT OF CRYPTOCURRENCIES

Cryptocurrencies have led to the emergence of new markets. By using Cryptocurrency, illegal transactions can be made without revealing identities. Thus, giving a rise in Dark Web transactions. A plethora of illegal activities have been facilitated because of the emergence of cryptocurrencies leading to several cybercrimes in past few years. Cryptocurrency presents a massive possibility for speculation much like gambling. Like trading of shares, there has been a significant increase in trading of cryptocurrencies. Without a central authority, the balance of currency power has shifted from governments and central banks to the masses. This has great potential to bring about changes in the current economic strata. Financial institutions and central banks maintain a record of all the transactions undertaken by the people to bring security and enable scrutiny with the help of Ledgers [14]. Now with digital currencies, people can challenge this economic power because of the public ledger system. This has led to the creation of a new autonomous bodies which can facilitate transactions. Cryptocurrency are also being rapidly adopted by many merchants and traders worldwide. Bitcoin, Ethereum, Ripple, Litecoin, Monero and many other cryptocurrencies continue to grow in price, market capitalization, and mainstream adoption. [12] Increased trading and demand has led to emergence of online Digital

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Currency Exchanges (DCE), that offer clients to trade fiat currencies or other assets for digital currencies. DCE's often allow trading of few currencies and provide an online personal cryptocurrency wallet.

The instability and volatility of these currencies, and partially because of the media, have attracted a lot of people interested in making 'easy-money'. Endless debates and discussions on whether these currencies are 'ponzi-schemes' or 'pyramid schemes' are becoming more frequent. But despite the criticisms, Cryptocurrencies have truly revolutionized the economic scene and are providing features and functions that are not only changing but also improving the way we do things. They are definitely disrupting the global economy, but by how much and at what cost remains to be seen.

3. EVOLUTION OF CRYPTOCURRENCIES:

Bitcoin was the first decentralized currency introduced in the year 2009 based on Blockchain released under open-source software. It was awarded through a process called 'mining' that involved solving difficult computational problems. The solution to these problems are easy to verify but difficult to compute. A cryptographic hash is calculated using SHA-256. The difficulty of the block is increased after a certain fixed number of bitcoins are mined. A number of cryptocurrencies have emerged since. Namecoin was created in order to attempt a decentralized DNS. In October 2011, Litecoin was released. It was the first cryptocurrency to successfully use scrypt (password-based function) as hash function and not SHA-256. The number of cryptocurrencies has been increasing rapidly in past couple of years, with each emerging currency promising to fix the problems of its predecessors. Cryptocurrencies and the blockchain in general have found a number of practical applications in today's computer era.

Cryptocurrencies have become a viable revenue generation alternative to advertisements in websites. Cryptocurrencies can be mined with the help of Javascript on client's system which would then be transferred to the currency address of the website owner. Almost 2500 websites as of 11th November 2017 have an embedded cryptominer in their java-script [15]. A number of libraries have been developed for mining using java-script including Coinhive, CryptocoinJS, and BitcoinJS. A good number of the websites implementing Javascript mining do not ask for user's consent. This raises ethical questions as it effectively 'steals' their visitor's valuable CPU resource.

Another problem is that of the increased carbon footprint required for mining these cryptocurrencies. It is estimated that with the current growth of these currencies, by 2019, it would require more electricity than entire United States and by 2020, more than the whole world combined [12]. Currencies like Ethereum, Monero are now using a small country's worth of electricity. This unforeseen problem has inadvertently led to an increase in the rate of global warming and is becoming a major hurdle that needs to be tackled in the very near future. A number of currencies have developed in order to solve these exact problems. Currencies like Filecoin, and Chia use storage and time-based stamps as a proof of work instead of intensive computational calculations and thereby saving precious energy [12]. Climatecoin claims to be the first currency that has zero carbon footprints.

Government regulations and bans, however, are perhaps the biggest hurdle in front of cryptocurrencies. Few countries have outright declared cryptocurrencies to be illegal. A significant number of countries are currently investigating the blockchain technology. The decentralized nature of these currencies makes it a safe haven for those involved in economic frauds including money laundering, illegal trade, and more as seen from the emergence of various Dark Net markets. A majority of the governments worldwide still remain indecisive and have neither accepted nor rejected cryptocurrencies.

4. FUTURE OF CRYPTOCURRENCIES:

The future of cryptocurrency depends upon inflation, commodities, accessibility and many more factors. Cryptocurrencies will play a crucial role during inflation. The average price of everything in the world is rising [13]. Due to this, the risk of hyper-inflation will undoubtedly rise. Cryptocurrencies are resistant to hyper-inflation. One journal article states that '*Hyperinflations have never occurred when a commodity served as money or when paper money was convertible into a commodity. The curse of hyperinflation has only reared its ugly head when the supply of money had no natural constraints and was governed by a discretionary paper money standard'* [7]. As cryptocurrencies are decentralized in nature, it will be immune from the woes of money supply theory. Reduction in general level of

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economics will not make cryptocurrencies volatile or lead to unavailability. The issues of unavailability are sorted as these currencies are electronics they can be subdivided unlikely fiat currencies. This will lead to low unavailability of currencies. By investing capitals in cryptocurrencies citizens can enclose their financial risk from hyper-inflation [13]. As there are many countries which have unstable currencies, Cryptocurrencies will help them in exchange rates.

There is a rise in fluctuation in exchange rates when two countries are in a torn-war in currencies. Cryptocurrencies will not fully help but in some extends it will minimal the risk of fluctuating exchange rates of traditional fiat currencies. Using cryptocurrencies as a place to hold one's money, they can either convert their currencies into some stable currencies or simply use the cryptocurrencies as a medium for their transactions [13]. Cryptocurrencies will also safeguard from fraud practises. As these currencies cannot be duplicated or in other words cannot be manipulated. In fact, it can be achieved by having control over half of the cryptocurrencies network. This require higher computing and can be achieve only for a few seconds. One of major use of these currencies are that they can be access from anywhere. This will help people who are in countries which lacks secure banking deposits or international trade.

Cryptocurrencies will also open up new opportunities for trade. If legalized by the government, customers would be able to bypass the problems associated with exchange rates, fees, and taxes when buying goods or services abroad. This will help people who are under hyper-inflation or in regions with unstable economies [13]. Many countries in near future can adopt these currencies, however for this to become real the country should be prone to hyper-inflation and it should have high rates of corruption and federal crimes. One of country, that has adopted cryptocurrencies (i.e. Bitcoin) was Cyprus [7]. There are three major thing that will roadblock the profitable way of developing countries struggling. Some of them are technological facility, cryptocurrencies facilities and fear of experiencing new ideas. One of the top issues that would resist the adoption of cryptocurrencies in countries with imbalanced economics is that they are tend to be technologically under developed. Specifically, those countries which lack access to the internet through personal computer. And those countries which have proper technological facilities lack proper financial technologies to adopt cryptocurrencies as payment.

5. CONCLUSION:

Despite some of the apparent drawbacks, cryptocurrencies will still remain as a masterpiece in modern digital currencies. This will change and disrupt the whole economic ecosystem of the world. If countries started adopting such currencies this will lead to a more secure and effective trading and marketing between nations. People should be aware about different cryptocurrencies that are emerging into market.

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ANALYSIS OF GREY HOLE ATTACK ON LLN'S USING RPL

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ABSTRACT

In last few years due to rise in IOT and its related research LLN's [3]has become an important part of a network and security domain. Usually these devices uses low power, limited memory, and fewer resources. For routing of information packets from node to node in such a network, a protocol is being developed called as RPL (routing protocol for low power and lossy network). Both ACP [2]and ANI[2], which are acronym for Autonomic Control Plane and Autonomic network infrastructure respectively (interfaces), are used by RPL. This fact made these networks very vulnerable and many different attacks are possible. Such as wormhole attack as well as Grey Hole[6] attack is possible which is very difficult to prevent. In this paper, we have analysed how RPL[2] protocol behaves on Grey Hole[6] attack over a LLN[2] network.

Keywords— *Grey Hole, RPL, LLN, Network Attack, IOT, Security, Network Protocol.*

1. INTRODUCTION

Low-power and lossy system ordinarily made out of numerous implanted gadgets with restricted power, memory, preparing assets interconnected by assortment of connections. Not at all like an Ad-hoc arrange, which is gathering of self-designing portable host framing an impermanent system with no additional framework, LLN's [1] are systems, for instance, material framework. Open shortest path (OSPF) and Intermediate System to intermediate system (IS-IS) such protocols are fine examples of the framework used currently for routing protocols. On-request Distance Vector (AODV) and Optimized Link State Routing (OLSR) [5] in their present shape don't meet the necessity for to utilize them as routing protocol for such systems.

As the previously mentioned protocols were not reasonable for LLN's IETF started building up a protocol particularly for LLN's which later named as RPL or Routing Protocol for Protocol for lossy and low power network RPL works by orchestrating topology in a Directed Acyclic Graph (DAG) where the topology is debased into Destination Oriented Directed Acyclic Graph (DODAGs) with roots at substance named as "controller".

Among AODV [4], DYMO and RPL, RPL routing protocol is most efficient as it has fast network establishment also it can handle critical scenarios. Likewise while RIP[4] is utilized as a part of for the most part restricted systems it is normal where the real topology of the system isn't known though OSPF is utilized as a part of bigger systems yet it can't oversee excessively numerous gadgets therefore RPL is more favored protocol for LLN.

Table – 1: Different Routing Protocols

Protocol	State	Link Cost		Node Cost	Control	Loss
RIP	Yes	-		-	Yes	No
AODV	Yes	-		-	Yes	-

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OLSRv2	No	Yes		Yes	-	-
OSPF/IS-IS	No	Yes		No	No	No
DYMO	Yes	-		-	Yes	-
DSR	-	-		-	Yes	Yes
TBRPF	No	Yes		-	No	Yes

2. RPL PROTOCOL FOR LOW POWER AND LOSSY NETWORK

RPL is specifically designed to work with LLN's which are low power router. The LLN's are for the most part utilized as a part of sensor or surveillance such as industrial monitoring automation building like air conditioning system, lighting access control etc. Connected homes, sensor network, health care, emergency management, environmental monitoring etc.

Distance vector Routing [4][3] is an algorithm on which RPL is based. RPL is hence a dynamic routing [9][8][4] protocol. The RPLInstanceID is shared by set of one or more DODAG's which is called as RPLInstance. In a LLN networks RPLInstanceID is a unique identifier. A RPL node may have a place with numerous RPL Instances & it might go about as router in some and as a leaf in other .A global RPL Instance ID must be unique to the whole LLN.RPL is an inclination based Routing that makes a Destination Oriented (DO) DAG perceived at an information power or sink node. The inclination is called rank, and it is in Broadway a portrayal of the node to assorted nodes concerning the DODAG root.

A Routing Target Function (OF) portrays how RPL hubs figure their rank capacities. Several requests are perceived in RPL. The fundamental issue in RPL is the approach that is utilized to assemble interface experiences. By virtue of the Trickle figuring, DIO messages are not broken. the trade between the little information structures that are utilized for keeping up neighborhood information at different layers of the convention stack, which may incite RPL utilizing conflicting or outdated connection information. The RPL meets high packet disaster rate. Packet incidents not on a very basic level increase way length. It essentially studies the connections that are at this minutes being utilized. This new framework permits a RPL node too enough to singular connections.

3. GREY-HOLE ATTACK

Grey-Hole attack is a modification of black-hole attacks in which nodes will drop the packets specifically. In black hole approaching and active data or packets are dropped without being seen by source hub that the packets did not exchanged to goal node[9][7][1]. At the end of the line aggressor attacks and dump packets at before goal hub gets them.

In black hole assault first Route ask for (RREQ) and Route answer (RREP) is gotten by source hub then aggressor sends RREP so as to demonstrate that the goal hub has gotten the packets. Grey Hole resembles a DOS attacks. It works in 2 stages. In which a hub can switch forward and backward between ordinary acting authentic hubs to perniciously acting hub which acts like black hole which is really an aggressor. Since the malicious node can be going about as an authentic node it is difficult to distinguish. The data of the next hop node from routing packet to goal node i maintained by each node [9]. By random chance that a source node i in need to send a parcel or packet to the goal node it will utilize a particular route and it will be checked in the routing table whether It is either accessible or not.

By random chance that node begins a route declaration process by connecting outer [5][8][7] request RREQ message to its nearby by getting the rote ask for message the transitional nodes will refresh their routing tables for turnaround route to the source. A route answer message is sent back to the source node when the RREQ inquiry achieves either to the goal node or to whatever other node, which has a present route to goal. Grey Hole assault influences the system to a great extent in execution and exactness department. Grey Hole carries on arbitrarily as it can go about as a pernicious

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node for quite a while or change to normal node and start forwarding packets or it can accept few packets randomly and drop others while forwarding. This behavior of Grey Hole makes it rather difficult to detect than Black Hole.

4. DETECTION OF GREY-HOLE ATTACK

Every node in a network maintains a table known as DRI (Data Routing Information) table this table is a collective information of all the neighboring nodes with respect to every other node in a network. After creating the DRI table as discussed every node analyses every other node in a network for an anomaly. It sends RREQ messages and receives RREP [9] messages from the neighboring nodes. Now initial node [9], which has started the anomaly detection, sends a packet to a suspected node through a cooperative node. If the node is actually Grey Hole than it will receive RREP message. If the cooperative node has not received the packet then it shows that suspected node [9] is Grey Hole and initial node updates the DRI [9].

Security threat can be involved while detection and isolation of malicious nodes. A bad mounting attack could be launched by group of malicious nodes through connive together this may lead in accusing a legitimate node and isolating it from the network. Although, this could be prevented by a simple technique of threshold cryptography [9]. If a node suspects a node to be malicious by invocation of cooperative detection mechanism procedure a private key is being sent to all its neighbors which has an alarm message[9] for all its neighbors. The suspected node [9] is being isolated from a network only when at least 'k' nodes [9] put their signatures (i.e. Private Key) [9] into alarm massage which is generated it is authenticated with all signatures. A global list of malicious nodes would be created and all the Node ID [9] of these nodes are identified as malicious node will be stored.

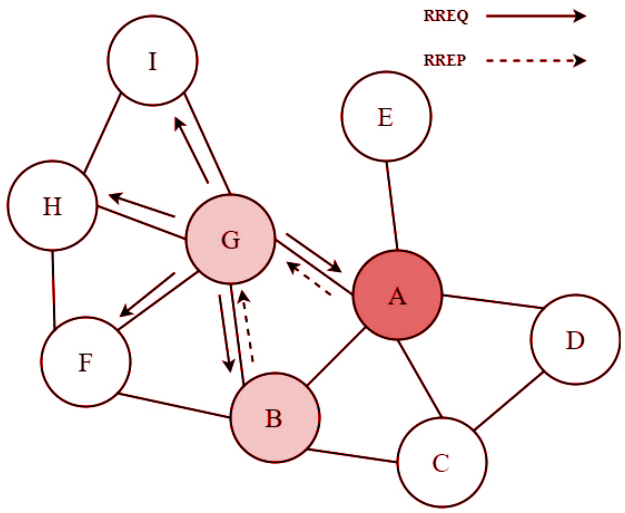

Fig.1 RPL Node Topology [9]

Periodically this list will be distributed in the network, as and when an update is made into it. Now, this list can create extra overhead to reduce it authors in this paper [9] has found an alternate method. In this method, the list could be piggybacked with normal routing messages (RREQ and RREP messages). So that it does not cause any extra overhead.

5. CONCLUSION

As LLN's are generally utilized as a part of numerous essential frameworks, for example, reconnaissance framework they are inclined to wind up focus of different malignant assaults. Above all else vital advance for safeguarding the system from such assault is recognizing such assaults. In the event of Grey-Hole assault, the contaminated hub can completely or incompletely drop bundles and can likewise carry on as a typical hub which makes it hard to identify. In this paper we have talked about how Grey-Hole assault can be identified on LLN's utilizing RPL directing protocol. Likewise how to keep the malignant node to meddle with the entire system utilizing edge cryptography by actualizing private key

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framework in the system. Which will distinguish and forestall Grey-Hole assault on LLN's. Through this investigation plainly Grey Hole assault can't be anticipated totally yet can be identified and amended the pernicious node from engendering to the authentic nodes.

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PHYSICAL AND LOGICAL DESIGN APPROACH FOR BUILDING BLOCKS OF IOT

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ABSTRACT

Over the last decade Internet has made significant impact in our economies and societies by bringing in remarkable communication and networking infrastructure. The world-wide web has been a major driver of global network information and media sharing. In continuation with this trend, it is poised to emerge as an "Internet of Things" where the web will provide a medium for physical world objects to participate in interaction. The Internet of Things is a pattern where the devices that are used daily are equipped with the ability to identify the object, sense and process the environment and that allows them to communicate with other similar devices over the internet, thereby the term 'Smart' is associated with the things of IOT. This way the digital information technology can integrate the physical world to the online world to provide a common interaction platform. It is estimated that by 2020 about 75 billion devices will be connected to internet and be called devices of IOT. In this paper, we have discussed the physical and logical designing structure of IOT, building blocks of Iot and the IoT enabling technologies.

Keywords*:* Internet of things, IoT, protocols in IoT, IoT enabling technologies, Communication in IoT, Computer engineering, Automation system

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1. INTRODUCTION

In recent years, the term 'Internet of Things' has evolved a lot. Internet of things, i.e. IOT simply corresponds to the interrelation of different computer entities, machines, people or any other thing that can send data over a network on its own without any human intervention. The Internet of Things refers to objects having their own identity and are connected to the internet to make many other domains smarter. It evolved so rapidly due to development in sensors, cloud computing, wireless networking and so on.

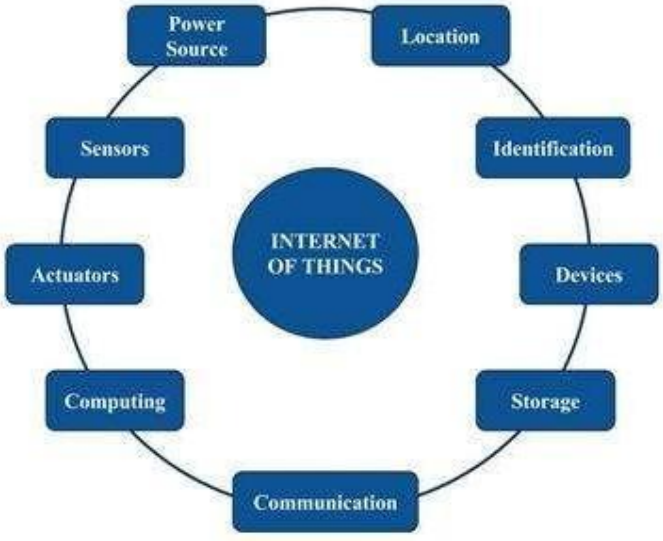

Fig.1 Parts of IO

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2. DEFINITION OF IOT

The Internet of Things (IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and are seamlessly integrated into the information network which communicate data without requiring human-to-human or human-to-computer interaction.

CHARACTERISTICS OF IOT

A. Intelligence: Ambient intelligence of IoT makes it possible to respond to the real-time situations. The most important role of intelligence is the interaction between the devices.

B. Connectivity: Connectivity in the IoT brings empowerment in the life by bringing together everyday objects. Connectivity enables network accessibility and consistency. Accessibility works on a network while consistency provides the common ability to consume and produce data.

C. Sensing: Sensing is the integral part of IoT since it detects the changes in the environment and generates a data or interacts with the environment and provide us with the facilities to create experiences that follow a true awareness of the physical world and the people in it. This is just basically the analog input from the physical world, but it can provide considerate output of our complex world.

D. Expressing: Expressing enables interaction with people and the real world. Irrespective of the place, be it a smart home or a farm with smart agriculture technology, expressing provides us with a measure to create products that interact judiciously with the real world.

E. Energy: Without energy we can't bring our imaginations to life. The problem is that it is not possible to create billions of things that runs on batteries. Energy harvesting, power efficiency, and charging infrastructure are some essential parts a power intelligent ecosystem that we must design.

F. Safety: With all the services that IoT provides, safety is also an essential aspect. This safety will include the security of our personal data and the physical wellbeing of IoT.

3. PHYSICAL DESIGN OF IOT

A. Things in IOT

Things said in IOT is in context to devices that can send data to other connected devices and process the raw data to infer information from them. They process the data locally or centralized databases or cloud computing receives the data for processing. The IOT devices consists of

1) *I/O interfaces for sensors:* This is the most crucial part of IOT. IOT is dependent on sensors because they make the objects effortless to use. The low cost of these sensors made them very popular in the IOT. They analyze the processes going on in the environment and collect data. Types of IOT sensors are accelerometer, proximity sensor, gyroscopic sensors, pressure sensors, optical sensors etc.
2) *Memory and Storage interfaces:* Once the data is collected by the sensor, it is send to the cloud for storage.
3) *Internet connectivity:* The sensors are connected to a variety of devices that do the task of sending data to cloud from the sensors. Here, is when internet connectivity comes into play. Data can be transferred using variety of ways like Bluetooth, WIFI, ethernet, etc.

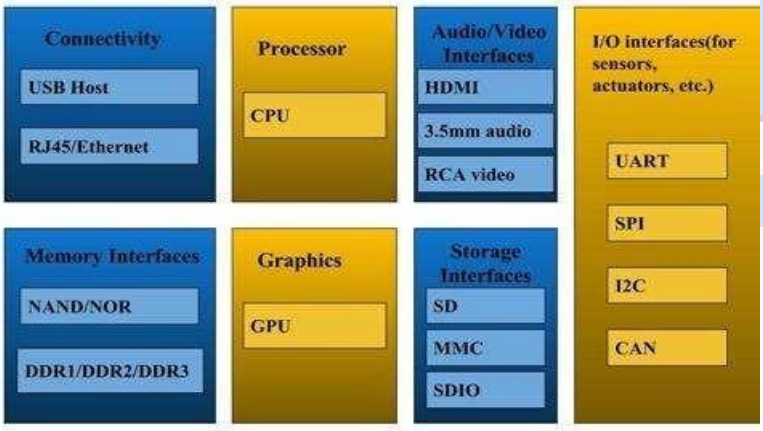

Fig.2 Generic Block diagram of IOT Device

B. IoT Protocols

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1) *Link Layer:* Link layer protocol determines how data is sent over the network's physical layer, example- Coaxial wires, Copper wires, etc. Some of the link layer protocols are 802.3 - Ethernet, 802.11 - WiFi, 802.16 - WiMax, 802.15.4 - LR-WPAN, 2G/3G/4G - Mobile Communication,
2) *Network Layer:* The network Layers are responsible for host addressing, packet routing and sending IP datagrams to the final network. Some of IP addressing schemes used are IPv4, IPv6, 6LoWPAN.
3) *Transport Layer:* The transport layer protocols provide end-to-end message transfer capabilities and also encapsulates application data. Some transport layer protocols widely used are TCP, UDP.
4) *Application Layer:* The application layer encodes application data. It also defines how application interface with lower layer protocols. Examples of application layer protocols are WebSocket, MQTT, XMPP, DDS.

4. BUILDING BLOCKS OF IOT

A. *End device/Node*: These are the "things" in IoT. Mostly these are active sensing devices and actuators which collects data and performs ground level processing. Example: temperature sensors at home, RFID sensors at common stores, cameras at the highways, etc.

B. *Gateways/Local processing nodes:* It connects the n number of nodes to the network or cloud. Ideally it should not only transfer data collected from the sensors to the cloud but process it to some extent and then transfer the relevant data to the cloud for making predictions and inferences.

C. *Connectivity:* As IoT is a networked system, connectivity is the essential part of it. Service providers are providing many solutions around the IoT to connect the n nodes to the gateways and gateways to the cloud as this is a duplet system. Data or signals also flows in reverse. The connectivity could be a combination of both wired and wireless mechanism. Example: Bluetooth, Wifi, radio frequency, GSM, etc.

D. *Cloud based application and storage*: The job of cloud-based application is to compute the data, analyze it and make the suitable predictions. Various sensors or the n nodes collect the data from the field provided to the gateways/local processing nodes for low level processing and filtering. The gateway sends the same to the connected cloud for in depth data analysis and to make inferences which are fed back to the sensor. The devices are connected through the internet all the while and can communicate seamlessly so that they can make any real time change as and when required.

5. LOGICAL DESIGN OF IOT

Logical design of an IoT is the layout of the entities and processes. It does not consider the low-level specifics of the implementation. Entity has chunk of information and the processes will map the actual designing.

A. IoT Functional Blocks:

An IoT system comprises of many functional blocks that provide the system the efficiencies of identification, sensing, actuation, communication, and management of the system. These functional blocks are as follows:

1) *Device:* This system consists of devices which will provide sensing, actuation, monitoring, and the control functions.
2) *Communication:* This block will handle the communication for the system. There are various protocols which come under communication.
3) *Services:* An IoT system will use various types of services for device monitoring, device control services, data publishing and services for device discovery.
4) *Management:* This functional block will govern various blocks of IoT system.
5) *Security:* This block secures the IoT system by providing functions like authentication, approval, message, content integrity and data security.
6) *Applications:* IoT applications will basically have a interface which can be accessed by the users to control and monitor various aspects. This will also allow the user to view ie analyze the processed data.

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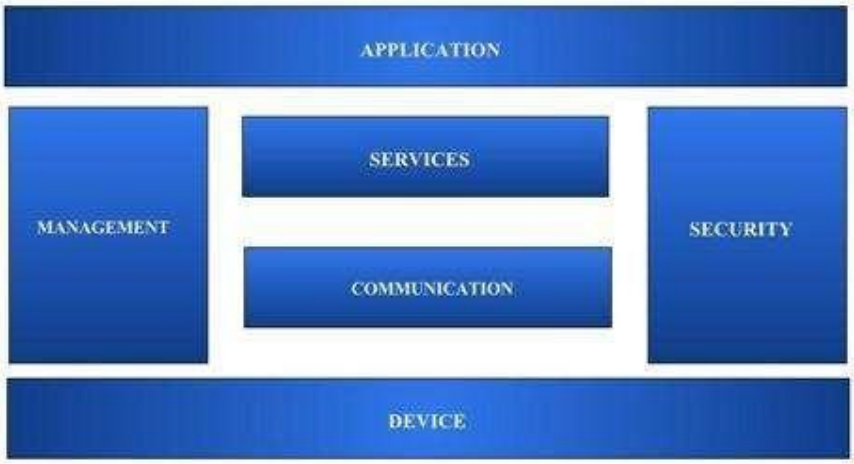

Fig.3 Functional Blocks of IOT

B. IoT Communication Models:

1. *Request-Response:* In this model, the client sends requests to the server and the server replies to it. The server decides how to respond, yield a response and sends it back to the client. Request-Response is a stateless communication model i.e. no information is retained, neither by the sender nor by the receiver.

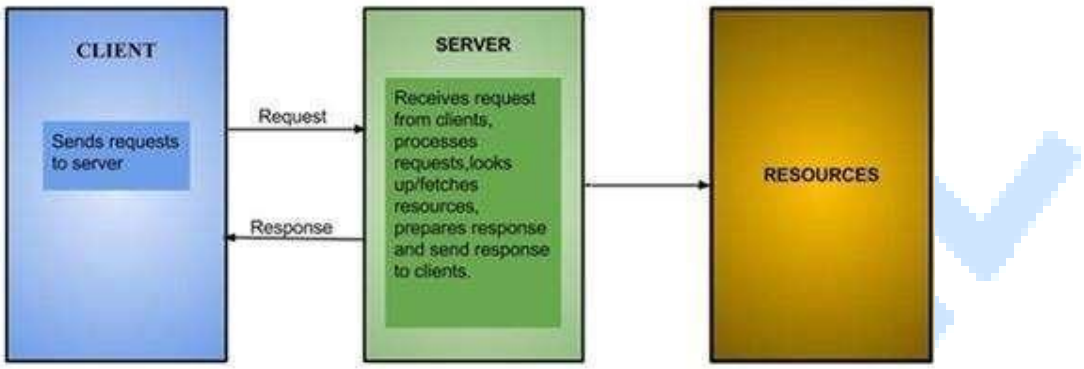

Fig.4 Request-Response Communication model

2. *Publish-Subscribe:* Publish-subscribe is a communication model that includes the publishers, brokers and the subscribers. The publisher is the source of data. This model reduces the network traffic by half. The publisher sends data to the broker who then sends it to all the subscribers. The Publishers don't have any knowledge about the subscribers.

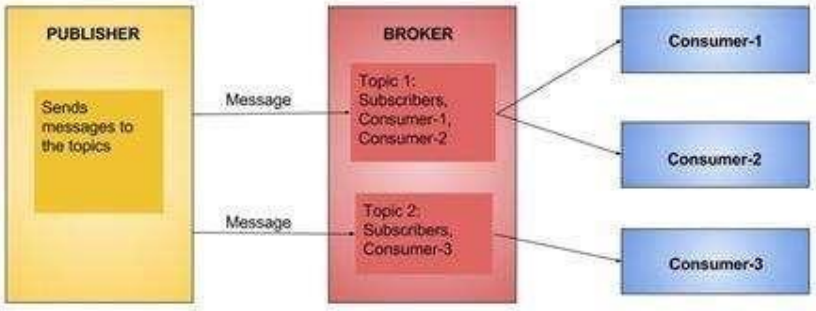

Fig.5 Publish-Subscribe Communication models

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3. *Push-Pull:* In Push-Pull communication model, the producers push data into the queue and the consumers pull datafrom the stack. This queue acts as a buffer to maintain the inconsistencies between the rate at which producers push data and the rate at which consumers pull data.

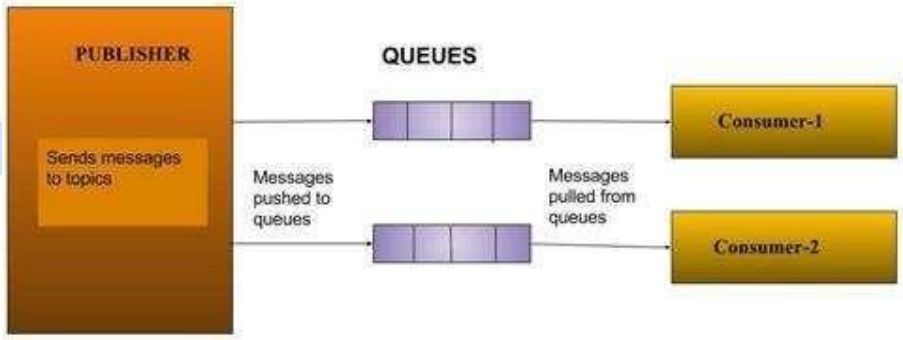

Fig.6 Push-Pull Communication Model

6. CONCLUSION

This Paper conclude the Internet of Things refers to physical and virtual objects that have unique identities like any networking devices and are connected to the internet. This structure support us to the smart development of domains like energy, logistics, industrial controls, retail, agriculture field. Things in IoT refers to the IoT devices which have unique identities and allow remote sensing actuating and remote monitoring capabilities. The paper also shows generic block diagram of the IoT enabled devices for processing. The development in Internet of Things has created tremendous opportunities for improving economic competitions and citizen's quality of life. IoT also focuses on the complex non- technical issues with respect to the security, ethics, governance, privacy and many more. This will catch the highest attention of people preferably within the background of a sustained and well determined international bodies.

7. ACKNOWLEDGMENT

We have learned a lot from the research of Internet of Things (IoT). We thank the designers of these systems for giving us an interesting perspective. Professor Saniket Kudoo gave us encouragement and many ideas, at the early stages of our research in Internet Of Things. We are also grateful to other Professors of Computer Engineering Department for encouraging us to write this paper for the issue National Conference on Role Of Engineers in Nation building 2018.

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A SURVEY ON PASSWORD AUTHENTICATION: AN ENHANCED TECHNIQUE WITH GRAPHICAL TESTIMONIAL

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ABSTRACT

User authentication is a necessary step in information security. Text based passwords are the most common way to used in most of user authentication systems to provide the security to the information, but text base passwords are sometimes vulnerable to different types of attacks like shoulder surfing. Emoji based Graphical technique will overcome the disadvantages of the text based passwords. Text based passwords are still prone to shoulder surfing attack which take much space in the system and generally user takes an extended time to enter a password. By using Emoji based graphical password, a new technique that overcomes the disadvantages of text based passwords is given in this paper. The proposed technique is resistant to different attack that can misused the confidential data, in addition to that it takes less space in the system's database and emoji based graphical password can remember easily. It provides a safe and happy session while users enter the password.

Keywords— *Graphical Password, Password Authentication, Emoji, Shoulder Surfing, Security.*

1. INTRODUCTION

System security is responsible for controlling access to system resources, which will include sensitive data. It is the prevention of intentionally or unintentionally interference with the proper operation of industrial automation and control systems.

User authentication is a fundamental component in most computer security. System security has always been a very challenging task for the Networking department [1]. In information security user authentication is necessary step. In proposed system, key feature is the Change Emoji Technology Which Prevents the Brute Force Attack and Shoulder Surfing by changing the emoji for each session and for each authentication stage which makes the password difficult to crack [2].

Information security is one amongst the cornerstones of data Society. Integrity and privacy of economic transactions, personal information and important infrastructure knowledge, all depend upon the provision of strong and trustworthy security mechanisms. Network and net property has provided nice advantages to the fashionable society in terms of sharing and accessing info, one mechanism security that has been the topic of abundant attention in recent years is that the security management of the assets of vital information crucial challenge. Organizations additionally give shoppers with access all over for info systems and also the frequency and also the evolution of security threats area unit growing, and also the have to be compelled to give security assume larger importance. Effective info security management needs security resources, as well as the bar of the attack, and reducing vulnerability and threat deterrence [5].

Authentication predominant technique by that user is securing access to computer systems is accomplished. On study reports that the common user has approximately twenty-five online accounts that need passwords. It must enter a median of eight passwords per day therefore attacks on the computer infrastructures are getting associate more and more major problem today, therefore several data security techniques area unit on the market nowadays to shield data systems against unauthorized use, duplication, alteration, destruction and viruses 'attacks. Therefore, data security management has become one amongst the most pressing problems facing businesses in today's competitive data technology (IT)-driven world [7]. The Figure 1 shows different types of emojis in different applications. Studies

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showed the user will remember or keep in mind a finite range of passwords; they have an inclination to jot down them down or can use the similar passwords for varied accounts.

User authentication is the primary defence against security breaches. United of the most common authentication ways, passwords facilitate to secure data by granting access solely to licensed parties. Password can be a secret characters or string. In order to function an efficient authentication technique, passwords should be robust, Secret, and unforgettable

[9]. The vulnerabilities of this technique are renowned. One amongst the most issues is that the difficulty of basic cognitive process passwords. Studies have shown that users tend to choose short passwords or passwords that are straightforward to recollect, these passwords are often easily guessed or broken by the secret dotty, passwords that are onerous to guesser break are typically onerous to recollect.

Fig-1: Example of different categories of Emoji pictures.

2. LITERATURE REVIEW

Following are some of the content, which have been reviewed which focuses on the different password authentication techniques.

1. The Graphical Security System by using CaRP [1].

Generally, the traditional text based password is most common and convenient authentication method but sometimes it is difficult to remember and can be guess easily. To overcome this problem new CaRP technique is introducing which is combination of captcha and textual password based. In this proposed system, CaRP image is used for create the password by clicking the points on that image.

2. A Novel way of ICON based Authentication Methods [2].

Most widely used alphanumeric password is sometimes shoulder surf. To overcome this problem, new scheme is applied in which user needs to create a password by choosing some images from a large set of images. The chosen images will be the user's password.

3. Design 3D Password with session based technique for Login Security in Smartphones [3].

First level for text based graphical password and next level for 3D image which provide high security to the user. If anyone guess first level password, then there is no possibility to guess second level password because 3D image will be change whenever the session is restart and hacker will be confused.

4. Prevent shoulder surfing using graphical and duo letter authentication [4].

Graphical passwords and pair based techniques are two different schemes. These two techniques have their own drawbacks. Bio-metrics, finger prints, face scan introduced but not generally used

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5. Shoulder Surfing Resistant Text-based Graphical Password Scheme [5].

The system tried to provide an enjoyable and secure authentication system to the user by combining graphical and text-based passwords to exploit the best advantages of both worlds. The analysis and discussion of the features of the proposed system showed that the system succeed in achieving most of the goals to induce great user authentication system.

6. Graphical Password Authentication System [7].

To overcome the weakness of text based authentication, this propose system is introduced. An authentication technique called Text based Graphical Password Authentication Scheme is resistant to shoulder surfing which is a combination of text as well as emoji based graphical passwords.

7. User Authentication System Using Emoji pictures passwords [8].

When user log into the system, need to click on the image on sequentially that user had selected while registration phase. In this proposed system, main advantage is when user select the image, there is multiple mouse cursors on image. So only user know where to click on image.

8. Using Emoji Pictures to Strengthen the Immunity of Passwords against Attackers [9].

User enter username and password similarly textual based scheme but here user enter emojis as a password. User need to enter password which is already given in system. Enter the password should be a quick process and not take lot of time in the process of writing the password. Use of Emoji pictures in writing password raises the complexity of the password and improves the immunity of the password against attackers by adding more ambiguity and confusion about the password.

3. ANALYSIS

The following Table-1 gives the analysis of literature papers on graphical password authentication.

Table-1: Analysis Table

No	Title of paper	Techniques	Advantages
1.	The Graphical Security System by using CaRP [1]	CARP Technique	Hard to guess password.
2.	A Novel way of ICON based Authentication Methods [2]	Braille Technique	Easy to remember pass icons.
3.	Design 3D Password with Session Based Technique For Login Security In Smartphone [3]	2-level authentication 1.Text based 2.3D image	Due to two level of authentication, hacker is difficult to crack the password.
4.	Prevent shoulder surfing using graphical and duo letter authentication [4]	Duo letter Authentication.	Easy to register, more secure, difficult to hack.
5.	Using Emoji Pictures To Strengthen The Immunity Of Passwords Against attackers [5]	Emoji-picture technique.	Take less space in database.
6.	Shoulder Surfing Resistant Text-based graphical password scheme [6]	Pass Sector and alpha numeric sectors	Simple and Efficient.
7.	Textual And Graphical Password Authentication Scheme Resistant To Shoulder Surfing [7]	CHC Algorithm.	Small size and no load on client.

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8.	Graphical password authentication system [8]	Drawing grid algorithm	Easy to remember and brute-force attack resistant.
9.	A Graphical Password Based Authentication Based System For Mobile Devices [9]	Token-based Biometric-based Knowledge-based	More reliable, secure, user-friendly, and robust authentication.

4. CONCLUSION

Generally, the system uses password, which is text, based. If it uses only text based password in which the user can easily and efficiently complete the login process but there is some drawback. If the password is short, then it is easy to guess and if the password is too long then it is difficult to remember. These techniques, which is based on graphical password authentication scheme, trying to make authentication system more user friendly. The operation of the proposed system is very simple, easy for learning and easy to use for the user. Change emoji technology, which prevents the brute force attack and shoulder surfing by shuffling the emojis for each session and for each authentication stage, which makes the password difficult to crack**.**

5. ACKNOWLEDGMENT

We consider our extremely fortunate to have the opportunity to learn under the supervision of Asst Prof. Mrs. Pallavi Vartak we are grateful for her constant guidance and support throughout this work. She has been a source of inspiration to us all over the period of this work.

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ANTICIPATION OF STUDENT ADMISSION IN INSTITUTES USING DECISION TREE ALGORITHMS: A SURVEY

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ABSTRACT

University or college admission is a complicated decision process that goes expect simply matching test scores and admission requirements. The proposed system is a predictive model for predicting college admission. It is a system which will predict the future college admission based on the past student data in a particular institute. The proposed system makes use of more number of attributes than the existing system which makes the prediction more accurate. The proposed system is a prediction system where a large amount of data is analyzed and some meaningful information is extracted form huge dataset. The proposed system predicts the college admission for student based on the last three year student data after applying pre-processing techniques on it. The pre-processing is an important step in data mining. The data pre-processing includes data cleaning, data selection and data transformation. The proposed system removes the noise and removes inconsistency using pre-processing techniques called transformation and selection of data. The system makes use of the huge dataset of student and college. The system uses the classifier algorithm called Decision tree classifier for classifying the dataset into a tree format which is used for the purpose of decision making.

Keywords*: - Data Mining, Classifier Algorithm, C5.0, Data Pre-processing, Support Vector Machine.*

1. INTRODUCTION

College prediction has always been a very challenging task for the Particular Institute. The proposed system is a College prediction tool which is used to predict the College based on the data mining technique with various attributes which are required or the prediction. The existing system predicts the college based on the raw dataset. The existing system also uses limited number of parameters for the prediction. The problem of missing predictor category assumes the record with the same category has zero probability.

The proposed system purifies the dataset with pre-processing technique in which makes the dataset pure and valid. The data selection is used to select only those attributes which are required by the system. The pure dataset is trained by the classifier to predict the college admission process.

The proposed system predicts the college based on the historical dataset which is given to the decision tree classifier. This classifier builds a tree and trains the system based on the dataset. The current conditions given as an input and the classifier make the decision on the basis of the trained dataset.

2. SYSTEM DESCRIPTION

The proposed system is being developed to give prediction to college. As predicting the college is done through

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the analysis and probability of past records which is the application of data mining. The prediction can be done by using two approaches, first one data intensive model and the second is the compute intensive model. The proposed system uses the data intensive model which includes predicting the future parameters based on the training data set and the current condition of the college admission process. The proposed system collects the historical dataset; pre-process it train the data set by applying the classifier algorithm on it.

3. LITERATURE SURVEY

Following are some of the content that has been reviewed for proposed system.

1. Prediction of the Admission Lines of College Entrance Examination based on machine learning[1]

In this paper, machine learning methods are used to carry out the college admission lines of research and prediction. Specially, in this paper Adaboost algorithm is used to study and forecast, which belongs to ensemble learning. Finally, the score of this model is given, which is better than the current prediction method. It can be seen that Adaboost had a good effect than Random Forests. The reason is that Adaboost is a strong classifier constructed by several weak classifiers. So it has a good effect on complex data, acting as the data of college entrance examination.

While Random Forests algorithm processes the complex data by subdividing the space. Therefore, Adaboost is a better model to handle college entrance examination problem.

2. HRSPCA: Hybrid Recommender System for Predicting college Admission [2]

This paper displays a school affirmation framework utilizing learning disclosure guidelines and cross breed recommender in light of information mining strategies learning revelation rules, for undertaking school confirmation expectation problems.in this framework comprise two course half and half recommender cooperating with the assistance of school indicator. The framework dissect understudy scholastic benefits, foundation, understudies record and the school affirmation criteria and afterward anticipate plausibility University College that an understudy may enter.

3. Students Admission Prediction using GRBST with Distributed Data Mining [3].

In this paper, the calculation has been given Binary Search Tree which stores the worldwide principles by develop the neighbourhood rules created at each site. This Global Rule Binary Search Tree (GRBST) can be utilized as a part of expectation of Students admission to school. Information mining methods can be helpful in getting designs from instructive information, and this example can be valuable to enhance Education System. Applying Data Mining (DM) procedures on organize movement information is a feasible arrangement that grows better interruption identification frameworks.

4. Forecasting Student Admission in Colleges with Neural Networks [4].

In this examination, the utilization of neural systems in foreseeing the execution of school at the affirmation directing, before the real occasion happens, is broke down. In this model, they plan to fledgling this anticipating issue into a grouping one, i.e., a school in light of its aggregate no. of seats filled amid the directing is arranged in one of the five yield review picked. This model can be utilized as an effective choice guide by the college administration, the individual school administration and the reckoning understudies. They have exhibited the essential outline of ANN took after by few words on determining. The information choice factors and the yield classes have been plainly consume.

5. E-Admission System [5].

Directorate of technical education (DTE) conducts online confirmations for designing universities yet they don't have

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programming to help understudies to choose school and branch. They give information as tables in pdf record and an understudy needs to experience it. Numerous understudies don't comprehend the information and numerous guardians who originate from rustic region and oblivious yet need their ward to think about in building neglect to fill alternatives shape. Whatever might be the CET score they attempt to fill best universities known. Consequently, they proposed PC supported framework will help the understudies to get the rundown of all schools in which they could get the affirmation at the snap of a catch. The understudies just need to enter their signs of CET, AIEEE and so forth. With this product, the understudies can without much of a stretch acquire the rundown of schools even branch shrewd and classification astute. This won't just influence the admission to process simple yet additionally limits worry of understudies .The principle target of this framework is to settle on right selection of universities, with the goal that greatest of the understudies get chose in the primary endeavor itself.

4. IMPLEMENTATION

The proposed system is prediction model for college prediction purpose which uses a data mining technique for the prediction. The dataset has been collected over the particular institute from the period of 2011 to 2016. The dataset is being pre-processed to make the dataset valid. The pre-processed data helps to enhance the performance of the system and also improves the accuracy of the system.

Data pre-processing:-Data pre-processing is required to clean dirty data that the system might contain. In this the raw data is converted into technically correct data using type checking and normalizing. This data is then converted into consistent data which are all parts of data cleaning. Consistent data is converted to statistical result by analysing output of consistent data. Finally statistical result is converted to format output by plotting the data received.

C5.0 :- C5.0 algorithm is extremely faster than other algorithms and is memory efficient.

Naive Bayes :- The Naive Bayes calculation oversees quick, very adaptable model building and scoring.

Support Vector Machine:- SVMs give a one of a kind arrangement, since the optimality issue is raised. This is favorable position contrasted with Neural Networks which have various arrangements related with nearby minima and thus may not be hearty over various examples.

The below figure 4.1 describes System Flow diagram for the proposed system. The system shows student dataset will be given as input and sent to the data preparing and processing block. Further which it splits performing two actions Training Dataset and Testing Dataset. For classification Naive Bayes and SVM algorithms will be used. C5.0 will be used for prediction of student dataset. Merging them will provide Knowledge base and using that knowledge base output will be generated.

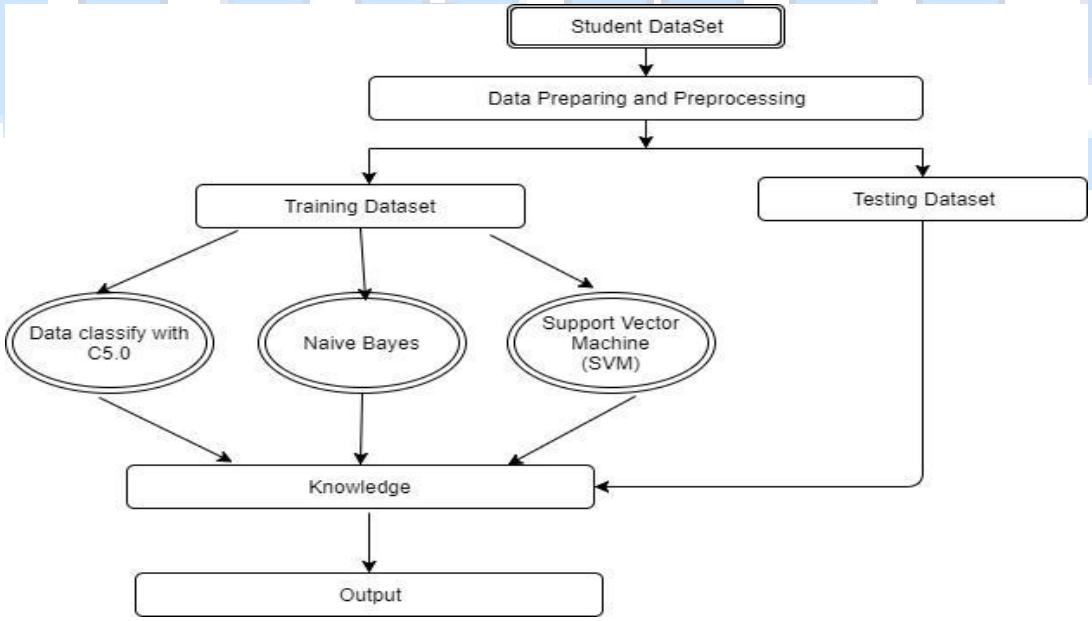

Fig 4.1: System Flow Diagram

5. EXPECTED RESULTS

This chapter will give the whole description about what is been expected from the proposed system. The expected output will be described in this chapter. In the existing system, various parameters have been used for the prediction. The system used five parameters for the prediction of college admission. The results of the existing system were not that accurate due to the use of finite number of parameters. The aim of the proposed system is to make the prediction accurate, which can be done by using a large amount of previous data and using more number of parameters. the use of these parameters enhances the accuracy of the prediction by using the combination of this algorithms proposed system will have an accuracy of about 90%.

6. CONCLUSIONS

The existing system predicts on the basis of College Entrance Examination (CEE). The existing system also uses limited number of parameters for the prediction. Thus the proposed system implements a College prediction model using the Decision tree classifier applied on the pre-processed dataset which is being collected for various institute. The pre-processing technique includes the data transformation and data selection. The choice tree characterization calculation was utilized to produce choice trees and rules for classifying college and student parameters such as student percentage, previous institute, location, CET marks etc. The outcomes acquired were group with the test informational collection arranged alongside the preparation information and were observed to be worthy considering the little size of the information accessible for preparing and testing. The proposed framework utilizes a lot of dataset and more number of parameters to have a superior and precise outcome.

7. ACKNOWLEDGEMENT

We would like to express a deep sense of gratitude towards our guide Mr. Dnyaneshwar Bhabad, Department of Computer Engineering for him constant encouragement and valuable suggestions. The work that we have been able to present is possible because of him timely guidance and support.

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NETWORK MANAGEMENT AUTOMATION, CHALLENGES AND SOLUTIONS

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ABSTRACT

Managing large, heterogeneous networks created a crisis for many organizations. The most common and serious problems of a network are the connectivity failures or fault management. Network management solutions should be simple to implement and cost effective. User-centric network management or QoE-based network management has been arisen as an approach effectively providing a user-level high quality of service. In this approach, users' satisfaction is used as a reference to manage and optimize network. The 5th generation (5G) of cellular mobile technology will herald a paradigm shift in the role of mobile networks in society. For achieving this, 5G will support diverse use cases and applications from vertical industries performance.

Keywords --*Network management, QoE, NMA, Cellular mobile technology.*

1. INTRODUCTION

A network administrator's efficiency to manage a network decreases as the network becomes more complex and heterogeneous. Maintaining huge, heterogeneous networks created a crisis for many organizations. The network management tools and solutions available are not only expensive but also difficult to install, configure, administer, and maintain. This paper discusses the tools and solutions available for network management, challenges involved in implementing network management solutions and also an easy and better solution for a pro-active network management solution is proposed. This solution was tested by implementing in a large enterprise. With the implementation, the stakeholders were capable to achieve higher adaptability and able to do proactive network management.

2. CHALLENGES OF IMPLEMENTING NETWORK MANAGEMENT SOLUTION

A network administrator's potency to manage a network decreases because the network becomes a lot of complicated and heterogeneous. Managing massive, heterogeneous networks created a crisis for several organizations. A network administrator's efficiency to manage a network decreases as the network becomes more complex and heterogeneous.

We discuss the tools and solutions out there for network management, challenges concerned in implementing network management resolutions and conjointly a straightforward resolution for a pro-active network management solution is planned. This resolution was tested by implementing during a massive enterprise. With the implementation, the stakeholders were able to succeed higher potency and able to do proactive network management.

Managing massive, heterogeneous networks created a crisis for several organizations associate degreed an imperative would like for an automatic network management resolution was felt essential. Thus it is suggested that Network operators got to perform these activities perpetually either manually or with the assistance of network management tools. Also it proposes that either one network management tool should support all the higher than activities or multiple tools will be integrated to produce these services. In general, network management could be a service that assists human

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network managers in observation, troubleshooting and maintaining networks. Network management is a process of monitoring and controlling the network to ensure that it is operational, works and provides value to the network administrator and its users. Further moving the author gives us a Network management design consists of a centralized manager and a group of relationships with finish stations referred to as managed devices that carries with it computer systems and alternative network devices.

3. QoE ESTIMATION FOR ADAPTIVE STREAMING OVER

It is suggested that this decade has been marked with tremendous growth of video streaming that has been called "bandwidth killer service". Unmanaged services or extraordinary services currently become additional and additional widespread within the industry. However, it's simple to understand that those services' suppliers don't guarantee a stable video quality for users as a result of they cannot manage the underlying network condition at the users' aspect. So as to manage this downside, many solutions are projected however this downside includes of the many aspects required to be coped with. The analysis comes up with the thought of activity network management pertaining to video quality perceived from users.

For a protracted amount, video delivery services had relied on period protocols just like the period Transport Protocol (RTP) that provides functions like time-stamping, sequence list and payload sort identification. Typically, RTP is made on UDP, and therefore it doesn't have the overhead or latency of block on retransmission. RTP could be a Just-In-Time (JIT) frame-based delivery model during which individual video frames square measure sent call at a paced manner and delayed or lost frames square measure unnoticed by the receiver. However, RTP-based video delivery is complicated. During this study, the influence of the on the market information measure, packet loss, jitter, and delay on QoE are going to be investigated. It is proposed that within the experiments of this study, Silverlight sleek Streaming has been used because the main video stream delivery technique. Whereas, ANN one of the machine learning techniques, are going to be applied so as to map network parameters to QoE.

4. NETWORK MANAGEMENT AUTOMATION IN 5G

The development of 5G cellular networks is driven by many discipline and radio technology evolutions; and by needs of various uses cases from the vertical industries that are supported. Combined, these drivers demand for brand spanking new approaches and processes to be applied towards the automation of Network Management (NM) tasks thus on advance operability levels for mobile network operators (MNOs). This paper analyzes the constraints of heritage Self-Organizing Networks (SON) introduced with 4G for Network Management Automation (NMA). Especially, there is a tendency to highlight the new challenges rising from these 5G options and gift many technological enablers which will be leveraged for 5G NMA. Also the author suggests that there is a tendency to embody a future NMA framework combining these enablers that address the NMA challenges by:

1) Enhancing the extent of intelligence in network components
2) Permitting the networks to raised method and analyze numerous varieties of network data
3) Approved identification of operational context and eventualities
4) Investment the building and sharing of NM data across completely different domains and networks.

Cellular NM may be a terribly difficult and resource intensive task even in today's networks, thanks to parallel operation of multiple heritage systems and overlays of various cell sorts. Self-Organizing Networks (SON) were introduced in 4G to reduce the NM complexness and expenses. The utilization cases self-addressed are, however, terribly specific to the underlying network technology and also the solutions in the main comprises machine-controlled management loops with pre-defined actions to bound triggers. SON can in and of itself not absolutely address the required flexibility of 5G networks. Moreover, 5G can any complicate NM and operability given the introduction of virtualized network nodes and functions, cloud Radio Access Networks (RAN), the support for numerous vertical eventualities, additionally as its support for heterogeneous user devices and a good denser preparation of cells. However Network Management Automation (NMA) should inherently address this complexness and at the same time improve network operability for 5G

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to be economically viable for MNOs. This paper reviews the new challenges to NMA, justifying the necessity for brand spanking new approaches towards psychological feature Network Management(CNM). Here, psychological feature refers to the appliance of machine learning and knowledge analytics on high of the same old SON management loops. We have a tendency to discuss however these new approaches may be leveraged to handle the new challenges and constraints.

5. COMPREHENSIVE ANALYSIS

As the network becomes larger and complex, it is harder and harder to manage due to the complexity and heterogeneity. The most common and serious problems of a network are the connectivity failures or fault management. Network management solutions should be simple to implement and cost effective.

User-centric network management or QoE-based network management has been arisen as an approach effectively providing a user-level high quality of service. In this approach, users' satisfaction is used as a reference to manage and optimize network performance.

The 5th generation (5G) of cellular mobile technology will herald a paradigm shift in the role of mobile networks in society and to achieve this, 5G will support diverse use cases and applications from vertical industries.

6. CONCLUSION

This paper reviews the new challenges to NMA, justifying the necessity for brand spanking new approaches towards psychological feature Network Management (CNM). Here discussed the tools and solutions available for network management, challenges involved in implementing network management solutions and also an easy and better solution for a pro-active network management solution is proposed.

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ENHANCED MECHANISM FOR SESSION PASSWORD AUTHENTICATION

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ABSTRACT

In the proposed system, a new method for password authentication is introduced. Various methods for authentication are proposed in the past years but many of them are vulnerable to shoulder surfing and phishing attacks. Many shoulder surfing preventive techniques have difficult rules. Traditional text passwords are less secure and can get attacked by shoulder surfing, dictionary attacks. In proposed system, the password authentication method will keep the system more secure and prevent different attacks. The proposed system uses session password which works as a onetime password. For every login, a new temporary password is generated. In proposed system, the intersection of rows, columns as well as diagonal of the grid is used to generate session password and it works on even as well as odd number of characters.

Keywords: - *Session password, Pair based, Even-odd, Shoulder surfing, Security.*

1. INTRODUCTION

Security domain is an important concept in the key management policy. Network security provides the IT professionals the skill to implement the parameters of security domain on network devices. Authentication is important part to a security system. Authentication can be defined as a process which allows one system to verify the user, hence in order to protect the user accounts authentication must be most secure. The different authentication methods used in the past are as using text and color, using Dynamic grid, using graphical and duo letter authentication, with colors and session password. The two techniques used for authentication are paired-textual method and graphical authentication. Short passwords are unprotected against attacks. Graphical passwords are secure but are very complicated. Hence, we have implemented a better method of session password which provides better security and is easy for the user. Sessions passwords are acclimated alone already during the login action and as anon as the affair is concluded the affair countersign expires. This method of authentication provides more preventive security against various attacks.

2. RELATED WORK

Passwords are used for authentication from long time. Hence, there are many systems implanted in this field. Swati Tidke, Nagama Khan, Swati Balpande, The proposed password scheme uses color code and paired-texts to generate session password. In this system, pair based method is used along with color codes as authentication method. The drawback of this method is that it is very tedious for the user and since the user has to remember the color rating it becomes a difficult task [1]. J. Thakur, S. Rathi, Implementation of one arrangement for Mobile Social Network which makes the affidavit action defended analyze to the added schemes is shown. Different kinds of schemes are implemented to secure the system. First explore some major schemes proposed for the Authentication process. A limitation of this system is that the key size of this algorithm is large [2]. S. Kasar, A. Baig, V. Gunjal, An increased graphical secret system is introduced by mistreatment graphical and pair-based strategies that is proof against shoulder aquatics. Here a two bases authentication scheme is used which is Graphical Authentication scheme and Pair based authentication scheme. The algorithms used here are Random algorithm and Bresenham's algorithm. The main disadvantage of this system is, it is very complicated for the user and the security is less [3]. P. More, A. Singh, P. Singh, The password which is generated, is based on color ratings given by the user. User just need to remember his color rating. Based on the rating of color that user gave user can realize intersection of row and column and find the primary digit of his session countersign. The session

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password is not vulnerable against different attacks as it changes at every login instance. The disadvantage of color rating system is that it is difficult for user remember the color code properly. It is very tedious for user [4].

3. PROPOSED SYSTEM

In proposed system, at registration user sets password. The password can contain any number of characters. Session password is generated based on the password set at the time registration. When the user logins, an interface consisting of a matrix is put on view during the login phase. The block is of size 6*6 is displayed and it contains a-z letters and 0-9 numbers. The block shuffles the letters and numbers in block randomly at every instance.

For example, User sets his/her password as "abc12". Since the |P| is odd, the pairs will formed as "ab", "c1" and the remaining '2' will be paired with 'a' i.e. pair will be "2a" Last remaining character of password and first character will be paired together. The "ab" will generate one character of password for that session. As per choice given by user, e. g. 1st character in the pair is set as "Right diagonal" and 2nd character is set as "Vertical". Then the user has to submit his session password base on his choice. The intersection of "Right diagonal" and "Vertical" will first letter of that temporary password.

Step 1:- At the time of registration, user can set preference to formed pairs.

Step 2:- User sets his password and corresponding choices for pairs from (Diagonal Left/ Right, Vertical, Horizontal)

Step 3:- At the time of login, user uses customized combination which he has registered with and can login by entering intersection of pairs.

s	8	1	r	u	3
n	c	x	2	z	7
e	j	4	h	5	f
g	v	9	t	k	o
a	y	0	w	m	q
1	p	d	i	b	6

Fig -1: Grid

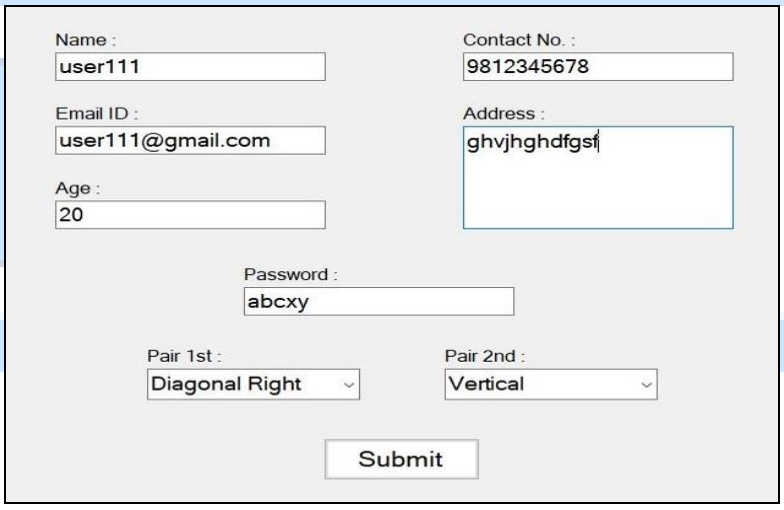

Fig -2: Sample example

4. EXPECTED RESULTS

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The proposed system can be used for confidential data with high security. Though system is complex, it can be used in Military where data is highly confidential. In this system, even as well as odd number of characters can be used. This system goals at lowering the risks from the unique malicious activities to a remarkable extent thereby increasing the safety.

The following table explains the advantage of the system:

Table -1: Different Authentication Techniques

Method	Resistance to Attacks.	Hardware Requirement	Protection Level
Session password	Shoulder surfing, key logger, hidden camera, phishing, brute force.	No	High
Conventional password scheme	No	No	Low
Key stroke dynamics	Shoulder surfing, phishing, key logger.	No	Medium
Click patterns	Shoulder surfing, phishing, key logger.	No	Medium
Graphical passwords	Shoulder surfing.	No	Medium
Biometrics	Shoulder surfing, phishing, key logger.	Yes	High
Expression Based	Brute force, shoulder surfing and dictionary attacks.	No	Medium

5. CONCLUSION

Since even and odd characters can be selected as password. This system will increase possibility of generating or selecting a wide range of passwords by the user. User can select the password diagonally which will make the system more secure. This method defensive against shoulder-surfing, Hidden Cameras, Random Click Attack, Brute-force Attack, Guessing etc. Due to temporary passwords, dictionary-attack is not possible. This system aims to be prodigiously robust and secured to the malevolent activities, ergo providing utilizer the liberation to have consummate security while handling user's confidential data and security essential systems from anywhere.

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PASSWORD SECURITY SYSTEM USING ALTERNATE CHARACTER

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ABSTRACT

Various methods for authentication are proposed in the past years but many of them are not safe for shoulder surfing and phishing attacks. In proposed system, password authentication method promises for well safety and prevents shoulder surfing, phishing attacks. In proposed system while registration, user set his password by selecting one alphabet from the password to be replace for every session by selecting 2 or more alternate alphabet. While 1st login user will replace the selected alphabet in password with 1st alternate character, similarly while 2nd time login user replace the selected alphabet by 2nd alternate alphabet, in password.

Keywords: - *Shoulder surfing attacks, Brute force attacks, Alternate character, Network, Security*

1. INTRODUCTION

The attack which is be done by just observing over others shoulder to guess when user enters his/her password. There are many password schemes are proposed. But this system is safe than other system. Security domain is an important concept in the key management policy. Network security domain provides the IT professionals the skill to implement the parameters of security domain. Textual password is common security method but some of these passwords are faces to the many attacks like shoulder surfing attacks and other attacks.

2. RELATED WORK

Monali Bendale proposed a paper in which When the user register, he has to enter his password K of length L characters and select any one pointer which will be already a pointer. The user must register an e-mail id for reenabling his/her disabled account [1]. Miss.Swati Tidke proposed a paper in which, While registration, user will rate the colors in the previous or first method else enters user password in the second method during login time, the user need to type password based on the interfaces display on the screen. The entered password gets verify by the system by checking comparison with content of that password created during the registration [2]. Janhavi Thakur proposed a paper in which, graphical passwords and biometrics used. In which attacks were identify. Then they have introduced this scheme and make comparison of parameters of Pair Based Dynamic Grid Authentication to available schemes [3]. Mr. Sagar A. Dhanake proposed a paper in which, schemes that makes the use of the alphabets and colors for creating session passwords [4]. Harsh Desai, proposed a paper that consists of registration, login and verification. In this system, user rate color which is use during of login. The pair of the color is use for session password. The first color of pair indicates row and other is column, and it uses to enter the session password [5].

3. PROPOSED SYSTEM

In the proposed system, during registration user sets his password. User can use both alphabets and numbers for the password. While registration user need to select 2 or more extra alternate alphabets to enter in the password which will be used for next session. User must select one digit/alphabet from the password and replace that alphabet with that alternate alphabet for every next login session.

Example: - During registration, let user sets the password as " STU123" and alternate alphabets for "U" are "A" and "E". So, after registration during login user must enter his/ her password as follow:

1st time login password is: - " STU123"

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2nd time login password is:- " STA123" , Here "U" will not be accepted.

3rd time login password is:- " STE123" , Here "U" and "A" will not be accepted.

4th time login password is:- " STU123" , Here "A" and "E" will not be accepted.

5th time login password is:- " STA123" , Here "U" and "E" will not be accepted.

Like this for every session the third alphabet of password will be different. And even if anyone see your password for current session and tries to enter same password for next session then it will show incorrect password. So, password is enter and it will prevents shoulder surfing attacks and other attacks.

In the proposed system, it will be difficult for the user to remember which alternate alphabet he had entered in the last session. To overcome this problem, on the login page there will be some indicator like single line of color which will indicate that third alphabet from the registered password. For that, user needs to set colors for that character during registration. For example for 'U', yellow color; for 'A' red color; for 'E', blue color. But this colors user must remember. It means, that color will help user to remember which alphabet user has to enter during every login session.

4. EXPECTED RESULTS

This system can be used to store data with the low and high security. The system is simple to use and understand for user and troublesome to understand for attacker, it can uses in the system or website like facebook, instagram and other such websites by making some changes in the password system. This system aims at reducing the risks from the different malicious attacks by increasing the security.

5. CONCLUSION

The proposed system is simple to understand and use. It also prevents various attacks like shoulder surfing attacks and other attacks. The proposed system is user friendly and can be used in any kind of web site or web applications. There is no compulsion of use particular digits of password or compulsory use special characters.

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REPOSITORY FILE TRANSFER: A NEW COMPOUND FILE ENCRYPTION TECHNIQUE

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ABSTRACT

Data security and protection is a field that protects digital privacy measures that are used to prevent unauthorized access to the computers and the confidential data, databases and websites. Corruption of data can be also inhibited using data security. It is an essential aspect of the IT for organizations of every size and type. The more popular approaches for data security are cryptography and steganography. This paper focuses on how the data is been transferred from one user to another in convenient and secure form by using cryptography Cryptography or cryptology is the arithmetic, for example, number hypothesis, and the use of equations and calculation s and which changes over the information that is unintelligible for an unapproved arrangement to the client. In this proposed system we have used the most of the preferred secret key encryption algorithm such as AES (Rijndael) and the best performing algorithm i.e. Blowfish to give piece savvy security to information and furthermore the symmetric key cryptography system has been utilized. Key size of both the calculations is 128 bits. Synchronization between the user is been maintained by using the symmetric key for the purpose of data cryptography. Hybridation of the algorithm is been done for the purpose of increasing the security and maintaining the integrity between user.

Keywords— QR Code, End to end encryption, Fire ware, Multiple Encryption, Secure file transfer

1. INTRODUCTION

The proposed system is based on transferring the data from one user to another with high security with QR code. Protecting data, such as those in a database, from the unwanted actions of unauthorized users.

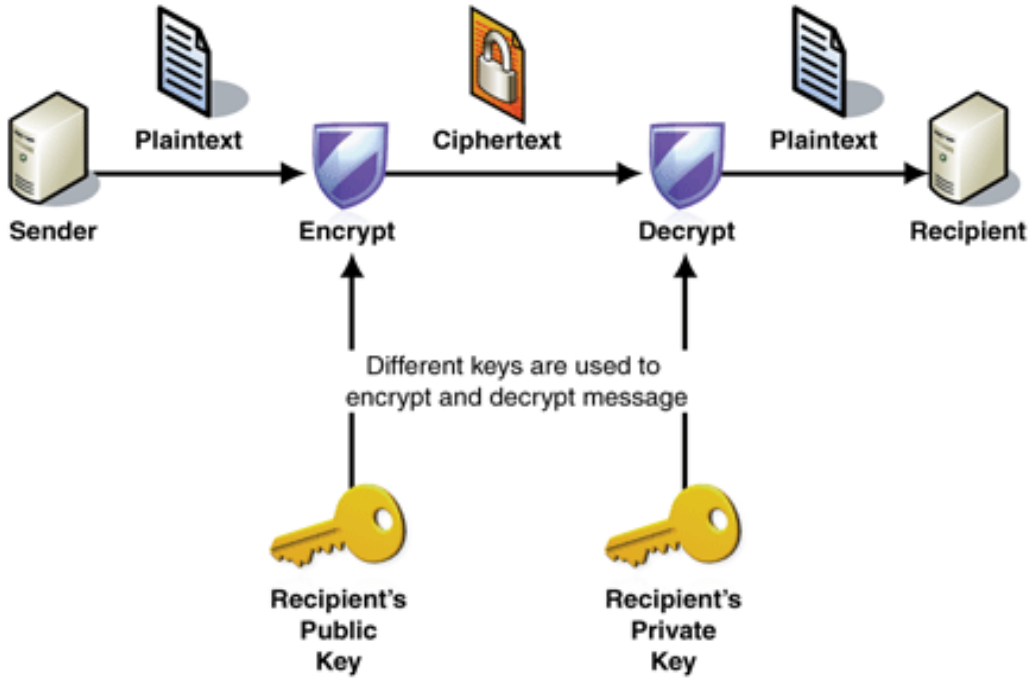

Fig 1.1: Basic diagram of cryptography

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Fig 1.1 shows formal structure of cryptography. Data security deals with protective digital privacy rule are applied to prevent unauthorized or unlegimate access to computers, databases and websites. Data security is one of the most important and challenging task around the world.

Information is the crude type of data put away as sections and columns in our databases, organize servers and PCs. This might be an extensive variety of data from individual records and protected innovation to showcase investigation and points of interest planned to top mystery. Information could be anything of intrigue that can be perused or generally translated in human shape. Be that as it may, some of this data isn't proposed to leave the framework. The unapproved access of this information could prompt various issues for the bigger company or even the individual home client. It keeps the trade off or loss of information contained in the database, an occasion which could have genuine repercussions for any organization. Some of the functions of database security include:

1. Blocking assaults from unapproved clients or programmers. This keeps the loss of touchy data.
2. Preventing malware contaminations and halting infections taking information.
3. Ensuring that physical harm to the server doesn't bring about the loss of information.
4. Prevents information misfortune through debasement of documents or programming blunders.

Essentially, database security ensures any touchy data that your organization may have put away in databases. It decreases the danger of this data being stolen, and shields you from the related lawful issues that would happen if it somehow managed to be stolen. Store record exchange is a protected and advantageous online answer for exchanging vast documents that surpass the email connection breaking points to beneficiaries inside the establishment and outer beneficiaries. Different calculation is being executed to secure the information from getting hacked or abused by deliberate and accidental methods for way. The earlier system comprises of single algorithm for encrypting the file hence, security was being compromised. The key feature of our system is that the key for the decryption of files is been converted in QR CODE and being transmitted to the receiver.

In this proposed system, it has been used the most of the preferred secret key encryption algorithm such as AES (Rijndael) and the best performing algorithm i.e. Blowfish to provide block wise security to data and also the symmetric key cryptography technique has been used. The proposed system provides enhancement in security by encrypting the file or message by multiple algorithm and result security is increased.

2. SYSTEM DESCRIPTION

In previous studies they used SMS transmission concept but it is not much efficient. It has some drawbacks like it is not more secure for transferring the data for end-to-end encryption. Only single algorithm is used in previous system so in proposed system hybridation of algorithms i.e. AES and Blowfish have been implemented for more security. The system try to solve this drawback by using the QR code system which provides more security. So, it will try to improve the efficiency. The system can be used in the day-to-day life for every human being. It is a secure and convenient web-based solution for transferring large files that exceed the email attachment limits to recipients within the institution and external recipients. The proposed system by us is implementing a secure file transfer using hybridation of encryption algorithm which in result provides us the enhanced security for transmission of files for one user to another. The drawback of previous system is being overcome and a secured manner of transferring key by encrypting it into a QR code is been achieved which increases the security and confidentiality. Repository file transfer is a secure and convenient web-based solution for transferring large files that exceed the email attachment limits to recipients within the institution and external recipients. Various algorithm is being implemented for the purpose of securing the data from getting hacked or misused by intentional and unintentional means of way. The system comprises of various security constraint such as End to end Encryption, Mobile as well as web based application, Security enhanced with Quick read code. The server will be responsible for storing and managing the files and authenticating the legimate user whereas, the end user is responsible for uploading the file with the address of legimate user.

3. LITERATURE REVIEW

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Following are some of the contents which have been reviewed for the proposed system.

1.A comparative survey of symmetric and asymmetric key cryptography [1]

Proposes the importance of network security & Types of keys explained in details. The concept of Symmetric and Asymmetric key, advantages of asymmetric key (separate keys for encryption and decryption) & why the asymmetric key is more effective than symmetric key In this paper, it has been studied the customary calculations, alongside the proposed calculations in view of their advantages and disadvantages, identified with Symmetric and Asymmetric Key Cryptography. The proposed calculations turned out to be exceedingly effective in their individual grounds however there are sure zones that stayed open, identified with these calculations.

2.DES and AES Performance evaluation [2]

The propose framework indicates correlation amongst AES and DES, AES execution over DES calculation. In this paper, it is talked about AES and DES and their correlation utilizing MATLAB programming. In the wake of applying AES and DES, it looks at their outcome on premise of torrential slide impact, reproduction time and memory required by AES and DES. AES encryption to secure the information before the transmission and DES additionally gives security as AES.
As result it found that the time required by AES calculation is substantially lesser than DES Algorithm. Encryption is finished by DES however Memory use in DES is more than in AES.

3.Enhanced Blowfish Algorithm for Image Encryption and Decryption with Supplementary Key [3]

The proposed system explains Encryption of multimedia files in efficient and secured method using blowfish (128,442bits). The ability of algorithm to encrypt the larger size of multimedia files such as images, voice clip etc. The variation of key generation by the bits size available for encryption (32, 64,128,448 bits). The proposed technique depends on Blowfish calculation with upgraded highlights. It has been upgraded with a supplementary key way to deal with reinforce the security of picture or any touchy information which are imparted electronically. The outcomes are recorded and indicate better execution. Blowfish calculation is a quick and contrasting option to existing encryption calculations.

4.Secure QR Code System [4]

The proposed framework centers around audit that contains the structure of QR code and security calculations for QR codes. This paper clarifies the QR code (Quick Response Code) and its trademark for a kind of network scanner tag (or two-dimensional standardized tag). A standardized identification is in a type of machine-coherent optical mark that contains data about the thing to which it is joined. QR code application gives greater security level and additionally keeps up in reverse similarity with QR codes that don't consolidate security highlights. Framework presents somewhat overhead as far as the defer required for honesty confirmation and substance approval. The principle issue of QR codes is that they are not intelligible, they must be perused utilizing particular machines (filtering gadgets).

4. IMPLEMENTATION

In this proposed system, it has been use the most of the preferred secret key encryption algorithm such as AES (Rijndael) and the best performing algorithm i.e. Blowfish to provide block wise security to data and also the symmetric key cryptography technique has been used. The proposed system provides enhancement in security by encrypting the file or message by multiple algorithm and result security is increased. The earlier system comprises of single algorithm for encrypting the file hence, security was being compromised. The key feature of our system is that the key for the decryption of files is been converted in QR CODE and being transmitted to the receiver.

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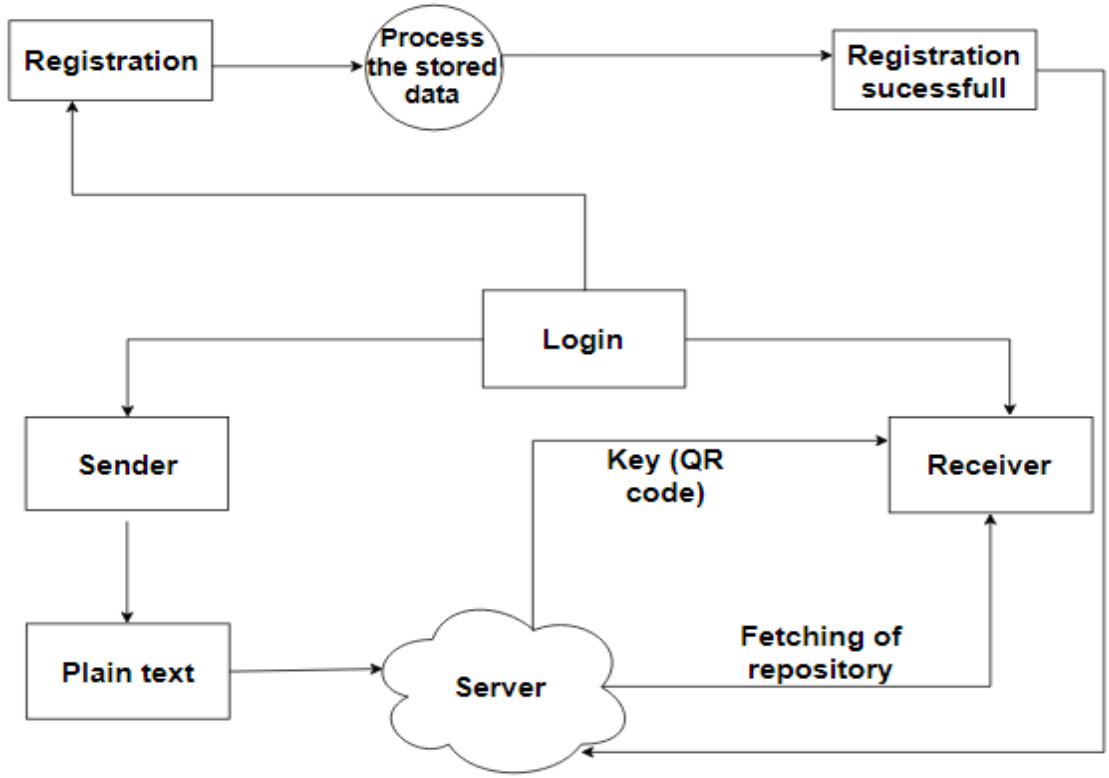

Fig 4.1: System flow diagram for proposed system

The Fig 4.1 shows the system flow diagram of proposed system, which comprises of three main components:

1. **SENDER**: It Selects the file from repository to be shared and sends it to the server. And waits for the key to be received by the server. Once the key is being transferred from server to sender it is been converted it in QR code.

2. **SERVER**: Server is responsible for receiving and storing the files from sender. The server plays an important role as once the file is been uploaded to the server by sender, the server encrypts the file using Blowfish algorithm and generates a key and this key is being encrypted by AES algorithm and encrypted key is been also converted in QR code. This QR code consists of information such as:
   I. Sender/receiver MAC address
   II. Encrypted key

3. **RECEIVER**: It gets the key in the form of QR code which is been then decrypted into reverse manner as used for encryption. The initial stage is to verify the machine address of receiver as it is the destination or specified recipient as defined by the sender, if it is true then files are fetched from server else the access denied to that user. Once the file is being downloaded the receiver cannot be able to download the same file again because the key does not remain same and user has to request sender for the key. Once the key is being decrypted from QR code to textual form it is able to retrieve the data/file or message from server.

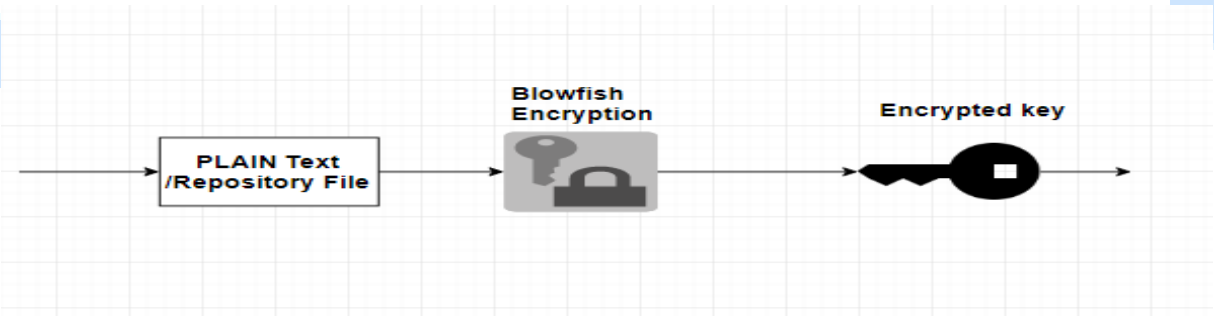

Fig 4.2: Encryption with blowfish algorithm

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The Fig 4.2 explains the phase 1 of system in which the plain text/repository which has to be transferred is been encrypted with Blowfish algorithm.

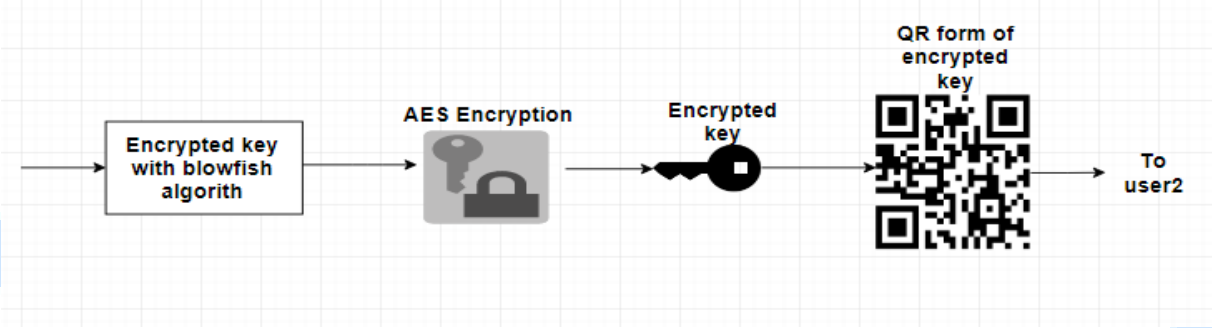

Fig 4.3: Encryption of key with AES algorithm

The Fig 4.3 explains the phase 2 of system in which the key generated from phase 1 is been encrypted with AES algorithm and converted in QR code form.

5. EXPECTED RESULTS

In the existing system, single algorithm has been used for encryption. The system hybridation of the algorithm is been done for encryption of data. The result of the existing system was not that secure due to single algorithm used and can be easily decoded by hacker. The aim of proposed system is to make the secure system for file transfer, which can be done by using hybridation of algorithm and converting the key into QR (Quick-read) code. The hybridation of algorithm enhance the security for file transfer.

The comparison of the algorithms is done with the help of following Parameters:
Time required: The time required for encrypting the data by the previous algorithm requires 10-11 [13] (For 256MB of data) seconds. The system uses the hybrid algorithm for encryption which in both require less time for encryption [13]. A less time required means a better model.
Performance: The algorithms used in system provides a large string of key which is been further converted into QR code and cannot be decoded else then the receiver and thus it enhances the performance. The performance for encrypting is also high then the algorithm used in existing system.
Average of data processed per second: The algorithm used by existing system process approximately 22-23 MB [13] of data per second, While the hybrid algorithms encrypts large amount of data within same time required by algorithm used in existing system.

6. CONCLUSIONS

The current framework encodes the information utilizing single calculation which trade off the security between clients**.**The existing systems also uses SMS medium for transmission of key which can be hacked. Thus, the proposed system implements a secure file transfer model using hybrid algorithm for encryption of data and transformation of key into QR code. The pre-processing technique includes the data encryption, key generation and Key conversion. Hybrid algorithm (AES and Blowfish) was used for encrypting the data, key generation into string format and then conversion of key into non-readable form (QR code). The result obtained were compared with the existing system and found that the time required is much lesser then the existing system and the enhancement in security between the users is been enhanced. The proposed system uses hybrid algorithm which increases and enhances the security key conversion in QR code increases confidentiality between end users to have a secured mechanism for file transfer.

7. ACKNOWLEDGEMENT

We would like to express a deep sense of gratitude towards our guide Ms. Ashwini Save, HOD, Department of Computer Engineering for her constant encouragement and valuable suggestions. The work that we have been able to present is possible because of his timely guidance and support.

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STUDY OF AUTOMATION AND MANUAL TESTING

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ABSTRACT

Testing is a major activity in software development process to find the defector bug in the software. It means testing in IT world is used to show how we can test and where our application or software is lacking. We have Testing can be conducted manually as well as automated. This paper presents the concept of automation and manual testing and problem with manual testing and benefit of automatic testing. This paper is also show the two forms of testing which is manual and automation (we use QTP) and how they different from each other and why we use both. The main objective of this research paper is to focus on, effectiveness and importance of automation testing.

Keywords— Test Cases, QTP, Software Development Life Cycle, Software Testing Life Cycle.

1. INTRODUCTION

Software testing is a testing model of system under testing. System under testing is a phase of maturity of the software testing for correct operations. Software testing executes all process of the whole system and also this testing provides finding errors. Software can be tested either manually or automatically. To create test cases manually and execute them without any tool support is known as manual testing. Manual software testing is performed by a human sitting in front of a computer carefully going through application screens, trying various usage and input combinations, comparing the results to the expected behaviour and recording their observations. Automation Testing means using an automation (different types of software) tool to execute test suite. Goal of automation is to reduce number of test cases to be run manually and not eliminate manual testing all together. Some automation tools are: Winrunner, Loadrunner, QTP, Rational Robot etc.

Mode of Testing

Based on test execution, testing can be classified into two categories:

A. Manual Testing
B. Automation testing

Manual Testing is the form of Testing in which we test the given product, Software or application to test and we test it manually. It is the process of evaluating the system or system components manually as per user requirement. Manual means the amount of men work will be more but in Automation we will automate a given product by writing scripts in different scripting language (QTP is used) .The men work will be less and it will perform faster and accurate results.

Table 1

MANUAL	AUTOMATION(QTP)
1.More Testers are required	1. Few Testers are required
2.Takes lot of time to execute a test case	2. Saves Time as compared to manual
3. No licence cost.	3. Usually have licence cost.
4. Don't need any kind scripting.	4. Scripting is used.
5. Can be used with changing requirement.	5. Mostly not used in which requirement are changing.
6. More expensive.	6. Less expensive.

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A. **Manual Testing:** Manual Testing is a testing technique where the test engineer prepare test case manually and execute them to identify defect in the software as per user requirement. It is most rigorous and old method of software testing. Manual testing is a laborious activity that requires the tester to possess a certain set of qualities; to be patient, observant, creative, innovative, open- minded. Repetitive manual testing can be difficult to perform on large software applications or applications having very large dataset coverage.

Problems with manual testing:

- **Time consuming:** since test cases are exe3cuted by human resources so it is very slow and tedious.
- **Huge investment in human resources:** as test cases need to be executed manually so more testers are required in manual testing.
- **Less reliable:** manual testing is less reliable as tests may not be performed with precision each time because of human errors.
- **Non Programmable:** No programming can be done to write sophisticated tests cases which fetch hidden information. Manual testing can become boring and hence error prone.

B. **Automation Testing**

Automation software testing involves developing test scripts using scripting languages such as python, java script, so that test cases cab be executed by computers with minimal human intervention and attention. Test design and development together can be automated to reduce human effort and save cost. The automation software can also enter test data into the system under test, compare expected and actual results and generate detailed test reports. Test automation demands considerable investments of money. No human intervention is required. Goal of automation is to reduce number of test cases to be run manually and not eliminate manual testing all together.

Benefits of automation testing:

- **Fast-** It is faster than the manual testing.
- **Cost Effective-** Test cases are executed by using automation tool so less tester are required in automation testing.
- **Repeatable-** The same test case (record and replay) can be re-executed using testing tools
- **Reusable-** Test suits can be re-used on different versions of the software.
- **Programmable-**Testers can program sophisticated tests that bring hidden information.
- **Comprehensive-** Testers can build test suites of tests that cover every feature in software application.
- **More reliable-**Automation tests perform precisely same operation each time they are run.

Dynamic test data submission

Sometimes, you may need to submit test data dynamically when the test scripts get executed.

1. When the scripts executes, you get an Input Box called login
2. When you enter the Agent Name
3. Inserts the Agent Name in the Flight

Reservation applications “Agent Name:” edit box.

Here, you dynamically provide input test data during the test execution and hence its name.

Front end objects

Sometimes, you may need to fetch values from an application (Front-end object) and based on the type of the values you fetch, you may need to insert the values in some other objects in the same/different application and execute the scripts. This method of driving the test using front-end objects is called Data Driven testing using front end objects.

Excel sheet

You can either insert data in the Data Table available for the script or use the values using Data Table. Value (“<parameter_name>”,sheetid) in your script or you can import an already existing excel sheet.

Importing an already existing excel sheet with test data:

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1. Assume there is a test data xls.
2. You can import the xls into your script and use the data.
3. You can directly import the data sheet manually to the Data table.
4. Select “ok” when you get the pop up
5. Select the appropriate sheet, you now get Data Table filled in with the available data.
6. You can’t execute your script using all the data rows.

7. Navigation File->Settings->run tab- >Select the option “run one iteration only”

Instead of using Data Table of QTP, you can also directly use VBScript program to fetch values from the input excel.

2. CONCLUSION

Manual testing is time consuming, tedious and requires heavy investment in human e-sources. Automation tools enable us to record the test suite and re-play it if required. Once the test suite is automated, no human intervention is required. In automation testing the initial investments are bigger than manual testing and you cannot automate everything but automatable test cases, determine which ones (manual or automated) would provide the biggest return on investment. Metrics are an important to analyse the quality, and progress of an automated software testing and manual testing effort. The test metrics provides the visibility into the readiness of the product and give clear measurement of the quality and completeness of the product. This paper discussed some manual testing metrics and automation metrics like test execution, test case productivity, defect rejection metrics test coverage metrics to evaluate the performance of both types of testing.

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REALITY MINING TRENDS

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ABSTRACT

We live in an innovation driven society where, every one of us consistently deserts advanced follows. Our cell phones, for instance, constantly sense our developments and connections. This socio-geographic information could be persistently caught by a large number of individuals around the globe and guarantees to uncover vital behavioral intimations about people. Mining examples of human conduct from substantial scale cell phone information has profound potential effect on society. Reality Mining, spearheaded by Nathan Eagle and Alex Pentla nd, (Massachusetts Institute of Technology (MIT)) is characterized as the investigation of human social conduct in light of remote cell phone detected information. Reality mining depends on information gathered by sensors in cell phones, autos, surveillance cameras, RFID ('keen card') perusers, and others, all take into account the estimation of human physical and social movement. Uses of reality mining are in various fields like the study of disease transmission, brain science, urban arranging, security, promoting and even investigation of destitution. This paper endeavors to diagram and breaks down the present patterns as a general rule mining. It additionally introduces the present difficulties in this field.

Keywords— Reality Mining, Social Network Mining, Context aware computing

1. INTRODUCTION

Reality Mining is characterized as the investigation of human social conduct in view of remote cell phone detected information by Nathan Eagle and Alex Pentland, (Massachusetts Institute of Technology (MIT). It is the gathering and examination of machine-detected natural information relating to human social conduct, with the objective of recognizing unsurprising examples of conduct. Cell phones are promising electronic gadgets as sensors because of their unfathomable use over the world on an every day persistent premise, and furthermore because of the various sorts of sensors inserted in the gadget. The cell phone has created, because of its vital nature, from a basic specialized gadget to incorporate numerous different apparatuses, for example, a camera, programs, diversions, logbooks, wake up timers, and will clearly keep on developing later on. These types of information can be examined to uncover insights about human conduct.

Sensors are all over the place, ceaselessly assembling data as we experience our day by day lives. Regardless of whether utilizing email, the phone, a bank machine, or much easier exercises, for example, driving, utilizing a photocopy machine, and a camera, these exercises leave hints of our conduct. As of late, the specialized gadgets have been seen from a designing viewpoint as sensors, catching information which researchers in many orders are extremely amped up for. This information conceivably impacts each one of us as researchers study the potential outcomes of their utilization. Look into utilizing cell phone information has for the most part centered around area driven information investigation, all the more particularly, utilizing Global Positioning System (GPS) information to foresee transportation modes to anticipate client goals or ways, and to foresee every day step tally. Other area driven undertakings have made utilization of Global System for Mobile Communications (GSM) information for indoor limitation or WiFi for vast scale confinement. There are a few works identified with movement demonstrating from area driven telephone sensor information. CitySense is a versatile application which utilizes GPS and WiFi information to condense "hotspots" of movement a city, which can then be utilized to make proposals to individuals with respect to, for instance, favored eateries. Applications to society overall are being explored as far as the study of disease transmission and brain research, urban arranging, security, and even in the examination of neediness. This paper concentrates on the conceivable outcomes, extension and difficulties identified with reality mining. A concise survey has been done for this reason.

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2. SOCIAL NETWORKS

A Social network is defined as a set of actors (individuals) and the ties (relationships) among them. Important research problems include the study of social networks' structural properties (such as community detection and evolution), user properties (such as reputation and trustworthiness), and user social relations (including influence and trust). Social networks are either explicitly specified, such as a Facebook friends list, or implicitly inferred from social interactions such as email or mobile phone co mmunications. Important research problems include the study of social networks' structural properties (such as community detection and evolution), user properties (such as reputation and trustworthiness), and user social relations (including influence and trust).

3. SOCIAL NETWORKS AS GRAPHS

Social networks are naturally modeled as undirected graphs (fig 1). The entities are the nodes, and an edge connects two nodes if the nodes are related by the relationship that characterizes the network. If there is a degree associated with the relationship, this degree is represented by labeling the edges.

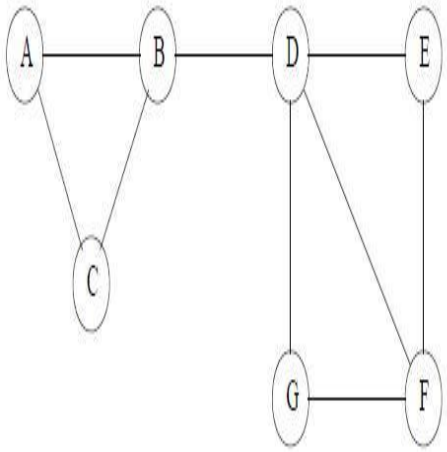

Fig 1.: Example of a small social network represented as **graph**

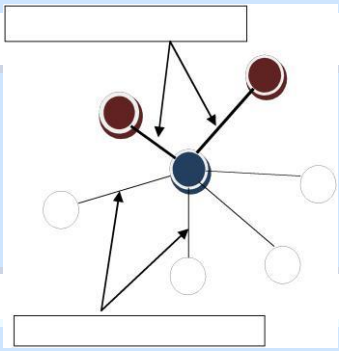

Fig 2.: Using Social Network Mining to estimate strengths of social relations

3.1 Social network mining

In social network mining, we apply data mining algorithms to study large-scale social networks. Social network mining has attracted a lot of attention for many reasons. For example, studying large social networks allows us to understand

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social behaviors in different contexts. In addition, by analyzing the roles of the people involved in the network, we can understand how information and opinions spread within the network, and who are the most influential people. In addition, since social network users may receive too much information from time to time, social network mining can be used to support them by providing recommendations and filtering information on their behalf.

4. CONTEXT AWARE COMPUTING

Context is a combination of any information that can be sensed or received by an entity which is useful to catch events and situations. Context-aware computing uses information about an end user's or object's environment, activities, connections and preferences to improve the quality of interaction with that end user or object. A contextually aware system anticipates the user's needs and proactively serves up the most appropriate and customized content, product or service. Applications that use context, whether on a desktop or in a mobile or ubiquitous computing environment, are called context-aware. There are four catagories of context aware applications:

- **Proximate Selection:** Presents information, which is selected considering some context to ease a choice.
- **Automatic Contextual Reconfiguration**: Current context automatically leads to new information. The entity creates new bindings to context resources.
- **Contextual Information and Commands:** Information and commands are shown / executed manually and adapted to the current situation.
- **Context-Triggered Actions:** The current context leads an application to start a process automatically [2]

5. CURRENT TRENDS

The Pioneers of reality Mining, the researchers of MIT, Nathan Eagle & Alex (Sandy) Pentland et.al [4] introduced a system for sensing complex social systems with data collected from 100 mobile phones over the course of 9 months. They demonstrated the ability to use standard Bluetooth-enabled mobile telephones to measure information access and use in different contexts, recognize social patterns in daily user activity, infer relationships, identify socially significant locations, and model organizational rhythms. The major findings included Behavior Prediction, Relationship Inference and Computational Social Science. Further, N. Eagle, A. Pentland, and D. Lazer et. al [5] analyzed 330,000 hours of continuous behavioral data logged by the mobile phones of 94 subjects, and compared these observations with self-report relational data. The information from these two data sources is overlapping but distinct, and the accuracy of self-report data is considerably affected by such factors as the recency and salience of particular interactions. A new method is proposed for precise measurements of large-scale human behavior based on contextualized proximity and communication data alone, and identify characteristic behavioral signatures of relationships that allowed to accurately predict 95% of the reciprocated friendships in the study. Using these behavioral signatures, it could be possible to predict, individual-level outcomes such as job satisfaction. The dataset built during these experiments is still being used by many researchers for their experimentation.

Further the field was explored by many researchers for various applications. Huiqi Zhang; Dantu, R.; Cangussu, J.W. et.al [6] proposed in their paper, a socioscope model for social-network and human-behavior analysis based on mobile-phone call-detail records. Because of the diversity and complexity of human social behavior, no one technique will detect every attribute that arises when humans engage in social behaviors. They used multiple probability and statistical methods for quantifying social groups, relationships, and communication patterns and for detecting human-behavior changes. They proposed a new index to measure the level of reciprocity between users and their communication partners. This reciprocity index has application in homeland security, detection of unwanted calls (e.g., spam), telecommunication presence, and product marketing.

Zhang, Huiqi; Dantu, Ram et. al [7] proposed that the social-tie strengths of person-to-person are different one another even though they are in the same group. In this paper the researchers investigated the evolution of person-to-person social relationships, quantify and predict social tie strengths based on call-detail records of mobile phones. They proposed an affinity model for quantifying social-tie strengths in which a reciprocity index is integrated to measure the level of reciprocity between users and their communication partners.

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Since human social relationships change over time, they map the call-log data to time series of the social-tie strengths by the affinity model. Then they used ARIMA model to predict social-tie strengths. Farrahi, K.; Gatica-Perez, D. et. al.[8] suggested that human interaction data, or human proximity, obtained by mobile phone Bluetooth sensor data, can be integrated with human location data, obtained by mobile cell tower connections, to mine meaningful details about human activities from large and noisy datasets. They propose a model, called bag of multimodal behavior, that integrates the modeling of variations of location over multiple time-scales, and the modeling of interaction types from proximity. They further demonstrate the feasibility of the topic modeling framework for human routine discovery by predicting missing multimodal phone data at specific times of the day.

Simoes J., Magedanz, T. et. al. [9] proposed a work by combining social network analysis, reality mining techniques and context-aware systems. This work provides an architecture and ground steps for understanding and predicting human behavior and preferences within one of the most promising business models of the future: "Advertising". Furthermore, it shows how user related data (context) can be securely managed and exposed to 3rd party providers, taking into account user context-aware privacy settings. The presented concepts are then realized in a prototype, which evaluates the basic functionalities previously described. Xu Yang, Yapeng Wang, et. al. [10] studied data mining for social network analysis purpose, which aims at finding people's social network patterns by analyzing the information about their mobile phone usage. In this research, the real database of MIT's Reality Mining project is employed. The classification model presented in this project provides a new approach to find the proximity between users - based on their registration frequencies to specific cellular towers associated their working places. K-means Algorithm is applied for clustering.

Huiqi Zhang; Dantu, R. et. al. [11] proposed the Bayesian inference model to calculate the willingness level of the callee to accept calls. Before making a call, the caller may use the willingness calculator to find out whether the callee is available. Based on this level the user can make a decision whether to make a call. They used time of the day, day of the week, talk-time and location for calculating the willingness level.

Michal Ficek, Lukas Kencl [12] proposed that the data captured from a live cellular network with the real users during their common daily routine help to understand how the users move within the network. Unlike the simulations with limited potential or expensive experimental studies, the research in user-mobility or spatio- temporal user behavior can be conducted on publicly available datasets such as the Reality Mining Dataset. These data have been for many years a source of valuable information about social interconnection between users and user-network associations. However, an important, spatial dimension is missing in this dataset. In this paper, the researchers present a methodology for retrieving geographical locations matching the GSM cell identifiers in the Reality Mining Dataset, an approach based on querying the Google Location API. A statistica l analysis of the measure of success of locations retrieval is provided. Further, they presented the LAC -clustering method for detecting and removing outliers, a heuristic extension of general agglomerative hierarchical clustering. This methodology enables further, previously impossible analysis of the Reality Mining Dataset, such as studying user mobility patterns, describing spatial trajectories and mining the spatio -temporal data. Zhenhui Li, Cindy Xide Lin et. al. [13] emphasized that Spatio-temporal data collected from GPS have become an important resource to study the relationships of moving objects. While previous studies focus on mining objects being together for a long time, discovering real-world relationships, such as friends or colleagues in human trajectory data, is a fundamentally different challenge. For example, it is possible that two individuals are friends but do not spend a lot of time being together every day. However, spending just one or two hours together at a location away from work on a Saturday night could be a strong indicator of friend relationship. Based on the above observations, in this paper the researchers aim to analyze and detect semantically meaningful relationships in a supervised way. That is, with an interested relationship in mind, a user can label some object pairs with and without such relationship. From labeled pairs, it is learnt that time intervals are the most important ones in order to characterize this relationship. These significant time intervals, namely T -Motifs, are then used to discover relationships hidden in the unlabeled moving object pairs. Xiaowen Dong, Pascal Frossard et. al.[14] proposed that mobile phone data provides rich dynamic information on human activities in social network analysis. In this paper, the researchers represent data from two different modalities as a graph and functions defined on the vertex set of the graph. They propose a regularization framework for the joint utilization of these two modalities of data, which enables them to model evolution of social network information and efficiently classify relationships among mobile phone users. From the above survey it is observed that the reality mining still has a large potential of getting explored and contribute to ubiquitous computing field. It is one aspect of digital footprint analysis. Much more experimentations could be carried out to analyze the social ties and predict human behavior that could be helpful in exploring parallel universes of opinion mining, emotional mining, social network mining, etc.

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6. SIGNIFICANCE OF THE STUDY

- **Security:** Reality mining can be a great tool to track terrorists as mobile phone networks can identify unusual patterns of movement and communication. GPS-enabled mobile phones and tracking devices are installed on commercial vehicles to monitor traffic conditions. It facilitates in tracking of real-time traffic congestion data.
- **Business:** It can help companies to boost inter-office cooperation. Mining Task-Based Social Networks can be used to explore Collaboration in Software Teams. Event planners who manage multi-million-dollar conventions and conferences can avail the data and make the best out of it. Telecom companies can analyze the service usage and can enhance customer service.
- **Healthcare:** Reality mining has the ability to contribute immensely towards healthcare. By gathering health related information through mobiles, they can predict disease outbreaks. With the aid of audio or motion sensors, changes in the nervous system can be deducted and this information could be used to screen depression.
- **Viral marketing, viral advertising:** these are the buzzwords referring to marketing techniques that use pre-existing social networks and other technologies to produce increases in brand awareness or to achieve other marketing objectives (such as product sales) through self-replicating viral processes, analogous to the spread of viruses or computer viruses. It can be delivered by word of mouth or enhanced by the network effects of the Internet and mobile networks. Viral marketing may take the form of video clips, interactive Flash games, advergames, ebooks, images, text messages,email messages, or web pages.
- **Digital Footprinting:** Uncovering or tracing the tourists with User-Generated content [3]

7. CURRENT CHALLENGES

The requirement for viable strategies and numerical models for investigation gets to be distinctly pivotal keeping in mind the end goal to makegood utilization of the sources. In machine learning, calculations have been produced to perceive complex examples and settle on astute choices in light of information. Conventional machine learning models are perceived as valuable devices for vast scale information investigation. They have been utilized as a part of the space of human conduct investigation, however their impediments with new sorts of information and human-driven inquiries get to be distinctly evident. For instance, a large portion of the conventional machine learning models is regulated, requiring preparing information which is frequently incomprehensible or unlawful to gather on human subjects. Different determinations identified with human-driven information incorporate the multimodal viewpoint, the commotion, the huge amount, and the unpredictable inquiries of intrigue.More specifically, data collected by mobile phone sensors include many types, ranging from GPS, Bluetooth, accelerometer, to voice features. Each of these sensors may be sampled with varying freq uencies, each has varying timescales and differing characteristics, and each has its own sources of noise. Although many basic conceptual questions remain unresolved, the major roadblock in defining the fundamental predictability limits for technosocial systems is their sensitivity and dependence on social adaptive behavior. Addressing these problems involves tackling three major scientific challenges. The first is the gathering of large-scale data on information spread and social reactions that occur during periods of crisis. This is not presently out of reach, via largescale mobile communication databases (such as mobile telephones, Twitter logs, and social Web tools) operating at the moment of specific disaster or crisis events. The second challenge is the formulation of formal models that make it possible to quantify the effect of risk perception and awareness phenomena of individuals on the technosocial network structure and dynamics. The third challenge is that of maintaining privacy i.e. to do privacy –preserving-mining.

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EXPLORING THE DEEP WEB

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ABSTRACT

The deep web research refers to any Internet content that, for various reasons, can't be or isn't indexed by search engines like Google. This definition thus includes dynamic web pages, blocked sites, unlinked sites, private sites, non-HTML/- contextual/-scripted content, and limited-access networks. A smart person buying recreational drugs online wouldn't want to type related keywords into a regular browser. He/she will need to anonymously go online using an infrastructure that will never lead interested parties to his/her IP address or physical location. Drug sellers wouldn't want to set up shop in an online location whose registrant law enforcement can easily determine or where the site's IP address exist in the real world, too. The Deep Web offers a certain level of unusual features that makes people in it more inclined to engage in illegal activities. The various transactions in it, including the makeup of well-known goods and services traded, very well paint a picture of what people would do if the secrecy of their identities was guaranteed.

Keywords : - *Deep Web, Surface Web, Search Engines, Website Content, Terrorism.*

1. INTRODUCTION

The Internet is like a vast ocean. That ocean is filled up with large continents and islands that people visit. A large continent would be Google, and an island would be the news site for your newspaper. Every day an average person visits these continents and islands using their web browser, which acts as a boat navigating to destination on the Internet. The reality though is that the continents and islands only make up 4% of the Internet. The rest of the Internet is made up of the Deep Web, which is located under the ocean. The Deep Web is used for both good and bad, while some may assume its used for illegal purposes. The use of the Internet keeps on evolving, and the Deep Web is a big part of that.

2. DEEP WEB

The Deep Web refers to any Internet content that, for various reasons, can't be or isn't indexed by search engines like Google. This definition thus includes dynamic web pages, blocked sites , unlinked sites, private sites, nonHTML/ contextual/-scripted content, and limited-access networks.

Limited-access networks cover all those resources and services that wouldn't be normally accessible with a standard network configuration and so offer interesting possibilities for malicious actors to act partially or totally undetected by law enforcers. These include sites with domain names that have been registered on Domain Name System (DNS) roots that aren't managed by the Internet Corporation for Assigned Names and Numbers (ICANN) and, hence, the feature URLs with nonstandard top-level domains (TLDs) that generally require a specific DNS server to properly resolve.

Much of the public interest in the Deep Web lies in the activities that happen inside the darknets. Unlike other Deep Web content, limited-access networks are not crawled by search engines though not because of technical limitations. In fact, gateway services like tor2web offer a domain that allows users to access content hosted on hidden services.

While the popular imagery for the Deep Web is an iceberg, we prefer to compare it to a subterranean mining operation in terms of scale, volatility, and access. If anything above ground is part of the "searchable Internet," then anything below it is part of the Deep Web inherently hidden, harder to get to, and not readily visible.

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Fig. 1 How-deep-is-your-web?

A. The Surface Web versus the Deep Web

When discussing the Deep Web, it's impossible for the "Surface Web" not to pop up. It's exactly the opposite of the Deep Web that portion of the Internet that conventional search engines can index and standard web browsers can access without the need for special software and configurations. This "searchable Internet" is also sometimes called the "clearnet."

B. The Dark Web versus the Deep Web

The Dark Web is not the Deep Web; it's only part of the Deep Web. The Dark Web relies on darknets or networks where connections are made between trusted peers. Examples of Dark Web systems include Freenet, TOR, or the Invisible Internet Project .

Taking on the mining tunnel metaphor, the Dark Web would be the deeper portions of the Deep Web that require highly specialized tools or equipment to access. It lies deeper underground and site owners have more reason to keep their content hidden.

3. CONTENT OF DEEP WEB

Contents of deep web comprises of websites, remote data,web pages, log files, status updates, etc. Some of it is generated by the constant chatter of the complex and dynamic software and hardware stack that underlies all Web 2.0 applications. Every user action generates a cascade of data describing what was shown, clicked, viewed and interacted resulting in many data events in the Deep Real-Time Web. Different types of contents present in the deep web are as follows:

1)Dynamic Content: Dynamic pages which are returned in response to a submitted query or accessed only through a form, especially if open-domain input elements are used; such fields are hard to navigate without domain knowledge.

2)Unlinked Content: Pages which are not linked to by other pages, which may prevent Web crawling programs from accessing the content.

3)Private Web: Sites that require registration and login (password-protected resources).

4)Contextual Web: Pages with content varying for different access contexts .

5)Limited Access Content: Sites that limit access to their pages in a technical way.

6)Scripted Content: Pages that are only accessible through links produced by JavaScript as well as content dynamically downloaded from Web servers via AJAX solutions or Flash.

7)Non-HTML/text Content: Textual content encoded in multimedia files or specific file formats not handled by search engines.

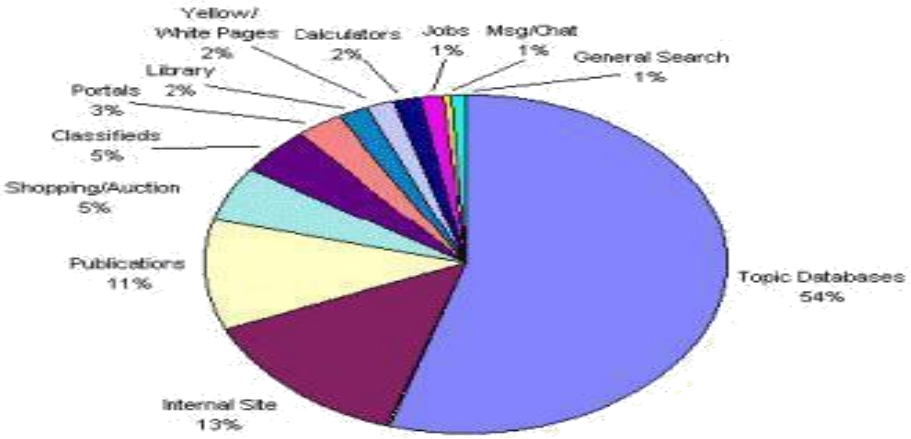

Fig. 2 Displays the distribution of deep Web sites by type of content.

4. CYBERCRIME IN THE DARK WEB

According to studies, virtual crime is not any different than crime in the real world it is just executed in a new medium: 'Virtual criminality' is basically the same as the terrestrial crime with which we are familiar.A great deal of crime committed with or against computers differs only in terms of the medium. While the technology of implementation, and

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particularly its efficiency, may be without pattern, the crime is fundamentally familiar. It is less a question of something completely different than a recognizable crime committed in a completely different way."

A.DRUGS, WEAPONS AND EXOTIC ANIMALS

Websites such as Silk Road act as anonymous marketplaces selling everything from tame items such as books and clothes, to more illegal goods such as drugs and weapons. These sites appear like any number of shopping websites, with a description of the goods, and a photograph.

B.STOLEN GOODS AND INFORMATION

It is correct to assume that dedicated sites facilitate users to trade in both physical and proprietary information, including passwords and access to passwords for surface Web paid-pornography sites and PayPal passwords. PayPal Store, Creditcards for All and Another Porn Exchange are active websites that offer such services.

C.MURDER

The Assassination Market website is a prediction market where a party can place a bet on the date of death of a given individual, and collect a payoff if the date is guessed accurately. This encourages the assassination of individuals because the assassin, knowing when the action will take place, could profit by making an accurate bet on the time of the subject's death. Because the payoff is for knowing the date rather than performing the action of the assassination, it is substantially more difficult to assign criminal liability for the assassination. There are also websites to hire an assassin popular ones are White Wolves and C'thuthlu.

D.TERRORISM

The dark Web and terrorists seem to complement each other the latter need an anonymous network that is readily available yet generally inaccessible. It would be hard for terrorists to keep up a presence on the surface Web because of the ease with which their sites could be shut down and can be tracked back to the original poster.

E.HACKTIVISM

More radical critics and hacktivists occupy part of the political space. The group commonly associated with Occupy Wall Street and other cyber activism, is one well-known hacktivist group.

F.EXPLOIT MARKETS

Exploits are malware based on software's vulnerabilities before they are patched. Zero-day exploits target zero-day vulnerabilities those for which no official patch has been released by the vendor. "Zero-day" refers to the fact that the programmer has had zero days to fix the flaw.

G.ILLEGAL FINANCIAL TRANSACTIONS

Websites such as InstaCard and Banker & Co. facilitate untraceable financial transactions through various methods. They either launder bitcoins by disguising the true origin of the transactions or give users an anonymous debit card issued by a bank. Users are also given virtual credit cards issued by trusted operators in the dark Web.

Buying stolen credit card information has never been easier. The user's details name, address and so on are available at an additional cost.

H.THE HIDDEN WIKI

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The main directory on the dark Web is the Hidden Wiki. It also promotes , contract killing, cyber attacks,money laundering services and chemicals, along with instructions to make explosives.

I.HEIST

There are many rob-to-order pages available in the dark Web, hosted by people who are good at stealing and will steal anything that you cannot afford or just do not want to pay for.

J.ARMS TRAFFICKING

Euroarms is a website that sells all kinds of weapons that can be delivered to your doorstep anywhere in Europe. The ammunition for these weapons is sold separately that website has to be tracked down separately on the dark Web.

K.GAMBLING

Many popular bitcoin gambling sites block US IPs because they are afraid of prosecution from the United States, which has a tight hand on gambling in the United States. With the help of the dark Web, users of these sites can continue gambling by disguising their US IP.

L.PEDOPHILIA

Pedophilia, or child pornography as it is commonly referred to on the dark Web, is extremely accessible. Pornography is accepted on the surface Web with some regulation. The dark Web offers various types of sites and forums for those wishing to engage in pedophilia.

5. MONITORING THE DARK WEB

The dark Web and the Tor network, in particular, offer a secure platform for cyber-criminals to support a infinite amount of illegal activities from various marketplaces to secure means of communication, to an untraceable and difficult to shut down infrastructure for deploying malware and botnets.

It has become increasingly important for security agencies to track and monitor the activities in the dark Web, focusing today on Tor networks, but possibly extending to other technologies in the near future.

Due to its complex webbing and design, monitoring the dark Web will continue to pose significant challenges. Efforts to address it should be focused on the areas as below.

A.MAPPING THE HIDDEN SERVICES DIRECTORY

Both Tor and I2P use a domain database built on a distributed system known as a “distributed hash table,” or DHT. A DHT works by having nodes in the system collaboratively take responsibility for storing and maintaining a subset of the database, which is in the form of a key-value store.

B.CUSTOMER DATA MONITORING

Security agencies could benefit from analyzing customer Web data to look for non-standard domains. Depending on the level of Web usage at the customer side, this may not help in tracking down the links to the dark Web, but it may still provide insights on the activities hosted with top-level domains.

C.SOCIAL SITE MONITORING

Sites such as Pastebin are often used to exchange contact information and addresses for new hidden services. These sites need to be kept under constant observation to spot message exchanges containing new dark Web domains.

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D.HIDDEN SERVICE MONITORING

Most hidden services tends to be highly volatile and go offline very often, coming back online later under a new domain name. It is essential to monitor its online activity every new site as soon as it is spotted. While crawling the Internet is usually an operation involving the retrieval of resources related to a site, this is not recommended in the dark Web.

E.SEMANTIC ANALYSIS

Once the data for a hidden service is retrieved, building a semantic database that contains important information about a hidden site can help track future illegal activities on the site.

F.MARKETPLACE PROFILING

Finally, it would be helpful to focus on profiling transactions made on dark Web marketplaces to gather information about sellers, users and the kinds of goods exchanged. Individual profiles could be built up over time.

6. CONCLUSION

The deep Web in particular, networks on the dark Web such as Tor represents a way for malicious actors to exchange goods, legally or illegally, in an anonymous fashion.The lack of obvious activities in unconventional dark Web networks does not necessarily mean they do not exist. The principle that inspires the dark Web, the activities are simply more difficult to spot and observe. A driving factor for the marketplace is the critical mass. Operators in the dark Web are unlikely to need a high level of, secrecy unless the consequences, if they are discovered, are sufficiently severe. It is possible that sites may come online at specific times and then disappear, making them more difficult to investigate.

Recent revelations about wide-scale nation-state monitoring of the Internet and recent arrests of cyber-criminals behind sites hosted in the dark Web are starting to lead to other changes. It would not be surprising to see the criminal underbelly becoming more fragmented into alternative dark nets or private networks, further making complex the job of investigators.

The dark Web has the potential to host an increasingly large number of malicious services and activities and, unfortunately, it will not be long before new marketplaces emerge. Security researchers have to remain alert and find new ways to spot upcoming malicious services to deal with new phenomena as quickly as possible.

7. ACKNOWLEDGEMENT

I would like to pay special thankfulness, warmth and appreciation to the persons below who made my research successful and assisted me at every point to cherish my goal:

My Assistant Prof. Pradnya Mhatre whose help and sympathetic attitude at every point during my research helped me to work in time. All the faculty, staff members of MCA Department, whose services turned my research a success. My Mom and Dad, family members and friends, without whom I was nothing; they not only assisted me financially but also extended their support morally and emotionally.

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6th National Conference on Role of Engineers in Nation Building, ISBN: (978-93-5288-028-7) IJARIIT (ISSN: 2454-132X)

EVOLUTION OF AMOLED DISPLAY

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ABSTRACT

This paper present the information about AMOLED(Active Matrix Organic Light Emitting Diodes) Display. In modern period this type of display is mostly uses in various types of digital devices like monitor, television and portable devices like mobiles phones and PDA(Personal Digital Assistant). The active AMOLED display consist of OLED pixels that have been deposited or integrated on to a Thin Film Transistor(TFT) Array to form a matrix of pixel that illuminate light upon electrical activation, which function as a series of switches to control the current flowing of each pixels. It provide promising features like thin thickness, self emission, lower driving voltage, a wide viewing angle, fast response time, high brightness and flexible characteristics. This paper mainly focus on introduction, new features, working and market growth of AMOLED.

Keywords : *Introduction, Evolution, Comparison, Working, Marketing Growth, AMOLED Todays.*

1. INTRODUCTION

The term AMOLED means Active-Matrix OLED. The 'active-matrix' part refers to the driving electronics, or the TFT layer. AMOLED displays are developed using thin-film display technology in which organic compounds form the electro-luminescent material. An AMOLED display consists of an active matrix of OLED pixels that generate light on electrical stimulation. The OLED pixels are deposited onto a thin-film transistor that functions as a switch to control the current flowing to each pixel. When you display an image, you actually display it line by line (sequentially) as you can only change one line at a time. TFT contains a storage capacitor which maintains the line pixel states, and so enables large size (and large resolution) displays.

AMOLED displays are widely used in smartphones, tablets, digital cameras, and other consumer electronic devices. One of the unique advantages of AMOLED displays is that they offer ultrahigh quality pictures while reducing power consumption. Moreover, they help reduce the weight of the device while adding to its aesthetic value.

2. EVOLUTION

We'll start alphabetically with AMOLED, although to be a little broader we should probably start with a little background about OLED technology in general. It's hidden in the name, but the key component in these display types is a Light Emitting Diode (LED). Electronics hobbyists will no doubt have played around with these little lights before, but in a display panel these are shrunk down dramatically and arranged in red, green and blue clusters to create an individual pixel that can reproduce white light and various colors. The arrangement of these subpixels can alter the performance of the displays slightly.

The O part in OLED stands for organic. Simply put, there are a series of thin organic material films placed between two conductors in each LED, which is then used to produce light when a current is applied.

Finally, the AM part in AMOLED stands in for Active Matrix, rather than a passive matrix technology. This tells us how each little OLED is controlled. In a passive matrix, a complex grid system is used to control individual pixels, where integrated circuits control a charge sent down each column or row. But this is rather slow and can be imprecise. Active Matrix systems attach a thin film transistor (TFT) and capacitor to each LED. This way, when a row and column is activated

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to access a pixel, the capacitor at the correct pixel can retain its charge in between refresh cycles, allowing for faster and more precise control.

One other term you will encounter is Super AMOLED, which is Samsung's marketing term for a display that incorporates the capacitive touchscreen right into the display, instead of it being a separate layer on top of the display. This makes the display thinner.

Types of OLED Construction

OLEDs can be constructed in a variety of ways to serve a variety of functions. While each type of construction uses the layers described previously, the manner in which each layer is built alters the way the OLED functions. The six most common types of OLEDs are as follows:

A. passive matrix OLED:

Anode and cathode laid perpendicular to each other. PM OLEDs are easy to make and display text and icons very effectively, particularly in small 2-inch to 3-inch screens

B. active matrix OLED:

AM OLEDs are constructed with continuous film materials. AM OLEDs use less energy than PM OLEDs and have faster refresh rates.

C. Transparent OLED :

Constructed with transparent materials for all five layers, a transparent OLED can be made as either a PM OLED or an AM OLED.

D. Top-Emitting OLED :

These types of OLEDs use an opaque or reflective substrate that is useful for smart card applications.

E. Foldable OLED :

The substrate of this type of OLED is very flexible, allowing the OLED to be folded or rolled up.

F. White OLED :

These OLEDs emit white light that is brighter, more uniform and more energy efficient than that emitted by fluorescent lights.

3. COMPARISON TO OTHER TECHNOLOGY

AMOLED displays provide higher refresh rates than passive-matrix,[not specific enough to verify] often reducing the response time to less than a millisecond, and they consume significantly less power. This advantage makes active-matrix OLEDs well-suited for portable electronics, where power consumption is critical to battery life.

The amount of power the display consumes varies significantly depending on the color and brightness shown. As an example, one commercial QVGA OLED display consumes 0.3 watts while showing white text on a black background, but more than 0.7 watts showing black text on a white background, while an LCD may consume only a constant 0.35 watts regardless of what is being shown on screen. Because the black pixels turn completely off, AMOLED also has contrast ratios that are significantly higher than LCD.

AMOLED displays may be difficult to view in direct sunlight compared with LCDs because of their reduced maximum brightness.[citation needed] Samsung's Super AMOLED technology addresses this issue by reducing the size of gaps between layers of the screen. Additionally, PenTile technology is often used for a higher resolution display while requiring fewer subpixels than needed otherwise, sometimes resulting in a display less sharp and more grainy than a non-(pen tile) display with the same resolution.

The organic materials used in AMOLED displays are very prone to degradation over a relatively short period of time, resulting in color shifts as one color fades faster than another, image persistence, or burn-in.

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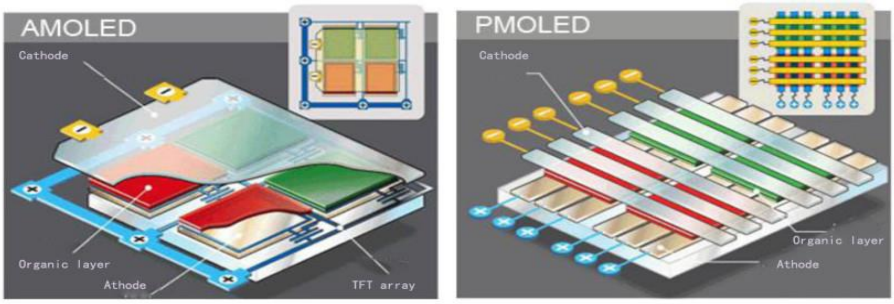

Chart -1 Comparision between AMOLED and PMOLED

4. WORKING

Active matrix (AM) OLED displays stack cathode, organic, and anode layers on top of other layer or substrate.it contains circuitry the pixels are in a continuous, discrete "dot" pattern. each pixel is activated directly when a corresponding circuit delivers voltage to the cathode & anode materials, AMOLED pixels are turn on & off more than three times faster than the speed of conventional motion picture film-matching these displays ideal for fluaid.

An AMOLED display consists of an active matrix of OLED pixels generating light (luminescence) upon electrical activation that have been deposited or integrated onto a thin-film-transistor (TFT) array, which functions as a series of switches to control the current flowing to each individual pixel.

Typically, this continuous current flow is controlled by at least two TFTs at each pixel (to trigger the luminescence), with one TFT to start and stop the charging of a storage capacitor and the second to provide a voltage source at the level needed to create a constant current to the pixel, thereby eliminating the need for the very high currents required for passive-matrix OLED operation.

TFT backplane technology is crucial in the fabrication of AMOLED displays. In AMOLEDs, the two primary TFT backplane technologies, polycrystalline silicon (poly-Si) and amorphous silicon (a-Si), are currently used offering the potential for directly fabricating the active-matrix backplanes at low temperatures (below 150 °C) onto flexible plastic substrates for producing flexible AMOLED displays.

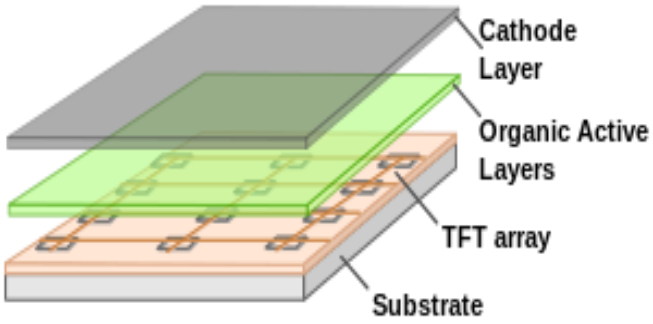

Chart -2 Layers of AMOLED

Now we discuss the how multilayer AMOLED can fabricated with two or more layers.these layers are improve the device efficiency as well as conductive properties. Many modern AMOLED incorporate a simple bilayer structure these layers are conductive layers and an emissive layer. In emissive layer there is a region which helps for the electron transportation i.e balancing the charge transport.

When a voltage is applied across the AMOLED such that anode is positive with respect to the cathode . a current of electrons flows through the device from cathode to anode . metals such as barium and calcium are often used for the cathode as they have low work functions which promote injection of electrons.such metals are reactive , so require a capping layer of aluminium to avoid degradation.

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5. MARKETING GROWTH OF AMOLED DISPLAY

The market of AMOLED display is estimated to attain USD 14.1 billion by 2018. There is an ongoing debate over the manufacturing of AMOLED display for larger display due to many complications involved for large display production as compared to the small and medium sized display.

The major driving factors for AMOLED displays are the advent of smart phones into the market and their emphasized utilization across the globe and other factors like the increased usage of Wi-Fi, broadband multimedia, tablets and similar devices.

AMOLED displays are widely used in digital camera manufacturing as they provide higher refresh rate as compared to OLED, minimizing the response time. It is quite effective in utilizing energy, is cost efficient and gives crystal clear images.

The material used in the production of AMOLED displays is degradable, in keeping with the concerns of EPA regulations and policies. This has given the AMOLED markets a clean sweep from various environmental regulatory agencies across the globe.

The paradigm shift towards the use of smart phones or tablets across the globe has increased, thereby fuelling the markets of AMOLED displays. With recent advancements, the market is moving towards AMOLED displays which are catered with HD displays offering more crystal clear images.

The approved materials used in the production of AMOLED displays by the EPA and changing trends across the globe coupled with the rise in the per capita income of people are acting as some of the major opportunities of the AMOLED display market. The major market share holders of AMOLED displays are:

- Samsung
- Dresden Microdisplay
- Novaled AG
- AU Optronics
- BOE Display

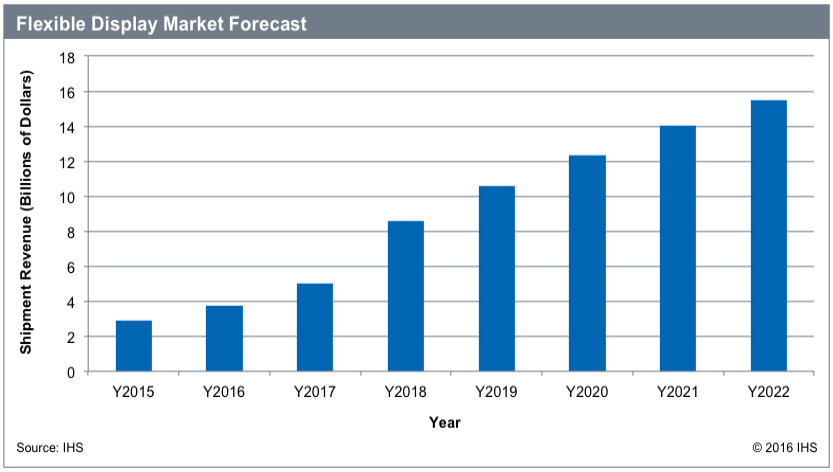

Chart -3 Flexible Display Market Forecast

6. OLED MARKET RESTRAINTS

Slow Adoption Rate of New Technology

- The adoption rate of OLED Technology is comparatively slower than the initial launch of LCD technology. Consumers are complacent with the current technologies it offers then a myriad o advantages and benefits.
- The largest issues foreseen are consumer perception, cost effectiveness of the product, ease of implementation and the ability of the service to provide true blended services.
- As a result, there is a significant and vital gap between new product design to volume manufacturing in the OLED market.
- Increasing costs and manufacturing complexity has hindered the adoption rate of OLED manufacturing equipment, especially for larger substrate sizes.

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- The growth of the OLED display market and, in turn equipment sales, will rely on increasing collaboration between material suppliers,technology enablers and equipment providers. Decreased time to market and focus on R&D will be the key to attaining the desired growth trajectory.

High Cost of Products

- The high cost of OLED display has hindered adoption rates. For Example, customers, while willing to pay a premium price for quality products,hedge until the product has reached mass adoption level. A manufacturing facility typically requires an investment of $ 1 Billion to 3 Billion.
- This has restrained the demand for OLED equipment. Equipment providers are still caught in a dilemma of balancing the high cost of technology development with affordable pricing for consumers.
- Careful adjustment of prices can help minimize the impact of this restraint. Pricing strategy is crucial for success for the overall OLED market.

Declining Prices of Competing Technologies

- The LCD market is continuing to witness strong demand despite the emergence of new products in the market.
- LCD Technology is transitioning t meet increasing demands for higher switching speeds, becoming more environmentally friendly by using LED backlighting, becoming sleeker and more compact, and having better resolution.
- The LCD and other existing technologies also offer consumers the ability to buy large screen displays. This had created major barriers for increasing the adoption rate for OLED manufacturing equipment.

7. AMOLED'S TODAY

AMOLED is a display technology used in some of the most popular mobile devices available today, this is used in various Android handsets and tablets, the technology, especially used in Samsung- made Android devices is very popular among Android devices makers.

AMOLED displays today are used in many applications - and are most common in smartphones. Samsung for example uses AMOLED displays in most of their high-end phones, including the latest Galaxy S7, S7 edge and the ill-fated Note 7. Samsung also uses AMOLEDs in tablets, digital cameras and wearable devices. Other companies (such as Motorola, Microsoft, Huawei and Sony) also adopt AMOLEDs in some of their products. Apple is using a flexible AMOLED in its SmarthWatch, and the MacBook Pro's Touch Bar is also an AMOLED display.

Chart -4 Todays AMOLED Displays

AMOLED displays are also used in OLED TVs - which are mostly available from LG. OLED TV screens range from 55" to 77", flat and curved and the high-end ones support HDR, 4K and are considered to be the best TV panels ever produced.

Now a days there are many types of AMOLED discovered . they are as follows :

- Super AMOLED
- Super AMOLED Advanced
- Super AMOLED Plus
- HD Super AMOLED
- HD Super AMOLED Plus

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- Full HD Super AMOLED
- Quad HD Super AMOLED

AMOLED is used in the following things :

- Smartwatches
- Phones
- Tablets
- Portable music players
- Games consoles
- Music production hardware
- Digital cameras

8. CONCLUSION

AMOLED displays are a type of OLED displays for mobiles and are rapidly gaining popularity in top end smartphone segment. AMOLED screens have all the attributes of an OLED display like brilliant color reproduction, light weight, better battery life, higher brightness and sharpness and light weight designs.

Super AMOLED displays - Super AMOLED displays are an even advanced version of AMOLED displays developed by Samsung. Super AMOLED display is built with touch sensors on the display itself, as opposed to creating a separate touch sensitive layer (as in capacitive touch screen). This makes it the thinnest display technology on the market.

Super AMOLED displays are also much more responsive than other AMOLED displays. Samsung's recent top of the line smartphone Samsung Galaxy S I9000 comes with Super AMOLED.

AMOLED is Flexible Displays redefine "mobile" as they can be bent into different shapes and sizes to allow easier storage and better portability. They stand to revolutionize the world of portable electronics and in particular, the cellphone. As Frank Gillett, Vice President and principal analyst at Forrester said, bendable displays stand to ultimately reduce the physical footprint of any mobile device.

If you were to choose a device by the kind of AMOLED display it comes with, then you'd better get a super AMOLED plus or HD super AMOLED screen. These are the kind of panels that today we all find the latest Android handset.

9. ACKNOWLEDGMENT

I would like to pay special thankfulness, warmth and appreciation to the persons below who made my research successful and assisted me at every point to cheris my goal. We thank our colleagues from VIVA School of MCA who provided insight and expertise that greatly assisted the research, although they may not agree with all of the interpretations of this paper.

We thank Prof. Mrs. Chandani Patel, Head of the Department of MCA, whose reminders and constatnt motivation encouraged me to meet the deadlines.

We would also like to show our gratitude to the VIVA School of MCA for sharing their pearls of wisdom with us during the course of this research, and we thank "anonymous" reviewers for their so-called insights. We are also immensely grateful to our familly for their comments on an earlier version of the manuscript, although any errors are our own and should not tarnish the reputations of these esteemed persons.

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WHY ASP, NOT JAVA?

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ABSTRACT

This research is a comparative study of JAVA and ASP .net. It mainly focuses on advantages of java over ASP.net. A review of evolution of JAVA and ASP.net was conducted to determine the current trends of their importance, overall effects, and usage within the modern industrial organization. A general framework for a proposed application is then developed, and a basic set of requirements for its implementation and general areas to be utilized in the development are outlined. Of primary concern is the formulation of a basic set of standards to be maintained by the modern-day software developer for industrial and public protection as well as professional competence and standardization.

Keywords:-Compiler, MSIL, JRE, Bytecode, ASP, IIS

1. INTRODUCTION

ASP.NET designed for web development to produce dynamic web pages it is an open-source server-side web application framework.It allowed programmers to build dynamic web sites, web applications and web services. It was Developed by Microsoft.ASP.NET has built in features using Common Language Runtime (CLR), allowing programmers to write ASP.NET code using any supported .NET language.

Whereas, Java is a general-purpose computer programming language that is concurrent,structured,reflective,class-based, object-oriented and specifically designed to have as few implementation dependencies as possible. It is intended to let application developers "write once, run anywhere" it is platform independent meaning that compiled Java code can run on all platforms that support Java without the need for recompilation.

2. EVOLUTION OF ASP.NET AND JAVA

A. History of ASP.net

Microsoft Active Server Pages (ASP) started its life as a public beta (v1.0) in October 1996 as an upgrade to Internet Information Server (IIS) 2.0. From that point on, ASP slowly evolved into version 2.x, and then finally 3.0. In the initial three versions, ASP used a scripting language, VBScript, as the default language. In early 2000, Microsoft introduced the new .NET Framework, and together with it, introduced the upgrade of ASP: ASP.NET 1.0 (previously known as ASP+).Over the last few years, ASP.NET has gone through a few evolutions, from ASP.NET 1.0 to 1.1, and now to ASP.NET 2.0.

B. History of Java

The history of java starts from Green Team. Java team members (also known as Green Team), initiated a revolutionary task to develop a language for digital devices such as set-top boxes, televisions etc. For the green team members, it was an advance concept at that time. But, it was suited for internet programming.

The major points that describes the history of java are as follows:

- James Gosling, Mike Sheridan, and Patrick Naughton initiated the Java language project in June 1991. The small team of sun engineers called Green Team.
- Originally designed for small, embedded systems in electronic appliances like set-top boxes.
- Firstly, it was called "Greentalk" by James Gosling and file extension was .gt.

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- After that, it was called Oak and was developed as a part of the Green project.
- In 1995, Oak was renamed as "Java" because it was already a trademark by Oak Technologies.
- The team gathered to choose a new name. They wanted something that reflected the essence of the technology: revolutionary, dynamic, lively, cool, unique, and easy to spell and fun to say. According to James Gosling "Java was one of the top choices along with Silk". Since java was so unique, most of the team members preferred java.
- Originally developed by James Gosling at Sun Microsystems (which is now a subsidiary of Oracle Corporation) and released in 1995. Time magazine called Java one of the Ten Best Products of 1995.

3. WORKING OF ASP.NET

When client request through web browser a page is redirected to web server, the web server (IIS) will first check if the request is for an HTML page. If it is, the request is fulfilled by fetching the files from the OS and then returning it to the client (web browser). If the client is requesting an ASP.NET page, IIS will pass the request to the ASP.NET runtime, which will then process the application and return the output to the client. ASP.NET pages use the .aspx extension. This is to ensure that ASP.NET is able to run side by side with classic ASP on the same server, which uses the extension .asp.

4. WORKING OF JAVA

A working JAVA model can be classified into four stages.

Stage 1: Write the source file. This file contains all the classes,method,objects and procedure within established protocol for Java Programming Language. The name of source file should be the name of the class. The source file name must have extension .java.

Stage 2: Java Source Code file Run through Java Compiler. Java Source code Compiler checks for error and syntax in the source file.

Stage 3: Compiler creates class file. These class file inherit the same name as the Source code file name, but the extension varies. The Source file name has extension 'filename.java', whereas the extension of class file is 'filename.class' created by compiler. This class file is coded into bytecode.

Stage 4: This class file created by Java Compiler is portable and architecturally neutral. Java Virtual Machine (JVM) is required to run this code no matter where.

REQUIREMENTS FOR ASP.NET AND JAVA

A. REQUIREMENTS FOR ASP.net

To run ASP.NET, you need to install IIS on your computer (IIS is not installed by default). In addition, to develop ASP.NET server applications, the following software's is also required:

- Microsoft Windows 2000 Professional and Server (SP 2 recommended)
- Microsoft Windows XP Professional
- Microsoft Windows Server 2003

B. REQUIREMENTS FOR JAVA

Java is supported by almost every operating systems. So you can download any of the operating system on your personal computer. Here are the minimum requirement.

- Java SDK or JRE 1.6 or higher
- Java Servlet Container
- Supported Database and library that supports the database connection with Java.

5. EXECUTION OF ASP.NET AND JAVA

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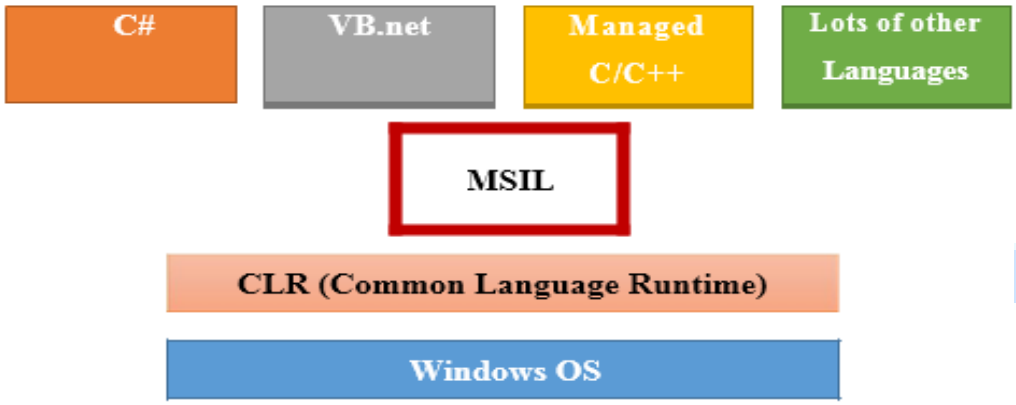

Fig. 1 A block diagram representing framework for ASP.net

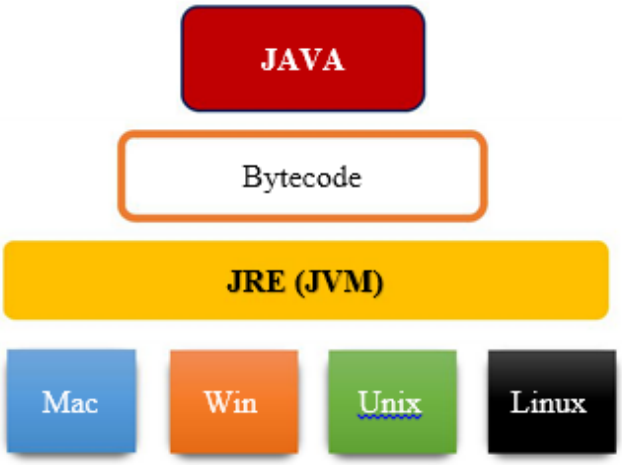

Fig. 2 A block diagram representing framework for JAVA

6. CONCLUSION

Java and .NET are two of the major technologies used for large-scale applications. Both technologies have evolved over the years to support and enhance desktop and server side application development. Often organizations and developers need to choose between the two.When it comes to ASP.net, i.e., using a scripting language, has its flaws. Code is interpreted rather than compiled. The interpreted code model of ASP has limited performance. The end goal of both platforms is similar. But the means vary. There are several differences in the internal mechanism of these ASP.net and JAVA, and languages they use.

A. **Windows vs. Multi-Platform:** There are a few open source implementations of Microsoft's .NET framework, .NET is mainly targeted for the windows operating system. Java, however is quite portable and platform independent. It is based on the concept that the same software should be interoperable with different computers, devices, consumer gadgets etc. on a network.

B. **Languages Supported:** With the J2EE Java framework, Java is the default programming language and there are no other choices offered. This makes it easier for developers wanting to master the technology by simplifying the selection. .NET development framework offers support for several language types including C#, F#, and VB.net. What's more, there is opportunity to rewrite additional programs for the .NET framework. Businesses often close on a dot net development company for enterprise app development, for this flexibility.

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C. **IDE:** Microsoft Visual Studio is the default IDE for .NET applications. This tool provides everything that a developer needs to develop, debug, build and deploy any type of application targeted for the .NET framework. There are four main IDEs, Eclipse, IntelliJ Idea, Oracle NetBeans and Oracle JDeveloper for Java and various minor ones. This means that instead of being tied up with a single platform and single environment, Java allows you to choose the product that best fits your requirements and budgets.

7. ACKNOWLEDGEMENT

I would like to pay special thankfulness, warmth and appreciation to the persons below who made my research successful and assisted me at every point to cherish my goal:

My Assistant Professor, Soniya Dubey whose help and sympathetic attitude at every point during my research helped me to work in time. All the faculty, staff members of MCA Department, whose services turned my research a success. My Mom and Dad, family members and friends, without whom I was nothing; they not only assisted me financially but also extended their support morally and emotionally.

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INTRUSION DETECTION SYSTEM- IDS

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ABSTRACT

This paper gives information about IDS. IDS is a software application or a system that monitors the network or system activities and detect any malicious operations or policy violation that are performed. With the rapid progress in the internet based technology new application areas for computer network have emerged. The growth of internet for communication has also raised the concerns about the information and data that transmits over the network. Intruders and hackers use different types of attacks on the system to get access to the valuable information. Many IDS techniques and algorithms help to detect these attacks. This paper provides the complete study of the intrusion detection, types of intrusion detection, types of attacks, IDS and firewall, applications, advantages and disadvantages of IDS.

Keywords— *Intrusion detection, IDS attacks, IDS types, Security, Techniques.*

1 Introduction

1.1 Intrusion and Intrusion Detection

Intrusion is the act of forcibly entering or taking possession of the property of another. The act of discovering or determining the existence, presence, or fact of the wrongfully entering upon, seizing, or taking possession of the property of another.

1.2 Intrusion Detection System (IDS)

Intrusion Detection System (IDS) is defined as the software or hardware product, which focuses and identifies probable incidents caused by attackers, monitors information about those intrusions, tries to terminate them, and produces a report for security administrators in real-time environment. So, Intrusion Detection System can be considered as a security operation that complements protection, e.g., firewalls. It also helps to provide security and prevention against various intrusion caused by the attackers.

1.3 Background (History and current facts)

For about two decades, intrusion detection has been an effective field of research. In 1980, James Anderson published a paper, "Computer Security Threat Monitoring and surveillance", which was one of the earliest papers in the field. Between 1983 and 1986, Dorothy Denning and Peter Neumann began working on government project related to IDS development; they researched and developed the first model of real-time IDS. The prototype was named the "Intrusion Detection Expert System (IDES)". The attackers used automated tools and exploit scripts for the attacks. From 2012 to 2015, number of cyber incidents in India has increased from 3500 to 11592 as shown in Fig.1. In the start of Year 2018 there were already 5 new attacks being recorded regarding privacy, and personal data stealing via fake app.

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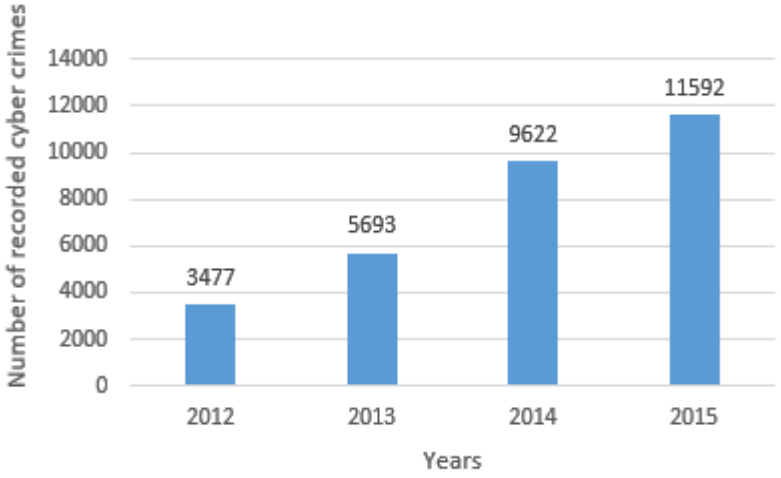

Fig. 1 : Number of registered cybercrime incidents committed in India from 2012-2015

2. Types of IDS

Intrusion detection systems are classified as:

i. Network-based IDS

ii. Host-based IDS

iii. Hybrid based IDS

2.1 Network-based IDS (NIDS)

Network-based IDS are standalone hardware appliances which include network intrusion detection capabilities. They are mostly deployed on strategic point in network infrastructure such as at a boundary between networks, virtual private network servers, remote access servers, and wireless networks. NIDS monitors network traffic going through particular network segments or devices. It can capture and analyse data to detect known attacks or illegal activities or analyse network and application protocol activity to identify anomalous and suspicious activity by traffic scanning. NIDS can also be referred as "packet-sniffers", because it captures and collect the data in the form of internet packets passing through communication mediums.

2.2 Host-based IDS (HIDS)

In Host-Based IDS, the characteristics of a single host are monitored and the events of that host are observed for any malicious activity. They can monitor network traffic, logs, processes, operations performed by applications, file access and modification, and any configuration change in system. The deployment of HIDS is usually done on critical hosts. Critical host includes servers or systems that are publicly accessible and have some sensitive information. They are placed on one server or workstation, where data is collected from different resources and machine analyse the data locally.

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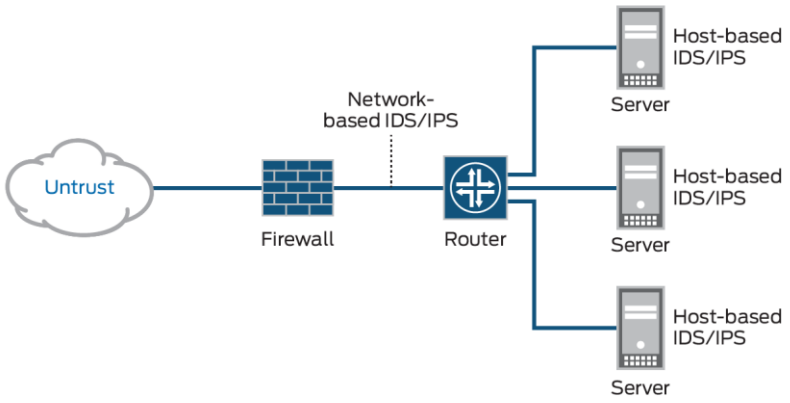

Fig. 2 : NIDS and HIDS in a Network

3. Types of attacks & Application of IDS

The system or agent is placed between a process and group of servers that monitors and analyses the application protocol between devices. Intentional attacks are the malignant attacks carried out by disgruntled employees to cause harm to the organization and Unintentional attacks causes financial damage to the organization by deleting the important data field.

3.1 Various types of attacks:

1. Denial of Service Attack: It tries to deny the authorized users from promoting the requested service. An advanced Distributed Denial of Service occurs in a distributed environment that the attacker sends or floods the server with numerous connection that request to knock the target system. Types of DOS attacks are:
   1.1 SYN Attack: SYN attack is also defined as Synchronization attack. Here, the attacker sends the flood of SYN request to the destination to use the resources of the server and to make the system unresponsive.
   1.2 Ping of Death: In this the intruder sends a ping request to the targeted system which is larger than 65,536 bytes which causes the system to crash. The formal size must be 56 bytes or 84 bytes in case of considering Internet protocol header.
2. Eavesdropping Attack: It is the scheme of interference in communication by the attacker. This attack can be done over by telephone lines or through email.
3. Spoofing attack: This attacker portrays as another user to forge the data and take advantages on illegal events in the network. IP spoofing is a common example where the system communicates with a trusted user and provides access to the attacker.
4. Intrusion Attack or User to Root attack (U2R): An intruder tries to access the system or route through the network. Buffer overflow attack is a typical intrusion attack which occurs when a web service receives more data than it has been programmed to handle which leads to loss of data.
5. Logon abuse Attack: A logon abuse attack would neglect the authentication and access control mechanisms and grant a user with more advantages.
6. Application level attack: The attacker targets the disabilities of application layer. For example, security weakness in the web server or in faulty controls on the server side

3.2 Application Techniques of IDS

1. Artificial Neural Networks (ANNs)

Artificial neural networks provide flexible pattern recognition capabilities. In ANNs, special kind of training is given to the system so that it can recognize various arbitrary patterns that are provided to it as input data. When system fully recognizes

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these patterns it is then asked to match these patterns with the output produced. By matching various input and output arbitrary patterns, it is detected that intrusion has occurred or not.

2. State Transition Tables

In State Transition Table, sequence of actions performed by an intruder is described in the form of a state transition diagram and behaviour of the system is observed. When it matches with identifiable compromised state and penetrated sate, an intrusion is detected.

3. Genetic Algorithms (GAs)

The function of Genetic Algorithms (GAs) is to imitate or mimic the natural reproduction system in nature. After undergoing recombination and various random changes, only the fittest individual will be reproduced in subsequent generations. In 1995, the application of GAs appeared in IDS research. It involves evolving a signature that indicates intrusion. Learning Classifier System (LCS) is the related technique, in which binary rules that recognize intrusion patterns are evolved.

4. Bayesian Network

In Bayesian Network, graphical models have been introduced. These graphical models are defined by a set of transition rules, represented as probabilistic interdependencies. In this model, a conditional probability table and the state of random variables are described in each node. A conditional probability table determines the probabilities of the node in a state, given a state of its parent. This approach can handle incomplete data.

5. Fuzzy Logic

Fuzzy Logic is designed to handle vague and imprecise data. To indicate an intrusion, a relationship between input and output variables is defined by creating different set of rules. It uses membership functions to examine the intensity of truthfulness

4. IDS and Firewall

A common misunderstanding is that firewalls recognize attacks and block them. This is not true. Firewalls are simply a device that shuts off everything, then turns back on only a few well-chosen items. In a perfect world, systems would already be "locked down" and secure, and firewalls would be unneeded. The reason we have firewalls is precisely because security holes are left open accidentally. Thus, when installing a firewall, the first thing it does is stops ALL communication. The firewall administrator then carefully add "rules" that allow specific types of traffic to go through the firewall. For example, a typical corporate firewall allowing access to the Internet would stop all UDP and ICMP datagram traffic, stops incoming TCP connections, but allows outgoing TCP connections. This stops all incoming connections from Internet hackers, but still allows internal users to connect in the outgoing direction.

A firewall is simply a fence around your network, with a couple of well-chosen gates. A fence has no capability of detecting somebody trying to break in (such as digging a hole underneath it), nor does a fence know if somebody coming through the gate is allowed in. It simply restricts access to the designated points.

In summary, a firewall is not the dynamic defensive system that users imagine it to be. In contrast, an IDS is much more of that dynamic system. An IDS does recognize attacks against the network that firewalls are unable to see.

For example, in April of 1999, many sites were hacked via a bug in ColdFusion. These sites all had firewalls that restricted access only to the web server at port 80. However, it was the web server that was hacked. Thus, the firewall provided no defence. On the other hand, an intrusion detection system would have discovered the attack, because it matched the signature configured in the system.

Another problem with firewalls is that they are only at the boundary to your network. Roughly 80% of all financial losses due to hacking come from inside the network. A firewall as the perimeter of the network sees nothing going on inside; it only sees that traffic which passes between the internal network and the Internet.

Some reasons for adding IDS to you firewall are:

a. Double-checks misconfigured firewalls.

b. Catches attacks that firewalls legitimate allow through (such as attacks against web servers).

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c. Catches attempts that fail.
d. Catches insider hacking.

5. Advantages and Disadvantages

5.1 Advantages of Network IDS:

a. Lower Cost of Ownership
b. Easier to deploy
c. Detect network based attacks
d. Retaining evidence
e. Real Time detection and quick response.
f. Detection of failed attacks

5.2 Advantages of Host IDS:

a. Verifies success or failure of an attack
b. Monitors System Activities
c. Detects attacks that a network based IDS fail to detect
d. Near real time detection and response
e. Does not require additional hardware
f. Lower entry cost

5.3 Disadvantages or Limitations of IDS

a. Rules: If the rules for IDS are bad they may cause false positives. In worst case they may provide coverage for real attacks.
b. Visibility: End-to-end encrypted traffic will be ignored or passed.
c. Fragmentation: The attack done using the data packets will be impossible for the IDS to detect.
d. Data storage requirement: IDS stores logs about each system/network. Thus may require storage space.

6. Conclusion

As IDS technologies continue to evolve, they will more closely resemble their real-world counterparts. Instead of isolated sensor units, the IDS of the future will consist of sensor units that report to master visualization consoles which are responsible for checking whether alerts from the sensors agree or correlate to likely event-chains. In the future, IDS, firewalls, VPNs, and related security technologies will all come to interoperate to a much higher degree. As IDS data becomes more trustworthy because of better coverage, firewalls and VPN administrators will be more comfortable with reacting based on the input from the IDS. The current generation of IDS (HIDS and NIDS) are quite effective already; as they continue to improve they will become the backbone of the more flexible security systems we expect to see in the not-too-distant future.

7. Acknowledgement

I would like to thank for the warmth and appreciation to the persons below who contributed and made my research successful and assisted me at every point to cherish my goal: My Supervisor, Prof. Pradnya Mhatre for her vital support and assistance. Her insight and expertise greatly assisted the research and encouragement made it possible to achieve the goal. Prof. (Mrs.) Chandani Patel, Head of the Department of MCA, whose reminders, constant motivation and comments encouraged me to meet the deadlines. All the faculty, staff members of MCA Department, whose support and services turned my research a success. My Mom and Dad, family members and friends, without whom I was nothing; they not only assisted me financially but also extended their support morally and emotionally.

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Li-Fi VISIBLE LIGHT COMMUNICATION

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ABSTRACT

This document gives the brief information about the Li-Fi Technology. Light Fidelity or Li-Fi is a Visible Light Communications (VLC) system running wireless communications travelling at very high speeds. Li-Fi uses common household LED light bulbs to enable data transfer, boasting speeds of up to 224 gigabits per second. The concept of light being used as a medium to transfer internet data has been coined Li-Fi by Harold Hass in TED talk 2011.So Li-Fi can be used to send high bitrate information through and from light. To sum it up you can walk into a room switch on the lights and simultaneously instantly have an internet connection hundred times faster than regular Wi-Fi.

Keywords— *Li-Fi Technology, Visible Light Communication, TED Talks, D-Light Project, Light Modulation.*

INTRODUCTION

Wi-Fi today has become the fourth commodity of life apart from food, clothing, and shelter. Using wireless internet has always been a hunt for bandwidth and we probably end up frustrated at slow speed. As more and more people and their devices access wireless internet, clogged airwaves are the reason for it. To overcome this limitation a German physicist Harold Hass has come up with a solution he calls data through illumination taking the fire out of the traditional wireless internet and using an LED light bulb for sending data. It uses the same concept that is involved in remote control communication but is far more powerful. It is estimated that more than half a billion new communication devices will be added in the coming year, this will increase dependency on cloud services for storage and processing and hence there is a need of new access technologies to allow this huge increase in network utilization. The solution to this problem is the use of visible light spectrum that offers 10,000 times larger frequency bandwidth that could accommodate this expansion of network capacity. Visible Light Communication is the point-to-point high-speed communication and illumination system. Light fidelity is the complete wireless, bi-directional, multi-network solution for visible light communications that would operate seamlessly alongside other Long-Term Evolution and wireless fidelity access technologies.

HISTORY

The term was first used by 'Professor Harald Haas', in his TED global talk in 2011. Li-Fi idea rates as "one of 50 best inventions of 2011" on TED world site on the internet. The D-Light project was the first project that explained the meaning of this technology. It was funded from January 2010 to January 2012 at Edinburgh's Institute for Digital Communications by Professor Haas.

Here we show the history of Li-Fi:

- 2011, Haas promoted this technology in TED global talk and helped start a company to market it.
- October 2011, companies and industry groups formed the Li-Fi consortium, to promote high-speed optical wireless systems and to overcome the limited amount of radio-based wireless spectrum available by exploiting a completely different part of the electromagnetic spectrum.
- In 2012, VLC exhibited by using Li-Fi.
- In October 2013, Chinese manufacturers work on development kits for Li-Fi.
- April 2014, the Russian company Stins Coman announced the development of a Li-Fi wireless local network called BeamCaster. Their current module transfers data at 1.25 Gbps.

D-LIGHT PROJECT

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D-Light, which means "data through illumination", is the invention of Professor Harald Hass. In this project D-Light produce data rates faster than 10 Mb per second, which is faster than the average connection. With this technology data for laptops, smartphones, and tablets can transmitted through the light in a room, the current version of the project is limited to the existing LED technologies and the usage of LEDs as transmitters and detectors at the same time.

However, Harald has created a better LED, which provides a data rate close to 4 Gbps operating on just 5 milliwatts of optical output power and using high bandwidth photodiodes at the receiver. With this LED a user can send data from 10 meters at up to 1.1 Gbps with a simple lens, and it is expected to increase up to 15 Gbps. The current WiFi standard radio band reaches under 7 Gbps, so Li-Fi would more than double of that rate.

This D-Light system uses Orthogonal FDM, that allow varying the LEDs output intensity at a fast rate, which is not visible to human eyes, for the eye the bulb would be on and providing light. This system uses the existing technology of LEDs thus it will be cheap and will be available everywhere in the near future.

CURRENT STUDIES

Li - Fi is a green communication method as it reuses the existing lightning infrastructure for communications. Information is transmitted by the rapid subtle changes of light intensity that is unnoticeable by the human eye. Recent studies have demonstrated data rates of 14 Gbps for Li - Fi using three off-the-shelf laser diodes. It was also predicted that a data rate of 100 Gbps is achievable for Li - Fi when the whole visible spectrum is utilized. Li - Fi offers inherent security, and also it can be employed in areas where sensitive electronic devices are present, such as in hospitals. In addition, Li - Fi is a potential candidate for other applications such as underwater communications, intelligent transportation systems, indoor positioning, and the Internet of Things. Modulation techniques developed for intensity modulation and direct detection optical wireless communication systems are suitable for Li - Fi communications systems. However, these modulation techniques may not be suitable for all lightning regimes. Li - Fi transceivers are illumination devices enabled for data communications. Therefore, adapting this modulation technique should first satisfy certain illumination requirements before being Li - Fi enabled.

Frank Deicke, who leads Li-Fi development at Fraunhofer Institute for Photonic Microsystems in Dresden, Germany, has said that Li-Fi can achieve the same data rates as USB cables which is challenging for wireless technologies such as Bluetooth and Wi-Fi. He also cites another advantage of Li-Fi being that the latency of Li-Fi is in the order of microseconds where as that of Wi-Fi is in the order of milliseconds.

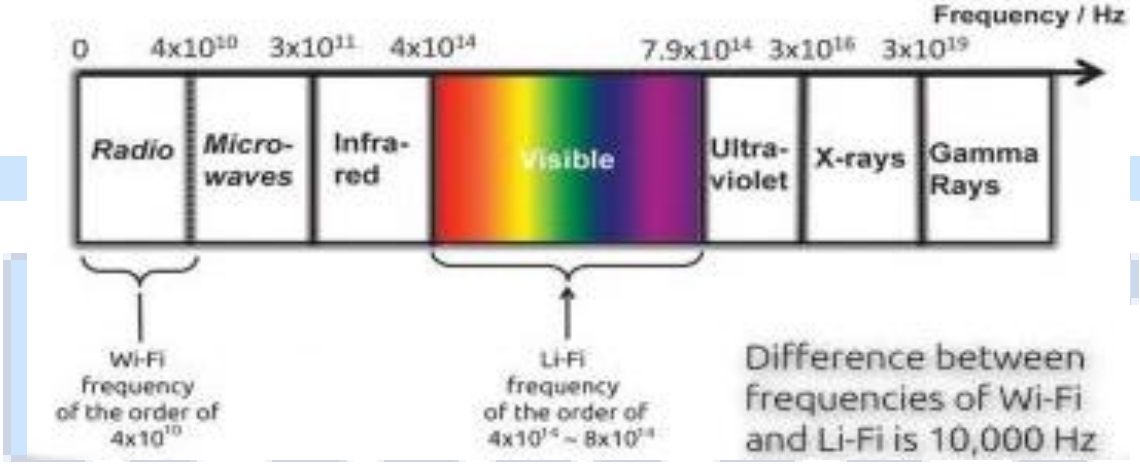

Chart -1: Frequency Spectrum

WORKING

LEDs can be switched on and off faster than the human eye can detect since the operating speed of LEDs is less than 1 µs, thereby causing the light source to appear to be continuously on. This invisible on-off activity enables data transmission using binary codes. Switching on an LED is binary '1', switching it off is binary '0'. Data can be encoded in light by varying the rate at which LEDs flicker on and off to give different strings of 1s and 0s. Modulation is so rapid that humans cannot notice it. A light sensitive device like photo detector then receives the signal and converts it back into original data. Rapid pulses of light can be used to transmit information wirelessly is technically referred to as Visible Light Communication. The term Li-Fi has been inspired due to its potential to compete with conventional Wi-Fi. The

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VLC uses visible light between 400 THz and 800 THz as the optical carrier for data transmission and for illumination. Data rates of greater than 100 Mbps can be achieved by using high speed LEDs with adequate multiplexing. Multiple data transmission using arrays of LEDs where each LED transmits a separate stream of data can be used to increase the VLC data rate. Though the lights have to be kept on in order to transmit data, they can be dimmed to the point that they are not visible to humans but still be capable of transmitting data.

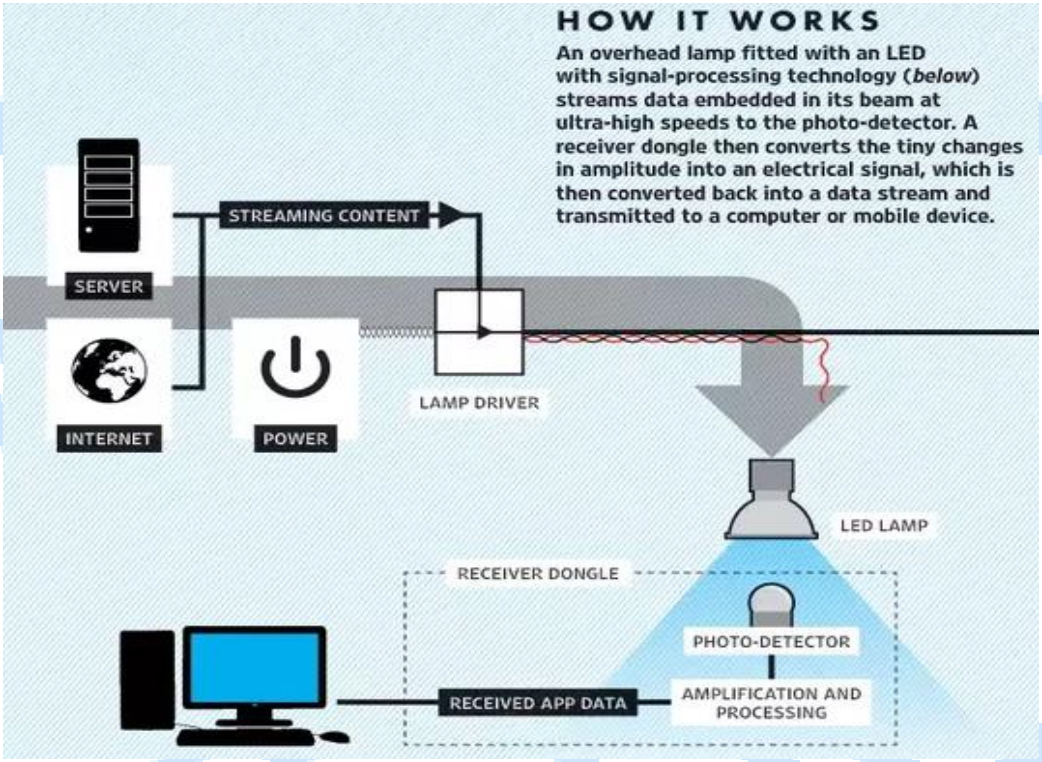

Chart -2: Working Principle of LiFi

TECHNICAL ASPECTS

1. **Modulation.**

   Modulation is the technique of altering the frequency of lights, different modulation schemes used are. OOK stands for On Off Keying, VPPM stands for Variable Pulse Position Modulation and CSK stands for Colour Shift Keying.

2. **Source**

   The source is basically a light source mostly LEDs.

3. **Implementation**

   The main components included in Li-Fi are:

   i) LED which acts as the communication source.

   ii) Silicon photodiode which serves as the receiving element.

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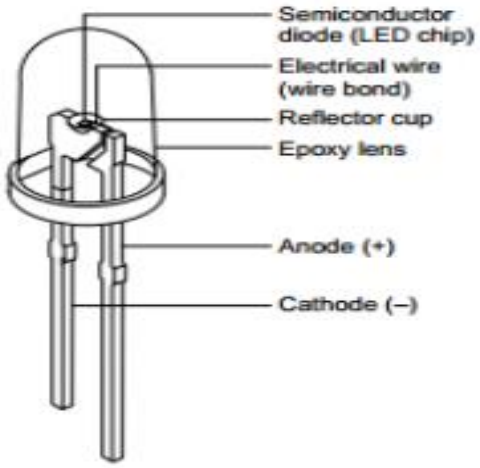

Chart -3: Architecture of LED

LIFI VS WIFI

Table-1: Issues of WiFi and their solution.

Parameter	**LI-FI**	**WI-FI**
Speed	High	High
Spectrum	10,000 times broader than that of Wi-Fi	Narrow spectrum
Data density	High	Low
Security	High security due to non-penetration of light through walls	Less secure due to transparency
Reliability	Medium	Medium
Bandwidth	High due to broad spectrum	Low
Transmit/receive power	High	Medium
Device-to-device connectivity	High	High
Latency	In the order of microseconds	In the order of milliseconds

APPLICATION

Li-Fi technology can find application in following fields.

(i) In Medical and Healthcare: Because of radiation, operating rooms do not allow Wi-Fi and even though Wi-Fi is in place in several hospitals, interferences from computers and cell phones can block signals from medical and monitoring equipment. Li-Fi solves these problems. Lights are an essential part of operating rooms and Li-Fi can thus be used for modern medical instruments. Moreover, there is no electromagnetic interference by Li-Fi and thus there is no disturbance to medical instruments such as MRI scanners.

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(ii) Airlines and Aviation Wi-Fi is prohibited in aircrafts. But, since aircrafts already have multiple lights, Li-Fi can be used for data transmission.

(iii) Power Plants: Wi-Fi is not suitable for areas like power plants as they can cause interference. Li-Fi can provide safe connectivity throughout the power plant. It offers a safe alternative to electromagnetic interference due to radio waves in environments such as petrochemical plants and mines.

(iv) Explorations and Communications: Underwater operating vehicles work well except in situations when the tether is not long enough to fully explore an underwater area or when they get stuck. If instead of the wires, the light was used then the ROVs would be freer to explore. Li-Fi can be used in the headlamps to communicate and send reports as radio waves cannot be used in water due to strong signal absorption.

(v) In the future Street lamps can be used to provide Li-Fi hotspots and can also be used to control and monitor lighting and data.

(vi) Laptops, smartphones and other mobile devices can interconnect using Li-Fi, much like they interconnect using Wi-Fi. These limited range connections provide very high data rates as well as increased security.

ADVANTAGES

Table -2: Issues of WiFi and their solution using LiFi.

Parameters	Issues with WiFi	Solution with LiFI
1. Capacity	The radio waves used by Wi-Fi to transmit data are limited as well as expensive. With the development of 3G and 4G technologies, the amount of available spectrum is running out.	The visible light spectrum is 10,000 times wider than the spectrum of radio waves. Additionally, the light sources are already installed. Hence Li-Fi has greater bandwidth and equipment which is already available.
2. Efficient	There are 1.4 million cellular radio masts worldwide. These masts consume massive amounts of energy, most of which is used for cooling the station rather than transmission of radio waves. In fact, the efficiency of such stations is only 5%.	LED lights consume less energy and are highly efficient.
3. Availability	Radio waves cannot be used in all environments, particularly in airplanes, chemical and power plants and in hospitals.	Light sources are present in all corners of the world. Hence, availability is not an issue. The billions of light bulbs worldwide need only be replaced by LEDs.
4. Security	Radio waves can penetrate through walls. This leads to many security concerns as they can be easily intercepted.	Light of course does not penetrate through walls and thus data transmission using light waves is more secure.

LIMITATION

Lifi has many advantages, but like any other technology there are number of limitation and LiFi has many disadvantages, these are enumerated below:

1)The main problem is that light cannot pass through objects, so if the receiver is inadvertently blocked in any way, then the signal will immediately be cut out. If the light signal is blocked one could use radio waves as a backup.

2) Reliability and network coverage are the major issues to be considered by the companies while providing VLC services. There may be an interruption in the communication caused by interference of external light sources like sunlight, normal bulbs and opaque materials in the path of transmission.

3) High installation cost of the systems can be complemented by large-scale implementation of VLC though adopting this technology will reduce further operating costs like electricity charges, maintenance charges etc.

4) Light bulbs that provide data cannot be used for objects that move at high-speed, and also, they cannot be used in remote areas where there are many natural obstacles like trees and walls, for that we still need WiFi.

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CONCLUSIONS

LiFi is really a revolutionary communication technology, the question in everyone's mind will be "does it work in real life?" the answer is yes, researchers have reached speeds of 10Gbps in lab conditions. LiFi has also been tested in commercial context using pure-LiFi. So, you can imagine yourself in future walking into any room switching on the light and instantly have an internet connection faster than your regular WiFi. The conclusion here is we can see very cheap light powered internet everywhere, a situation where all electronic devices communicate with each other. If LiFi becomes widely available it would turn the corner into a technological revolution where the transfer of information using the internet will no longer be an obstacle for a user.

ACKNOWLEDGEMENT

In this paper, a survey on Li-Fi technology has been discussed. I wish to express my gratitude to Mrs Chandni Patel, HOD, VIVA School of MCA for helping me to complete this research paper.

I sincerely thank all the staff members and friends for their guidance and encouragement. I also thank NCRENB for providing me the opportunity to present this paper.

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FACE-PAY TECHNOLOGY

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ABSTARCT

This paper gives information about the Face-Pay technology in which, your face becomes your wallet for performing various payments. Face-pay technology merges the concept of face recognition system and various other payment methods like paying with cash, credit card, debit card, mobile phone (NFC Technology) or with a check. Face-Pay is the newest payment option helps to get rid of any of the previous hardware which are currently using by peoples. In Face-pay technology person just need to walk up to the register where a camera scans your face and matches it against the database. In the background, Face-Pay algorithms processes biometrical data of person to find his/her account in their database just like approaching to the cashier. The only thing person has to do beyond that is to confirm payment with their Face-Pay pass code and tap OK on a screen. The core advantage of this technology is that, the whole transaction will be done in less than 5 seconds, which terminate the efforts to carry debit/credit cards and also helps to reduce the time it usually takes person to pull out their wallet for making payment. This paper provides the complete study of the working of Face-Pay system, applications, advantages and disadvantages of Face-Pay technology.

Keywords— *Paying with your face, Face Wallet, Face pay facial recognition, Face id payment, Card less payment.*

1. INTRODUCTION

Face of human being is well constructed and complex design work with lots of differentiation to each other. The extraordinary variety of facial features helps people to read and define each other and is deciding to the formation of complex societies. Technology is rapidly growing up with the human ability to read faces. The human face is not an only a name-tag. It displays a lot of other definition and machines can read that, too. Computer machines are marvellously good at recognizing faces, and the technology is improving rapidly in the fact of both security and convenience. Face recognition might convert everything from policing to the way people interact every day with shops and transportation facilities. Whereas, Debit card and credit card are the most popular and efficient in today's day to day life. Most of peoples choose among these methods to make payments, instead of carrying the wallet with cash. The working of debit/credit card is simple and no surprise. This payment method is secure and convenient, and it allows consumers to pay as they visit and track their all spending. Debit cards are similar to credit cards, except debit cards allow you to use money that you already have, which comes out of a checking wallet or bank account linked to the card. The Face-Pay technology uses the ideology of a facial recognition system who is able of identifying or verifying a human from a digital image or a video frame from a video source. One of the ways to do this is by comparing selected facial information from the image and a face database. Face-Pay technology is conceptual system through which registered customer has facility to make payments for goods or services which they are willing to buy. For making those payments, customer doesn't have to carry the hard cash or any e-payment card all the time with them. Face-Pay Technology merges the concept of 'Debit/Credit card' and 'implementation of face recognition system'. In the Face-Pay Technology, user can make a payment via validating their face through the system. This technology could bring quite some convenience to our life. Organizations are searching for new policies to innovate the way people holds transactions. Making use of Face recognition system to define the many uncommon features of a human's face, algorithms are justifying being decent enough to define singleness through geometric and dimensional calculation. Of the many applications for face recognition, one of the potentially profitable is financial transactions. We have to make sure this technology is used for good purposes**.** Certainly, as face recognition technology enlarge more dominant, it may also boost confidentiality concerns. Like many emerging technologies that rely on collecting massive amounts of data, it will be up to the public and lawmakers to decide how far they want to compromise privacy in exchange for convenience.

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2. WORKING OF FACE-PAY TECHNOLOGY

For accessing Face-Pay Technology in the real world scenario, there are some requirements to make the system available to the End user which includes:-

1. Computer supporting Face-Pay system.
2. Customer should have any Debit/ Credit card.
3. Customer with Face-Pay Account.
4. Receptionist for managing Face-Pay system.

The Face-Pay system must be supported and installed on the computer system through which customer can able to make the payments and also end-user(Receptionist) can able to accessing and managing Face-Pay system.

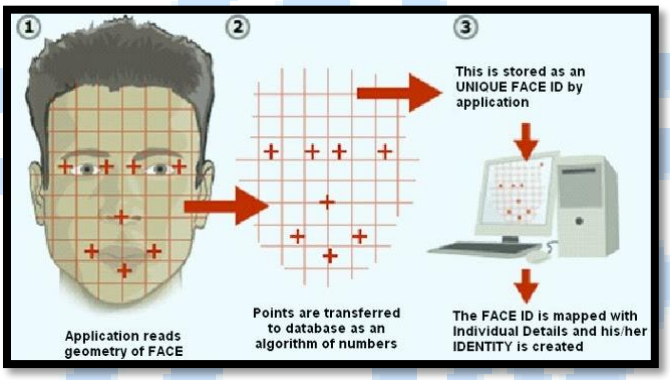

CHART 1: Creating FACE ID using geometry of face

REGISTRATION OF CUSTOMER:

1. Search for place which offers for Face-Pay transaction method.
2. Request for customer registration at reception.
3. Choose your payment account.
4. Enter your account password.
5. Scan your face through Face-Pay system from receptionist.
6. Enter your Email-ID and mobile number for registration.
7. Face-Pay system will generate unique pass code for your Face-Pay account.
8. Passcode will be send via register Email-ID and mobile number.
9. Now customer is ready for making payment through Face-pay account.

3. HOW SYSTEM WORKS?

Customer who is willing to make payments via Face-Pay account can visit the place which is working with Face-Pay system and accept payment via Face-Pay as one of their transaction method. At the time of making payments after choosing the products or services, the customer validation process starts.

Customer validation process includes the follows:

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1. Capturing Image
The initial stage is for the system to gather physical or behavioural samples in proposed circumstances and during a stated course of time.

2. Extracting
Then, all this gathered data should be extracted from the samples to create templates based on them.

3. Comparing data
After the extraction, collected data is compared with the existing records.

4. Search for Matching
Next stage of Face-Pay system is to make a call whether the face's features of a new sample are parallel with the one from a facial database or not. The total mechanism usually takes just few seconds.

5. Enter Passcode
System will now ask for pass code for validating account. If the customer is validates through the Face-Pay system, then total bill amount of purchased products/services will be deducted from the linked debit card/credit card account.

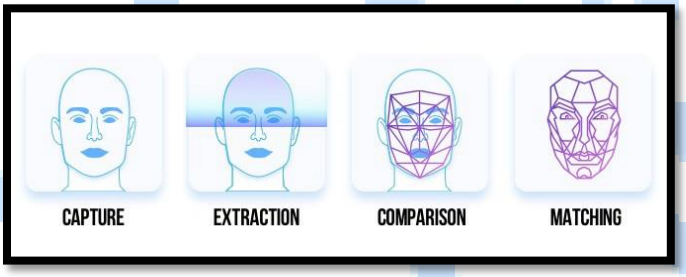

CHART 2: Face validation and verification

WHAT IF CUSTOMER FORGETS THEIR PASSCODE?

If a register customer forgot his/her pass code, then he/she can make request at reception for generating new pass code for their Face-pay account. Receptionist can calls to Face-Pay system for generating new passcode for that customer. Generated new pass code can send to the register customer via their register Email-Id and mobile number.

4. APPLICATIONS OF FACE-PAY TECHNOLOGY

1. The Face-Pay technology can be efficiently usable in many of day to day activities.
2. Supermarkets and shopping malls are the best places where peoples do shopping in a vast amount. Many of peoples visit shopping malls and market on the daily basis. Some of retailers take the help of supermarket to expand their local business. While taking consideration of the total heavy transaction of those supermarket and shopping malls, this Face-pay technology can be able to minimize the transaction overload.
3. This system can be successfully work in places like Bakery, Beauty parlour and Beauty salons, Chemist and drugstore, Gift shops etc.

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4. Face-Pay can also be efficient in public places like Library, Café, Gas station, fast food shops like Pizza hut, McDonald's, Burger king, KFC, Subway etc.
5. If we consider the ticket booking system on the frequent usage activity then Face-Pay can be beneficial and co-operative in Airline ticket booking system and Movie ticket booking also.

6. ADVANTAGES OF FACE-PAY TECHNOLOGY

1. First of all, Face-Pay technology eliminates the need of carry cash or debit card to user.
2. Face-Pay technology uses TRIPLE DES (Data Encryption Standard) algorithm, which ensure that data which is shared with Face-Pay system is most secure and cannot be decrypted in any condition.
3. It also ensures that, the information like account details and pass code are End-To-End Encrypted.
4. While Face-Pay technology requires pass code for verifying registered customer, it eliminates access to account from people who is identical twin.
5. Removes efforts of paying cash or swiping debit card which results into time efficient transaction.

7. DISADVANTAGES OF FACE-PAY TECHNOLOGY

1. Customer registration is mandatory to make use of Face-Pay system.
2. Shopkeeper or shopping mall must have to collaborate with Face-Pay for performing transaction via this system.
3. Customer must have bank account for linking their debit card with Face-Pay system.

8. CONCLUSIONS

The main benefit of Face-Pay technology is that, users don't have to worry if they forget their wallet or debit card. Use of Face-Pay technology can effectively decrease total time which requires in generating bills. This system can enhance by developing mobile app for the same system. Mobile app of this system may able to use for creating Face-pay account by using front camera for users' Smartphone. It can use as a catalogue to keep record of transactions perform by user in their Face-Pay account. Mobile app may process on request of user in case of forgetting their pass code. For performing e-transaction with the platform like Amazon and Flipkart, this Face-Pay system may also be use as a one of the payment method for online transaction. Even though this approach aims to solve the issues by integrating face recognition in the process, this system still has much more roads for improvement. Since we implement a modular approach we can improve different modules until we reach an acceptable detection, identification and authentication limit rate.

The comparison of the real time image with the image that is stored in the database should be reliable and fast as the user of the system should not be made to wait for a long time. This technology could bring quite some convenience to our digital life. It could ensure more safety than our traditional passwords and pin codes. But at the same time, it could raise the control over individuals. We are standing at a critical point where we have to make sure this technology is used for betterment good purposes. We want to see our technological advances to truly enhance our life, to ensure a much brighter future, not a darker one.

9. ACKNOWLEDGEMENT

In this paper, a complete overview on FACE-PAY technology has been discussed. Nobody has been more important to me in the pursuit of this paper than the members of my family. I would like to thank my parents whose love and support are with me for preparing this paper.

I genuinely thank all the staff members and friends for their guidance and assistance. I am also thankful to NCRENB for bringing me the opportunity to present this paper.

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DATABASE CONNECTIVITY

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Abstract - This paper discusses innovative and proficient methods to access vast databases and concentrates on database connection with two technologies: Java and PHP. The interaction of web and database is becoming a vital module of database education; the incorporation of information across diverse systems is a foremost challenge with existing information systems. The interaction of web and database is becoming a vital module of database education; the incorporation of information across diverse systems is a foremost challenge with existing information systems.

Keywords*-PHP , Java , JDBC, Database,MySQL*

1. INTRODUCTION

Database management technology has gained worldwide popularity because of heavy dependence of business world on online record maintenance like finance, transport, education, culture, healthcare, leisure (theatre, concerts), utilities like water, gas, electricity etc. To manage work easily and efficiently database connection technologies have been a boon. This paper describes various database connection technologies, particularly Java and PHP. It gives a brief introduction on each of the languages and how we can connect to database using each of the specified languages .It involves basic step by step procedure which works perfectly well and is easy to implement too.
In Java, there are two methods for connectivity to the database: JDBC and Hibernate. There are four types of JDBC drivers.

2. DATABASE CONNECTIVITY IN JAVA

A. Introduction to java

Sun Microsystems introduced an innovative programming language in the year 1995 - Java. Earlier the word 'Java' could have only these meanings like an island or a specific blend of coffee. It stems the syntax from C and its features from C++.
Thus, the goal behind developing Java was to create software that could be embedded in electronic devices.
Java is an object oriented programming language that offers a robust, secure and portable environment. It is unique in the sense that it is platform independent i.e. its programs can run in various platforms such as Linux, Microsoft Windows, Apple Macintosh, etc. Compared to other high level, fully interpreted scripting languages, Java is one of the best in terms of performance. Moreover, it is a dynamic language that fully supports multithreading.
Multiple relational databases over the web can be retrieved by its database connectivity interface. Fig.1. shows the integration of web server and database server.

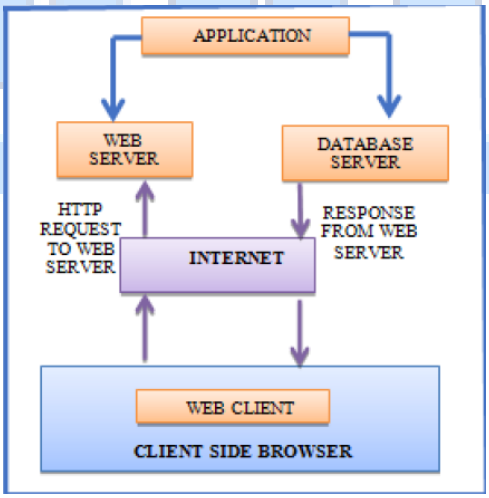

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Fig 1.Integration of Web Server and Database Server

B.JDBC Overview

Web application runs at a remote location, which can be viewed and controlled by all the users having administrative rights at any instance of time. An application can have three components:

1. Presentation logic defines the user interface and appearance of the application.
2. Business logic implements several business related policies into the application.
3. Data access logic looks after the connectivity of presentation and business logic with database.

For extension to the web, JDBC was created. JDBC is a database access framework API that comprises of a collection of interfaces and classes, allowing java programs to interrelate with database. JDBC driver transforms low level proprietary DBMS data to low level data understood by the JBC API.J2EE component use some process for interaction with DBMS. The process is divided into subsequent routines.

- Load the JDBC driver.
- Open a connection between J2EE and DBMS.
- Create and execute a statement.
- Return data and error messages that adapt to the JDBC specification to the JDBC driver.
- Return transaction management routines.
- Terminate the connection with database.

Fig. 2.depicts a code connecting database through JDBC ODBC driver. A JDBC driver can be implemented in four different types . These four types are illustrated in Fig.3. They differ in two ways:

- How they support multiple database connections?

```
<%@ page language="java" import="java.lang.*"
import="java.sql.*" %>
<html>
<body border="1" bgcolor="white" width="650">
<%
Connection con_1 = null;
Class.forName("sun.jdbc.odbc.JdbcOdbcDriver");
con_1 =
DriverManager.getConnection("jdbc:odbc:abc","","");
Statement stmt=null;
%>
<form method="GET" ACTION="ProcessAction_1.jsp">
<h3><P ALIGN="LEFT"><FONT SIZE=10> EMPLOYEE
INFO</FONT></P></h3></br></br>
<table callspacing=8 cellpadding=3 bgcolor="pink"
colspan=4 rowspan=4 align="left">
<tr><td><font size=5> Enter Emp ID_1</td>
<td><input type="TEXT" ID="id"
name="emp_id"></font>
<select name="empIds"
onchange="document.getElementById('id').
value=this.options_1[this.selectedIndex_1].text">
<option>Select One</option>
<%String rec="SELECT empid_1,empname_1 FROM
Employee ORDER BY empid_1";
try {
stmt=con.createStatement();
ResultSetrs=stmt.executeQuery(rec);
while(rs.next())
{ %><option><%= rs.getInt(1)%></option><%}
}
catch(Exception e){System.out.println(e); }
%>
</select></font></td></tr>
<tr><td><font size=5> Enter EmpName_1</td>
<td><input type="text"
name="empname_1"></font></td></tr>
<tr><font size=5><B>
<td><input type="RADIO" name="n1" VALUE="add_1"
>Insert </td></tr>
<tr><td><input type="RADIO" name="n1"
VALUE="del_1" >Delete </td></tr>
<input type="RADIO" name="n1" VALUE="modify_1"
>Modify/Update
</font></b><tr>
<input type="SUBMIT" VALUE="Submit_1">
<input type="RESET" value="1_reset">
</body>
</html>
```

Fig 2.Sample java code connected with JDBC ODBC Driver.

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C.Comparison between types of Drivers.

JDBC Drivers	Advantages	Disadvantages
Type- 1 JDBC ODBC Bridge Driver	Suitable for use by clients who run locally the database server. It is integrated into JDK v1.1	Need remote client to pre-install ODBC binary code. Not to be used by remote clients that is java applets.
Type-2 Native API Partially Java Enabled Driver	Client connects directly to the database server. Good speed and power with which a client access a remote database.	Needs prior configuration to install native code at the client side. Driver is dependent on DBMS. Loss of some portability of code.
Type-3 Net Protocol Fully Java Enabled Driver.	The most flexible configuration as client can access multiple databases by downloading one JDBC driver. Independent of DBMS.	Needs configuration of the intermediate server. Needs vendor supplied intermediate server.
Type-4 Native Protocol Fully Java Enabled Driver	It is the fastest way to communicate with SQL queries to the DBMS. It allow a direct call to the database without client pre -configuration	Requires loading a different driver for each DBMS it needs to access. It is not appropriate for java clients applets.

Table-1: Comparison of types of Drivers

4. DATABASE CONNECTIVITY IN PHP

A. Introduction to PHP

PHP is an important language in the software development market. PHP is at the forefront of Web2.0 and Service Oriented Architectures supports technologies along with other open source projects MYSQL and Apache . For many people, the foremost reason why they acquire knowledge about a scripting language like PHP is of the interaction with database it can offer. In this, I will show you how to use PHP to connect with MYSQL databse.PHP is endorsed not only by its large open source community in the IT market such as IBM, Oracle and Microsoft. This paper provides instructions for connectivity to MYSQL database using PHP.

B.Creating a Database

To create and delete a database you should have admin privilege. It is very easy to create a new MYSQL database. PHP uses mysql_queryfunction to create a MYSQL database. It takes two parameters. It returns FALSE on failure or TRUE on success.

C.Syntax

bool mysql_query_1(sql, connection);

D.Parameter & its Description

- sql – Required – It is an SQL query to form a database
- Connection - Optional- if not given then last opened connection by mysql_connect will be used.

E.Establish a connection to the MySQL database

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```
$user name="your_username_1";
  $password="your_password_1";
  $database="your_database_1";
```

Fig 3.Establishing connection

F.Connect PHP to the Database

```
Mysql_connect($localhost,$user
name,$password)
```

Fig.4 Connecting to database

F.Parameter &Description

- Localhost- Optional – It is the host name running database server. In case, if it is not stated then default value is localhost:3306.
- Username- Optional – the username accessing the database.
- Password- Optional – the password of the user accessing the database.

After the connection is established, select the database wish to use. This should be a database that username has access to. This can be accomplished through the following command:-

```
@mysql_select_db($database) or die($cant choose
database)
```

Fig 5.Database Selection

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.Running the database_connectivity.ph

```
<?php
        // Session Initialization
session_start();
        // Data entered by user is stored in variables below
        $user = $_REQUEST["username_1"];
        $pass = $_REQUEST["password_1"];
       // Initializing Connection Variable
        $connection = mysql_connect("localhost",
       "username_1","password_1")
or die("Failed! connecting to the server");
$db = mysql_select_db("DBUSERNAME",
$connection)
or die(" Failed! selecting the database");
        $forlogin = "select * from user";
        $result = mysql_query($forlogin);
        $flag = true;
        while ($row = mysql_fetch_array1($result)) {
        if ($user == $row['username'] && $password ==
        $row['password']) {
        $_SESSION['currentuser_1'] = $user;
        header('Location: /folder1/page-to-goto-if-login-
        successful');
        $flag = false;
        }
        }
        if ($flag == true)
// Unsuccessful login
      header('Location: /folder1/page-to-goto-if-
unsuccessful
      -login'?myerror=mismatch');
      ?>
```

p file.

Fig.6 Sample Code for connecting and running PHP file.

5. CONCLUSION

In this paper have successfully established connection to database through various technologies. We are able to do MySQL tasks of managing databases using PHP and Java. In Java we have discussed various types of JDBC drivers with advantages and disadvantages. Using PHP, we are now able to manage large databases .The advantage of PHP is that it has been designed for the creation of web apps.

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SMART WATCH TECHNOLOGY

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ABSTRACT

This document gives the brief information about the Smart Watch Technology. A smart watch is a mobile device; it consists of a package, including the computer and the display, attached to a bracelet. While early models can perform basic tasks, such as calculations, digital time telling, translations, and game-playing, 2010s smart watches are effectively wearable computers. Smart watches are digital watches that do more – a lot more – that your old analog time tracking device.

Keywords: - *smart watch, latest technology, smart watch timeline, latest smart watch, smart watch development.*

1. INTRODUCTION

This document gives the brief information about the Smart Watch Technology. We are not talking about that once-amazing calculator watch that you had in elementary school. These are full-fledged digital tools. Smart watches can run apps and play back all sorts of digital media, like audio tracks or radio streamed to Bluetooth headphones. Many of these watch have touchscreens, which allow you to access functions like a calculator, thermometer, compass and more.

2. HISTORY

The first digital watch, which debuted in 1972, was the Pulsar manufactured by Hamilton Watch Company. "Pulsar" became a brand name which would later be acquired by Seiko in 1978. In 1982, a Pulsar watch (NL C01) was released which could store 24 digits, making it most likely the first watch with user-programmable memory, or "memory bank" watch. With the introduction of personal computers in the 1980s, Seiko began to develop computers in the form of watches. The Data 2000 watch (1983) came with an external keyboard for data-entry. Data was synced from the keyboard to the watch via electro-magnetic coupling (wireless docking). The name comes from its ability to store 2000 characters. The D409 was the first Seiko model with on-board data entry (via a miniature keyboard) and featured a dot matrix display. Its memory was tiny, at only 112 digits. It was released in 1984, in gold, silver and black. These models were followed by many others by Seiko during the 1980s, most notably the "RC Series": During the 1980s, Casio began to market a successful line of "computer watches", in addition to its calculator watches. Most notable was the Casio data bank series. Novelty "game watches", such as the Nelsonic game watches, were also produced by Casio and other companies.

3. SMARTWATCH TIMELINE

Fig. 1 shows a map that fit on our wrist, a driver could turn the knobs to scroll up their route in a manner far more dignifying than the giant-map-fold-curse-refold maneuver. While a bit smaller than the average map, when the driver exceeded the map's limitations, they could simply swap it out for another and continue on their journey. Sure, we have to do some manual knob turning, but at least you didn't have to charge it every night.

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Fig. 1 Plus Four Wristlet Route Indicator: 1927

Fig. 2 Pulsar was the world's first electronic digital watch. Pulsar was developed Fifty years later the first all-electric digital watch arrived, from the Hamilton Watch Company, wrapped up in 18-carat gold. It boasted LEDs and you had to push a button to see the time. A bargain at $2,100 back in 1972.

Fig. 2 Pulsar: 1972

Fig. 3 Seiko TV Watch was particularly mind-blowing for the time because of its display. It needed an adapter and a whopping great receiver box in order to show grainy TV images below the digital time display. It cost about £500 and your TV action was presented in ten shades of grey. That's not a softcore porno, that's the display.

Fig. 3 Seiko TV Watch: 1982

Fig. 4 The Data-2000 is a fantastic watch. To avoid having lots of little buttons on the watch, this watch has a docking station with lots of little buttons, so we don't have to carry them around. The Data-2000 could store memos and calendar entries and also acted as a calculator. You had to make use of the clip on keyboard. Seiko was pretty prolific in the smart watch arena in the 80s. It also launched the UC-2000, the RC-1000, the Memo Diary and the UC-3000 within a year of the Data-2000.

Fig. 4 Seiko Data-2000: 1983

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Fig. 5 never made it past the prototype stage, this monster from the British company behind the massively successful ZX Spectrum, working alongside watch specialist Timex, had three separate sections: an LCD watch, piezoelectric speaker and FM tuner, along with a battery compartment in the clasp. It was cancelled as a result of Sinclair's financial woes, with only 11,000 being produced.

Fig. 5 Sinclair FM Wrist Watch Radio: 1985

Fig. 6 watch display caller IDs, it could also display updates on a variety of subjects ranging from sports scores, stock prices and weather forecasts. The paging ability allowed people to call an automated service and send specific messages to your watch. This paging capability relied on a FM sub-carrier signal and it was limited to certain geographic areas.

Fig. 6 Seiko Message Watch: 1995

Fig. 7 the Breitling Emergency has a built in ELT (emergency location transmitter). If you become stranded as the result of a downed aircrash or a boating mishap, you simply unscrew the protective cap and pull out the antenna. The Breitling will broadcast a signal on the 121.5MHz aircraft emergency frequency for 48 hours. The Breitling Emergency Watch was credited in helping in the rescue of two British pilots after their helicopter crashed in Antarctica in 2003.

Fig. 7 Breitling Emergency Watch: 1995

Fig. 8 is known as the 'father of wearable computing', Steve Mann built the first Linux-powered watch in 1998 and a prototype was launched by IBM two years later. Designed to communicate wirelessly with PCs, cell phones and other wireless-enabled devices, the 'smart watch' will have the ability to view condensed email messages and directly receive pager-like messages, read the fact-sheet. Future enhancements will include a high-resolution screen and applications that will allow the watch to be used as an access device for various Internet-based services such as up-to-the-minute information about weather, traffic conditions, the stock market, sports results and so on.

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Fig. 8 Linux Wrist Watch: 1998

Fig. 9 Fossil is looking to get back into the wearable tech game – it was recently revealed that the US watches company will be teaming up with Intel for a smart watch assault. It was 12 years ago that it had its first crack. Awarded 'best of Comdex 2002' it featured a 160 x 160 display, 2MB of internal memory and Palm apps such as address book, memo pad, to-do list and a calculator. It had a stylus integrated into the strap.

Fig. 9 Fossil Palm Pilot: 2002

Fig. 10 SPOT stands for Smart Personal Object Technology, it is an initiative by Microsoft to personalize household electronics and other everyday gadgets. The SPOT Watch was its flagship product, but the technology was also made available on other products like car navigation systems and coffeemakers. SPOT was backed by the MSN Direct Network, which enabled users to receive instant messages from Windows Messenger as well as receive personalized news headlines, stock updates, and weather forecasts.

Fig. 10 Microsoft SPOT: 2003

Fig. 11 Garmin has a pretty strong foothold in the GPS sports watch arena; it has an accurate GPS, heart rate monitor. Garmin Forerunner is very thin and light and also easy to read in sunlight. The original Forerunner range paved the way for the likes of the Forerunner 15 by measuring speed, distance, pace and calories burned, and it ran from a pair of AAA batteries – which would get you around 14 hours of action.

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Fig. 11 GarminForerunner: 2003

Fig. 12 was an activity tracker worn on the wrist and is to be used with an Apple iPhone, iPad or Android device. It tracked your steps, earning you Fuel Points throughout the day. It offered automatic syncing using Bluetooth and the second edition, which launched in 2013, improved the ambient light settings so it glowed brighter in darker situations.

Fig. 12 Nike+ Fuelband: 2012

Fig. 13 is a line of wearable devices that connects to an Android smartphone and can display Twitter feeds, SMS, among other things. It had a 1.3-inch OLED display and was well received by the tech press despite its tendency to crash for no apparent reason. It was succeeded by the Smart Watch 2 in 2013 and the Android-Wear toting Smart Watch 3 was recently unveiled at IFA.

Fig. 13 Sony Smart Watch: 2012

Fig. 14 it's a smartphone accessory that can pick up notifications, control music playback, and keep time with a rich variety of watch faces, but Samsung takes it a few steps further by integrating a 1.9-megapixel camera, a speaker, and two microphones — allowing us to shoot short 720p movies and even conduct phone calls with the Galaxy Gear. The original Gear was a critical flop and very much stank of a product released just to beat Apple to the punch.

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Fig. 14 Samsung Galaxy Gear: 2013

Fig. 15 The Samsung Gear S boasts 3G connectivity, which means it can operate without an accompanying smartphone – a first for Samsung smart watches, which before now required a Galaxy handset. The **Gear S** keeps you connected to your calls and notifications right on your wrist. Unlike previous editions of Gear, **Gear S** can be **used** as a standalone device. Take it on a run or a quick errand when you don't want to carry your mobile device. The **Gear S** doesn't have to be within Bluetooth range to let you stay in touch. The 360 x 480 resolution is one of the best out there, and keeps maintains Samsung's dominance in the display department.

Fig. 15 Samsung Gear S: 2014

4. FUTURE ENHANCEMENT

The future is mass censoring of all things around us through the watch and through all sensors around us that communication with the watch. The internet of things is the mostly used overarching name. This will become the backbone of all data gathering and all insights. It will increase up to a point where most users don't know any better. Everything is measured automatically. Wearables will do that for humans. Smart watches will be a part of that group of sensors. On top of all this data gathering the seamless experience for the user will become the bigger challenge. The data players will have one goal: create real-time relevance out of this huge pile of data within the right context of a unique user. Mistakes in these experiences will become rarer. Up to a point where the user will only realize what is happening silently in the background when a sensor is not functioning, or an experience is not implemented correctly.

5. CONCLUSION

As the smartwatch industry continues to grow and more products are released, I am sure to see that list of disadvantages shrink and the list of advantages grow. In the meantime, it is important to consider whether buying a smartwatch is right for us. What's right for someone else certainly might not be right for us!

6. ACKNOWLEDGEMENT

It is with a great pleasure that I present my Smart Watch Technology for research paper. I thank all of those who devoted their precise time to my research paper; it would not have been possible without the help of my teachers and some of my friends. I acknowledge my sincere gratitude to all those who helped me to complete my research paper successfully.

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E-Commerce Growth

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***Abstract*— - Electronic Commerce is process of doing business through computer networks. A person sitting on his chair in front of a computer can access all the facilities of the Internet to buy or sell the products.**
The drivers for electronic commerce are both technological and business oriented. This paper will highlight some guidelines for companies who are entering into E-commerce to create an E-commerce strategy or who already have an E-commerce presence to revise their existing strategy. E-Commerce is now seen as a reality for many businesses and a normal part of a business plan. The immediate benefits, in terms of cost savings, efficiencies and enhanced profitability are clear at every stage in the supply chain.

In the near future, the Internet seems to become an inseparable part of our society, especially with the emergence of new technologies which are about to change the way business is being done. Small and Medium sized companies are therefore facing up to understand the nature of the Internet and adapt themselves into this new medium as quickly as possible.

***Keywords*—** *Computer network, Internet, Business oriented, Cost Saving, Fast Transaction*

1. INTRODUCTION

E-commerce is a transaction of buying or selling online. Electronic commerce draws on technologies such as mobile commerce, electronic funds transfer, supply chain management, Internet marketing, online transaction processing, electronic data interchange(EDI), inventory management systems, and automated data collection systems. Modern electronic commerce typically uses the World Wide Web for at least one part of the transaction's life cycle although it may also use other technologies such as e-mail. Typical e-commerce transactions include the purchase of online books (such as Amazon) and music purchases (music download in the form of digital distribution such as iTunes Store), and to a less extent, customized/personalized online liquor store inventory services. There are three areas of e-commerce: online retailing, electric markets, and online auctions. E-commerce is supported by electronic business

HISTORY OF E-COMMERCE

The beginnings of e-commerce can be traced to the 1960s, when businesses started using Electronic Data Interchange (EDI) to share business documents with other companies. In 1979, the American National Standards Institute developed ASC X12 as a universal standard for businesses to share documents through electronic networks. After the number of individual users sharing electronic documents with each other in the 1980s, in the 1990s the rise of eBay and Amazon revolutionized the e-commerce industry. Consumers can now purchase endless amounts of items online, both from typical brick and mortar stores with e-commerce capabilities and one another.

TYPES OF E-COMMERCE

Ecommerce can be classified based on the type of participants in the transaction:
1**) *Business to Business (B2B)*:** B2B ecommerce transactions are those where both the transacting parties are businesses, e.g., manufacturers, traders, retailers and the like.
2**) *Business to Consumer (B2C):*** When businesses sell electronically to end-consumers, it is called B2C ecommerce.
3) ***Consumer to Consumer (C2C)*:** Some of the earliest transactions in the global economic system involved barter -- a type of C2C transaction. But C2C transactions were virtually non-existent in recent times until the advent of ecommerce. Auction sites are a good example of C2C ecommerce.

1. BENEFIT OF E-COMMERCE

The benefits of e-commerce include it's the speed of access, a wider selection of goods and services, accessibility, and international reach. It's perceived downsides include sometimes-limited customer service, not being able to see or touch a product prior to purchase, and the necessitated wait time for product shipping. To ensure the security, privacy and effectiveness of e-commerce, businesses should authenticate business transactions, control access to resources such as

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webpages for registered or selected users, encrypt communications and implement security technologies such as the Secure Sockets Layer.

2. GROWTH OF E-COMMERCE

The growth of e-commerce continues to accelerate on a worldwide basis as more consumers gain confidence to transact on the internet, traditional business shifts its service facility to e-commerce platforms and internet access levels in both developed and underdeveloped countries continues to increase.

The man credited with beginning online shopping was Michael Aldrich in 1979.

Business models across the world also continue to change drastically with the advent of e-commerce and this change is not just restricted to USA. Other countries are also contributing to the growth of e-commerce. The United Kingdom has the biggest e-commerce market in the world when measured by the amount spent per capital, even higher than the USA.

Not only UK or USA, but China's e-commerce market also continues to expand. With 384 million internet users, China's online shopping sales rose to $36.6 billion in 2009 and one of the reasons behind the huge growth has been the improved trust level for shoppers.

As the graph below indicates, emerging markets are playing an increasingly large role in the global ecommerce market.5 According to e-Marketer, the region with the highest total of ecommerce sales is Asia-Pacific, where ecommerce sales overtook North America in 2014 to reach $525.2 billion, compared to $482.6 billion in North America.6 In fact, according to Forrester, the ecommerce market trend in the Asia-Pacific region will reach $1.4 trillion in 2020, with the Chinese online retail market reaching $1.1 trillion.7 e-Marketer attributes the growth of the Asia-Pacific market to the development of technology in the region, allowing customers to make online purchases for the first time .

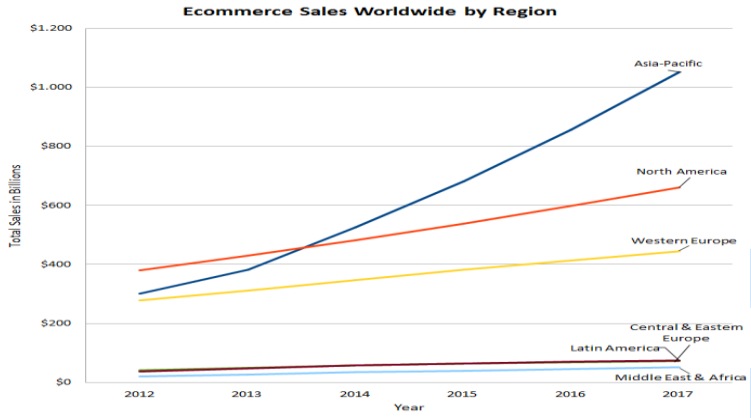

Fig. 1 E-commerce Growth

3. GROWTH OF E-COMMERCE IN INDIA

Although India's use of the Internet is lower than many poorer countries, the country's e-commerce sector tripled – or grew by 209% over the last five years – from $4.4 billion (Rs 20,020 crore) in 2010 to $13.6 billion (Rs 83,096 crore) in 2014.

These data were contained in a reply given to the Lok Sabha in March 2016. Online business was expected to reach $16 billion (Rs 104,000 crore) by the end of 2015.

The e-commerce market in India likely to reach $38 billion (Rs 252,700 crore) in 2016, according to an Associated Chambers of Commerce & Industry of India report released in January 2016.

The online retail sector in India is expected to be a $1 trillion (Rs 6,60,000 crore) market by 2020, according to this recent report by the Confederation of Indian Industry and Deloitte, a consultancy. The study indicates that more e-commerce will trigger big innovations in India.

The goods and services tax, once implemented, is expected to boost the growth of e-commerce by simplifying taxation and logistics, said the CII-Deloitte report.

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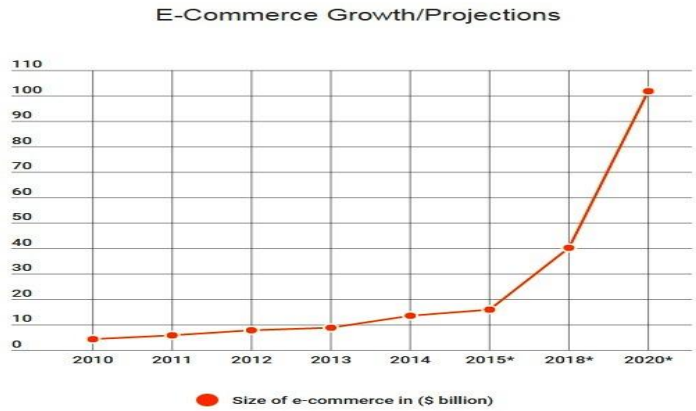

Fig. 2 E-commerce Growth Projection in India

4. GROWTH OF E-COMMERCE IN UNITED STATES

B2B ecommerce is big, and according to a report from Forrester, it's about to get a whole lot bigger.

Unlike B2C ecommerce, where companies sell directly to consumers via a website, the B2B ecommerce market is more fragmented. Businesses can buy goods not only from a company's website, but also through a bevy of software marketplaces and networks.

Forrester estimates that B2B ecommerce sales in the US will top $1 trillion by 2020. For perspective, the B2C ecommerce market in the US was a measly $304.9 billion in 2014, according to the US Department of Commerce.

Forrester's B2B figures represent an 8 percent compound annual growth rate over the next five years, with B2B sales reaching $780 billion by the end of this year alone.

The research firm says the driving force behind such growth is a shift in behavior on the part of B2B buyers. Today, 74 percent of B2B buyers research at least one-half of their work purchases online. Combined with cost savings gained by the self-serve ecommerce environment, more businesses are expected to move online in the next few years.

As for the industries that top the ecommerce sales list, Forrester says sellers of petroleum and petroleum products hold the largest share of all B2B ecommerce, and will continue to claim that lead in 2020.

Figure 1 Forecast: US B2B eCommerce Sales, 2015 To 2020

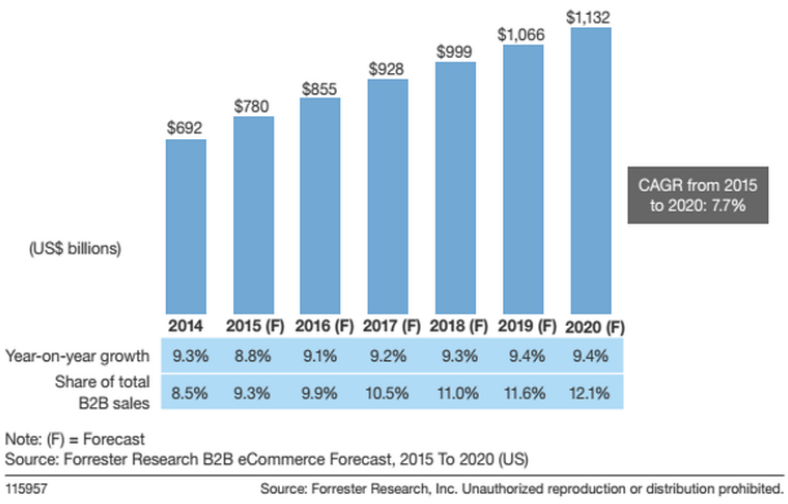

Fig.3 E-commerce Growth in USA

5. GROWTH OF E-COMMERCE IN AUSTRALIA

The Asia-Pacific region has seen an online boom over the past decade, particularly in ecommerce.

In fact, this part of the world actually has the largest online market globally and high levels of growth in the Australian ecommerce market have had a lot to do with this.

According to a report by e-Marketer, Australia's total online sales are forecast to exceed $32 billion in 2017, putting us in the top ten worldwide.

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Despite having a smaller population than its competitors, there are several factors that explain why Australia has become one of the world's biggest players when it comes to ecommerce

Fig.4 E-commerce Growth in Australia

I. THE LATIN AMERICA E-COMMERCE REPORT

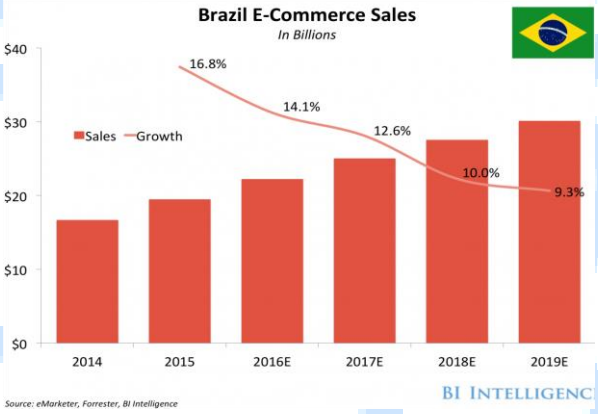

Fig.5 E-commerce Growth in Latin America

Latin America is one of the fastest-growing regions for e-commerce, behind Asia-Pacific. We expect online retail sales to grow at a compound annual growth rate (CAGR) of 17% between 2014 and 2019 to reach $85 billion in sales at the end of the forecast period.

Brazil is the largest online retail market in Latin America, accounting for 42% of the region's $47.4 billion in e-commerce sales. But e-commerce growth is decelerating due to an economic downturn. Between 2014 and 2019, we expect e-commerce sales to rise at a CAGR of 12.5%.

Mexico is the second-largest market for e-commerce in Latin America. Mexico currently accounts for 12.3% of the region's e-commerce, but we expect Mexico's share to increase to 15.6% by 2019. By 2018, Mexico is forecast to reach $11 billion in e-commerce sales - or just under 2.5% of total retail sales in the country.

Argentina ranks third in terms of online retail sales in Latin America, but it will be the fastest-growing e-commerce market of the three countries. The country currently accounts for 8.9% of sales in the region, but by 2019, we expect its market share to increase to 14.6%.

US retailers are investing heavily in building out their e-commerce businesses in the region, despite the slowing economy. Walmart recently redesigned its country-specific site in Brazil and is finalizing construction of three new e-commerce fulfillment centers in the country - doubling its current fulfillment network. Amazon has been investing heavily in Mexico, launching a Spanish-speaking version of its shopping site Amazon.com.mx .

ECOMMERCE GROWTH BOOMS IN CHINA

In 2016, China overtook the United States as the world's top ecommerce market. However, a lot of the end of 2016 was uncertainty concerning new tax laws that the Chinese Government was implementing on foreign ecommerce imports. However, if 2017 proved anything, it's that this monster of a market isn't going anywhere.

In fact, between now and 2019, the Chinese ecommerce market is predicted to double. With such exponential growth, targeting the Chinese market is one of the best ways to put yourself in a great strategic position for next year.

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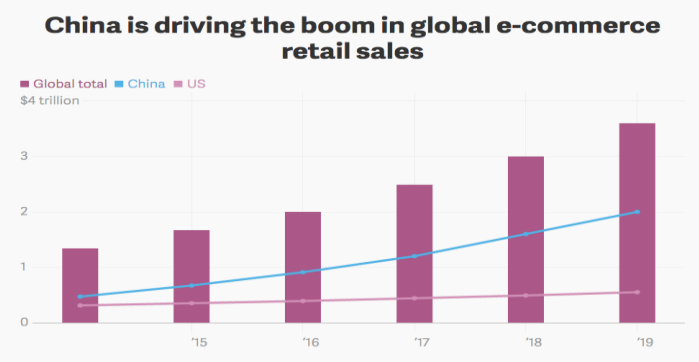

Fig.6 E-commerce Growth in China

NON-ENGLISH SPEAKING MARKETS ARE DRIVING GROWTH

The top 6 fastest growing retail e-commerce countries (Indonesia, India, Argentina, China, Mexico, and Russia) and 7 of the top 10 (including Brazil) aren't native English speakers. Their combined weighted average growth of 24% (19.4% w/o China) in 2017 is nearly double the 13% average of the fastest

Growing English-speaking countries (USA, Canada, and Australia). It is also worth noting that no Western European nations cracked the top 10.

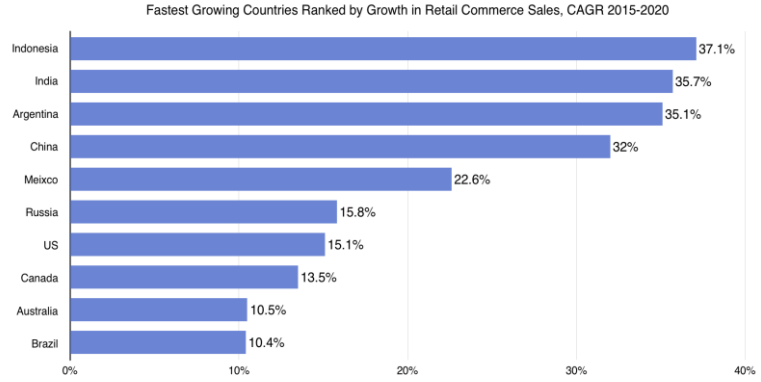

Fig.7 E-commerce Growth in non-English speaking markets

SEGMENTS THAT RECORDED GROWTH

Online channels are playing an important role of connecting with consumers of unexplored markets. The journey of online spending that started with an increasing number of buyers of travel and holiday plans in the last decade has now extended to an increase in spends on household appliances and luxury products. While segments like apparel and luxury products have registered unprecedented growth in 2011, jewelry, electronic appliances and hardware products have shown promising growth trends as well. "Indian consumers are showing greater appetite to transact online, fuelling the e-commerce boom," said Anuj Kumar, CEO, Affle.

The report also found that coupon sites are rapidly gaining popularity, with 16.5 per cent of the Indian online population visiting the category in November 2011 – 27.2 million online users in India aged 15 and older accessed the retail category from a home or work computer, an increase of 18 per cent from the previous year, as consumers continue to turn to the web to shop for and purchase items and retailers continue to increase their online visibility through active marketing campaigns.

Increase in shoppers of the coupon sites indicate that pricing is playing the role of catalyst in bringing more and more shoppers online. Many of these shoppers have shown affinity towards affordable online goods, which was priced lesser than the market price. Some of the largest retail subcategories revealed that coupons category was the largest with 7.6 million visitors as consumers rapidly adopt daily deal sites. Consumer electronics ranked next with 7.1 million visitors, growing at 12 per cent over the previous year, while 5.8 million online users visited comparison shopping sites, an increase of 25 per cent from the previous year.

6. CONCLUSION

E-commerce is a new experience and has greatly impacted the lives of consumers in its short time of existence. It is expected to grow constantly in years to come with advancements in technology. E-business has made consumers more effective and efficient in their shopping behaviour and has driven businesses to a new level, forcing many to make the necessary adjustments and changes to reach the new market of knowledgeable consumers. The results of this survey underscore the need for businesses to take the online market seriously. The survey conducted revealed a positive attitude and behavior toward online shopping even by those consumers who still like traditional stores. These consumers are

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mostly in low and high age groups. Those consumer groups have time to spend in traditional stores and malls and value the offline shopping experience for social reasons, such as meeting with friends. These consumers appear to be more knowledgeable by gathering information online and then purchase it from traditional stores. Rapid growth of e-commerce has resulted in a E-transformation in the global retail infrastructure. Internet has emerged as a cost effective means of doing business. Despite being faced with numerous bottlenecks, Thanks to rising internet and higher incomes and more savvy population. Secured online payments, better to Electronic Stores, return policies and exciting discounts could help the Perceptions of Shopping Benefits. Considering the demographic profiles of online users; gender, age and education have significant association to web shopping in the current scenario. Online users are aware of the serviceable and pleasure-seeking benefits of online shopping, they are reluctant to actually utilize internet for shopping purpose.

7. ACKNOWLEDGEMENT

Firstly, I would like to express my sincere gratitude to my advisor Prof. Chandani Patel for the continuous support of my research and related research, for her patience, motivation, and immense knowledge. Her guidance helped me all through the research and writing of this thesis. Besides my advisor, I would like to thank the rest of my College professors for their insightful comments and encouragement, but also for the hard question which incented me to widen my research from various perspectives. Without their precious support it would not be possible to conduct this research.

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6th National Conference on Role of Engineers in Nation Building, ISBN: (978-93-5288-028-7) IJARIIT (ISSN: 2454-132X)

CLOUD COMPUTING: A PERSPECTIVE STUDY

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ABSTRACT

Cloud computing paradigm promises reliable services delivered through next-generation data centers which are built on compute and storage technologies. Consumers will be able to access applications and data from a cloud anywhere in the world on demand. Services like Google Docs are cloud Computing , where your document exist on the company's servers and you can reach these documents easily and work on them without using your own hard drive.

A cloud is defined as type of parallel and distributed system consisting of a collection of interconnected and virtualized computers. Cloud computing uses 'Hadoop' software that implements a cloud on a cluster of computers. Google Apps, Google Maps and Gmail are all based on the cloud .Other major web players including Amazon, eBay, yahoo and Facebook are running some sort of an enormous cloud computing. Computing at the scale of the cloud allows the users to access supercomputers-level power and storage. The idea behind cloud computing is to scale your application by deploying it on a large grid of commodity Hardware boxes. Thus, cloud computing and storage converts physical resources into scalable and shareable resources over the internet.

Keywords- *Cloud Computing, Virtualization, Hadoop, supercomputers, Distributed System.*

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1. INTRODUCTION

With the increase in development of the processing and storage technologies and the success of the internet, computing resources have become cheaper, more powerful than ever before. This technological trend has enabled the realization of a new computing model called cloud computing, in which resources (e.g., CPU and storage) are provided as general utilities that can be leased and released by users through the Internet in an On-demand fashion. In a cloud computing environment, the role of service provider is divided into two : the infrastructure providers who manage cloud platforms and lease resources according to a usage-based pricing model, and service providers, who rent resources from one or many infrastructure providers to serve the end users. Cloud are clearly next generation data centers with nodes 'virtualized' through hypervisor technologies like Virtual Machines[VMs].These are dynamically 'provisioned' on demand , as a personalized resource collections to meet a specific service level-agreement, which is established through a 'negotiation and is accessible as a compos able service. The compute cloud consists of three basic elements:

A. A Web Server/Application Layer
B. A Distributed Layer and
C. **A Distributed Queue Layer.**

Each one of these layers is a cloud in itself, which means that boxes are all identical and perform the same function.

2. CLOUD-COMPUTING ARCHITECTURE

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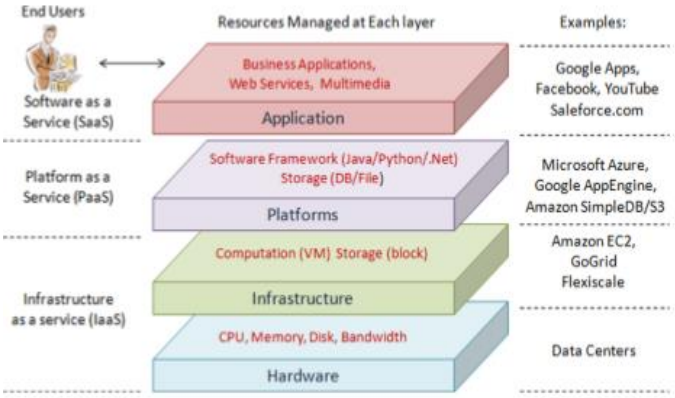

Fig.1

Generally, the architecture of a cloud computing environment can be divided into 4 layers:

A. The Hardware layer

This layer is responsible for managing the physical resources of the cloud, which includes physical servers, routers, switches, power and cooling systems. The hardware layer is typically implemented in data centers. A data center usually consists of thousands of servers that are organized in racks and interconnected through switches, routers or other fabrics.

B. The Infrastructure Layer

The infrastructure layer creates a pool of storage and computing resources by portioning the physical resources using virtualization technologies such as Xen, KVM and VMware. The infrastructure layer is an essential component of cloud computing, since many key features, such as dynamic resources assignment, are only made available through virtualization technologies. It is also called as the virtualization layer.

C. The Platform Layer

Built on top of the infrastructure layer, the platform layer consists of operating systems and application frameworks. The aim of the platform layer is to minimize the burden of deploying applications directly into VMcontainers, Forexample GoogleAppEngine operates at the platform layer to provide API support for implementing storage, database and business logic of typical web applications.

D. The Application layer

At the upmost level of the hierarchy, the application, the application layer consists of the actual cloud application. Cloud application scan leverage the automatic scaling feature to achieve better performance, availability and lower operating cost.

3. FEATURES OF CLOUD COMPUTER

The characteristic features of cloud computing include off-site resources, availability on demand, payment mechanism, and that is web-based.

A. Offsite Resources

The basic principles of cloud computing is that user access IT resources in a data center that is not his own, these IT resources are virtual, implying that they are icon based and can be assembled with drag-and-drop ease. This enables cloud service providers to assemble software stacks of databases, web servers, operating systems, storage and networking, and manage them as virtual servers.

B. Availability On Demand

In a cloud, resources can be either added or removed at any moment of time. This includes all types of resources, such as processors, the amount of memory, network bandwidth, etc.

C. Payment Mechanism

Based on the usage, users can subscribe mostly on monthly deals or per-hour basis. For Example: - Amazon charges in intervals of 10 cents per hour for EC2.

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D. **Web-Based Nature**

Cloud computing involves browser access to hosted data and resources.

4. CLOUD DEPLOYMENT MODELS

There are three commonly-used cloud deployment models: private, public, and hybrid

A. Private cloud

Private cloud is built and managed within a single organization. Organizations use software that enables cloud functionality, such as VMware, vCloud Director, or Open-Stack.

B. Public cloud

Public cloud is a set of computing resources provided by third-party organizations. The most popular public clouds include Amazon Web Services, Google AppEngine, and Microsoft Azure.

C. Hybrid cloud

Hybrid cloud is a mix of computing resources provided by both private and public clouds.

D. Community cloud

Community cloud shares computing resources across several organizations, and can be managed by either organizational IT resources or third-party provide.

5. CLOUD COMPUTING SERVICE MODELS

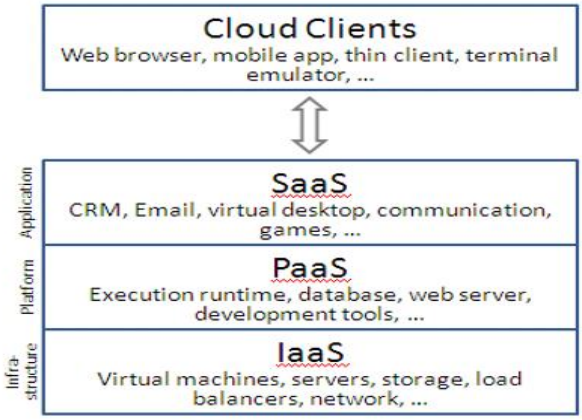

Fig.2

Cloud service models describe how cloud services are made available to clients. Most fundamental service models include a combination of IaaS (infrastructure as a service), PaaS (platform as a service), and SaaS (software as a service).

A. **IaaS (Infrastructure as a Service)**

The IaaS (Infrastructure as a Service) model provides infrastructure components to clients. Components may consist virtual machines, storage, networks, firewalls, load balancers, and so on. With IaaS, clients have direct access to the lowest-level software in the stack . With IaaS, clients have direct access to the lowest-level software in the stack – that is, to the operating system on virtual machines, or to the management dashboard of a firewall or load balancer. Amazon Web Services is one of largest IaaS providers.

B. **The PaaS (Platform as a Service)**

The PaaS (Platform as a Service) model delivers a pre-built application platform to the client; clients needn't spend time building underlying infrastructure for their applications. On the backend, PaaS automatically scales and provisions required infrastructure components depending on application requirements. Typically, PaaS solutions provide an API that includes a set of functions for programmatic platform management and solution development. Google AppEngine is a popular PaaS provider, and Amazon Web Services also provides some PaaS solutions in addition to IaaS offerings.

C. **SaaS (Software as a Service)**

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SaaS (Software as a Service) provides ready online software solutions. The SaaS software provider has complete control of application software. SaaS application examples include online mail, project-management systems, CRMs, and social media platforms . The main difference between SaaS and PaaS is that PaaS normally represents a platform for application development, while SaaS provides online applications that are already developed.

6. CLOUD COMPUTING ACTORS

Cloud Computing Actors, here we introduce 4 major actors of Cloud computing that have a distinct role inside Cloud environment.

A. Cloud User

Cloud user consumes the Cloud computing services that can be a person or an organization.

B. Cloud Provider

Cloud provider is responsible of produce and management of a Cloud environment, serving the requested service by users and delivery of service through access networks to users.

C. Cloud Broker

Cloud Broker acts as an intermediate tool between Cloud users and provider facilitating the procedure in terms of management, performance and delivery of services to users.

D. Cloud Carrier

It is related to carrying Cloud services from Cloud provider towards Cloud users that is carried out by use of telecommunication and access networks like optical and wireless.

7. CLOUD MANAGEMENT SERVICES PROVIDER

Cloud management service providers are niche-market players who help customers to simplify cloud management. Major cloud providers concentrate on the core of their business by providing scalable and reliable cloud infrastructure to customers, but in some cases providers may lack the resources (or inclination) to develop complementary cloud management services Customers benefits from the additional capabilities provided by cloud management services, which may include integration services, security and access control services, high-availability features, and database-replication services. CMS providers work directly with specific cloud providers to integrate provider services with a customer's existing cloud, or to create value added services on top of the provider's existing infrastructure. Customers benefits from the additional capabilities provided by cloud management services, which may include integration services, security and access control services, high-availability features, and database-replication services. CMS can be classified into three main branches: Cloud Value Added Management Services, Cloud Integration Services, and Cloud Service Brokerages.

A. Cloud Value Added Management Services

Cloud value added management service (CMS) providers enhance existing cloud provider services by building additional features on top of them. CMSs are typically used for public cloud services. CMSs bring value to customers because they save time and resources by automating regular tasks that customers would otherwise have to implement themselves. Cloud value added management services make sense because they save time and resources for companies.

B. Cloud Integration Services

Cloud Integration Services (CIS) provide integration between private and public clouds. A major benefit of CIS is that they provide a transparent management abstraction layer that offers exactly the same controls to manage multiple clouds. . A CIS can automate routine administrative tasks such as provisioning, scaling, and monitoring and configuration management with easy-to-use centralized administration tools. CISs provide multi-cloud governance tools to allow customers to monitor all logs, security events, and computer resources utilization from a single dashboard.

C. Cloud Service Brokerages

Cloud service brokerages (CSB) aggregate the services offered by multiple cloud providers and organize these services into a service catalog. This service catalog provides easily-searchable product information for the IaaS, SaaS, and PaaS services available for purchase though the CSB provider distribution network. CSB services can be viewed as a cloud services marketplace, where customers can quickly identify and purchase required services.

8. CLOUD STORAGE PRICING

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Most cloud storage providers determine pricing using the following factors:

A. **On-Demand**

These types of instances allow customers to pay hourly service fees without long-term commitments. This pay-as-you-go pricing model is ideal for situations when a company cannot estimate computing resources demand up-front.

B. **Prepaid**

With prepaid services, customers pay a fixed amount up-front for a specific commitment period. Normally, you pay lower costs for longer commitment periods because this helps cloud providers to estimate their infrastructure expenses.

C. **Auctioned**

The auctioned pricing model enables customers to bid for the computing capacity offered by a cloud provider, with bid price regulated by supply and demand. if your bid meets or exceeds the current bid price, you can access the resources. If your bid is overridden, you give resources back. The costs for auctioned computing resources are significantly lower compared to prepaid and on-demand services; however these resources cannot be used for critical production environment because they can be taken away if a customer loses a bid.

9. CLOUD ADOPTION AND CONTROL CHALLENGES

Cloud transformation is a lengthy process that involves both technical and organizational challenges.

A. **Data Security**

Data security is by far the most challenging barrier to cloud adoption. Data is the most precious corporate asset, and companies want to know that their data is safe.

B. **Cost Uncertainty**

There are hundreds of different cloud offerings on the market, and their pricing models vary considerably. This creates uncertainty, and makes it difficult to estimate the real financial benefits of cloud computing.

C. **Loss of Control**

Loss of control factors can be subdivided into two types: technical loss of control, and organizational loss of control.

D. **Data Portability/Integration**

It can be technically difficult to integrate data in a company's internal datacenter with data located in a public off-premises cloud. Organizations that consider using a hybrid cloud where data is spread across both private and public clouds may face data integration problems.

E. **Software Compatibility**

Cloud providers typically support a specific set of software vendors and versions. A public cloud is a shared environment, where software is shared among hundreds or thousands of isolated customer environments.

F. **Performance**

Most cloud provider SLA agreements cover only infrastructure availability, not performance.

G. **Lock-In Challenges**

This can be easier with IaaS-based cloud services, to which companies can install their own software on a provided infrastructure platform, but with PaaS or SaaS cloud platform customers must learn the provider's specific interfaces and APIs in order to interact and manage these platforms.

10. TOP SECURITY RISKS

The security risks related to cloud computing could be divided in three categories:

A. Policy and Organizational Risk

1) **Lock In*:*** There is not much portability or interoperability for data and services provided by the current cloud providers, and there is no clear incentive for cloud providers to provide these benefits.
2) **Loss of Governance:** The loss of governance and control could severely impact the organization's strategy and ability to meet its mission and goals.
3) **Cloud Service Termination:** Failures in the services outsourced to the cloud provider may have a significant impact on the cloud customer's ability to meet its duties and obligations to its own customers and employees.

B. Technical Risks

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1) **Management interface compromise:** The management interface could suffer from problems such as man-in-the middle, script attacks etc.
2) **Denial of Service (Dos):** An attacker could launch a denial of service by using the public channel to use a customer's metered resources.
3) **Loss of Security Keys:** Vulnerabilities like poor management of keys and usage of certain algorithms could lead to the corruption or loss of the keys and potentially result in unauthorized use for authentication and signature purposes.
4) **Isolation Failure:** This class of risks includes the failure of mechanisms separating storage, memory, routing, and even reputation of different tenants of the shared infrastructure.

C. Legal Risks

1) **Subpoena and e-discovery*:*** In the event of the confiscation of physical hardware by law enforcement agencies occasioned by a subpoena or civil suits, the centralization of storage as well as shared tenancy of physical hardware means many more clients are at risk of the disclosure of their data to unwanted parties.
2) **Changes of Jurisdiction*:*** Customer data may be held in multiple jurisdictions, some of which may be high risk.
3) **Data Protection*:*** Failure to comply with data protection laws may lead to administrative, civil and also criminal sanctions, which vary from country to country, for the data controller.

11. SLA AGREEMENTS

An SLA (Service-Level Agreement) agreement is a contract that describes the level of services offered by a cloud provider .An SLA serves as both the blueprint and warranty for cloud computing.. In the case of cloud services, SLA could be measured in terms of mean time between failures, mean time to repair the outage and other operational metrics such as network response time and system performance. The SLA should act as a guide for handling potential problems. We need to look at the SLA as a tool for protecting the stability of the service, protecting the assets of the company and minimizing the expense should drastic actions be required.

Companies should perform due diligence to carefully examine a cloud provider's SLA agreements. Even cloud providers as large as Amazon provide only 99.95% guaranteed annual uptime for of their servers, while some organizations require 99.99% annual uptime. Interdepartmental service between IT and other departments inside a company are typically defined by operational level agreements (OLA).

12. ADVANTAGES OF CLOUD COMPUTING

Since the user define the resource requirements and the cloud provider virtually assembles these components within its infrastructure.

A. **Elasticity**

The ability to scale computing capacity up or down on-demand is very important. Financially, it doesn't make sense to invest up-front knowing that computing infrastructure will remain only partially utilized nine or ten months per year.

B. **Pay-As-You-Grow**

Public cloud providers like Amazon allow companies to avoid large up-front infrastructure investment and purchase new computing resources dynamically as needed.

C. **Economics**

Without Cloud computing customer pays for everything including the required service while in case of using Cloud computing payment is done only for what he uses therefore is definitely more financial than the usual way.

D. **Flexibility**

Businesses are able to determine how much resources they need like storage and processing.

E. **Time-to-Market**

Introducing and developing new services demanding new infrastructure is more efficient and faster through Cloud Computing compare to traditional computing.

F. **Economics**

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Without Cloud Computing customer pays for everything including the required service while in case of using Cloud computing payment is done only for what he uses therefore is definitely more financial than the usual way.

G. **Portability**

Cloud computing give the opportunity to businesses employees and users to access the computing resources remotely no matter where they are as soon as they have a web based access to Cloud, geographical restrictions.

H. **Scalability**

Businesses are able to transition from processing a small quantity of data to large amount of data immediately without requiring extra requirements or buying additional devices.

13. THE FUTURE OF EMERGING TREND

The Emerging computing trend, namely grid computing, SOA and cloud computing, are increasingly being deployed in Enterprises and across the Internet. Commercial deployment is also on the rise. Global compute cloud comprises compute and storage components. The enterprise IT consumer would use a broker service to use the compute cloud. Auctioneers periodically clear bids and tasks received from market participants. Brokers mediate between consumers and providers by buying capacity from the provider and sub-leasing these to the consumers. Consumers, brokers, and providers are bound to their requirements and related compensations through SLA's. Thus the enterprise IT consumer would get this compute tasks executed through the compute cloud.

14. CONCLUSION

Cloud computing has recently emerged as a compelling paradigm for managing and delivering services over the Internet. The rise of cloud computing is rapidly changing the landscape of information technology, and ultimately turning the long-held promise of utility computing into a reality. However, despite the significant benefits offered by cloud computing, the current technologies are not matured enough to realize its full potential. Many key challenges in this domain, including automatic resource provisioning, power management and security management, are only starting to receive attention from the research community. Therefore, we believe there is still tremendous opportunity for researchers to make ground breaking contributions in this field, and bring significant impact to their development in the industry.

15. ACKNOWLEDGEMENT

Firstly, I would like to express my sincere gratitude to my advisor Prof. Chandani Patel for the continuous support of my research and related research, for her patience, motivation, and immense knowledge. Her guidance helped me all through the research and writing of this thesis. Besides my advisor, I would like to thank the rest of my College professors for their insightful comments and encouragement, but also for the hard question which incented me to widen my research from various perspectives. Without their precious support it would not be possible to conduct this research.

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BITCOIN AND ITS GROWTH

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ABSTRACT

This document gives the brief information about Bitcoin. It was First Designed in the year 2009. Bitcoin is one of the Digital Currency used worldwide for transactions. Nowadays Everyone in India is Curious to know What Exactly Bitcoin is? So Bitcoin is like sending a gold coin via Email. It is consensus network that enables a payment system and complete digital money. In other words we can say Bitcoin is nothing but Crypto Currency. The Entire Process is peer to peer taking place between one user and other user. This Transaction happens with the help of Crypotgraphy. Being Common in other Countries India have recently started bitcoin Exchanges . The basic concept in Bitcoin is no one can alter with it. It is completely Encrypted. Bitcoin wallets keep a secret data namely "private key" which is used to sign transactions to provide a mathematical proof that it comes from the owner of the wallet. All transactions between users are confirmed by an bitcoin network within a few minutes and mostly within an hour. Bitcoins can be exchanged for currencies, online products and Services.

Keyword – *Bitcoin, Blockchain, Cryptocurrency, Double spending, Peer to peer*

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1. INTRODUCTION

As the time goes Passing by in the 21st century We are coming across end numbers of things . Whenever a new thing shows up in the Internet age, it takes a while for everyone to determine what it is, let alone what it can become. As in the case of bitcoin, it's been 8 years since it came out but most of us are still unsure about what it is. So lets see what actually Bitcoin is?Bitcoin is a cryptocurrency, or a digital currency, that uses rules of cryptography for regulation and generation of units of currency. Bitcoin falls under the scope of cryptocurrency and was the first and most valuable among them. It was introduced by Satoshi Nakamoto in the year 2009. Bitcoins are completely virtual coins designed to be 'self-contained' for their value, with no need for banks to move and store the money. Bitcoin offers the promise of lower transaction fees than traditional online payment mechanisms and is operated by a decentralized authority, unlike government-issued currencies. Bitcoin charts high on popularity, and has triggered the launch of other virtual currencies collectively referred to as Altcoin.

2. WHAT IS IT???

A. What actually Bitcoin is???

It's hard to understand the jargon when you don't understand the problem that it's trying to solve. Let's imagine a completely hypothetical scenario where you had a 1000 rupee note but you gave that note to the government because suddenly, that's the law. After that physical transaction, you are left with nothing whereas the government has your 1000 rupee note. Now imagine if you had a digital 1000 rupee note, things are not so simple anymore. You could simply copy-paste and email the note to the government while simultaneously emailing it to the terrorist outfit of your choice. These are not my words; it's the government that assumes you're funding terrorists with that money – feel free to take this issue with them. Regardless, this is called the double spending problem and it baffled computer scientists for a long time until Bitcoin offered a solution in 2009.

B. How it works in environment???

Imagining a 1000 Rs Digital currency and 1000 Rs Bank value it will help us understand better that how does Bitcoin works . So let me tell you how does it work. Bitcoin works on the Peer to Peer networks(User to User) directly. So there's no involvement of banks during the transaction as the money would be directly transferred to that particular user. But in the case of 1000 Rs bank value which you need to transfer to a particular user . It will be Deducted from a bank account and then it will be transferred to another user bank account .Bitcoin consists of a network of peers. Each one has a unique ID (or digital signature) and a copy of the "blockchain", that is, a public ledger that contains entries of all bitcoin transactions ever performed. When someone makes a bitcoin transaction, it gets processed by "miners" on the network. Miners have dedicated hardware that implements time-consuming crypto algorithms to ensure the validity of the transaction so that it can be added to the blockchain.

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This is the reason bitcoin transactions take very long. Once added, it is highly improbable that the transaction will be reversed. The miners get rewarded with bitcoins for their service to the network and that is the only way to generate new bitcoins.

3. HISTORY OF BITCOIN.....

- 1998 – 2009 The pre-Bitcoin years
  Although Bitcoin was the first established cryptocurrency , there had been previous attempts at creating online currencies with ledgers secured by encryption. Two examples of these were B-Money and Bit Gold, which were formulated but never fully developed.
- 2008 – The Mysterious Mr Nakamoto
  A paper called Bitcoin – A Peer to Peer Electronic Cash System was posted to a mailing list discussion on cryptography. It was posted by someone calling themselves Satoshi Nakamoto, whose real identity remains a mystery to this day.
- 2009 – Bitcoin begins
  The Bitcoin software is made available to the public for the first time and mining – the process through which new Bitcoins are created and transactions are recorded and verified on the blockchain – begins.
- 2010 – Bitcoin is valued for the first time
  As it had never been traded, only mined, it was impossible to assign a monetary value to the units of the emerging cryptocurrency. In 2010, someone decided to sell theirs for the first time – swapping 10,000 of them for two pizzas. If the buyer had hung onto those Bitcoins, at today's prices they would be worth more than $100 million.
- 2011 – Rival cryptocurrencies emerge
  As Bitcoin increases in popularity and the idea of decentralized and encrypted currencies catch on, the first alternative cryptocurrencies appear. These are sometimes known as altcoin and generally try to improve on the original Bitcoin design by offering greater speed, anonymity or some other advantage. Among the first to emerge were Namecoin and Litecoin. Currently there are over 1,000 cryptocurrencies in circulation with new ones frequently appearing.
- 2012 – Bitcoin for Dummies
  In 2012, bitcoin was featured as the main subject within a fictionalized trial on the CBS legal drama The Good Wife in the third-season episode "Bitcoin for Dummies". The host of CNBC's Mad Money, Jim Cramer, played himself in a courtroom scene where he testifies that he doesn't consider bitcoin a true currency, saying "There's no central bank to regulate it; it's digital and functions completely peer to peer". The Bitcoin Foundation was launched to "accelerate the global growth of bitcoin through standardization, protection, and promotion of the open source protocol". The founders were Gavin Andresen, Jon Matonis, Patrick Murck, Charlie Shrem, and Peter Vessenes.
- 2013 – Bitcoin price crashes.
  Shortly after the price of one Bitcoin reaches $1,000 for the first time, the price quickly begins to decline. Many who invested money at this point will have suffered losses as the price plummeted to around $300 – it would be more than two years before it reached $1,000 again.
- 2014 – Scams and theft
  Perhaps unsurprisingly for a currency designed with anonymity and lack of control in mind, Bitcoin has proven to be an attractive and lucrative target for criminals. In January 2014, the world's largest Bitcoin exchange Mt.Gox went offline, and the owners of 850,000Bitcoins never saw them again. Investigations are still trying to get to the bottom of exactly what happened but whatever the story, someone dishonestly got their hands on a haul which at the time was valued at $450 million dollars. At today's prices, those missing coins would be worth $4.4 billion.
- 2015 - Bitstamp announced that their exchange would be taken offline
  In 2015, Coinbase raised 75 million USD as part of a Series C funding round, smashing the previous record for a bitcoin company. Less than one year after the collapse of Mt. Gox, United Kingdom-based exchange Bitstamp announced that their exchange would be taken offline while they investigate a hack which resulted in about 19,000 bitcoins (equivalent to roughly US$5 million at that time) being stolen from their hot wallet. The exchange remained offline for several days amid speculation that customers had lost their funds. Bitstamp resumed trading on 9 January after increasing security measures and assuring customers that their account balances would not be impacted.
- 2016 – Ethereum and ICOs.
  One cryptocurrency came close to stealing Bitcoin's thunder this year, as enthusiasm grew around the Ethereum platform. This platform uses cryptocurrency known as Ether to facilitate blockchain-based smart contracts and apps. Ethereum's arrival was marked by the emergence of Initial Coin Offerings (ICOs). These are fundraising platforms which offer investors the chance to trade what are often essentially stocks or shares in startup ventures, in the same

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manner that they can invest and trade cryptocurrencies. In the US the SEC warned investors that due to the lack of oversight ICOs could easily be scams or ponzi schemes disguised as legitimate investments. The Chinese government went one further, by banning them outright.

- 2017 –Bitcoin reaches $10,000 and continues to grow

  A gradual increase in the places where Bitcoin could be spent contributed to its continued growth in popularity, during a period where it's value remained below previous peaks. Gradually as more and more uses emerged; it became clear that more money was flowing into the Bitcoin and cryptocoin ecosystem. During this period the market cap of all cryptocoins rose from $11bn to its current height of over $300bn. Banks including Barclays, Citi Bank, Deutsche Bankand BNP Paribas have said they are investigating ways they might be able to work with Bitcoin. Meanwhile the technology behind Bitcoin – blockchain – has sparked a revolution in the fintech industry (and beyond) which is only just getting started.

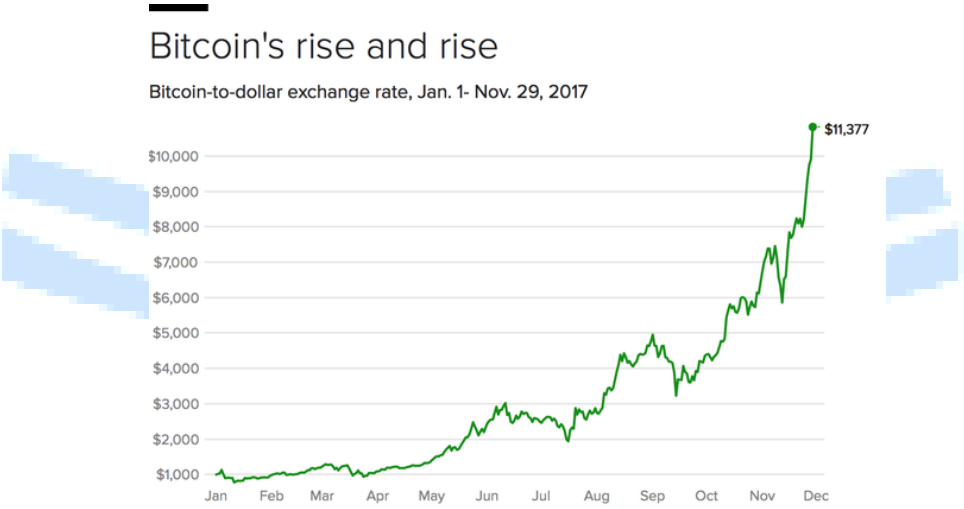

Fig. 1 Bitcoin growth in year 2017

4. How Come Bitcoin Gained its Popularity???

"Stay at home & become rich" Seems Funny Right? But this might prove that this is best solution. How? As The Daily Bitcoin Price changes in the Market . From being $900 its lowest to $20000 its highest the prices Vary a lot.. So if anyone Would start investing bitcoin say at price ($11000) today .Its value in the next 4-5 years can be Quadriple . So many investors look to invest there money in bitcoin. So more You invest more you earn. Also Bitcoin's birth is shrouded in controversy and anonymity. It was created by a person or a group of people called Satoshi Nakamoto. He posted the Bitcoin code on the Internet as open source and was active in the development process up until 2010. He was the first miner and based on the block-chain, he has roughly one million bitcoin but his software works as designed – no one knows who or where he is. Again, there are a limited number of bitcoins that can be mined and that number is roughly around 21 million and out of that only 4.5 million are left. $1.58\times10-8$ is the roughly the probability the of mining a single block which contains 25 bitcoins. Now with a decreasing number of bitcoins, this process becomes more and more complex. It is that complex and is draining a huge amount of electricity just for the sake of mining a virtual currency.

C. Blockchain and Double spending

Bitcoin really helps Spending Twice.. All thanks to "Block Chain" a public ledger that contains entries of all bitcoin transactions ever performed. When someone makes a bitcoin transaction, it gets processed by "miners" on the network. Miners have dedicated hardware that implements time-consuming crypto algorithms to ensure the validity of the transaction so that it can be added to the blockchain. This is the reason bitcoin transactions take very long. Once added, it is highly improbable that the transaction will be reversed. The miners get rewarded with bitcoins for their service to the network and that is the only way to generate new bitcoins.

D. Now we will see what is cryptocurrency???

A Cryptocurrency, as the name suggests, is a secret/hidden currency which exists in the records called public ledger, just like the balance in your bank account's passbook, talktime in your mobile phone, DTH,etc.It cannot be physically seen or felt, but is used for online transactions, making and receiving payments, just like internet banking.A cryptocurrency is a digital or virtual currency that uses cryptography for security.

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E. **Some types of Cryptocurrency :-**

- LiteCoin – 2011.
  Litecoin sets itself up as the "silver to Bitcoin's gold." Confirmations of transactions are purportedly processed more quickly with Litecoin than Bitcoin. The way it's mined also eliminates some of the advantage for miners with specialized computer hardware.
- PeerCoin – 2012
  Peercoin markets itself as using less energy and being more environmentally sustainable than some of the other coins on the market. It says it is designed to have a 1 percent rate of inflation.
- PrimeCoin -2013
  With this coin, miners have to use their computers to find Cunningham chains, which are sequences of prime numbers. Primecoin touts the mining of such prime numbers as "providing potential scientific value in addition to minting and security for the network."
- NameCoin -2011
  Namecoin was created to explore the record-keeping side of the cryptocurrency technology. It acts as a peer-to-peer, decentralized domain name system for dot-bit domains. People can purchase dot-bit domains with Namecoin, and then Namecoin tracks the transaction in the "block chain," or public ledger.
- Ripple -2013
  Ripple has already attracted millions in venture capital, including from Google Ventures. In contrast to Bitcoin, there is no mining of Ripples. Ripple also is set up as a payment network, not only for Ripple, but for other currencies, and as an automated system for currency trades.
- SexCoin -2013
  According to its website, the goal of Sexcoin is to have a way for purveyors and consumers of "adult content" to have a fast, stable and secure method of transactions that protects privacy.
- Auroracoin -2014
  Auroracoin was created after a purported Icelandic entrepreneur came up with the idea of distributing cryptocurrency to everyone in his country. Auroracoin is based on the Litecoin and is 50 percent pre-mined. The pre-mined coins will be distributed to the entire population of Iceland beginning at midnight March 25.
- Mastercoin – 2013
  Created to address some of the security and price stability issues of Bitcoin, it implements more advanced features on top of the block chain. It appears the importance of Mastercoin is more in its technology than in its currency.
- Freicoin -2012
  Freicoin imposes a "demurrage fee" of about 5 percent annually on money held by users, meaning that users who hoard their money instead of spending it will see their money fall in value.
- Etherium -2015
  Ethereum is an open-source, public, blockchain-based distributed computing platform featuring smart contract (scripting) functionality. It provides a decentralized Turing-complete virtual machine, the Ethereum Virtual Machine (EVM), which can execute scripts using an international network of public nodes. Ethereum also provides a cryptocurrency token called "ether", which can be transferred between accounts and used to compensate participant nodes for computations performed.
- Quark -2013
  The Quark coin uses nine rounds of encryption to ensure security and anonymity in its transactions. It claims that, because Quark is mined using regular computer processing power, it offers the "fairest distribution model available."
- DodgeCoin -2013
  This altcoin initially started as a joke by combining two Internet phenomena — bitcoins and the doge meme. It's one of the most talked about cryptocurrencies behind Bitcoin, which may explain in part its growing market cap. It doesn't hurt that its mascot is an adorable Shiba Inu puppy.Equations.

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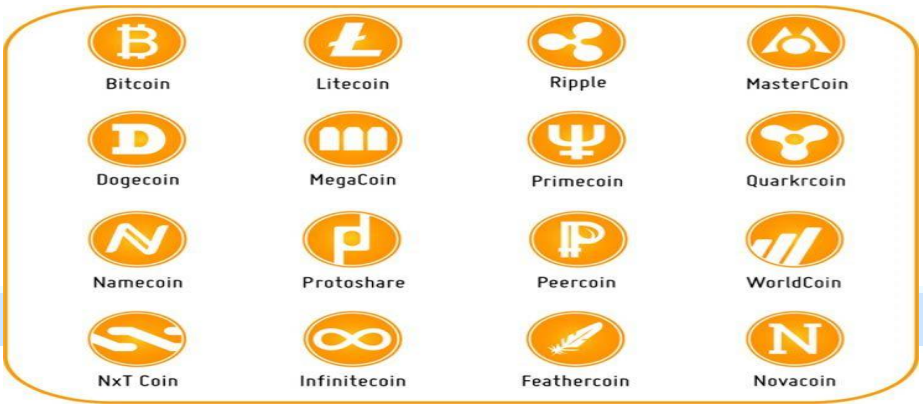

Fig. 2 Some Cryptocurrency types

5. CONCLUSIONS

Year	Bitcoin Price Prediction
2017	17000 USD
2018	45000 USD
2019	70000 USD
2020	100,000 USD

Fig.3 Bitcoin price prediction in upcoming years

We don't mean that BTC exchange rate will fall. The contradiction with the law of supply and demand doesn't prevent Bitcoin growth. Bitcoin would cost as much as the market pays for it. We would like to conclude that its very debatable whether to invest in bitcoin or not? Everyone has a different perspective about this as many economists would see as a challenging to invest in bitcoin. It may be advantage to some it may be loss to many. The ratio won't be the same. On the second hand there's no denying that there is growth in bitcoin. We believe people should invest smartly and cautiously. We accept that this cryptocurrency(bitcoin) is expensive compared to others but also very popular amongst others so it's a good option to invest in this cryptocurrency.

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6th National Conference on Role of Engineers in Nation Building, ISBN: (978-93-5288-028-7) IJARIIT (ISSN: 2454-132X)

MACHINE LEARNING

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ABSTRACT

Machine learning, is a field of computer science that evolved from studying pattern recognition and computational learning theory in artificial intelligence. Machine learning uses certain statistical algorithms to make computers work in a certain way without being explicitly programmed. The algorithms receive an input value and predict an output for this by the use of certain statistical methods. The main aim of machine learning is to create intelligent machines which can think and work like human beings.

Keywords : - *Machine Learning, Deep learning, Big Data , Data Mining, Artificial Intelligence.*

1. INTRODUCTION

Machine Learning is a new trending field these days and is an application of artificial intelligence. Machine learning uses certain statistical algorithms to make computers work in a certain way without being explicitly programmed. The algorithms receive an input value and predict an output for this by the use of certain statistical methods. The main aim of machine learning is to create intelligent machines which can think and work like human beings.

"A computer program is said to learn from experience E with respect to some task T and some performance measure P, if its performance on T, as measured by P, improves with experience E." -- Tom Mitchell, Carnegie Mellon University.

So if we want our program to foresee, for example, traffic forms at a busy node (task T), we can run it through a machine learning process with data about previous traffic patterns (experience E) and, if it has successfully "learned", it will then do better at predicting upcoming traffic patterns (performance measure P).

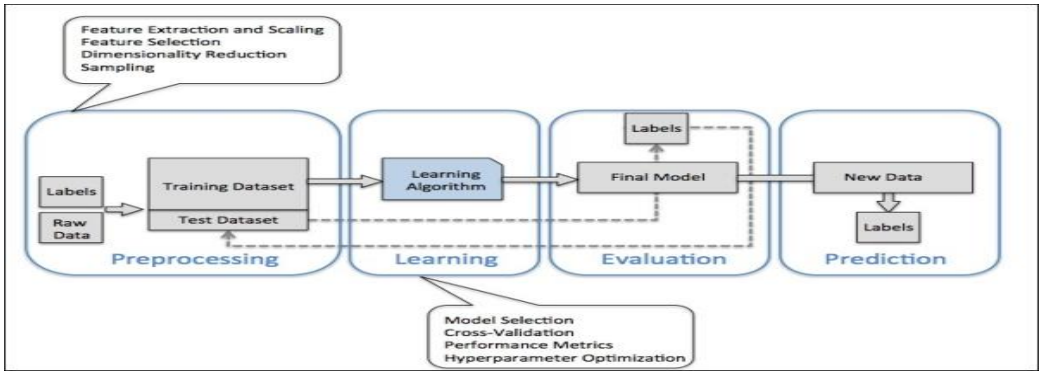

Chart -1: Machine Learning process

Machine Learning is a branch of artificial intelligence that gives systems the ability to learn automatically and improve themselves from the experience without being explicitly programmed or without the intervention of human. Its main aim is to make computers learn automatically from the experience.
We need machine learning in the following cases:-

- Human expertise is absent. E. g. Navigating on Mars.
- Humans are unable to explain their expertise. E. g. Speech Recognition.

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- Solution changes with time E. g. Temperature Control.
- Solution needs to be adapted to particular cases. E. g. Biometrics.
- Problem size is too vast f or our limited reasoning capabilities. E. g. Calculating webpage ranks.

Consider the recognition of spoke speech, where an acoustic speech signal is converted to ASCII text. The pronunciation of a word may vary from person to person due to differences in age, gender or pronunciation, so in machine learning, the approach is to collect a large collection of sample utterances from diverse people and learn to plot these to words. As another example, consider routin packets over a computer grid. The trail maximizing the
quality of service from source to destination changes regularly as the system traffic changes. A learning routing procedure is able to adapt to the best path by monitoring the network traffic.

1.1 Methods of Machine Learning

Machine learning involves two types of tasks:-

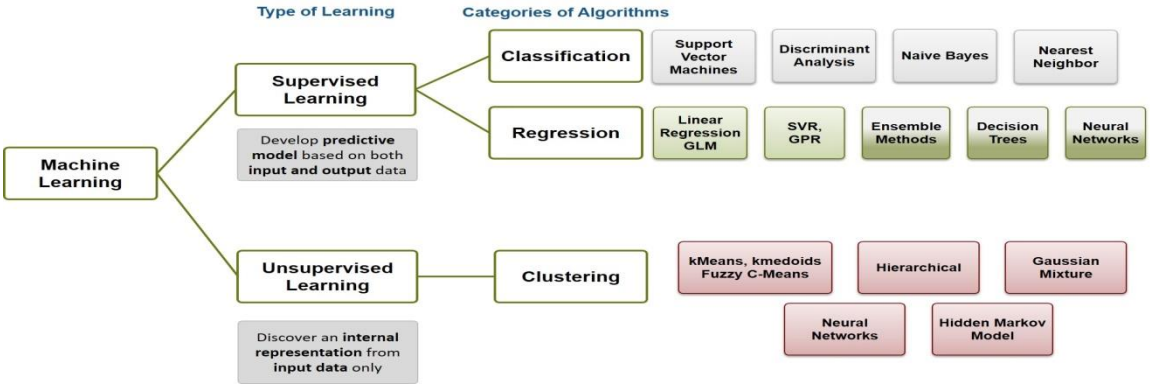

Chart -2 : Machine Learning Methods

- Supervised Learning – In this method, input and output is provided to the computer along with feedback during the training. The accuracy of predictions by the computer during training is also analyzed. The main goal of this training is to make computers learn how to map input to the output.
- Unsupervised Learning – In this case, no such training is provided leaving computers to find the output on its own. Unsupervised learning is mostly applied on transactional data. It is used in more complex tasks. It uses another approach of iteration known as deep learning to arrive at some conclusions.

1.2 How does machine learning work?

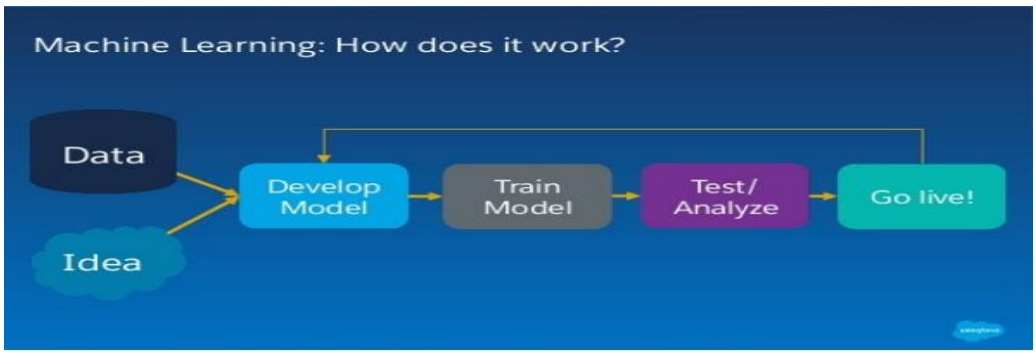

Chart -3: Working of Machine Learning

Machine learning makes use of processes similar to that of data mining. Machine learning algorithms are described in terms of target function (f) that
maps input variable (x) to an output variable (y). This can be represented as:
y=f(x)

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There is also an error e which is the independent of the input variable x. Thus the more generalized form of the equation is:
y=f(x) + e
In machine the mapping from x to y is done for predictions. This method is known as predictive modeling to make most accurate predictions. There are various assumptions for this function.

1.3 Benefits of Machine Learning

Chart -4: Benefits of Machine Learning

Everything is dependent on machine learning. Find out what are the benefits of machine learning.

- Decision making is faster – Machine learning provides the best possible outcomes by prioritizing the routine decision-making processes.
- Adaptability – Machine Learning provides the ability to adapt to new changing environment rapidly. The environment changes rapidly due to the fact that data is being constantly updated.
- Innovation – Machine learning uses advanced algorithms that improve the overall decision-making capacity. This helps in developing innovative business services and models.
- Insight – Machine learning helps in understanding unique data patterns and based on which specific actions can be taken.
- Business growth – With machine learning overall business process and workflow will be faster and hence this would contribute to the overall business growth and acceleration.
- Outcome will be good – With machine learning the quality of the outcome will be improved with lesser chances of error.

2. DEEP LEARNING

A new area of machine learning research, which has been introduced with the objective of moving machine learning closer to one of its original goals: Artificial Intelligence.

Deep learning draws its roots from Neocognitron; an Artificial Neuron Network (ANN) introduced by Kunihiko Fukushima in 1980. An ANN is an interconnected network of processing units emulating the network of neurons in the brain. The idea behind ANN was to develop a learning method by modeling the human brain. However, this method lost favor within the machine learning community owing to the fact that it required an impractical amount of time as well as a humungous amount of data to train the network parameters for any decent application. Deep learning is a method to train multi-layer (and hence the word “deep”) ANN using little data. This is the reason why ANN is back in the game. Using an example to compare Machine Learning with Deep Learning, we can say that if a machine learning algorithm learns parts of a face like eyes and nose for face detection tasks, a deep learning algorithm will learn extra features like the distance between eyes and the length of the nose. Hence Deep Learning is a major step away from Shallow Learning Algorithms.

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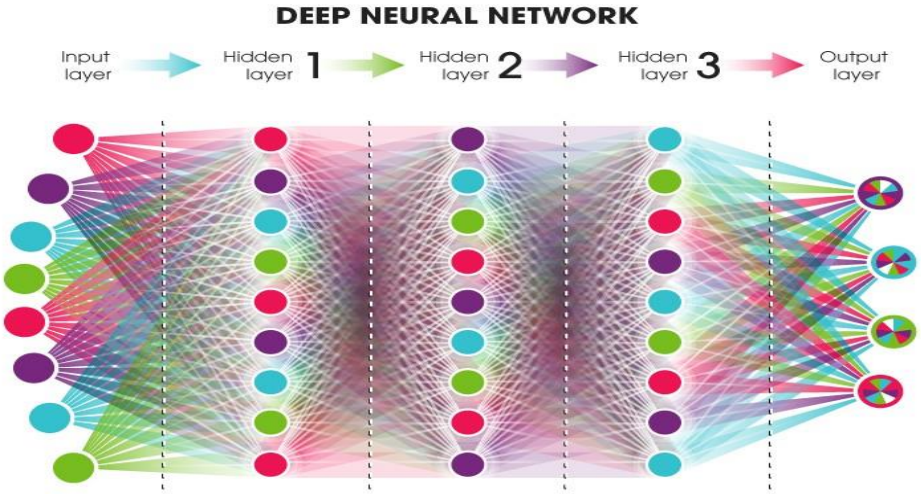

Chart -5: Deep Learning network Hidden layer Expression

The term deep learning gained traction in midd 2000s after the "vanishing gradient problem" responsible for causing a reduction in speed was solved in a publication by Geoffrey Hinton and Ruslan Salakhutdinov. They showed how a multi-layered feed forward neural network could be effectively retrained at a time, treating each layer in turn as an unsupervised restricted Boltzmann's machine, then using supervised back-propagation for fine tuning.

A Deep Neural Network (DNN) is defined to be an Artificial Neural Network (ANN) with at least one hidden layer of units between the input and output layers. The extra layers give it added levels of abstraction, thus enhancing its modelling capability. The most popular kinds of Deep Learning models, are known as Convolutional Neural Nets (CNN), or simply ConvNets. These area type of feed-forward artificial neural network, extensively used in computer vision, where the individual neurons are tiled in such a way that they respond to overlapping regions in the visual field. In recent times, CNNs have also been successfully aplied to automatic speech recognition (ASR). Deep Belief Networks and Convolutional Deep Belief Networks are some other popular deep learning architectures in use.

There are two disadvantages with DNNs. They are overfitting and computation time. Overfitting is when the DNN learns very specific details on the training data using its hidden layers. As a result, the DNN performs well if the training data is given as input, but poorly when the input data is different. This problem is solved by a method called "dropout" regularization where some units are randomly removed from the hidden layers during training. The matrix and vector computations required here are well suited for GPUs. Hence, we could speed up the computations by harnessing their enormous processing power.

The figure below illustrates how categorizing of different images can be achieved using a deep learning model where every layer learns a single feature a t a time. At the first layer it can learn the different edges; in the second, it could learn slightly more complex features like different parts of a face such as ears, noses and eyes. In the third layer it could learn even more complex features like the distance between eyes or face shapes. The final representations can be used in applications of categorization.

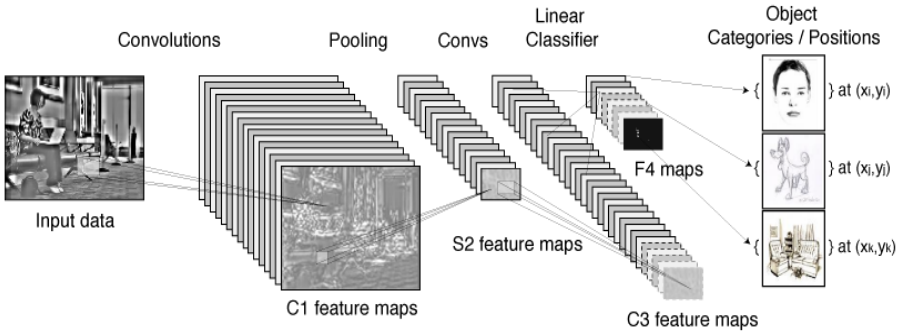

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Chart -6: Deep learning network architecture diagram

Applications of deep learning are as follows:-

- Optical Character Recognition E.g. Scanning an image an extracting text from it.
- Speech Recognition E. g. Generating textual representation of speech from a sound clip.
- Artificial Intelligence E. g. Robotic Surgery
- Automotive Applications E. g. Self-Driving Cars.
- Military and Surveillance E. g. Drones.

Advantages of Deep Learning:-

Deep Learning helps in solving certain complex problems with high speed which were earlier left unsolved. Deep Learning is very useful in real world applications.

Following are some of the main advantages of deep learning:

- Eliminates unnecessary costs – Deep Learning helps to eliminate unnecessary costs by detecting defects and errors in the system.
- Identifies defects which otherwise are difficult to detect – Deep Learning helps in identifying defects which left untraceable in the system.
- Can inspect irregular shapes and patterns – Deep Learning can inspect irregular shapes and patterns which is difficult for machine learning to detect.

3. BIG DATA

Deep Learning and Big Data are two high-focus areas of data science. Deep learning algorithms extract complex data patterns, through a hierarchical learning process by analyzing and learning massive amounts of unsupervised data (Big Data). This makes it an extremely valuable tool for Big Data Analysers.

Big Data has 4 important characteristics, namely, Volume, Variety, Velocity and Veracity. They are Learning algorithms are mainly concerned with issues related to Volume and Variety. Deep Learning algorithms deal with massive amounts of data, i.e. Volume whereas shallow learning algorithms fail to understand complex data patterns which are inevitably present in large data sets. Moreover, Deep Learning deals with analyzing raw data presented in different formats from different sources, i.e. Variety in Big Data. This minimizes the need for input from human experts to retrieve features from all new data types found in Big Data.

Semantic Indexing, Data Tagging and Fast Information Retrieval are the main objectives of Deep Learning in Big Data. Consider data that is unstructured and unorganized. Haphazard storage of massive amounts of data cannot be used as a source of knowledge because looking through such data for specific topics of interest and retrieving all relevant and related information would be a tedious task. Using Semantic Indexing and Data Tagging, we identify patterns in the relationships between terms and concepts based on the principle that words used in the same context have similar meanings. The related words can then be stored close to each other in the memory. This helps us present data in a more comprehensive manner and helps in improving efficiency. A direct result of such a form of storage would be that search engines would work more quickly and efficiently.

4. DATA MANING

Data mining (DM) is a most popular knowledge acquisition method for knowledge discovery. Classification is one of the data mining (machining learning) technique that maps the data into the predefined class and group's. It is used to predict group membership for data instance. There are many areas that adapt Data Mining techniques such as medical, marketing, telecommunications, and stock, health care and so on.

Data Mining is about using Statistics as well as other programming methods to find patterns hidden in the data so that you can explain some phenomenon. Data Mining builds intuition about what is really happening in some data and is still little more towards math than programming, but uses both.

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Machine Learning uses Data Mining techniques and other learning algorithms to build models of what is happening behind some data so that it can predi*ct* future outcomes. Math is the basis for many of the algorithms, but this is more towards programming.

Data mining is a very first step of Data Science product. Data mining is a field where we try to identify patterns in data and come up with initial insights.

E.g., you got the data and you identified missing values then you saw that missing values are mostly coming from recordings taken manually.

Few people mistake Data mining with data extraction. Data mining comes into play once you have collected data.

Companies use powerful data mining techniques coupled with advanced tools to extract valuable information out of large amount of data.

E.g., Walmart collects point of sales data from their 3,000+ stores across the world and stores it into their Data Warehouse. Walmart suppliers have access to this database and they identify the buying patterns among Walmart customers and use this to maintain their inventory in future. Walmart data warehouse processes more than a million such queries every year.

Data mining uses power of machine learning, statistics and database techniques to mine large databases and come up with patterns. Mostly data mining uses cluster analysis, anomaly detection, association rule mining etc. to find out patterns in data.

In short Data Mining is finding out hidden and interesting patterns stored in large data warehouses using the power of statistics, artificial intelligence, machine learning and database management techniques.

5. ARTIFICIAL INTELLIGENCE

Artificial Intelligence is the theory and development of computers which are capable of performing tasks which humans can. Deep learning represents the rudimentary level of attempts towards achieving this task. It is utilized in visual perception, speech recognition, game playing, expert systems, decision-making, medicine, aviation and translation between languages.

In the gaming industry, Artificial Intelligence could be useful as we could have a ‘gamebot’ stand as an opponent when a human player is not available. We could also have deep learning algorithms suggest how enemy spawns could be strategically placed in the arena to obtain different levels of difficulty. The military as well as aviation industries can use Artificial intelligence to sort information related to air traffic and then provide their pilots with the best techniques to avoid the traffic. A medical clinic can use Artificial Intelligence systems to organize bed schedules, staff rotations and provide medical information.

6. CONCLUSION

Machine learning techniques are being widely used to solve real-world problems by storing, manipulating, extracting and retrieving data from large sources. Supervised machine learning techniques have been widely adopted however these techniques prove to be very expensive when the systems are implemented over wide range of data. This is due to the fact that significant amount of effort and cost is involved because of obtaining large labeled data sets. Thus active learning provides a way to reduce the labeling costs by labeling only the most useful instances for learning.

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CLOUD COMPUTING

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ABSTRACT

Cloud computing is a general term for the delivery of hosted services over the internet. Cloud computing enables companies to consume a compute resource, such as a virtual machine (VM), storage or an application, as a utility just like electricity rather than having to build and maintain computing infrastructures in house.

Keywords- *introduction of cloud computing,history, iaas,paas,saas.*

1. INTRODUCTION OF CLOUD COMPUTING

Cloud Computing refers to manipulating, configuring, and accessing the hardware and software resources remotely. It offers online data storage, infrastructure, and application Cloud computing offers platform independency, as the software is not required to be installed locally on the PC. Hence, the Cloud Computing is making our business applications mobile and collaborative.

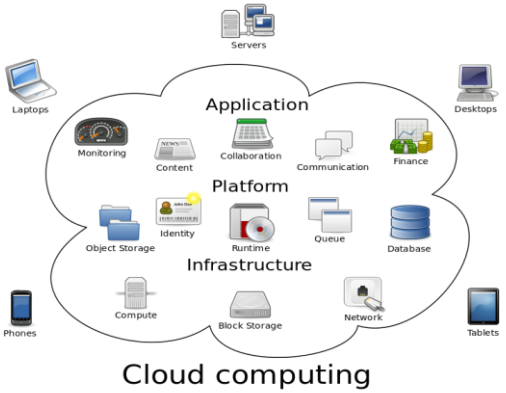

Figure-1:Cloud Computing

Cloud computing is the latest generation technology with a high IT infrastructure that provides us a means by which we can use and utilize the applications as utilities via the internet. Cloud computing makes IT infrastructure along with their services available "on-need" basis. The cloud technology includes - a development platform, hard disk, computing power, software application, and database. This technology doesn't require large-scale capital expenditure to access cloud vendors. Rather, cloud facilitates 'pay-per-use' i.e. the users of the organizations have to pay only that limited amount as much they use the cloud infrastructure. In other words, cloud computing refers to applications and services that run on a distributed network using virtualized resources and uses the common internet protocols for accessing.

2. HISTORY OF THE CLOUD COMPUTING

Initially cloud computing was thought of as being only public. Thus, it was called the public cloud. However, due to security reasons, we shifted from public clouds to private clouds. The focus was toward making the cloud more secure and yet to provide the same services and resource sharing. Then cloud infrastructures naturally evolved to what is known as hybrid clouds. Hybrid clouds can be explained with the help of an equation also:

Hybrid Cloud = Public Cloud + Private Cloud

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This means that now you can have the benefits of both internal network storage as well as public data clouds that can be accessed from anywhere in the world using the Internet. Using broadband services along with the cloud, companies can connect to larger networks to make use of available resources. There is no need for a huge computer now to handle complex tasks like database indexing.

2.1 Evolution of the Cloud Computing

2.1.1 In the 1960s:

(a) Joseph Licklider, a Professor at MIT, described the idea of cloud computing and resource sharing.

(b) Professor John McCarthy, at MIT and Stanford focused on the concepts of time-sharing, computing power, and applications being used and sold as a utility and online social networking.

(c) In 1966, Douglas F. Parkhill, published a book on The Challenge of Computer Utility wherein he described the utility-like features of cloud computing such as dynamic provisioning, illusion of infinite supply, and being always online.

2.1.2 In the 1970s:

(a) In 1979, Dun and Bradstreet bought National CSS, which sold the time-sharing concept.

(b) BBN Technologies, founded by MIT, in the 1970s marketed time-sharing.

2.1.3 In the 1980s:

(a) In 1985, DEC also introduced VAX clusters where several VAX machines were grouped together for resource sharing.

(b) In 1980, Tim Berners-Lee worked on hypertext and is known today as the father of the Internet.

2.1.4 In the 1990s:

(a) Ian Foster and Carl Kesselman wrote a book entitled The Grid: Blueprint for a New Computing Infrastructure. They explain the concepts of grid computing, which can work cohesively for computationally intensive tasks.

(b) In 1998, the Data Protection Act in the UK had a very long-term impact on cloud computing. This act covered data collection, protection, and sharing in a multi-tenant environment.

(c) In 1999, Salesforce.com, who happens to be a pioneer in Software-as-a-Service (SaaS) CRM, made the cloud operational.

(d) In the mid-1990s, Yahoo also offered cloud-based email services.

(e) Again in the 1990s, server virtualization was introduced (based on 8086 microprocessors). This became the base/foundation for cloud resource sharing.

(f) In 1998, VMware was founded by Mendel and colleagues at the University of California.

2.1.5 In the 2000s:

(a) In 2001, the SIIA (Software and Information Industry Association) used the acronym SaaS and compared it with ASP (Application Service Provider).

(b) In 2002, Amazon launched its web services to permit users to integrate their websites with Amazon's online content. This later became IaaS, EC2 (Elastic Compute Cloud), and S3(Storage-as-a-Service). They actually introduced pay-per-use pricing and very quickly it became a standard with other companies.

(c) In 2003, Nicholas Carr, published a research paper in the Harvard Business Review called "IT Doesn't Matter" wherein he described that corporate will start purchasing IT resources as and when needed from external resources only.

(d) In 2008, Gartner declared cloud computing an emerging technology that was still in its infancy stage.

2.1.6 In the 2010s:

(a)In February 2010, Microsoft released Microsoft Azure, which was announced in October 2008.

(b)In July 2010, Rackspace Hosting and NASA jointly launched an open-source cloud-software initiative known as OpenStack. The OpenStack project intended to help organizations offering cloud-computing services running on standard hardware. The early code came from NASA's Nebula platform as well as from Rackspace's Cloud Files platform. As an open source offering and along with other open-source solutions such as CloudStack, Ganeti and OpenNebula, it has attracted attention by several key communities. Several studies aim at comparing these open sources offerings based on a set of criteria.

(c)On March 1, 2011, IBM announced the IBM SmartCloud framework to support Smarter Planet. Among the various components of the Smarter Computing foundation, cloud computing is a critical part. On June 7, 2012, Oracle announced the Oracle Cloud. This cloud offering is poised to be the first to provide users with access to an integrated set of IT solutions, including the Applications (SaaS), Platform (PaaS), and Infrastructure (IaaS) layers.

(d)In May 2012, Google Compute Engine was released in preview, before being rolled out into General Availability in December 2013.

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3. USES FOR THE CLOUD COMPUTING

3.1 Scalable Usage:

Cloud computing offers scalable resources through various subscription models. This means that you will only need to pay for the computing resources you use. This helps in managing spikes in demands without the need to permanently invest in computer hardware.

Netflix, for instance, leverages this potential of cloud computing to its advantage. Due to its on-demand streaming service, it faces large surges in server load at peak times. The move to migrate from in-house data centres to cloud allowed the company to significantly expand its customer base without having to invest in setup and maintenance of costly infrastructure.

3.2 Chatbots:

The expanded computing power and capacity of the cloud enables us to store information about user preferences. This can be used to provide customized solutions, messages and products based on the behaviour and preferences of users.

Siri, Alexa and Google Assistant - all are cloud-based natural-language intelligent bots.

3.3 Communication:

The cloud allows users to enjoy network-based access to communication tools like emails and calendars. Most of the messaging and calling apps like Skype and WhatsApp are also based on cloud infrastructure. All your messages and information are stored on the service provider's hardware rather than on your personal device. This allows you access your information from anywhere via the internet.

3.4 Productivity:

Office tools like Microsoft Office 365 and Google Docsuse cloud computing, allowing you to use your most-productive tools over the internet. You can work on your documents, presentations and spreadsheets - from anywhere, at any time. With your data stored in the cloud, you don't need to bother about data loss in case your device is stolen, lost or damaged. Cloud also helps in sharing of documents and enables different individuals to work on the same document at the same time.

3.5 Business Process:

Many business management applications like customer relationship management (CRM) and enterprise resource planning (ERP) are also based on a cloud service provider. Software as a Service (SAAS) has become a popular method for deploying enterprise level software.

Salesforce, Hubspot, Marketo etc. are popular examples of this model. This method is cost-effective and efficient for both the service provider and customers. It ensures hassle free management, maintenance and security of your organization's critical business resources and allows you to access these applications conveniently via a web browser.

3.6 Backup and recovery:

When you choose cloud for data storage the responsibility of your information also lies with your service provider. This saves you from the capital outlay for building infrastructure and maintenance. Your cloud service provider is responsible for securing data and meeting legal and compliance requirements. The cloud also provides more flexibility in the sense that you can enjoy large storage and on-demand backups. Recovery is also performed faster in the cloud because the data is stored over a network of physical servers rather than at one on-site data centre. Dropbox, Google Drive and Amazon S3 are popular examples of cloud backup solutions.

3.7 Application development:

Whether you are developing an application for web or mobile or even games, cloud platforms prove to be a reliable solution. Using cloud, you can easily create scalable cross-platform experiences for your users. These platforms include many pre-coded tools and libraries — like directory services, search and security. This can speed up and simplify the development process. Amazon Lumberyard is a popular mobile game development tool used in the cloud.

3.8 Test and development:

The cloud can provide an environment to cut expenses and launch your apps in the market faster. Rather than setting up physical environments developers can use the cloud to set up and dismantle test and development environments. This saves the technical team from securing budgets and spending critical project time and resources. These dev-test environments can also be scaled up or down based on requirements. LoadStorm and BlazeMeter are popular testing tools.

3.9 Big data analytics:

Cloud computing enables data scientists to tap into any organizational data to analyze it for patterns and insights, find correlations make predictions, forecast future crisis and help in data backed decision making. Cloud services make mining massive amounts of data possible by providing higher processing power and sophisticated tools. There are many open

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source big data tools that are based on the cloud for instance Hadoop, Cassandra, HPCC etc. Without the cloud, it won't be very difficult to collect and analyze data in real time, especially for small companies.

3.10 Social Networking:

Social Media is the most popular and often overlooked application of cloud computing. Facebook,LinkedIn, MySpace, Twitter, and many other social networking sites use cloud computing. Social networking sites are designed to find people you already know or would like to know. In course of finding people, we end up sharing a lot of personal information. Of course, if you're sharing information on social media then you are not only sharing it with friends but also with the makers of the platform. This means that the platform will require a powerful hosting solution to manage and store data in real-time - making use of cloud critical.

4. ADVANTAGES OF CLOUD COMPUTING

4.1 Cost Efficient

Cloud computing is probably the most cost-efficient method to use, maintain and upgrade. Traditional desktop software costs companies a lot in terms of finance. Adding up the licensing fees for multiple users can prove to be very expensive for the establishment concerned. The cloud, on the other hand, is available at much cheaper rates and hence, can significantly lower the company's IT expenses. Besides, there are many one-time-payment, pay-as-you-go and other scalable options available, which makes it very reasonable for the company in question.

4.2 Almost Unlimited Storage

Storing information in the cloud gives you almost unlimited storage capacity. Hence, you no more need to worry about running out of storage space or increasing your current storage space availability.

4.3 Backup and Recovery

Since all your data is stored in the cloud, backing it up and restoring the same is relatively much easier than storing the same on a physical device. Furthermore, most cloud service providers are usually competent enough to handle recovery of information.

Hence, this makes the entire process of backup and recovery much simpler than other traditional methods of data storage.

4.4 Automatic Software Integration

In the cloud, software integration is usually something that occurs automatically. This means that you do not need to take additional efforts to customize and integrate your applications as per your preferences. This aspect usually takes care of itself. Not only that, cloud computing allows you to customize your options with great ease. Hence, you can handpick just those services and software applications that you think will best suit your particular enterprise.

4.5 Easy Access to Information

Once you register yourself in the cloud, you can access the information from anywhere, where there is an Internet connection. This convenient feature lets you move beyond time zone and geographic location issues.

4.6 Quick Deployment

Lastly and most importantly, cloud computing gives you the advantage of quick deployment. Once you opt for this method of functioning, your entire system can be fully functional in a matter of a few minutes. Of course, the amount of time taken here will depend on the exact kind of technology that you need for your business.

5. DISADVANTAGES OF CLOUD COMPUTING

5.1 Technical Issues

Though it is true that information and data on the cloud can be accessed anytime and from anywhere at all, there are times when this system can have some serious disfunction. You should be aware of the fact that this technology is always prone to outages and other technical issues. Even the best cloud service providers run into this kind of trouble, in spite of keeping up high standards of maintenance.

Besides, you will need a very good Internet connection to be logged onto the server at all times. You will invariably be stuck in case of network and connectivity problems.

5.2 Security in the Cloud

The other major issue while in the cloud is that of security issues. Before adopting this technology, you should know that you will be surrendering all your company's sensitive information to a third-party cloud service provider. This could potentially put your company to great risk. Hence, you need to make absolutely sure that you choose the most reliable service provider, who will keep your information totally secure.

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5.3 Prone to Attack

Storing information in the cloud could make your company vulnerable to external hack attacks and threats. As you are well aware, nothing on the Internet is completely secure and hence, there is always the lurking possibility of stealth of sensitive data.

6. CLOUD SERVICE MODELS

6.1 SaaS (Software-as-a-Service)/Application-as-a-Service (AaaS)

Application-as-a-Service (AaaS) or SaaS is defined as a software model in which both the application and the relevant data is hosted on a cloud by independent developers, which enables a user to access the software as and when required from any location. Examples include email sites, social media sites, and so on. We would even consider Microsoft Business Productivity Online Suite (BPOS) and Dynamics CRM Online to be some examples of SaaS.

SaaS is a software delivery business model where a provider or third party hosts an application and makes it available to customers on a subscription basis. SaaS customers use the software running on the provider's infrastructure on a pay-as-you-go basis. Customers do not have to commit to any long-term contracts. Depending on the contract, customers can quit using the software at any time. It is important to understand that in SaaS, the underlying infrastructure and the software configuration are invisible to the users. Thus, the users have to settle for the functionality that is provided. In addition, SaaS uses a highly multi-tenant architecture and the user contexts are separated from one another logically at both runtime and rest. Collaboration applications that solve the same problem across many enterprises have been very successful in the SaaS arena. Remember that because the hardware and software configuration is transparent to the end users, there is minimal if any need for professional IT involvement. Some SaaS applications can even be customized by the end users. The point is that SaaS empowers business units to bypass IT procurement processes. Enterprise architecture teams need to realize this aspect and teach these business units about the importance of governance. In addition, the teams should design new governance processes or modify the existing ones to accommodate SaaS.

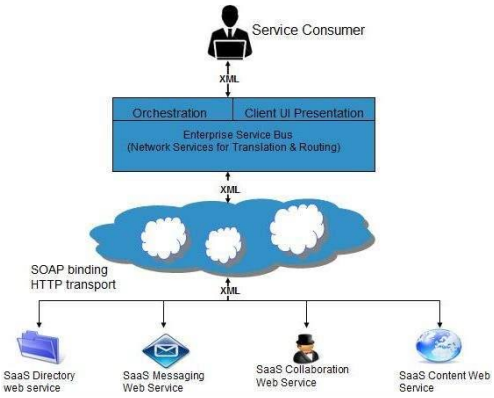

Figure-2: Software-as-a-Service

The following points characterize SaaS/AaaS:

1. The customers rent software that is hosted by the vendor such as Microsoft or Amazon, and so on.
2. An Internet connection is required here.
3. All customers can use the same software version.
4. Global accessibility and easier administration are some of its benefits.
5. Tasks like software deployment, software maintenance (changes), cloud software testing, patching, and so on, are all managed by the provider.
6. In a nutshell, SaaS is what a provider hosts as software (service) that is centrally located and that can be made easily available to customers via the Internet on a pay-per-use basis.
7. Thus, commercial software is accessible through the web.
8. APIs allow for integration between different pieces of software.
9. Security is a serious issue here because all the data is available in the cloud.
10. There is slow switching between different SaaS vendors.
11. Time critical applications, that is, applications that demand response time in milliseconds, are not benefited by SaaS.

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12. Multi-tenancy means sharing of the resources by many users. SaaS has two modes—simple multitenancy and fine-grained multi-tenancy. In the simple multi-tenancy case, every user has their own resources, which are different from other users. On the other hand, in fine-grained multi-tenancy all resources are shared except customer-related data.
13. Web applications like blogs, social networks, web content management, and WIKI services are all applications of SaaS only.
14. Enterprise services like desktop software, workflow management, supply chain management, and CRM are all applications of SaaS only.
15. Clients are very much interested in moving their applications to SaaS platforms because they can reduce their monitoring of many servers.
16. In the SaaS cloud, the vendor supplies the hardware infrastructure, software, and applications. The customer interacts with the application through a portal.
17. Some SaaS providers include MS Live CRM, MS Azure, Google Apps, Trend Micro, Symantec, and Zoho.
18. Cloud applications have a global scope while SaaS has more of a centralized hosting platform.
19. SaaS is like a "thin app" where client machines need only a web browser with some sort of plugin to provide additional functionality.
20. Applications reside on top of the cloud stack. Services are provided by this layer. These services can be accessed by the end users through web portals. Conventional applications like MS Word, MS Excel, and so on, are accessed as a service on the web in real time.
21. Salesforce.com relies on the SaaS model only. It offers business productivity applications that reside fully on their servers. Thus, customers can customize according to their needs in real time.

6.2 PaaS (Platform-as-a-Service)

In this model, the developer creates software using tools and the other utilities of a cloud provider. For example, websites are designed, developed, and hosted on the cloud. PaaS fills the needs of those who want to build and run custom applications as services. These could be ISVs, value-added service providers, or enterprise IT shops. PaaS offers hosted application servers that have near-finite scalability owing to their reliance on large resource pools. PaaS also offers the necessary supporting services such as storage, security, integration, infrastructure, and development tools for a complete platform. A service provider offers a pre-configured, virtualized application server environment to which applications can be deployed by the development staff. Since the service providers manage the hardware (patching, upgrades etc.,) as well as the application server uptime, the involvement of IT professionals is minimized. It is important to understand that PaaS is suitable for brand-new applications, as legacy applications often require extensive refactoring to comply with sandbox rules.

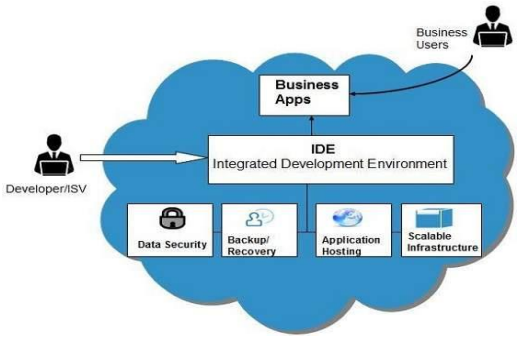

Figure-3: Platform-as-a-Service

The following points characterize PaaS as a service:
1. It provides hardware, OS, storage, and network capacity on a pay-per-use basis via Internet only.
2. It provides services for application development and deployment.
3. It allows users to create web applications rapidly. There is no overhead for the cost and complexity of buying and hardware/software management.
4. It is used to build multi-tenant applications, that is, services that can be accessed by multiple users simultaneously.
5. The applications can be deployed on the cloud using tools and different programming languages supported by a particular provider. The web developer will simply write the code using PaaS services. It is the job of the PaaS provider to upload that code and make it online available through the Internet.
6. There is more security because customer environments are separated from each other.

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7. An Internet connection is required.
8. Google App Engine (GAE), LongJump, Force.com, WaveMaker, MS Azure, and CloudBees are some of the PaaS providers.
9. The main aim of the GAE is to run the user's web application efficiently. It maintains Java-RuntimeEnvironments (JRE) and Python on the application servers. It includes simple APIs to access Google services. Now applications are able to integrate data services and other GAE services like email, image storage, and so on.
10. MS Azure offers a service called SQL Azure that stores data in the cloud.
11. When looking for a PaaS provider, the basic goal should be reduced time-to-market and not cost savings. Other factors like high availability, security, and scalability are also vital for developers and cloud testers.
12. A good PaaS environment should support caching for cloud resources because it increases performance. This functionality needs APIs to put an object or a resource in the cache.
13. The PaaS environment must have a browser-based development studio with an IDE for development, test, and debugging of applications.
14. It must support very secure and on-demand collaboration throughout the SDLC.
15. Hadoop software enables applications to work easily with thousands of nodes and petabytes of data and is based on Java. PaaS must be able to monitor such operations.

6.3 IaaS (Infrastructure-as-a-Service)/HaaS (Hardware-as-a-Service)

IaaS is a model where the cloud provides both hardware and software. IaaS can be compared to the creation of Virtual Machines (VM) on the cloud infrastructure. With VMs one can launch Windows Server, MS SQL Server, Oracle, MangoDB, SharePoint Server, and Linux in minutes and then scale up from one to thousands of VM instances. VMs can be used on-demand to get a scalable compute infrastructure when you need flexible resources. It is also possible to create VMs that run Windows, Linux, and enterprise applications or capture your own images to create custom VMs. IaaS is analogous to traditional hosting where a business will use the hosted environment as a logical extension of the onpremises data center. Note that the servers (physical and virtual) are rented on an as-needed basis and the IT professionals who manage the infrastructure have full control of the software configuration. In addition, some providers may even allow flexibility in the hardware configuration, which makes the service more expensive when compared to an equivalent PaaS offering. The development staff will build, test, and deploy applications with full awareness of the hardware and software configuration of the servers. For instance, customers like Webzeb, Telenor, Avanade, Toyota, and so on, are using VMs over the MS Azure platform.

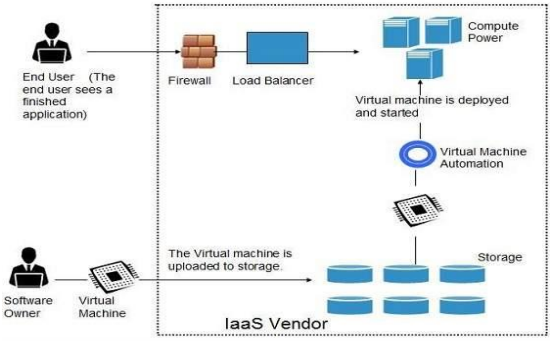

Figure-4: Infrastructure-as-a-Service

The following points characterize Iaas/HaaS:
1. It is a virtual provider of computing resources such as hardware, storage services, devices, networking, operating systems, virtualization technology, and so on.
2. This service provider owns the required equipment and is responsible for configuring, running, and maintaining it.
3. It is defined as a process for making available cloud computing infrastructure resources, that is, servers, storage, network, and operating systems as an on-demand service. Rather than purchasing servers, software, data center space, or network items, clients instead buy those resources as a fully outsourced service on demand.
4. Amazon Web Services (AWS) is an IaaS provider.
5. IaaS can be considered a basic template for other services in the cloud like SaaS and PaaS.
6. IaaS providers will act promptly when there is a need to scale up or down and this is known as autoscaling.

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7. It provides elastic load balancing that auto-distributes the incoming traffic related to an application to different instances of virtual computers. Thus, elasticity is also possible.
8. It is a platform independent service.
9. It charges only for the resources that are used.
10. It also supports a multi-tenant architecture, which represents several users who can work on a single piece of hardware.
11. Scaling of resources can be done as needed.
12. Its scalability is therefore flexible.
13. No need for hardware administration and maintenance.
14. Location independence is another feature because users can access the service from anywhere with an Internet connection.
15. Because cloud hosts are redundant, if one network or server fails then there is no effect on the data centers due to multiple hardware resources. In the worst case scenario, if the entire data center fails, then there would be secondary and tertiary data centers for smooth functioning.
16. Less risk in Return On Investment (ROI).

7. CONCLUSION

Cloud Computing, has now made it effortlessly easy for all to access applications and software from the internet. Earlier the software and applications had to be physically installed but not anymore. With the evolution in technology and the feasibility to access beneficial apps off the internet, businesses are reaping huge benefits from cloud computing.

Cloud computing permits you to access data outside from your computing environment. It offers your business many benefits. Cloud computing gives you the opportunity to set up a virtual office and get connected to your business anywhere. With web-enabled devices like smart phones and tablets that are ultimately provide ease to access youth data. Cloud computing is the most innovative advancement in information technology.

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6th National Conference on Role of Engineers in Nation Building, ISBN: (978-93-5288-028-7) IJARIIT (ISSN: 2454-132X)

EMPLOYEE MANAGEMENT SYSTEM

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Abstract—This report includes a development presentation of an information system for managing the staff data within a small company or organization. The system as such as it has been developed is called Employee Management System..

Keywords—EasyPay,Employee, Super, ESS, Payroll, Attendance, **Biometric, Leaves, Salary**

1. INTRODUCTION

EasyPay is very easy, flexible and user-friendly Payroll Management Software that takes care of all your requirements relating to accounting and management of employees' payroll. This versatile user friendly package offers user defined Earning / Deduction / Loan Heads & Calculation Formulae / Tables. The package generates all outputs & statutory reports required by a Payroll application. Every report gives the user selection of Branch, Department, Grade, Designation etc. and other parameters to generate output as per requirement. Outputs can be on Screen, Printer or in a File Format (Word, Excel, Acrobat) etc.

Fig. 1 Framwork of the Web Payroll system

2. WORKING FUNCTIONALITIES

A. How does it WORK ?

EasyPay takes the employees data either being entered manually in the system or it can directly take the employees attendance data through the linked Biometric System.

It has the feature of uploading the employees data through the excel sheet in bulk at once which makes it easy to input the records of employees whether it is their daily attendance, leaves enjoyed or their personal information.

B. Key Features

- Flexible Structure building capability of Earnings & Deductions
- Leave & Attendance Management
- Loan & Advance Management
- Payroll Processing
- Reimbursement Management
- Salary Reports (Payslip & Salary Sheet)
- Bank Transfer

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- Arrears Calculation
- Income Tax Management
- PF Calculation & Reports
- Full & Final Settlement
- User Defined Reports
- HR Functions
- Employee Self Service Module (ESS)
- Data Import (Masters, Salary & Leave Record)
-

C. **EasyPay Management**

In this there is bifurcation on who can see what !

Managing of Employees in EasyPay is done in two following ways;

- SUPER LOGIN : ITS THE LOGIN AREA FOR THE USER WHO MANAGES THE EMPLOYEES

In Super login,the user of the system has complete control over the modules and its content and the employees information.The Super user can view all the details and modify it.

- ESS LOGIN : ITS THE LOGIN AREA OF THE INDIVIDUAL EMPLOYEE

In the ESS login, the employee can view and manage data related to him/her self only.

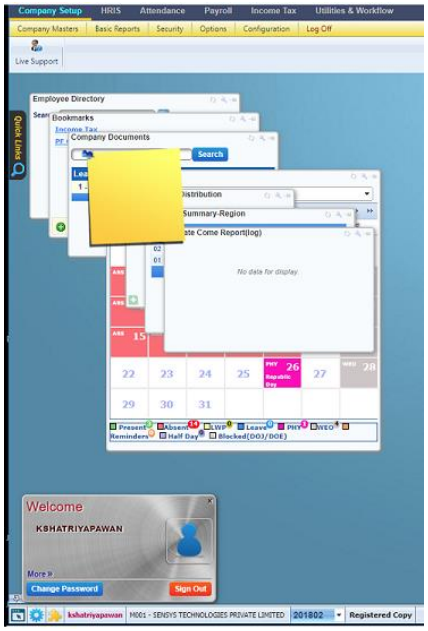

Fig. 2 EasyPay SUPER Login

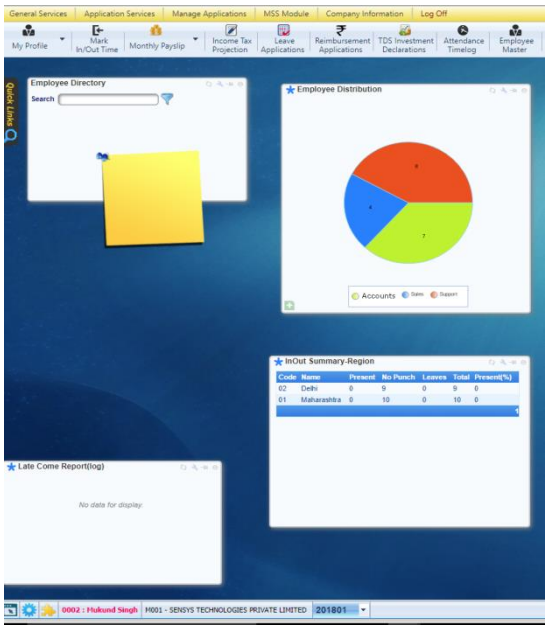

Fig. 3 EasyPay ESS Login

D. **Employee Master data Table**

This is the master table which is on the server & contains all the information on employees.

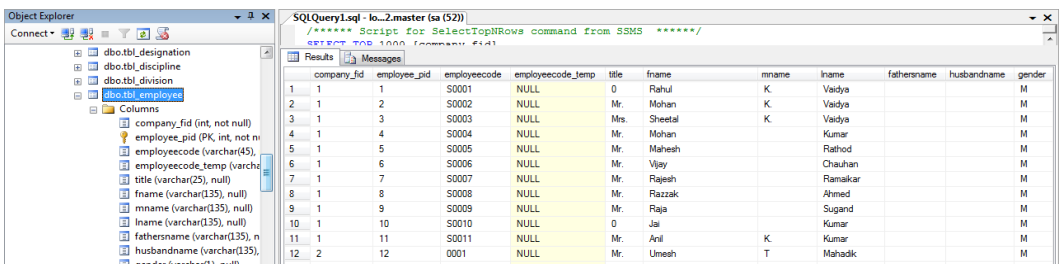

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Fig. 4. Master employees Table

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E. Reference Images of other key modules of EasyPay

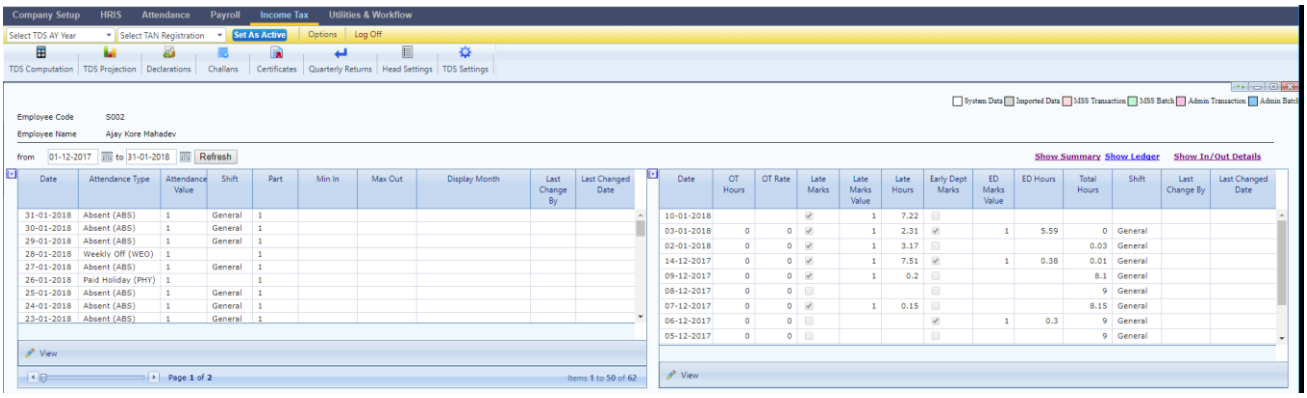

Fig. 5. Employee's Attendance details

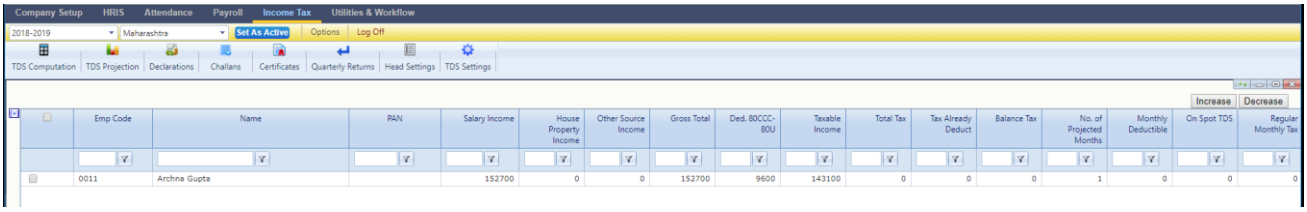

Fig. 6. Income Tax of a particular employee

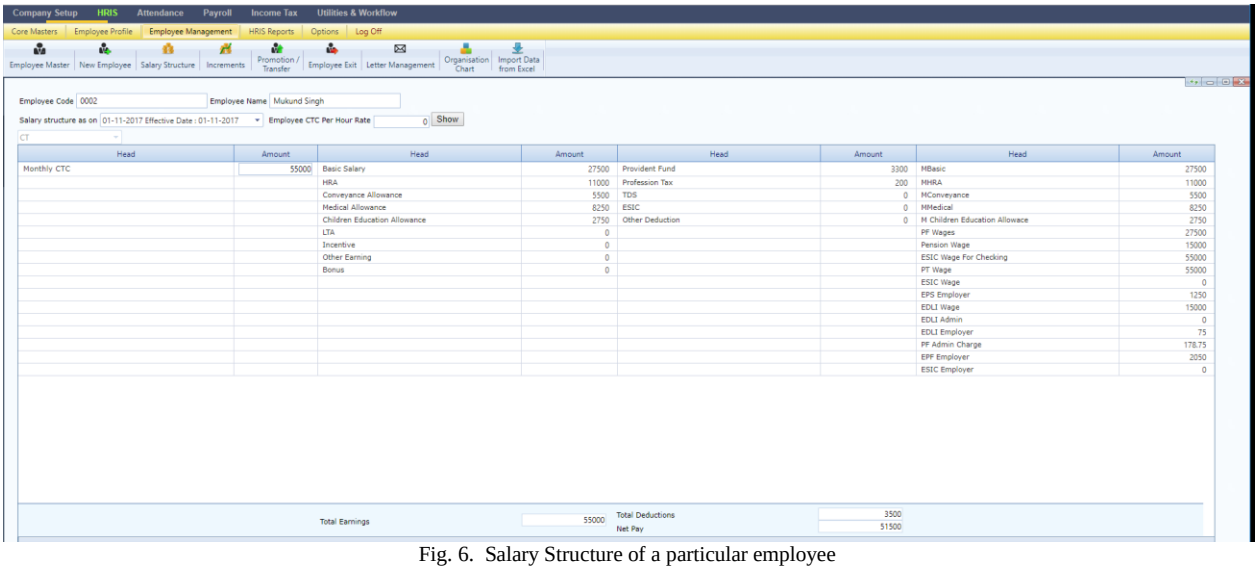

Fig. 6. Salary Structure of a particular employee

3. CONCLUSIONS

Easypay makes the employee management very easy, reliable, secure and handy. It provides ease of accessing and manging the data as it gives the user to access and update the data on the go with their associated login credentials. All the different salary and tax related information.

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4. ACKNOWLEDGMENT

I am grateful to my professors as well as my employer for providing the needfuls and guiding all the way for completing this research paper.

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6th National Conference on Role of Engineers in Nation Building, ISBN: (978-93-5288-028-7) IJARIIT (ISSN: 2454-132X)

MOBILE BANKING AND ITS CHALLENGES

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ABSTRACT

This document gives the brief information about the Mobile Banking. Today the technological revolution has reached at its peak one of the notable sectors of the economy where technology has its attention with respect to customer service is BANKING. Over the years, the banking has been transcended over the years banking from a traditional brick and mortar model of customers queuing for services to the modern day banking where banks can be reached at any point for their services. In today's business, technology has been on the predominant indicators of growth and competitiveness. The Banking Industry today is in the industry of its revolution. Information technology is mainly used in two ways in banking. One is Communication and connectivity and other in business process. Today's banks are using wireless and mobile technology in their work to offer their customers the freedom to pay bill's planning payments any time. To receive updates on the various efforts while present at a party to provide more personal and intimate relationships. The paper gives acceptance of users to a new electronic payment service as mobile banking and the factors affecting the adoption of mobile banking in India.

Keywords — Mobile Banking, Communication and Connectivity, Wireless and Mobile Technology

1. INTRODUCTION

Basically it is a 21st century innovation or we can say it is just an effective way of Banking from a Mobile Device so that without visiting to the bank we can say that the bank has been at home so the banking transactions and payment information can be effectively done by just a single click on your mobile devices. So the New age Technology of Mobile Banking brings us a fine and a user friendly experience of mobile banking. *Mobile banking* typically operates across all major mobile providers in the Country through one of three ways: SMS messaging; mobile web; or applications developed for iPhone, Android or Blackberry devices.

2. WHAT IS IT

The Banking Industry today is in the industry of its revolution. Information technology is mainly used in two ways in banking. One is Communication and connectivity and other in business process. Mobile banking is the new age way banking of customers with the use of mobile banking from anywhere at any time so the physical and mental stress of the user has been reduced by not going to the bank just all the services at the cost of the just a click on the mobile and all information is provided by the users and connectivity with the bank.

A. What actually is mobile banking???

In the real world scenario if you went to a bank to deposit some amount money or carry out a banking transactions like cash deposit it is essential to that particular person to present their and he has wait for his turn and such process is time consuming in that case the digital currency has made its mark and the customer or consumer today can securely do banking transactions and all the other activities at their doorstep and it is very easy to work with the mobile applications that are provided to the user so an efficient way of banking from anywhere an any instance of time so that provides an efficient way of banking and has fulfilled the needs of the user.

B. How it works :-

Mobile banking works on a Mobile Device with the help of a mobile application that works on the Platform for which the particular bank's provided by the bank's management and the contract or the deals that are done with some of the telecomm

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department to full fill their needs and the security for the Banking transactions and thus provide them the needs of the customer requirements and needs according to their use.

C. ***History :-***

When cellphones turned into smartphones , it began easy to use the power of computers, banks have been able to provide consumers with effective mobile banking apps that allow you to complete your banking from wherever you are. This includes making deposits ,depending on the bank and its mobile app -- checking funds, making bill payments, transferring or sending money. Mobile banking is different from the available internet banking on smartphones , as it provides a sign-in link to your individual checking or savings accounts by an app you download from your bank's website. Though some European banks offered mobile banking around year 1999, it took 2007 for major banks in the U.S. to develop mobile banking apps that actually worked and customers liked it.

- **In the Beginning**

Banks facing mobile banking challenges in the early part of the evolution of smartphones until the first smartphone has been availaible in the market the market in 2007. Consumers found it difficult to view their account information on the small phone screens that were common at the time of the 21st century. Some banks offered the mobile banking,service only to discontinue it for lack of interest from users. In 2002, Wells Fargo developed a mobile banking service and only 2,500 customers used it. Because of the poor response, they soon stopped the services.

- **Smartphones Changed Everything**

Once smartphones took over from cellphones, and the size and capabilities of mobile devices increased, so did the effectiveness of mobile banking. Banks introduced mobile banking apps that accommodated more types of cellphones, but smartphone users and advanced apps gave mobile banking the boost that made it a safe and viable choice. Consumers preferred the easier navigation and improved images and graphics offered by these updated, technologically advanced apps.

- **The Revolution**

By 2008, even smaller banks began to offer mobile banking services and apps. By then, larger banks and their customers were using these services regularly. By 2012, more than 21 percent of all smartphone owners were using mobile banking in a report conducted for the Board of Governors for the Federal Reserve -- but 44 percent of that number belongs to the 18-to-29 age group, with the second largest group -- 30 to 44 -- representing 36 percent of those who use mobile banking apps. These numbers are expected to increase as more people rely on smartphones and tablets, and banks continue developing apps for a variety of mobile devices.

Mobile banking, or m-banking, is one of the most promising tools for achieving a cost-effective pathway to digital financial inclusion at scale. Globally, mobile phone use has grown at an explosive pace as people around the world from the top to the bottom of the pyramid have decided that they are affordable and effective tools for communication, security, entertainment, and other uses. The ubiquitous use of mobile phones makes them an effective, cost-efficient and scalable service delivery platform. Many practitioners have recognized and harnessed this potential through a variety of mobile banking tools, allowing previously unreachable clients to make digital payments via their phone, or sending clients SMS payment reminders. Through mobile banking, transactions can be conducted more securely and at lower cost than with traditional platforms. While billions of lowincome people now own and use mobile phones*, they are not yet widely used in the developing world for accessing financial services.

3. CHALLENGES

- **Variety in internet connections and browsers** – A variety of browsers (Firefox, Chrome, IE etc.) using different internet connections like broadband or dial-up are used by variety of users to login from their system . Testing should consider the performance of the page across all connections and prominent browsers to provide an optimal banking experience.
- **Usage paths** – Internet banking is rich in functionality. It can have a huge number of usage paths unlike most other websites. Different users may access different link sequences. Testing should ensure each link connects to the next link simultaneously .

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- **Usability testing** – A bank has a wide range of some people who may lack necessary technical skills or financial awareness required to easily perform their banking tasks. The website should be tested for simple and efficient design to make it usable across various groups of customers.
- **Security testing –** Banking portals, due to their very nature, are prime targets for hacking and fraudulent activities. Using vulnerability scanners and performing penetration testing can reveal propagation of errors and consequent system vulnerabilities. Compliance to international security standards should also be ensured.

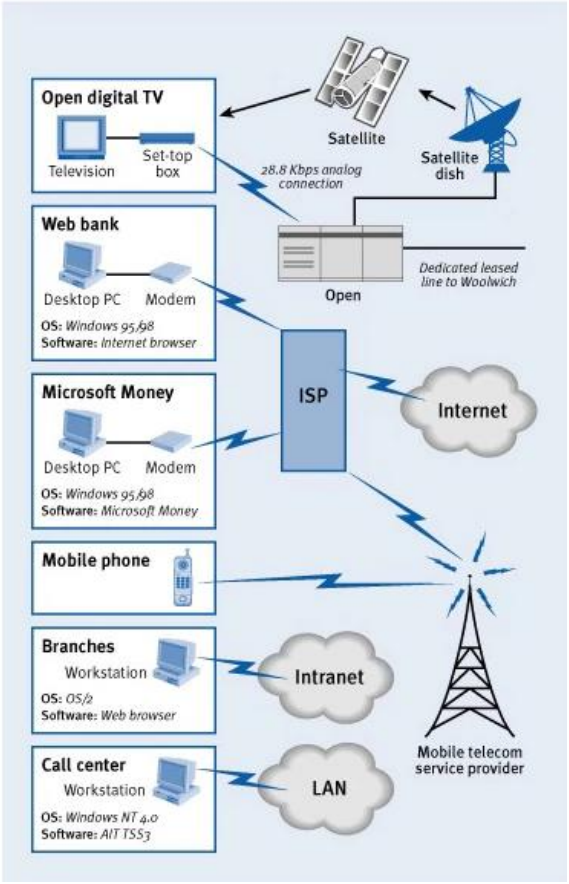

Fig.1 Mobile banking procedure

- **Performance testing –** Certain time periods like payday or festival seasons bring a spike in traffic. Unlike other websites, performance failures in banking portals can have a personal effect on the customers. An example in this case is the Cyber Monday IT failure in RBS and NatWest banks that showed incorrect balances and left customers stranded, unable to pay bills at restaurants or check-out in stores.
- **Broad range of devices –** Mobile testing in any sector is challenging due to the multitude of devices, platforms and networks a tester needs to consider. Often automation is not well-planned. Adequate attention needs to be given to ensure the app provides an optimal user experience across devices and networks.
- **Configuration and design vulnerabilities** – In a test survey of 275 apple iOS and Android banking apps, 8 out of 10 apps were found to be in deviation of best practices of software development and were also improperly configured. Testing should uncover such deficiencies so that customer accounts are not compromised.
- **Security Testing** – The variation in OS and networks across mobile devices makes security testing challenging. Banking apps are sensitive due to the nature of data. Testing should ensure it adheres to security standards across platforms, networks and OS.
- **Time to Market –** Banks are frequently in a rush to attract customers with new features. Rush to market causes testing teams to cut short on testing. This can have serious consequences on safety of accounts, not to mention the loss of credibility and customer trust.

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A. ***Advantages :-***

- Mobile Banking uses the network of service provider and it doesn't need internet connection.In a developing countries like India where there is no internet connection in the interiors there is the presence of mobile connectivity.
- Mobile Banking is available round the clock 24/7/365 and is easy and Convenient mode for many Mobile users in the rural areas.
- Mobile Banking is said to be more secured and risk free than online/internet Banking.
- With the help of Mobile Banking you can pay you bills,transfer funds,check account balance,review your recent transaction,block your ATM card etc.

B. ***Disadvantages :-***

- Though the security threat is less than Internet Banking, Mobile Banking has to security issues. One of the great threat to Mobile Banking is "Smishing" which is similar to "phishing"..In "Smishing" users receives fake message asking for their Bank details.Many users have fallen to this trap.
- Mobile Banking is not available on all mobile phone.Some time it requires you to install apps on your phone to use the Mobile Banking feature which is available on high end smartphone.If you don't have a smartphone than the use of Mobile Banking becomes limited. Transaction like transfer of funds are only available on high end phones.
- Regular use of Mobile Banking may lead to extra charges levied by the bank for providing the services.
- Mobile phones are limited in processing speeds,screen size and battery life.This act as a barrier in Mobile Banking.
- Like all other technology Mobile Banking has got it advantage and disadvantage and its up to you how you use the technology.But their is no doubt that Mobile Banking is the future of banking.

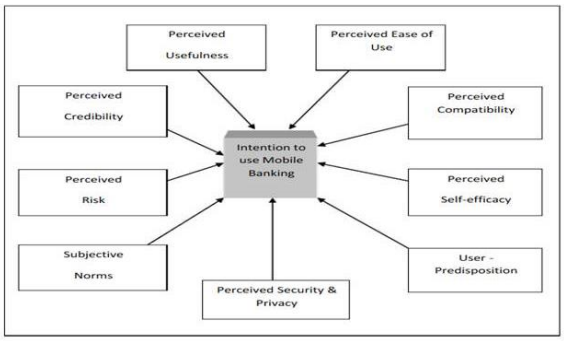

Fig.1 Flow chart for Mobile banking procedure

4. CONCLUSIONS

It is well recognized that mobile phones have immense potential of conducting financial transactions thus leading the financial growth with lot of convenience and much reduced cost. For inclusive growth, the benefits of mobile banking should reach to the common man at the remotest locations in the country. For this all stakeholders like Regulators, Govt, telecom service providers and mobile device manufactures need to make efforts so that penetration of mobile banking reaches from high-end to low-end users and from metros to the middle towns and rural areas. Inclusion of non-banking population in financial main stream will benefit all. There is also need to generate awareness about the mobile banking so that more and more people use it for their benefit.

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AD SERVING

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ABSTRACT

Ad serving refers to the technology and service that provides functionality to place advertisements on Web sites. Ad serving technology providers provide software to the Web sites and advertisers to serve ads, count them, and choose the ads that will make the Web site or advertiser the most money, monitor progress of different advertisement campaigns and reporting. Ad servers can be categorized into two types—publisher ad servers and advertiser (or third party) ad servers. An ad server is, simply put, a platform that serves ads. But whether it is in-house or managed by an agency, the full truth is a bit more complex than that…

Keywords:–*Ad serving, ad server, performance, display advertising, publisher ad server, advertiser ad server.*

1. INTRODUCTION

Ad serving is the process of delivering ads to viewers with the help of ad server. An ad server is a web-based technology which is basically a platform that allows you perform tasks related to online advertising program in an easy and efficient way. Ad serving is a technology that uses software to place ads on various websites. An ad-serving engine is the core element of every ad server. It makes use of complex algorithms and advanced decision-making tools to select the most relevant ads to display. These are the rules that are defined by publishers, advertisers and by the ad server itself. These rules include settings like targeting criteria, the frequency of ad viewing, ad priority, ad placement, ad formatting, earning potential and more. Apart from the above mentioned tasks, ad servers also provide functionality for ad tracking, ad management, ad reporting and ad billing or accounting.

2. WHAT IS AD SERVER?

An ad server is a web-based technology that stores, maintains and serves advertisements to website visitors when a page is loaded. They are dedicated computer servers (particularly web based) responsible for hosting, optimizing and distributing advertising content across various websites, social media platforms and mobile apps. You can think of an ad server as a large container for raw creative graphics. Every time a user visits a web page or app, a specific ad creative is fetched and served in the advertising slot. An ad server tool is used by publishers, networks and advertisers to help with ad serving, ad management, campaign management, ad trafficking and billing. It also provides reporting on ads served on the website. Ad servers are special-purpose web servers; like other web servers, they use HTTP (Hypertext Transfer Protocol) to serve the related files in response to user requests, which are forwarded by their computers' HTTP clients. When a user requests a web page by typing a URL (uniform resource locator) or site name into their browser's address bar, the browser creates a connection to the site publisher's content server. When the content server returns the code for the page, at least one line includes the option to display an ad, along with the URL for retrieval of the specific ad content. In addition to delivering advertising content, ad servers perform a variety of other tasks. Depending on the particular product or service, an ad server may also track ad views, impressions and clicks and target ads based on pre-defined criteria. Some also monitor for indications of click fraud and other types of ad fraud to ensure that the advertiser's content is actually being viewed by the appropriate audience. An ad server can be of two types depending on whether they run locally or remotely.

1) *Local ad servers:* Local ad servers are those servers that run directly through an affiliate marketing merchant and publisher, who is the advertiser at the same time. The publisher has full control over the created advertising campaigns.
2) *Remote ad servers:* Remote ad servers allows you to display the ads with publishers on several websites. The campaigns are managed through a central servers so that advertisers and publishers can track the distribution of their online ads.

3. COMPONENTS OF AD SERVING TECHNOLOGY PLATFORM

An ad serving technology platform consists of various components, some of these components are given below:

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A. Ad Serving

An ad serving engine is the core element of an ad server. It makes use of complex rules and algorithms to select the most relevant ad to display to each viewer. The ad selection process must follow the rules and regulations, as defined and applied by the publisher, the advertiser or by the ad server itself. These rules include the viewer targeting criteria, viewing frequency ad priority, earning potential and other settings.

B. Ad Tracking

Before, after and during an ad is served to the viewer, the ad server records different ad metrics and events such as impressions, clicks, and conversions for processing and analysis. An Ad Tracker is a program which tells a webmaster where the visitors on his website come from for location based targeting. If he has several links out there in the web in ads, banners, text links etc. he needs to know which one is successful in terms of generating visitors and which one is not.

C. Ad Management

Ad management is not just about adverts. An ad is just only one entity type. There are many other entities related to ads that need to be managed on the same platform such as zones, groups, channels, websites, and site partners. Ad management enables you to control different entities present within your account. Setting up a simple ad may need only one or two modules while ad for complex organization might require all the basic modules plus customized ones.

D. Ad Reporting

The ad reporting system allows you to report numbers and metrics in multiple ways using tables, grids, charts and other visual elements with the help of ad tracking databases. These reports may include impressions, clicks, click-through rates (CTRs), revenue/expense, conversions, and events etc. These reports can also be sent to external users.

E. Ad Billing/Accounting

The ad server also provides the means to generate invoices and payment reports to be sent to all the relevant parties and can also handle revenue and payment details. Ad billing is used by the publisher to create and send invoices to the advertiser. The advertiser uses the tool to review the ad performance reports and pays the invoices.

4. HOW DOES AD SERVING WORK?

The working of ad serving technology is a bit complex and involves many steps:

Step1: When a user visits a website or app, an IP connection between the user's computer and the publisher's web server is established. The website begins to load. At the same time, ad tags on the site load, too, and call the sell-side ad server.

Step 2: When the publisher's ad server receives the ad request, it immediately analyzes data about the user, such as geolocation, language, time of day, online behavior and demographic attributes (age, gender, marital status, employment, etc.).

Step 3: Then, the ad server sends requests to ad exchanges, where buyers bid on it if they are interested in the ad space and find the user relevant.

Step 4: Ad servers also check how many time the potential ad was shown to this particular user in the past, called frequency capping. If the ad was shown too often, it is rejected.

Step 5: A publisher's ad server processes millions of buyer requests and chooses the best paying ad in milliseconds. Then it redirects the browser to the marketer's ad server and fetches the ad creative from the content delivery network (CDN).

Step 6: Finally, the ad is retrieved and successfully downloaded on the web page. This counts as an impression. Regardless of the number of calls the user's browser makes, the whole process of ad serving, ad selecting and ad placing must not take longer than a second.

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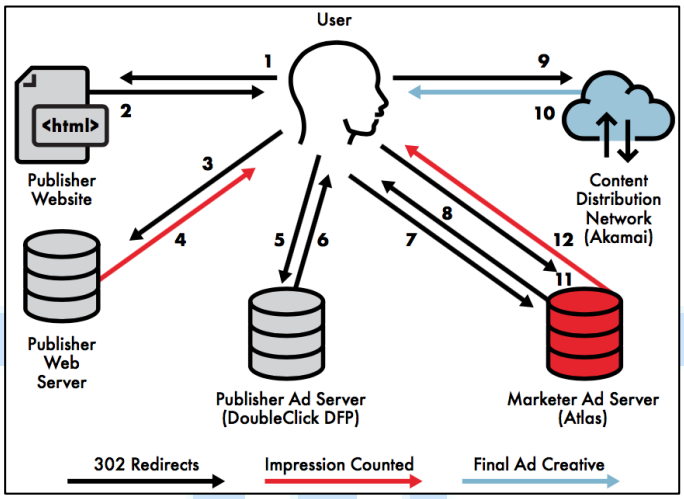

Fig 1: Detailed operation of Ad Server

5. PUBLISHER AD SERVER

Publisher ad servers allow media sellers to increase the value of every clicks and impressions and maximize yield by serving the highest paying ads to viewers across their own media domain. Ad servers help find optimal viewers for every impressions, control how viewers react to the ad (whether they click on it or not), calculate how many times the ad was displayed and monitor overall performance. Having separate ad servers to communicate advertising material across their domains enables convenience for the publisher, as they will have access only to the advertising content they require for their publication rather than sort through an ad server containing all the advertising content in which Marketers/Advertisers are using. The ad serving interface allows digital media sellers to add new buyers to their contact lists and provide functionality for editing, managing and deleting partners. Publishers can also obtain reports about ad creatives to help optimize their ad space on time.

6. ADVERTISER AD SERVER

Advertiser ad servers are also called as third-party ad servers. They help save advertisers time and money with the right tools. Advertisers and marketers use a centralized ad server that allows them to create reports about the demand and help them update their creative content in one place, rather than using individual publisher ad servers which allow them to manage content across multiple servers with different publishers. Ad servers also provide advertisers with reports on the performance of their ads, revenues and ad spending, ad priority, ad optimization etc. Some ad servers are developed in such a way that they can be integrated with media buyers' logic. They help achieve maximum profits for minimum costs and centralize the ad buying process across a variety of publishers. Ad servers also allow advertisers to track metrics using reports which include impressions, clicks, click-through rates (CTRs), revenue/expense, conversions, and events.

7. HOSTED VS SELF HOSTED AD SERVER

A. ***Hosted Ad Server Pros***

1) *No Installation*: Nothing to install. You just sign up for service and everything is already installed for you.
2) *Updates:* All updates to the platform are installed for you.
3) *Support:* In general support is of a higher quality with hosted platforms and is more readily available.
4) *Speed and Reliability:* Most hosted platforms are monitored for problems on a continuous basis. So speed issues and problems are solved quickly. Usually, before you are even aware of them.

B. ***Hosted Ad Server Cons***

1) *Price:* The cost of a hosted ad server is higher than self-hosted.
2) *Customization:* Most hosted ad servers can't be customized. Modifying a hosted script to meet users' needs is quite complex and has limitations.
3) *Data Control:* Your data is stored on the hosted ad server and is not 100% under your control.

C. ***Self-Hosted Ad Server Pros***

1) *Price:* The price of a self-hosted ad server script is a one-time fee. Your only ongoing cost is that of the server you are running it on.

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2) *Customization:* You can modify or hire a programmer to modify a self-hosted script to meet your exact needs.
3) *Data Control:* Your data is on your server and under your control.

D. ***Self-Hosted Ad Server Cons***

1) *Installation:* You need to install the ad server script on your server. This takes a little technical knowledge.
2) *Updates:* You have to watch for updates and install them yourself.
3) *Technical Issues:* If a technical issue with the script or server arises, you have to fix it yourself.

8. FEATURES OF AD SERVER

We should choose the ad servers on the basis of following features:

1) *Ad creative upload:* Supports all standard creative sizes and formats, such as text, image, video, animation, audio, games, interactive, native, rich media, in-app, mobile and others.
2) *Automatic optimization:* Chooses the best performing ads and relevant ads and serves more of those to the viewers.
3) *Delivery speed:* Determines how often impressions are delivered (evenly or as fast as possible).
4) *Location-based targeting:* Targets by country, state, province, metro area, city, zip code, language.
5) Technical targeting: Delivers ads to web, mobile, tablet or TV screens and offers various operating system and cross-device targeting.
6) *Time targeting:* Schedules ads to a specific time of the day when users are most active.
7) *Socio-demographic targeting:* Focuses on age, language, gender, nationality, income, employment status, etc. to choose the most relevant ads to serve.
8) Behavioral targeting: Targets consumers by their online behavior, search history and interests.
9) *SEO optimization:* Allows bidding on keywords and ensures ads appear on search engine results pages.
10) *Ad tracking:* Monitors whether the creative content is generating desired results and the proper traffic of ads happens and guarantees the advertising content is shown in front of intended audiences in the correct time and place.
11) *Reporting:* Offers real-time, dashboard, notification alert, custom reports and provides granular reports on clicks, impressions, costs, ROI and eCPI.

9. CONCLUSION

To summarize, an ad server helps you manage the entire scope of your digital marketing efforts in one place: from media planning, ad trafficking and targeting, to serving, optimization, verification and reporting. It will give you the ability to serve your ads to only those most likely to be open to your message and at the end of the day, avoid wasting of your next marketing dollar.

10. ACKNOWLEDGEMENTS

I would like to express my deep and sincere gratitude to our HOD, Prof. Chandani Patel, for giving me the opportunity to do research and providing invaluable guidance throughout this research. I thank the management of Viva School of MCA for their support to do this work. Finally, my thanks go to all the people who have supported me to complete the research work directly or indirectly.

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SECTION C

VHDL implementation of autocorrelation and cross correlation using Vedic Multiplier

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Abstract

The correlation of two finite length sequences is the basic operations in the area of digital signal processing. It requires repetitive multiplications to find intermediate partial products. This paper presents novel method of implementation of correlation in hardware which uses Vedic multiplier for partial product calculation. The Vedic multiplier has improved area and power requirements compared to conventional multipliers like array and Booth's multiplier.[1] The novel method of integrating the advantages of vedic multiplier with correlation operation is presented in this paper which optimizes the overall performance of the implementation. The correlation is performed on finite length sequences which comprise of signed numbers. The implementation is performed using VHDL language in XILINX 13.1 software. ISIM simulator is used for testing of the proposed algorithm. The proposed algorithm is implemented on reconFigurable FPGA SPARTAN-3E starter board and synthesized using XILINX software. The implementation has delay of 24ns which is 16% lesser than Booth multiplier. The area requirements of the proposed implementations are reduced considerably when compared to implementation of correlation using conventional multipliers.

Keywords— *autocorelation;crosssorelaton;Vedic Multiplier;VHDL,FPGA,XILINX*

1. INTRODUCTION

The use of Digital Signal Processors has increased drastically in past few decades. The applications of DSP include operations like linear convolution, circular convolution, auto correlation and cross correlation etc. All these operations needs fast multiplication algorithms because they involve large number of multiplications. When these algorithms are implemented in hardware they require more area and more path delay using conventional multipliers.

This paper throws light on an efficient hardware implementation technique of correlation operation in which conventional multipliers are replaced by Vedic multiplier. The results of implementation gives improved performance over conventional ones.

The Vedic multiplier is a multiplying algorithm developed based on the sutras from Ancient Vedic Mathematics. The Vedic multiplier works on URDHVA TIRYAGBHYAM sutra which means vertically and crosswise.

The organization of the paper is as follows: section I contains introduction to Vedic mathematics and URDHWA TIRYAGBHYAM sutra. In section II, implementation of Vedic multiplier is presented. Section III throws light on method of calculating correlation of finite length sequence. In section IV design and implementation of proposed algorithm is presented. In section V testing and results of proposed method is presented. Finally conclusion is obtained.

2. VEDIC MATHEMATICS AND URDHWA TIRYAGBHYAM SUTRA

1.1 Vedic Mathematics

Vedic mathematics is an ancient Indian science of mathematics described in Vedas. Vedic mathematics contains 16 sutras in which fast methods for calculating basic operations like multiplication,division are explained. These 16 sutras cover the complete mathematics branches like algebra,geometry,calculus,statistics etc. This Vedic mathematics sutras were rediscovered by Swami Swami Bharati Krishna Tirthaji Maharaj. Swamiji have explained each and every sutra in detail with examples in his book Vedic Mathematics.[2]

1.2 URDHWA TIRYAGBHYAM sutra

URDHWA TIRYAGBHYAM sutra is ne of the 16 sutras given in Vedic Mathematics. This sutra is used for fast multiplications because it requires less number f steps to calculate product compared to conventional shift and add method. The sutra uses crosswise and vertical multiplications and additions. The sutra can be explained with the following example: consider multiplication of 100 X 101

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Conventional method: 1 0 0

		X	1	0	1
			1	0	0
+		0	0	0	-
+	1	0	0	-	-
	1	0	1	0	0

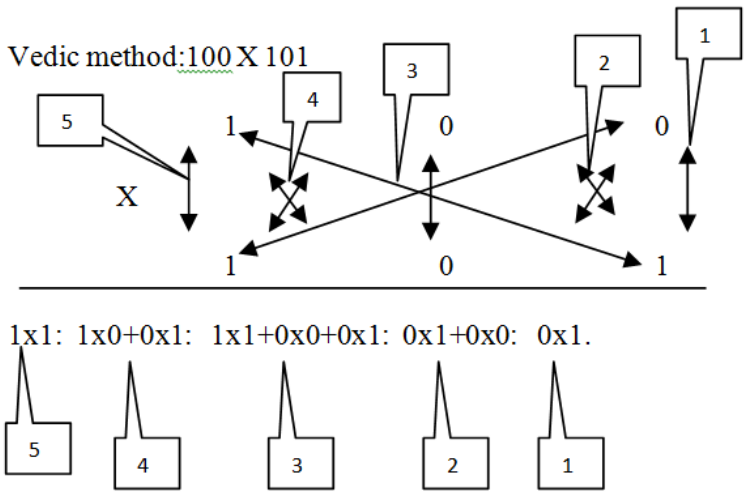

Fig-1 Vedic multiplication using URDHWA TIRYAGBHYAM sutra

The Figure explains the steps for multiplication using Vedic method. It can be seen from the Figure that Vedic method requires 9 multiplications and 4 additions where conventional method requires 9 multiplications and 9 additions for the 3 digit multiplier. This example itself is sufficient to prove the faster multiplication approach of Vedic method. As the number of digits increases, Vedic method becomes more and more desirable because of its reduced calculations. Thus, if the Vedic multiplier is used in devices where repetitive multiplications are involved, the performance of the system will definitely be affected in a positive way. This paper attempts to present the implementation of correlation algorithm using Vedic Multiplier on the same logical base.

3. AUTOCORRELATION AND CROSSCORRELATION

CROSS-CORRELATION OF X(N) AND Y(N) IS A SEQUENCE, $R_{XY}(L)$ WHERE,

$$r_{xy}(l) = \sum_{n=-\infty}^{\infty} x(n)\,y(n-l) \qquad l = 0, \pm 1, \pm 2, \ldots$$

$$r_{xy}(l) = \sum_{n=-\infty}^{\infty} x(n-l)\,y(n) \qquad l = 0, \pm 1, \pm 2, \ldots$$

AUTOCORRELATION OF THE SEQUENCE IS CORRELATION OF FUNCTION WITH ITSELF. CONSIDER TWO SEQUENCES X(N)={1,2,3,4} AND Y(N)={5,6,7,0} THE CROSS CORRELATION IS $R_{XY}(L)$ IS DEFINED AS

$$r_{xy}(l) = \sum_{n=-\infty}^{\infty} x(n)\,y(n-l)$$

THE TABULAR METHOD OF CALCULATING CROSS CORRELATION IS

TABLE-1

	0	7	6	5
1	0	7	6	5
2	0	14	12	10
3	0	21	18	15
4	0	28	24	20

Thus the output of cross correlation is

rxy(l)={ 0,7,20,38,56,39,20}

similarly, x(n)={1,2,3,4} the autocorrelation is given by

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	4	3	2	1
1	4	3	2	1
2	8	6	4	2
3	12	9	6	3
4	16	12	8	4

rxx(l)={4,11,20,30,20,11,4}

The MATLAB software has readymade functions available to calculate cross correlation of two sequences. Using xcorr(x,h) function we can calculate and plot the correlated output of the given sequences. Thus the implemented output can also be verified using xcorr function in MATLAB.

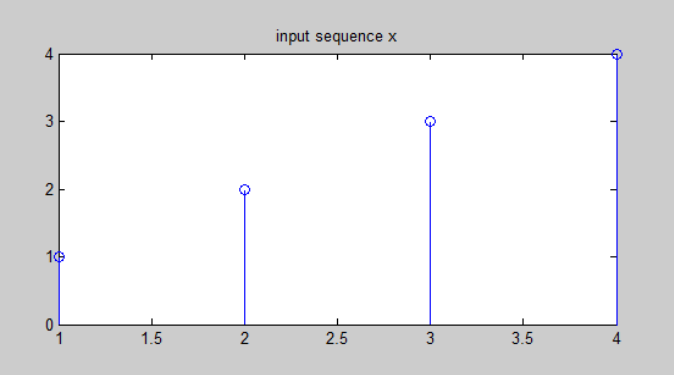

Fig. 1 Plot of sequence x

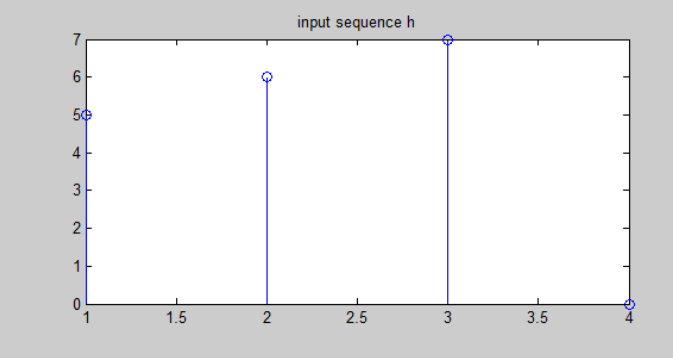

Fig. 3 Plot of sequence h

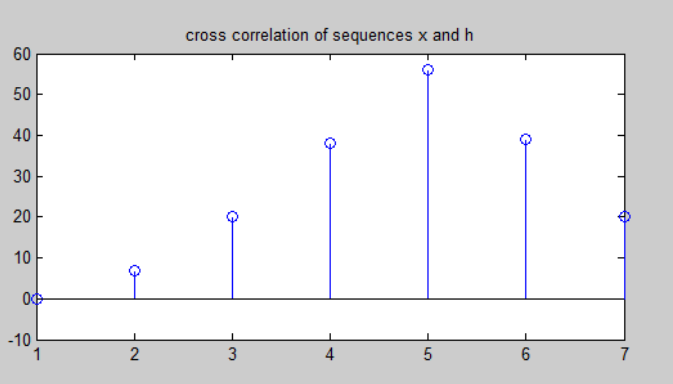

Fig. 4 Plot of output y

4. DESIGN AND IMPLEMENTATION OF PORPOSED ALGORITHM

The correlation algorithm is coded in VHDL language using XILINX 13.1 software. For hardware implementation and testing ease this algorithm represents every sample in a sequence is represented by 4 bit signed binary equivalent. The size of each sequence is fixed to 4 i.e. every sequence contains 4 samples. These constraints can be modified by slight changes in the code. Thus the entity will have two bit vectors x and h with bit width of 16. Output will have 7 samples and each sample will have 8 bits so the output bit vector y will be 56 bit wide.

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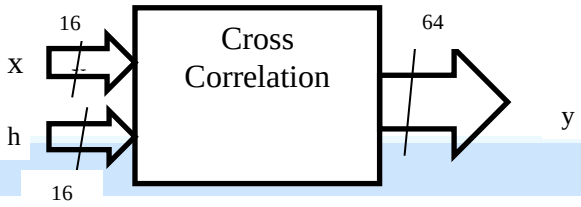

Fig. 5 VHDL entity for cross correlation

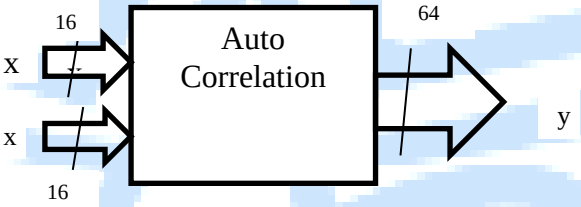

Fig.6 VHDL entity for auto correlation

Consider example of cross correlation of two finite length sequences where x={1,2,3,4} and h={5,6,7,0}

For hardware implementation, the representation of x and h will be:

x=0001 0010 0011 0100

h=0101 0110 0111 0000

the correlation output is

y={0,0,7,20,38,56,39,20}

The hardware entity output will be

y=00000000 00000000 00000111 00010100 00111000 00100111 0010100

The testing of the proposed algorithm is done using ISIM simulator.

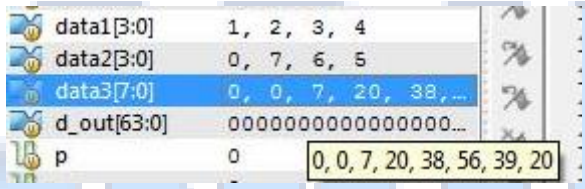

Fig. 7 Array representation of x,h,y in ISIM simulator for cross correlation

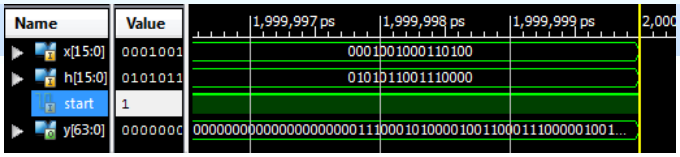

Fig. 8 Output waveforms in ISIM simulator for cross correlation

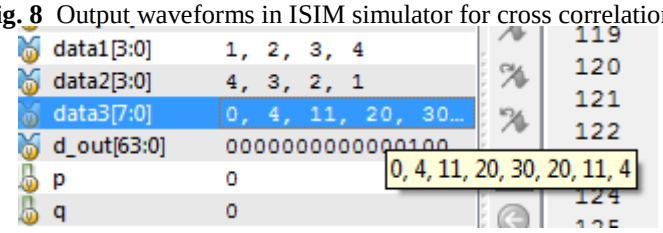

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Fig. 9 Array representation of x and y in ISIM simulator for auto correlation

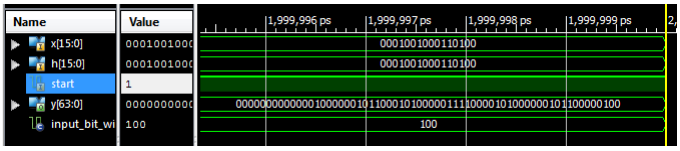

Fig. 10 Output waveforms in ISIM simulator for auto correlation

5. RESULTS

The proposed algorithm is synthesized using XILINX 13.1 software and it is compared with cross correlation using array multiplier, cross correlation using Booth Multiplier. The results shows that cross correlation using Vedic multiplier proves to be efficient in terms of area when compared to Array and Booth multiplier. It also has 85% less delay compared to Booth's multiplier.

TABLE I

COMPARATIVE ANALYSIS

Parameters	**Correlation**		
Device utilization summary: Selected Device : 3s500efg320-4	***Using Vedic multiplier***	***Using Array multiplier***	***Using Booth's multiplier***
Number of Slices:	374 out of 4656 8%	510 out of 4656 10%	576 out of 4656 12%
Number of 4 input LUTs:	680 out of 9312 7%	903 out of 9312	1021 out of 9312 10%
Default OFFSET	23.849ns	21.270ns	28.338ns
Levels of Logic	21	18	23
Total memory usage	188140 kilobytes	182828 kilobytes	186028 kilobytes

6. CONCLUSION

The method proposed in this paper is an attempt to integrate Vedic Multiplier with cross correlation and auto correlation algorithm in hardware using VHDL language. The coding of algorithm is done using XILINX 13.1 software and is implemented on SPARTAN-3E FPGA starter board. The code is synthesized using XILINX software. Results of synthesis show that using Vedic multiplier for cross correlation reduces 54% area requirements and increases speed of the implementation by 16% when compared to that of Booth's implementation.

The reconFigurable nature of FPGA makes it modular and scalable by changing the input and output bit width depending on the length of the discrete sequences.

7. ACKNOWLEDGMENT

Authors thank staff of Electronics department K.J Somaiya College of engineering, Vidyavihar, Mumbai for their support and Viva Institute of technology, Virar (E) for availing the latest software.

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Delta Bot Using Smoothie Board

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ABSTRACT

Delta-Bot is a tool which allows us to build accurate 3-D models of real object. Here Smoothie board is the controlling unit of our project. Any object can be printed if we have the 3-D design of that particular object. 3-D printers can be used in many industries and have many applications. This project aims to create a printer that prints accurately and with effective speed using Delta robotic design, its working technologies, and the possibility of taking the concept further. It will help it creating a better 3-D model printer.

Keywords:-*Delta design, Backlash errors, Ball screw, Digital 3D design through Software or Scanner, accuracy, better prototyping.*

1. INTRODUCTION

A delta-bot can print accurately according to a given design. Any shapes can be printed depending upon the requirement. Accurate printing reduces the printing post work.3d printer reduces the use of dyes which saves the product manufacture cost.the crucial step is finding the right printer for our desired task. Our project "Delta-Bot Using Smoothie Board" lowers the cost of manufacture of spare parts and also its basic design can be used to pick and drop objects. This technology can be used in medical industry for making 3d implants. Aerospace and aviation sectors use 3d printed metallic structures. Automation requires precise movements which can be achieved by this technology.

1.1. Type of 3D Printing

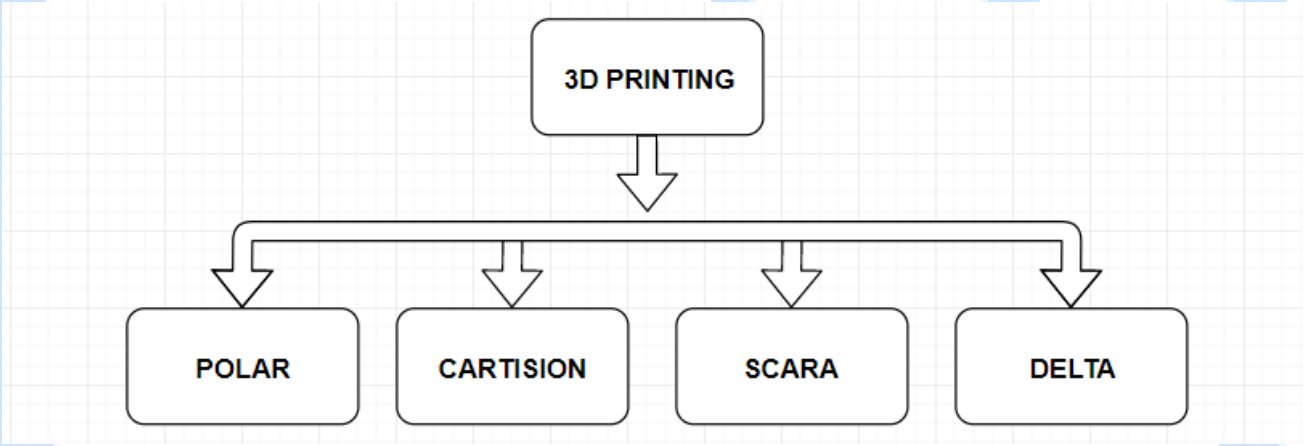

fig. 1:Types of 3D printing technologies

1.2. History

In the past few years 3D printing technology has been revolutionizing the way we produce entire physical objects and parts. Large numbers of items are produced by using 3D printing technology, and it continues to get more ambitious. In the recent times anything can be 3D printed from simple toys to clothing to tools. We can also use the technology to produce musical instruments and even human body parts. And it has endless potential.

This technology became popular back in the late 1980s. Its initial popularity was among industries. It was in their favorite list because it provided rapid prototyping and also low cost in prototype building. It was effective fast and also gave good performance.

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As a technology grows old it has to go through many stages similarly 3D printing has to go through its life stages.

1. The Initial Stage: 1980 to 1999
2. The Adolescence Stage: 2000 to 2010
3. The Adult Stage: 2011 to the present

Some people say that 3D printing is in its golden era others argue that it has a still long way to go. The latter group's thought might be right. With the progress in technology new features will keep on adding. Thus one can say that better ways of 3D printing will be coming soon.

2. REVIEW

The idea is to create a CNC machine that using a firmware and a GUI that can control and monitor the whole system[1].Delta robot is one of the most used technology in industries[2]. This study develops a novel command generation paradigm for desktop fused filament fabrication 3D printers. In the conventional approach, designed artifact in CAD software is saved as an STL file, which is still a de-facto file standard in the field, and then imported into the CAM software of the corresponding 3D printer[6]. In this paper, we intend to address the issue for Fused Deposition Modelling (FDM) process - one of mostly adopted AM technologies. Based on the FDM mechanism, it is attributed that the dimensional inaccuracy to two significant error sources that affect the shape of the product consecutively[8]This article describes about a 3D printer that provides quality in the printed product. In addition repetier is used as a GUI [9]. A linear PID is used with feedback loop to control the temperature and maintain it to a desired level[10].

3. PROJECT THEORY

3D printing is a process of making 3D objects with a digital 3D design generated through software. The printing material is added layer by layer to get the required object. Deposition coordinates of the printing material should be precise also the quantity of material deposited is important for accuracy. These layers can be seen if the printed object is held close or through magnifying glass.3D printing is an additive process so very less material comes out as waste than that in subtractive process which includes drilling a hole in an object, cutting out the required amount from big metal sheet.

Initially a 3D model is created in a computer. A 3D model can be created with the help of a 3D modeling software or by scanning it using a 3D scanner. A 3D scanner can give a good quality of details of any scanned object.

Backlash error is the movement caused by loose connections between gears or threads of screw or timing belt of a 3D printer. It creates an unstable printing environment which leads to objects being printed inaccurately. Sometimes Backlash can cause less movement than the required one. It can be prevented with proper choice of hardware and proper maintenance of the 3D printer.

One can achieve zero backlashes just by calculating and making proper adjustments. A 3d printer does not have much load so moving weight (extruder) is the crucial aspect. Selecting motor as per calculation of weight is necessary. Lead screws are generally are not a good choice when you are looking for high accelerations using less power. Timing belt is a better choice but still motor's minute steps can get missed due to problem in gear ratio. Ball screw provides least backlash errors as there is no space between the ball nut and the screw. The least error can be of 0.0000006 mm which makes it a best choice. It can provide more acceleration using less power because there gap between nut and screw is filled with bearings. This also reduces coefficient of friction which adds up into an advantage.

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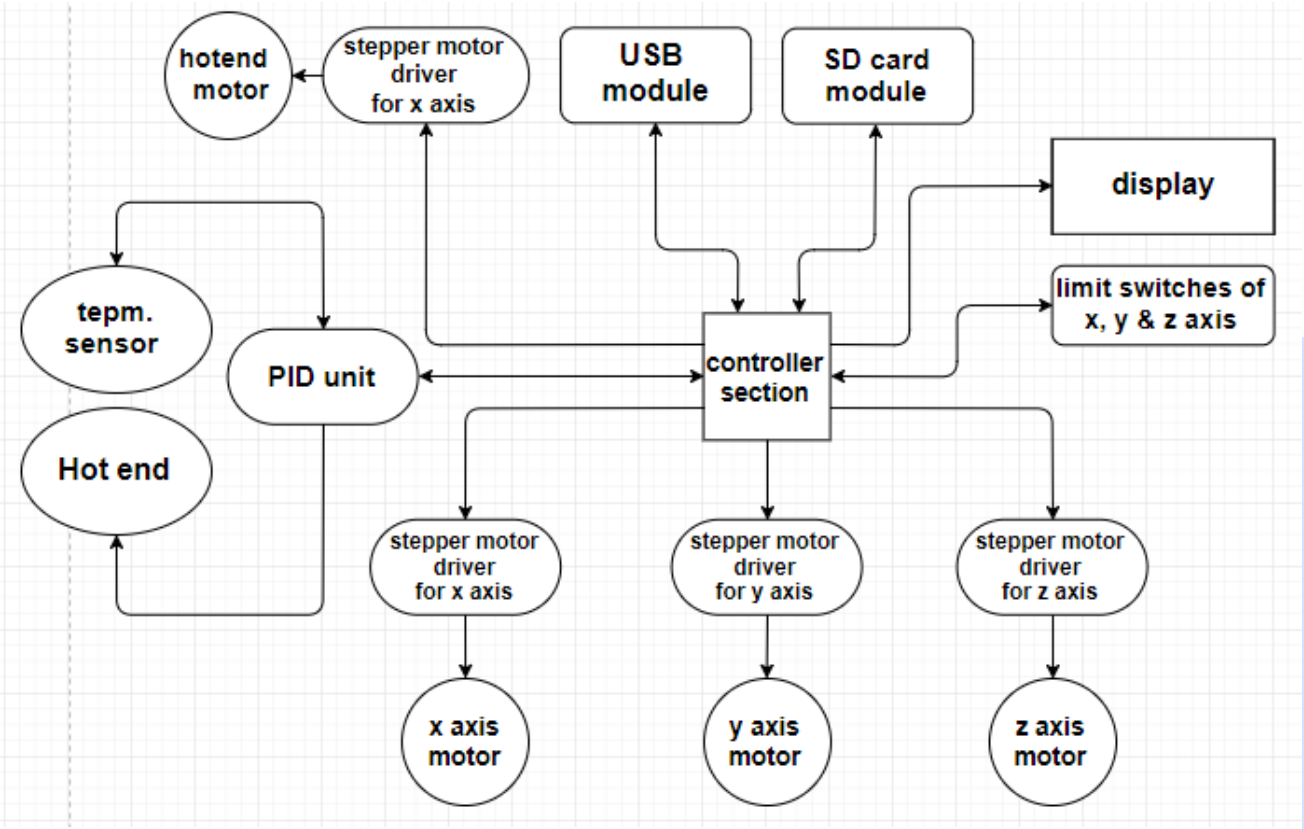

fig.2: Basic block diagram of 3D printer

4. COMPARISON BETWEEN OLD & NEW DESIGN

Cartesian and polar designs are slow as compared to rostock delta design. In delta design all three motors move together to reach at a desired height and location which makes it move faster.
Our design has ball screw instead of timing belts and lead screw which reduces backlash errors thus increasing printing accuracy. Every step taken by motor is accurately detected and same amount of height is increased or decreased due to ball screw.

We will be using large value stepper drivers rather than on-board stepper drivers so they can handle larger current values and less heat dissipation can be achieved

5. FUTURE SCOPE

As the technology is advancing prototyping has become a best way to test new things. So 3D printing provides cheap prototyping and thus industries can invest in new ideas.

Making a body part through 3D printing is one of the latest ideas. Research is still being done in this domain. Not only delta but scara and Cartesian design are slowly replacing man power making everything automatic. Thus this technology is going to play a major role in future automation. This technology is will take manufacturing industries to a next level.

6. CONCLUSIONS

Rostock delta design provides low inertia and fast movements. Stability and freedom from vibration when moving a heavy print head on the end of spindly arms is a technical challenge though this design has mostly been favoured as a means of gaining a large print volume also use of ball screws reduces vibration in movements, provides less inertia in motion, backlash errors and increases accuracy in printing. Printing material can be deposited on the desired location by changing the height of axis i.e. by rotating axis motors. A firmware that supports a user friendly graphical user interface is being used.

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7. ACKNOWLEDGMENT

On the very outset of this report, we would like to extend my sincere and heartfelt active guidance, help, and cooperation obligation towards all the personages who have helped me in these endeavors. Their and encouragement, we would not have made headway in the project.

First and foremost, we would like to express our sincere gratitude to our guide & head of electronics & telecommunication department prof. Mrs. Archana Ingle for guiding us in this project and creating a sustained enthusiasm and involved interest from her side.Next, we would like to thank our principal Dr. Arunkumar for supporting us.

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NEXT GENERATION WIRELESS RGB LED BRIGHTNESS CONTROLLER

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ABSTRACT

This paper proposes a controller to adjust the brightness and colour of RGB LED is done by means of varying the Pulse Width Modulated (PWM) wave. A wireless device (Bluetooth or other) will be used for adjusting the LED brightness. With the help of three colours i.e. RGB, multiple colours and shades can be formed by varying the intensity of each colour of the LED. As per the requirement of the application, the brightness and colour can be controlled to achieve desired requirement. This paper finds its application in indoor lighting systems, theatrical house side lighting, agriculture lighting and many other areas. The key advantage of this project is that it has low power consumption and better durability than conventional lighting systems.

Keywords— *Bluetooth, LED Driver, Microcontroller*

1. INTRODUCTION

In recent years, with development of the LED lighting technology, the LED lightings more favoured by the market and even have a bright future because it has several blessings like high brightness, non-polluting, low power consumption and long life [1]. With the event of connected technologies, LED currently will be wide applied on numerous areas. Applications from home appliance to indoor lighting are common within the standard of living. What is more, the good phones and tablets have initiated during a new fashion for people [2]. Several management systems are developed and integrated with applications (APPs) of phones and tablets. Users will access the APP and so remotely management the home appliance that is incredibly totally different from tradition continuously. In this paper, a LED lighting system supported the Bluetooth wireless network is planned .Through the association between Bluetooth within the phone and also the Bluetooth module, signal and command are transmitted wirelessly. Users will management the brightness and hues of LEDs by APP only Android system. Once APP starts, it can automatically find whether the Bluetooth is accessible or not. Then a window can pop up to turn on the Bluetooth else that the APP can shut. The management bar for RGB brightness cannot work if the Bluetooth module isn't connected to the phone. Once clicking the CONNECTION" button, the list can show all the devices that has been connected and also the devices that has been automatically found. Next, choose the Bluetooth module to attach; the information and the status will be shown next to the main title and all the control bars will be enabled. When connecting to Bluetooth, users will slide the control bar to regulate the brightness of RGB LEDs [5] [6]. High-efficiency LED lighting has attracted the interest of many people. LEDs have some advantages, such as no environmental pollution, safety and reliability. Because of the characteristics of the voltage and current, the brightness of the LED is directly proportional to the forward current that flows through the LED. The brightness of an LED can be changed by the current flowing through it [7]. Light-emitting diode (LED) and fluorescent technologies are presently at the forefront of delivering the fore most economical alternatives to incandescent lighting. Though each cause technical challenges, they also offer significant advantages beyond simple incandescent light bulb replacement, including improved efficacy (lumens/watt), reduced energy consumption and the ability to add intelligence... as a result of the sunshine quality of those alternate lighting technologies is seemed to be the same as that of incandescent lighting, the advantages of longer life and exaggerated energy savings might not continuously be thought of vital enough to inspire changes within the market. Microchip's advanced lighting solutions provide you with the chance to include non-traditional capabilities into your lighting design.

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2. DESIGN METHODOLOGY

2.1 HARDWARE

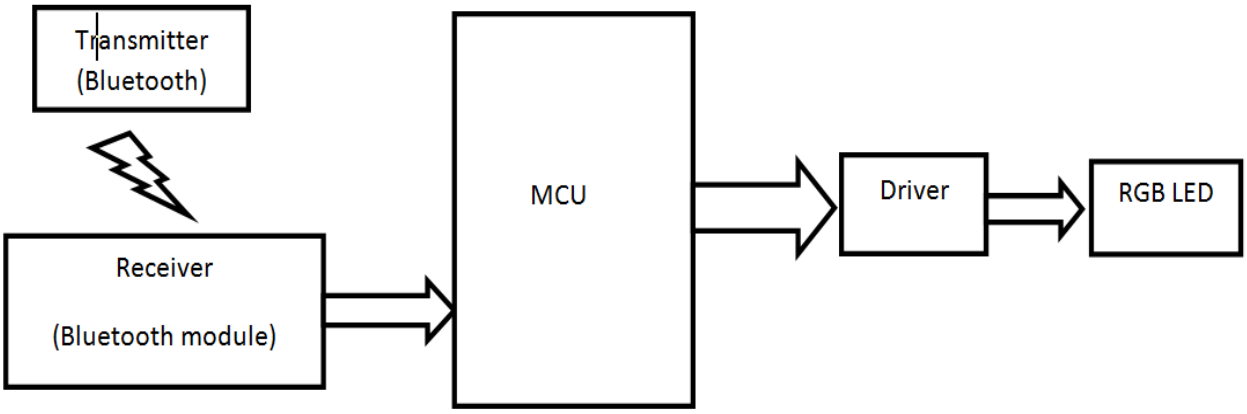

FIGURE 2.1.1. BLOCK DIAGRAM

In this block diagram, Transmitter is used to transmit the data from user side to microcontroller. This data is transmitted through an app which is connected to the microcontroller via Bluetooth. Receiving device will receive the data from transmitted at 2.4GHz which is feed to microcontroller at the UART pins. Microcontroller circuit has predefined function for received data i.e. integer value send from mobile device According to the input data microcontroller will drive the LED's through different channel using transistorised switching circuit. Here NPN BJT are used to control the LED outputs using PWM signal.

2.2 SOFTWARE

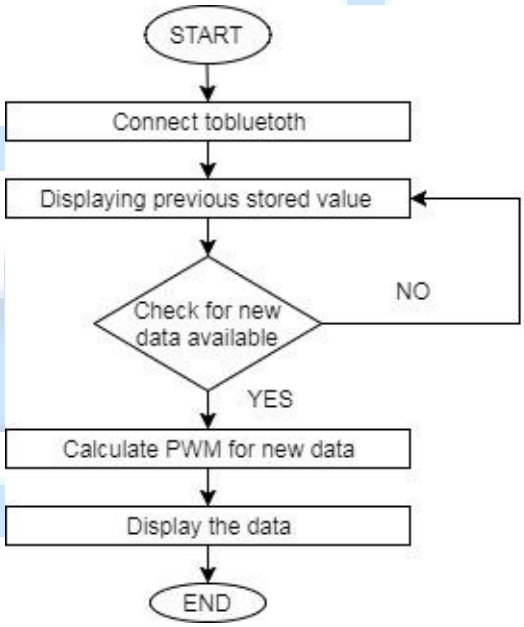

FIGURE 2.2.1. FLOW CHART

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Initially to connect our LED modules with app, Bluetooth connectivity is used. After connecting Bluetooth Successfully, the app is now connected with LED module. Now the microcontroller circuit will check if new data from user is available or not, if new data is not available then it will display the previous stored value. If new data is available then the microcontroller circuit will calculate PWM for newly arrived data. After calculating PWM value by microcontroller, the equivalent value will be displayed.

3. RESULT

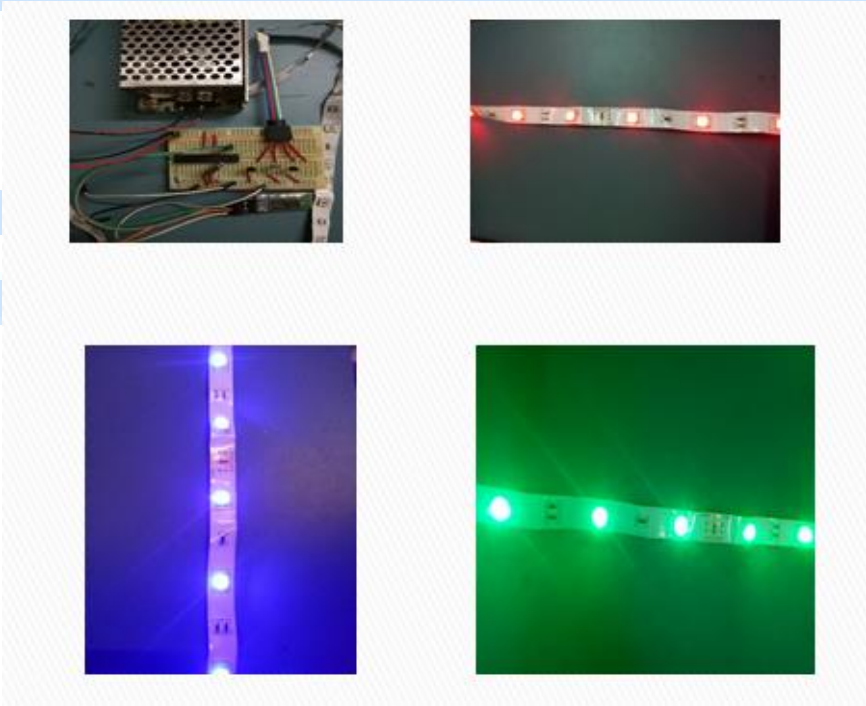

FIGURE 3.1. OUTPUT

Sr. No.	Colour	Colour Name	Hex Colour Code	RGB Colour Code (R,G,B)
1		WHITE	#FFFFFF	255,255,255
2		SILVER	#C0C0C0	192,192,192
3		GRAY	#808080	128,128,128
4		BLACK	#000000	0,0,0
5		RED	#FF0000	255,0,0
6		MAROON	#800000	128,0,0
7		YELLOW	#FFFF00	255,255,0

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8		**OLIVE**	**#808000**	**128,128,0**
9		**LIME**	**#00FF00**	**0,255,0**
10		**GREEN**	**#008000**	**0,128,0**
11		**AQUA**	**#00FFFF**	**0,255,255**
12		**TEAL**	**#008080**	**0,128,128**
13		**BLUE**	**#0000FF**	**0,0,255**
14		**NAVY**	**#000080**	**0,0,128**
15		**FUCHSIA**	**#FF00FF**	**255,0,255**
16		**PURPLE**	**#800080**	**128,0,128**

TABLE 3.2. OF IMPLEMENTING PWM CYCLES FOR DIFFERENT COLOR ON MICROCONTROLLER.

4. CONCLUSION

Control of brightness and color is done by means of varying the Pulse Width Modulated (PWM) wave. A wireless device (Bluetooth or other) will going to use for adjusting the LED brightness .With the help of three colors i.e. RGB, multiple colors and shades can be formed by varying the intensity of each color of the LED. User can alter the brightness and color of RGB LED lamp through their smart phones.

5. ACKNOWLEDGMENT

It gives me immense pleasure to express my deepest sense of gratitude to my respected guide Prof. Nutan Malekar, EXTC department, VIVA Institute of Technology, Virar; for her guidance and help for completing this work. I would like to express my sincere thanks to Dr. Arun Kumar, Principal for his support. I also wish to express my gratitude to asst. Prof. Mrs. Archana Ingle, HOD, Electronics & Telecommunication for her kind hearted support. I also wish to express my indebtedness to my parents as well as my family members whose blessings & support always helped me to face the challenges ahead. At the end, I would like to express my sincere thanks to all my friends & others who helped me directly or indirectly during this project work.

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Intelligent Safety Driving Vehicle

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ABSTRACT

This project aims to build an intelligent vehicle, it is capable of reaching the destination safely and intelligently thus avoiding the risk of human errors. Many existing algorithms like lane detection, obstacle detection are combined together to provide the necessary control to the vehicle. With the number of accidents increasing, it has become important to take over the human errors. All of this could come to an end with self-driving vehicles and then let the passengers continue with their work. The work could be enhanced by improving the algorithm by adding machine learning to it. It is accurate but its efficiency could be further enhanced if it starts learning by itself and avoid unnecessary calculations of the regions which are already known.

Keywords-*Open CV, Object detection, Lane detection, Python, Neural network.*

---

1. INTRODUCTION

A self-driving vehicle, also known as a robot vehicle, intelligent vehicle, or driverless vehicle an autonomous vehicle capable of fulfilling the human transportation capabilities of a traditional vehicle. Self-driving vehicles are autonomous vehicles that can drive through traffic all by themselves. As unbelievable or far-fetched as it may sound, it may just be the greatest technological revolution of the near future.

There are several technologies that can be used to develop these autonomous vehicles, machine learning, ultrasonic sensors, computer vision, image processing, etc. The goal is to program the vehicle to be able to detect its way from one point to another on a driving environment avoiding any obstacle on the way as an autonomous vehicle, it is capable of sensing its environment and obstacles without human input. Robotic vehicles exist mainly as prototypes and demonstration systems (CNN). The Open CV is a library of programming functions mainly aimed at real-time computer vision. In our project is used to detect the roads and guide the vehicle on unknown roads.

This project is used to detect the paths and guide the vehicle on unknown roads. Traditionally, lane could be detected by two approaches namely feature based technique and model based technique. In robotics, obstacle avoidance is the task of satisfying the control objective subject to non-intersection or non-collision position constraints. Normally obstacle avoidance involves the pre-computation of an obstacle-free path along which the controller will then guide a robot.

Initially teaching the robot how to drive; this is done by making the robot go around a track a small number of times. The Neural Network is trained by using image data, along with the user action. At run-time, images of what is in front this project main focus lies in the vehicle's ability to follow a road by keeping itself at a fixed distance from the obstacle(crash barrier). The work could be enhanced by improving the algorithm by adding machine learning to it. The present algorithm performs the operations on all the frames. If it starts learning by itself then its efficiency could be further enhanced and avoid unnecessary calculations of the regions which are already known or familiar.

CNNs have revolutionized pattern recognition. Initially most pattern recognition tasks were performed using an initial stage of hand-crafted feature extraction. The breakthrough of CNNs is that features are learned automatically from training examples. The CNN approach is especially powerful in image recognition tasks because the convolution operation captures the 2D nature of images. Also, the entire image can be scanned by using convolution kernels relatively few parameters need to be learned compared to the total number of operations.

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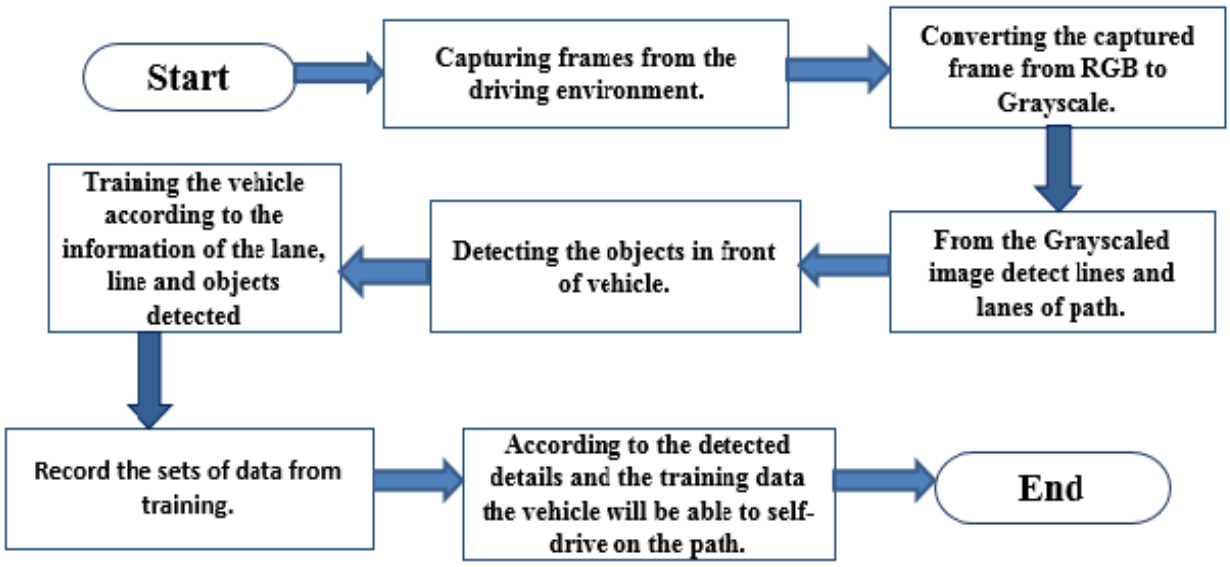
2. FLOW CHART



Initially, starting from capturing the frames from the driving environment. Then converting the captured image frame from RGB to Grayscale. From the converted gray scale image, obtaining information about edges of the path and to detect objects (obstacles) in front of the vehicle. From the edges of the path detected and the objects captured training the vehicle accordingly using neural network. Recording these sets of data and from this recorded sets of data the vehicle drives on its own.

3. HARDWARE AND SOFTWARE

3.1 Raspberry Pi (rev B) for GPU and CPU computations

The Raspberry pi is a credit card size single board computer. In this project we have used it as a main central processing unit it comprises of 512Mb ram model with 2 USB ports and a 10/100 Ethernet control.

3.2 Wi-Fi 802.11n dongle to connect to Pi remotely

Wireless USB was based on the Wi Media Alliance's Ultra-Wide Band common radio platform, which is capable of sending 480 Mbit/s at distances up to 3metres and 110 Mbit/s at up to 10metres.

3.3 Motor driver IC L293D which can control two motors

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction.

3.4 Pi camera

It is a camera shipped with Raspberry pi camera module is also available to which can be used to take high definition videos as well as still photographs.

3.5 Ultrasonic sensor to detect obstacles

Ultrasonic sensors (also known as trans receivers when they both send and receive, but more generally called transducers) work on a principle similar to radar r sonar which evaluate attributes of a target by interpreting the echoes from radio or sound waves respectively.

3.6 Servo motor

A servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback.

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3.7 Python

Python is an interpreted high-level programming language for general-purpose programming. Python has a design philosophy that emphasizes code readability, and a syntax that allows programmers to express concepts in fewer lines of code.

4. RELATED WORKS AND RESULTS

Step 1: Getting visuals

Fig (1)

Fig (2)

Step 2: Conversion from RGB to Grey

Fig (3)

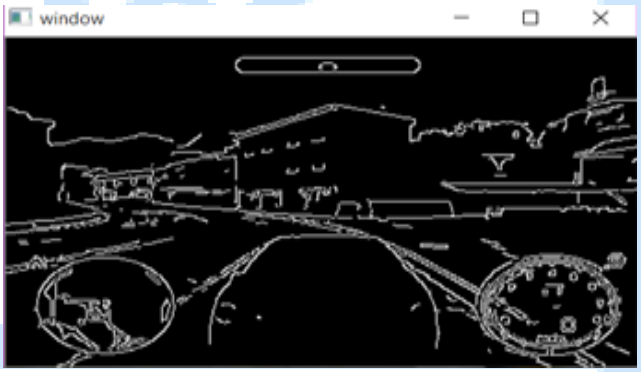

Fig (4)

Step 3: Lane Detection

Fig (5)

Fig (6)

Initially, starting with getting visuals of the driving environment from the interface (game) shown in Fig (1) and

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capturing maximum number of frames for fast response in Fig (2). Then converting the captured images from RGB is done in Fig (3) and these RGB figures are converted to Greyscale shown in Fig (4). After conversion, considering the necessary dimensions of path and discarding the unwanted information such as trees, buildings shown in Fig (5). In order to drive the vehicle on the appropriate path vehicle detects both the edges of the road for moving in forward direction. If the vehicle detects the right edge of the lane it steers to the left direction and vice versa as shown in Fig (6).

5. CONCLUSION

This project is about designing an autonomous vehicle driving system to develop the artificial intelligence that would be able to make a driverless vehicle safe enough to drive on the path. The novel method to determine the uneven, marked or unmarked road edges is explained in details relying upon open cv. Thereby taking the responsibility of the driver, providing a more manageable control over it and a swarn of the autonomous vehicle could just be the solution to traffic problems or traffic jam.

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IMAGES DE-DUPLICATION USING HADOOP

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ABSTRACT

This project represents a duplication-less storage system over the engineering-oriented cloud computing platforms. This deduplication storage system will manage data and duplication over the cloud system and it consists of two major components, a front-end deduplication application and a mass storage system as back- end. Hadoop distributed file system (HDFS) is a common distribution file system on the cloud, which is used with Hadoop database (HBase). With a deduplication application we can built up a scalable and parallel de-duplicated cloud storage system .

Keywords—*Images de-duplication using hadoop; Big data; Cloud computing*

1. INTRODUCTION

Apache Hadoop is a framework which allows the distributed processing for large data sets across clusters of commodity computers using a simple programming model. Doug Cutting started writing the first version of Lucene in 1997.Apache Lucene is a full text search library which makes Google return results with sub second latency. FT search library is used to analyse ordinary text with the purpose of building an index.

Got great feedback and feature requests. In 2001, Lucene moves to Apache Software Foundation. Cutting turns his focus towards indexing web pages. He is joined by University of Washington graduate student Mike Cafarella, in an effort to index the entire Web. This entire project was termed as Apache Nutch. Nutch is what is known as a web crawler (robot, bot, spider), a program that "crawls" the Internet, going from page to page, by following URLs between them. Nutch simplified the operational side of things, but on the other side it effectively limited the total number of pages to 100 million. To overcome limitations, they needed a distributed storage layer satisfying following requirements:

Schema less –It has no predefined structure

Durable - once data is written it should never be lost

Capable of handling component failure without human intervention

Automatically rebalanced to even out disk space consumption

In October 2003, Google published the Google File System paper. It contained blueprints for solving the very same problems they were struggling with. After incorporating the suggestions in GFS, they named it Nutch Distributed File System (NDFS). Following the GFS paper, Cutting and Cafarella solved the problems of durability and fault-tolerance by splitting each file into 64MB chunks and storing each chunk on 3 different nodes. With this, the operational side of things had been taken care of. Next their, idea was to somehow dispatch parts of a program to all nodes in a cluster and then, after nodes did their work in parallel, collect all those units of work and merge them into a final result. In December 2004, Google published a paper by Jeffrey Dean and Sanjay Ghemawat, named MapReduce. Simplified Data Processing on Large Clusters"

2. PROPOSED SOLUTION

Keeping the problem statement in mind, we decided to go one step further by implementing a system to eliminate duplicate images in fastest and reliable way. The aim of our project is implement a system to remove duplicate images using Hadoop and Map Reduce. Most of the images are in binary format. Also most of the binary formats particularly those that are compressed or encrypted cannot be split and must be read as a single linear stream of data. Using such files as input to a MapReduce job means that a single mapper will be used to process the entire file, causing a potentially large performance hit. In such a situation, it is preferable to either use a split-able format such as Sequence File, or, if you cannot avoid receiving the file in the other format, do a pre-processing step that converts it into a splitable format.

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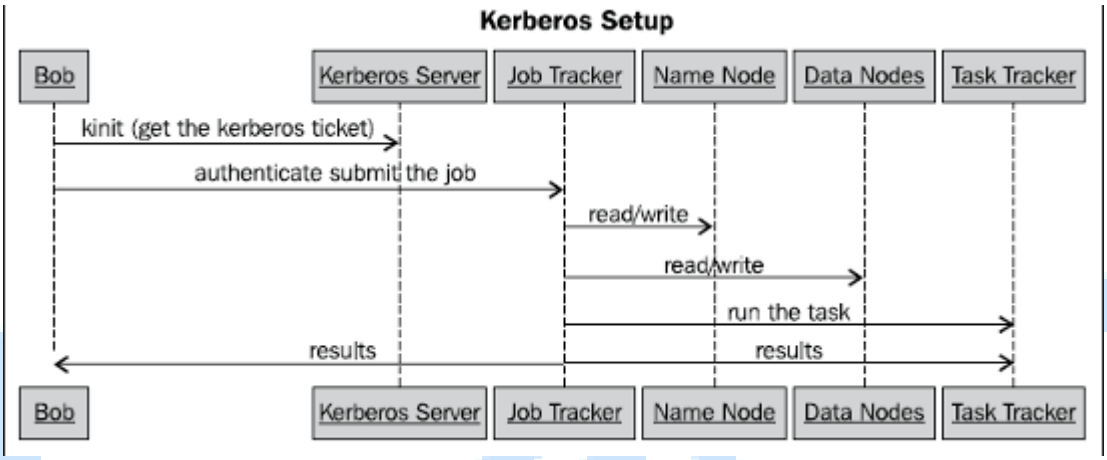

fig.1. Hadoop overview

2.1 Algorithm

Move files to HDFS then prepare list of files which has to be given as input to our mapper and then convert Binary Files to Hadoop Sequence file .Write Map Reduce program to remove duplicate files from the given Sequence File Run Image Driver with Image Duplicates Mapper and Image Dups Reducer on the created Sequence File and check the list of Non-duplic10

2.2 Flow chart

First it will load the image and convert the image into HDFS format. Now the HDFS format will be converted into the sequential file format. After conversion by applying map reduce to the sequential file formats to identify unique and duplicate images .Now it will display the result into tabular format which will consist of names of unique images and duplicate images.

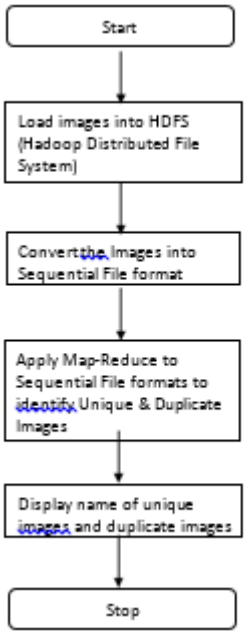

fig.2. flow chart

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2.3 *MapReduce Program*

First we will take input(Driver Code) .There Are various method here we are considering main method .Now it will define the job configuration and set the map output (key and value) format .Set the final (reduce) output. It will always be in the input format and the output format Set the input path and output path then set the map and reduce class .Map code contains code to generate key-value pairs. Reduce code contains the code to reduce (sum /remove/aggregation) the key-value pair generated by map code

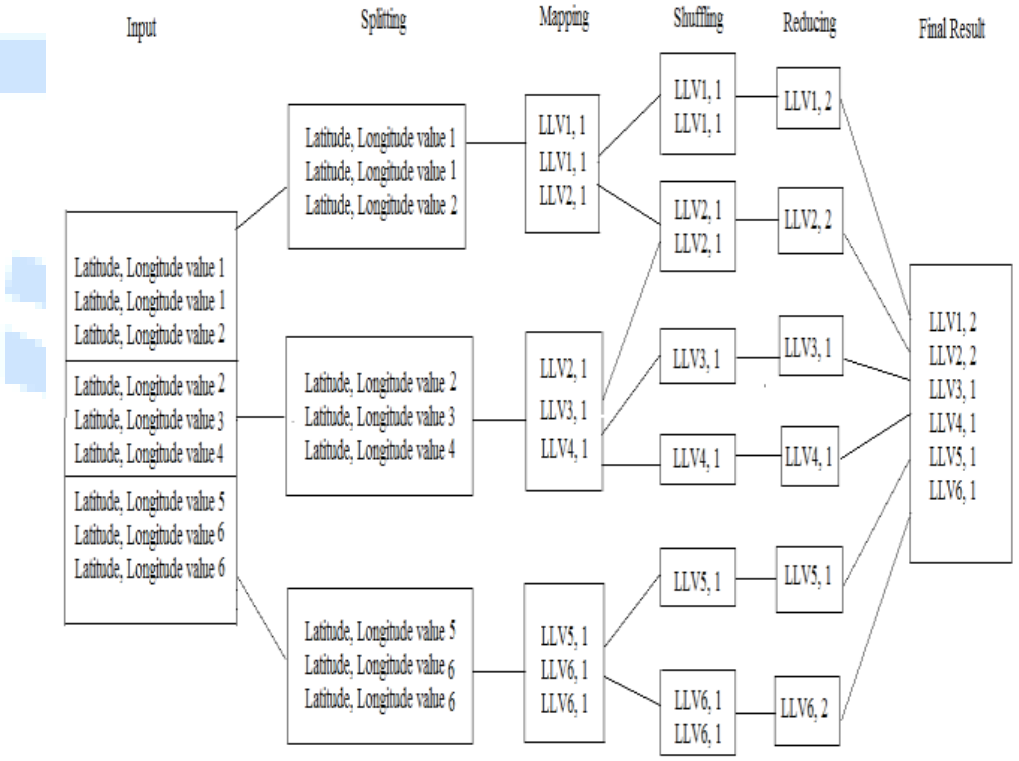

fig.3. map redundancy

Expected result will consist of a list of unique and duplicate image. The result will have the names of images which will be displayed in a separate list box that is unique and duplicate image

3. CONCLUSIONS

We conclude that we will discuss the data de-duplication in cloud computing using Hadoop. The tools & technology related to Hadoop used for developing trends in big data analysis. We will also speculate on what the future holds the big data analysis and the Hadoop ecosystem.

4. ACKNOWLEDGMENT

We are very thankful to the department of EXTC for giving us opportunity to present our project topic and research paper on topic of 'IMAGE DE-DUPLICATION USING HADOOP". We are very thankful towards principal Dr . Arun Kumar, Principal for whole hearted support. We are also very thankful to our project guide "SHOEB SHAIKH "for guiding us in our paper

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Piezoelectric Power Generation

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Abstract

Electricity is a basic need of present day and its demand is increasing continuously. So simple method need for power generation. This paper shows a one of the electricity generation method using piezo material. Vibration energy that is generated by walking movement of people will be converted to electrical energy by piezoelectric effect. Instead of considering rush as a problem it can be take it as an opportunity to produce energy. And the generated energy will be used street light, charging etc.

Keywords— *Piezoelectric Generator, Vibration, Pressure, Harvesting Energy, Footstep*

1. INTRODUCTION

At present, electricity has become a lifeline for human population. Its demand is increasing day by day. Modern technology needs a huge amount of electrical power for its various operations. Human population all over the world and hence energy demand is increasing day by day linearly. Electrical power generation from this ever increasing human population that does not negatively impact the environment. This technology is based on a principle called the piezoelectric effect, in which certain materials have the ability to build up an electrical charge from having pressure and strain applied to them. Piezo refers to the ability of some materials to generate an electric potential in response to applied pressure. Piezoelectric material can provide the magic of converting pressure exerted by the moving people into electric current. In present circumstances, electricity has become a need of every single human, demand of electricity increasing day by day. This new generation needs lots of electrical power for their different operations. When there is walking mechanism some of energy is wasted in the form of vibrations this vibrational energy is converted into an electrical energy using piezoelectric crystals. The use of piezoelectric plate is to produce the electric power from surrounding vibrations. These materials have the ability to absorb mechanical energy and transform it into electrical energy that can be used to power other devices. Piezoelectricity refers to the ability of some materials to generate an electric potential in response to applied pressure embedded piezoelectric crystals provide the ability to convert the human walking energy into the electric current due to the exerted pressure. This project depend on four section namely study of piezoelectric material, application of energy harvesting via piezoelectric material, locations for generating large scale electricity.

2. LITERATURE SURVEY

This project aims to emphasize on the technique of energy harvesting using the piezoelectric material. Energy is generating through mechanical vibrations source and accelerations. It produce pollution free electricity by some techniques like Piezoelectric effect in piezoelectric plate and power generation by piezoelectric generator and using them in piezoelectric roads, as congestion on roads is becoming inevitable with the fancy of masses towards personal transportation systems for their growing mobility. The piezoelectric generator is able to power LED-lamp.When the electrical energy produced by the pressure is captured by piezoelectric plate and converted to an electrical charge by piezo, then stored and used as a power source. And it has many applications as in agriculture, home devices and street lighting and as energy source for sensors in remote locations.

3. HARDWARE

3.1 Piezoelectric Material- Piezoelectric Effect is the ability of certain materials to generate an electric charge in response to applied mechanical stress.

3.2 Arduino Uno- Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board.

3.3 Weight Sensor Module- Load cell is transducer which transforms force or pressure into electrical output. Magnitude of this electrical output is directly proportion to the force being applied. Load cells have strain gauge, which deforms when pressure is applied on it. And then strain gauge generates electrical signal on deformation as its effective resistance changes on deformation. A load cell usually consists of four strain gauges in a Wheatstone bridge configuration. Load cell comes in various ranges like 5kg, 10kg, 100kg and more, here we have used Load cell, which can weight up to 40kg.

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3.4 Battery- A rechargeable battery, storage battery, secondary cell, or accumulator is a type of electrical battery which can be charged, discharged into a load, and recharged many times, as opposed to a disposable or primary battery which is supplied fully charged and discarded after use.
3.5 USB- Use for file transmission and Charging.
Connecting Wire- Whether you're prototyping, reworking, or building a final product, electrical wire can be your best friend. Wire is the most basic element when creating your own circuits.

4. SOFTWARE

Arduino IDE- The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software. This software can be used with uno Arduino board.

5. DESIGN METHODOLOGY

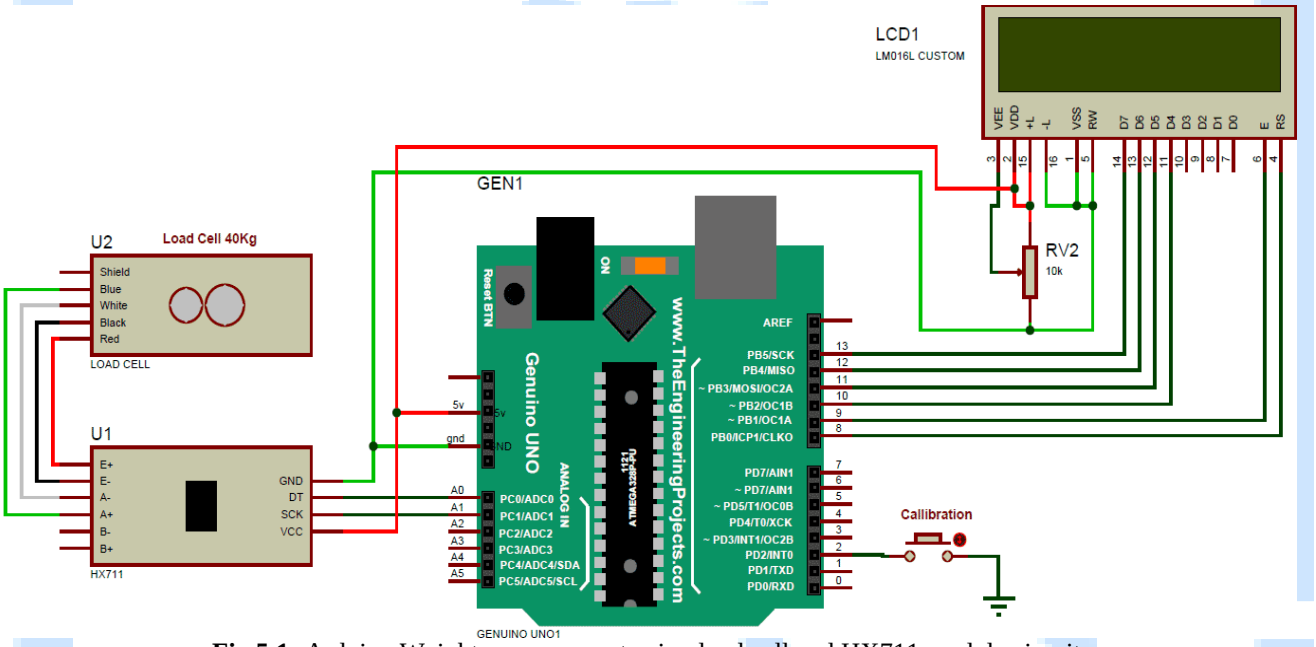

Fig 5.1: Arduino Weight measurement using load cell and HX711 module circuit

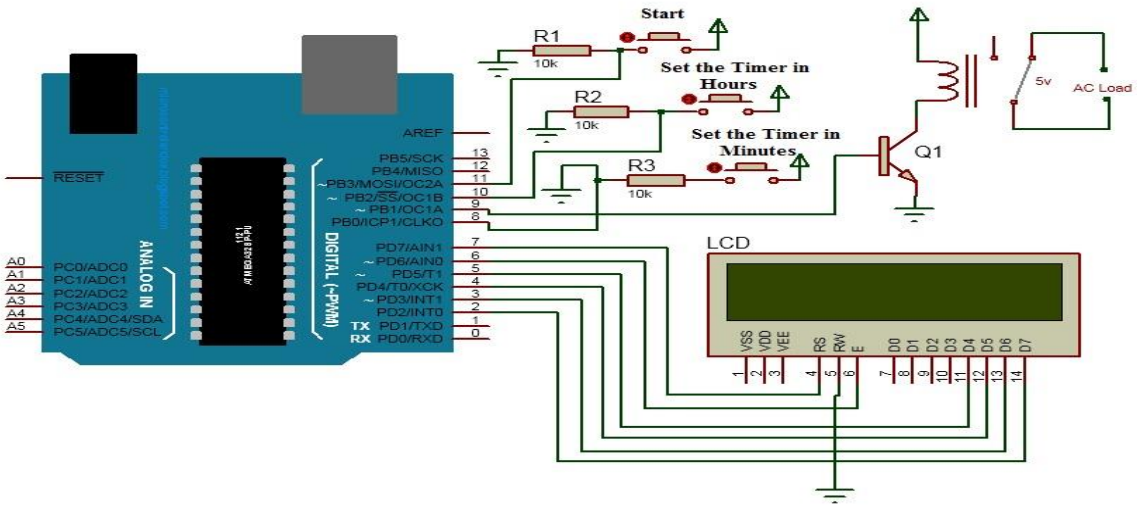

Fig 5.2: Vending Machine

6. SYSTEM BLOCK DIAGRAM

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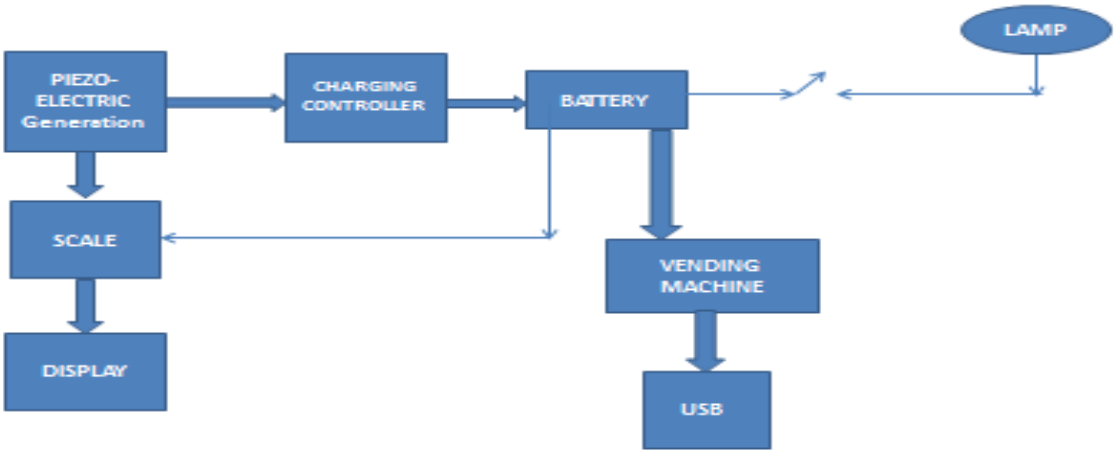

WORKING PRINCIPLE:

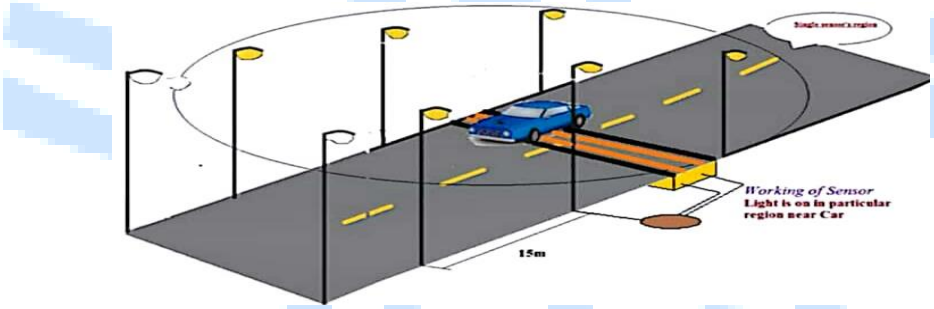

Fig 6.1: Schematic representation of working model

In this system is capturing unused energy from surrounding any system and converting it into electrical energy. The piezoelectric placed under insulating material like hard rubber and pressure created by foot step and water fall pressure will produce electrical energy which can be stored and used for domestic purpose. The piezoelectric Material is to generate electricity when we apply pressure. It has two axis, mechanical axis & electrical axis. When we apply pressure in mechanical axis, it generates power in its electrical axis. The concept of piezo is generation of the electrical polarization of a material as a response to mechanical strain. This phenomenon is known as direct effect or generator effect and is applied fundamentally in the manufacture of sensors like mobile phone vibrators, lighters etc. Piezoelectric material converts pressure into electrical energy. The pressure can be either from weight of moving vehicles or from the weight of people walking on it. The produced output is in the variable form .so bridge circuit is used to convert variable voltage into linear voltage. An AC filter is used to filter out this output voltage and it is stored in rechargeable battery. Two possible connections were tested-parallel and series connections for producing 40v output. Inverter is connected to battery and battery connection provide AC load. In this paper use of piezoelectric crystal is to generate electric output from surrounding vibration. Piezoelectric materials have crystalline structure. They can convert mechanical energy into electrical energy and vice versa. The produced electrical energy from piezoelectric crystal is very low in the order of 2-3 volts and is stored in battery to charge controller, since it is not possible to charge 12v battery through crystal output. To increase the voltage, the boost converter circuit is used. The level of voltage ranges 12v and it is stored in 12v battery.

7. RESULT

Piezoelectric material is superior in characteristics. Also, by comparison it was found that series- parallel combination connection is more reliable. The weight applied on the tile and corresponding voltage generated is studied and they are found to have linear relation. It is generally suited for implementation in crowded areas. This can be used in street lighting without use of high power. It can also be used as charging ports, lighting of pavement side buildings. People whose weight varied from 40kg to 75 kg were made to walk on the piezo tile to test the voltage generating capacity of the Piezo tile. The relation between the weight of the person and power generated. From the graph it can be seen that maximum voltage is generated when maximum weight/force is applied. maximum voltage of 40V is generated on the tile when a weight of 75 Kg is applied on the tile.

8. CONCLUSIONS

Piezo electrical material is superior in characteristics as well as by comparison it was found that series- parallel combination connections are more suitable. The weight applied on the tile and corresponding voltage generated is studied and they are found to have linear relation. It is especially suited for implementation in crowded areas. This can be used in street lighting without use of long power lines. It can also be used as charging ports, lighting of pavement side buildings.

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9. ACKNOWLEDGMENT

I have immense pleasure and a sense of deep satisfaction in submitting this project work report of Piezoelectric Power Generation. I am thankful to H.O.D**. Prof. Archana Ingale** for the regular Guidance, cooperation, encouragement and kind help.

I would like to take this opportunity to express my respect and deep gratitude to my Project guide **Prof.Kaustubha Gawas** for giving us all necessary guidance required, for this project, apart from being constant source of inspiration and motivation. We are also thankful to our parents who providing their wishful support for our project completion successfully. Last but not least, the backbone of my success and confidence lies solely on the blessings of my parents and lastly we thanks to our all friends and the people who are directly or indirectly related to our project work.

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Hand Gesture Recognition and Voice Conversion Using Sign Language

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ABSTRACT

Deaf and dumb people used Hand gesture for communication purpose, but they find strait when they are communicating with others people who don't understand Hand gesture. To overcome this, we developed the glove with flex sensor that translate Hand gesture into speech, in order to make the communication take place between the mute communities and the normal humans. A gloves is used which is normal cloth driving gloves fitted with flex sensors along five fingers and Deaf people can use the gloves to perform hand gesture and it will be converted into speech by using microcontroller so that normal people can understand their expression. Hand gesture is the used by deaf people and it is a way of communication that uses hand gestures use in place of voice to convey meaning, orientations and movement of the hands used to communicate words and sentences to audience.

Keywords— *Flex sensor, Gesture Recognition, Sign language Recognition, Text to Speech, Microcontroller, Accelerometer Sensor.*

1. INTRODUCTION

Many researchers have found out a number of possible solutions, but gesture recognition has been a research area which received much attention from many research communities such as human computer interaction and electronic device. The enlargement in human-machine interactions in our daily lives has made user interface technology progressively more important which makes a bridge between machines and humans than primitive text user interfaces or even graphical user,which still limit the majority of input to keyboard and mouse. Gestures done with physically as instinctive expressions will greatly ease the interaction process and empower humans to more naturally command computers or machines. This could potentially avoid use of input devices like keyboards, mouse also a touch-screens redundant a gesture may be defined as a movement, usually of hand or face that expresses an idea, sentiment or emotion, such as rising of eyebrows, shrugging of shoulders are some of the gestures we use in our day to day life. Physical motion or using Sign language is a more organized and defined way of conveying in which every word or alphabet is assigned some gesture with the rapid advancements in technology, the use of computers in our daily life has increased manifolds .In American Sign Language (ASL) each alphabet of English vocabulary, A-Z, is assigned a unique gesture. Sign language is the language which is applicable for the deaf &dumb or people with any other kind of disabilities. We are making this project because our aim is to design a Equipment that can perceive the sign language accurately so that the deaf and dumb people may communicate with the normal people without the need of an interpreter. It can be used to generate speech or text.

Lamentably, there has not been any system with these capabilities so far. A huge population in India alone is of the deaf and dumb. It is our social influence to make this community more independent in life so that they can also be a part of this growing technology world. In this we used a simple sign language which make the communication easy. No one can make sign language which is universal as it goes varies from region to region and country to country and a single gesture can carry a different meaning in a different part of the world. Various available sign languages are American Sign Language (ASL), British Sign Language (BSL), Turkish Sign Language (TSL), Indian Sign Language (ISL) and many more. There are a total of 26 alphabets in the English vocabulary. Each alphabet may be assigned a unique gesture. In our project, we use a Flex sensor which plays a vital role in our project. Due to which the project actually happen to work .when flex sensor is in motion, this make the changes in its resistance which were recognized some pattern or gesture. This recognized gesture may then be used to generate speech or text.

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2. DESIGN METHODOLOGY

Block diagram: transmitter

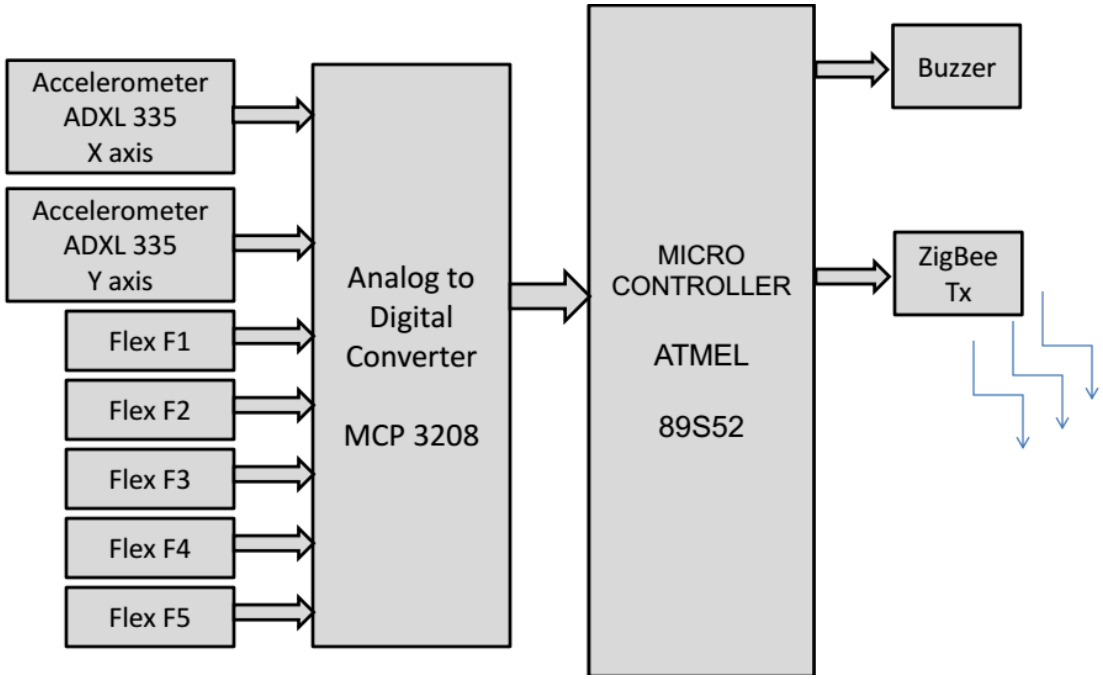

Fig.1. Transmitter module

Block diagram: receiver

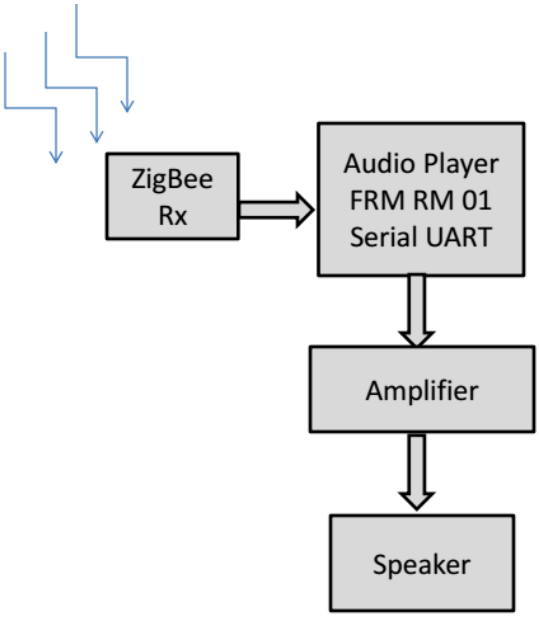

Fig.2. Receiver module

Figure above shows the block diagram of proposed system. Microcontroller act as main control unit for proposed application. System describes method to read gesture using various sensors, process data and conclude valid gesture.Flex sensor; provide change in resistance along with tilt ADXL335 is used to detect gesture. Variation of voltage is read by 12 bit serial ADC [MCP 3208]and transmitted to microcontroller using SPI communication. Data from accelerometer again is in analog voltage variation which is converted into digital by ADC.5 channel are used for flex sensor reading and two channel for ADXL335.

Microcontroller process the data with various. Software filters and compare with predefined gesture to conclude the detected gesture system uses wireless link between glove and receiver unit.

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Wireless link is setup using 2.4 GHz ZigBeemodule. Data received .wirelessly is feed to audio player [FN RM 01] which play particular file from memory card.Power supply is common for all component.it consist regulator 7805 along with protection diode and Filter section. System operates on +5v DC. A battery operated transmitter section is ready to have mobility with minimum hardware complexity.

Software Flowchart:

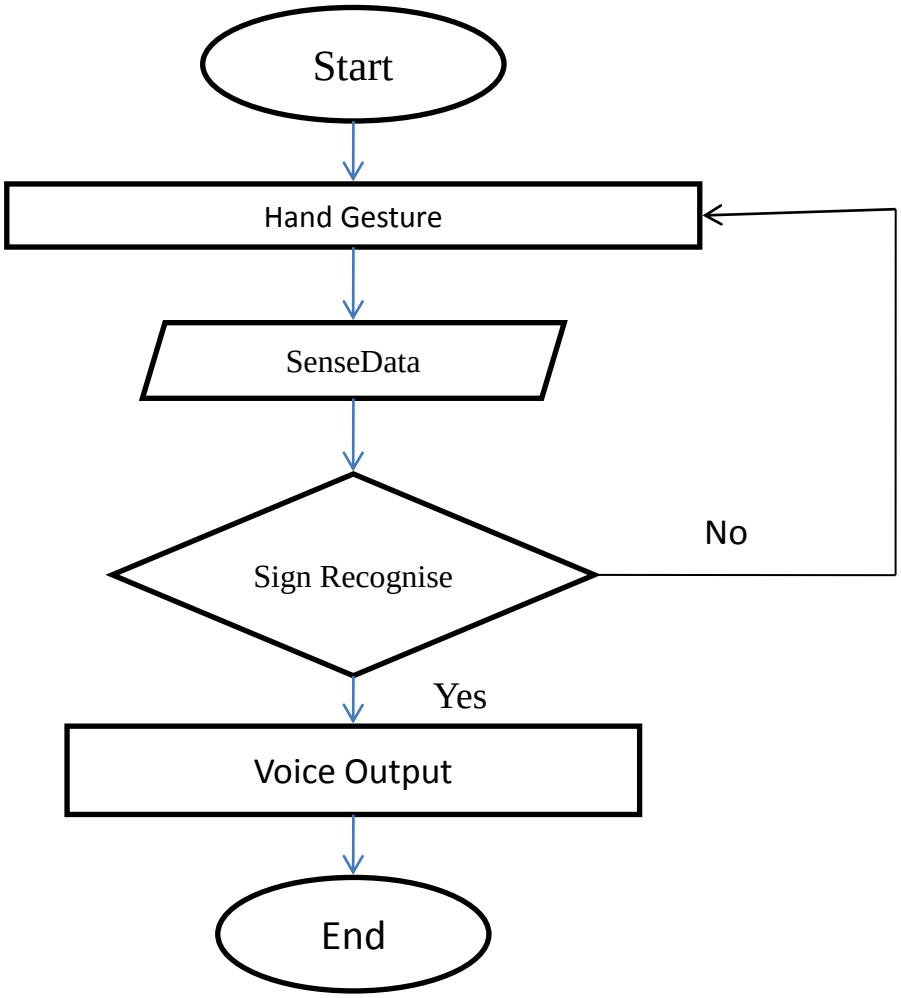

Fig.3 flowchart

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3. RESULT

SR NO.	Binary	Hex	Gesture	Message
1	00000	00		No Message
2	01101	0D		I Need Water
3	01110	0E		Call Doctor
4	01111	0F		I Want to Go to Washroom

TABLE 1

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4. CONCLUSIONS

The deaf and dumb people can easily communicate with each other by using glove with flex sensor and convey their message to others without any difficulty. The main aim is to help deaf and dumbpeople .We can communicate with more no. of hand gestures and listen the message via speaker.

5. ACKNOWLEDGMENT

We would like to thank our project guide Prof. Shoeb Shaikh for their guidance and encouragement. We also would like to deeply express our sincere gratitude to Project coordinators. We would also like to thank our department for giving us the resources and the freedom to pursue this project.

We also thankful to Head of the Electronics and Telecommunication Dept. Prof Archana Ingle, for her approval of this project. We are also thankful to her for providing us the needed assistance, detailed suggestions and departmental facility.

We would like to deeply express our sincere gratitude to our respected principal Dr. Arun Kumar and the management of VIVA Institute of Technology for providing such an ideal atmosphere to build up this project.

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VIDEO SURVEILLANCE USING RASPBERRY PI and OPEN CV SOURCE

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Abstract

Visual surveillance has become a necessary space of analysis and research, with the quickly growing importance in military and surveillance applications. It becomes cumbersome for human operators to observe for long durations. An economical solution for continue surveillance can be a robot which can detect motion and follow an object at the simultaneously with the help of camera which is interfaced to the Raspberry Pi. The object which is to be tracked or detected is first fed to raspberry pi and after that the raspberry searches for similar match of pixel in the real time video captured by the pi camera. Only single object is detected at a time. Image is divided into virtual grids and the motion of the bot is based on the position of the object in the grid. The detection is based on the colour using background subtraction. Quadrant based detection is being used to track the object.

Keywords*:-* *video surveillance, raspberry pi ,open cv, python, pi camera*

1. INTRODUCTION

Robots are being used in variety of industrial application for various applications like drilling, cutting, painting and welding. Robots are becoming smarter and smarter as technology progresses. Use of technology is also increased in field of defence and video surveillance Detection of a moving object is necessary for any surveillance system. A stationary camera can detect and track an object as long as the object is in range of the camera. But as the object [3] goes beyond the boundary of the camera frame, the camera stops tracking it, which is a major limiting factor for the use of a static camera [3].

Automatic video surveillance is very important for the field of security. The task of reliably detecting and tracking moving object detection and tracking namely radar technology and image processing technology [4] **.** Video surveillance is an hot research topic in computer science that tries to detect, recognize and track objects over a sequence of images and it also makes an attempt to understand and describe object behavior by replacing the aging old traditional method of monitoring cameras by human operators.Video surveillance in a dynamic environment, especially for humans and vehicles, It is a key technology to fight against terrorism, crime, public safety and for efficient management of traffic.

It has implemented mainly to show that using common technology available to the common people we can create a robot which can be used for detecting objects and tracking them. It is a real time visual based, that means input is images or video which is continuously captured with the help of pi camera located on front side of the robot chassis and connected to Raspberry pi**.**

2. LITERATURE SURVEY

After studying the literature related to object tracking and reading various papers that is related to our project, there are various method to implement the tracking. The paper [1] mainly focuses on implementing various detection technique such as shape,motion,colour & texture based representation .author mainly focuses on The Kalman filter which uses constructed on Maximum Periodic Documents Dispensation algorithm, As in [2] , images are continuously Captured with the help of pi camera. Detection is done using image processing erosion and dilation technique. In [3] paper presents an implementation of real time detection and tracking of an unknown object in video stream with 360° (azimuth) rotating camera .it uses two algorithm Object tracking using Dominant colour and CAMSHIFT algorithm. In [4] paper image processing technology is used for detection and tracking of moving object. Detection, classification and tracking are the three important steps for any object detection and tracking system. The objects of interest are first extracted from the sequence of frames then segment them from background and track them across different frames while maintaining their identity. The object detection and tracking algorithm is not only Limited to video surveillance system but also in other application domain such as virtual reality, video compression, human machine interface, video editing and multimedia database. Paper [5] focuses on detection of moving objects in video surveillance system then tracking the detected objects in the scene, author describes Background subtraction with alpha, statistical method, Eigen background Subtraction and Temporal frame differencing to detect moving object. Author also described tracking method based on point tracking, kernel tracking and silhouette tracking. In [6] paper author uses background subtraction and foreground

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detection to tack the object and can extract object attributes. [7] Implements object detection on its colour, which is a visual based project if and if the object is detected, the servo motor is rotated in such a way that wherever the object moves. In [8] a robot is designed using Raspberry Pi and Open CV. Here only a one object is being detected at any given time. The tracking of the object is based on division of the image into virtual grids. here predefined position quadrant based algorithm is used. As in [9] raspberry pi is used for video surveillance. Open cv is used and thresholding is used for detection and tracking .programming is done in cpp. Nut in [10] the surveillance system which detects vehicle and tracks them and counts the object for traffic management. It uses image segmentation techniques. In [11] author proposes a system which captures real time images and displays it on browser using tcp/ip.Face detection algorithm is applied on raspberry pi.it enables live streaming with human face detection. But [12] implements a surveillance system through raspberry pi such that it can be used from any part of the world.

3. DESIGN METHODOLOGY

3.1 Hardware and Software Used

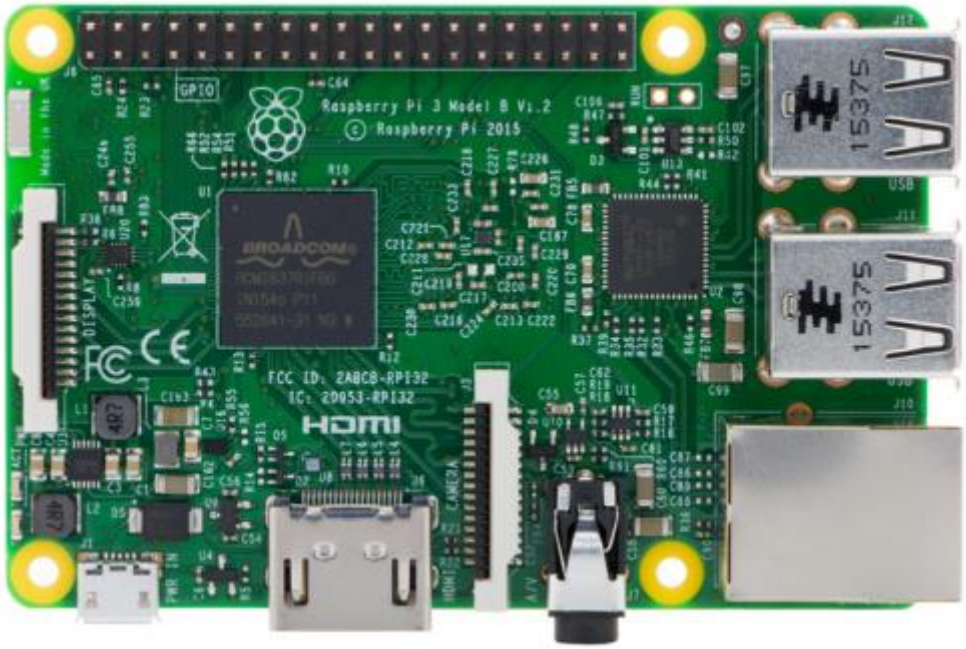

Fig 1: Raspberry Pi

The Raspberry Pi is open hardware, the Broadcom SOC(System on a Chip), The Raspberry Pi 3 is the third-generation Raspberry Pi. It replaced the Raspberry Pi 2 Model B in February 2016.Quad Core 1.2GHz Broadcom BCM2837 64bit CPU1GB RAM BCM43438 wireless LAN and Bluetooth Low Energy (BLE) on board 40-pin extended GPIO4 USB 2 ports which runs many of the main components of the board–CPU, graphics, memory, the USB controller, etc.

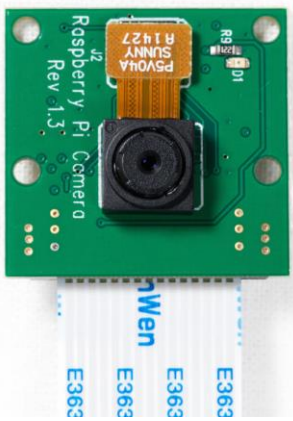

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Fig 2: Pi Camera

The Raspberry Pi Camera Board plugs directly into the CSI connector on the Raspberry Pi. It's able to deliver a clear 5MP resolution image, or 1080p video recording at 30fps!. The module attaches to Raspberry Pi, by 15 Pin Ribbon Cable, to the dedicated 15-pin MIPI Camera Serial Interface (CSI). The CSI bus is capable of extremely high data rates, and it exclusively carries pixel data to the BCM2835 processor.

Fig 3: L293D Motor Driver

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. The L293D is a quadruple half H-bridge bidirectional motor driver IC that can drive current of up to 600mA with voltage range of 4.5 to 36 volts. It is suitable to drive small DC-Geared motors, bipolar stepper motor. There are 4 input pins for l293d, pin 2,7 on the left and pin 15 ,10 on the right .Left input pins will regulate the rotation of motor connected across left side and right input for motor on the right hand side.

.

OpenCV (Open Source Computer Vision) is a library of programming functions mainly aimed at real-time computer vision. Originally developed by Intel it was later supported by Willow Garage and is now maintained by Itseez.

3.2 Block Diagram

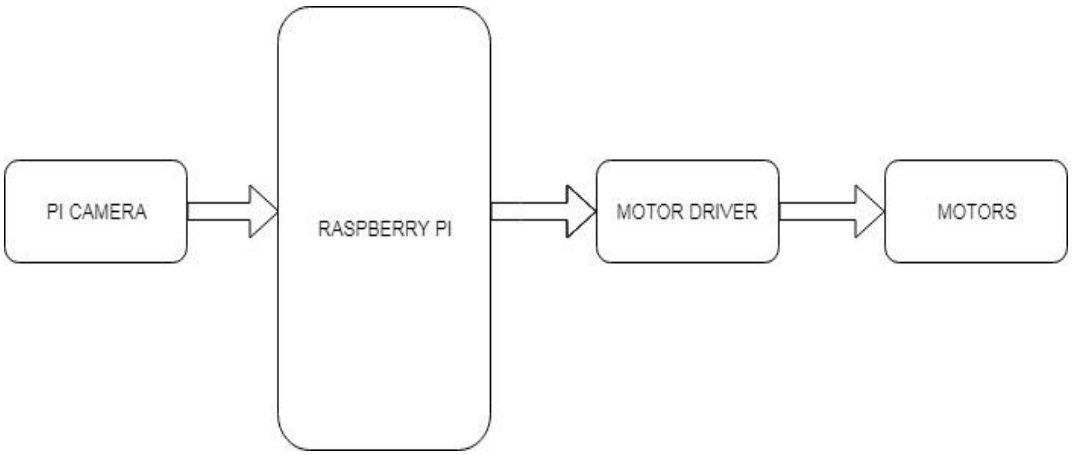

Fig 4: Block Diagram

The real time video is taken by the camera which is placed in the front of the robot, the camera used is pi camera and it is directly connected to raspberry pi. The extracted image taken out from the pi camera is send to the raspberry pi and it is followed to execution of code. First of all the object that is to be detected is selected using mouse cursor, the point selected by the cursor is assumed as centroid and the movement is detected by where the object moves from the centroid.

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In the coding, object is detected and after that the tracking is done using quadrant based algorithm and the signals are generated, these generated signals coming from the raspberry pi is sent to robot through motor driver. Motor driver drives the robot in the direction of object. The tracking we can monitor on pc also.
First of all the Linux os is installed into the Raspberry Pi board via Micro SD card and appropriate code is written in Python language for the object detection using the Open CV libraries and is dumped in the board. The visual data captured by the pi camera is processed in the Raspberry Pi and the object is detected and once if the object is detected, the servo motor is rotated in such a way that wherever the object moves, the robot will move in that direction.

3.3 Flow Chart

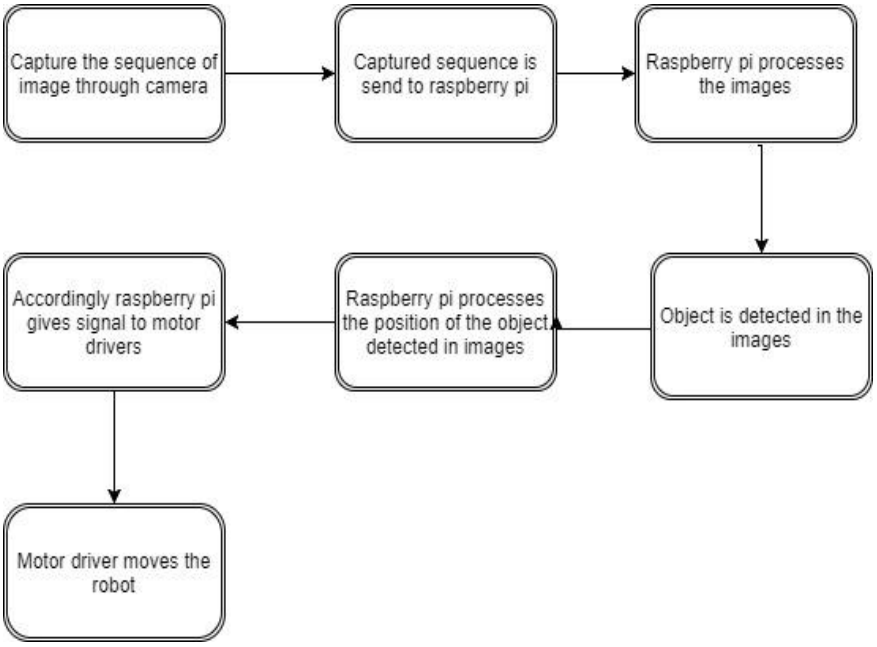

Fig 5: Flow Chart

4. RESULT

After implementing the concept and executing program, desired object is successfully detected and tracked in real time and there is not much delay in the response of the system, selection of other object is also simple and it is easy to change the object of interest.

5. CONCLUSION

Tracking of moving objects is a key task in video monitoring applications. Object detecting and tracking has a wide variety of applications in computer vision such as video compression, video surveillance, vision-based control, human-computer interfaces, medical imaging etc. By implementing object tracking in feasible cost then it will help our society in many different ways.

6. ACKNOWLEDGMENT

We would like to express our gratitude and appreciation to all those who gave us the possibility to complete this project. A special thanks to our College Principal Dr. ARUN KUMAR and also to Head of the Department MRS. ARCHANA INGLE , who helped us with stimulating suggestions and encouragement throughout this project.
We would also like to acknowledge with much appreciation to the Project Guide MISS. CHITRA TAKLE for giving us the guidance in achieving the goal as well as to encourage us to keep the project in track. A warming thanks to Project Head MRS. KARISHMA RAUT for providing us all the support and knowledge throughout the project.We would also like to thank the crucial role of laboratory assistants, who gave the permission to use all required machinery and necessary material to complete the project. A special thanks to EXTC DEPARTMENT of VIVA INSTITUTE OF TECHNOLOGY for providing us a wonderful environment to complete our project.

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FARM MONITORING USING UAV

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ABSTRACT

This project idea works to improve e-farming concept in fruit farming. The basic idea is Fly camera and sensor equipped UAV through orchard, acquired video data from UAV by means of Radio Communication and then performing some image processing techniques on video data. This process will tell the farmer about current condition of field which includes Fruit's quality, ripeness and any defects in it, and also the health of leaves of plant. This type of assist can help in farm management and decreases use of resources.

Keywords— *UAV, Farm Monitoring, e-farming, image processing, fruit disease detection, Leaf health detection*

1. Introduction

India is the world's largest producer of many fresh fruits and vegetables. And it is important to control our agri-productivity and to best invest limited resources. In India farmers walk down their fields for checking their plant health, presence of weeds or bugs, parched soil and other sign of distress. But sometimes due to human errors any pathogenic infection on yield cannot be noticed. So by using such agribots we can monitor the farm continuously. So any problem in the orchard can be avoided.

2. Proposed Method

In the prior work the techniques for detection of age factor for a particular fruit are explained. In which they have used MATLAB software as image processing tool and done various tasks such as extraction of region of interest, edge detection and colour detection. In further article we get to know work in this field of agriculture and fruit farming using image processing, composed of the mainly three main steps background subtraction, feature extraction, and training and classification. An image processing based solution is also explored from the published literature for automatic fruit/vegetable recognition and classification and automatic detection and recognition of fruit diseases from images using colour and texture features.

Drones have become very popular in recent times. What was once the preserve of a few enthusiasts has now achieved mainstream success. This popularity has driven drone development and that is why this magazine will be covering the future of uavs. Part of the rise in knowledge about drones comes from reports about their use by the military. In this way this has fed an interest in future drones military use. Drone technology has moved on so much that there is a drone for every purpose. Drones development means that the most advanced military drone may never be achieved. It must be noted however, that drone use on the battlefield is still a 3 controversial subject. Thankfully, drones technology is not only restricted to military purposes, so a whole new market has opened up for consumers. From film making to taking photos, and even search and rescue operations, the scope that future drones have to offer is immense. There are large recreational UAVs, fly sized drones, and many other designs as companies jockey for position in the future drone market. As a result, the quality and capabilities of these machines has improved a lot in recent years. This means that the capabilities of future drones will be many and varied so stick with us as we cover everything from the best military drones to the leading commercial ones.

As per the 2010 FAO world agriculture statistics, India is the world's largest producer of many fresh fruits and vegetables [1]. And it is important to control our agri-productivity and to best invest limited resources. In India farmers walk down their fields for checking their plant health, presence of weeds or bugs, parched soil and other sign of distress. But sometimes due to human errors any pathogenic infection on yield cannot be noticed. So by using such agribots we can monitor the farm continuously. So any problem in the orchard can be avoided.

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3. METHODOLOGY

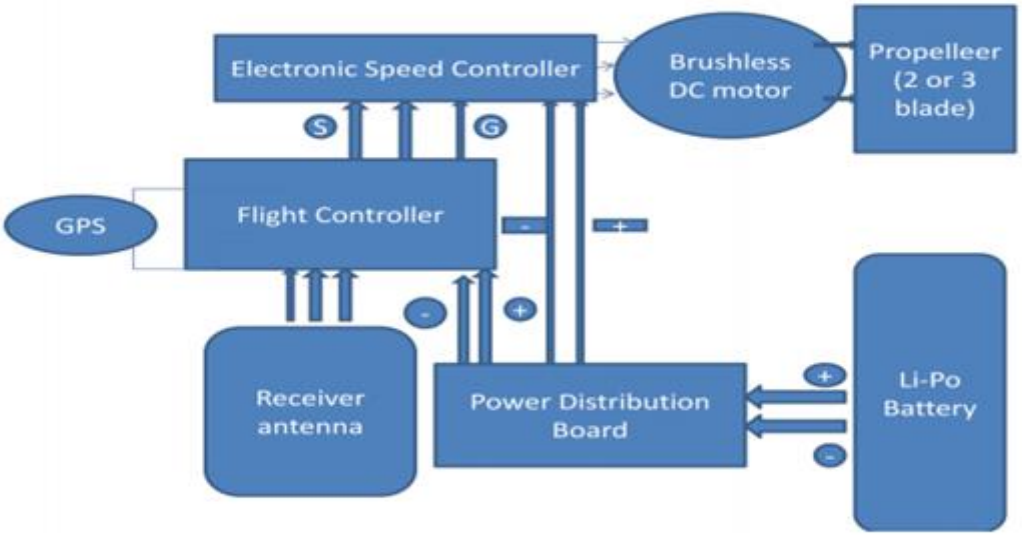

Fig 3.1 UAV Design Block Diagram

3.1 Hardware Assembly

Actually it is a specially designed multi propeller system inside a drone that makes this device highly independent and also assists in reduction of failures. One important thing to note about this multi propeller system is that even if any motor inside this device stops working; it will keep on flying as it gets support from propellers that are working in group. Drones that possess large number of motors inside are able to gain more control over their elevation and hence can carry more loads during flight. These propellers get their power from a dedicated source and most of these devices contain removable batteries so that it can stay in air for long run. The flight time can be extended with use of powerful batteries in design.

A flight planning system was developed such that the predefined points could be loaded into the controlling system and illustrated on a digital map in the control software viewer.

Most of the work in this field using image processing is composed of the mainly three main steps (1) background subtraction, (2) feature extraction, and (3) training and classification. An image processing based solution is also explored from the published literature for automatic fruit/vegetable recognition and classification and automatic detection and recognition of fruit diseases from images using colour and texture features.

in the first step image segmentation/defect segmentation is carried out using K-Means clustering method, in the second step features are extracted from the segmented image/defected region, and finally in the 6 third step images are classified into one of the classes of fruit/fruit diseases.

3.2 Flight Controller

Controller plays an important role in drone flying mechanism. This device is used by experts for controlling every movement of drone, ranging from its launching, navigation abilities and even up to landing.

The Flight controller is the nerve centre of the drone. They have inbuilt various sensors like- Gyroscope, Accelerometer, Barometer, GPS. By calibrating these sensors, we can control roll, yaw and pitch angles of air craft. This flight controller can trace their routes back to their remote location. All other devices on frame are controlled by this flight controller.

Major task of a controller is to establish proper communication channel between remote unit and the radio waves.

3.3 ESC to motor Connection

From ESC to the motors we have cables with bare tips. While some wires depend on manual soldering. Sometimes we also have presoldered wires with bullet connectors attached.

To rotate the motors clockwise which of the wires should be connected?

Left wire of ESC is connected to the left of motor

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Middle wire of ESC is connected to the middle part of motor.
And right wire to the right one.

To rotate the motors anticlockwise which of the wires should be connected?
Left wire of ESC is connected to the right of motor.
Right wire of ESC is connected to the Left of motor.
Middle wire of ESC is connected to the middle part of motor.
By this we get proper hovering and the motors work properly.

3.4 Power Distribution Board

PDB is a board that takes power from your battery and then it distributes it to all other components like ESC,FC,vtx, camera, radio receivers and LED. Some quadcopters frames have a PDB integrated into frame and sometimes we have to mount them separately for carbon fibre frames.
PDB is fairly simple, it connects all the +ve connectors and -ve ones with each other. This allows our battery to power equipment in a clean and easy way instead of having
bird nest of power cables going between components.

Many features of a smart phone and drone are same as like both carry GPS, Wi-Fi and many other common sensor units. These onboard sensors help drone to stay in air for long run and make right decisions about its height, direction and other important movements. The landing process is also controlled by propeller system inside and the sensors make decisions about its speed, altitude and motor rotation etc. A drone works like an intelligent air unit that can cover large distance when used with powerful batteries and can bring the hidden information for you like a spy. This is the main reason behind it popularity in military applications.

There is no doubt to say that drones are one of the most wonderful and precious advancement of technology. Presently almost all countries are developing their drones for different applications. There are still some clauses for improvements and many professionals are continuously working on it. Drone carrying camera units inside them are more useful for commercial as well as military applications and they are being developed by almost all top companies in the world. It is a combination of all advanced technologies like micro controllers, GPS, Wi-Fi and sensor units- they all work in perfect coherence to deliver awesome performance for different applications. Most of the countries these days have decided their specific rule set for drone flights and few restrictions are poses on their weight carrying capacity.

3.5 Propellers

They are assembled over motors, they rotate because of the power of the motors and so drown hovers(flies). They are made up of carbon fibre and plastic.
Propeller selection decides which type of drone the user is up to, whether it is racing drone or causal flying drone, do we wish to do acrobatics or aerial videos or are carrying a heavy payload.

3.6 Brushless DC electric motor

They are also known as electronically commutated motors or synchronous DC motors, are synchronous motors powered by DC electricity via power supply which produces current to drive other devices too.

3.7 Implementation

The first stage to implement this idea is to build a stable UAV or drone which will easily go into the farms and can send the captured video or image to user's location.

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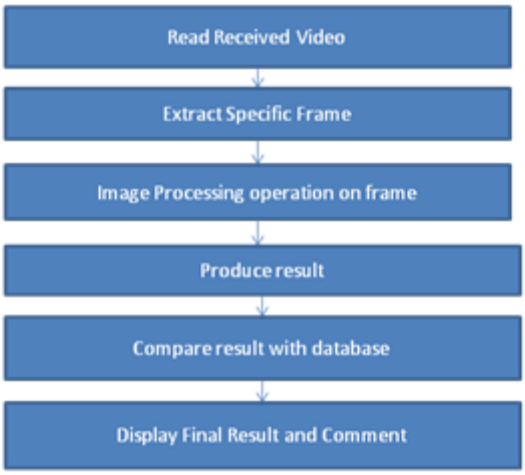

Fig 3.2 Software Flowchart

3.8 Image Acquisition

Images of the infected fruits or leaves are taken from farm. This database has different types of plant diseases, and the images are stored in JPEG format these images are then read in MATLAB using imread command.

3.8 Image pre processing

If noises are present in image, interested region in the image is not clear. In the image clipping, smoothing, enhancement are the three steps included in pre-processing phase. The process of image collection and lots of information may bring noise which makes the quality of image dropped. To perform denoising different kinds of reduction technique are applicable.

3.9 Image Segmentation

Image segmentation is the first step and also one of the most critical tasks of image analysis. According to the region of interest, the image will be segmented into different parts. To divide the image into same meaningful region is the image segmentation.

3.10 Image Feature Extraction

The features extraction is the input data transform into set of features The feature set will extract the relevant information so should carefully chosen Feature extraction involves simplifying the amount of resources required to describe a large set of data accurately.

3.11 Image classification

The intent of the classification process to categorize all pixels in a digital image into one of classes, or theme The objective of image classification is to identify, as a unique gray level (or colour), the features occurring in an image in terms of the object or type these features actually represent on the ground Image classification is perhaps the most important part of digital image analysis.

3.12 Feasibility

The project will mainly use in agricultural area where it is important to frequently monitor the current condition of crops or yield. It is also possible to completely automate this project by implement the concept of Geo-tagging. The user can give the co-ordinates of the field and the UAV can go there and will capture the picture which user needs. This makes the flight fully autonomous where user can simply see the results directly on computer.

3.13 Communications

Most UAVs use a radio frequency front-end that connects the antenna to the analog to digital converter and a flight controller that controls avionics (and that may be capable of autonomous or semi-autonomous operation). Radio allows remote control and exchange of video and other data. Early UAV had only uplink. Downlinks (e.g., real time video) came later In military systems and high-end domestic applications, downlink may convey payload management status. In civilian applications, most transmissions are commands from operator to vehicle. Downstream is mainly video. Telemetry is another kind of downstream link, transmitting status about the aircraft systems to the remote operator. UAVs use also satellite “uplink” to access satellite navigation systems. The radio

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signal from the operator side can be issued from either: Ground control – a human operating a radio transmitter/receiver, a smart phone, a tablet, a computer, or the original meaning of a military ground control station (GCS). Recently control from wearable devices, human movement recognition, human brain waves was also demonstrated. Remote network system, such as satellite duplex data links for some military powers. Downstream digital video over mobile networks has also entered consumer markets, while direct UAV control uplink over the cellular mesh is under researched. Another aircraft, serving as a relay or mobile control station – military manned unmanned teaming (MUM-T).

4. RESULT

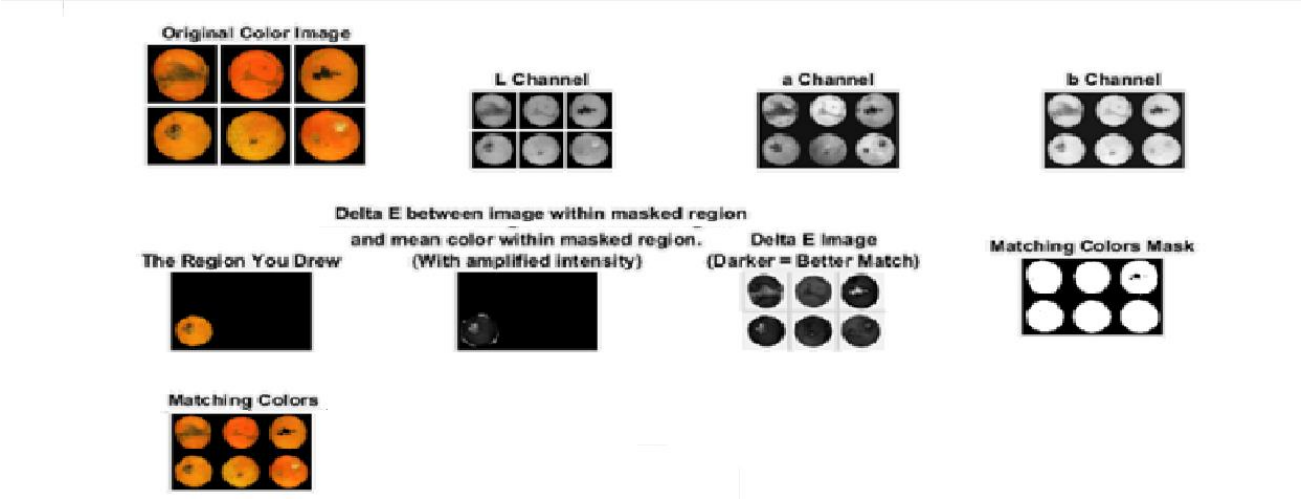

Fig 4.1 Result

5. CONCLUSION

In India, the agriculture sector is increasing the use of robots and in future the place of agro-workers will be taken by the bots.In India, by increasing the future technology we can in hand implement the precision farming and make it worth useful.

6. ACKNOWLEDGMENT

It gives me immense pleasure to express my deepest sense of gratitude to my respected guide Prof. Karishma Raut, Electronics and Telecommunication department, VIVA Institute of Technology, Virar, for her guidance and help for completing this work. I would like to express my sincere thanks to Dr. Arun Kumar, Principal for wholehearted support. I also wish to express my gratitude to Prof. Mrs. Archana Ingle, HOD Electronics and Telecommunication for her whole hearted support. At the end I would like to express my sincere thanks to all teaching and non-teaching staff who helped me directly or indirectly during this project.

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EYEBALL CONTROL WHEELCHAIR

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ABSTRACT

Statistics suggests that there are 11,000 new cases of quadriplegia every year in United States of America. Great people like Stephen Hawking and Max Brito have been suffering from this crippling phenomenon. Our project is an attempt to make lives of the people suffering from this phenomenon simple and by simpler we mean self-reliant, which will thereby reinstate their confidence and their happiness. The idea is to create an Eye Monitored System which allows movement of the patient's wheelchair depending on the eye movements. We know that a person suffering from quadriplegia can partially move his eyes and tilt his head, thus presenting an opportunity for detecting those movements. We have created a device where a patient sitting on the Wheel Chair assembly looking directly at the camera, is able to move in a direction just by looking in that direction. The camera signals are monitored by a MATLAB script, which will then guide the motors wired to the Microcontroller over the Serial Interface to move in a particular direction. The system is cost effective and thus can be used by patients spread over a large economy range.

Keywords: *Electronics & Telecommunication Engineering, Image Capture And Eye Detection, Image Processing, Movement Detection.*

1. INTRODUCTION

The microprocessor will take an USB output from the laptop and convert the signal into signals that will be sent to the wheelchair for wheel's movement. Also, the pressure and object detection sensors will be connected to microprocessor to provide necessary feedback for proper operation of the wheelchair system people who are unable to walk and are using wheel chairs exert great amounts of energy using physical strength to turn and steering the wheels. With eye's being their guide, the disabled would save energy and could use their hands and arms for other activities.

The purpose of this project is to be develop wheelchair that will be controlled by the eyes of the person seated in the wheelchair. This will allow people without full use of their limbs the freedom to move and provide a level of autonomy. This project will consist of three main parts the final part of the project is the motor drivers to be interface with the wheelchair itself. There will be two motor drivers for each motor on the wheelchair both left and right sight. Each motor driver will consist of an h-bridge that will provide power to the motor depending on the output of the microprocessor. The motor drivers will control both speed and direction to enable the wheelchair to move forward, reverse, left, or right.

2. HIGH LEVEL DESIGN

There are two major components from the system design standpoint - a) Eye-Detection and motion tracking. b) 8051 microcontroller controlled Wheel Chair.

2.1 Eye-Detection and Motion Tracking-

A webcam is mounted on a laptop, continuously staring at the user's eyes. The webcam wired to the patient's laptop, is running a MATLAB application designed to monitor and react to eye movements. Based on a series of snapshots taken and there after processed, the motion of the user's eyes are detected, decision to move the Wheel Chair in a particular direction is taken and communicated serially to 8051 microcontroller. MATLAB 2013 has an image processing toolbox which we utilized for the eye detection. We used the 'Cascade Object Detector' capable of detecting eye-shaped objects based on their shape and size. It uses the Viola Jones for the same. A description of the Algorithm is given in the software section of the report.

Continuous snapshots of every 25th frame are taken and feature points extracted are saved i.e. we capture approximately 1 snapshot every second and process it. Based on the position of the feature points in previous snapshot and current snapshot, a movement is detected and this is communicated to the wheelchair

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2.2 Microcontroller 8051 controlled Wheel Chair-

A decision based on the processing done by the MATLAB application is communicated and received by the 8051uc. The controller on reception forces the port pin high on which the motors have been connected for desired motion of the Wheel Chair.

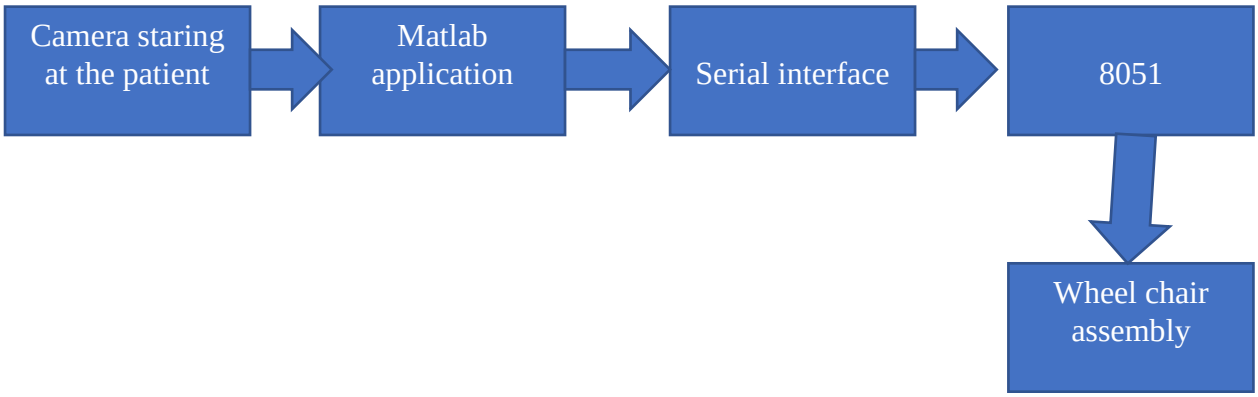

Fig 1: Block diagram

So, now we will have a look at the overall code structure of our algorithm and the logic behind the decision making. There are two parts in the code structure. The first part is to detect the eye movements and the other part is to drive the motors. The code structure can be explained in the following steps:

2.3 Initialization*:* Initially we set up the serial communication that will be used later for the interface between MATLAB and the controller, the video capture and the program variables.

2.4 Image and Video Processing*:* We then take continuous video frames and sample the input and save it as the screen shots. Each frame is then converted into the black and white frames. For the accurate results, we perform contrast stretching on each frames to make the dark region darker and bright region brighter. This will enable the detection of the eyes better.

2.5 Estimation: Now, after working on the each frame we try to detect the eyes. This we do by estimating the position of left as well as the right eye. Thus, we set the threshold and detect the position of the eyes which can be used for the further processing**.**

2.6 Detection: Now, in this step we actually detect the eye movements. The idea is to compare the current position of the eye with the previous position. Thus, the difference in the coordinates will help us to predict the motion in the particular eye. But sometimes, it may be possible that only one of the either eye will be detected. In that case, we will give preference to the eye that is detected currently.

2.7 Error Handling*:* To avoid detection errors, we incorporated an error handling mechanism, which specifies a threshold for the height and width of a valid eye, by calibrating it for the user.
If the detection results give a height and width value lesser or greater than the threshold, the value is voided and not considered for the decision making.

2.8 Motion: Now after detecting the eye movements, we have to come up with a decision algorithm that will help the controller to drive the motors accordingly: a. Valid Left: The decision to turn left will be considered as valid if the eye turns left and stays there for a cycle. This action will be detected as a left turn request. After that, the patient will turn right to again look forward. Thus, this signal should be considered as void. b. Valid Right: Similarly, the decision to turn right will be considered as valid if the eye turns right and stays there for a cycle. This action will be detected as a right turn request. After that, the patient will turn left to again look forward. Thus, this signal should be considered as void. c. Valid Straight: The signal to go straight is when a person looks left and right or right and then left. This will be detected as to go straight.

2.9 Safety Considerations*:* Given the application of the system, we incorporated a safety mechanism, wherein based on the blink detection the wheel chair halts. If the user wants to halt the wheel chair in case of an emergency, he can blink thrice, causing the wheel chair to halt.

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2.10 Serial Communication: Now according to the detected command, the MATLAB application will transmit 0, 1 or 2 for left, right and straight respectively to the controller which will drive the motors.

3. SOFTWARE DESIGN-

There are multiple aspects to the software design of this project. Since majority of computational work is done in software, a lot of our time went in software design and testing.

The MATLAB component is responsible for capture of regular snapshots, processing of those snapshots, determining the movement of eyes, algorithm for movement of wheelchair and serial transmission of the decision to move.

The firmware component deals with receiving the serial signal, based on which drive the motor connected to the port pins, forcing the wheelchair in the direction it is supposed to move in. MATLAB Component The MATLAB design can be structured into many small sub-parts each of which is described below -

3.1 Initialization of variables and setting up serial communication -

MATLAB 2013 can easily be configd to serially transmitting data on the Port mentioned in the code. Initially all the already set up serial ports are disabled. After which, we need to mention the current port, by checking the 'Device Manager' which indicates the port in use. The baud rate of communication is set to 9600. The communication is set to have no flow control and parity check is disabled.

After setting up the serial communication to enable the data link between MATLAB and 8051uc, we reset the variables needed in the course of the program to their initial valuables.

3.2 Image Capture and Eye Detection -

MATLAB 2013 equips an Image Processing Toolbox, which we have used majorly in this section of the Software Design. We use a Microsoft LifeCam HD-5000 web camera which is connected via a USB cable to the Computer on which the MATLAB script is running. We can stream continuous video signals on MATLAB coming from the camera using the video processing toolbox available. The function 'imaqhwinfo' is used to recognize all video capture adaptors. Identifying the correct device and then using it to stream the video signal is the next step.

The requirement of our design was to continuously look at different frames, based on which determine motion. It is practically impossible to do a lot of processing on a per frame basis. That is why we try to sample every 25th frame. So, a snapshot of every 25th frame is captured and processed. We used the 'get snapshot' command to capture these snapshots. The image is then converted to grayscale image, as we do not need colour information to detect eye feature points. The conversion in fact makes the detection easier. The 'imadjust' command is used then to contrast stretch the image to make darker sections even darker, enhancing the eye feature points useful for the application.

This pre-processing of the image makes the image easier to process and extract the eyes from. After the initial pre-processing, we move towards the eye detection. The Eye Detection is done using the Viola-Jones Object Detection Algorithm. Primarily this algorithm was designated for face detection though it is used for all sorts of object detections. The algorithm is designed to work on sum of pixels in a rectangular area. Viola-Jones algorithm says that face can be detected by looking for rectangle. And then the large rectangle is made up of many such smaller rectangles, which are fundamentally feature points on a human face.

The 'cascade object detector' on MATLAB, utilized this algorithm to extract and detect the eyes of the person. We then show the detected eye by plotting the rectangle at the appropriate position of the eye.

3.3 Image Processing -

Initially, all we do is monitor if any eye feature points have been detected or not. If not set a flag and display it on the debug screen. To increase the detection accuracy, we wanted to neglect all other points on the screen except the actual eye of the person. The reason being, if anyone except quadriplegic person comes in front of the camera, the person should not affect the system. Also certain things seemingly looking like eyes should be rejected as well. The way we incorporated this is taking into account the height and length of the eye. After repeated testing, we decide a length and height of a valid eye, sets a range around the threshold and reject everything which is outside it.

The blink detection section is not compute intensive. We use a flag which is set each time no valid eyes are detected. If in corresponding frames the flag value sets, it indicates a blink. A series of 3 such blinks command the motors to freeze, halting the wheel chair.

What is assumed is that the position of the camera is fixed, relative to which the left and the right eye approximate positions can be estimated. Using this, we try to distinguish and store left and right eyes in different matrices. This helps getting a clear discrimination between both the eyes, helping in easy movement detection.

3.4 Movement Detection -

The movement detection is done with a very basic principle. We take in the feature points for both left and right eyes and save it. Thereafter take the difference in pixels of the left eye position and right eye position in the current snapshot from the previous snapshot. We define the threshold for the minimum movement of the eye required to be qualified as a valid attempt. In each snapshot the difference is evaluated, and if this difference above the threshold in any

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Direction left or right, the flags indicating left movement or right movement are set. If the difference is not above the threshold, the flag which says that no movement has occurred is set.
Sometimes due to non-linearity, both the eyes are not detected. At such instances while evaluating the difference for detecting movement, we would give a bias to the eye which was detected in the previous snapshot.
After detecting the eye movements, we can proceed to determining and sending serial signals to the micro-controller.

3.5 Motor signals -

The way we qualify a valid right, left and straight attempts to move, we need to incorporate many factors. The way a valid right is recognized is by tilting face on the right side and stay there for a second, after which the wheel chair starts moving. But the person's face is still tilted on the right. If the person now tries to go back to the initial position by tilting left, the system will detect it and lead to an otherwise invalid left movement of the chair. This has to be avoided.
We set flags for left and right movements each time the wheel chair moves, avoiding precisely this unwarranted behaviour of the system. The way a valid straight movement is detected is titling in corresponding frames in left and right directions. Over here as well, the effect of the offset coming into picture are avoided in the same fashion with the help of flags.

As already mentioned, three corresponding blinks should halt the motors. Along with the motion command, a halt command is also transmitted to the microcontroller assembly which thereby halts the motors as per the user's desire. After determining which direction the wheel chair has to be moved in, the decision is transmitted to the micro-controller via the serial port. The only thing sent is a one digit decision, saying right, left or straight movement.

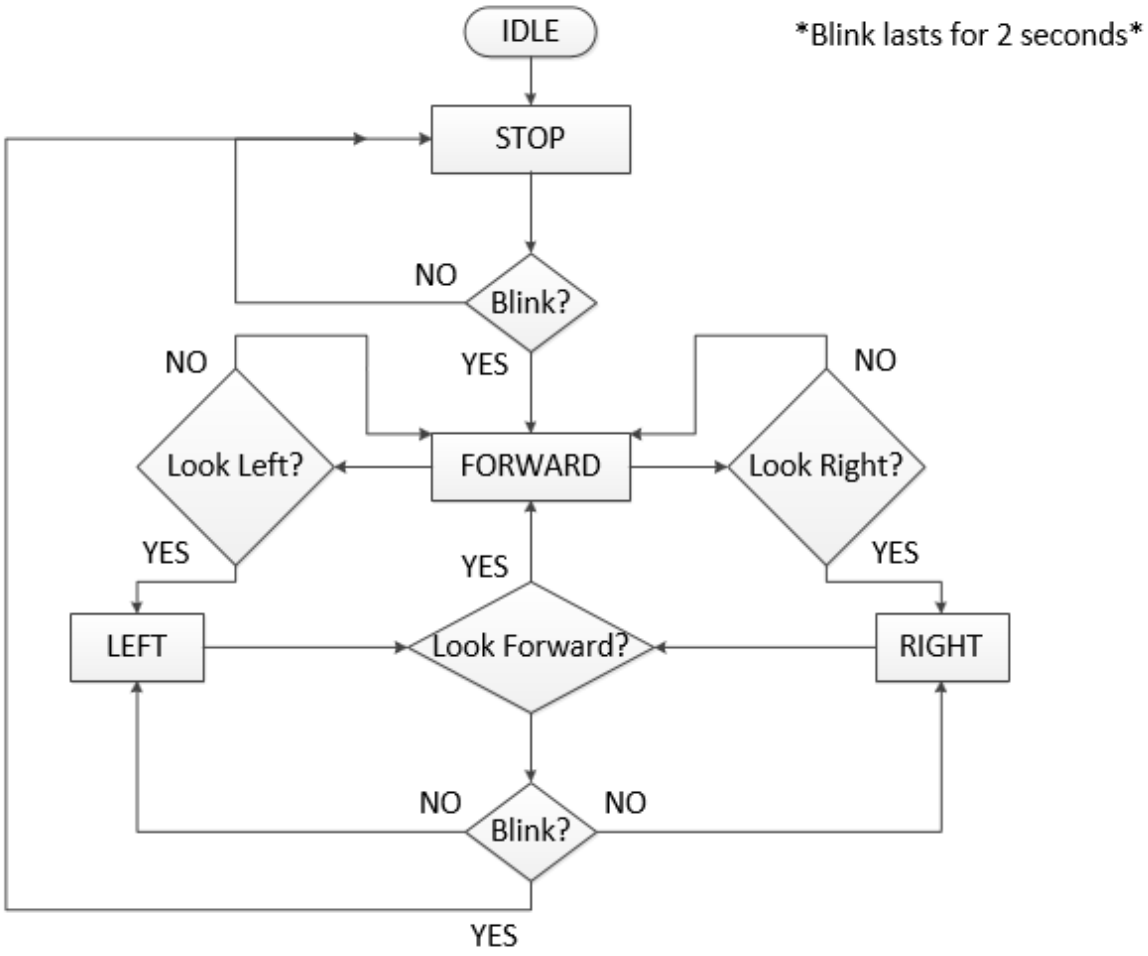

Fig-2 Flowchart

The fig above shows the flow of our project. Initially the system will be in standby state where it will be waiting for visual input from users eye movement .once the user blinks their eye's the chair will start moving forward .this will keep the chair in forward motion while the chairs in forward motion ,the program will check for left or right movement of eye ball.if eyeball moves to left the chair will them to left & right if eyeball moves to right.if the user wants to get back on straight course they need to look forward which will be detected by program and then blink again to get the chair back to idle state

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4. CONCLUSIONS

In this system we present innovation in ordinary wheelchair by adding motor type mechanism and making easier and simple wheelchair to handle by using eye motion tracking for physically disabled and paralyzed. The aim of this system is to contribute to the society in our small way by setting out an idea from this system which could actually better the lives of millions of people across the globe

In this system we present an innovation in ordinary wheelchair by adding motor type mechanism.

5. ACKNOWLEDGEMENT

It gives me immense pleasure to express my deepest sense of gratitude to my respected guide Prof. Ameya Purandare, Electronics and Telecommunication department, VIVA Institute of Technology, Virar, for her guidance and help for completing this work. I would like to express my sincere thanks to Dr.Arun Kumar, Principal for wholehearted support. I also wish to express my gratitude to Prof. Mrs.Archana Ingle, HOD Electronics and Telecommunication for her wholehearted support. At the end I would like to express my sincere thanks to all my friends and others who helped me directly or indirectly during this project..

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FIRE DETECTION USING IMAGE PROCESSING & EXTINGUISHING

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ABSTRACT

From prehistoric times fire has proved to be a boon to mankind, it provided heat for warmth and light to make tools. It has also been a problem to mankind, causing disasters where it has been responsible for much destruction and loss of life. Both natural and manmade environments have suffered when fire has gotten out of hand.
There can be several causes for the occurrence of fire, but when fire strikes it is necessary to take immediate steps to reduce the damage by getting the situation under control. History has been witness to many situations where fires got out of control due to the failure of an immediate response. As technology improved sensors to detect fire early were developed, but these still they have some flaws in alerting people to a potential fire. Our project's aim is to replace the sensor based fire alert system using a vision based system which will use image processing. In simple terms, a computer program will take input stream from a camera in the form of frames. Once the input is taken, the program will perform an analysis based on algorithms which will detect the fire. Once the fire is detected an alert will be given and the system will try to extinguish the fire with help of a connected fire extinguishing system. Thus, this will help in taking immediate action as well as can help to prevent casualties in dangerous situations.

Keywords— *IMAGE PROCESSING; MULTIDIMENSIONAL SIGNAL PROCESSING; COMPUTER VISION; FIRE DETECTION; ARDUINO;*

1. INTRODUCTION

Fire disaster can cause a huge loss to human life and property. Through the post researches and analysis of these fire disasters it has been observed that the damage done by these outrageous fire could have been prevented only if some or any immediate response was given at the time of origin of fire. Only if immediate response in terms of an alarm or taking out fire was available. It's not always possible that fire brigades are close to the place where the event has occurred. Many a times a delay is possible.

To prevent the harm in large amount caused due to fire outbreak it is necessary to keep watch on possible locations where origin of fire is possible. As technology improved the methods for detection and extinguishing of fire also evolved. Systems having smoke detectors, infrared sensors, water sprinklers, foam bombs, etc. have been implemented in various places over past few years.

Our project aims to develop such a system which will can use visual input unlike heat input to detect fire. As fire is a source of light and light has very high speed, it can be utilized to detect the fire more rapidly as compared to sensors where the sensors are required to get heated to actually detect the fire. The image processing-based fire detection system can also monitor wider space than the conventional sensor-based fire detection system.

Now a days, cameras are used at many places for surveillance purpose. Additional functionality for detection of fire can be added to these surveillance systems. The idea is that by using camera a larger part of given area can be covered as compared to sensors. Due to the rapid development of digital camera technology and advanced content based image and video processing, there is a major trend to replace conventional fire detection system with computer vision based system. This system can be further modified to take actions like alarming the people present in the concerned region and take measures for extinguishing the fire depending on the severity of the situation.

2. OVERVIEW OF PREVIOUS METHODS

This section of paper includes the information about the methods used previously by other authors. There have been previous researches on the relative topics of fire detection. After going through journal papers it came to notice that many had used same modelling but with different approaches. Some had output of high efficiency while some had with little less efficiency.

We have organized the studies of previous methods depending on the approaches made by them which are as followed:

Applying Colour Model
Edge Detection
Segmentation
Analysing the Frame difference

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2.1 Applying Colour Model

When a computer system acquires a visual input it sees it as a matrix of different levels of pixels. These pixel levels are nothing but information about different colours, their saturation, intensity, hue and other attributes. In the concerned project colour models are required for creating a reference colour model for detection of fire. There are different colour models existing already which can be applied in varied methods to create a desired reference models. Turgay Celik, Huseyin Ozkaramanli , and Hasan Demirel [1] proposed a generic model for the fire colour.in fire and smoke detection without sensors, this is the image processing based approach paper the author combined their model with simple moving object detection. The colour based pre-processing is the essential part for all image processing based fire and smoke detection systems an efficient colour model is needed. In 'Flame Detection using Image Processing Techniques', they have applied YCbCr along with RGB model after analysing several inputs which had fire in them. They kept in mind the fact that fire has concentration more towards red spectrum and high illumination. In 'OPTIMIZED FIRE DETECTION USING IMAGE PROCESSING BASED TECHNIQUES' there's use of RGB and YCbCr colour models with proposed method of comparing different colour levels in order to identify fire in the given frame and use of histograms for YCbCr models. In 'Fast and Efficient Method for Fire Detection Using Image Processing', Turgay Celik has proposed a method for detection of fire portion using conversion of RGB colour model to CIE *L*a*b** colour model.

2.2 Edge Detection

Edge detection deals with those points on image where there is sharp change in brightness and other discontinuities. Edge detection in our proposed system can be used to determine the growth of the fire. This step will help us further in segmentation. Sobel, Fuzzy Logic, Canny & Prewitt are some of the edge detection methods. Kumarguru Poobalan and Siau-Chuin Liew have used Sobel Edge detection method in the research work on 'FIRE DETECTION ALGORITHM USING IMAGE PROCESSING TECHNIQUES'. They have proposed use of 3x3 masks to the image. 'A Contour Fluctuation Data Processing Method for Fire Flame Detection Using a Colour Camera', Hideaki Yamagishi & Jun'ichi Yamaguchi have used edge detection methods to recognize the contour or shape of the fire. Edge thinning technique to increase the accuracy has been used in 'Advance Algorithm for Fire Detection Using Image Processing and Colour Recognition'.

Sadiccha C. pol, Ashwini H. Wagh, Pooja T. Ramole, Smrati H. Sharma [7] in this paper proposed the system in that the camera capture the images, then that capture images are taken for colour recognition. In colour recognition doing RGB to GREY and then GREY to BINARY code conversion. This will detect the colour, mainly specific colour of fire such as red, yellow, orange etc. after taking inputs from sensors such as smoke sensor, temperature sensor these two sensors will help to more clearly identify fire. After identifying fire performing two operations that is turning ON pump (extinguisher) and sending message to fire brigade depending on threshold values. In methodology there are image processing: A manually segmented fire set is used to train a system that recognised fire like colour pixel.

2.3 Segmentation

Segmentation is a process to separate different layers in an image. We will be using segmentation to separate fire from the rest of the background in frame. YCbCr colour can be used for segmentation purpose as it has separate luminance and chrominance components. In 'FIRE DETECTION ALGORITHM USING IMAGE PROCESSING TECHNIQUES' the proposed method for segmentation is combined result of using RGB colour model and Sobel Edge detection. Another technique of segmentation using CIE *L*a*b** colour space is given in 'Fast and Efficient Method for Fire Detection Using Image Processing'. In 'Fire Detection Using Image Processing', the idea is to use YCbCr colour model along with HSV model to perform segmentation.

2.4 Analysing Frame Difference

No system is absolutely perfect. Same goes for vision based fire detecting system. It is possible that the system might take some still object or anything that somewhat resembles to fire as actual fire outbreak. Thus to avoid this error and increase the overall accuracy, frame difference is required. Frame difference is the change in the current frame with respect previous frame. This can help whether the detection is actual fire or still object depending on the motion of subject. Detecting fire growth is possible from frame difference method. Hideaki Yamagishi, Jun'ichi Yamaguchi [11] proposed the system in present the fire flame detection algorithm. In that some flame colour areas detected in case of following: scene of the fire flame and the artificial light, scene of the fire flame and its reflection light (on the wall, on the road and so on), scene of the flame areas separated by smoke, scene of street lamps and so on. In these method a flame colours histogram is made by counting the appearance of flame colours in sequential input image then the position of fire is decided by coordinate of the centre of gravity of maximum degree area. The space-time Fluctuation of the Contour: the contour of the flame colours area is extracted using an edge operator. Using the distribution, it is possible to distinguish the difference between the fire flame and the artificial light. Punam Patel, Shamik Tiwari [9] proposed the colour model for fire detection are to be applied on image. The RGB colour model is a fire can be described by its colour properties. There are three different colour element of colour pixel: R, G, and B. RGB colour model is used to detect red colour information in image. YCbCr colour model is used in our model rather than other colour spaces because of its ability to distinguish luminance information from chrominance information more effectively than other colour model.

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3. METHODOLOGY

Detection of fire using an array of sensors is an easy method when compared to detection of fire using image processing. For detection of fire using image processing we need to understand the visual properties of fire as well as it is important to understand how a computer reads an image. We need to also be able to distinguish the fire from other objects in surroundings with similar colour properties.

Our approach to detection of fire using image processing proposes multiple techniques to detect the fire in a given frame. The goal is to use previously use methods by others all together and to know whether the system is able to detect the fire more efficiently as compared to each method used individually. In this way we can reduce the chances of false positive output of the system thus preventing system from generating false alarm.

The flow chart included in this section describes the approach for proposed method.

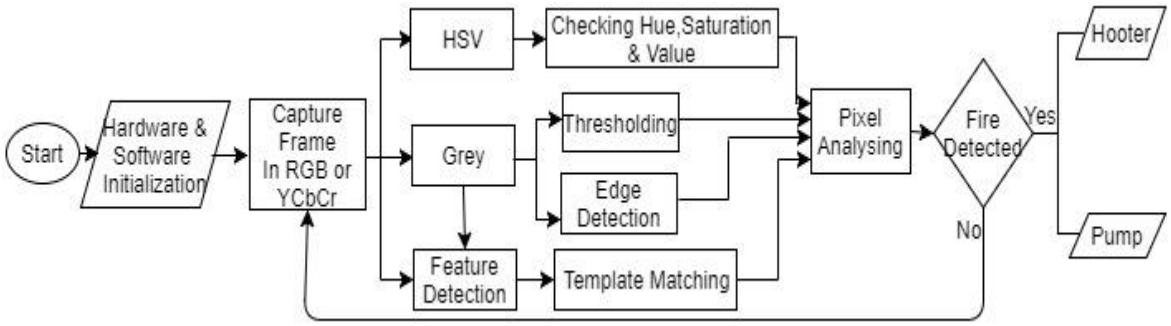

Fig-1: ROI in Greyscale and HSV colour space

3.1 Image Acquisition

For detection of fire in a given scenario to the system, it must capture a frame. We have used a webcam for the prototyping purpose. The system initializes the webcam at the beginning and captures an initial frame just for background reference in case of fire is ignited in later stages.

Once the main loop of system has started the program will trigger the camera to capture the frame after certain interval after that will be predefined. At every trigger the camera will capture a single frame and give to the computer on which the program is running.

The frame is captured in MPEG_640x480p format which will give the captured frame in RGB colour space.

Fig 2: Captured Frame from webcam

3.2 ROI and Colour Space Conversions

Once the frame is captured we need to set the Region of Interest in the frame to reduce the region of processing to detect the fire in scene. We set the ROI of 400x400p in the captured frame so as to cover more region and reduce the time for process cycle. The frame we capture will be in RGB colour space. Computer understands the image with grey levels for R, G and B component individually. The grey level captured in a frame may or may not vary depending on the quality of the camera thus we have to consider the camera quality as well. Output of camera also varies depending on the light available from rest of the surrounding, but in case of fire which itself is a source of light there are chances that

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camera may capture it different from how the human eyes perceive. RGB colour space becomes less reliable in such conditions.

Fig 3: ROI in Greyscale and HSV colour space

In order to increase the reliability of the captured data we need to convert the captured frame from RGB colour space to other colour spaces which can be observed as device independent at considerable level. The method discussed here utilizes three different colour space to increase the correctness of system rather than depending on a specific colour space. After the frame is capture the system converts the frame from RGB to Grey Colour Space and HSI Colour Space. We are using HSI colour space in order to carry out segmentation based on thresholding and to detect the edges of the features in the frame.

RGB to Greyscale conversion can be done in 3 different levels viz. Lightness, luminosity and average. The following equations show the RGB to Greyscale conversion based on 3 levels mentioned:

Lightness:

$G = (\max(R, G, B) + \min(R, G, B)) / 2$

Luminosity:

$G = 0.21\ R + 0.72\ G + 0.07\ B$

Average:

$G = (R + G + B) / 3$

RGB to HSV conversion can help the detection of fire more efficiently as compared to RGB colour space as it measures Hue, Saturation and Value for each colour individually instead of just calculating grey levels for R, G and B. This way we can specify the range for each component instead of calculating values for different light conditions which has to be done in RGB space.

The following equations show RGB to HSV conversions:

The R, G, B values are divided by 255 to change the range from 0-255 to 0-1:

$R' = R/255 \quad G' = G/255 \quad B' = B/255$

$Cmax = \max(R', G', B') \quad Cmin = \min(R', G', B') \quad \Delta = Cmax - Cmin$

Hue calculation:

$$H = \begin{cases} 0°, \Delta=0 \\ 60° \times (G'-B' \ (\text{mod}6)) / \Delta, Cmax=R' \\ 60° \times ((B'-R') / \Delta) + 2), Cmax=G' \\ 60° \times ((R'-G') / \Delta) + 4), Cmax=B' \end{cases}$$

Saturation calculation:

$$S = \begin{cases} 0, Cmax=0 \\ \Delta / (Cmax), Cmax \neq 0 \end{cases}$$

Value calculation: $V = Cmax$

3.3 Thresholding & Edge Detection

Once the captured frame is converted to Greyscale image we use it to detect the fire based on threshold values for R, G and B colours individually. This method requires input of upper and lower threshold limits. Once the threshold levels are specified the program will create a binary image of the region where fire is detected. There different methods for performing thresholding on a greyscale image, viz. Otsu's method, adaptive thresholding, etc. The problem of thresholding lies with the grey level of RGB component individually as they vary with change in light conditions. This

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reduces the reliability even if we consider taking average data for threshold values. Even with this drawback we can use the segmented binary image in conjunction with HSV colour space. Idea is to check whether the pixels detected as fire in binary image is really fire by checking each pixel for its H, S and V values.

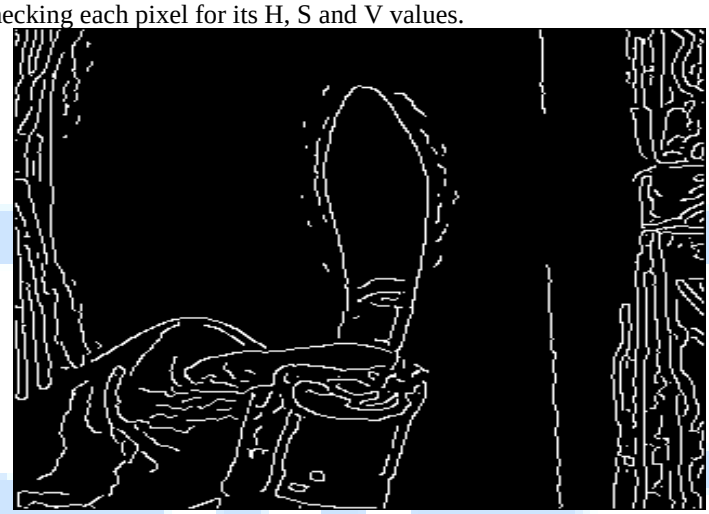

Fig4: Edge Detection on ROI

We use edge detection method to reduce the region of processing even more by detecting the edges of fire in given frame. There are different methods for detecting edges in an image like Prewitt's Mask, Sobel Edge Detection and Canny Edge detection. After testing on many samples we concluded that Canny Edge detection method proved more reliable as compared to Sobel edge detection. Once the contour of fire is detected in given frame, the system checks for the presence of fire within the contour with help of HSV colour model.

The following equations describe the canny edge detection in mathematical form:

$g(m,n) = G_\sigma(m,n) * f(m,n)$……..smoothing with Gaussian Filter

Where $G_\sigma = (1/(2*pi*\sigma^2)^{1/2})\exp(-(m^2+n^2)/2\,\sigma^2$

$M(m,n) = (g_m^2(m,n) + g_n^2(m,n))^{1/2})$…….Compute Gradient

$\Theta(m,n) = \tan^{-1}[g_n(m,n)/\, g_m(m,n)]$

$M_T(m,n) = M(m,n)$ if $M(m,n) > T$ else 0

3.4 Template Matching

In our method to detect fire we are also using template matching method in which idea is to store a number fire images as a reference for system. The system will load the database at the initialization stage. The captured frame will be checked for matching features with reference to database images. This will be followed by verification with pixel analyses for detected features in HSV colour space.

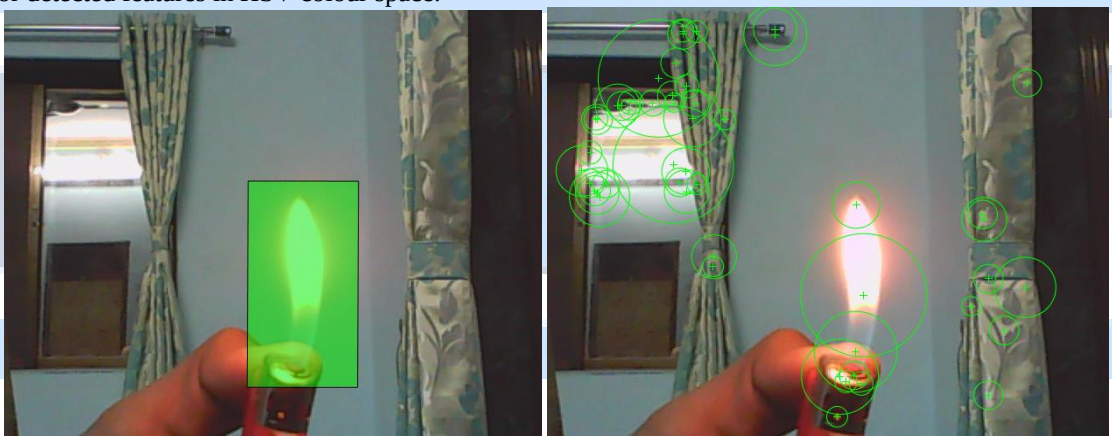

Fig5: Fire Detected in frame using template matching

There are different methods for template matching method like SURF, FAST, KAZE, MSER, HOG, LBP, etc. We used SURF blob detection method for our project to detect the fire. The template matching is pretty much reliable but the problem with this technique is that system needs to be preloaded with base images for comparison and matching purpose, chances of system becoming slow due to this are higher thus increase the processing time for each frame.

3.5 Alarming & Extinguishing

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Once the fire is detected it is necessary to alarm the concerned authorities about the detected fire as well as take the actions for extinguishing fire. An efficient microcontroller or SoC can be interfaced to the machine which is running the program for detection of fire.
Once the fire is detected our system will command the interfaced controller to raise the warning alarm like a siren or hooter or any other warning. Once the alarm is raised it will trigger the extinguishing systems like water pump or sprinkler to put off the fire.
In our project we have used an Arduino UNO board based on ATmega328 microcontroller. A hooter alarm and a pump will be interfaced to the board which will extinguish the fire.

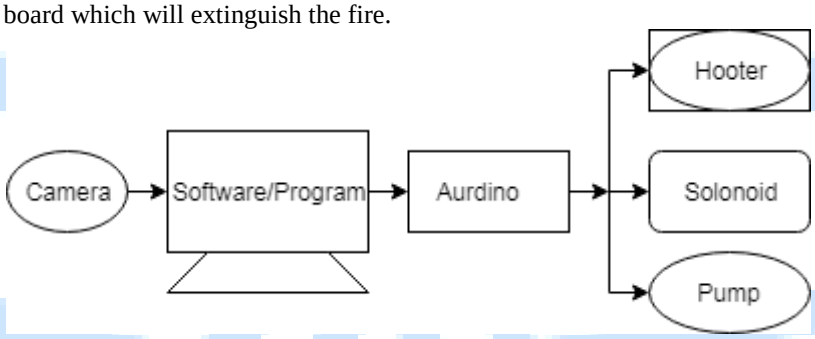

Fig 6: Block Diagram for planned extinguishing system

4. RESULTS

For result purpose we carried out few number of tests on images captured from webcam for 3 different methods for detecting fire that are thresholding, edge detection and template matching. The results are tabulated below.

Method	Number of Tests(Fire Present)	Number of times Fire detected	Reliability
Thresholding	20	17	85%
Edge Detection	20	16	80%
Template Matching	10	5	50%

TABLE-1: RESULTS TABLE

5. CONCLUSIONS

We developed the fire detecting and extinguishing system by referring to the previously done work by other authors. We built the system based on multiple methods instead of using only a single specific method for detection of fire. From results table we can see that the thresholding and edge detection are more reliable as compared to template matching. We can use the feature extraction in template matching method to check for fire using more precise database.
On other hand the use of multiple methods take more amount of time for processing to detect fire in each frame. The use of template matching with preloaded images of fire also uses more system memory thus unless there is not enough database we can see that system fails to detect fire using template matching for half of the tests. The possible solution for future development is to design the system to develop its own database of fire with help of detected fire using other running algorithms on system. This method will be more like self-adapting system which will be human monitored at beginning for training purpose more like neural network system.

6. ACKNOWLEDGEMENT

We are very thankful to the department of Electronics and Telecommunication who gave us a chance to present our research paper on Fire Detection Using Image Processing & Extinguishing. We also thank all the experts with whose help we were able to complete his paper work. I am very thankful towards Principal Dr. Arun Kumar, Principal for whole hearted support. I also wish to thanks to our Project Guide, Professor and HOD of EXTC department Mrs. Archana

Ingale for her kind support and I am also grateful to my teachers for their guidance. I also wish to express my indebtedness to my parents who always supported helped me to face the challenges ahead. At least but not least I'm very thankful to all my friends and others who helped me complete my work directly or indirectly.

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Leaf Disease Detection Using Image Processing in Matlab

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ABSTRACT

To prevent the losses in yields and quantity of the agricultural products identification of plant disease is essential. The study of visually observable patterns seen on the plant is nothing but the study of plant disease. Health monitoring and disease detection on plant is very critical for sustainable agriculture. It is very difficult to monitor the plant diseases manually. It requires tremendous amount of work, expertise in the plant diseases, and also require the excessive processing time. Hence, image processing is used for the detection of plant diseases. Disease detection involves the steps like image acquisition, image pre-processing, image segmentation, feature extraction and classification. The work discussed the methods used for the detection of plant diseases using their leaves images.

Keywords— *leaf disease, image processing, matlab, classification, neural network*

1. INTRODUCTION

India's 70% of population depends on agriculture. Plant disease leads to the significant reduction in both the quality and quantity of agricultural products. Monitoring of health and disease on plant plays an important role in successful cultivation of crops in the farm. Farmers have large range of diversity for selecting various suitable crops and finding the suitable pesticides for plant. In early days, the monitoring and analysis of plant diseases were done manually by the expertise person. This requires tremendous amount of work and excessive processing time. At the same time, in some countries, farmers do not have proper facilities or even idea that they can contact to experts. Due to which consulting experts even cost high as well as time consuming too. In such condition, the suggested technique proves to be beneficial in monitoring large fields of crops and automatic detection of the diseases by just seeing the symptoms on the plant leaves makes it easier as well as cheaper. Image processing is the technique, which is used for measuring affected area of disease and to determine the difference in the colour of the affected area. Major role in economic development of India Agriculture is the largest economic sector [1]. To distinguish between different types of leaf diseases which are trusting on human resource the manual classification and identification methods are used. They are subjected to some kind of errors since these techniques are focused by human involvement. The automated system helps to reduce the time consumed by manual techniques since humans are subjected to tiredness. The deficiency of labours automatic system needs to be incorporated to minimize the work and many new farming industrialization tools are being established by university investigators that pose questions about the effectiveness with which we succeed current farming practices [2].

1. LITERATURE SURVEY

Referring various papers, the survey on different diseases classification techniques and an algorithm for image segmentation technique that can be used for automatic detection as well as classification of plant leaf diseases have been computed [3]. There are three main steps for leaf diseases detection. At first preprocessing is done which include two steps grey conversion. Second stage is k-means based Image features. Third stage is feature extraction, which includes color features and shape. Feature extraction consists of two algorithms SVM and KNN. SVM is very complex in calculations and it is not the cost effective testing of each instance and inaccurate to wrong inputs. KNN algorithm is effectual classifier would be used to minimize the computational cost. KNN classifier obtains highest result as compared to SVM [2], [5]. The Color Transformation Structure, The HIS color model and Image Feature Extraction methodology uses leaf features for disease detection where feature extraction is done on segmented diseased area. Hue image from HIS gives clear discrimination of diseased spots, and which is more helpful for extracting size, color and centroids [7]. Classification is done using two classifiers Neural networks and Fuzzy logic. Neural networks are used in order to increase the recognition rate of final classification process. Fuzzy logic is used for process control, management and decision making, operations research, pattern recognition and classification [9], [11].

2. DESIGN METHODOLOGY

A system for analysis the leaf disease has been developed using the Matlab application. To improve and enhance the image to a better quality the image processing techniques are applied. This methodology involves various processes such

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as image acquisition, pre-processing and segmentation, analysis and classification of the various leaves. To separate affected lesion area from normal area all the leaf image samples will be passed through the segmentation techniques like

thresholding, region growing, K-means clustering and then feature extraction is done. Later by using neural network and fuzzy logic technique it undergoes classification to identify various types of diseases.

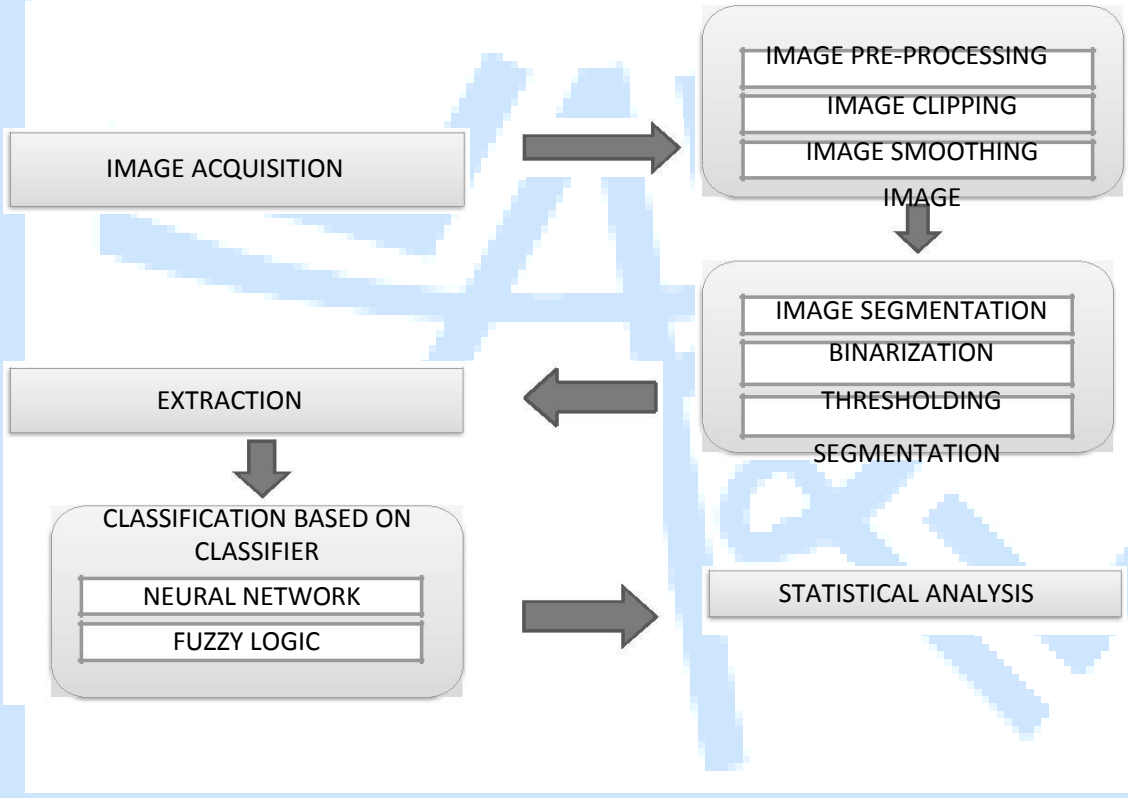

Fig. 1 Flow chart

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3.1 Image Pre-Processing

Image pre-processing is a prophase relative to feature extraction and image recognizing. The images which have input are always not satisfactory regardless of what image acquisition devices are adopted. For e.g., there are noises in the image, the region of interest in the image is not clear or other objects' interference exist in the image and so on. Different pre-processing methods should be chosen for different image applications. To remove noise in image or other object removal, Image clipping i.e. cropping of the leaf image to get the interested image region. Image smoothing is done using the smoothing filter. Image enhancement is carried out for increasing the Contrast.

3.2 Image Segmentation

Segmentation means partition of image into different part of same skin tone into different part of same elements or having some likeness. Dividing the image into some meaningful regions is called segmentation. Simply to say, image segmentation means to separate the object from background for following processing in an image. It contains Thresholding, Binarization and Segmentation.

3.3 Extraction of Features

The input image is enhanced to protect information of the pretentious pixels before colour from the background. The colour space equally is used to reduce effect of illumination and distinguish between disease and non disease leaf colour inventively the resulting colour pixels are clustered to acquire groups of colours in the image. Feature extraction is nothing but transforming the input data into the set of features. If the features extracted are carefully chosen it is expected that the features set will extract the relevant information from the input data in order to perform the desired task using this reduce representation instead of the full size input.

3.4 Classification

Categorization of leaf is based on its different morphological facial peripheral. Plant leaf infection classification has wide application in cultivation. Classification based on a classifier: We are using Artificial Intelligence Techniques to solve the problem. We are going to classify it with the original existing work. Some of the classification techniques used are Component Analysis, k-Nearest National Classifier, Artificial Neural Network and Fuzzy Logic to classify the plant diseases.

3.5 Statistical Analysis

By comparing the classification results of ANN and Fuzzy Logic Technique. These analyzes, which system is better in sense of Accuracy, Speed, User friendly, easily adaptable topology of the network changes, a new sequence number is necessary before the network re-converges; thus, DSDV between nodes by sending full dumps infrequently and smaller incremental updates more frequently. Whenever there is not suitable for highly dynamic networks. As in all distance-vector protocols, this does not perturb traffic in regions of the network that are not concerned by the topology change.

3. RESULT

The appropriate image processing method is used for extracting the spot features from image. These features are very important for the color and morphology of the leaf spots and they provide critical information about its visual representation. The features correspond to color characteristics are the mean and variance of the gray level of the red, green and blue channel of the spots; as in fig. 2 and fig.3.

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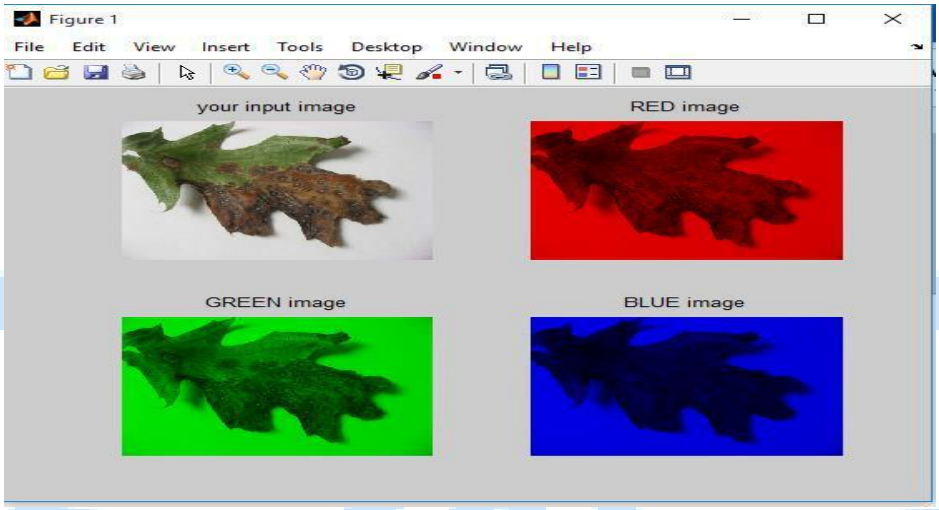

Fig. 2: RGB Images

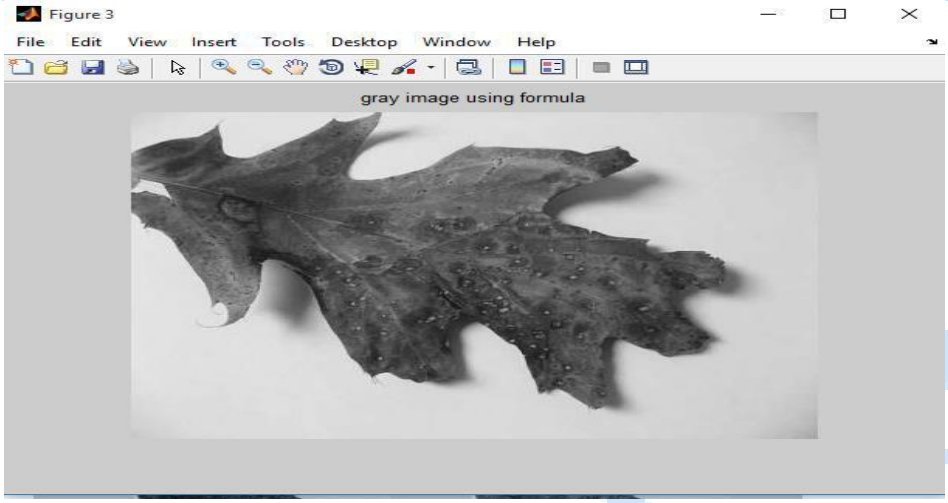

Fig. 3: Gray Scaled Image

4. CONCLUSION

This project presents the survey for plant leaf disease detection and an algorithm for image segmentation technique that can be used for automatic detection as well as classification of plant leaf diseases. There are some species on which proposed algorithm is tested. Therefore, related diseases for these plants were taken for identification. With very less computational efforts the optimum results were obtained, which also shows the efficiency of k-mean algorithm in recognition and classification of the leaf diseases. Another advantage of using this method is that the plant diseases can be identified at early stage or the initial stage. To improve recognition rate in classification process Artificial Neural Network, Bayes classifier, Fuzzy Logic and hybrid algorithms can also be used.

5. ACKNOWLEDGEMENT

It gives me immense pleasure to express my deepest sense of gratitude and sincere thanks to my highly respected and esteemed guide Prof. Karishma Raut, Viva Institute of Technology Virar, for his valuable guidance, encouragement and help for completing this work. His useful suggestions for this whole work and cooperative behavior are sincerely acknowledged.

I would like to express my sincere thanks to Prof. Karishma Raut, for giving me this opportunity to undertake project. I would also like to thank principal for wholehearted support. I also wish to express my gratitude to Prof. Archana Ingle HOD (Extc dept.) for her hearted support. I am also grateful to my teachers for constant support and guidance.

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I also wish to express my indebtedness to my parents as well as my family member whose blessing and support always helped me to face challenge ahead. At the end, I would like to express my sincere thanks to all my friends and others who helped me directly or indirectly during this project work.

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Microcontroller based 3D Scanner using Image Processing

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ABSTRACT

A 3D scanner is a data acquisition device which analysis real world objects based on their shape, size & colour. The acquired data is used to reconstruct a 3D model of the object scanned. A set of hardware & software is used to digitize the physical data. Our project "Microcontroller based 3D scanner using Image Processing" is used to digitize data of real world objects using laser based technology & hardware assembly constructed on triangulation law. Further this project aims at developing a 3D data acquisition tool which reconstructs model in less time, affordable cost & highly accurate digitized model using laser technology.

Keywords: - *3D Scanner, Scanning, Microcontroller, Laser, Triangulation, Data acquisition, 3D digital model*

1. INTRODUCTION

1.1. Introduction to Scanning

Observing all parts in order to view all features of an object is referred to as scanning. The objects being scanned are based on requirements of the user. Scanning is used to obtain replicated copy of the original object in different dimensional form.

1.2. Types of Scanning

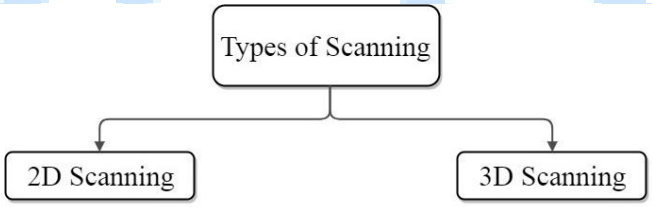

Fig. 1 Types of scanning

1.2.1 2D Scanning:

Reading the vertical and horizontal arrangement the 2D scanner reads data in two dimensions like Dot matrix, QR code or PDF.

1.2.2 3D Scanning:

A 3D scanner is a device that analyses a real-world object or environment to collect data on its shape and possibly its appearance (e.g. color). The collected data can then be used to construct digital three-dimensional model.

1.3. History of 3D scanner

With the advent in technology followed by the industrial revolution development of huge machinery and complex architecture became possible. Production using electrical energy was done along with mechanical expertise however the process of replication was slow which reduced the pace of production. Industries developed contact probes but still the process was not as fast as expected thus developing a system which could replicate the system in less time as well with much precise details became a necessity. This further led to the development and advancement of "3D Scanner".3D scanner was first developed during the last half of the 20th century to precisely recreate various objects and models.

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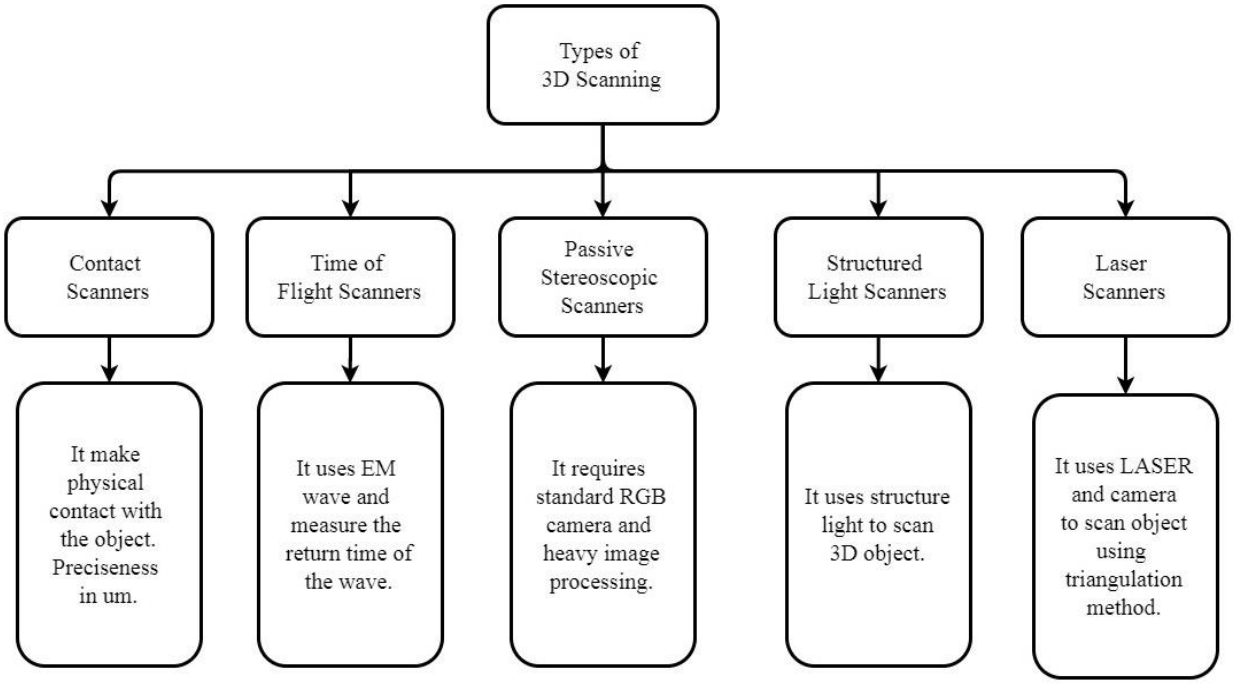

Fig. 2 Types of 3D scanner

2. REVIEW

In laser scanning technique the main aim is to achieve images having only laser line, or array of points belongs to this laser line [13]. In this project real world object or environment are scanned by a 3D data acquisition tool which collects raw data based on appearance and dimensions of the object. Digital 3-dimensional structure can be constructed by the data being collected. The technical goal of this project is to make a 3D appearance of the structure or object so that we can compute and precisely replicate the whole of it [2]. In this the author proposed a technique for point noise processing on the 3D scanned data the point cloud is deal with clustering and sampling steps and finally achieved a satisfying de-noising result [4]. Triangulation method is applied by using a camera and a laser pointer with line pattern generator to define depth from a single image that captured by camera to acquire points for point cloud. After obtaining the point cloud of a real world object. A digital 3D model is reconstructed using point cloud which replicates the scanned object in dimensions. Using laser technique for scanning depth of object is also determined.

3. PROJECT THEORY & CALCULATIONS

Our project "Microcontroller based 3D Scanner using Image processing" is implemented using laser technology with the geometry calculated by 'Triangle Law', microcontroller controlling the laser and motor on which an object placed for scanning.

3.1. Project Theory

3.1.1 Triangle law

Triangulation based 3D scanner also referred as 'Active 3D Scanner'. Triangle law is used to define the geometry of the structure. Configuration and calibration must be done prior the scanning process begins. Configuration between the laser and camera helps acquire the region of interest from the camera frames, reference frame distance with respect to camera, angle between camera, laser and object along with the focal length. It takes care about the laser position to capture the desired frames.

3.1.2 Controlling of Device

The scanner designed is controlled using two Microcontrollers:-

1) Master microcontroller
2) Slave microcontroller

Master microcontroller also called the host software controls the overall system i.e. camera, laser & the rotating disk. Controlling of each component is indeed important as each has to turn ON & OFF at particular time interval to

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create an accurate point cloud. The camera settings are done using the host software the required focus is acquired using host setting.
Slave microcontroller is used to carry out synchronization between lasers and turn table. It receives signal from the host to turn laser ON or OFF and further rotate the disk accordingly. The process is carried out in a fraction of seconds thus has to be synced properly to capture every detail of the object more precisely and accurately.

3.1.3 Horus

Horus is open source software develop by Jesus Arroyo, Irene Sanz, Jorge Robles publish by the Free Software Foundation. Being supported by multiple operating systems like Windows and Mac, programming is done using python. Providing real-time visualisation of 3D objects it provides better results as compare to other point cloud computing software's like MATLAB.

3.1.4 Point Cloud

Collection of data point defining a given coordinate system in digital world is defined as point cloud. Point cloud acquisition is a technique that digitizes real world objects into 3D digital models. In 3D Cartesian coordinate system, a point is defined by three coordinates taken together correlates to a precise point in a space relative to a point of origin. X, y, and z axes extend in two directions and the coordinates identify the distance of the point from the intersection of the axes(0) and the direction of divergence, expressed as + or -. 3D scanner gathers point measurements from real world objects or photos for a point cloud that can then translated to a 3D mesh.

3.2. Calculations

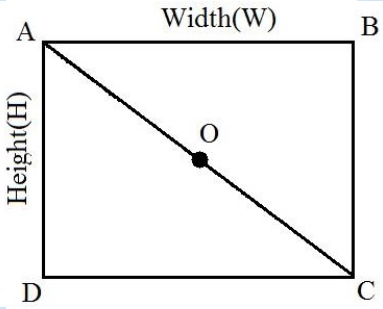

Fig.3(a) Aspect Ratio

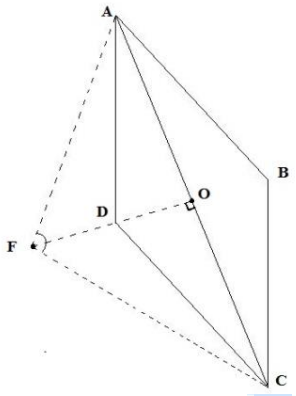

Fig. 3(b) Field of View(FoV)

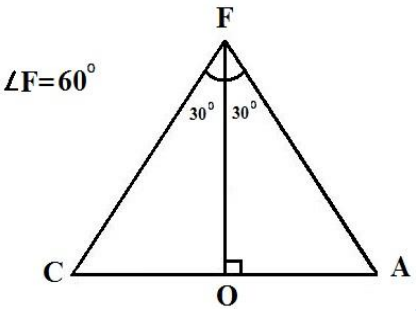

Fig. 3(c) 2D View

Aspect Ratio (W:H) = 4:3 (standard)
From fig. 3(a),
side DC = 4(Width) and side AD = 3(Height)
Therefore ΔADC forms right angle triangle
For ΔADC using pythagoras theorem
$DC^2 + AD^2 = AC^2$
Therefore AC = 5 units (standard aspect ratio)
From fig. 3(b),
point F perpendicular to point O (where F = Camera lense; O = Centre of frame tobe scanned)
Since FoV = 60º(Field of View for Camera)
Therefore ∠F = 60º
Therefore distance (FO) = $\frac{1}{2} * AC \ / \ \tan(\frac{F}{2})$ …… Distanace Formulae
AC = 5, F = 60º.
Therefore, FO = 4.33 (standard value)

4. WORKFLOW

To carry out scanning properly the 3D scanner is operated in multiple steps which include:-

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4.1. Data acquisition

Data acquisition is the process of acquiring data for point cloud creation. For our project data acquisition is carried out using Laser, Camera and the turn table used to rotate the object in front of the camera. As the power is turned ON the turn table is turned ON. The camera continuously captures frames of the object placed on the turn table named image (A). The laser being controlled by microcontroller is switched ON for a fixed time interval which gives us images with Laser say image (B). The two controllers working in synchronization rotates the disk at a fixed time interval to acquire both images the one with laser over it and the other without laser over it. These acquired images are subtracted from one another to acquire the points for point cloud.
Thu Point cloud point(P)=Image with Laser(B) - Image without Laser(A)
The point P is then given to the Point cloud computing software to form a point cloud of the real-world object into 3D digital world.

4.2. Point Cloud Computation

Point cloud is the process of developing a digital matrix from the acquired data. The matrix is created in Horus where the 3-dimensional object is computed in 2D matrix. The scanning process is paused and resumed from start until the points acquired are enough to calculate the whole point cloud matrix.

4.3. Reconstruction of object

Once the point cloud computation is completed the last process is of reconstruction. The real-world object is reconstructed in digitized form using MESHLAB. The object being reconstructed defines same geometry and colour information as that of the object being scanned.

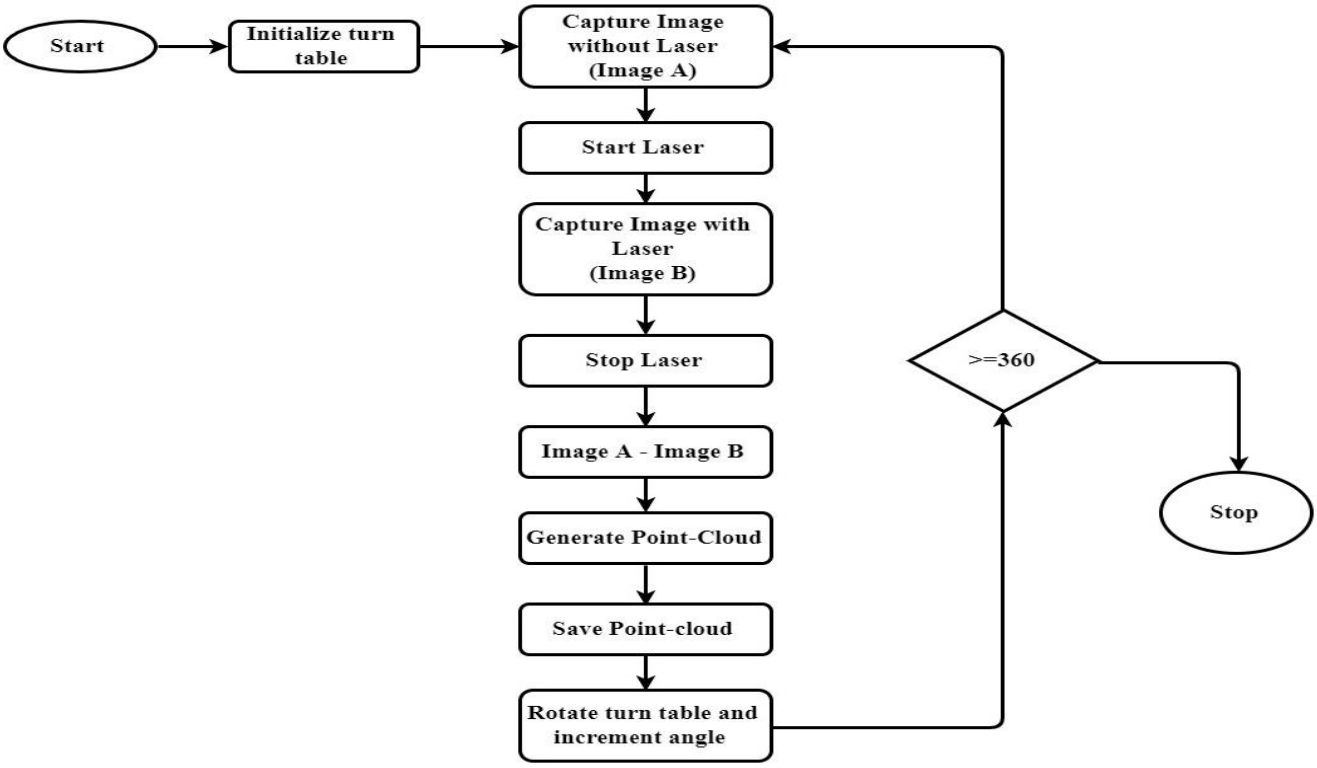

Fig. 4: Workflow of scanning process

5. RESULTS

The resulting image will be as shown in the figures.

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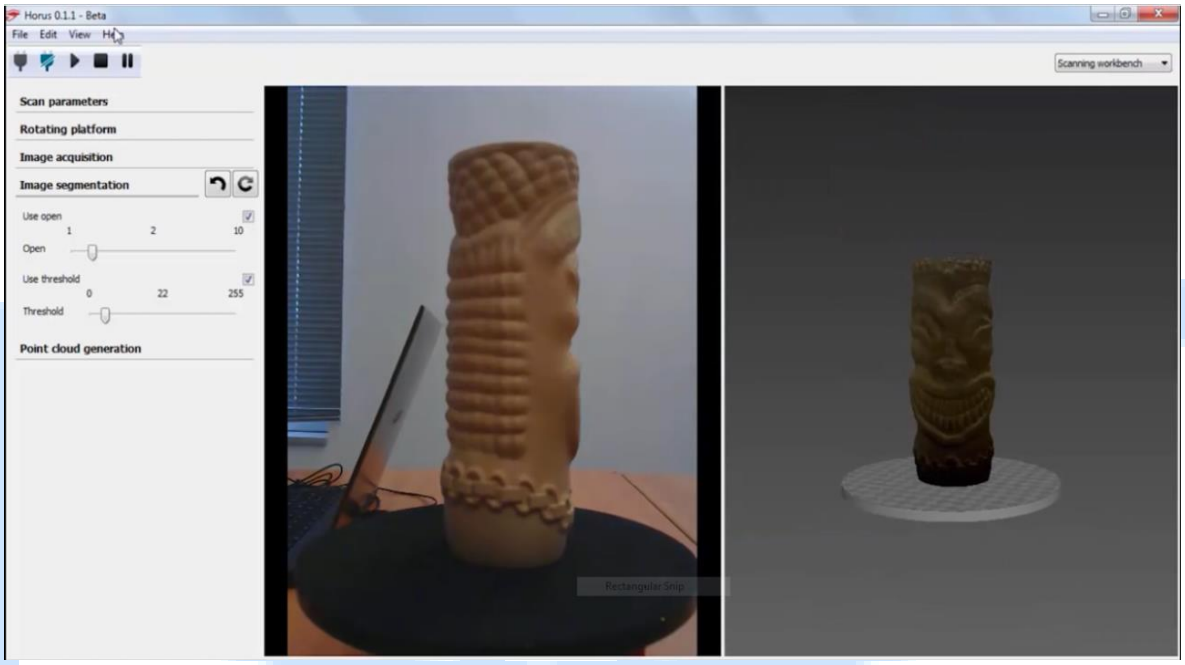

Fig. 5: Horus GUI

Figure (fig.5) shown result for GUI created by Horus.

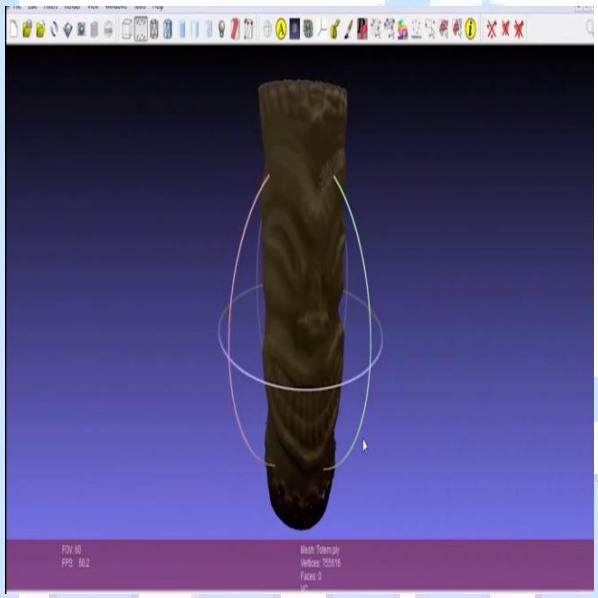

Fig 6: Meshlab

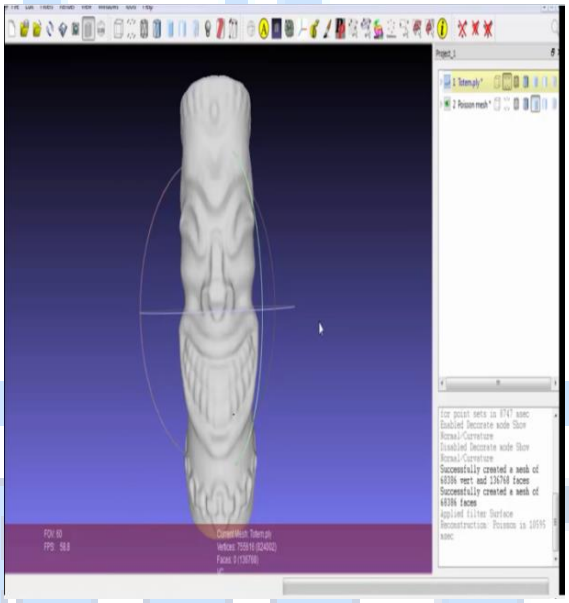

Fig. 7: Reconstructed Object

Figure (fig.6) shows reconstructed images of scanned object in MESHLAB.

6. CONCLUSION

Development in technology is taking place with rapid pace this developing technology demands accuracy as well as preciseness in order to replace the traditional manual techniques with the new system. 3D scanner is one such device that gives accurate and highly precise 3D replicated image of a real world object. Our project "Microcontroller based 3D scanner using Image Processing" will be basically used as it is environment friendly and has eye safe laser systems, the principle of operation relies on the object selective illumination and laser reflection detection. 3D scanner is the most versatile system as it is used in different industries for replication. The accuracy of 3D scanner is in the range of few micrometres for size of several meters which provides us with more perfect results in order to develop products using its replicated image.

7. FUTURE SCOPE

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The microcontroller based 3D scanner using image processing isn't complete yet. We plan to work on it and develop it to be more efficient with help of different algorithms.
According to the algorithms referred the system won't be able to provide a precise scan output for metallic shiny surface. Since the laser will use is red line laser thus it may be unable to scan red shiny surface accurately.
We aim at minimizing these errors in order to get an accurate as well as precise 3D scanned image of the object and to make it fit for industrial use.

8. ACKNOWLEDGEMENT

"It is not possible to prepare our final year project report without the assistance and encouragement of other people. This one is certainly no expectation."
On the very outset of this report, we would like to extend our sincere and heartfelt thanks for active guidance, help, and cooperation obligation towards all the personages who have helped us in these endeavours. Without their encouragement, we would not have made headway in the project.
First and foremost, we would like to express our sincere gratitude to our Guide & Head of Electronics & Telecommunication Department of our Institute Prof. Mrs. Archana Ingle for guiding us in this project and creating a sustained enthusiasm and involved interest from her side. Next, we would like to thank our Principal Dr. Arun Kumar for supporting us in our project. We also want to thank Mr. Nayan Mestry owner of NM Technocrafts for guiding us and providing us will all the equipment's and workshop for completion of our project.

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Smart Waste Segregator Based on Image Processing Using Raspberry Pi 3

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ABSTRACT

With the rapid increase in the population there is rapid increase in the consumption of various products and hence as a result volume and types of waste too have increased gradually due to continuous economic growth, urbanization and industrialization. Thus, waste segregation is becoming a burgeoning problem for local and national governments to ensure effective and sustainable management of waste. The segregation involves handling, transport, and disposal of large volume of waste which needs to be properly managed to minimize the risk to the health and safety of the public, patients as well as the environment efficiently. Currently, there is no such system of segregation of separating dry, wet and metallic wastes at the household level however, in many countries and cities two different bins are used to separate the wet and dry waste which is still not followed by many people and thus waste segregation becomes a troublesome and time-consuming process.In this project we developed an idea which is easy to use solution for a segregation of waste for household use, so that it can be sent directly for processing. It is designed to sort the waste into dry waste (e.g. paper, metallic waste, plastic, glass, fabrics, rubber and others) and wet waste (e.g. kitchen waste, garden leaves, dried flowers, etc.).This can be done using a Raspberry Pi 3, a camera and some software-based image processing via MATLAB which when programmed can detect the waste object placed in front of the camera and sort them out as wet or dry.

Keywords: *Electronics & Telecommunication Engineering, Image and multidimensional signal processing, Waste segregator, dry or wet waste, MATLAB, Raspberry Pi 3, Camera, Segmentation, Edge detection.*

1. INTRODUCTION

Several government, NGO's and other non-profit environmental organizations are trying to counter the problem of separation of dry and wet waste easily. To carry out their activities, they have taken various efforts to create awareness among the people about separating the wet and dry waste separately so that it would be easier for further treatment. Some of these efforts included awareness via social media, TV's, public plays, speeches and even they have distributed two free dustbins to the people for separating wet and dry waste. However, in today's society the number of people who practice these efforts are very less, but increasing day-by-day as they get aware.

The aim of this study is to determine how individuals' can contribute to the environmental benefit at household which in turn will reduce the long process for segregation of waste into different categories, saving the time required to do so by huge setup which include machines well equipped by many sensors, conveyer belt, etc. Also, less manual labour will be required comparatively. The research question is as follows: To what extent does a person can distinguish between the wet and dry waste? In this context, the extent to which people feel that they are able differentiate between the types of waste varies from person to person and with different age groups.

The research question is answered through this experiment that entails detecting the waste and classify it as wet or dry. These wastes can be randomly placed in front of a setup. The setup consists of a Raspberry Pi 3, a compatible camera to capture waste and software like MATLAB. Based on the different image processing techniques the object would be matched with the pre-existing images of the object, after successful match the object will be classified. The more the number of sample images the better will be the response and smaller will be the error in detecting a particular type of waste. These correct results would have an impact on the ratio of success identifying the correct type of the waste they need to separate down.

Further research could be undertaken to identify other factors which would be helpful to bear in mind when selecting the best images for such comparison. Some of the techniques used include machine learning and computer vision and even artificial intelligence which will make it self-adapting. The waste will also be then identified and show its properties e.g. shape, product brand and it use on a display. Also, a speaker can be used to alert the user via voice commands.

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2. LITERATURE SURVEY

This section of paper includes the information about the methods used previously by other authors. There have been previous researches on the relative topics of fire detection. After going through journal papers, it came to notice that many had used same modelling but with different approaches.

We have organized the studies of previous methods depending on the approaches made by them which are as follows:

2.1 Image acquisition

The first stage of any vision system is the image acquisition stage. After the image has been obtained, various methods of processing can be applied to the image to perform the many different vision tasks required today. However, if the image has not been acquired satisfactorily then the intended tasks may not be achievable, even with the aid of some form of image enhancement.

We have used webcam to capture the images with the help of Raspberry Pi 3. And these images are processed in MATLAB.

As in [2], [3] & [4] respective authors have used Raspberry Pi for capturing the image via a webcam and give it to MATLAB for further image processing.

2.2 Segmentation

Segmentation involves distinguishing objects from the background and from other objects. In this step, quite generic image processing methods are used, namely: Border detection (Prewitt, Canny, Sobel algorithm), Thresholding to isolate the object from the background and eliminate noise, Gaussian blur to soften details and filter noise if there, Conversion from colour to grayscale (black and white) and binary image and Contour detection in binary images to analyse objects separately.

Even if the objects to be analysed have been separated from the background, it's still possible that some of them are in contact, so it is necessary to separate them. In order to do this, we use watershed segmentation.

As in [1], the authors used segmentation methods like edge detection using Canny algorithm to detect the object. They used thresholding for its isolation by analysing histogram and Otsu algorithm, Gaussian blur, Contour detection and Watershed segmentation were used to remove noise, contacts, characterization methods like moments and Fourier descriptor for further processing.

Also, in [2], [3], [4] & [11] similar techniques are used for segmentation, thresholding and edge detection purpose.

In our case, we will use colour-based segmentation which will detect colours from the image. Some of the methods that can be used are different colour spaces such as L*a*b, RGB, CMY, etc and also K-means clustering, etc.

2.3 Template matching

In order to compare the images, we use template matching which will initially load the database. The captured image will be checked for matching features with reference images in our database. The different template matching methods used are SURF, FAST, KAZE, MSER, HOG, LBP, etc. Template matching requires system to be preloaded with sample images for comparison and matching purposes due to which the system becomes slow and takes more time for processing.

3. SYSTEM REQUIREMENTS

The system in this paper consists of Raspberry Pi 3, MATLAB, and Camera. Here the camera will be integrated with Pi3 to capture image of the object which is waste in or case and MATLAB will be used for the image processing to identify the waste is dry or wet and lastly a speaker for audio output.

3.1 MATLAB

MATLAB (matrix laboratory) is a multi-paradigm numerical computing environment. A proprietary programming language developed by Math Works, MATLAB allows matrix manipulations, plotting of functions and data, implementation of algorithms, creation of user interfaces, and interfacing with programs written in other languages, including C, C++, C#, Java, Fortran and Python.

Although MATLAB is intended primarily for numerical computing, an optional toolbox uses the MuPAD symbolic engine, allowing access to symbolic computing abilities. An additional package, Simulink, adds graphical multi-domain simulation and model-based design for dynamic and embedded systems. You can find MATLAB solutions for: Data Analytics, Image Processing and Computer Vision Signal Processing and Communications, Computational Finance, Control Systems Computational Biology, Deep Learning, Robotics, Computer Vision, Quantitative Finance and Risk Management, Robotics, Wireless Communications etc.

As of 2017, MATLAB has over 2 million users across industry and academia. MATLAB users come from various backgrounds of engineering, science, and economics.

3.2 Raspberry Pi3

The Raspberry Pi is a series of small single-board computers developed in the United Kingdom by the Raspberry Pi Foundation to promote the teaching of basic computer science in schools and in developing countries.

There are two giant upgrades in the Pi 3. The first is a next generation Quad Core Broadcom BCM2837 64-bit ARMv8 processor, making the processor speed increase from 900 MHz on the Pi 2 to up to 1.2GHz on the Pi 3.

The second giant upgrade (and this is the one we're personally most excited about) is the addition of a BCM43438 Wi-Fi chip BUILT-IN to your Raspberry Pi. No more pesky WiFi adapters - this Pi is WiFi ready. There's also Bluetooth Low Energy (BLE) on board making the Pi an excellent IoT solution (BLE support is still in the works, software-wise).

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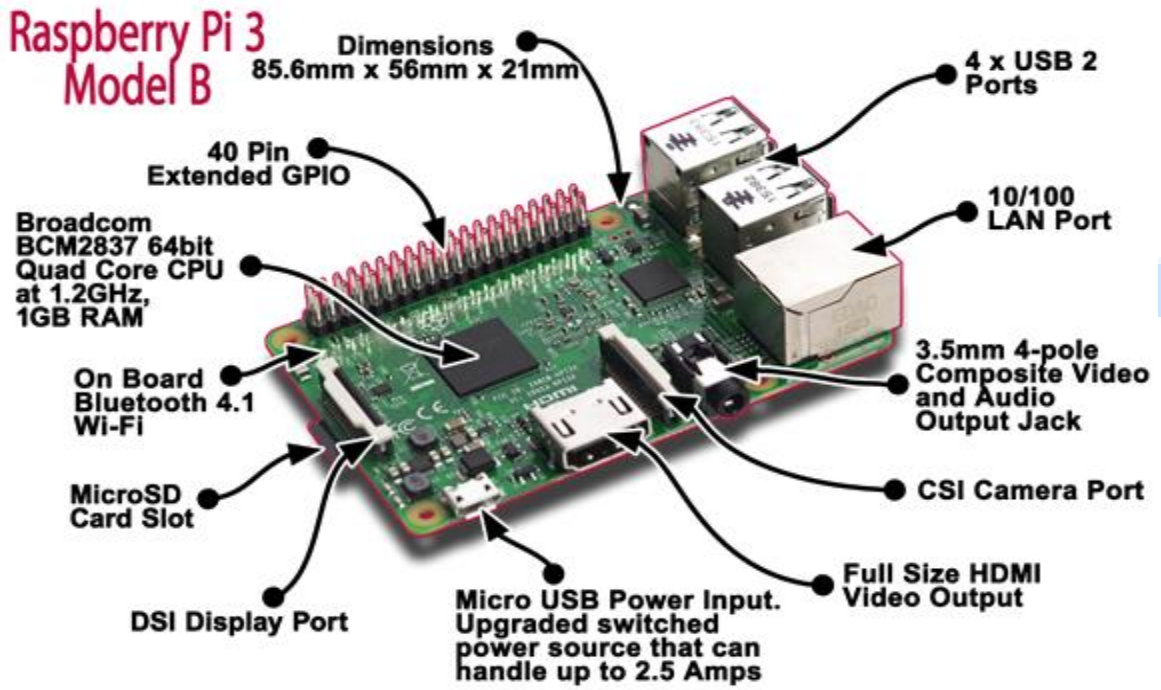

Fig-1 : Raspberry Pi 3

Lastly, there's an upgraded switched power source that goes up to 2.5 Amps instead of just 2 Amps – allowing your Pi to power even more powerful devices over USB ports. The best part about all this is that the Pi 3 keeps the same shape, connectors, and mounting holes as the Pi 2. The only difference is a slight change in where the LEDs are. 99% of cases and accessories will still be fully compatible with the Pi 3, Pi 2, and Pi B + - though if you have a case with a metal top there might be some WiFi chip difficulties.

3.3 Camera

A camera is an optical instrument for recording or capturing images, which may be stored locally, transmitted to another location, or both. The images may be individual still photographs or sequences of images constituting videos or movies. The camera is a remote sensing device as it senses subjects without any contact.There are many cameras available for Raspberry Pi made b different manufacturers. Some of the most popularly used cameras are Raspberry PI 5MP Camera Board Module, Pixy (CMUcam5) Smart Vision Sensor, Raspberry Pi 5MP 1080P Camera NoIR, Arducam 5 Megapixels 1080p Sensor OV5647 Mini Camera, etc. We have used webcam to capture the images.

3.4 Speaker

A speaker is an electroacoustic transducer; which converts an electrical audio signal into a corresponding sound. Speakers have an internal amplifier and consequently require a power source, which may be by a mains power supply often via an AC adapter, batteries, or a USB port (able to supply no more than 2.5W DC, 500Ma at 5V). Battery-powered wireless Bluetooth speakers require no connections at all. Most computers have speakers of low power and quality built in; when external speakers are connected they disable the built-in speakers.

We have used speaker to give the output as an audio file. The 'dry waste' will be heard if the waste object detected is dry & 'wet waste' if waste belongs to wet waste.

4. DESIGN METHODOLOGY

First of all, for the separation of waste into wet or dry, the sample images of various waste materials/objects are taken and saved so as to compare other images with these reference images. Images are classified as dry and wet category only. More the number of samples higher is the success rate of the waste getting identified correctly. The waste to be segregated is first taken and placed in front of the camera. The camera is connected to the Raspberry Pi Module via connecting wires and is connected to a power source via USB cable. The waste object is then captured via camera and then image processing is done on it. It is done so that we could be able to compare the processed image with our sample references images pre-saved. If the processed image we got matches with at least any one of the sample image then it checks whether the image belongs to dry waste or not. If yes, then it will result in an audio sound "dry waste" else as "wet waste" as output. And if the image does not match with any of the pre-saved images then the software will ask the user to add it as a new entry. After the user adds that new image, the samples will be updated and now if that object is placed again in front of the camera, this time it will be successfully identified.

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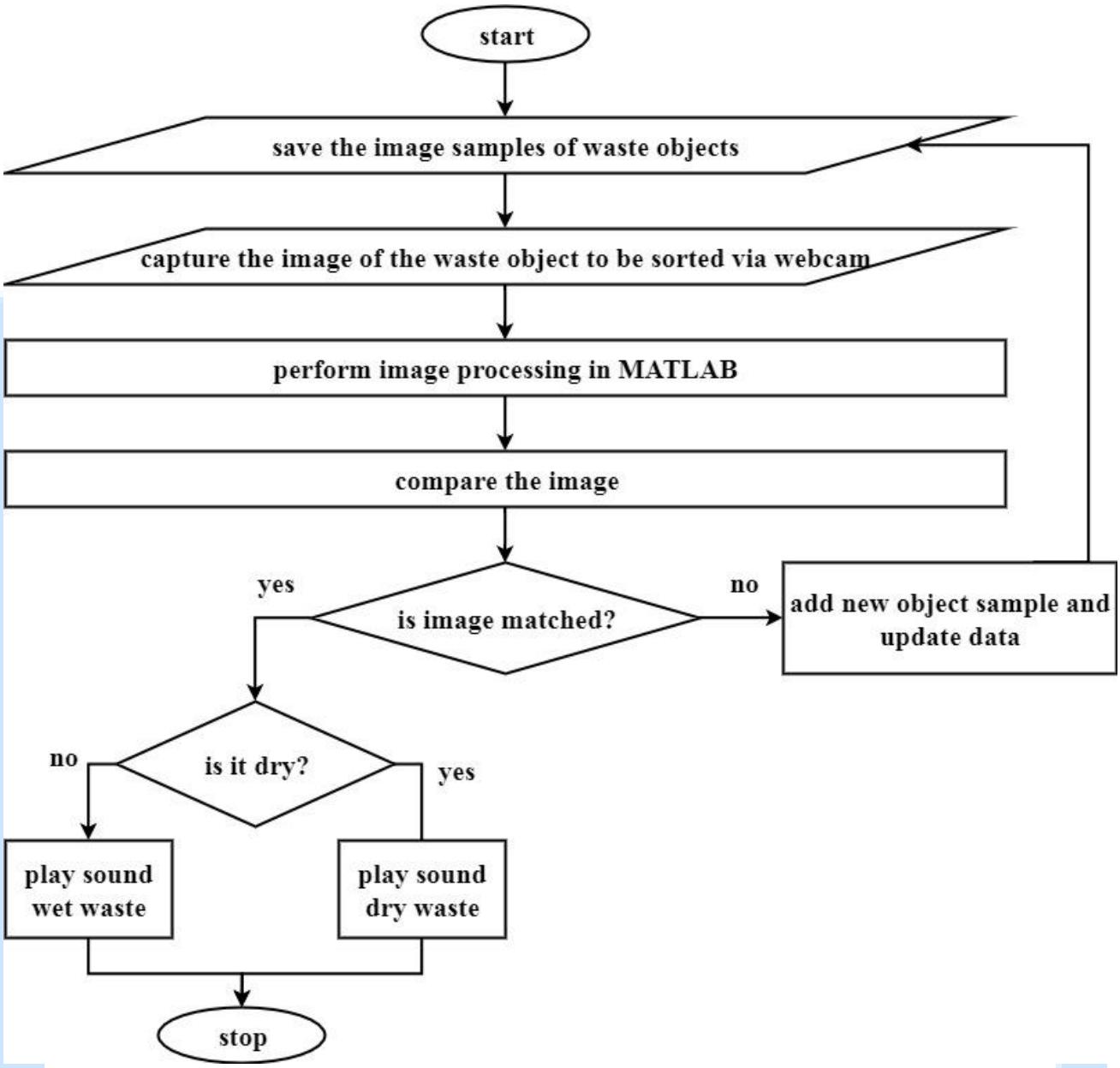

Fig-2: Flowchart

5. CONCLUSIONS

This project will help the society and the government and waste management systems successfully as there will be no confusion among the people regarding which type of waste it is and in which bin it should be disposed. This will help the society and will boon the cleanliness of the environment and benefit each and every individual as some of the dry waste they disposed can be recycled and reused in future after proper processing while the wet waste can be used buried into the soil and used as fertilizers while the rest of the hazardous waste will be sent for treatment. This way hygiene will be maintained which in turn will result in a healthy society.

This in turn will help to preserve the beauty of nature and will contribute to "Swacch Bharat Abhiyan".

6. ACKNOWLEDGEMENT

The We have immense pleasure and a sense of deep satisfaction in submitting this project work report of "Smart Waste Segregator Based on Image Processing Using Raspberry Pi 3".

We are thankful to Principal Dr. Arun Kumar & H.O.D. Prof. Archana Ingle and also our Project Guide Prof. Chitra Takle for the regular guidance, cooperation, motivation, encouragement and kind help. We are also thankful to the EXTC Department of VIVA Institute of Technology and the one who gave best knowledge about our project, our parents who provided their wishful support for our project completion successfully.

And lastly, we thanks to our all friends and the people who are directly or indirectly related to our project work.

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Design and Fabrication of 2.5Ghz Rectangular Microstrip Patch Antenna using Inset Feed

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ABSTRACT

A novel optimization method based on IE3D software is used to design an Inset Feed Rectangular Microstrip Patch Antenna for RFID applications. The aim of the project is to design and fabricate an inset fed rectangular Microstrip Antenna and study the effect of antenna dimensions Length (L), Width (W) and substrate parameters relative Dielectric constant (εr), substrate thickness on Radiation parameters of Bandwidth. Low dielectric constant substrates are generally preferred for maximum radiation. The conducting patch can take any shape but rectangular and circular configurations are the most commonly used configuration. Other configurations are complex to analyse and require heavy numerical computations. The length of the antenna is nearly half wavelength in the dielectric; it is a very critical parameter, which governs the resonant frequency of the antenna. In view of design, selection of the patch width and length are the major parameters along with the feed line depth. Desired Patch antenna design is been simulated by using IE3D simulator. Patch antenna is realized as per design requirements.

Keywords— *Microstrip Antenna, IE3D Simulator*

1. INTRODUCTION

The simple Microstrip patch Antenna consists of a dielectric substrate having fixed dielectric constant. Radiating patch is present on one side of a dielectric substrate and a ground plane is present on other side of a substrate. The metallic patch may take any geometrical shapes like rectangular, triangular, circular, helical, ring, elliptical etc. The dimensions of the patch are corresponds to the resonant frequency of antenna. However, microstrip patch antennas are having narrow bandwidth and bandwidth enhancement is necessary for most of the practical applications, for increasing the bandwidth different approaches are utilized.

Microstrip patch antenna used to send on board parameters of article to the ground while under operating conditions. The aim of this project is to design and fabricate an inset-fed rectangular Microstrip Patch Antenna and study the effect of antenna. It's dimensions Length (L), Width (W) and substrate parameters relative Dielectric constant (εr), substrate thickness(t) on the Radiation parameters of Bandwidth .Beam-width to make it operational in RFID range.Low profile planar configuration which can be easily made conformal to host surface. Low fabrication cost, hence it can be manufactured in large quantities. Supports both, linear as well as circular polarization and can be easily integrated with microwave integrated circuits (MICs).Capable of dual and triple frequency operations.

1.1 History

The idea of microstrip antenna can be traced back to 1953. Microstrip antennas consist a very thin metallic strip (patch) placed on a dielectric substrate above a ground plane. Metamaterial is an artificial materials (not found in nature) which is firstly theoretically introduced by Victor Georgievich Veselago in 1967. Metamaterial has unique properties such as negative values of permittivity and permeability, negative refractive index, backward wave propagation etc. Due to these properties, the metamaterial is used to ameliorate the antenna.

1.2 Reviews

Metamaterial is also used in various application other than ameliorate the antenna. The substrate material used in this design is Duroid5880 with permittivity 2.2 and size 47.43mm × 39.65mm × 1.6mm. ANSOFT HFSS EM simulator is used for design and simulation of the microstrip antenna. The various antenna parameters such as frequency, VSWR, gain and directivity are analyzed to characterize the proposed antenna [5]. The antenna is fabricated on RT-Duroid material substrate having 2.45 permittivity with loss tangent 0.002. In paper, we also mentioned the design of microstrip patch antenna. Paper will focus our attention on using IE3D to simulate the structure and obtain its various parameters at 2.5GHz and 3.0GHz frequency [2]. Collection of environmental parameters and control of equipment in greenhouse are the main contents of the greenhouse management. Aiming at the defect of traditional wired monitoring system, this system designs a wireless sensor [9]. The purposed impedance matching technique for inset feed microstrip patch antenna is based on the concept of coplanar waveguide feed line and has been investigated for a printed antenna at X-Band antenna operating at a frequency of 10GHz. The proposed technique has been used in the design of Grooved Microstrip patch antenna array [9].

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2. DESIGN METHODOLOGY

2.1 Design of Microstrip patch Antenna:

Microstrip antennas are attractive due to their lightweight, conformability and low cost. These antennas can be integrated with printed strip-line feed networks and active devices. This is a relatively new area of antenna engineering. The radiation properties of micro strip structures is been known since the mid 1950's. The application of this type of antennas started in early 1970's when conformal antennas were required for missiles. A major contributing factor for recent advances of microstrip antennas is the current revolution in electronic circuit miniaturization brought about by developments in large scale integration. As conventional antennas are often bulky and costly part of an electronic system, micro strip antennas based on photolithographic technology are seen as an engineering breakthrough.

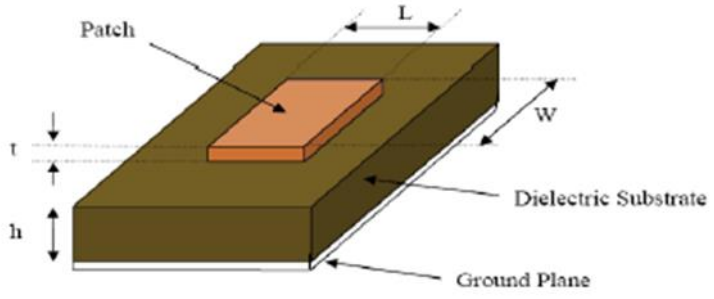

Fig 1. : Structure of Microstrip Patch Antenna

2.2 Mask Generation and Antenna Fabrication

Layout generation can be done in intellicad or autocad software for preparing the mask. Once the mask is printed on a transparent sheet, the patch can be fabricated using conventional photolithography

2.3 Test And Measurement

The return loss for the patch antenna can be measured on a network Analyzer. The E-plane and H-plane patterns can be measured in a far-field test set up (preferably in an anechoic chamber) with a standard gain antenna as a transmitting antenna and the Antenna under test as a receiving antenna mounted on a pedestal.

2.4 Software and Hardware Used

2.4.1 IE3D Software

IE3D (Integral Equation Three Dimensional) is the first SCALABLE EM design and verification platform. IE3D offers the highest simulation capacities and fastest turnaround times for the broadest number of applications making it the best choice for improving your design team productivity and meeting design schedules on time.

Today's high performance antenna array design requires both, large capacity EM simulation and unit array cell EM design and optimization capabilities. Getting the array unit cell right from the start is essential before replicating into a larger antenna array structure. If accuracy is sought, then the designer needs to be extremely careful with approaches that formulate estimated boundary conditions for unit cells used within larger arrays. These approaches typically suffer from poor capacity limits and do not accurately model the EM behaviour between unit cells, especially for cells on the antenna array periphery. IE3D-SSD offers FASTEM to thoroughly explore the relevant design space and optimize the geometry for each unique unit cell. In addition, IE3D-SSD's superior capacity and run-time enable even the largest antenna arrays can be involved in least amount of time. IE3D-SSD is the best solution for your antenna design. The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in ˚Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. This temperature sensor measures the temperature of the green house environment.

2.5 Rectangular patch

The most commonly employed microstrip antenna is a rectangular patch, which looks like a truncated microstrip transmission line. It is approximately of one-half wavelength long. When air is used as the dielectric substrate, the length of the rectangular microstrip antenna is approximately one-half of a free-space wavelength. As the antenna is loaded with a dielectric as its substrate, the length of the antenna decreases as the relative dielectric constant of the substrate increases. The resonant length of the antenna is slightly shorter because of the extended electric "fringing fields" which increase the electrical length of the antenna slightly. An early model of the microstrip antenna is a section of microstrip transmission line with equivalent loads on either end to represent the radiation loss.

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2.6 Network Analyzer

A network analyzer is an instrument that measures the network parameters of electrical networks. Today, network analyzers commonly measure s–parameters because reflection and transmission of electrical networks are easy to measure at high frequencies, but there are other network parameter sets such as y-parameters, z-parameters, and h-parameters. Network analysers are oftenly used to characterize two-port networks such as amplifiers and filters, but they can be used on networks with an arbitrary number of ports. Network analyzers are used mostly at high frequencies; operating frequencies can range from 5 Hz to 1.05 THz. Special types of network analyzers can also cover lower frequency ranges down to 1 Hz. These network analyzers can be used for example for the stability analysis of open loops or for the measurement of audio and ultrasonic components.

2.7 Spectrum Analyzer

A spectrum analyzer measures the magnitude of an input signal versus frequency within the full frequency range of the instrument. The primary use is to measure the power of the spectrum of known and unknown signals. The input signal that a spectrum analyzer measures is electrical; however, spectral compositions of other signals, such as acoustic pressure waves and optical light waves can be considered with the use of an appropriate transducer. Optical spectrum analysers also exist, which use direct optical techniques such as a monochromators to make measurements. By analyzing the spectra of electrical signals, dominant frequency, power, distortion, harmonics, bandwidth, and other spectral components of a signal can be observed that are not easily detectable in time domain waveforms. These parameters are useful in the characterization of electronic devices, such as wireless transmitters.

The display of a spectrum analyzer has frequency on the horizontal axis and the amplitude displayed on the vertical axis. To the casual observer, a spectrum analyzer looks like an oscilloscope and, in fact, some lab instruments can function either as an oscilloscope or as a spectrum analyzer.

3. PROPOSED MODEL

3.1 Substrate Selection

Dielectric constant (Ɛr) is in the range from 2.2 to14. Ɛr of air, polystyrene, dielectric honey comb is in the range from 0 to 2. Ɛr of fiberglass reinforced Teflon is in the range from 2 to 4. Ɛr of Ceramic, Quartz, Alumina is in the range from 4 to 10.Dielectric constant should be less than 4(Ɛr<4) in order to get higher radiation efficiency and directivity. Height should be h<2mm for operating frequency less than 10 GHz. So the proposed system selects 1.58mm and FR4 substrate as it is Readily available.

3.2 Calculate The Width Of The Patch

The selected parameters for the antenna design are as follows:
F0 (operating frequency) = 2.45 GHz
Ɛr (dielectric constant) = 4.4
h (substrate height) = 1.6mm

$$w= \frac{c}{2Fo\sqrt{(\varepsilon r+1)/2}}$$

3.3 Calculate the Length of the Patch

$$\varepsilon reff=\frac{\varepsilon r+1}{2}+\frac{\varepsilon r-1}{2}\left[1+12\frac{h}{w}\right]^{-\frac{1}{2}} \qquad Leff=\frac{C}{2fr\sqrt{\varepsilon reff}}$$

$$\Delta L=0.412h\frac{(\varepsilon r+0.3)((w/h)+0.264)}{(\varepsilon r-0.258)((w/h)+0.8)} \qquad L=Leff-2\Delta L$$

where,

ΔL = effective increase in length due to fringing effects
L =the actual length of the patch
Leff =effective length of the patch
Ɛreff = effective dielectric constant
Using above formula, following results were obtained which are tabulated in Table I

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PARAMETERS	VALUES
Substrate Material	FR4
Relative permittivity of substrate	4.4
Thickness of dielectric	1.6
Operating Frequency	2.5GHz
Length	28.22mm
Width	36.49mm

TABLE 1- PATCH PARAMETERS

Sr. No	Inset Feed Length	S11(in dB)	VSWR
1	20	-9.5	2.501
2	25	-14	1.63
3	30	-7.929	2.807
4	22.5	-8.459	2.6

TABLE 2- Variations in Inset Feed

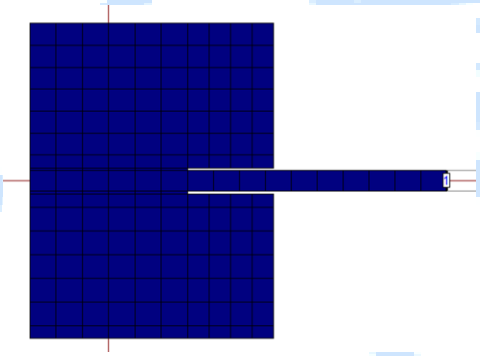

Fig 2: Rectangular patch with inset feed (IE3D)

4. Expected Results

S11 (Return loss) results are as shown in Figure 8. Return loss of below 10dB is obtained at 2.5 GHz. VSWR (Figure 9) is 1.6 at 2.5GHz.

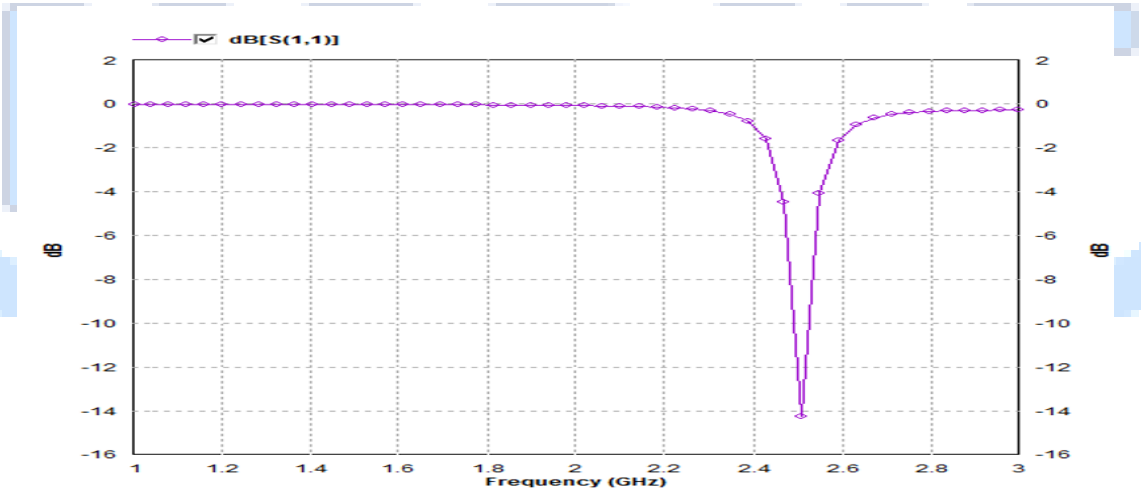

Fig 3:S11 results for proposed model

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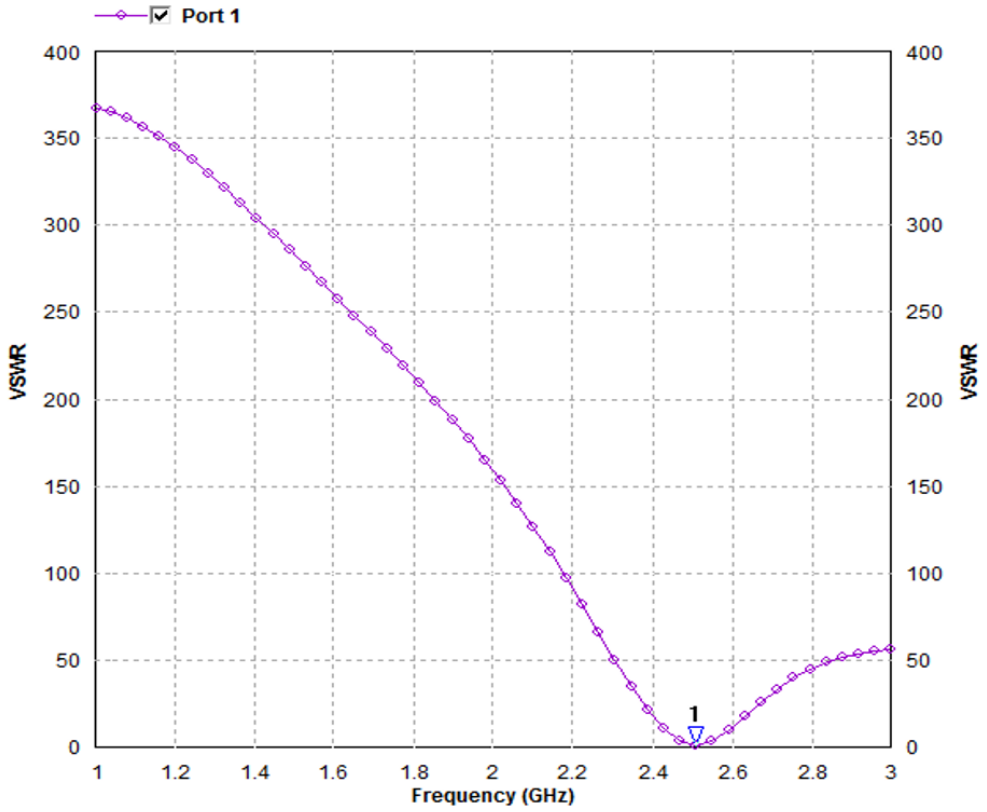

Fig4: VSWR results for proposed model

5. CONCLUSIONS

The optimization of the Microstrip Patch needs to be realized using different feeds and varying feed length in Inset Feed. Realization of results by IE3D will be concluded with the fabrication of the patch of the Microstrip Patch Antenna. The Fabricated Microstrip Patch will be tested on Vector Network Analyzer. Moreover, this microstrip antenna which is been designed can be used for various applications based on the operating frequency.

6. ACKNOWLEDGMENT

It gives me immense pleasure to express my deepest sense of gratitude to my respected guide Prof. Ameya Purandare , Electronics and Telecommunication department, VIVA Institute of Technology, Virar, for her guidance and help for completing this work. I would like to express my sincere thanks to Dr. Arun Kumar, Principal for wholehearted support. I also wish to express my gratitude to Prof. Mrs. Archana Ingle, HOD Electronics and Telecommunication for her wholehearted support. At the end I would like to express my sincere thanks to all my friends and others who helped me directly or indirectly during this project.

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Solar Based Wireless Lawn Mower With Obstacle Detection

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ABSTRACT

This is a wireless lawn mower based on solar energy described here will allow user ability to cut grass with nominal effort. The battery being used here will charge with the help of solar panel. The system control is done by Microcontroller AT89S52. Obstacle detection is achieved by using IR sensor. Wheels and cutting operations are done using dc motors. There are some patterns installed in the robot so, no human effort needed for the operations and helps to trim lawn in different patterns easily with less time. Bluetooth module is pre-owned will deal with the basic robot movement functions to control a robot via wireless technology as well as serial communication between robot. All the manual operations will be controlled by using android app. Aiming at the defect of traditional wired embedded system. The software is written in embedded C language in the KEIL µVision IDE development environment, and works in the Windows operating system. The collected data can be displayed on the LCD interface and in real time. Eagle software has been used for the schematic and PCB layout of a Mower circuit.

Keywords—*ROBOTICS, SOLAR, MOWER, OBSTACLE, ANDROID*

1. INTRODUCTION

Grass cutter machines have become very popular today. Most of the times, grass cutter machines are used for soft grass furnishing. In a time where technology is merging with environmental awareness, consumers are looking for ways to contribute to the relief of their own carbon footprints. Pollution is man-made and can be seen in our own daily lives, more specifically in our own homes. A model is proposed for the automatic grass cutting machine powered through solar energy, (non-renewable energy). Automatic grass cutting machine is a machine which is going to perform the grass cutting operation on its own. This model reduces both environment and noise pollution.

2. LITERATURE REVIEW

The present technology commonly used for trimming the grass is by using the manually handle device. In this they have automated machine for trimming the grass. The device consists of linear blade which is operated with the help of the motor the power supply for the motor is by using battery. The battery can be charge by using power supply and solar panel[1]. In particular, the obstacle detection and avoidance is typically a simple collision detection. This is an autonomous lawn mower that will allow the user to the ability to cut their grass with minimal effort. Unlike other robotic lawn mowers in the market, this design requires no perimeter wires to maintain the robot within the lawn and also with less human effort in the manual mode operation. There are some preset pattern installed in the robot, in the automatic mode operation no human effort needed for the operation and helps to cut different patterns in the lawn very easily with less time[2]. This work discusses a prototype autonomous lawn mower with camera-based non-contact obstacle avoidance. A model can be revised with a low-cost compact module consisting of color cameras and an ARM-based processing board, which can be added to an autonomous lawn mower with minimal effort[3].

The purpose of this project is to design and implement a compound robot. The compound robot will be able to move in four directions (left, right, forward, backward) and will detect the distance of the obstacle from the robot on the android app[4]. The main intent of this project is to design and bring about a robot prototype by using Arduino Uno, Motor Driver L293D, and HC05- Bluetooth module and to procure the goal of this project, to gain knowledge about Ultrasonic sensor HCSR-04, reconcilable software and controlled motor circuit need to be determined. The robot will have several characteristics like continuous display of distance from the obstacle on the app, easy handling of a robot with the help of an app rather than any remote controller. This paper reports an undergraduate project that attempts to develop a partner robot to assist and support humans in the task of lawn mowing, which is a routine task that has been widely considered as both boring and tiring .

3. DESIGN AND METHODOLOGY

3.1 Overview of lawn mower:

Below block diagram shows the overview of the lawn mower. All the blocks are connected to the microcontroller AT89C51[5]. IR sensor is used for obstacle detection. If any object is detected then the sensor will give the signal to microcontroller and buzzer will on. Solar panel is used as a energy source. Externally 12V battery is also connected. This

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lawn mower can be operated via ANDROID app using bluetooth module. Two motor driver IC'S are used for the motor movements. This mower can operate in automatic mode and manual mode also[6].

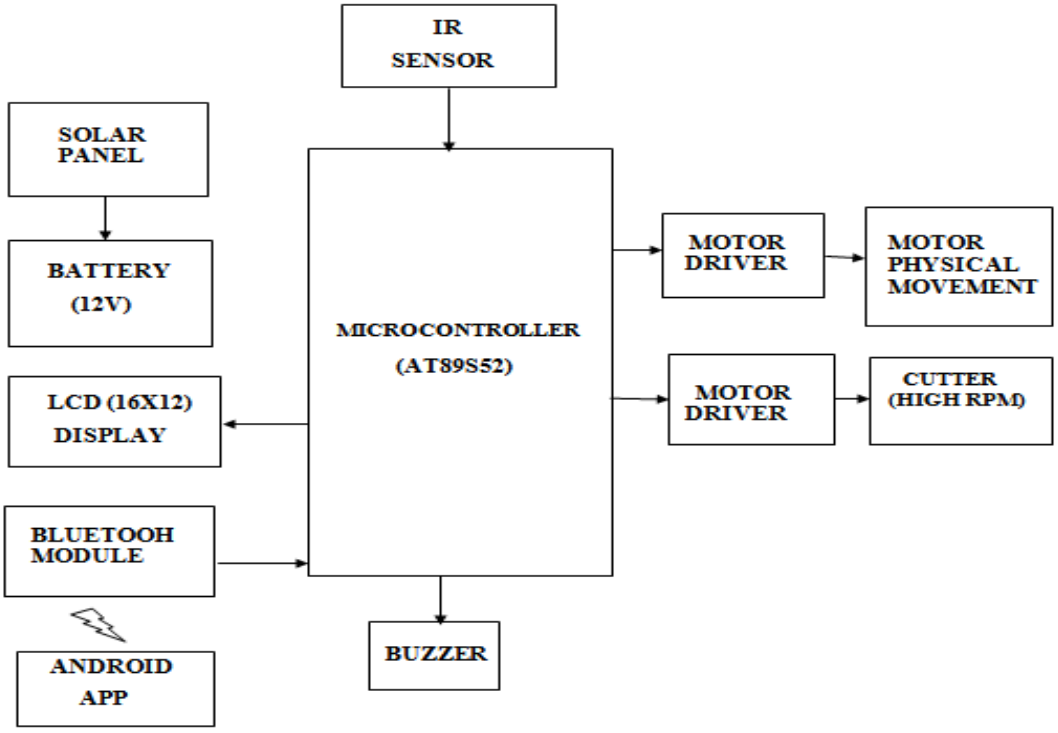

Fig.1 Block diagram

3.2. Flow chart

3.2.1 For automatic mode of operation:

For automatic mode operation of the lawn mower, the following steps are followed by the robotic lawn mower. The steps are given in the flow chart below. In this mode the mower will moves automatically.

First we select an automatic mode. Then mower will move forward for trimming. It will check if there is any obstacle in its path. If any obstacle is detected mower will stop and wait for obstacle clearance for some time. If obstacle is not cleared it will assume it as a boundary and it will turn 180
Degrees to the left. And it will move forward to follow its path again.

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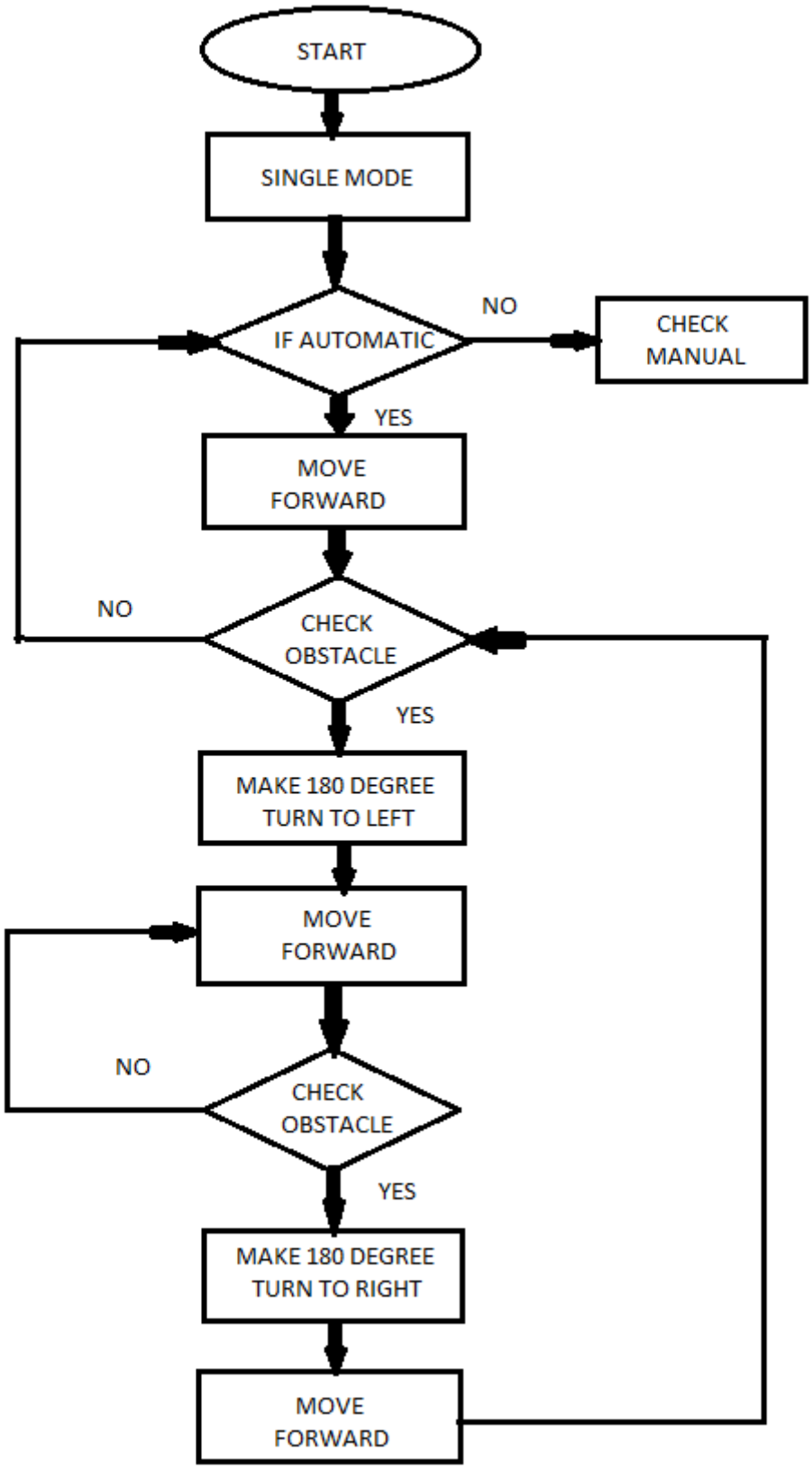

Fig. 2 : Flow chart for automatic mode

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3.2.2 For manual mode:

For manual mode operation of the lawn mower, the following steps are followed by the robotic lawn mower. The steps are given in the flow chart below.

In manual mode of operation, user have to select the manual mode on android app. After that mower will check for the mode. Then the control messages are given to the mower via android app.

Microcontroller will receive the instructions from android app it will decode the message and drive the motors by giving commands to the motor driver IC'S Movement of mower is depended on the instructions given by android user. User can give the instructions to mower to turn left, right, forward and backward [2]. And he also can start or stop the cutter by giving instruction to mower.

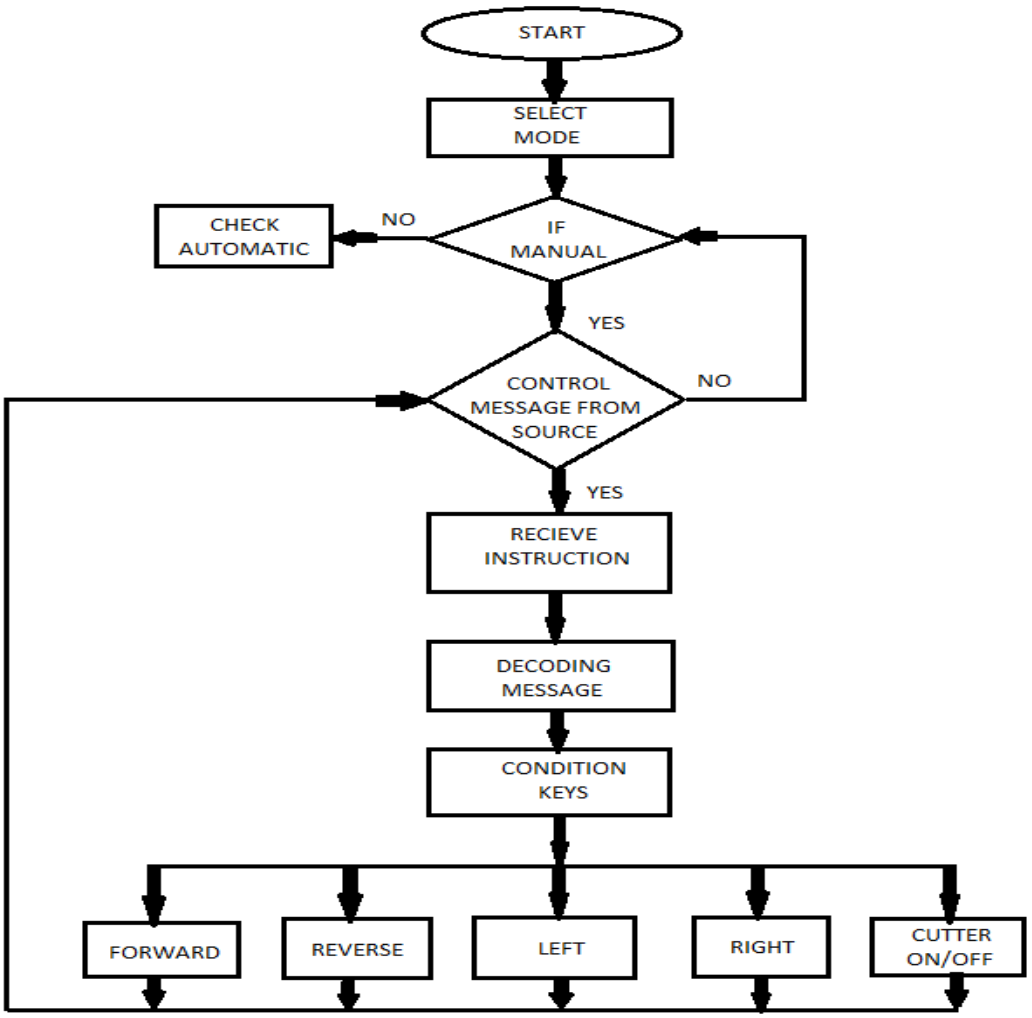

Fig.3: Flow chart for manual mode

4. RESULT:

Lawn mower has been designed and following images shows the actual hardware of the lawn mower. It moves in forward and backward direction now. Further work is going on for left and right movements. Solar panels are properly working.

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Fig.4 Front view of the lawn mower

Fig.5 Top view of the lawn mower

5. CONCLUSIONS

This project will help in automatic control and monitoring of obstacle detection in lawn mowing without human interference. In this wireless lawn mower is composed of two major components which are namely, the Bluetooth module & the android app control unit. In this project we will try to overcome the limitation of energy consumption and fuel cost as it is solar based. Any obstacle will be detected by IR sensor. The main feature provided by this lawn mower is it will mow the lawn in different pattern. The PCB implementation is done by eagle (EDA) software is written in Embedded C language in the KEIL µVision IDE, and works in the Windows operating system. The collected data can be displayed on the LCD display interface and in real time. If this project is implemented in large scale it can be used in automation of lawn maintenance. The system designed here is user friendly, more efficient, comfortable, and energy-saving.

6. ACKNOWLEDGEMENT

It gives me immense pleasure to express my deepest sense of gratitude to my respected guide Prof. Karishma Raut, Electronics and Telecommunication department, VIVA Institute of Technology, Virar, for her guidance and help for completing this work. I would like to express my sincere thanks to Dr. Arun Kumar, Principal for wholehearted support. I also wish to express my gratitude to Prof. Mrs. Archana Ingle, HOD Electronics and Telecommunication for her wholehearted support. At the end I would like to express my sincere thanks to all my friends and others who helped me directly or indirectly during this project.

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WIRELESS SOLUTION FOR GREENHOUSE MONITORING AND CONTROL SYSTEM

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ABSTRACT

A greenhouse is a building where plants are grown. Most greenhouse system still uses the manual system in monitoring the temperature and humidity in the greenhouse, a lot of problem can occurred not for worker but also affected production rate because the temperature and humidity of greenhouse must be constantly monitored to ensure excellent conditions. The wireless sensor network can be used to gather the data from point to point to trace down the local climate parameters in different parts of the big greenhouse to make the greenhouse automation system work properly. The goal of this project is developing a greenhouse monitoring system to monitor a greenhouse temperature, humidity and soil moisture parameters by applying the Zigbee device as the wireless sensor network system. In this project, Zigbee will be used as a wireless device and the temperature and humidity sensor will be used to collect data of temperature, humidity and moisture of soil in the greenhouse. This project is a combination of hardware such as Microcontroller, Zigbee and software such as NS2, Matlab. NS2 is used to build a complete WSN system. The simulation of NS2 will contain a ring topology. Matlab is used as a GUI where all real time parameters can be displayed or examined. The data from the green house will be measured by the sensor nodes and the data that are collected will be send to the Microcontroller which will further send the data to the Matlab for further simulation. The data will be displayed on the Matlab in form of graphs. By using this system, the process of monitoring is easier and it is also cheaper for installation and maintenance process.

Keywords— *greenhouse, zigbee, ns2, matlab, sensor nodes*

1. INTRODUCTION

Greenhouse is a kind of place which can change plant growth environment, create the best conditions for plant growth, and avoid influence on plant growth due to outside changing seasons and severe weather. This overall design consists of a transmitter section and the monitoring section. Transmitting section consist of sensor nodes. A wireless sensor node consist of four major components which are the sensing unit, the processing unit, the power unit and finally the wireless transceiver unit. The sensing unit converts such measured physical quantities as temperature, moisture etc. into a voltage signal and digitizes it to produce digital output for processing. The processing unit with a microcontroller controls all of the functions of the sensor node and manages the communication protocols to carry out specific tasks. Communication between the WSN node and the base station is provided by the transceiver unit. And finally the power unit, which is the most important component of a sensor node, supplies mandatory power to all of these units. Nodes are connected in ring topology. In this project we will try to overcome the limitation of ring topology in which node failure is a very big problem. If any node fails then ring topology will converts into star topology. Monitoring station, which communicates with the underlying wireless network through the serial interface and receives the collected sensor data operates on the computer to better handle, display and store data. The collected data can be displayed on the display interface dynamically and in real time, which is represented in a graphical format. Network connected together in the form of a ring where data can be send in either clockwise or anti clockwise.

2. LITERATURE REVIEW

Collection of environmental parameters and control of equipment in greenhouse are the main contents of the greenhouse management. Aiming at the defect of traditional wired monitoring system, this system designs a wireless sensor[9]. This document shows the design and implementation of a wireless sensor network, using the zigbee communication standard, for monitoring the climatic variables in an orchid greenhouse. The objective is to develop a system of low-cost and low-energy of supervision, so that floriculturists have the possibility to monitor the climatological conditions inside the greenhouse and take necessary preventive measures on orchids, optimizing growing time and productivity[10]. This paper proposes a Wireless Sensor Network (WSN) based embedded system and deals with the implementation of ZigBee network (over IEEE 802.15.4) for remote controlling of the Greenhouse parameters. The particular information regarding establishment of ZigBee network in Star topology as well as in Mesh Topology, inside the Greenhouse is illustrated. It also demonstrates the real time monitoring of parameters such as temperature, humidity,

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as well as the total power consumption of the system, with the help of a PC based GUI application developed on Java platform[12].

3. DESIGN AND METHODOLOGY

3.1 Hardware design

HARDWARE CONTAINS:

1) Transmission of sensor node data
2) Reception of data

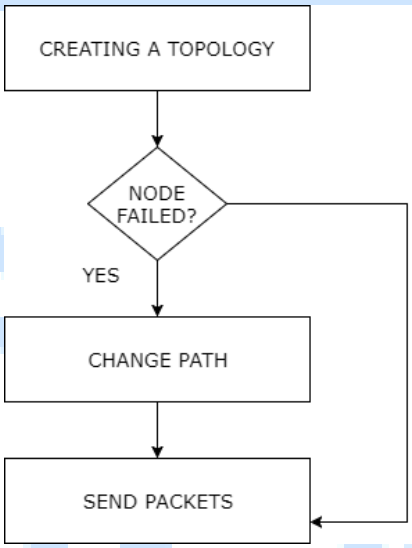

Fig1. Process Flow Of Hardware

3.2 Sensor node design

The sensor node is the basic unit of the environmental information monitoring system; its task is to achieve the perception, collection, processing and wireless communication of environmental data. The general architecture of a wireless sensor node is presented in Fig. 2. As seen from the figure, a wireless sensor node is composed of four major components which are namely, the sensing unit, the processing unit, the power unit and finally the wireless transceiver unit. The sensing unit converts such measured physical quantities as temperature, moisture etc. into a voltage signal and digitizes it to produce digital output for processing. The processing unit with a microcontroller controls all of the functions of the sensor node and manages the communication protocols to carry out specific tasks. Communication between the WSN node and the base station is provided by the transceiver unit. And the power unit, which is the most important component of a sensor node, supplies necessary power to all of these units.

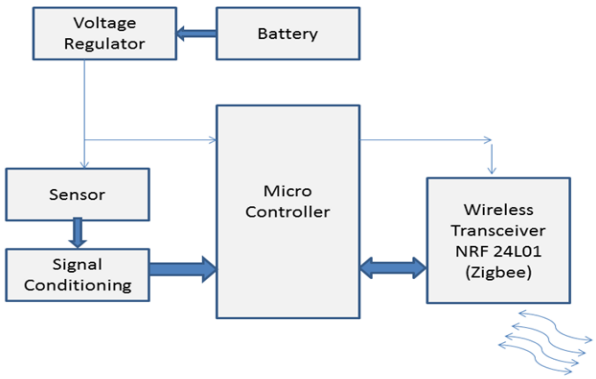

Fig 2: Wireless sensor node block diagram

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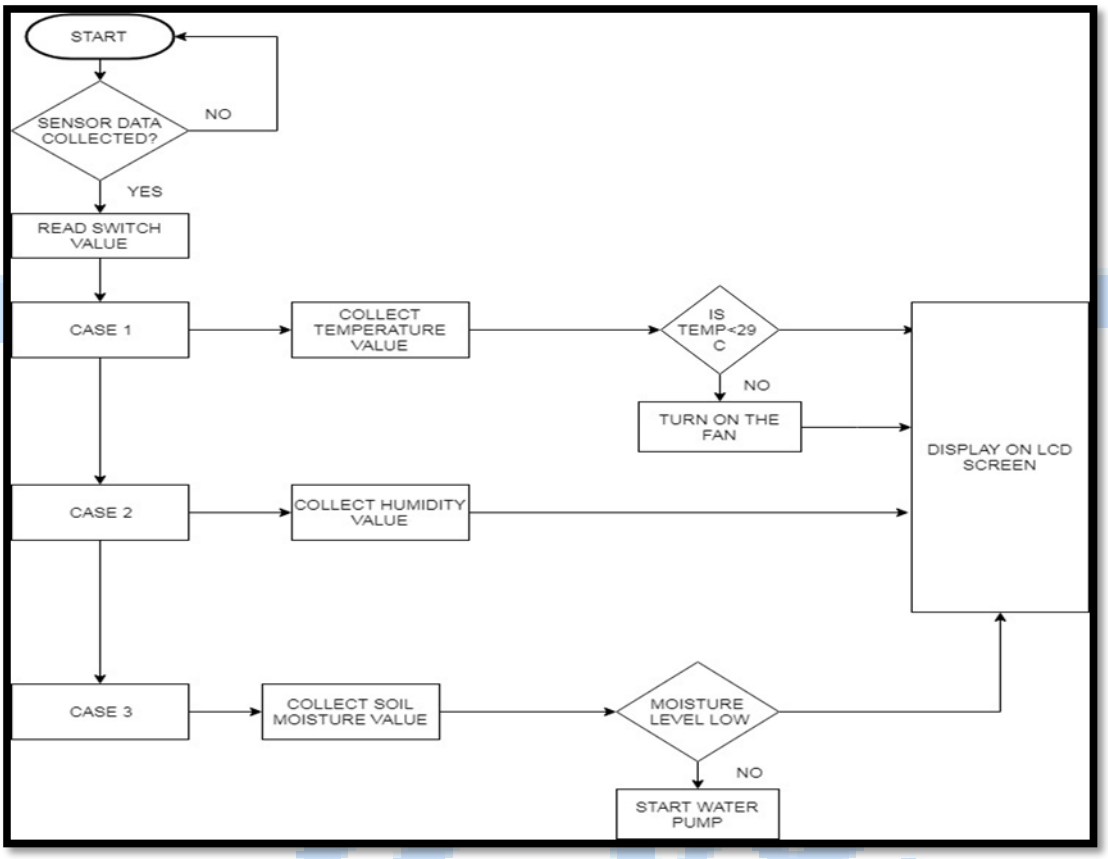

Fig 3. Flow chart of sensor nodes

3.3 Role of sensor nodes

3.3.1 Humidity and temperature sensors:-

Humidity is the presence of water in air. Therefore, to measures both moisture and air temperature, this part of the system monitors real time humidity and temperature data from the area continuously to keep the greenhouse humidity and temperature at desired level. The greenhouse system has some static humidity and temperature levels. Those values, the microcontroller sends corresponding signal to the interface devices which turns on the air-condition on to restore or balance the greenhouse humidity and temperature. It takes analog input from the humidity and temperature sensors and provides digital output.

3.3.2 Soil moisture sensor:-

This section has been used to detect the water level in the corresponding greenhouse. If there is a lack of water in greenhouse the detector senses, it and sends signal to the microcontroller. Therefore, the microcontroller sends signal to the corresponding devices to turn on the pump. Furthermore, when the so it has moisture to a desired level the microcontroller sends signal to turn off the pump through interfacing devices according to the sensors output.

3.4 Software design

3.4.1 Ring topology

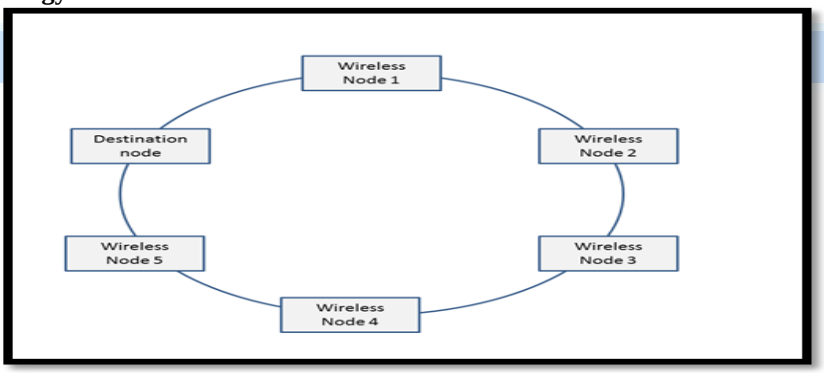

Figure4. -Ring Topology

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In the ring topology the nodes will be connected in a closed loop configuration. Adjacent pairs of nodes are directly connected. Messages from one node to another travel from originator to destination via the set of intermediate nodes; the communication can be unidirectional or bidirectional. It is good for peer-to-peer communications as it needs no main node ,which also gives high performance.
Network connected together in the form of a ring where data can be send in either clockwise or anti clockwise .The nodes defect can be easily identified in ring. It has an easy approach. The input design is the link between or is the interface between the information system and the user. It comprises the developing specification and procedures for data preparation and those steps are necessary to put transaction data in to a usable form for processing. This can be achieved by inspecting the computer to read data from a written or printed document or it can occur by having people keying the data directly into the system. The design of input focuses on controlling and supervising the number of input required, controlling the errors, avoiding delay, avoiding extra steps and keeping the process simple. The input is designed in such a way so that it provides security and ease of use with retaining the privacy.

3.4.2 Failure of node

In this project, we will try to overcome the limitation of ring topology in which node failure is a very big problem. For which we have increased power transmission in which a single node failure can change its path to deliver its data to its next hop. A ring network is a network topology in which each node connects to exactly two other nodes, forming a single continuous pathway for signals through each node - a ring. Data travel from node to node, with each node along the way handling every packet. The network is dependent on the ability of the signal to travel around the ring. When a device sends data, it must travel through each device on the ring until it reaches its destination. Every node is a critical link. In a ring topology, there is no server computer present; all nodes work as a server and repeat the signal Power efficient is also being considered which reduces its power and make it effective to be used. Now we can say that the disadvantage (if one workstation or node goes down, the entire network gets affected) has been rectified to an extent.

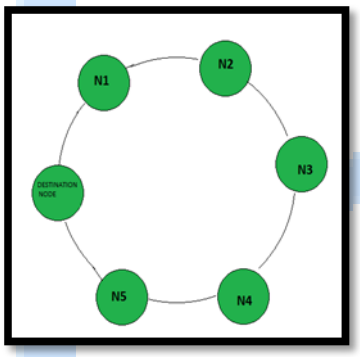

Figure5. Basic ring topology

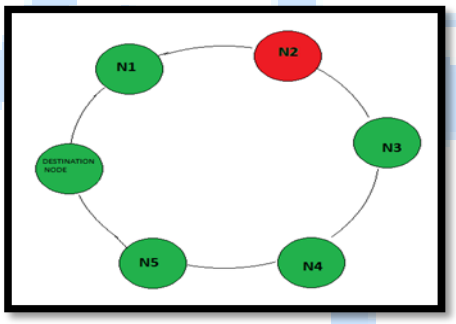

Figure6. Node Failure

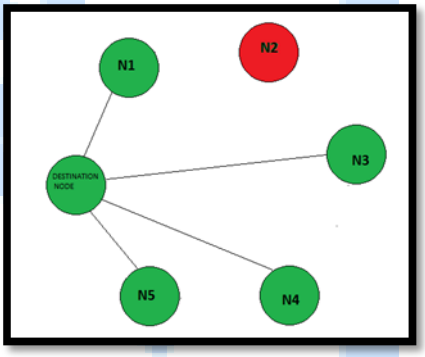

Figure7. Changing path because of node failure

3.5 Monitoring station:

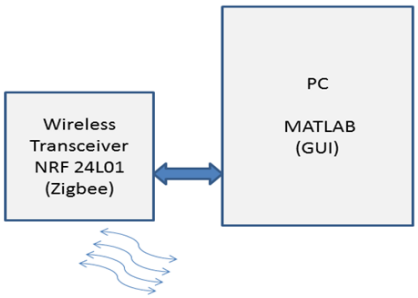

Fig 8. Monitoring Station Block Diagram

Monitoring station, which communicates with the underlying wireless network through the serial interface and receives the collected sensor data operates on the computer to better handle, display and store data. The software is written in C ++ language in the MATLAB development environment, and works in the Windows operating system. The collected data can be displayed on the display interface dynamically and in real time, which is represented in a graphical format.

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4. CONCLUSIONS

We studied wireless sensor network due to its importance and wide applications. This method will help in automatic control and monitoring of different parameters inside the greenhouse which are required for smooth maintenance without human interference. In this project a wireless sensor node is composed of four major components which are namely, the sensing unit, the processing unit, the power unit and finally the wireless transceiver unit. In this project we will try to overcome the limitation of ring topology in which node failure is a very big problem. If any node fails then ring topology will converts into star topology. Software used in this system is NS2 for making a 'virtual topology'. In this we have created "Ring Topology". Using genetic algorithm we have implemented ring as a "Virtual" ring with clustering technique. Virtual ring provides alternative path if any node of the system fails which is the biggest disadvantage Alternative path is being provided by using two previous hop and two next hop as primary and alternative hops. The collected from the sensor nodes can be displayed on the display interface dynamically and in real time, which is represented in a graphical format. If this project is implemented in large scale it can be used in automation of plantations. This project can be implemented in automation of hi-tech greenhouse. The system designed here is user friendly and more efficient.

5. ACKNOWLEDGMENT

It gives me immense pleasure to express my deepest sense of gratitude to my respected guide Prof. Mohini Ghotekar, Electronics and Telecommunication department, VIVA Institute of Technology, Virar, for her guidance and help for completing this work. I would like to express my sincere thanks to Dr. Arun Kumar, Principal for wholehearted support. I also wish to express my gratitude to Prof. Mrs. Archana Ingle, HOD Electronics and Telecommunication for her wholehearted support. At the end I would like to express my sincere thanks to all my friends and others who helped me directly or indirectly during this project.

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ARTIFICIAL INTELLIGENCE ON IMAGE.

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ABSTRACT

Aim of image retrieving systems is to incorporate effective user states for responding efficiently to their interests. Selection of features specific to object in images is one of the major challenges. Building learning models is also a difficult task.
Our project deals with effective classification and retrieval of images with help of different multiple kernel learning frameworks. A computer can read image in different colour spaces. Applying multiple kernels can make use of these colour space to learn and detect the features in an image more efficiently and intelligently.
The results of our experiments on specific amount of datasets will demonstrate the advantages of multiple kernels for feature detection in an image in terms of different performance parameters.
Keywords— Artificial Intelligence, Python, Anaconda, Image Processing, Edge detection, Neural Network, segmentation, recognition.

1. INTRODUCTION

Our brains make vision seem easy. It doesn't take any effort for humans to tell apart a lion and a jaguar, read a sign, or recognizes a human's face. But these are actually hard problems to solve with a computer: they only seem easy because our brains are incredibly good at understanding images. In the last few years the field of machine learning has made tremendous progress on addressing these difficult problems.

In particular, we've found that a kind of model called a deep convolutional neural network can achieve reasonable performance on hard visual recognition tasks matching or exceeding human performance in some domains.

1.1 **Importance of project**

- Machine learning of human functions, like reading, object detection, image classification is an ancient dream. However, over the last five decades, machine learning has grown from a dream to reality.
- Object recognition has become one of the most successful applications of technology in the field of pattern recognition and artificial intelligence.
- Many commercial systems for performing Image Recognition exist for a variety of applications, although the machines are still not able to compete with human image classification capabilities.
- Object recognition, is the process of extracting image from given pictures. Although image recognition is a well-studied topic, As such, it is often necessary for computers or mobile devices to automatically recognize them. Among the various subtopics of scene image classification, object classification (i.e. the process of recognizing various images and objects) is perhaps the most important.

The implementation of our neural network requires many different steps. The first step required is dataset preparation. Even for those that are commonly used, datasets come in many different formats. It is often necessary to write a few short scripts that will take in the examples from the dataset and then format them properly for the machine learning tools that will be used. It is also often necessary to do what is known as feature engineering. Examples from datasets can have too many features. Running a training algorithm on a dataset with too many features can cause the algorithm to become confused and produce subpar results. Therefore, it is necessary to pick out which features to keep and which to remove (or to give less weight to). This can be done manually by hand or using an algorithm like PCA (principal components analysis).
Finally, even after successfully running the algorithm on a dataset, it may be helpful to tweak some parameters and re-run the algorithm.

2. DESIGN METHODOLOGY

This chapter will mainly discuss about the methodology of the project & the aspect or factor that must be taken into consideration during the development process. All these factors were important make sure the project will achieve its objective.

- User should be able to upload the image.
- System should be able to pre-process the given input to suppress the background.
- System should detect object regions present in the image.

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- System should retrieve object present in the image and display the accurate classification to the user.

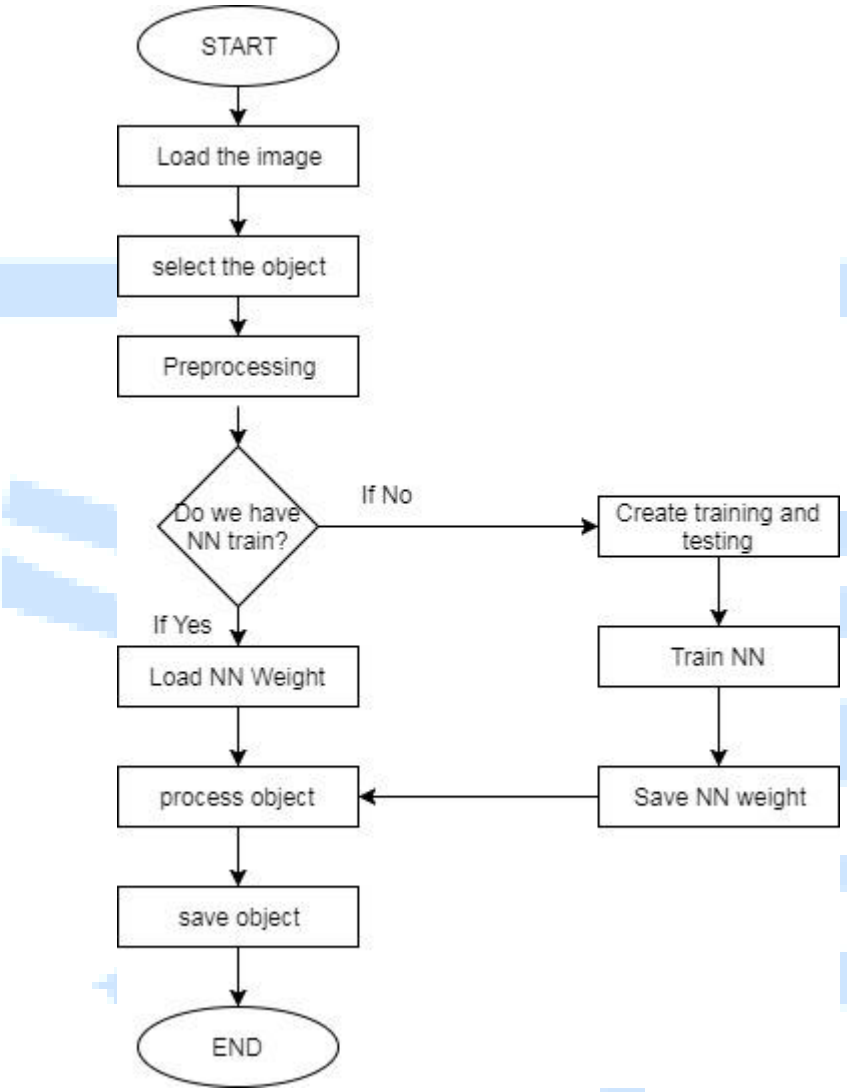

Fig 1: Flowchart of Process

An overall overview of the main principle in object recognition of pattern is first to teach the machine which classes of patterns that may occur and what they look like. The teaching of the machine is performed by showing the machine examples of image of all the different classes. Based on these examples the machine builds a prototype or a description of each class of object. Then, during recognition, the unknown objects are compared to the previously obtained descriptions, and assigned the class that gives the best match.
In most commercial systems for object recognition, the training process has been per- formed in advance. Some systems do however include facilities for training in the case of inclusion of new classes of characters.

1. Image Acquisition
2. Artificial Neural network
3. Back propagation algorithm

3. RESULT

After implementing all the previously discussed functionality in Python, the resulting artificial neural network has an accuracy of 38% on previously unseen data. To achieve these results, the network was trained for 10 epochs (the number of times the full dataset is passed through the network) with a batch size of 20 (the number of inputs that are passed through the network before updating the weights) and a learning rate of 0.001 and a momentum of 0.5. It took approximately 223 minutes for the network to finish the computation.

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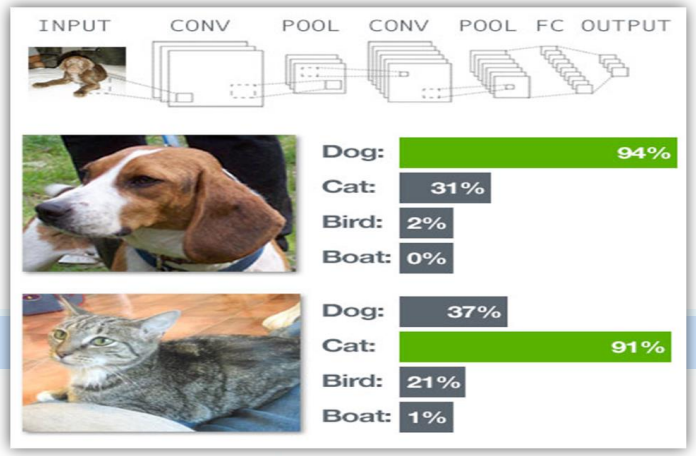

Fig 2: Expected Result

4. CONCLUSION

Object/image recognition is complex task for machines in comparison to human brains ability to object recognition. Training of machine for Object/image detection makes them able to classify between various pre-defined objects/images. To do so, it's important to make use of convolution neuron network instead of traditional neuron networks, since tradition neuron takes millions/billions of permutation and combination to determine classification among various objects. Since, the training is of pre-defined images introduced into machines, we can also put random object/image as a test model for better learning of machines. Though, by training machine will be able to classify among various images/object but it's not possible or very rare possible that it will give 100% of accuracy, since machine learning and in top of that ,images which contains combination of R,G,B model, takes lots of time and powerful graphic processing.

5. ACKNOWLEDGMENT

We shall be failing in our duty, if we will not express our sincere gratitude to all those distinguished personalities with the help of whom we successfully completed our project.

My deep gratitude to Prof. Archana Ingle, THE HEAD OF EXTC DEPARTMENT, VIVA Institute of Technology, Who always been playing a great role in all round development of the student.

I would like to thank my Project Guide Prof. Madhura Ranade for her valuable guidance, advice and constant aspiration to our work, teaching and non-teaching staff for their kind support, help and assistance, which they extended as and when required. Particularly, we must thank all lab assistance for taking keen interest in us to give us excellent and unforgettable facilities.

Last but not the least I wish to thank my friends for providing technical and moral support. I hope that this project report would meet the high standards of all concerned people and for their continuous co-operation during the whole period of period of project that helped us in enhancement of this project.

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Design & Implementation of Industry Oriented PLC for Bottle Filling.

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ABSTRACT

PLC means programmable logical controller is an industrial computer control system which continuously monitors the state of input devices and makes decisions based on a custom program which control the state of output devices. we aim to design an industrial plc, using micro-controller atmega 328p which is heart of plc. here, plc will provide 8 digital i/p, 4 digital o/p, 2 analog i/p & 1 pwm pin to interface with an outside electromechanically circuitry. plc's are programmed by using ladder logic. it also consists of protection circuitry to protect our plc from outside circuitry. here we make a bottle filling application which shows working of plc. in this application we are using proximity sensors, stepper motor & solenoid valve

KEYWORDS— ***PLC, MOTORS, SENSORS, SOLENOID VALVE, LCD.***

1. INTRODUCTION

A programmable logic controller, PLC, is a digital computer used for automation of usually industrial electromechanical processes, such as control of machinery on factory assembly lines, amusement rides, or light fixtures. PLCs are used in many machines as well as in many industries.

PLCs have been achieving, popularity on the factory floor and will probably remain most noticeable for some time to come. Most of this is because of the advantages they offer. Cost effective for controlling complex systems. Tensile and can be reapplied to control other systems quickly and easily.Computational abilities allow more sophisticated control.Trouble shooting aids make programming easier and reduce downtime. Authentic components make these likely to operate for years before failure

1.1 Importance of project

In computer family Programmable Logic Controllers (PLCs), also known as programmable controllers. They are used in private enterprise and production applications. A PLC monitors inputs as well as makes decisions based on its program, and controls outputs to automate an machine. This course is meant to supply you with basic information on the task and design of PLCs.

1. In the world of automation industry PLC plays an important role. Automation is used for all control systems and the technologies. PLC is use to reduce the human work and helps in increasing the production.

2. It acts a major function in the automation field which tends to diminish the complexity, increases safety and cost efficient

3. PLCs are easily programmed and can be easily recognize programming language. And also can be Re-programmed.

4. A very complex logic can be created without use of complex wiring.

2.

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3. DESIGN METHODOLOGY

This chapter will mainly discuss about the methodology of the project & the aspect or factor that must be taken into consideration during the development process. All these factors were important make sure the project will achieve its objective. Moreover, this chapter will also discuss about designation stage on this project including electronics design, hardware design & material selection.

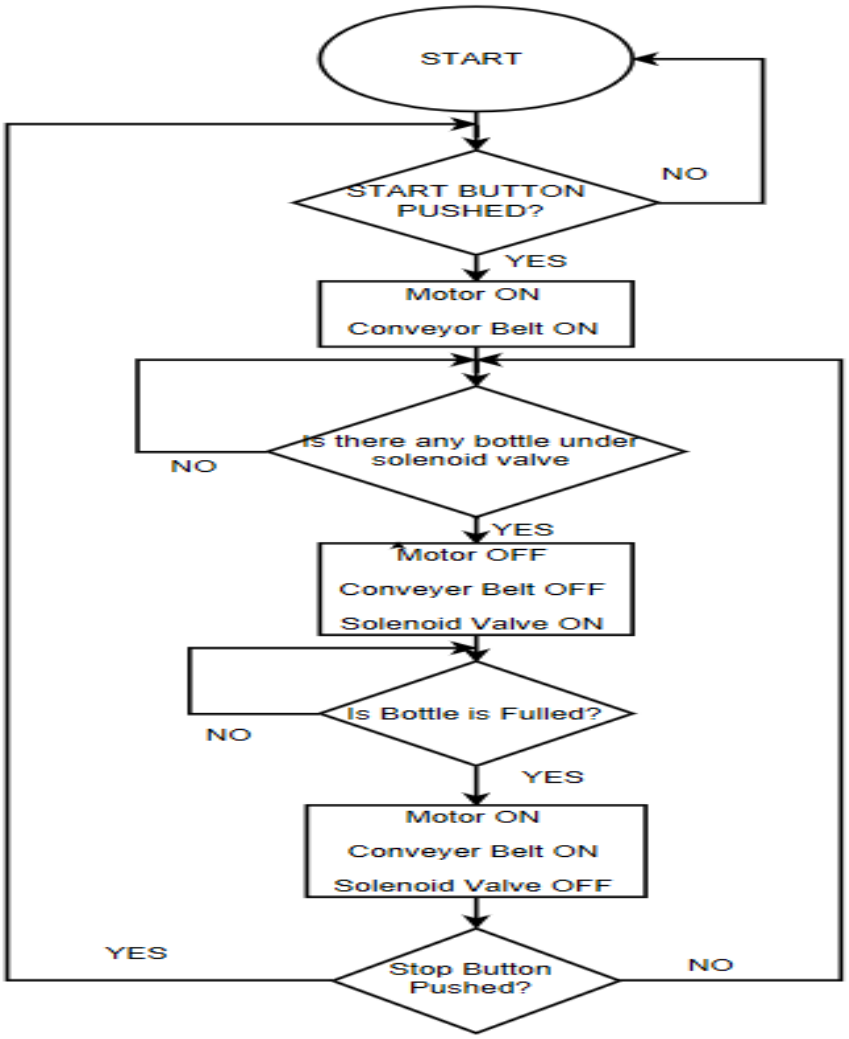

Fig 1.: Flowchart of Process

The processes controlled by PLC. When we Pushed start button Motor starts will switch on then conveyor will start moving. Bottle goes under the valve then a sensor senses the bottle and the valve open. The liquid filled in to the bottle. The filling operation depends on user characterized volume. Valve open for the particular time in that time the liquid filled in to the bottle. Motors starts again (i.e. Conveyor belt) & the process repeats till user want to continue it.

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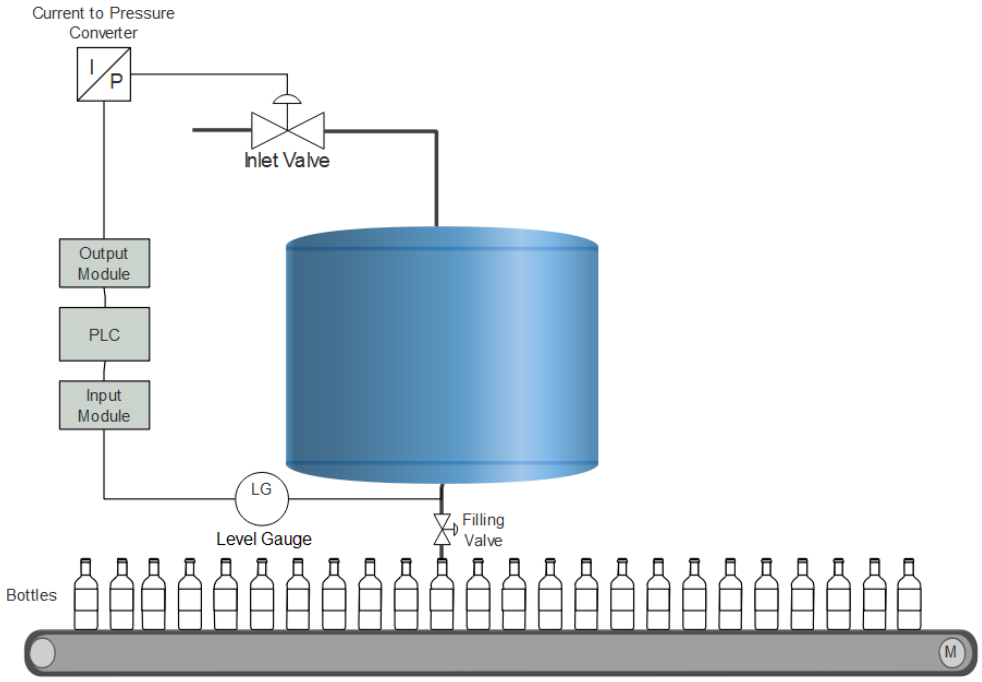

Fig 2: . Bottle Filling Process

2.1 TOOLS **TO USE**

2.1.1 Hardware

In the hardware design part overall component such as ATMEGA328p, Motor, proximity sensor, Conveyor belt, LCD display, Keypad (4*4) are used.

2.1.2Software

The following are the lists of programming languages specified by this standard:

- Ladder diagram (LD)
- Sequential Function Charts (SFC)
- Function Block Diagram (FBD)
- Structured Text (ST)
- Instruction List (IL)

2.2 LADDER Logic

Ladder logic is popularly used to program PLCs, where sequential control of a process or manufacturing operation is needed. Ladder logic is useful for simple but complex control systems or for reworking old hardwired relay circuits. As programmable logic controllers became simpler it has also been used in very complex automation systems.

Ladder logic has evolved into a programming language that presents a program by a graphical diagram based on the circuit diagrams of relay logic hardware. Ladder logic is used to create software for programmable logic controllers (PLCs) used in industrial applications.

Ladder logic has contacts that create circuits to control coils. Each coil or contact corresponds to the status of a single bit in the programmable controller's memory. A ladder program can refer many times to the status of a single bit, equal to a relay with an indefinitely large number of contacts.

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2.3 LD MICRO

LD micro generates native code for certain Microchip PIC16 and Atmel AVR microcontrollers. Usually software for these microcontrollers are written in a programming language like assembler, or BASIC. PLCs, on the other hand, are often programmed in `ladder logic.
Using LD micro, you can create a ladder diagram for your program. You can simulate the logic in real time on PC. Then when you are satisfied that it is correct you can assign pins on the micro-controller to the program inputs and outputs. Once you have assigned the pins, you can compile PIC or AVR code for your program. The compiler output is a hex file that can be program into your microcontroller

2.4 FUTURE SCOPE

By the attachment of jet nozzle and strong solenoid valve can minimize the time to fill bottles and can efficiently increase yield.A capping section could also be established.

4. CONCLUSION

PLC helps in adaptation required in automation which is of great use in industries.Our PLC consist of additional features Such as GSM, SD card, real time clock etc. Implementation of our project deals with bottle filling application using PLC. It has facilities like storing data of work done OR work which is in progress.
Our project is a combination of electronics and mechanical work, which will provide us knowledge and make us aware of What all factor we need to consider while desiging a project based on automation.

5. ACKNOWLEDGMENT

We shall be failing in our duty, if we will not express our sincere gratitude to all those distinguished personalities with the help of whom we successfully completed our project. My deep gratitude to **Prof.Archana Ingle**, THE HEAD OF EXTC DEPARTMENT, VIVA Institute of Technology, who always been playing a great role in all round development of the student. I would like to thank my Project Guide **Prof. Pratik Parsewar** for her valuable guidance, advice and constant aspiration to our work, teaching and non-teaching staff for their kind support, help and assistance, which they extended as and when required. Particularly, we must thank all lab assistance for taking keen interest in us to give us excellent and unforgettable facilities. Last but not the least I wish to thank my friends for providing technical and moral support. I hope that this project report would meet the high standards of all concerned people and for their continuous co-operation during the whole period of period of project that helped us in enhancement of this project.

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ROUGH TERRAIN BEETLE ROBOT

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ABSTRACT

This proposed work explores new possibilities for social interaction between a human user and robot . Normally some of the risky and various tasks cannot be done by human beings. Thus there is need for change in present era. So, robot is the best option and it can be a good and effective option for risky purposes. Robot plays various roles in different fields of industries, medical, colleges, home appliances and military and defense. The proposed work is to design and develop a rough terrain beetle robot. Now a day's robot's comes in the market works on a simple terrain were this proposed works focusing on plain surface as well as rough surface such as forest, hilly and rocky areas. In this propose work we focusing on the use of rough terrain robots instead of using other simple robots also presents an automatic robot which uses different technologies like Infrared sensor, PIR sensor etc. and this proposed a low voltage power supply, low cost.

Keywords— *raspberry pie, android studio, python*

1. INTRODUCTION

Controlling an object with just the gaze of your eyes is something we've imagined and seen in the movies. Although mostly seen as something fun and fictional, the idea of eye controls is of great use to not only the future of natural input but more importantly the handicapped and disabled. Our project focuses on using our eyes as the controller commanding any object we see fit. The object we chose was a wheel chair however; we could have possible interfaced with a toy car, hover craft, a video game, or even an entertainment system. People who are unable to walk and are using wheel chairs exert great amounts of energy using physical strength to turn and steer the wheels. With eyesight being their guide, the disabled would save energy and could use their hands and arms for other activities. There are no products on the market, but there are other applications such as virtual reality using eye tracking to control the vision of the game. Eye tracking is not heavily used in mainstream products but are beginning to pick up as input to electronics become more and more natural. The purpose of this project is to develop a wheelchair that will be controlled by the eyes of the person seated in the wheelchair. This will allow people without full use of their limbs the freedom to move about and provide a level of autonomy. The project will consist of three main parts. The first part is the mounted camera and laptop system that will track the camera wearer's eyes. The camera will take an image of the eyes that will be sent to the laptop where the images will be processed using the open source image processing software Open CV. Once the image has been processed it moves onto the second part, our microprocessor. The microprocessor will take a USB output from the laptop and convert the signal into signals that will be sent to the wheelchair wheels for movement. Also, the pressure and object detection sensors will be connected to our microprocessor to provide necessary feedback for proper operation of the wheelchair system. The final part of the project is the motor drivers to interface with the wheelchair itself. There will be two motor drivers for each motor on the wheelchair both left and right.

2. DESIGN METHODOLOGY

2.1 Block Diagram

Instead of using all these existing and above discussed technology we can use a bug leg shaped wheels for running on a rough terrain. We can also use different sensor like PIR sensor, IR sensor and Ultrasonic sensor for purposes like for distance measurement, obstacle detection, for depth sensing and for distance measurement respectively. RF modules are used for transmitting and receiving to the microcontroller that controls the direction movements of motors along with the laser shooter. In this proposed model we want to achieve three aspects:

I. To design radar concept: In this mode we use the ultra sonic sensor that sense the obstacle and measure the distance and display in lcd.
II. Accident avoiding feature: In this mode we use the infrared sensor that sense automatically and check the problem and automatically stop and weep the buzzer.
III. Depth detection: In case of depth the robot sense the depth automatically stop and weep the buzzer.

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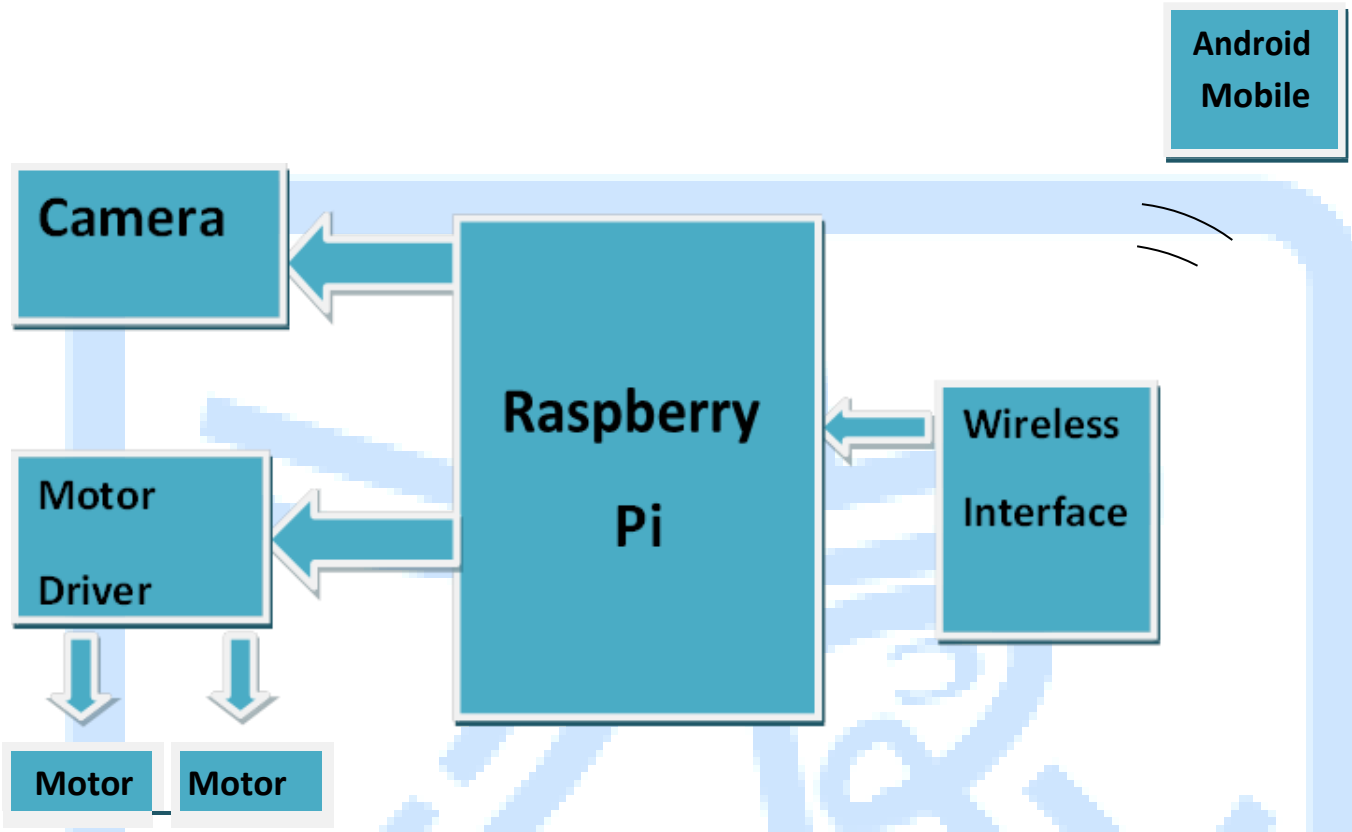

Fig.1: Block diagram of robot

In this proposed model contains two units one is Robot unit and Control unit. Robot unit: The heart of the system is AT89s52, which controls all the activities of the robot section. RF Module is configured to transmit and receive signals between robot and control unit. Four motors have been used in this project for wheel control. The robot is remotely controlled by a joystick remote. This allows the user to remotely control the directional movement as well as speed and power of the robot. The joystick uses RF transmit the commands to the robot remotely.

2.2 Software Design

Python is a widely usedhigh-level programming language for general-purpose programming, created by Guido van Rossum and first released in 1991. An interpreted language, Python has a design philosophy that emphasizes code readability (notably using whitespace indentation to delimit code blocks rather than curly brackets or keywords), and a syntax that allows programmers to express concepts in fewer lines of code than might be used in languages such as C++ or Java. The language provides constructs intended to enable writing clear programs on both a small and large scale.
Python features a dynamic type system and automatic memory management and supports multiple programming paradigms, including object-oriented, imperative, functional programming, and procedural styles. It has a large and comprehensive standard library. Python interpreters are available for many operating systems, allowing Python code to run on a wide variety of systems. C Python, the reference implementation of Python, is open source software and has a community-based development model, as do nearly all of its variant implementations. CPython is managed by the non-profit Python Software Foundation. Python is a multi-paradigm programming language: object-oriented programming and structured programming are fully supported, and many language features support functional programming and aspect-oriented programming (including by metaprogramming and metaobjects (magic methods)). Many other paradigms are supported via extensions, including design by contract and logic programming. Python uses dynamic typing and a mix of reference counting and a cycle-detecting garbage collector for memory management. An important feature of Python is dynamic name resolution (late binding), which binds method and variable names during program execution. The design of Python offers some support for functional programming in the Lisp tradition. The language has filter(), map(), and reduce() functions; list comprehensions, dictionaries, and sets; and generator expressions.

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Rather than requiring all desired functionality to be built into the language's core, Python was designed to be highly extensible. Python can also be embedded in existing applications that need a programmable interface. This design of a small core language with a large standard library and an easily extensible interpreter was intended by Van Rossum from the start because of his frustrations with ABC, which espoused the opposite mindset. While offering choice in coding methodology, the Python philosophy rejects exuberant syntax, such as in Perl, in favor of a sparser, less-cluttered grammar. As Alex Martelli put it: "To describe something as clever is not considered a compliment in the Python culture." Python's philosophy rejects the Perl "there is more than one way to do it" approach to language design in favor of "there should be one—and preferably only one—obvious way to do it". Python's developers strive to avoid premature optimization, and moreover, reject patches to non-critical parts of CPython that would offer a marginal increase in speed at the cost of clarity. When speed is important, a Python programmer can move time-critical functions to extension modules written in languages such as C, or try using PyPy, a just-in-time compiler. Cython is also available, which translates a Python script into C and makes direct C-level API calls into the Python interpreter. An important goal of Python's developers is making it fun to use. This is reflected in the origin of the name, which comes from monty python, and in an occasionally playful approach to tutorials and reference materials, such as using examples that refer to spam and eggs instead of the standard. A common neologism in the Python community is pythonic , which can have a wide range of meanings related to program style. To say that code is pythonic is to say that it uses Python idioms well, that it is natural or shows fluency in the language, that it conforms with Python's minimalist philosophy and emphasis on readability.

2.3 TOOLS TO USE

2. 3.1 Hardware

The Raspberry Pi is a series of small single-board computers developed in the United Kingdom by the Raspberry Pi Foundation to promote the teaching of basic computer science in schools and in developing countries. The original model became far more popular than anticipated, selling outside of its target market for uses such as robotics.

Fig.2: Raspberry pi model

The Pi 3 is exactly what you would expect from the latest Raspberry Pi. No, it doesn't have SATA or USB C or a PCIeconnector. The goal of the Raspberry Pi Foundation has always been to produce an inexpensive computer for everyone, and adding these ports would only drive up the price. Instead of pleasing the power users, the Pi Foundation has done their best to please anyone. Like the Raspberry Pi 2 from late last year, the Raspberry Pi 3 features a new CPU, a Broadcom BCM2837 quad-core 64-bit ARM Cortex A53 running at 1.2 GHz. While the most newsworthy pre-launch leak surrounding the Raspberry Pi 3 is the added wireless functionality, the big news is the upgraded CPU. With the Cortex A53, the Pi 3 has passed through a threshold. The Raspberry Pi isn't just a board that is used to play retro video games in emulators anymore, and it's no longer confined to duty as a set-top box. The Pi 3 is a real computer. When the original Raspberry Pi launched four years ago, it immediately fulfilled its promise of bringing a low-cost Linux-based computer to the masses. This promise wasn't one to bring a high power Linux computer to the masses; checking your email, or loading a web page on the original Pi was a chore. Still, the board was capable enough to be very popular, and rightly so: there's a lot you can do with a tiny Linux board with a few GPIO pins and an Ethernet port.
I still have my Pi 2 connected to an old flat screen TV and keyboard on my workbench for light-duty browsing and viewing PDFs. The Raspberry Pi 3 is another beast entirely. The Pi 3 is now over a threshold where it becomes a useful

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desktop computer. The goal of the Raspberry Pi foundation is to promote computer science in early education. While the Pi 1, Pi 2 and Pi Zero are marginally capable in this role, the Pi 3 is much more useful. This is a computer that could populate an entire elementary school computer lab. The Raspberry Pi has now passed a threshold of usefulness.

2.3.1.1 Raspberry pi camera:

The Raspberry Pi camera module can be used to take high-definition video, as well as stills photographs. It's easy to use for beginners, but has plenty to offer advanced users if you're looking to expand your knowledge. There are lots of examples online of people using it for time-lapse, slow-motion and other video cleverness. You can also use the libraries we bundle with the camera to create effects. If you're interested in the nitty-gritty, you'll want to know that the module has a five megapixel fixed-focus camera that supports 1080p30, 720p60 and VGA90 video modes, as well as stills capture. It attaches via a 15cm ribbon cable to the CSI port on the Raspberry Pi. It can be accessed through the MMAL and V4L APIs, and there are numerous third-party libraries built for it, including the Picamera Python library.

3. Flow Chart:

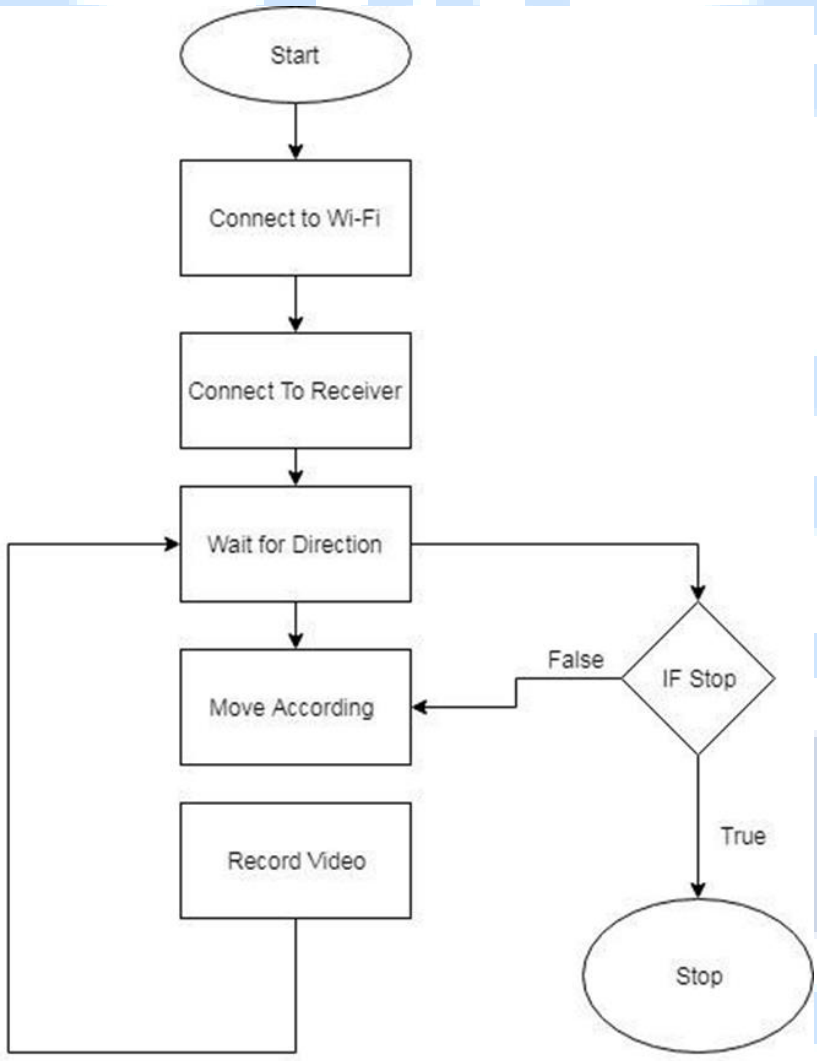

Fig.3: Flow chart

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3.1 Flowchart of Process

When the device initially Boot's up it's start looking for saved wifi and connects into the network.after getting in it looks for concern receiver.Receiver stores the device configuration and default moments.Device fetch that moment and act accordingly.Device parallelarly records the live video and store locally and send the back up to the receiver and receiver stored the footage on globle serve.

4. CONCLUSION

The proposed robot has scope of widespread industrial, defense and home applications. It can be used to analyze the environment of a coal mine without any human intervention. It can also be employed in a hostage situation to pin point the exact location of terrorists with the help of ultrasonic and PIR sensor, saving many lives during rescue mission. Another application is home security system to sense movement of intruder through PIR sensor.

5. ACKNOWLEDGMENT

It gives me immense pleasure to express my deepest sense of gratitude to my respected guide Prof.Ashwini Haryan, Electronics and Telecommunication department, VIVA Institute of Technology, Virar, for her guidance and help for completing this work. I would like to express my sincere thanks to Dr.Arun Kumar, Principal for wholehearted support. I also wish to express my gratitude to Prof. Mrs.Archana Ingle, HOD Electronics and Telecommunication for her wholehearted support. At the end I would like to express my sincere thanks to all my friends and others who helped me directly or indirectly during this project.

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A Literature Review on Varying Dimensions of E-Shaped Microstrip Patch Antenna & Its Application

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ABSTRACT

This paper reviews the effects of varying different dimensions like slot length, length of the leg, position of feed of an E-shaped microstrip patch antenna. Depending on the variations made, the varieties of applications are also stated in the paper. Corresponding changes in the gain and the bandwidth of E-shaped antenna with a rectangular patch antenna are studied. Apart from changing dimensions a study of effects on antenna operation by adding or removing certain shapes is also done.

Keywords— *E-shaped microstrip antenna, patch antenna, WLAN, slot length, multiband operation*

1. INTRODUCTION

Today's world without technology is unimaginable. With advent in technology over the past century we have gone wireless for almost everything. Antennas are the vital part of today's technology. In the need of compact antennas, researchers invented microstrip antennas which are not just compact but easy to fabricate, robust, low profile and compatible with integrated circuits which makes them a superior choice over conventional antennas [1]. However, their drawbacks are their low efficiency and lower bandwidth. These issues are usually dealt with use of thick substrate with lower dielectric constants [2]. The other techniques used to improve the bandwidth of microstrip antennas are insertion of shorts, slots and slits of various shapes and sizes [3-5]. The combination of thick substrate with lower dielectric constants and use of shorts and slots are employed to increase the bandwidth and reduce the size of the antenna [6]. E-shaped antennas have been derived from a regular patch antenna by introducing slots [7].

2. E-SHAPE ANTENNAS

As seen from the literature survey wide bandwidth and multiband operation are the major reasons why E-shaped antennas are popular. The variations in the parameters like side leg length, slots, shortings, and changes in the ground plane have shown a significant increase in gain of the microstrip antenna thereby improving its efficiency. GSM, digital enhanced cordless telephone, WIMAX, WLAN, GPS are some of the applications where E-shaped microstrip path antennas have been used [8]. In many research papers E-shaped antennas also exhibit multiple bands. Multi-band antennas are versatile in a sense that same antenna can be used for multiple applications thereby making it more cost and energy efficient. Multi-band antennas can also be used further to develop reconfigurable antennas which are useful in Cognitive radio. A study of effects of such variations in the dimensions of E-shaped antenna has been presented in this paper. The basic configuration of E-shaped antenna has been shown in Fig. 1[9].

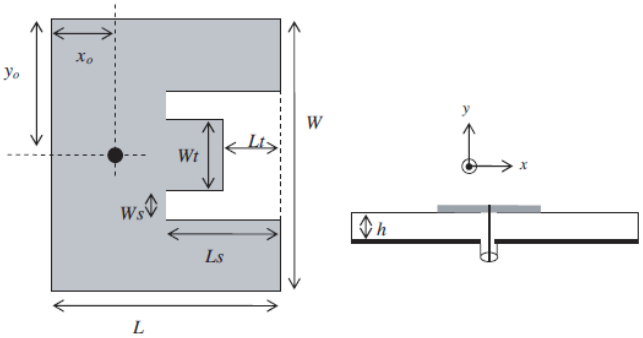

Fig. 1: Geometry of E-shaped antenna[9].

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3. OPTIMIZATION OF E-SHAPED ANTENNAS

As mentioned at the beginning of this paper, a variety of variations are made in E-shaped microstrip antennas to achieve better bandwidths and gain. Following sections describes methods to optimize this structure to be used in a variety of applications.

3.1 Cutting slots in the structure

Cutting slots in the structure to achieve multi-band operation and bandwidth enhancement has been proposed by authors. In both these papers [10] [11], cutting slots have introduced extra resonance frequencies than the basic antenna structure. A simple patch resonates at a single frequency and when slots are incorporated, current starts flowing around the slots that allow the antenna to resonate at another frequency. These antennas can be used in WLAN application. Figure 2 from mentioned paper are good examples of this method to achieve multi-band operation and enhancement of bandwidth.

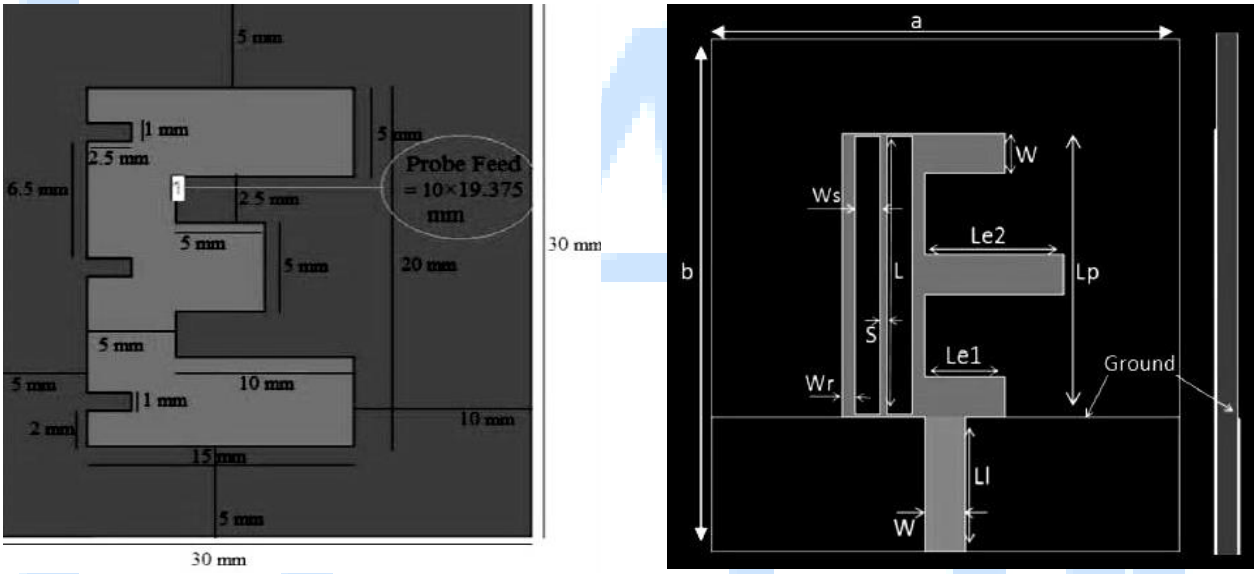

Fig. 2 : Examples of cutting slots in the E-shaped microstrip antenna [10][11].

3.2 Varying the length of legs

The flow of current through the side and centre leg of the E-shape antenna causes the addition of frequency band at lower and upper frequencies [7]. Increase in the width of centre leg achieves better return loss at higher frequencies and increasing the width of side legs shows better return loss at lower frequencies. Such addition of resonance frequencies at upper and lower frequencies helps to boost the bandwidth. The current distributions causing extra resonance frequencies are shown in Figure 3(a) and 3(b).

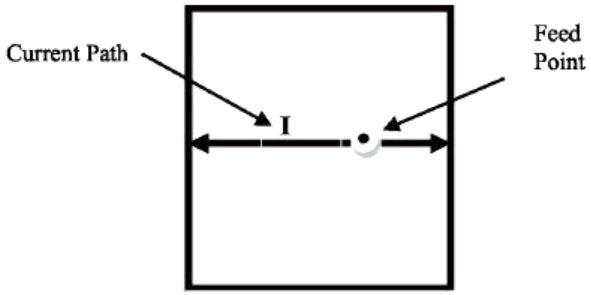

Fig. 3(a) Current distribution in Rectangular Patch[7].

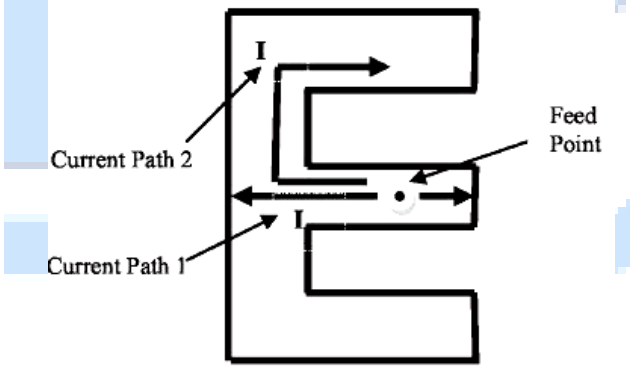

Fig. 3(b) Current distribution in E-shaped Antenna[7].

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3.3 Adding U-shaped structure around the antenna

Along with improvement in bandwidth, some of the authors have proposed addition of structures around the E-shape to improve the gain of the antenna [12] [13]. The optimization of gap between the additional U-shape structures around E-shape is performed to find the maximum gain [8]. A gain of 7.22 dB was achieved by keeping the u-shape structure as close as possible to E-shaped antenna. The geometry of designed antenna is shown in Figure 4[8].

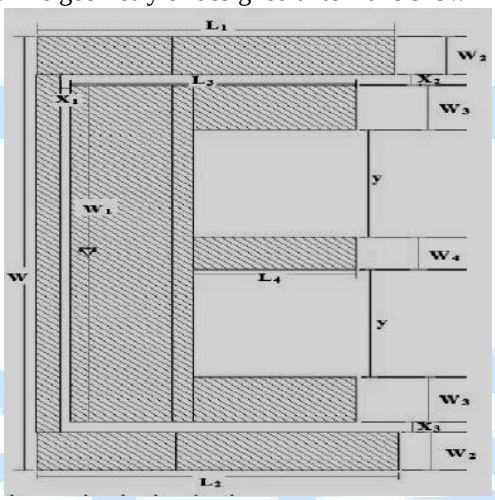


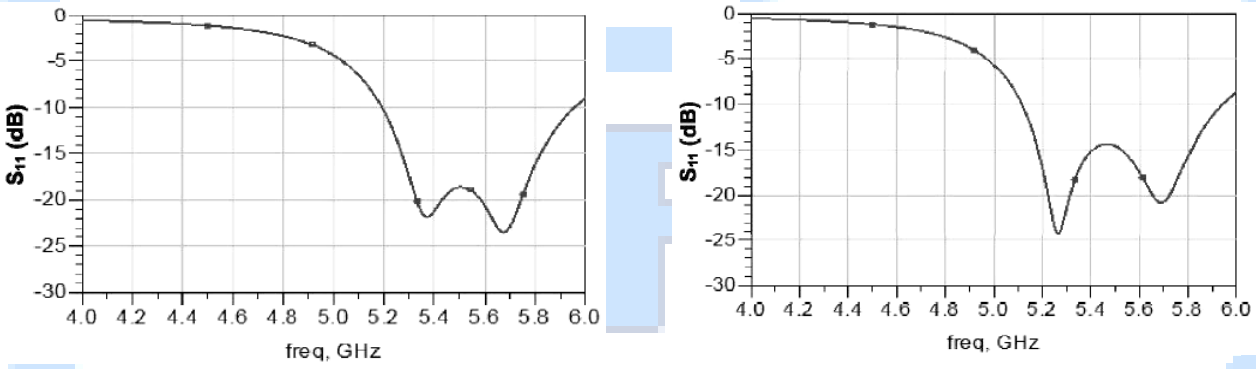
Fig. 4: Addition of U-shaped structure around E-shaped antenna [8].

3.4 Cutting slots in the Ground plane

Many authors have tried to achieve a multiband operation by changing the current distribution on the ground plane. This is achieved by cutting slots in the ground plane. Absence of ground plane below the radiating patch causes addition of new bands [14]. The authors have also incorporated shorting pins along with the slots in the ground plane.

3.5 Varying the slot lengths of E-shape

Slot length happens to be another important parameter in the design of E-shaped antenna. With the increase in slot length the current path would increase for lower resonance frequencies [7]. With increase in slot lengths the lower resonance frequencies are seen to be shifting to lower frequencies, as shown in Figure 5 [7]. Varying the length of the slot unevenly for both slots has shown shifting of resonance frequency to lower frequencies [15].



(a) (b)

Fig. 5 : Various slot lengths (Ln) (a) Ln = 2.5 mm (b) Ln = 3.0 mm

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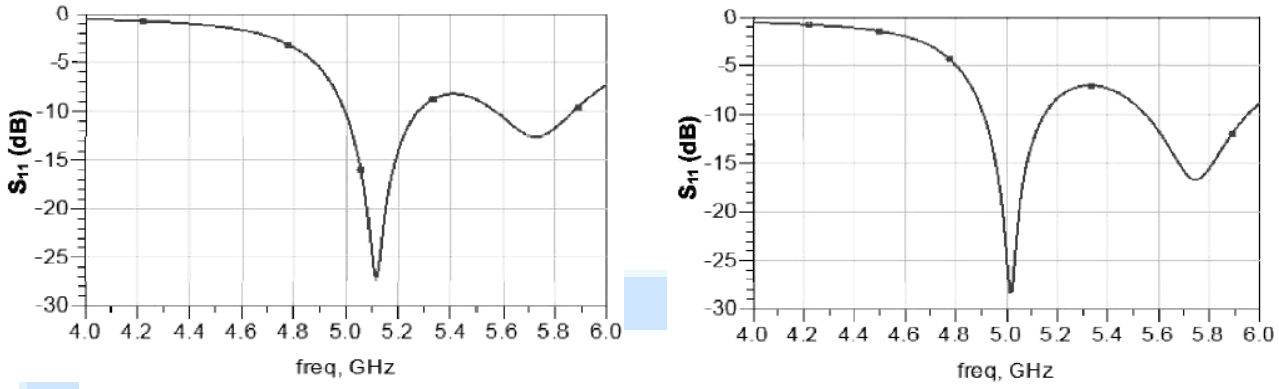

(c) (d)

Fig. 5: Various slot lengths (Ln) (c) Ln = 3.5 mm (d) Ln =4.0 mm

3.5 Array of E-shape antenna

Multiple patch antennas may be itched on one plane close to each other to achieve cross polarization has been shown in [16] shown in Figure 6a. The design also serves multiple inputs multiple outputs (MIMO) that provides a bandwidth of 20 MHz which is suitable for WLAN applications. Another example of array of E-shaped antenna is realized by fabricating double E shape facing each other to achieve a good gain up to 9 dB with changes in widths of the gaps [17] shown in Figure 6b.

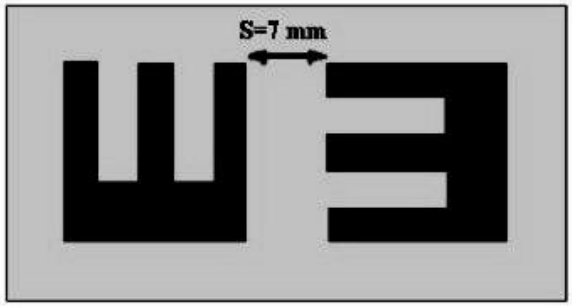

Fig. 6(a): Array of antenna with MIMO to achieve cross polarization[16].

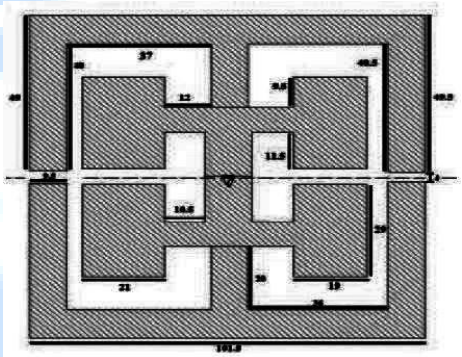

Fig. 6(b): Double E shape antenna to achieve better gain [17].

3.6 Adding shorting pins

Another way to produce multi-band operation shorting pins is introduced. However the position and dimension of the shorting pin with respect to the feed plays important role in bandwidth enhancement. Figure 7 shows the geometry of antennas discussed in [14] and [6] that makes use of shorting pins to achieve multi-band operation thereby improving the overall bandwidth.

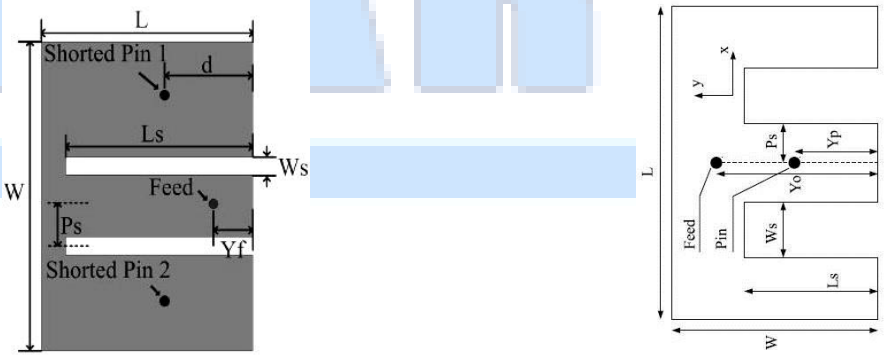

Fig. 7(a): Geometry of E- shaped antenna with shorting pins.

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4. CONCLUSIONS

Literature survey that has been presented in this paper, shows that the E-shaped antennas are better choice than simple microstrip patch antennas when multi-band operations are desirable. Better gains and bandwidths can be achieved by varying dimensional parameters like, slot widths, changing the lengths of center and side legs, slot lengths, adding structure around the antenna, using shorting pins, altering the ground planes and by placing multiple E-shaped antennas close to each other. Similar variations can also be used by using the diodes to change the dimensions that will provide multiple frequency bands.

Typically E-shaped microstrip antennas find application in GSM, GPS, WIMAX. WLAN and if dimensions can be changed by incorporating diodes to change the band of operation then, they can also be used in cognitive radio.

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OLED

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ABSTRACT

OLED are a different type of solid state lighting source which is composed of an organic layer that emits light in response to a electrical current. An OLED device is typically formed in a sheet with emissive organic layers located between a cathode and anode and deposited on a substrate. The substrate can be rigid such as glass or metal or flexible using a polymer plastic. The number of emissive layers depends on the desired light output of the device. OLED technology has great potential for new uses such flexible paper thin OLED panels, transparent OLED panel and white OLED. Organic light emitting diode (OLED) is an light source, can be driven at low voltage and does not include any material which is harmful to the human body and environment like. It has light weight, flexible plastic substrates, wider viewing angles, improved brightness, better power efficiency and quicker response time. As a light source for illumination or backlight, a white light is usually required.

Keywords— *Light Emitting Diode, Flat panel display, Organic material, Lifetime, Applications.*

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1. INTRODUCTION

Old style Television set powered by cathode-ray tubes were biggest about 30–60cm (1–2ft) deep and almost too heavy to lift. The CRTs inside were so long that they had to stand upright firing their picture toward the ceiling, with a little mirror at the top to bend it sideways into the room. Now most of us have computers and TVs with LCD screens, which are thin enough to mount on a wall, and displays light enough to build in portable gadgets like cell phones. The next generation of displays made using OLED (organic light emitting diode)technology. They're super light, almost paper-thin , flexible enough to print onto clothing, and they produce a brighter and more colourful picture. The following are the specific objectives:

i. How an OLED works
ii. Advantages and disadvantages of OLEDs
iii. Current and future OLED applications

2. HISTORY

The first observations of electroluminescence in materials were made by André Bernanose and co-workers at the Nancy University in France in the early 1950s. They applied high alternating voltages in air to materials such as acridine orange, either deposited on or dissolved in cellulose or cellophane thin films. The proposed mechanism was either direct excitation of the dye molecules or excitation of electrons. [1][2][3] Ohmic dark-injecting electrode was developed by Martin Pope in NY University in 1960. They explained needs for hole and electron electrode contacts. DC electroluminescence was first observed under vacuum on one crystal of anthracene [4] by Pope‘s group. He implied in 1965 that when external E.F. is absent, electroluminescence [5-7] in anthracene crystals is generated by recombination of electron and hole. Ching W. Tang and Stephen Van Slyke in 1987 at Eastman Kodak reported the first polymer light emitting diode using a novel two-layer structure with distinct hole transporting and electron transporting layers to occur recombination and light emission in middle of the organic layer, leading to OLED research and device production.

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2.1 Organic Light Emitting Diode

OLED (Organic Light Emitting Diodes) is a flat light emitting technology, made by placing a series of organic thin films between two conductors. When electrical current is applied, a bright light is emitted. OLEDs are emissive display that do not require a backlight and so are thinner and more efficient than LCD displays (which do require a white backlight).OLED displays are not just thin and efficient but they provide the best image quality ever and they can also be made transparent, flexible, foldable and even roll able and stretchable in the future. OLEDs represent the future of display technology.

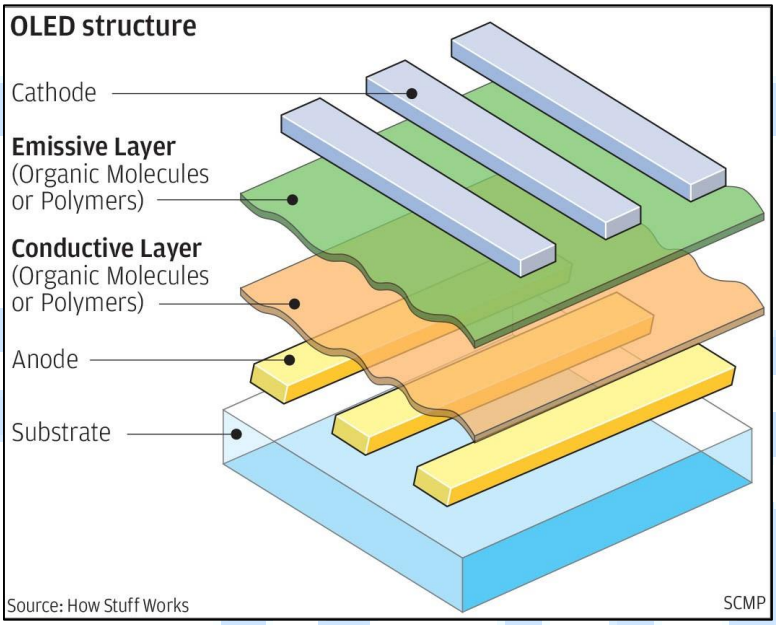

Fig. 1: Basic structure of OLED

2.1.1 Working

A typical OLED is composed of a layer of organic materials situated between two electrodes, the anode and cathode, all deposited on a substrate. Anode and cathode are used for connecting OLEDs to the source of electricity. The main component in an OLED display is the OLED emitter - an organic (carbon-based) material that emits light when electricity is applied. The basic structure of an OLED is an emissive layer sandwiched between a cathode (which injects electrons) and an anode (which removes electrons)[8].When power is applied to an OLED, the emissive layer becomes negatively charged and the conductive layer becomes positively charged. Due to electrostatic forces applied, the electrons move from the positive conductive layer to a negative emissive layer. This may lead to a change in electrical levels and creates radiation that varies in frequency range of visible light. OLEDs also work as diodes if current flows through them in correct direction[9]. The anode layer connected above the emissive layer is at a higher potential compared to the cathode connected to the conductive layer for the working of OLEDs. Modern OLED devices use many more layers in order to make them more efficient and durable, but the basic functionality remains the same[10].

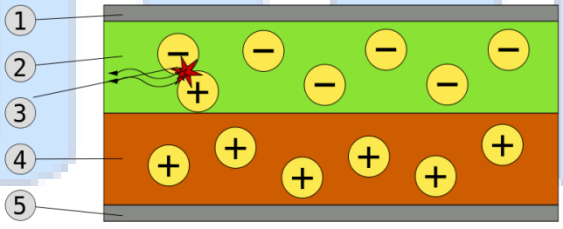

Fig. 2: Schematic of a bilayer OLED: 1. Cathode (−), 2. Emissive Layer, 3. Emission of radiation, 4. Conductive Layer, 5. Anode (+)

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2.1.2 Fabrication Methods For OLEDs

There are two methods to fabricate OLEDs: thermal evaporation of the organic small molecules and spin-coating polymer layers. Thermal evaporation is often performed in a vacuum. The vacuum pressure is usually about 10-6 torr or better. In addition to depositing molecules, it can also be used to deposit cathode materials. There are some advantages to using thermal evaporation. During the fabrication the thickness of each layer can be monitored easily, compared to spin-coating. The vacuum equipment is already in the semiconductor industry, and it is easy to achieve the multi-color displays by using shadow masks for depositing organic materials. Spin-coating is widely used in the polymer-based LEDs. The polymer layers can be deposited from solution directly, but the thickness can't be monitored during the deposition.

2.1.3 Advantages

2.1.3.1 Light Weight and flexibility

OLED is an emerging display technology that enables beautiful and efficient displays and lighting panels. Thin OLEDs are already being used in many mobile devices and TVs, and the next generation of these panels will be flexible and bendable. When we talk about flexible OLEDs, it's important to understand what that means exactly. A flexible OLED is based on a flexible substrate which can be plastic, metal or flexible glass. The plastic and metal panels will be light, thin and very durable - in fact they will be virtually shatter-proof. It is estimated that the first range of devices to use a flexible display won't be flexible at all. While the manufacturer may bend the display or curve it around a non-flat surface, the final user will not be able to actually bend the device. Still it will have several advantages: these displays will be lighter, thinner and much more durable compared to glass based displays. Second generation flexible OLED devices may indeed be flexible to the final user. Finally, when the technology is ready, we may see OLED panels that you can fold, bend or stretch [11].

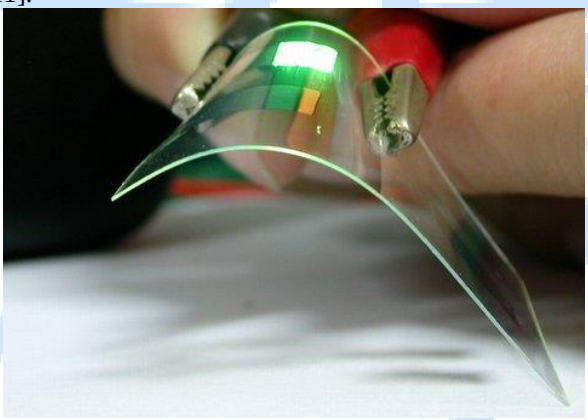

Fig. 3: Demonstration of flexible OLED device

2.1.3.2 Low cost

OLEDs can be printed onto any suitable substrate by an inkjet printer or even by screen printing, theoretically making them cheaper to produce than LCD or plasma displays. However, fabrication of the OLED substrate is currently more costly than that of a TFT LCD [12]. Roll-to-roll vapor-deposition methods for organic devices do allow mass production of thousands of devices per minute for minimal cost; however, this technique also induces problems: devices with multiple layers can be challenging to make because of registration - lining up the different printed layers to the required degree of accuracy.

2.1.3.3 Long Life

Recent improvements in the OLED allow some of our OLEDs to run more efficiently with higher outputs. When run through a lower current, a longer life for the OLED will result. This improvement in lifetime allows for the technology to be used in more applications and provides further protection of product longevity. Standard off-the-shelf displays are available as well as custom solutions for high volume application. This improvement in lifetime allows for the technology to be used in more applications and provides further protection of product longevity. Standard off-the shelf displays are available as well as custom solutions for high volume applications.

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2.1.3.4 Better picture quality

OLEDs enable a greater contrast ratio and wider viewing angle compared to LCDs, because OLED pixels emit light directly. Furthermore, OLED pixel colors appear correct and unshifted, even as the viewing angle approaches 90° from the normal.

2.1.3.5 Better power efficiency and thickness

LCDs filter the light emitted from a backlight, allowing a small fraction of light through. Thus, they cannot show true black. However, an inactive OLED element does not produce light or consume power, allowing true blacks. Removing the backlight also makes OLEDs lighter because some substrates are not needed. When looking at top-emitting OLEDs, thickness also plays a role when talking about index match layers (IMLs). Emission intensity is enhanced when the IML thickness is 1.3–2.5 nm. The refractive value and the matching of the optical IMLs property, including the device structure parameters, also enhance the emission intensity at these thicknesses [13].

2.1.3.6 Low voltage

Efficient and low-voltage top-emitting OLED using surface-modified Ag anode is reported. By inducing a thin silver oxide at the surface of Ag, whole injection from Ag anodes into OLEDs is largely enhanced yet with rather high reflectivity retained. Top-emitting devices using such surface-modified Ag anode show device characteristics competitive with those of a bottom-emitting device using the indium tin oxide anode. OLED materials are designed to generate light with high efficiency at a low voltage in a stable device structure. Typically 70% of the light is trapped in the OLED. Efficient extraction of generated light is the next key step to improve OLED efficiency.

2.1.4 Disadvantages

2.1.4.1 Lifespan

The biggest technical problem for OLEDs was the limited lifetime of the organic materials. One 2008 technical report on an OLED TV panel found that "After 1,000 hours the blue luminance degraded by 12%, the red by 7% and the green by 8%". In particular, blue OLEDs historically have had a lifetime of around 14,000 hours to half original brightness (five years at 8 hours a day) when used for flat-panel displays. This is lower than the typical lifetime of LCD, LED or PDP technology. Degradation occurs because of the accumulation of non radiative recombination centers and luminescence quenchers in the emissive zone [14]. However, some manufacturers' displays aim to increase the lifespan of OLED displays, pushing their expected life past that of LCD displays by improving light out coupling, thus achieving the same brightness at a lower drive current.

2.1.4.2 Water damage

Water can instantly damage the organic materials of the displays. Therefore, improved sealing processes are important for practical manufacturing. Water damage especially may limit the longevity of more flexible displays [15].

2.1.4.3 Outdoor performance

As an emissive display technology, OLEDs rely completely upon converting electricity to light, unlike most LCDs which are to some extent reflective. The metallic cathode in an OLED acts as a mirror, with reflectance approaching 80%, leading to poor readability in bright ambient light such as outdoors [16]. However, with the proper application of a circular polarizer and antireflective coatings, the diffuse reflectance can be reduced to less than 0.1%.Recent advances in OLED technologies, however, enable OLEDs to become actually better than LCDs in bright sunlight. The Super AMOLED display in the Galaxy S5, for example, was found to outperform all LCD displays on the market in terms of brightness and reflectance.

2.1.4.4 Power consumption

While an OLED will consume around 40% of the power of an LCD displaying an image that is primarily black, for the majority of images it will consume 60–80% of the power of an LCD. However, an OLED can use more than three times as much power to display an image with a white background, such as a document or web site. This can lead to reduced battery life in mobile devices, when white backgrounds are used [17].

2.1.5 Current status of development

OLEDs are used today in mobile phones, digital cameras, VR headsets, tablets, laptops and TVs. Samsung is the clear leader in OLED production for mobile devices, and the company uses OLEDs in all of their flagship devices,

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including the latest Galaxy S8, S8+ and Note 8. Apple is using an OLED in its flagship iPhone X and so do many other companies including Motorola, Dell, Google, Sony, Lenovo etc.

OLEDs are used in mobile devices today because they are thin, efficient, flexible and bright. OLEDs carry a price premium over LCDs, but companies are using these displays more and more as performance increases and prices decrease. Here's our list of products and gadgets with an OLED display. If you are looking to adopt an OLED display in your own device, our OLED Marketplace is the world's most comprehensive OLED display catalog.

2.1.5.1 Oled tv' :

OLED TV panels offers several advantages over LCDs like faster refresh rate, better contrast (true blacks), better color reproduction ,better form factor, thinner panels, better viewing angle and efficiency. OLED panels can potentially be made flexible and transparent.

Fig. 4: HD OLED TV

2.1.5.2 Military applications:

Military OLED applications range from wearable electronic displays, including visor-mounted displays, to high-contrast automotive instrument panels and windshield displays. With the introduction of a lightweight, flexible, stretchable screen, other government and military applications for the technology could expand. The new technology could also reduce the weight of electronics equipment currently carried by soldiers in the field, who sometimes carry as much as 100 pounds of equipment. The military is finding this technology to be useful in situational awareness, thermal imaging, simulation and training, among other applications.

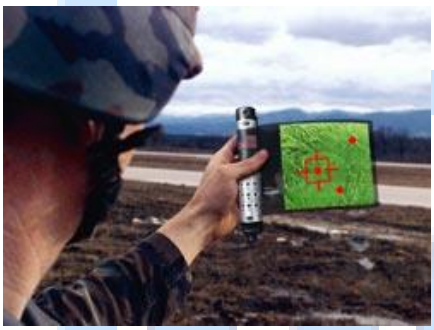

Fig. 5: Military Photonics

Fig. 6: OLED micro-display technology

3 CONCLUSION

OLED technology has advanced rapidly in recent years, with high-performing products now beginning to enter the market place for certain niche lighting applications. The thin, flexible structure of OLED panels provides new

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opportunities for innovative lighting products, and steady OLED efficiency improvements are expected to make OLEDs a viable, cost-competitive option for many lighting applications within the next coming years. However, there still exist a number of "incremental" roadblocks that have to be overcome, many of which may require inventions or major breakthroughs, and most of these roadblocks are materials related. The rate of progress will depend on the success in designing and synthesis of novel high performance, stable materials components of OLED devices to replace those that are still deficient.

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EEG BASED SECURITY SYSTEM

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ABSTRACT

Nowadays, security plays an important role in everybody's life, example for ATM, safety vault and many more. Currently, biometric passcode, something a person knows (memorized password) and token passwords. Till date human brain is the secure and safe place to keep our passcode save. Thoughts are different and unique and differ from person to person. EEG (Electroencephalograph) help to record the level of brain signals. These signals are recorded and are acting like passcode. The recorded signal is transmitted. An EEG-based system should be suitable for especially high security systems.

Keywords—*Safety Vault, Biometric, token passwords, electroencephalograph, brain signals.*

1. Introduction

The measurement of a person's physical features is called Biometrics, such as mental state, psychological and behavioural characteristics which differ by individuals body characteristics such as voice, face, finger prints have used for centuries to recognize each other. Behavioural biometrics refers to those related to the behaviour of an individual. Such as signature, voice, typing rhythm and gait. But the most extensively used are facial patterns, fingerprints and eye irises for person authentication or identification purposes, but they have certain limitations.

The brain activity can be monitored through several methods, which can be classified as invasive and non-invasive. The invasive method need to permanently implant devices in the brain which generated many risks and it is not feasible in particle applications. The non-invasive methods include positron emission tomography (PET), functional magnetic resonance imaging (fMRI), electroencephalography (EEG), optical imaging and magnetoencephalography (MEG).

While using EEG brain signal, we are measuring the activities produced by brain such as magnetic, metabolic and electrical signals. Brain imaging is the procedure which measures brain function by finding the small changes in pluses and blood flow which is detected by fMRI and PET. Magnetic fields are recorded by MEG. Unluckily, to record these waves the device must be sophisticated, expansive and long-time of measuring which isn't feasible for practical application. Measuring brain signals using EEG, is a simple non-invasive method to observe brain activity. So, we stress on studying activities produced by brain recorded from the electrodes which are placed on scalp.

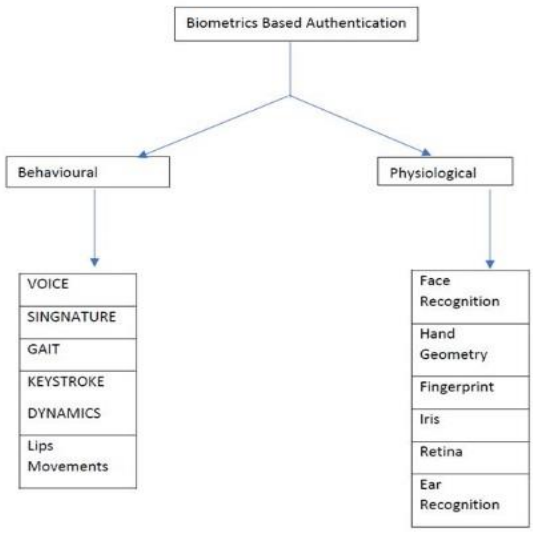

Fig.1:Types of biometrics authentication

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2.EEG signal generation

2.1 What does EEG measure?

In brain cerebral cortex there are majorly six layers but two specialized type of neurons are one is called pyramidal cells which is fifth layer and having 80% of brain neurons and another is stellate cells. Some of them are comparatively larger and arranged perpendicular to the surface of the cortex and parallel to each other. When action potentials propagate along neurons local currents are produced outside of the cell which facilitate propagation of the signal along the neuro. However, these currents are too small to be detected by EEG and the axons are arranged randomly so many of the currents cancel each other out. But there are other sources of current in neurons at the synapse between two neurons neurotransmitter moves across the synaptic cleft and binds to the postsynaptic membrane. This causes ion channels to open in a membrane and positively charged ions flow into the cell.

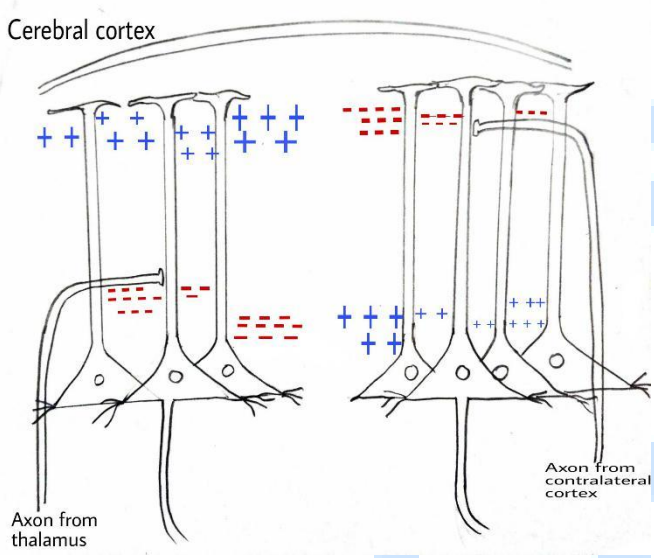

Fig. 2: Cortical neurons

With highly positive ions rushing into the cell the extra space within the cell around the neuron become negatively charged. in above diagram the negative charge shown in red colour and is called the sink. In a distant part of the neuron the ion eventually leaves the cell and this outward flow of positive ions leaves the extracellular due to which the is space positively charged, this is shown blue in diagram referred to as the source. The combination of these two related processes clearly forms an electrical dipole between different parts of neuron. However, the diploe from single neuron is very small and there is a thick skull as well as other layers of soft tissues that pass through. So, individually they are undetectable. Fortunately, as mentioned earlier there are many pyramidal cells in this layer of the brain all aligned parallel to each other and often all of these cells are stimulated at the same time. Therefore, the individually small dipoles summate to form a dipole which is detectable outside the head. If we place electrodes on the surface of the scalp there is a deflection in the voltage signal compared to a reference voltage.

2.1 How is EEG recorded?

To record an EEG electrical signal, electrodes are used to sense this. The electrodes are placed on a scalp at very specific location. This diagram shows the 10-20 system of electrode placement. The numbers refer to the distance from certain reference points on the head to ensure the placement is consistent across different studies. All the electrodes are in place, now signals are collected.

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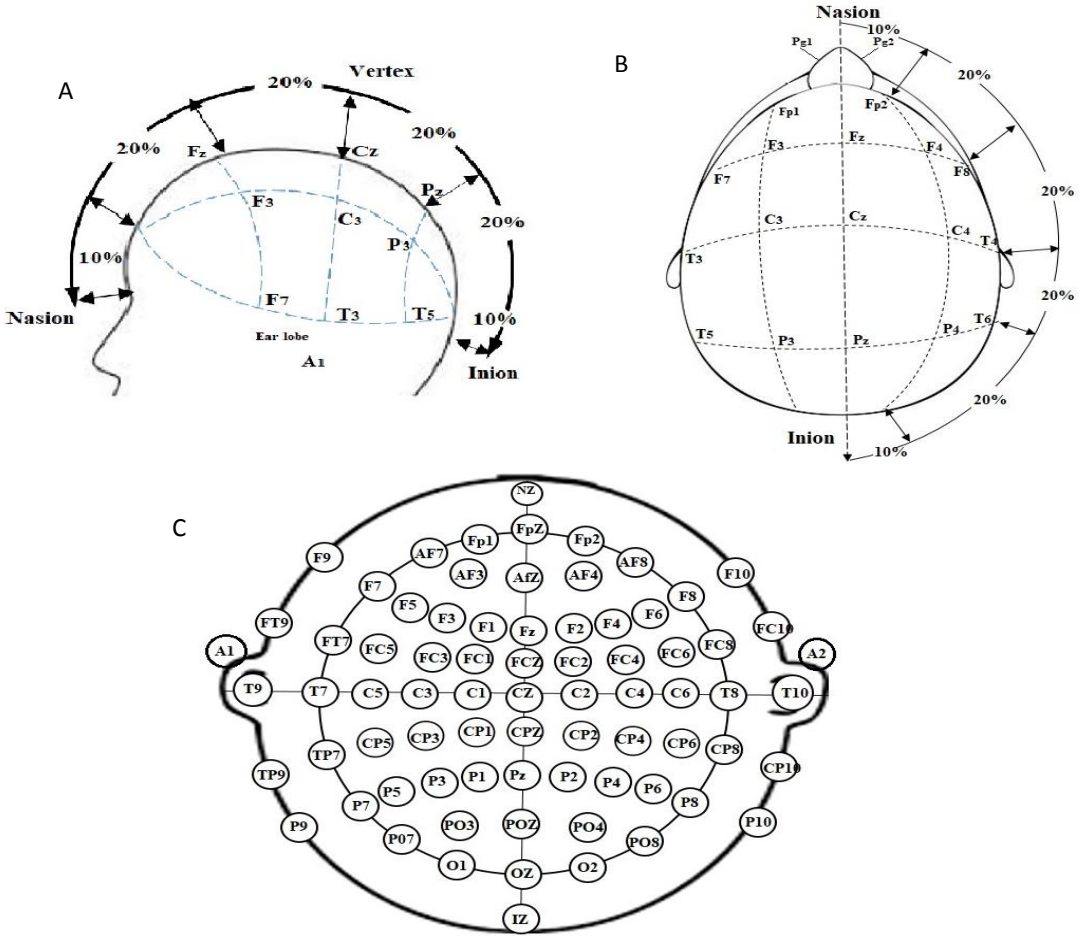

Fig. 3 :The international 10-20 system seen from (A) left and (B) above the head. (C) Indicates a two-dimensional view of the electrode setup configuration [1]

2.2 What does EEG show?

EEG trace have different types of wave which is defined by their frequency. Alpha waves have a frequency from 8 to 3 Hertz and it's seen in adults when they relaxed. The highest frequency is called Beta waves and they are seen commonly in alert, awake adult having frequency between 13-30 Hz. Theta waves are lower frequency and abnormal in adults who are awake but normal during sleep in children. Delta waves are very low frequency less than 4 hertz and they are only normal in deep sleep and in young babies.

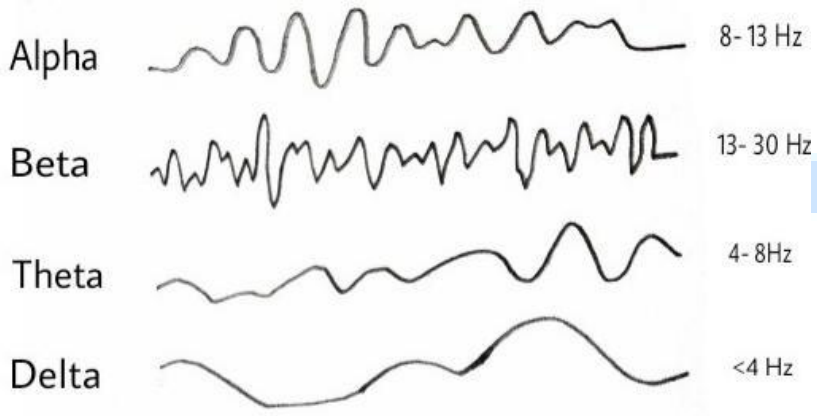

Fig. 4 :EEG major bands

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3. EEG signal characteristic for biometrics

Signal produced by brain are in pattern for every individual is unique, and therefore EEG signals can be used as biometrics. As with the required biological measurements of other popular biometrics, the different characteristics of EEG as a biometric identifier include:

Universality: Individual person should have the characteristic. This requirement is highly satisfied by the EEG since any person, by nature, contains brain signals.

Distinctiveness: As the words says distinct mean different, In terms of features ad characteristics any two persons should be different. Although the uniqueness of EEG brain signals is a complex issue [2], the evidence from past EEG-based person recognition research, [3, 4] shows that EEG is a highly individual characteristic, which is consistent with previous neurophysiology studies [5, 6].

Collectability: The quantitatively measurement of the characteristics. Electrode are placed on the scalp of a person then the EEG brain signal is being acquired. The sheer number of electrodes and the use of conductive gel can cause users inconvenience. However, these limitations of EEG biometrics collectability can be overcome with the recent introduction of the dry electrode and limiting the number of electrode used [7].

Performance: The characteristic used should have to achieve a good recognition accuracy. Different types of EEG brain signal had been studied, and the results have shown that the recognition rates are promising. [8]

Acceptability: in this digital unsecure world, in day today lives people are willing to accept the characteristics of EEG signal and make their data more secure. EEG brain signals have been playing an very important role in medical and health applications for some time. Moreover, affective research had been trying to study the states of human minds and emotions through EEG signals. [8]

Circumvention: The characteristic should be resistant to attacks. EEG signals relate to the activities inside the brain, so by their nature, EEG biometrics are difficult to understand the pattern ,fake, impossible to be observed, and it is easy to do live detection. [8]

4.Authentication using EEG signals

Having the massive advantages of being very difficult to detect the patter,(close to impossible) to fake, impossible to be observed or intercepted, unique, un-intrusive, and requiring live person recording [3], EEG signals are attractive researchers in the security area. [9] Proposed a person authentication method for accessing computing devices by thinking a pass thought instead of typing a password. After that, using brainwave patterns for person authentication was investigated and confirmed by [3] at the Dalle Molle Institute Intelligence Artificial Perceptive (IDIAP) in Switzerland. [8]

The above fig.4 describes the flow chart of biometric security system while doing authentication. The security system usually has three stages: enrolment is the first stage, verification is second and lastly identification. First, comes the enrolment stage, is the most important stage of overall system. It consists of feature amplification of EEG signal, extraction of signal and pre-processing. Raw brainwaves are very difficult to understand and extract the meaningful information from it. Hence, it need to pre-process the signal. amplification and Pre-processing of the data reduces noise in the brain wave. Then, features are extracted by a feature selection algorithm that enables the selection of only useful features. [8]

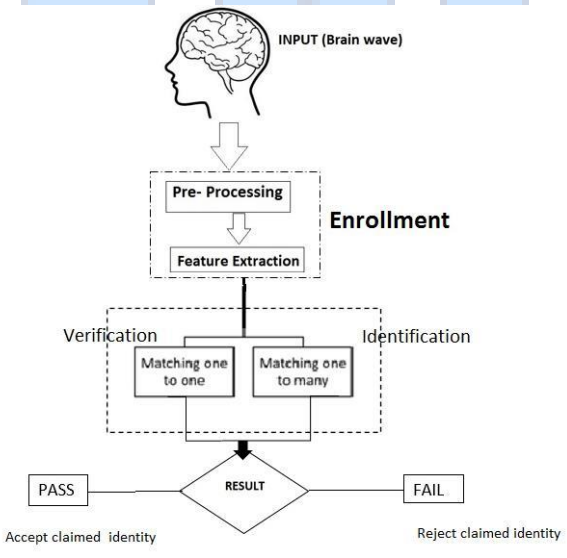

Fig. 5 :EEG-based person authentication diagram

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In the process of identification simply takes the input signal from desired sensor which are electrodes and the system conducts a special operation call one to- many schema to recognise the person identity and integrity whereas, an authentication process first users need to go through the enrolment process then system conducts same to same comparisons to make the unique integrity of the user before the system is able to verify the specific biometric of the person. [10]

An authentication and verification process consist two types of attempts 1), Pass (True identity) and 2) Fail (False identity). This stage needs to be implemented in order to decide if the collected biometric sample belongs to the claimed individual or not (verification mode) or in order to decide to whom this biometric sample belongs to (identification mode).

5. Conclusion

EEG-based biometrics has recently attracted more attentions and increasing research and good results have been published in this emerging field for authentication, the EEG—based biometrics has audible limitations. These limitations come from several intrinsic properties of the scalp EEG signals. First, the current EEG devices are not that much accurate and the spatial resolution of scalp EEG signals is poor, these limits the investigation of brainwave activities. Second, even for a same subject, the brainwave may change over time, this makes it very challenging to find robust EEG features. Hence, given the current hardware devices and biological theories on human brain, the EEG-based biometrics is in its minor stage and still far away from building up industrial applications. However, with the improvement on EEG devices and development of biological theories, maybe one day, the EEG-based bio metrics can be seen in real applications

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FOREST DISASTER MANAGEMENT USING WSN

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ABSTRACT

A wireless sensor network consisting number of wireless nodes that help to monitor and store the information about surrounding environment also to detect physical conditions. There are different applications of wireless sensor network related to disaster management. Our project's aim is in the forest disaster management where it is important to detect forest fire in real time and water level monitoring. Also temperature and humidity in the forest region can be detected using wireless sensors. To develop the complete WSN system NS2 software is used; NS2 is object-oriented and an open source software that provides many standard routing and application protocol for wireless network. Hardware architecture of sensor nodes is simulating using this software where the complete model is examining using ring topology. The drawbacks of ring topology arise during the node failure. In this situation routing path can be change by neglecting that failed node and increasing the transmission power so it provides the good efficiency. All the information is collected at the host and continuously monitor so that prevention can be done.

Keywords:-*Wireless sensor, NS2, Disaster Management, Topology, Simulation.*

1.Introduction

Forests are the important part and indispensable resources for human survival and social development that protect the balance of the earth environmental science. However, because of some uncontrolled activities and unusual natural conditions forest fires occur frequently. These fires are most dangerous disasters to living organisms. In recent times, the number of forest fires has increased seriously due to climate change, human actions and other factors. The monitoring and preventing of forest fires has become a global interest in forest fire prevention organizations. So we are going to introduce the project on, "Prevention of trees extinction and wildlife based on Wsn".

For the monitoring and prevention there will be two systems one is Master & other is Slave. Master is to send the present force of trees at present time. One force sensor we are using between our trees because in forest areas all trees are very near even if one of the tree gets cut or any other activity on tree will effect on other side trees. In forest, rain is high so we are going to use slave circuit which will receive the force & location signals. It consists of transreciever unit. This real-time parameters such as temperature, relative humidity can be precisely monitored and send the data immediately to the computer of the monitoring centre. The gathered data will be analysed and managed by the computer. Compared with the normal climatic information and basic forest resource data, the system can make a fast estimation of a fire danger. The analysed results will then be sent to the relevant section as the policy-making basis by which the section will make the decision for fire fighting or fire prevention.

1.1 Need for Disaster Management

Recent years studies have gathered proofs indicating that the universal climate is changing. The changes include the appearance of severe climate occurrence that may have harmful results to humans. The Intergovernmental Panel on Climate Change has spotted a number of major climate phenomenon with high level of likelihood to occur [10]; heat waves; floods; landslides; avalanche; soil erosion; tropical cyclones, drought and storms.

2. Design Methodology

The sensor node is the primary unit of the environmental data monitoring system; the function of the sensor node is to obtain the perception, collection, processing and wireless communication of environmental information. The architecture of a wireless sensor node is shown in Fig.1. A wireless sensor node is composed of four major components which are the sensing unit, the processing unit, the power unit and finally the wireless transreceiver unit. The sensing unit converts such measured physical quantities such as temperature, moisture etc. into a voltage signal and converts it to produce digital output for processing. The functions of the sensor node are controlled by the processing unit with a

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microcontroller and it manages the communication protocols to carry out specific tasks. Communication between the WSN node and the base station is provided by the transceiver unit. And finally the power unit which is the most important component of a sensor node supplies the required power to all of these units.

2.1 Block Diagram

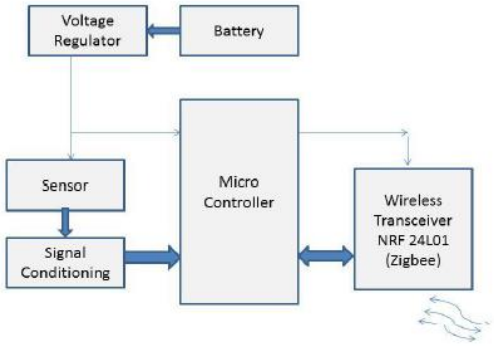

Fig.1: Wireless Sensor Node

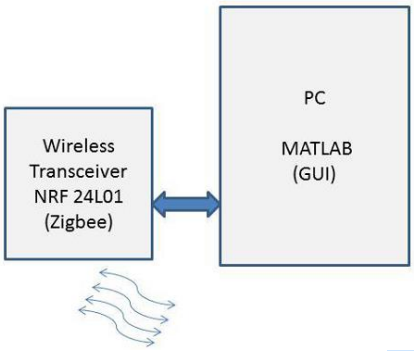

Fig.2: Wireless Sensor Node

2.2 Flowchart

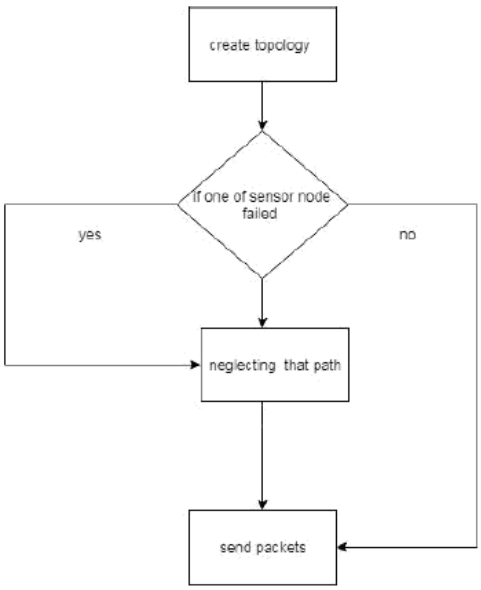

Fig.3: Process flow of software

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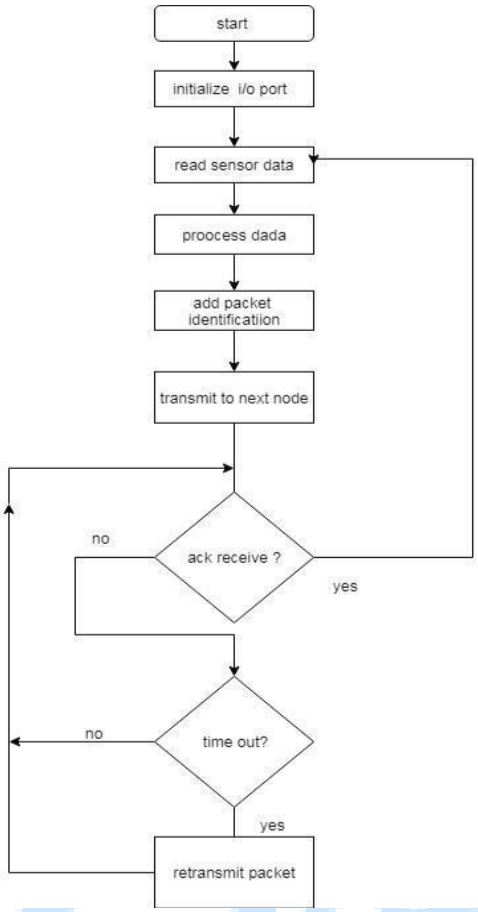

Fig.4: Process Flow of Hardware

2.2 Ring Topology

In the ring topology the nodes will be connected in a closed loop configuration. Adjacent pairs of nodes are directly connected. Messages from one node to another travel from originator to destination via the set of intermediate nodes; the communication can be unidirectional or bidirectional. It is good for peer-to-peer communications as it needs no main node which also gives high performance. Each node checks the destination address in the message header and processes the messages to it .The base station collect these messages which including the overall information collected by the sensor nodes. MATLAB simulink is used to develop a complete wireless sensor node system. Simulation process includes developing the hardware architecture of the transmitting nodes. The simulation model is scanned using ring topology under various conditions and numerous results are collected.

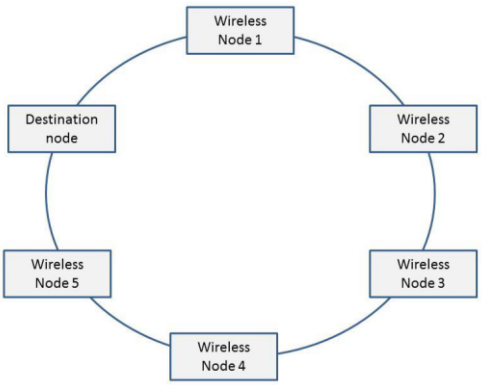

Fig.5: Ring Topology

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2.3 Failure of node

In this project we will try to overcome the limitation of ring topology in which node failure is a very big problem. For which we have increased power transmission in which a single node failure can change its path to deliver its information to its next hop. A ring network is a network topology in which every node is connected to exactly two other nodes forming a single continuous pathway for signals through each node - a ring. Information travel from node to node with each node along the way managing every packet. The network is based on the capability of the signal to travel around the ring. When a device sends information it must travel through each device on the ring until it reaches its end. Every node is a critical link. In a ring topology, there is no server computer present; all nodes work as a server and repeat the signal Power efficient is also being considered which reduces its power and make it effective to be used. Now we can say that the disadvantage (if one workstation or node goes down the entire network gets affected) has been rectified to an extent.

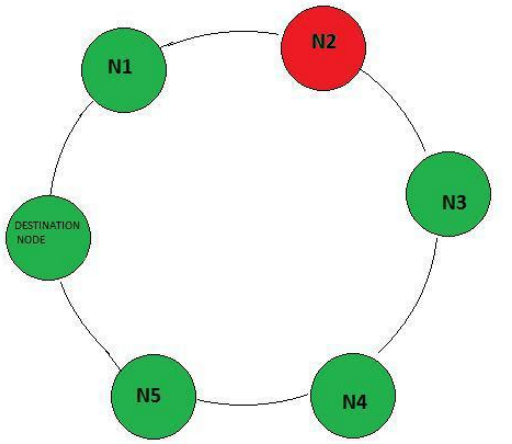

Fig.6. NS2 node failed

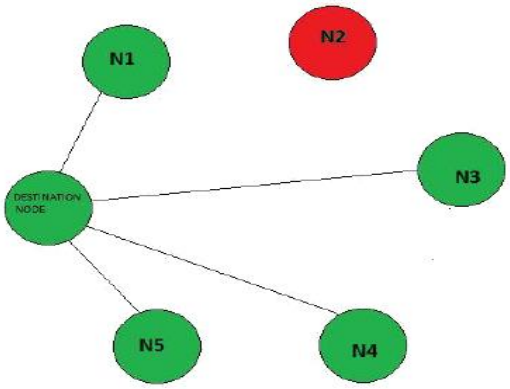

Fig.7. Changing path because of the node failure

3.Result

For the result purpose we create a scenario in which sensor nodes are provide its output different sensors namely temperature humidity fire detection soil moisture and lighting are used, as per the requirement their threshold values are select. Fig shows a single node which senses the surrounding temperature.

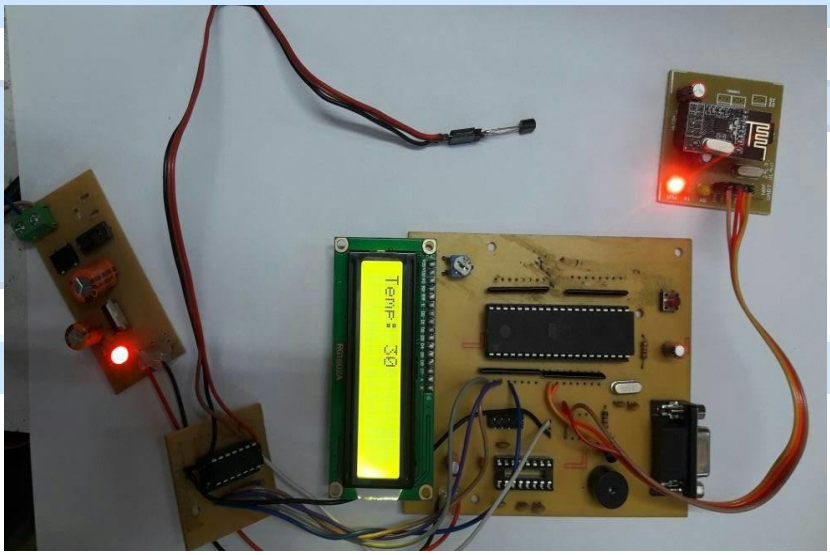

Fig.8: Sensor Node

4.Conclusion

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We studied wireless sensor network which plays an important role in wide applications. Many applications of wireless sensors are time critical in case of monitoring and reporting. Also the system delay considered as an important parameter to be taken into account. Different topologies are used to implement wireless sensor network this will help to make the system more efficient. For our proposed work ring topology was build to implement complete network using clustering technique which is common technique for statistical data analysis. In case of node failure which is the biggest drawback of the system the virtual ring provides an alternative path by neglecting failed node. The transmission power will increase due to the virtual ring which was used. Wsn using ring topology can be implemented in various applications like agriculture, home automation etc. Hence Wsn is useful for science and technology.

5.ACKNOWLEDGEMENT

We have great pleasure in introducing "FOREST DISASTER MANAGEMENT USING WSN" as our project work. When we took up this job we found it difficult but valuable guidance by our project guide Prof. Nikita Thalia made it easier to complete our project work. We also express our gratitude to them who have continuously given us encouragement and support in completion of our project. We also express our gratitude to our Head of Department Prof. Archana Ingle for their priceless support for providing valuable help. We also thank our staff members who helped us directly or indirectly at all stages to reach the success of our project. Last but not list this acknowledgement would not be considered complete unless we record our gratitude to our Principle Prof. Mr. Arun Kumar and our parents who support us at every stages.

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ANTI DROWNING SYSTEM

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ABSTRACT

This system is very helpful for saving the life of a person drowning in the water. This is done by informing the heartbeat rate of any person in the water to the lifeguard. Our system will monitor the heart rate. It will then transmit using RF. its range would be around 5-6 meters, if under water around 2-4 meters. For this the system includes transmitting and receiver circuit. The receiver circuit is with the lifeguard to inform about the person's heart beat rate, while the transmitting circuit is with the person in the water.

Keywords— *RF module, Voltage Regulator, ATmega 328 Microcontroller, Heart sensor, Embedded system, buzzer, LCD display, keil compiler*

1.Introduction

Drowning is the second leading cause of unintentional injury death globally after road traffic injuries. In 2000, an estimated 449,000 people drowned worldwide. Drowning occurs in the ocean, beaches, lakes, ponds, rivers, irrigation canals, animal feeders, swimming pools, spas, and bathtubs. young infants may drown in buckets filled with rainwater and even in toilet bowls. People drown as a result of Capsizing of watercraft, falling overboard, becoming fatigued or unconscious while swimming, getting entangled in objects underwater and many other causes. Many adult drowning deaths and injuries occur during recreational activities such as boating, swimming, and diving in open waters. Most child drowning deaths in high income countries occur in swimming pools, particularly, domestic pools. Apart from actual drowning, many deaths in water occur due to hypothermia. Even if a victim can stay afloat with the help of a life vest, in cold water, hypothermia can cause death rapidly. In such cases it is difficult to detect whether the person is safe or not. So, the current idea helps to know the status of the person who is in water. By this 99% of the deaths because of drowning can be controlled.

As a result, many inventions to prevent drowning and to rescue drowning victims have been made over the years. The recent trends make the prevention easy by detecting the heartbeat. The proposed system is very helpful for saving the life of a person drowning in the water. The system is informing the heartbeat rate of any person in the water to the lifeguard to save life.

The model of this idea consists of the transmitting and receiver circuit. The receiver circuit is with the lifeguard to inform about the person's heart beat rate, while the transmitting circuit is with the person in the water. The transmitter circuit uses AVR family microcontroller interfaced to LCD screen. This LCD screen is used to display the heart beat level to the lifeguard. This transmitter circuit is powered by 12V battery. Similarly, the receiver circuit also includes AVR family microcontroller and RF module which are attached to 12V transformer. The system also includes heart beat rate sensor. This heart beat rate sensor can be mounted on the hand or head of the person inside water which will help to track the person's heart beat rate. The receiver circuit also includes LED light and a buzzer. This LED light and the buzzer are turned ON when a person's heartbeat level fastens or becomes too low. Thus this system helps to inform the lifeguard as soon as the heartbeat level is not within the limit and thus can save life of the person drowning in the water. This reduces the death rates due to drowning of both the children and the adults.

The heart beat rate sensor can be mounted on the hand or head of the person inside water which will help to track the person's heart beat rate. The LED light and the buzzer are turned ON when a person's heartbeat level fastens or becomes too low. When this happens the buzzer will ring and the lifeguard can get the signal more effectively; even he did not observe the LED glowing, he can save the drowning person by listening to the buzzer sound. This idea can also be modified and extended by attaching GSM module to both the transmitter and the receiver blocks and can able to send a message to the mobile of the lifeguard. This can be useful in the case when the lifeguard is not near to the drowning person.

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2.Block Diagram

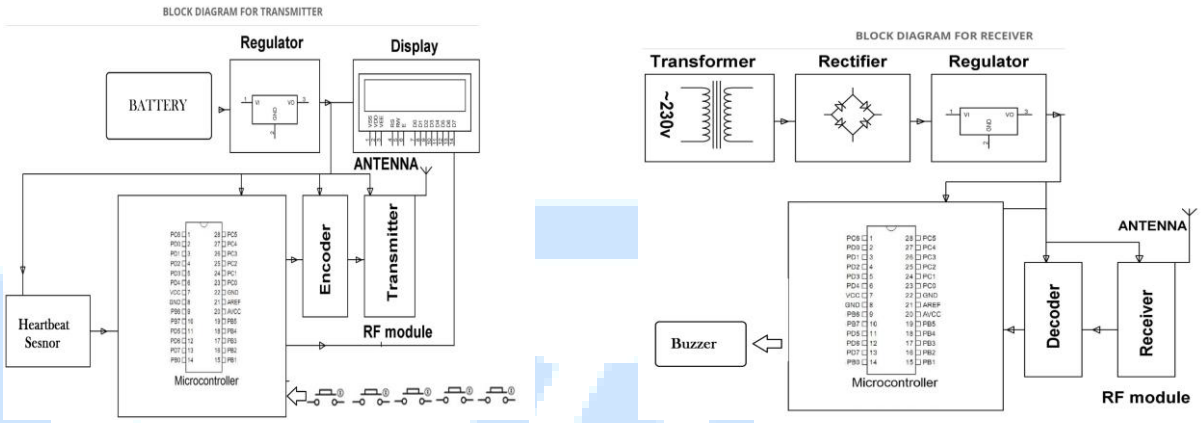

Fig 1: Transmitter And Receiver Block Diagram.

This system will monitor the heart rate. The detection range would be around 5-6 meters and if under water around 2-4 meters. This system includes both transmitter and receiving circuits. The receiver circuit is with the lifeguard to inform about the person's heart beat rate, while the transmitting circuit is with the person in the water. The transmitter circuit uses AVR family microcontroller interfaced to LCD screen. The transmitter circuit is powered by 12V battery. Similarly, the receiver circuit also includes AVR family microcontroller and RF receiver which are attached to 12V transformer. The system also includes heart beat rate sensor. The receiver circuit also includes LED light and a buzzer. This LED light and the buzzer are turned ON when a person's heartbeat level fastens or becomes too low. Circuit diagram: Conventional devices use RF frequency and works with RF transmitter and receiver. The proposed system is works with the RF module where we can use a RF module and thus can provide a multi user interface.

The transmitter block consist of battery, RF module which further has a encoder and transmitter, LCD, push button switch, Regulator IC and heart sensor. Battery used here is rechargeable battery i.e. when the main supply is ON the battery charges to its full capacity and during power failure the battery is used as a power backup. Thus, the battery can be recharged a number of times. To rectify and get a constant voltage inspite of fluctuations in main supply we use here a 7805 voltage regulator IC. Push button switches are used to set the limit for pulse count i.e. upper limit and lower limit. Depending on these limits the buzzer at receiver rings. LCD is used to display the limit values

The receiver block consist of a RF module, buzzer, microcontroller, transformer, rectifier and regulator. Similar to transmitter block receiver also has the same components barring a few changes. RF module here decoder and receiver to receive RF signals. Here we however use a 12-0-12 V transformer which is connected to 230V mains supply. Like transmitter here also we have rectifier and regulator IC for constant output voltage. The most important part of receiver block is buzzer used to indication emergency condition of swimmer and also LED is connected in case if buzzer fails. The ATmega 328 microcontroller is the main heart of the system. It is common to both transmitter as well as receiver. It will process all our signals and function as per the user requirement. ATmega88 and ATmega328 support a real Read-While-Write Self-Programming mechanism. There is a separate Boot Loader Section, and the SPM instruction can only execute from there. In ATmega48, there is no Read-While-Write support and no separate Boot Loader Section. The SPM instruction can execute from the entire Flash.

3. Project Working

1. As the system start you will see two options on display i.e start and setting.
2. We can select any one of the option by pressing up and down key accordingly and then pressing enter.
3. If we select start option the system enter into operation mode.
4. Before enter in operation mode, user must wear the sensor in his hand index finger.
5. As operation mode start it will initialize for few seconds and then it will display pulse rate (i.e pulse per minute).
6. While in operation mode there are 2 way of detecting the distress signal.

   A. Manual distress: If user felt any distress, he/she can long (few second) press the help key which will transmits help signal to the receiver which intern set the buzzer.

   B. Automatic distress: This signal is transmitted when the pulse being detect fall out of rang then it will transmits signal to the receiver.

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7. To escape back to menu from any of the distress condition user have press back key.
8. The second option in the menu is setting which when enter allow user to set heart beat rang.
9.When entered in setting mode ,it will first allow user to set the lower limit of heart beat rang which is selected by pressing up and down key followed by enter key.
10. Once lower limit is entered system will display the setting for the upper limit which is done same as low limit selection.
11. When upper limit is entered then the system will enter in normal operation mode.

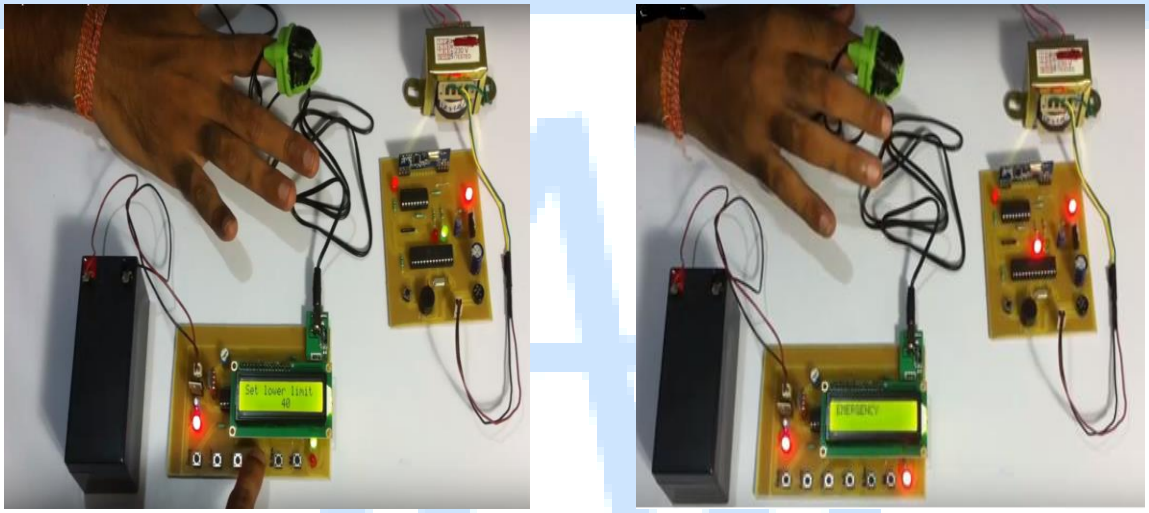

Fig 2: shows setting and working of circuit diagram respectively

4.Major building blocks in the system

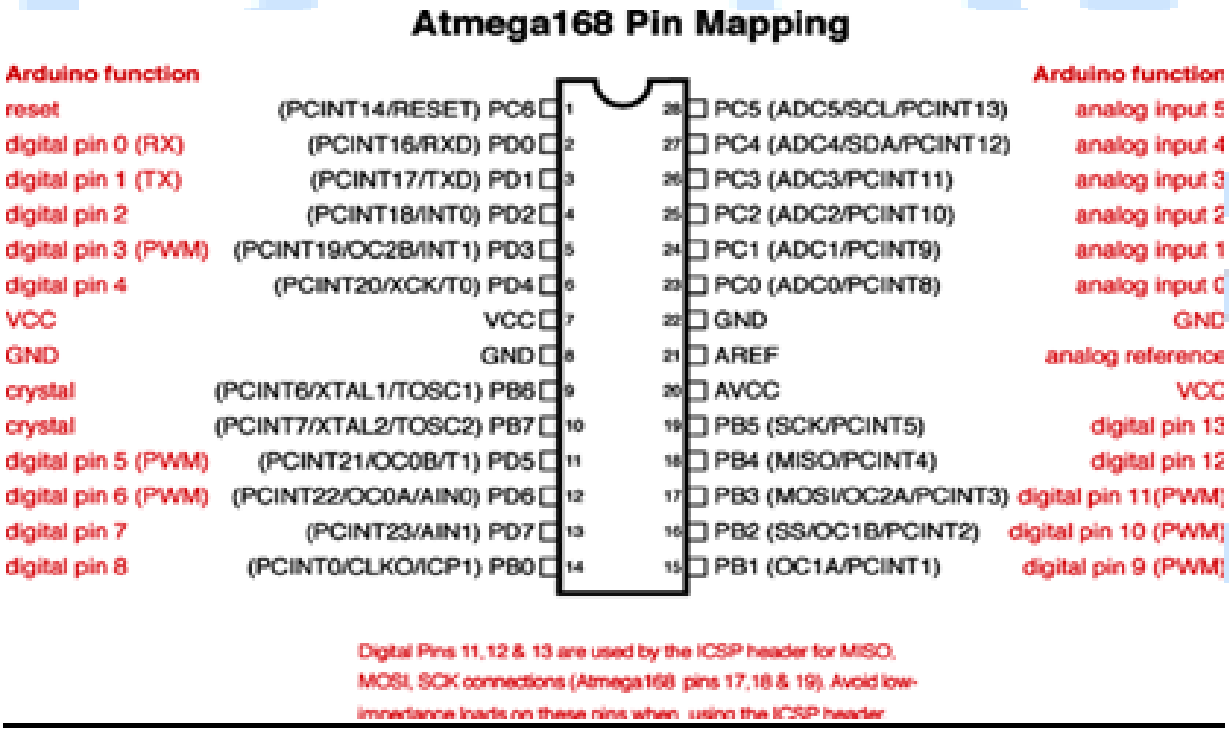

Fig 3:shows pin diagram of ATmega 328

4.1 Pin description
VCC: Digital supply voltage.

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GND: Ground.

4.2 Port B (PB7:0) XTAL1/XTAL2/TOSC1/TOSC2

Port B is an 8-bit bi-directional I/O port with internal pull- up resistors (selected for each bit). The Port B output buffers have symmetrical drive characteristics with both high sink and source Capability. As inputs, Port B pins that are externally pulled low will source current if the pull-up resistors are activated. The Port B pins are tri-stated when a reset condition becomes active, even if the clock is not running. Depending on the clock selection fuse settings, PB6 can be used as input to the inverting Oscillator amplifier and input to the internal clock operating circuit. Depending on the clock selection fuse settings, PB7 can be used as output from the inverting Oscillator amplifier. If the Internal Calibrated RC Oscillator is used as chip clock source, PB7.6 is used as TOSC2.1 input for the Asynchronous Timer/Counter2 if the AS2 bit in ASSR is set.

4.3 Port C (PC5:0)

Port C is a 7-bit bi-directional I/O port with internal pull-up resistors (selected for each bit). The PC5.0 output buffers have symmetrical drive characteristics with both high sink and source capability. As inputs, Port C pins that are externally pulled low will source current if the pull-up resistors are activated. The Port C pins are tri-stated when a reset condition becomes active, even if the clock is not running.

4.4 PC6/RESET:

If the RSTDISBL Fuse is programmed, PC6 is used as an I/O pin. Note that the electrical characteristics of PC6 differ from those of the other pins of Port C. If the RSTDISBL Fuse is un-programmed, PC6 is used as a Reset input. A low level on this pin for longer than the minimum pulse length will generate a Reset, even if the clock is not running. Shorter pulses are not guarantee to generate a reset.

4.5 Port D (PD7:0):

Port D is an 8-bit bi-directional I/O port with internal pull-up resistors (selected for each bit). The Port D output buffers have symmetrical drive characteristics with both high sink and source capability. As inputs, Port D pins that are externally pulled low will source current if the pull-up resistors are activated. The Port D pins are tri-stated when a reset condition becomes active, even if the clock is not running.

4.6 AVCC:

AVCC is the supply voltage pin for the A/D Converter PC3:0 , and ADC7:6. It should be externally connected to VCC, even if the ADC is not used. If the ADC is used, it should be connected to VCC through a low-pass filter. Note that PC6.4 use digital supply voltage, VCC.

4.7 AREF: AREF is the analog reference pin for the A/D Converter.

4.8 RF modules

Radio Frequency Module is an integral part with a control module or unit and an antenna it is used for wireless identification. Main tasks of the RF module are to send an energizing signal via the antenna.. Furthermore a field strength dependent digital output is available for synchronization purposes. The RFM is tuned to resonance with the antenna by adjusting the inductance of the tuning coil at the RFM's output stage.

RF Module can be categorized into two parts:

1. Transmitter
2. Receiver

4.8.1 RF transmitter

This wireless data is the easiest to use, lowest cost RF link we have ever seen .Using these components to transmit position data, temperature data, and even current program register values wirelessly to the receiver. These modules have up to 500 ft range in open space. The transmitter operates from 2-12V. The higher the voltage, the greater the range. We have used these modules extensively and have been very impressed with their ease of use and direct interface to an MCU. The theory of operation is very simple. What the transmitter 'sees' on its data pin is what the receiver outputs on its data pin. We you can configure the UART module on a uC, we have an instant wireless data connection. The typical range is 500ft for open area.

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Fig 4:shows RF Transmitter Module

4.8.1.1 Features:

1.434 MHz or 315 MHz Transmitter Operation
2.500 Ft. Range - Dependent on Transmitter Power Supply
3.2400 or 4800bps transfer rate
4.Low cost

4.8.2 RF Receiver

This receiver type is good for data rates up to 4800bps and will only work with the 434MHz or 315 MHz transmitter. Multiple 434MHz or 315MHz receivers can listen to one 434MHz transmitter or 315 MHz transmitter. Use these components to transmit position data, temperature data, and even current program register values wirelessly to the receiver. What the transmitter 'sees' on its data pin is what the receiver outputs on its data pin. If we can configure the UART module on a uC, we have an instant wireless data connection. Data rates are limited to 4800bps. The typical range is 500ft for open area. This receiver has a sensitivity of 3uV. It operates from 4.5 to 5.5 volts-DC and has digital output.

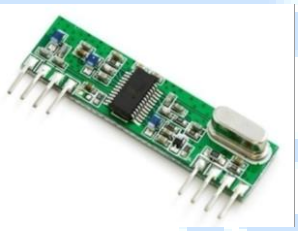

Fig 5:shows RF receiver Module

4.8.2.1Features:

1.434 MHz or 315 MHz Operation
2.500 Ft. Range - Dependent on Transmitter Power Supply
3.4800 transfer rate

5.Applications & Future Scope

1.Helpful in the swimming classes where the coach can monitor his students without any inconvenience.
2.Anti-drowning system can be used for many other water borne activities which make it flexible for situations and locations like private swimming pool, garden ponds, river side, sea water, beach, on a boat, floods, travel, etc.
3.Helpful for parents to keep check on kids in kids pool

6.Future Scope

1.It can be extended and also modified by attaching another GSM module and thus it can send a message to the person if he is not near the buzzer.
2.Motion sensors can be placed to detect drowning pattern.
3.Range can be extended by using zigbee coordinators.
4.Anti-loss alarms can be added to device to track them.

7.Conclusion

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It is evident from this project work that circuit has no interference. It can be cheaply made from low-cost locally available components and is waterproof in nature.The components required are compact and portable. (So small and few that they can be Embedded on a single small.)

8.Proposed result

Finally, our System which provides safety, security, and Convenience. As it continuously monitors because of buzzer connected to receiver section It is also efficient in water having impurities. Hence, this system is scalable and flexible.The proposed system has many advantages over the existing system such as the inclusion of the buzzer, the light indication system and the transmission through RF. This will help prevent many drowning deaths in the future

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VIRTUAL BATTLE GROUND

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ABSTRACT

This Article primarily draw attention toward how engineering has change the simple Wood and Stone set into a highly advanced circuited system weapon. This show how a set of Stone, Threads and Stick making a simple weapon for the pre human's survival against nature to a deadliest weapon which can destroy the last DNA of any species. Apart from this, document draw attention toward how the normal stone equipment are change to most and deadliest weapon of the earth which have the capacity to demolish the whole environment which was earlier not possible. This show that how Humans for the sake of Security using the Technology to threating of Human and involve technical use of Instruments.

Keywords: *Weapons, Uav, Engineering, Technology, Circuits, Drone, Battleground, Stone & Wood, Steel, Iron & Bronze, India, Terrorist, Isis, Israle, etc.*

1. Introduction

If we go on describing the definition of weapon, we get a huge range for the understanding the meaning of weapon and weaponoly. WEAPON is basically a Device used for the Survival of any Individual {ANCIENTLY}. HOWEVER, with increase of the Technology any can define Weapon like a Gun used to protect the Individual, which is completely false as weapon is a device which can be utilized for the protection or harm or to awe a person.

Talking about the Evolution of the Weapon, one can see a drastict change in its WORKING, SIZE, Ability of DESTRUCTION and more important its mobility with increase in the development of Science and more importantly the development of the engineering fields in the Modern Advance World.

Field Of Engineering	Help In Weapon
MECHANICAL	SIZE, SHAPE, COMPACTABILITY.
EXTC	CIRCUIT BOARDS OF HEAVY TANKS, MISSILES
ELECTRICAL	WIRING {which is basic for any system}
CIVIL	LAUNCHING FACILITY.
Field Of Engineering	**Help In Weapon**

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SPACE ENGINEERING	FOR CORSE OF INTERCONTINETAL AND CONTIENTAL PATH.
TEXTILE	SAFETY.
CHEMICAL	FOR PREPARATION OF ATOM AND BIOLOGYICA BOMBS.

Table: 1 Help Of Engineering In Weapons

Apart from this, Engineering has also helped in carrying capacity of the Instruments. For example the first ever Indian Atomic Bomb called as Smiling Buddha was an 8K ton bomb which is a 5th heaviest bomb in the world. Other is, earlier Tanks was having a payload capacity of 180 ton which was quiet less nowadays which has been increased to 68 metric ton which is a huge one.

1.2 History of weapons

1.2.1 Axe

An **AXE** is a device to shape, split and cut Wood; to harvest Timber; as a Weapon; and as a Ceremonial or Heraldic symbol. The axe has many forms and specialized uses but generally consists of an axe head with a Handle. Before the Modernization, the Stone handed axe was used from 2 million without handle. It was later used with wooden handle. The earliest examples of handled axes have heads of stone with some form of wooden handle attached. Axes made of iron, copper, brass and steel appeared as these technologies developed. AXE is one of tool which had its existence in history according to Indian Mythology {USED BY GOD PARASURAM}.

CHART 1: Ancient Remains Of Axe

CHART 2: Modern Axe

1.2.2. Spear

A **Spear** is a wooden stick weapon consisting of a shaft, usually of wood, with a sharp head. The material used for the head are steel, iron and gold. The most common design used in spear are metal in triangle shape which provide better peeling effect and less force. Apart from this at the end or the wooden stick was made up of rosewood or teak.

SPEAR also had rich history in which most commonly involve INDIA AND GREECE.

CHART 3: Ancient Spear

CHART 4: Modern Spear

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1.2.3. Bow And Arrow

The **Bow and Arrow** is a ranging weapon which uses the principle of projectile motion using a elastic membrane string. (arrows).The Use of Bow and Arrows by Humans for hunting practices predates recorded history and were common to most prehistoric cultures. They were important weapons of war among most of the civilizations throughout ancient history until the early modern period, where they were rendered increasingly obsolete by the development of the more powerful and accurate firearms, and has been eventually dropped from warfare. Today, Bows and Arrows are used primarily for Recreational Hunting and Sporting purposes. This weapon has also gain the importance of game in commonwealth and Olympics too and has rich past in indian history.

CHART 5: Ancient Bow

CHART 6: Modern Bow

1.2.4 Sword

A **Sword** is generally a steel casted tool used for Slashing or Thrusting that is longer than a knife or Dagger. The Precise definition of the term varies with a particular area like in india it has a mythological value too. A Sword consists of a long blade attached to a wooden handle or soft . The blade can be straight or curved. Thrusting swords have a pointed tip on the blade, and tend to be straighter; slashing swords have a sharpened cutting edge on one or both sides of the blade, and are more likely to be curved. Many swords are designed for both thrusting and slashing.Historically, the sword developed in the Bronze Age, evolving from the dagger, the first sword was prepared 1600 BC back by late roman army. Apart from this Asian country has also a great culture regarding the sword, especially the southern Asian countries like INDIA AND SRILANKA.

CHART 7: Anicent Sword

CHART 8: Modern Sword

Other Weapon which too play a vital role for describing the modern world are CESTUS, BAALISTA, GREEK FIRE, SHURIKEN, ROCKETS, HALBERD, CANNON, MINES, MATCHLOCK ETC.All the above are example from the Ancient and Pre modern world, these weapons were actually regarded as a true which were actually used by human for their use IN BATTLE GROUND.However, with increase in the technology, we have begin to manufacture a virtual battle ground which is actually far away but now been made just near to anyone finger below. Now a day people used technology like satellite, rockets and self driving vehicles for their Destruction and the material used were in quite large like IRON, COPPER AND BRASS.

1.3 Modernized weapons

These weapons are generally semi or completely automatics for their advance use and material utilized for their production such that they could give emissive firepower to user unlike from the past one.

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1.3.1 Rifles

An Rifle is a semi or completely automatic which uses a detachable magazine of various size and shape . the rifle saw first action in WWII .The material used in the rifle are steel, brass, iron and the material which gain importance is carbon fibre which is quite light and compact. The mechanism used in are either gas motion or water cooled mechanism as both reduces recoil. The rifle comes with scope and with grenade launcher as it boost Examples include the Stg 44, AK-47 and the M16, tavor rifle.

CHART 9: Tavor

1.3.2 Missile

A Missile is basically self propelled firing system that acts like rocket on a small scale and acts as guided targeting system on a larger scale . Missiles have four components: targeting or navigation, flight, lifting components like engine, and warheads Missiles come in types adapted for different purposes: surface-to-surface and air-to-surface missiles, surface-to-air missiles , air-to-air missiles, and anti-satellite weapons.Material used in rocket depend upon for which height and for what is used. Basically it consist of material like iron, hydrogen, nickel, steel etc whose concentration depends upon the type of propellent used .

The missile was coined by india but used by the America firstly during WWI and now a day it is for defense purpose as compared to research purpose.

The Arrival of the missile, brought the true meaning of our titled i.e., virtual battleground. The reason why I had chosen the topic regarding this is that using above meaning any one needed to be on battle field but by missiles by sitting on any where one can even destroy an area as large as the Sahara desert, one even can make the area radioactive or biological active such that for almost 3-4 generation of human or species can be easily affected.

Missile world also give vast employement to the EXTC AND ELECTRICAL DEPARTMENT A HUGE SCLE BUSSINESS as the missile involves the circuit and wiring system on which the missile solily dependents.Circuit play a vital role in the missile system as it act as a head by means of which it can destinated to any particular areas.CIRCUITS are nothing but the closed network system of wires, chips and resistor. Which play a vita role in direction of a missile and explosion time which give a best result and help to aviod the casulaties.

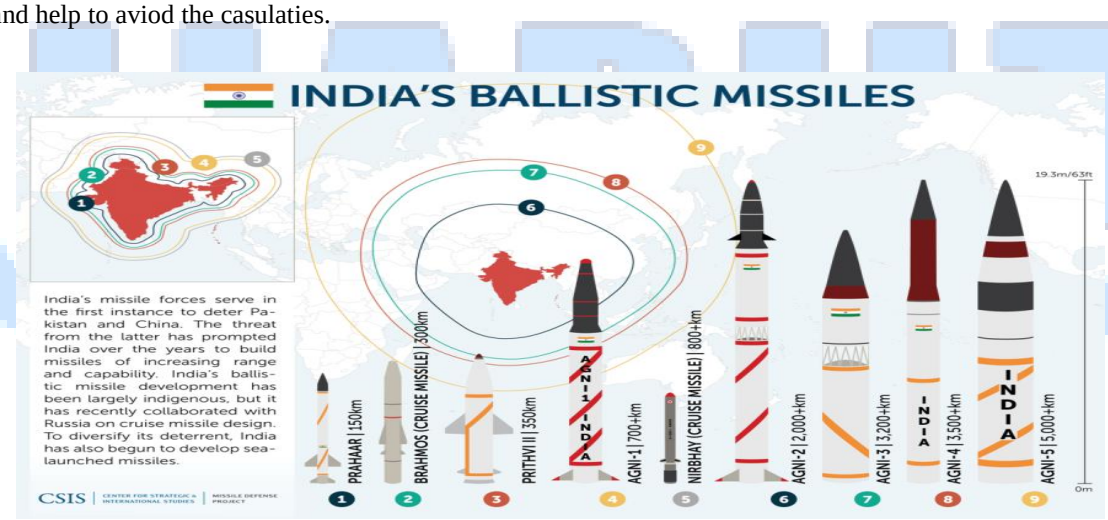

CHART 10: Agni Missile Series

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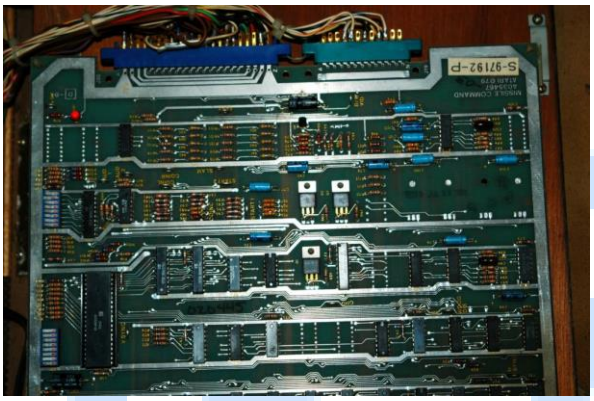

CHART 11: Circuit Board Of Missile (Scanned)

CHART 12: Circuit Board Of Missile

However with advantage, every thing has great disadvantage that is its noise and carring capacity. During its travel anyone can easily know about the presensy of missile which could be a great thread. To avoid new vehicles were introduced called as An **UNMANNED AERIAL VEHICLESS** (**UAV**), commonly known as a **drone**, is an aircraft without a human pilot aboard. UAVs are a component of an unmanned aircraft system (UAS); which include a UAV, a ground-based controller, and a system of communications between the two. The flight of UAVs may operate with various degrees of autonomy: either under remote control by a human operator or autonomously by onboard computers. This system a impressive power to the army as prevents human lose more about this is that it is most effective mean for the destruction.

CHART 13: American Uav

CHART 14: Indian Uav

2 CONCLUSION

The whole Document is to present how with increase in the technology precisely engineering has boost the weapon system to protect the world. With such a increase in the weapn this draw a attension toward the increasing threat to the mankind . dictators like Kim Jong-un, ISIS AND OHER TERRIORST ORGANISATIONS has used this technology badly. It also show that how from sword and spare, the system has change to such a situation that where using the engineering anything can be change whether it is aircrafts, ships, submarine and destruction is just below finger tips. However nation such as INDIA, ISRALE are also present which has a policy of second us i.e., the war will not be begin by us. INDIA IS THE ONLY NATION WHO HAS A HISTORY OF PROTECTING THE MANKIND .The most good and bad use of weapons proved that science is a BOON WITH BONE.

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Matching Technique for Coupled-Patches RFID tag Antenna

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ABSTRACT

A novel impedance matching technique for extremely low-profile on-body UHF RFID tag antennas based on coupled shorted-patch antennas .The approach employs a novel arrangement of comb-notches perpendicular to the central radiation slot that excites the close higher order mode that affects the field distribution of the fundamental mode and sets the input impedance to the required complex values of UHF RFID chips. Small and very low-profile antennas for on-body applications are in high demand in the field of body area network (BAN) communication and also in radiofrequency identification (RFID) of people in the UHF band (860–960 MHz). Proper input impedance and sufficient radiation efficiency are the main parameters for assessing the quality of the radiator. The coupled-patches technique, introduced and applied in, enables the design of low-profile antennas with good immunity from the influence of a human body. The radiation efficiency of these structures is satisfactory—typically better than 50%, even if an extremely low-profile substrate is used, when the radiation efficiency of a typical half wavelength patch antenna is significantly lower.

Keywords: *- RFID, patch antennas, comb-notches, low-profile antennas, radiation efficiency.*

1. INTRODUCTION

Impedance matching is the practice of designing the input impedance of an electrical load or the output impedance of its corresponding signal source to maximize the power transfer or minimize signal reflection from the load.In the case of a complex source impedance ZS and load impedance ZL, maximum power transfer is obtained when

$$Z_{\mathrm{S}} = Z_{\mathrm{L}}^{*}$$

where the asterisk indicates the complex conjugate of the variable. Where ZS represents the characteristic impedance of a transmission line, minimum reflection is obtained when

$$Z_{\mathrm{S}} = Z_{\mathrm{L}}$$

The concept of impedance matching found first applications in electrical engineering, but is relevant in other applications in which a form of energy, not necessarily electrical, is transferred between a source and a load. An alternative to impedance matching is impedance bridging, in which the load impedance is chosen to be much larger than the source impedance and maximizing voltage transfer, rather than power, is the goal. Impedance is the opposition by a system to the flow of energy from a source. For constant signals, this impedance can also be constant. For varying signals, it usually changes with frequency. The energy involved can be electrical, mechanical, acoustic, magnetic, or thermal. The concept of electrical impedance is perhaps the most commonly known. Electrical impedance, like electrical resistance, is measured in ohms. In general, impedance has a complex value; this means that loads generally have a resistance component (symbol: R) which forms the real part of Z and a reactance component (symbol: X) which forms the imaginary part of Z. In simple cases (such as low-frequency or direct-current power transmission) the reactance may be negligible or zero; the impedance can be considered a pure resistance, expressed as a real number. In the following summary we will consider the general case when resistance and reactance are both significant, and the special case in which the reactance is negligible. Impedance matching to minimize reflections is achieved by making the load impedance equal to the source impedance. If the source impedance, load impedance and transmission line characteristic impedance are purely resistive, then reflection-less matching is the same as maximum power transfer matching.

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2. MAXIMUM POWER TRANSFER MATCHING

Complex conjugate matching is used when maximum power transfer is required, namely

$$Z_{\text{load}} = Z^*_{\text{source}}$$

where * indicates the complex conjugate. This differs from reflection-less matching only when the source or load have a reactive component. If the source has a reactive component, but the load is purely resistive, then matching can be achieved by adding a reactance of the same magnitude but opposite sign to the load. This simple matching network, consisting of a single element, will usually only achieve a perfect match at a single frequency. This is because the added element will either be a capacitor or an inductor, whose impedance in both cases is frequency dependent, and will not, in general, follow the frequency dependence of the source impedance. For wide bandwidth applications, a more complex network must be designed.

3. RADIO-FREQUENCY IDENTIFICATION (RFID)

Radio-frequency identification (RFID) is the wireless use of electromagnetic fields to transfer data, for the purposes of automatically identifying and tracking tags attached to objects. The tags contain electronically stored information. Some tags are powered by electromagnetic induction from magnetic fields produced near the reader. Some types collect energy from the interrogating radio waves and act as a passive transponder. Other types have a local power source such as a battery and may operate at hundreds of meters from the reader. Unlike a barcode, the tag does not necessarily need to be within line of sight of the reader and may be embedded in the tracked object. RFID is one method for Automatic Identification and Data Capture (AIDC).

Fig 1: RFID Chip

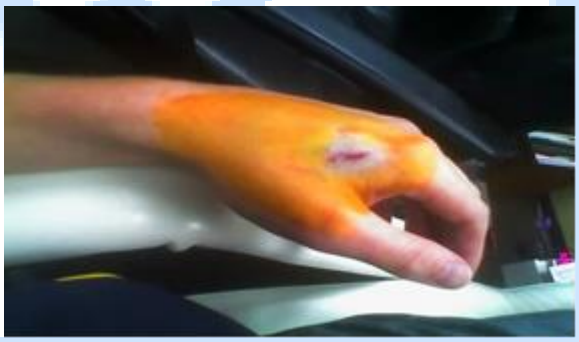

Fig 2: RFID Chip Implant

3.1 RFID TAGS

A radio-frequency identification system uses tags, or labels attached to the objects to be identified. Two-way radio transmitter-receivers called interrogators or readers send a signal to the tag and read its response. RFID tags can be either passive, active or battery-assisted passive. An active tag has an on-board battery and periodically transmits its ID signal. A battery-assisted passive (BAP) has a small battery on board and is activated when in the presence of an RFID reader. A passive tag is cheaper and smaller because it has no battery; instead, the tag uses the radio energy transmitted by the reader. However, to operate a passive tag, it must be illuminated with a power level roughly a thousand times stronger than for signal transmission. That makes a difference in interference and in exposure to radiation. Tags may either be read-only, having a factory-assigned serial number that is used as a key into a database, or may be read/write, where object-specific data can be written into the tag by the system user.

3.2 RFID TAG READERS

RFID systems can be classified by the type of tag and reader. A Passive Reader Active Tag (PRAT) system has a passive reader which only receives radio signals from active tags (battery operated, transmit only) allowing flexibility in applications such as asset protection and supervision. An Active Reader Passive Tag (ARPT) system has an active reader, which transmits interrogator signals and also receives authentication replies from passive tags. An Active Reader Active Tag (ARAT) system uses active tags awoken with an interrogator signal from the active reader. A variation of this system could also use a Battery-Assisted Passive (BAP) tag which acts like a passive tag but has a small battery to power the tag's return reporting signal. Fixed readers are set up to create a specific interrogation zone which can be tightly controlled. This allows a highly defined

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reading area for when tags go in and out of the interrogation zone. Mobile readers may be hand-held or mounted on carts or vehicles.

4.MICROSTRIP-PATCH ANTENNA

A micro strip or patch antenna is a low-profile antenna that has a number of advantages over other antennas: it is lightweight, inexpensive, and electronics like LNA's and SSPA's can be integrated with these antennas quite easily. While the antenna can be a 3- D structure (wrapped around a cylinder, for example), it is usually flat and that is why patch antennas are sometimes referred to as planar antennas. A flat plate over a ground plane. This antenna is often built of printed circuit board material and the substrate makes up the patch antenna's dielectric. The distance between the patch and the ground plane – the substrate or dielectric height h – determines the bandwidth. A thicker substrate increases the gain to some extent, but may lead to undesired effects like surface wave excitation: surface waves decrease efficiency and perturb the radiation pattern.

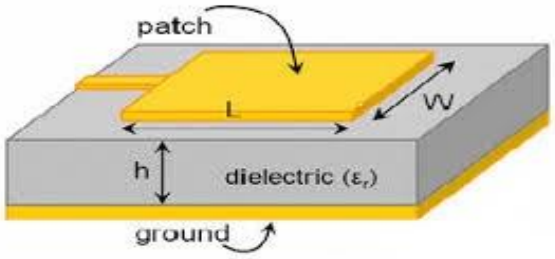

Fig 3: Microstrip-Patch Antenna

4.1 CURRENT DISTRIBUTION IN PATCH ANTENNA

The feed position of a patch antenna excited in its fundamental mode is typically located in the center of the patch width direction (y axis) and somewhere along the patch resonant length direction (x axis). The exact position along the resonant length is determined by the electromagnetic field distribution in the patch. Looking at the current (magnetic field) and voltage (electric field) variation along the patch, the current has a maximum at the center and a minimum near the left and right edges, while the electric field is zero in the center and maximum near the left and minimum near the right edges. Keep in mind that the field distribution constantly changes in amplitude and sign.

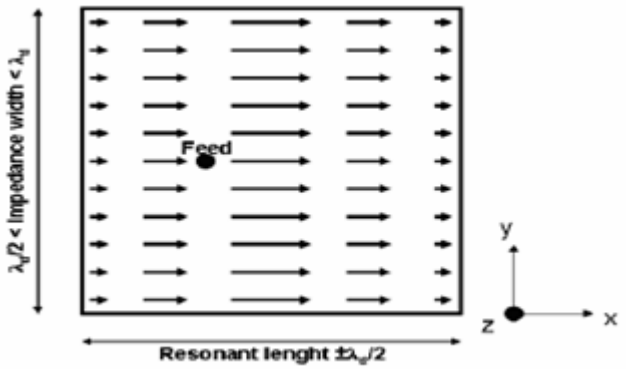

Fig 4: Current distribution on the patch surface

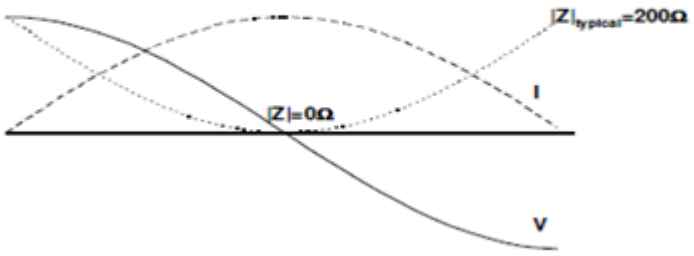

Fig 5: Voltage,current and impeadance distribution along patch's resonant length

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4.2 COUPLE-PATCH ANTENNA

The Impedance bandwidth of a basic patch is a couple % at best. The radiation bandwidth is usually much larger and can be up to 50%. Aperture coupling to a patch is a classic impedance bandwidth enhancement technique. The aperture coupled patch has a slot cut in the ground plane under the radiating element . The slot is excited with a microstrip or stripline transmission line over the slot on the opposite side of the ground plane.

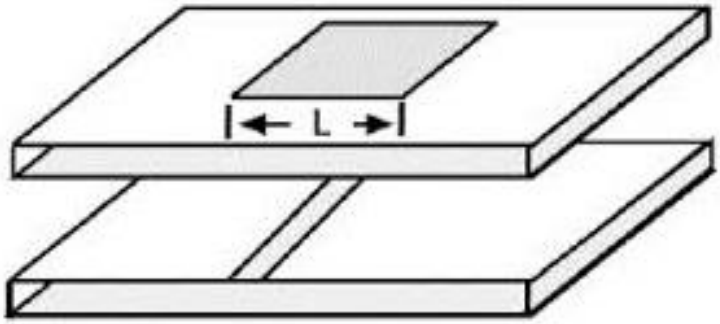

Fig 6: Couple-patch antenna

The microstrip fed aperture coupled patch may suffer from a reduced front to back ratio. A stripline feed avoids this: the feed line is 'captured' between two ground layers. A cross section of a stripline fed, aperture coupled patch. Impedance bandwidths of 10% can be readily achieved but this structure tends to be a bit more challenging to design.

4.3 SLOT ANTENNA

A slot antenna consists of a metal surface, usually a flat plate, with a hole or slot cut out. When the plate is driven as an antenna by a driving frequency, the slot radiates electromagnetic waves in a way similar to a dipole antenna. The shape and size of the slot, as well as the driving frequency, determine the radiation distribution pattern. Often the radio waves are provided by a waveguide, and the antenna consists of slots in the waveguide. Slot antennas are often used at UHF and microwave frequencies instead of line antennas when greater control of the radiation pattern is required. Slot antennas are widely used in radar antennas, for the sector antennas used for cell phone base stations, and are often found in standard desktop microwave sources used for research purposes.A slot antenna's main advantages are its size, design simplicity, robustness, and convenient adaptation to mass production using PC board technology.

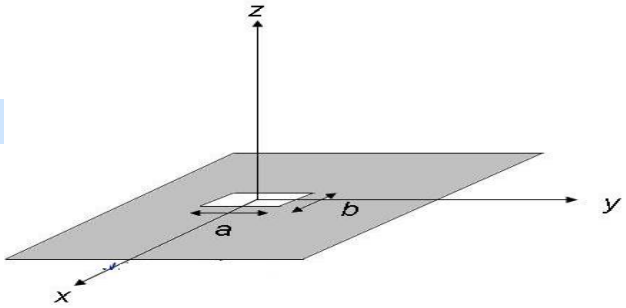

Fig 7: Rectangular-patch slot antenna

4.4 Comb-Notches Coupled-Patch Antenna

A novel input impedance tuning technique using comb-notches placed perpendicular to the coupling slot. This enables the input impedance to be set for typical complex values of UHF RFID chips , i.e., approximately 5–50 Ω for the real part and 100–200 Ω for the imaginary part, and also for 50 Ω impedance.The proposed antenna structure is composed of two patches shorted at the outer edges and coupled by a central gap, to which a pair of perpendicular comb-notches is placed symmetrically, as depicted in Fig. 1. The complex and real (typically 50 Ω) input impedance of the antenna can be achieved by changing the number, the length, and the width of the comb-notches and the intermediate strips. The total size of the two antenna prototypes is 105 × 60 × 0.76 mm3 (the relative size is 0.3 × 0.17 × 0.0022 λ0 at 866 MHz). The antenna sensor matched to 50 Ω has six pairs of notches 26 mm in length. The other dimensions are designated in Fig. 1(a). The antenna is performed on a low-permittivity GML 1000 woven-glass laminate with εr = 3.2, and loss tangent tan δ = 0.002. The antenna feeding RG 174 flexible microcoaxial cable passes through the substrate and is connected directly to the ends of the central pair of strips of the combnotches, thus forming differential feeding. Although the antenna is a patch type that operates over the ground plane, symmetrization of the feeder was not implemented. The influence of nonperfect symmetrization on the radiation

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pattern tilt is assumed not to be significant for using the antenna in a complex environment (on the moving human body) that, to a greater or less extent, disturbs the properties of the propagation channel

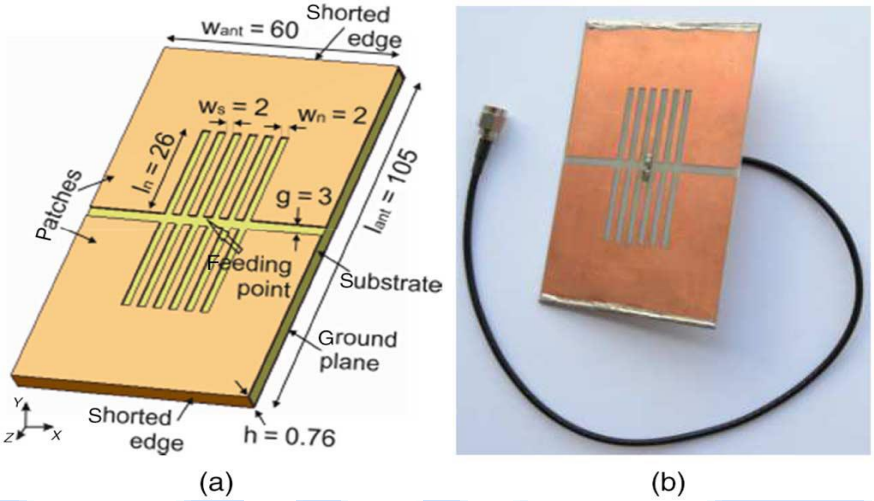

Fig 8: Antenna with comb-notches

An arrangement of coupled shorted-patches operating without comb-notches at resonant frequency excites antinodes of current density at the outer shorted edges and nodes at the central gap . This suggests a fundamental operational mode that corresponds to two quarter-wavelength patch antennas coupled by the open ends forming a central gap over which a differential feed is applied. Nearly uniform distribution of the electric field along the gap can be assumed due to the constant magnitude of the current density at the gap edges.This configuration exhibits high input resistance at resonant frequency with the larger dimension corresponding to lant = λg/2. The resistance value can be reduced to some extent by extending the shorter size want, but this type of modification has a negative effect on efforts to miniaturize the antenna size. The input reactance exhibits nearly symmetric continuance around a value of 0 Ω . This is a typical impedance behavior of patch-type antennas when a single fundamental mode is excited. Placing a pair of comb-notches perpendicular to the central gap (while maintaining the same footprint size) causes excitation of a higher order mode, which dominates and resonates closely above the resonant frequency of the fundamental mode, which is shifted due to the change in the effective permittivity of the central part of the patch caused by the presence of the comb notches. The orientation of the vector current density of this higher order mode on the feeding strip pairs is opposite to the vector current density in the outer parts of the patches. The flow of the vector current density on the upper patch surfaces thus forms a closed double loop with maximum magnitude at the central feeding strip pair and with minima at the outer edges of the central gap. The orientation of the vector current density of the fundamental mode at the circumference of the antenna with comb-notches i.e., vertical parts and outer patch edges, has the same continuance as at a frequency except that it has the opposite phase.

5. CONCLUSIONS

A novel technique using comb-notches for input impedance tuning of an extremely low-profile shorted coupled-patches antenna.The flexibility of the proposed technique for tuning the input impedance by proper manipulation of the chosen comb-notch parameters to selected complex impedances that are conjugate to the impedances of the chips used in UHF RFID band.

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Survey on Color Space used for Skin Modelling

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ABSTRACT

Skin color has proven to be a useful and robust cue for face detection, localization and tracking. Image content filtering, content aware video compression and image color balancing applications can also benefit from automatic detection of skin in images. Numerous techniques for skin color modelling and recognition have been proposed during several past years. A few papers comparing different approaches have been published. However, a comprehensive survey on the topic is still missing. We try to fill this vacuum by reviewing and studying most widely used color spaces for skin modelling.

Keywords— *skin color, skin color modelling, skin detection.*

1. Introduction

Human skin detection and tracking has been the topics of an extensive research for the several past decades. Many heuristic and pattern recognition based strategies have been proposed for achieving robust and accurate solution. From available skin detection technique, the one that gained strong popularity is the one that use skin color as a detection method. Color allows fast processing and is highly robust to geometric variations. Also, the experience suggests that human skin has a characteristic color, which is easily recognized by humans. When building a system, that uses skin color as a feature for skin detection, the researcher usually faces three main problems. First, what color space to choose, second, how exactly the skin color distribution should be modelled, and finally, what will be the way of processing of color segmentation. Here we discuss different color space used for skin modelling.

2. Color Spaces used for Skin Modelling

Computer graphics and video signal transmission standards have given birth to many color spaces with different properties. A wide variety of them have been applied to the problem of skin color modelling. We will briefly review the most popular color spaces and their properties.

2.1 RGB

RGB is a color space originated from CRT display applications, when it was convenient to describe color as a combination of three colored rays (red, green and blue). It is one of the most widely used color spaces for processing and storing of digital image data. However, high correlation between channels, significant perceptual non-uniformity, mixing of chrominance and luminance data makes RGB not a very favourable choice for color analysis and color based recognition algorithms.

2.2 Normalized RGB

Normalized RGB is a representation, which is easily obtained from the RGB values by a simple normalization procedure

$$r = \frac{R}{R+G+B}, \qquad g = \frac{G}{R+G+B}, \qquad b = \frac{B}{R+G+B} \tag{1}$$

As the sum of the three normalized components is known (r + g + b = 1), the third component does not hold any significant information and can be omitted, reducing the space dimensionality. The remaining components are often called ”pure colors”, for the dependence of r and g on the brightness of the source RGB color is diminished by the normalization. A remarkable property of this representation is that for matte surfaces, while ignoring ambient light,

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normalized RGB is invariant under certain assumptions to changes of surface orientation relatively to the light source. This, together with the transformation simplicity helped this color space to gain popularity among the researchers.

2.3 HSI, HSV, HSL - Hue Saturation Intensity (Value, Lightness)

Hue-saturation based color spaces were introduced when there was a need for the user to specify color properties numerically. They describe color with intuitive values, based on the artist's idea of tint, saturation and tone. Hue defines the dominant color such as red, green, purple and yellow of an area, saturation measures the colorfulness of an area in proportion to its brightness. The intensity, lightness or value is related to the color luminance. The intuitiveness of the color space components and explicit discrimination between luminance and chrominance properties made these color spaces popular in the works on skin color segmentation. Several interesting properties of Hue were noted in. It is invariant to highlights at white light sources, and also, for matte surfaces, to ambient light and surface orientation relative to the light source. However, several undesirable features of these color spaces includes, hue discontinuities and the computation of brightness, which conflicts badly with the properties of color vision.

$$H = arc\cos\frac{\frac{1}{2}((R-G)+(R-B))}{\sqrt{(R-G)^2+(R-B)(G-B)}} \quad (2)$$

$$S = 1 - 3\frac{\min(R.G.B)}{R+G+B} \quad (3)$$

$$V = \frac{1}{3}(R+G+B) \quad (4)$$

An alternative way of hue and saturation computation using log opponent values was introduced in year 1996, where additional logarithmic transformation of RGB values aimed to reduce the dependence of chrominance on the illumination level. The polar coordinate system of Hue-Saturation spaces, resulting in cyclic nature of the color space makes it inconvenient for parametric skin color models that need tight cluster of skin colors for best performance. A different representation of Hue-Saturation using Cartesian coordinates can be used.

$$X = S\cos H, \quad Y = S\sin H \quad (5)$$

2.4 TSL - Tint, Saturation, Lightness

A normalized chrominance luminance TSL space is a transformation of the normalized RGB into more intuitive values, close to hue and saturation in their meaning.

$$S = [9/5(r'^2+g'^2)]^{1/2} \quad (6)$$

$$T = \begin{cases} arc\tan(r'/g')/2\pi + 1/4. & g' > 0 \\ arc\tan(r'/g')/2\pi + 3/4. & g' > 0 \\ 0. & g' = 0 \end{cases} \quad (7)$$

$$L = 0.299R + 0.587G + 0.114B \quad (8)$$

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Where r' = r − 1/3, g' = g − 1/3 and r, g come from (1). Sir Terrillon have compared nine different color spaces for skin modelling with a uni-modal Gaussian joint probability distribution function where only chrominance components of the color spaces were used. They argue that normalized TSL space is superior to other color spaces for this task [24].

2.5 YCrCb

YCrCb is an encoded nonlinear RGB signal, commonly used by European television studios and for image compression work. Color is represented by luma which is luminance, computed from nonlinear RGB, constructed as a weighted sum of the RGB values, and two color difference values Cr and Cb that are formed by subtracting luma from RGB red and blue components.

$$Y = 0.299R + 0.587G + 0.114B$$
$$C_r = R - Y \quad (9)$$
$$C_b = B - Y$$

The transformation simplicity and explicit separation of luminance and chrominance components makes this color space attractive for skin color modelling.

2.6 Perceptually uniform color systems

The term ”skin color” is not a physical property of an object, rather a perceptual phenomenon and therefore a subjective human concept. Therefore, color representation similar to the color sensitivity of human vision system should help to obtain high performance skin detection algorithm. CIELAB and CIELUV are perceptually uniform color spaces that were proposed by G. Wyszecki and standardized by CIE (Commission Internationale de L’Eclairage). Perceptual uniformity means that a small perturbation to a component value is approximately equally perceptible across the range of that value. The well known RGB color space is far from being perceptually uniform, the non-linear transformation to CIELAB and CIELUV try to correct the situation. The price for better perceptual uniformity is complex transformation functions from and to RGB space, demanding far more computation than most other color spaces.

2.7 RGB channels ratio

It was observed, that skin invariably contains a significant level of red. Using this observation, certain values of R/G ratio were used as skin presence. Usefulness of other RGB space ratios (R/B and G/B) for skin detection was tested and evaluated by Brand and Mason in year 2000.

3. CONCLUSION

The detection and segmentation of skin pixels using HSV and YCbCr color space is explained. The result of HSV and YCbCr color space based skin color detection is based on the selection of threshold value. These approaches discriminate color and intensity information even under uneven illumination conditions. The transformation of color images from RGB to HSV is time consuming process. In this, Cartesian coordinate system is converted into polar coordinate system. The HSV based detection is best suited for simple images with uniform background. Moreover,pixels with small and large intensities are not considered, if there is a lot fluctuation in the value of the color information (hue and saturation). In the case of YCbCr color space, transformation and efficient separation of color and intensity information is easy as compared to HSI or HSV. This color space is effective and efficient for the separation of image pixels in terms of color in color images. So YCbCr color space can be applied for the complex color images with uneven illumination.

4. ACKNOWLEDGMENT
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I would like to express my deepest appreciation to all those who provided me the possibility to complete this research work. A special gratitude I give to my M.E guide Dr. Manjusha Deshmukh, whose contribution in stimulating suggestions and encouragement, helped me to coordinate my project especially in writing this report.

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Study of Measuring RF power in field

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ABSTRACT

RF Power Measurement is important to designers and operators since the earliest days of wire line and wireless communication and information transmission. With today's complex modulation schemes, increased popularity of wireless transmission and pulsed communication modes, the need to accurately and efficiently measure RF power has become crucial to obtain optimum performance from communication systems and components. Techniques used for measuring average and peak power and the associated equipment options available for field testing is discussed here. The two most widely employed RF or microwave instruments are the power sensor and the spectrum analyzer. A comparison between different power sensors and spectrum analyzers is presented in this paper.

Keywords— *Thermistor, Diodes, RF/Microwave signal*

1. INTRODUCTION

RF Power Measurement has been of importance to designers and operators since the earliest days of wire line and wireless communication and information transmission. In today's complex modulation schemes, increased popularity of wireless transmission and pulsed communication modes, there is need to accurately and efficiently measure RF power to obtain optimum performance from communication systems and components. The output power level of a system is the critical factor in the design and performance of almost all radio frequency (RF) equipment. This requires instruments accuracy while delivering measurements that are stable under various environmental and operating conditions. It is also very important that all measured results, regardless of the equipment, have a common agreement as to what is considered an absolute value for the power measurement. There are a variety of different power sensors covering a range of input frequencies and power levels but RF/microwave detectors generally fall into two categories, thermal-based sensors and diode-based sensors. In the next two sections of this application note, the basic technology and operation of these power sensor types will be discussed including their relative sensitivities and dynamic range.

2. POWER MEASUREMENT TECHNOLOGIES

There are a several different technologies available for the measurement of RF power. These generally fall into four categories:

Thermal The heating effect of RF power upon a sensing element is measured.
Detector The RF signal is rectified or "detected" to yield a DC voltage proportional to the signal's amplitude.
Receiver A "tuner" type circuit is used to receive the signal, then measure its amplitude component.
RF Sampling. The RF signal is treated as a baseband AC signal, and is directly digitized.

Both thermal and detector type measurements are typically "direct sensing," in which the amplitude of the RF signal applied to a load element is measured by converting the RF to an easily-measured DC quantity. The RF-to-DC conversion is typically performed close to the signal source by connecting a small converter probe known as an RF power sensor to the device under test. The receiver and RF sampling methods are usually indirect, the signal is brought into an instrument via a cable connection, processed through a multi-stage circuit to yield amplitude information, then scaled to power.

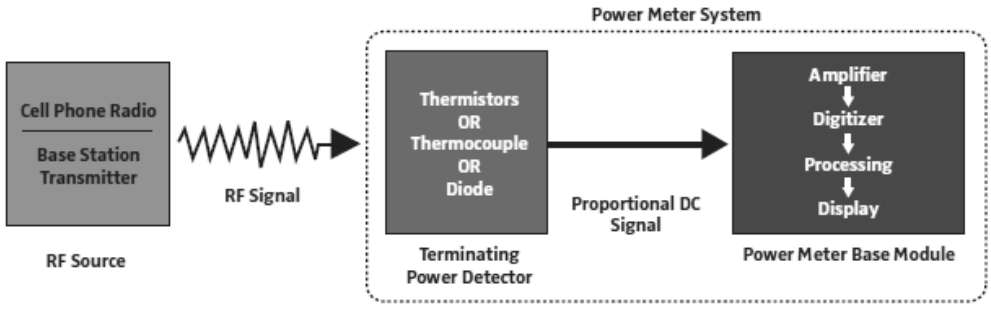

Fig. 1 Direct power measurement block diagram

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2.1 Thermal RF Power Sensors

Thermal sensors use the incoming RF energy to produce a temperature rise in a terminating load. The temperature rise of the load is measured either directly or indirectly, and the corresponding input power is computed. Thermal-based sensors convert heat generated by the RF signal into a change in the electrical property of the sensor. These types of sensors include thermistors and thermocouples. Thermal based sensors respond to the total power in the signal and report the true average power of the signal, regardless of modulation format. Thermistor functions as a power measurement sensor when the input RF signal causes a temperature rise in the sensor which results in a decrease in the sensor's resistance. The change in resistance, and the associated sensor bias, can be accurately measured in a bridge circuit.

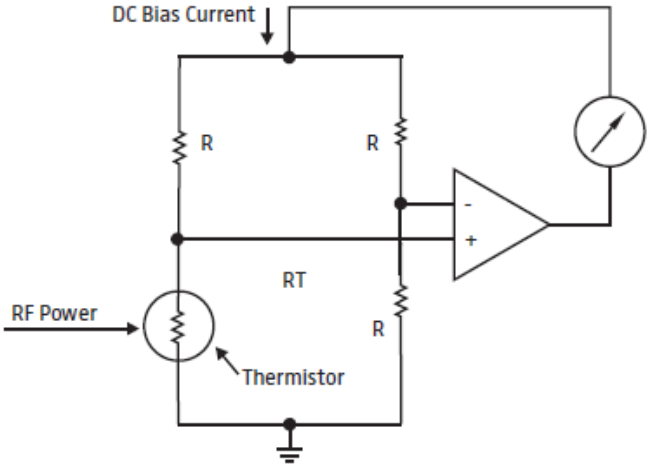

Fig 2. Thermistor Sensor diagram

Thermocouples also measure power with thermal changes in the sensor. In this sensor type, temperature changes generate a voltage change that can be directly measured by the instrument. Thermocouples are generally more rugged and less sensitive to ambient temperature than thermistors making them a better choice for field measurements. The sensitivity of the thermocouple is slightly improved to approximately –35 dBm but requires a reference oscillator to calibrate for temperature drift and sensor aging.

2.2 Diode-Based Power Sensors

Diode sensors use high-frequency semiconductor diodes to detect the RF voltage developed across a terminating load resistor. The diodes directly perform an AC to DC conversion, and the DC voltage is measured by the power meter and scaled to produce power readout. In a diode type RF power sensor, one or more diodes perform a rectification (peak detection) function at high levels and act as a nonlinear resistor at lower levels, conducting more current in the forward direction than reverse.

Diode-based sensors rectify and filter the input RF signal using a diode and capacitor as shown in Figure 3.

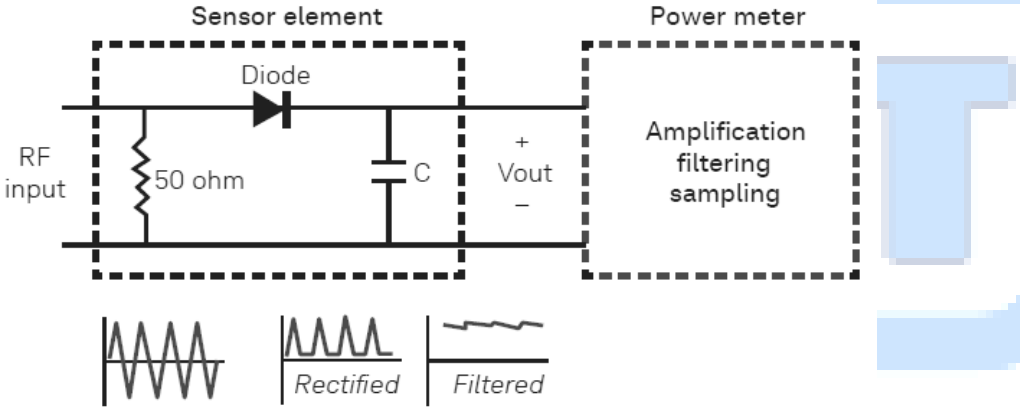

Fig. 3. Diode-based power sensor

Similar to the thermocouple sensors, diode sensors require a reference oscillator for calibration and traceability. For the highest measurement accuracy, diode sensors require a 30-minute warm-up time which could be problematic when attempting to make rapid measurements in the field. Diode-based power sensors are also extremely sensitive to static discharge and mechanical shock. It is important to follow electrostatic discharge (ESD) safety precautions when handling power sensors.

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2.3 Receiver-Based Amplitude Measurement

Along with the many power sensor options available for measuring the power of CW and modulated signals, there is a fairly simple technique to measure average power using a spectrum analyzer. The spectrum analyzer is a specific form of a tuned receiver offering improved sensitivity, higher dynamic range and no warm-up time when compared to the thermal-based and diode-based power sensors.

The measurement technique is similar for all of these and is essentially the same process used in an ordinary AM radio. The input signal is coarsely tuned, and down converted to an intermediate frequency (IF) by combining the incoming RF with the output of a local oscillator (LO) using a mixer. Included in the mixer's output are sum and difference products of the original signal. The LO frequency is adjusted so that the difference product falls at the desired intermediate frequency. This IF is then fed to one or more tuned stages, which amplify the signal and limit its bandwidth so that only the desired input RF range is measured.

The amplified and tuned IF is then either digitized directly or demodulated by some sort of detector. Some measurement instruments in this category, such as spectrum analyzers, can adjust or sweep the tuning parameters of the receiving circuit, such as the tuned frequency and RF (resolution) bandwidth. This offers considerable benefit and flexibility where information on the signal's spectral content is needed, but can be a hindrance when trying to perform accurate power measurements.

The primary reason for this is that receiver-based measurements are not truly power measurements at all, but rather a measurement of the absolute amplitude of a signal's voltage component over a specific frequency range.

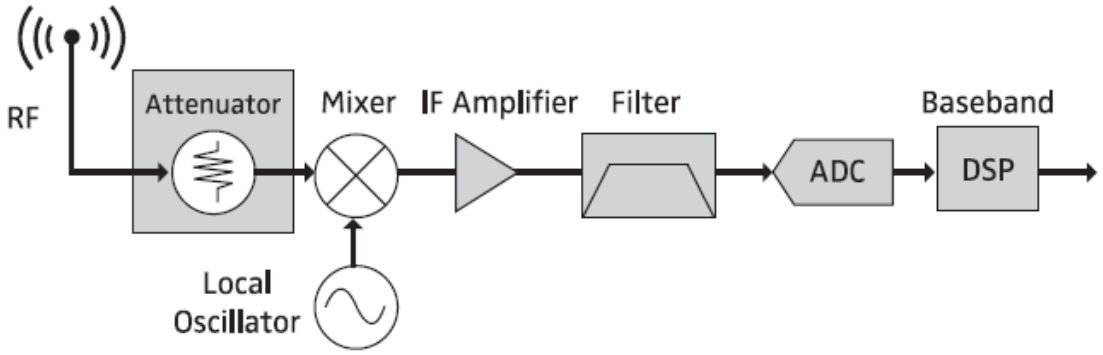

Fig. 4. Generic block diagram of receiver based amplitude measurement using spectrum analyser

3. CONCLUSIONS

Measuring RF power in a field environment can be a simple task which can be accomplished accurately and inexpensively. It can also involve a great deal of care and proper training to ensure accurate measurement of equipment.

The study has introduced measurement techniques and instrument types for average and peak power testing. Power sensors, including thermistors, thermocouples and diode-based sensors offer the highest measurement accuracies but with limited dynamic range, potentially long measurement times and lengthy equipment warm-up requirements.

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SECTION D

AUTOMATIC STAMPING MACHINE

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ABSTRACT

Stamping Machine is one of the important machines used in paper industry for stamping the paper. It is mainly used as the name indicates to stamp the logo or any other symbols. So we are going to make a machine for "automatic stamping machine" and make it with minimum cost and for profitable output. The machine is simple to operate, easy to adaptable. Hence we tried our hands on "Automatic Stamping Machine." Automatic stamping machine is workingon the principle of microcontroller. By using this machine we can easily print our logo or name on leather, card board, papers, and plastic articles crafts by using pad printing tool. Majority of the automatic process came into existence to give better quality and highly accurate products. The main aim of project is creating a project model of an Arduino uno Controlled Paper Stamping Machine which controls feed and stamping mechanism of paper useful in many kinds of organization like Universities, Government offices, Post offices, Banks, Colleges etc. The feed of the paper will be accommodated by using a roller mechanism and the stamping will be done by incorporating a simple link mechanism. We have proposed a system which can work with good accuracy, clarity, reduce the wastage of time and consume less power.

Keywords—*Automatic stamping, profitable, microcontroller, accuracy, printing pad*

1. INTRODUCTION

The machine is basically an automation based control system done by integrating Arduino uno with paper stamping machine. This paper stamping machine basically deals with the conventional stamping done automatically with the help of controller which controls the motion of the stamp, paper feeding etc. The paper feeding for stamping is done by paper feeder mechanism used in printer. Two friction rollers grab the paper and feed it to the stamping tray by rolling the paper under it. The stamping on the paper is done by linear motion of actuator mechanism. Arduino controller is used to control the complete setup of this stamping machine from feeding of paper then stamping and finally till receiving the paper. Structure of the setup will be made of wood to ensure light construction. The stepper motors will used as actuators. Motors will control the to and fro motion of the starter.. Over the years Arduino has been the brain of thousands of projects, from everyday objects to complex scientific instruments.

Generally this machine we have made this is cost effective, with less maintenance and gives considerable output. In this machine there are three modes of operation we have added i.e. manual mode, single auto, continuous auto .With minimum input by using this machine we can achieve maximum profit. This is the main purpose of this machine.

1.1 Conceptual view

The implementation of project includes stamping the paper automatically instead of manually stamping. This includes idle time between two successive stamp, Programming, paper length adjustment, actuator controls etc. For solving the above problem aurdino programming will be used. The stamping machine which we are developing is motorized operated. In the present situation workers done the stamping operation by hand.it is like that stamper is pressed against pad and then it is press into paper. Without control of pressure stamp get extra link from stamping pad which are not required this machine can be modified to fully automate programming machine. This automated stamping machine can perform any specified printing or embossing work in minimum time, speed and with high accuracy. It can be used to transfer the job from one work station to another using conveyer system. If the path of the operation is given through programming. This machine does not need any regular attention. Line tracker machine is another improvement that can be done for specific work. The purpose of this project is to generate the correct sequence of events for a stamping machine by designing the scotch yoke mechanism and by controlling the motions of actuators and stamper which is used for paper feeding with the help of some circuit mechanisms such as relays, electronic timers etc. This method helps to find out optimal condition for a process which can be used to achieve better stamping finish with speed Machining. This method is a simple and reliable method that is used to optimize the process parameter by decreasing the variation in time. Stamping method employed systematic approach to the robust design by increasing performance quality and decreasing the cost.

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2 .OBJECTIVES OF THIS STUDY

The objective of stamping machine is as following:

a. Ease the process of stamping: Stamping is a very monotonous process wherein we need to manually ink the stamp and then stamp it on the paper, refill it for the other paper which consumes more efforts. Automation of stamping process ease the process of stamping and reduce efforts
b. Reduce Stamping time: Automated stamping consumes less time than the manual stamping. Time saved can be utilized in some other work. Productivity of the process also increases
c. Contribution to our Institute: It can be useful to our Institute for various stamping like journals, HOD, Principle stamp etc

3.LITERATURE REVIEW

Raj Kumar Sharma, Rakesh Patwal, et al [2016] [1], states that Kinematic Design & Development of Automatic Paper Stamping Machine by using CAM & FOLLOWER Mechanism. This project is basically an automation based generate the correct sequence of events for a stamping machine by designing the cam and follower and by controlling motions of conveyor and stamper which is used for paper stamping with the help of some circuit mechanisms such as relays, electronic timers etc.

Arun S, Shree Rajendra and Vijayvithal Bongale et al [2016] [2], the proposed work describes the design and fabrication of project model of automatic stamping machine controlled by aurduino uno and focus on the working principle and the hardware structure machine. Punching or pressing process is one of the most important and necessary processing step in sheet metal industry. By automating this process one can have a greater control over the process Programmable Logic Controllers are used for the control of the system. This machine can replace existing manual stamping . By Using Aurduino controls with the electrical actuators, it is possible to achieve good results in the form of decrease manufacturing complexity, reduced cost .

G. Bretthaer, D. Osswald, et al [2015] [3], article presented on the approaches taken to integrate a novel anthropomorphic robot into a humanoid robot for paper handling. Which enables a robot hand to be used in and environment built for human are presented. Starting from a design that look like the human hand regarding size and moving ability. A mechatronic low level control system is provided with reliable and stable controllers for joint angles and torques. A high level system is connected with a low level system to coordinate fingers of humanoid robot are presented.

Chiara Lamni and Macro Ceccavelli [2015] [4], Chiara Lamni and Macro Ceccavelli has analyzed the mechanisms in two-finger gripper to create an optimum Design procedure. The design has optimized by using fundamental characteristics of grasping mechanisms. Originally a multi objective optimum algorithm was used by considering four different functions. This new algorithm achieves a kinematically optimized design of gripper mechanism.

Kyada A et al [2015] [5], this research paper presents design and development of manually operated stamping machine. In this they present objective of stamping machine design, factors affecting paper emergence, some mechanisms. The elementary objective of scattering operation is to put the paper and stimulant in rows at desired length and paper to paper spacing, cover the paper with box bracket and provide proper compaction over the paper. The recommended paper to paper spacing and length of paper location vary from time to time for different orientation sizes conditions to achieve optimal yields. From this we know that mechanical factors effects on paper germination like uniformity of length of placement

4. EXISTING SETUP

Paper Feeding and Paper Collecting Mechanism: The paper feeding for stamping is done by roller mechanism. Two rubber rollers grab the paper and feed it to the stamping tray by rolling the paper under it. The rollers are mounted over a shaft which is housed inside bearings. This ensures the smooth functioning of paper feed process. Stamped paper collected by frictional rollers at the end of process.

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. **Fig.1** Paper Feeding and Paper Collecting Mechanism

a. Brackets For Accommodate Variety of Paper: Two L shaped brackets are provided to accommodate different types of papers having different widths. Slots are machined on both paper base and brackets which helps in bracket movement to adjust for different papers.

b. Automatic Inking Stamp: A self-inking stamp is a rubber stamp inside of a mechanism that contains a spring, stamp and pad. The stamp rest on the pad when it's not being used. Since the stamp is resting on the stamp pad all the time with pressure it causes couple of problem. First it placed an impression on pad if we want to change the stamp on self-inking mount, it is advisable to change the pad also. If pad is not replaced stamp may not work correctly. Second, the pad over time will wear out.

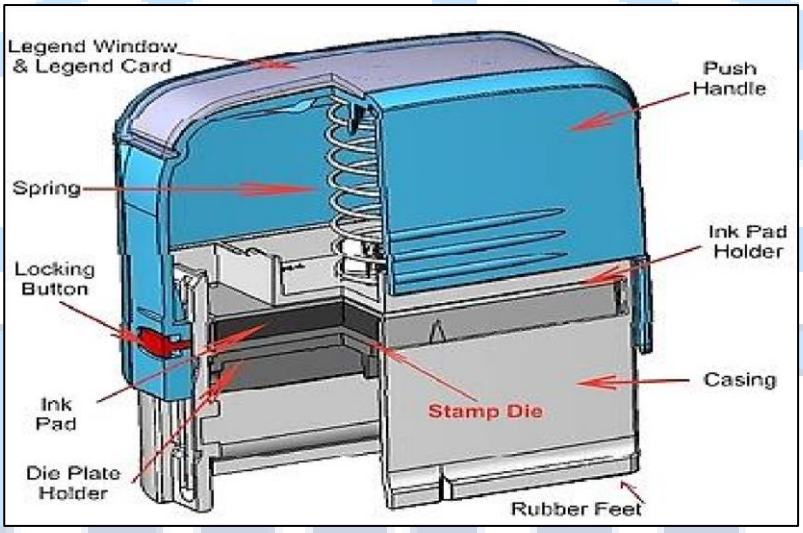

Fig.2 Automatic Inking Stamp

c. Paper Transporting Mechanism – Conveyor Belt: A conveyor belt is the carrying medium of a belt conveyor with an endless loop of carrying medium the conveyor belt that rotate about them. One or both of the pulleys are motorised, moving the belt and the object or material on the belt in forward direction. The powered pulley is called drive pulley while unpowered pulley called idler pulley.

d. Automatic Paper Adjustment Mechanism: As the number of stamping papers decreases, the base is elevated due to spring force to accommodate the height for reduced number of papers. The spring is at the central of the base and rise or lowers it depending upon the number of papers

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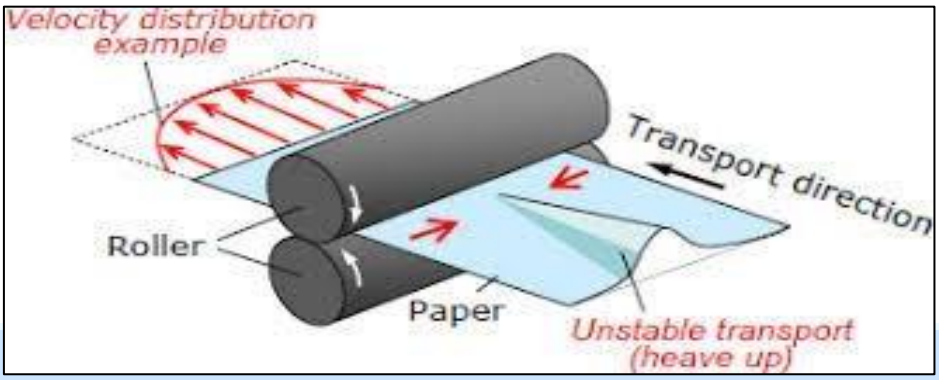

Fig.3 Automatic Paper Adjustment Mechanism

e. Electrical Actuator: Linear electrical actuator have been developed to operate function similar to hydraulic and pneumatic actuator cylinder. These are based on motor driven lead screw. The motor may be ac or dc. Speed of the motor reduced with the compact gear box before driving the lead screw. Actuator have been developed thrust upto 15 kN and 3 meter bore. Compacted, strong and lightweight construction covers a wide range of torques, double worm gear design prevents any valve movement from dynamic forces within the pipeline, Mechanical torque switches prevent motor and gear set damage during extreme torque scenarios. Large visual indicator allows for positive visual position identification from greater distances, Digitized control components are some of the advantage.

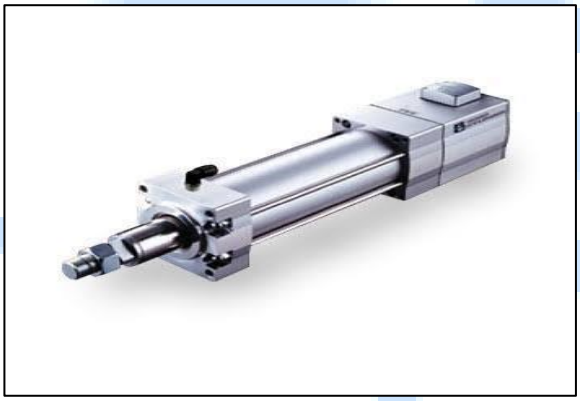

Fig.4 Electrical Actuator

f. Controller: Arduino controller is used to control the complete setup of this stamping machine. From feeding of paper then stamping to receiving paper everything is controlled by Arduino. Arduino is an open platform used for programing and integrating our device with the computer. It is a very simple to operate and program Structure & Actuators: Structure of the setup will be made from wood. An Arduino is actually a microcontroller based kit which can be either used directly by purchasing from the vendor or can be made at home using the components, owing to its open source hardware feature. It is essentially use in communications and also use controlling and operating devices. Arduino processor basically uses the Harvard architecture where the program code and program data have separate memory. It consists of two memories- Program memory and the data memory. The code is stored in the flash program memory, whereas the data is stored in the data memory. The Atmega328 has 32 KB of flash memory for storing code, 2 KB of SRAM and 1 KB of EEPROM and operates with a clock speed of 16MHz. A typical example of Arduino board is Arduino Uno.

5. WORKING OF OPERATION

The bunch of paper is placed inside the feeder tray. Paper feeding mechanism consist of two roller having frictional surfaces. The system starts and one by one paper are fed onto the stamping area. Stamping operation carried out by scotch yoke mechanism which converts rotary motion of connecting link into reciprocating motion.
This mechanism consists of stamp at its bottom position. The stamp which are used in this operation is suspended with automatic ink feeder. The stamping link hits the stamp into the paper. The paper is then retrieved by the conveyor belt mechanism. The paper one by one get stamped and collected in drum. Stamping operation is carried out automatically by

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aurduino. Aurduino control the speed of motor which are used in stamping and paper transferring mechanism. Finally stamp paper are collected in collecting drum in proper manner.

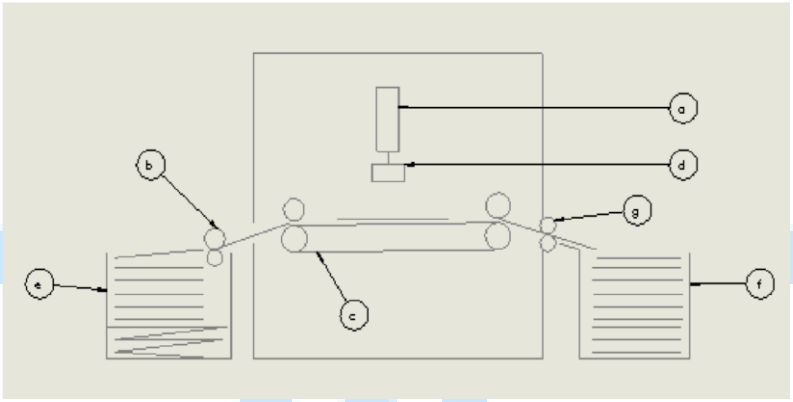

Fig.5 Automatic paper stamping machine

6. CONCLUSION

This stamping machine is very easy to use and it has smooth functioning operation. It uses DC motors that operate the two rollers thereby for grabing the paper and feeding it to the stamping tray by rolling the paper under it. The stamping on the paper is done by using linear actuator to which the stamp is attach. From feeding of paper then stamping to receiving paper everything is controlled by Arduino. The spring accommodates the height adjustment when amount of papers is less. Structure of the setup is made of wood. Motors control the to and fro motion of the stamp mechanism. On this machine different size papers can be stamped continuously and this is the big advantage of this machine over manual stamping by hand. While concluding this report, we feel quite fulfill in having completed the project assignment well on time, we had enormous practical experience on fulfillment of the manufacturing schedules of the working project model. We are therefore, happy to state that the in calculation of mechanical aptitude proved to be a very useful purpose.

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"PIN ON DISC TYPE WEAR TEST"

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ABSTRACT

From a surface engineering point of view, wear test is carried out to evaluate the potential of using certain surface engineering technology to reduce wear for a specific application, and to investigate the effect of treatment conditions (processing parameters) on the wear performance, so that optimized surface treatment conditions can be realized. From material point of view, the test is performed to evaluate the wear property of a material so as to determine whether the material is adequate for a specific wear application. The set up development is so as to get accurate and reliable results to further use for analyzing the material for different applications involving resistance to wear. There is already existing setup which is used to check the wear resistance of different materials as per the standards. This project aims at optimizing the design of existing wear test set up to eliminate mentioned drawbacks of the existing set up. For optimization of design, modification in design is proposed with vibrationanalysis.

Keywords— *mechanical, vibration, design, clamping, speed, wear*

1. INTRODUCTION

The word tribology means "the science of rubbing" is derived from a Greek word "Tribos." Surface interactions in a tribological interface are highly intricate, and their understanding requires knowledge of various disciplines including solid mechanics, fluid mechanics, thermodynamics, heat transfer, materials science, rheology, lubrication, machine design, performance and reliability. In sliding and rolling surfaces of modern machinery, tribology is very essential. The main purpose of this research is the minimization and eliminating of losses occurring because of wear and friction. A tribometer is a machine or a device which use to perform test and stimulation of wear, friction and lubrication. Most of the wear setup is generally subjected to load and speed on the surface in contact. There are different system may going to use like four ball, pin on disc, block on ring, win disc are testing machine. Hence tribology helps in testing the properties of the materials under the high temperature, vacuum and other atmospheric condition.

2. EXAMINATION OF EXISTING SETUP

To study wear of the materials, we must simulate the process of wear in a controlled manner and study the effect on different samples with the same test conditions. One way to perform the wear is with a pin-on-disk test. In this test, the sample to study is mounted on a rotating stage and a pin, or ball, comes in contact with the sample surface, with a known force, to create the wear. A flat or a sphere shaped indenter is loaded on to the test sample with a precisely known force. The indenter (a pin or a ball) is mounted on a stiff lever, designed as a frictionless force transducer. As the disk is rotated, resulting frictional forces acting between the pin on the disk are measured. A ball or pin for the evaluation of wear loss provides several distinct advantages. Balls of a wide variety of materials are readily available from many suppliers. Their reproducibility and quality can be excellent ensuring easy accurate comparisons. Evaluating the wear of the ball or pin provides wear information at the contact point which stays under load during the full duration of the test. This compared to the base material that only experiences wear during a comparatively short period of time. Wear test is carried out to predict the wear performance and to investigate the wearmechanism.

3. WORKING

The existing setup have a clamp arrangement and the motor arrangement .When switch get start then the motor rotate by their speed .There is a pin type arrangement take place on the length of The bar section which is attach to the clamp. The clamp hold the length of the bar and the pin type arrangement when the motor start then the pin which is hold by the clamp which is touch to the disc .The motor hold a disc and the shaft, the shaft is hold the full arrangement .Hence when the pin is attach to the disc then due to ear of the disc can calculated .This is the actual working of the existing setup.

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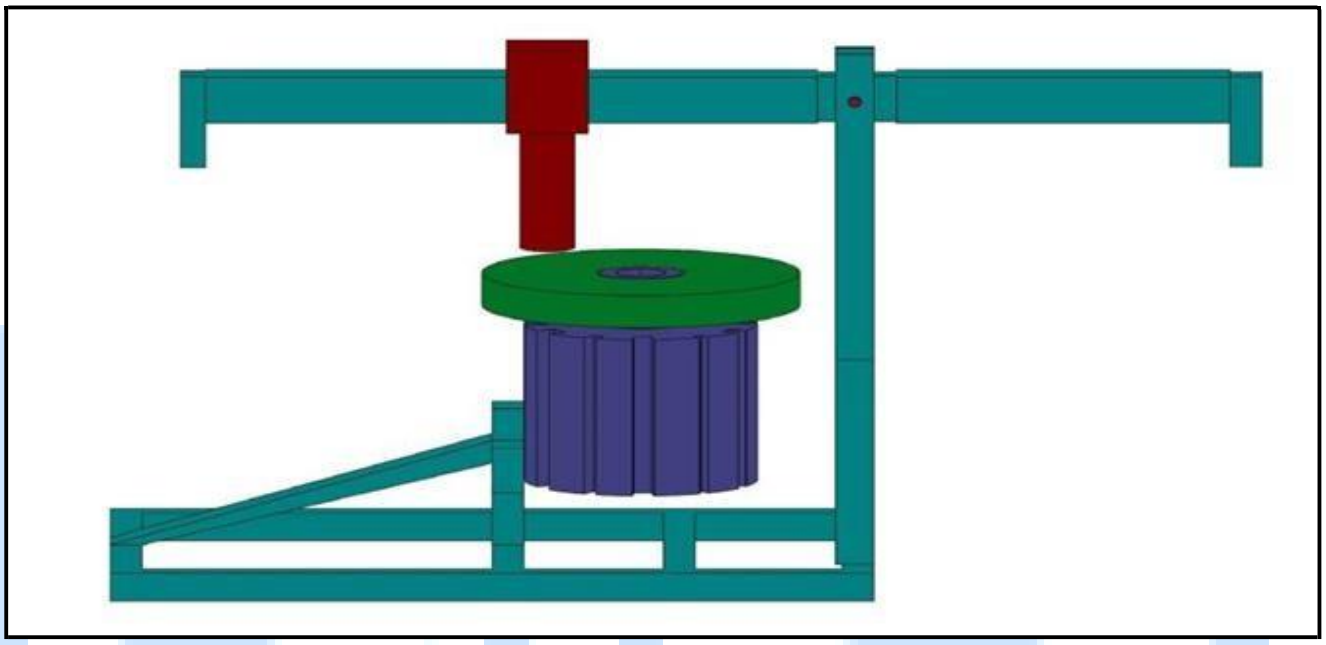

Fig-1 Existing Setup

4. PROBLEM IN WORKING SETUP

a) **Vibration due to improper arrangement of beam**: The tool jumps over the disc, the vibration is transmitted to the mass attached, and it startsoscillation.

b) **Inaccurate force analysis**: **dynamic forces**: Due to such oscillation mention above static law of the force calculationfails.

c) **Inability to achieve variable speed**: There is no instrument to vary thespeed.

d) **Dynamic load calculation**: By considering resolved component of centrifugal forces we need to apply some balancing to compensate the force in ydirection.

5. SOLUTIONS

5.1 Accurate force:

i. A Strain gauge (sometimes referred to as a Strain gage) is a sensor whose resistance varies with applied force; it converts force, pressure, tension, weight, etc., into a change in electrical resistance which can then be measured. When external forces are applied to a stationary object, stress and strain are the result. Stress is defined as the object's internal resisting forces, and strain is defined as the displacement and deformation thatoccur.

ii. By using a damper the forces acting on the bar section reduces hence by using that force calculation isappropriate.

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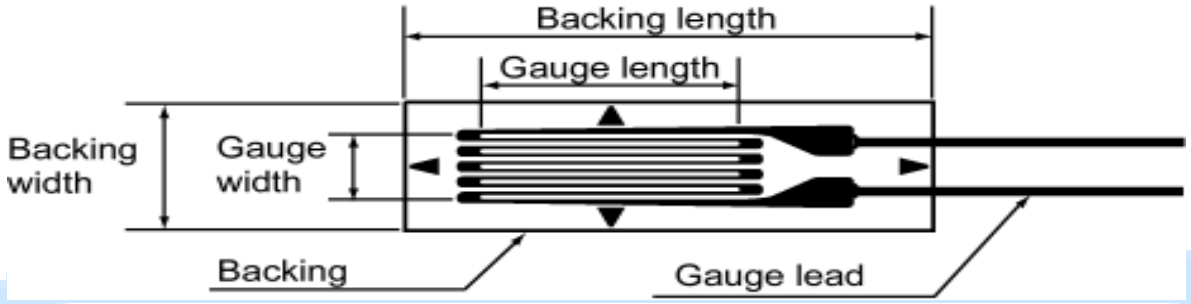

Fig 5-1 Strain Gauge Diagram

5.2 By Changing BeamLength:

i. By changing the length of beam as it effects in less vibration .As reducing the length of beam the vibration occur in the beam get reduces .

ii. By changing the length of the size of the setup reduces due to that vibration is lessoccur.

5.3 Include SpeedVariations:

i. Regulator used to control the speed. To know about the working process of regulators one should know about resistance. All devices with electrical conductor let the current pass through. However, the regulator conductor would work with a specific resistance range for current passage. The overall resistance would depend on conductor materials. Regulator comes with wire spools having varied resistance amounts. While the knob is set at a certain position, the resistance gets included in series with fan. A series of connection would indicate that the resistance is proportion with themotor.

ii. By including different speed we get a different wear test calculation in same test .Hence by changing the speed of the motor different wear test calculation is easilydone.

iii. In the market different speed varying product are there which help directly to calculated vibration occurring in the existing setup.

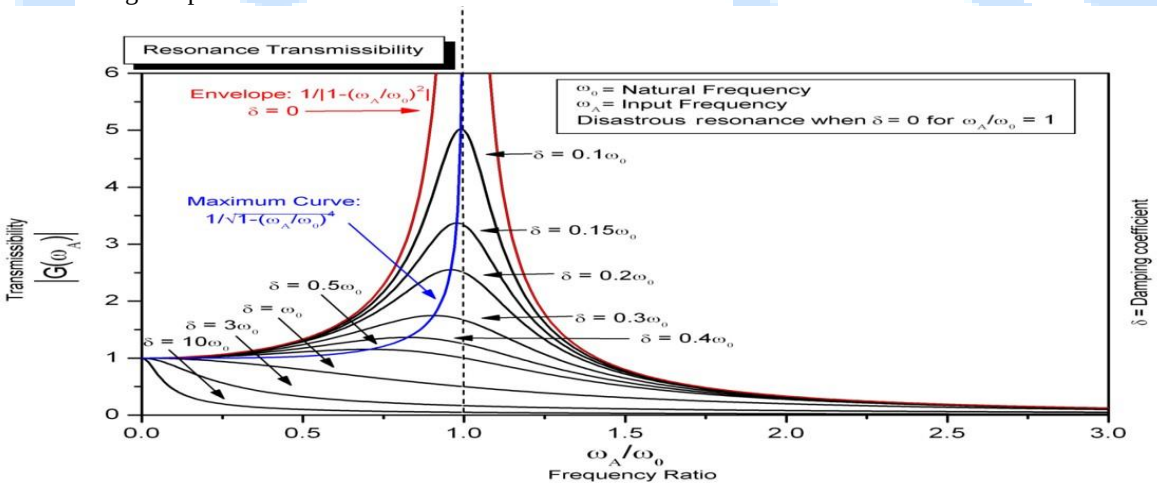

Fig **5-2 Frequency Ratio Graph**

5.4 Reduce Vibrations:

i. Be applying extensive line of neoprene, which are designed to manage the vibration, noise and shock that can cause mechanical systems to fail. The key to isolating vibration is to reduce its transmission to a component or supporting structure. In a nutshell, the rubber in a mount acts as a spring with its own natural frequency, and this frequency partly depends on the stiffness of the spring.

ii. By changing the length of the beam the force acting on the setup get reduces which helps to reduce thevibration.

iii. By using damper in the setup the vibration occurs in the setup may get reduces at certainlevel?

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6. CONCLUSION

In this paper, by changing some parameter the vibration occurs in the setup may reduce is discussed and illustrated. The technical advancements and science has brought few methods in these fields. Most of them are reliable. Many others have economic advantage. However their applications are restricted in few locations. Hence by changing a speed different parameter will get. The device proposed in this paper brings a remedy on these drawbacks. Bychanging certain think existing model more accurate and reliable. It opens newer gates of exploration and also will provide new routes for testing and wear out testing method. There are multiple models presented in this report and one of them is taken into consideration and elaborated thoroughly to the vision of making its idea clearer. Its mechanism along with its operation has been properly elucidated along with its advancement from its early design which is attempted to optimize.

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TITLE: Pure Water Generator by using Vapour Compression Cycle

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ABSTRACT

The lack of clean drinking water is one of the key issues facing the world today. The water in many countries is of poor quality creating a big demand for bottled water where the economic means are available. For underdeveloped countries this has led to the death of millions while it in the industrialized world has meant a big increase in consumption of bottled water which has had a big negative effect on the environment. The problem with the water which is available to us is that it is acidic in nature and expensive. Our project is to make a pure water generator which works on the same principle as a refrigerators and air conditioners i.e. on the principle of cooling through evaporation. The method is called Vapor Compression Cycle.

The pure water generator works by converting atmospheric air to pressurized air using a compressor and then this air is then passed through condenser pipes which decrease its temperature to dew point. The air condenses to liquid and is passed through a filtration system and then stored in a tank. This water generator will cut the electricity as well as transportation cost and the water which we get is pure by utilizing the natural formation of water vapour in air to produce clean drinking water.

Keywords: - *Water generator, Vapour Compression cycle, Condensation, Evaporation, Refrigeration*

1. INTRODUCTION

The Atmosphere contains water in the form of water vapor, moisture etc. Within that amount almost 35% of the water is wasted. This amount of water can be used with the help of a Pure Water Generator. This device is capable of converting atmospheric moisture directly into usable and even drinking water. The device uses the principle of latent heat to convert water vapor molecules into water droplets. According to previous knowledge, we know that the temperature require to condense water is known as dew point temperature. Here, the goal is to obtain that specific temperature practically or experimentally to condense water with the help of some electricity or engines. The water which we use from our day to day life is acidic and in some way harmful for our health. It is a bit costly when we pay Rs.20 for a liter of water. So our project is to make water which is healthy for our body. It will be done by making a potable water generator which will work on the principle of refrigerator or an air conditioner in which the water will be cheaper than others. The water is purest in its vapor form or we can say moisture as there is no TDS (Total dissolved solid) in it. So our project is to make a water generator which will work on the principle of refrigerator or air conditioner. For example if we keep our air conditioner on for 24 hours, it creates water of around one liter. In case we use 0.25KW refrigerant compressor to make water, it creates around 20 litres of water in 24 hours. That means cost of water per liter is Rs.2. The water which we use from our day to day life is acidic, and the water we will get from this water generator will be basic in nature which is better for health. This type of water is available for Rs.300/liter in big hotels. It is also called as 'bacteria free water'. The experimental concept of this project is based on 'Vapor compression cycle' in which there are four components namely compressor, condenser, expansion valve and evaporator. The compressor compresses the refrigerant gas which is in vapor form and increases its temperature & pressure. Now this superheated vapor can be condensed in condenser and the rejected heat is carried away. After that the saturated liquid undergoes an abrupt reduction in pressure through expansion valve. The cold mixture is then routed to evaporator where warm air circulated by fan evaporates condenses and condensed water which is then filtered and collected in a storage tank.

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2. PROBLEM STATEMENT

Safe drinking water is essential to humans and other life forms even though it provides no calories or organic nutrients. Access to safe drinking water has improved over the last decades in almost every part of the world, but approximately one billion people still lack access to safe water and over 2.5 billion lack access to adequate sanitation. There is a clear correlation between access to safe water and gross domestic product per capita. However, some observers have estimated that by 2025 more than half of the world population will be facing water-based vulnerability.

Water covers some 70% of the Earth's surface. Approximately 97.2% of it is saline, just 2.8% fresh. Potable water is available in almost all populated areas of the Earth, although it may be expensive and the supply may not always be sustainable.

The conventional freshwater resources such as groundwater and glaciers are being depleted due to factors such as disappearance or pollution due to climate changes. The exponential growth rate of the human population is a main contributing factor in the increasing use of these types of water resources.

3. VAPOUR COMPRESSION CYCLE

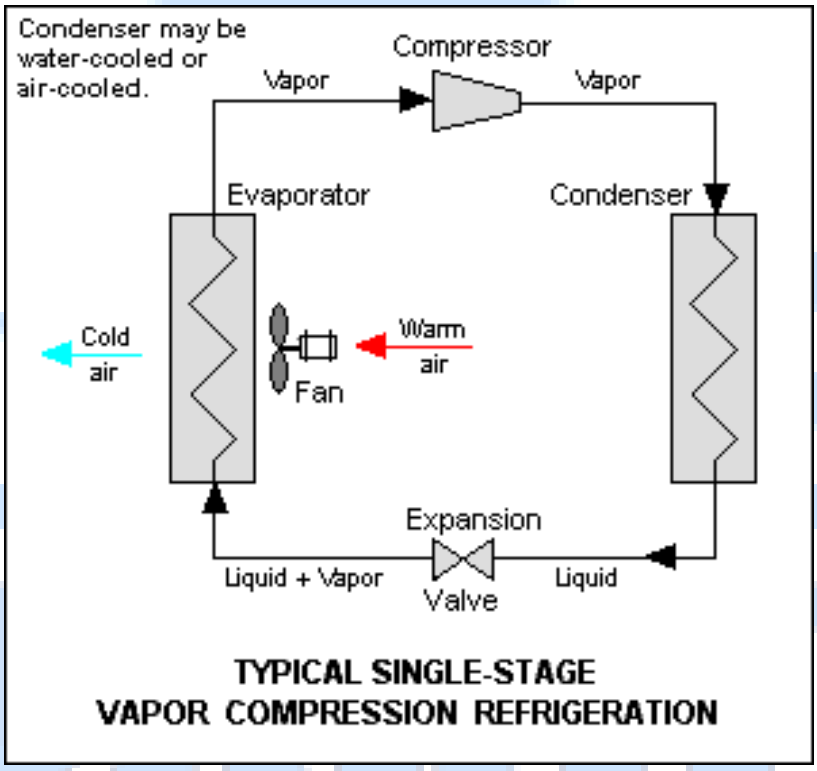

Fig -1: Vapour Compression cycle

There are several types of systems by which we produce cold air or water in the process of refrigeration and air conditioning. We can produce refrigeration effect with absorption type refrigeration, steam jet refrigeration, air refrigeration, non-conventional refrigeration such as Vortex refrigeration, pulse tube refrigeration and Vapour compression refrigeration system. It is roughly estimated that over 80% of the refrigeration and air conditioning system today use the Vapour compression (VC) system.

In VC system working fluid is liquid called Refrigerant which involves sensible heat as well as latent heat and thus COP of system is more. The refrigerant moves around the closed system of vapour compression cycle and continuously

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condense and evaporate. In evaporating refrigerant absorbs latent heat from products and in condensing refrigerant rejects heat to the circulating water

4. COMPONENTS

There are 5 essential components

Compressor

Condenser

Capillary tube

Evaporator

Refrigerant

4.1 Compressor

The function of a compressor is to draw refrigerant vapour from the evaporator and thereby create a low pressure so that the liquid refrigerant boils and achieves the desired heat exchange at a low temperature. The compressor also raises the pressure and thereby the temperature of the refrigerant vapour, so that it can transfer its heat to the cooling air or water at the condenser and, as a result, the refrigerant is liquefied.

4.2 Condenser

The condense**r** is the part of a refrigeration system where the heat taken in at the evaporator, together with the heat added by compression, is lost by the refrigerant to the surrounding air or water coolant

4.3 Capillary tube

It is used for small capacity units like domestic refrigerators. It is small diameter copper tube connected between condenser and evaporator. The required pressure drop is caused due to heavy frictional resistance offered by a small diameter tube. The resistance is directly proportional to length and inversely proportional to diameter. The flow rate is the function of pressure differential between condenser and evaporator. As the load increases in summer, tube supplies more quantity of flow as an effect of increased condenser pressure. Similarly in winter load decreases, the flow rate through tube also decreases.

4.4 Evaporator

The phase where the water production occurs is in the evaporator. The cold moist gas inside the evaporator is being cooled to convert it into liquid. This can be done by many possible ways. In this case, convection is used where heat transfer takes place between coils and fins of evaporator and the fluid inside

4.5 Refrigerant

A liquid which absorbs heat from low temperature body and rejects the same to high temperature either in the form of sensible and or latent heat refrigerants are mainly classified into two groups
Primary refrigerant and
Secondary refrigerant
Primary refrigerant directly take part in refrigeration system for example- household refrigerator, where as secondary refrigerant are first cooled with the help of primary refrigerant and are further used for cooling purpose for example Ice plant.

5. WORKING

Low-pressure refrigerant gas enters the compressor and is compressed and discharged as hot high-pressure gas into the condenser. High pressure liquid coming out of the condenser then passes through a drier into the capillary tube which is

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bonded to the suction line as shown in fig. to form a heat exchanger. Some heat is removed from the liquid refrigerant in this heat-exchanger/ the capillary tube lowers the pressure of the refrigerant liquid (as well as temperature) because of the resi

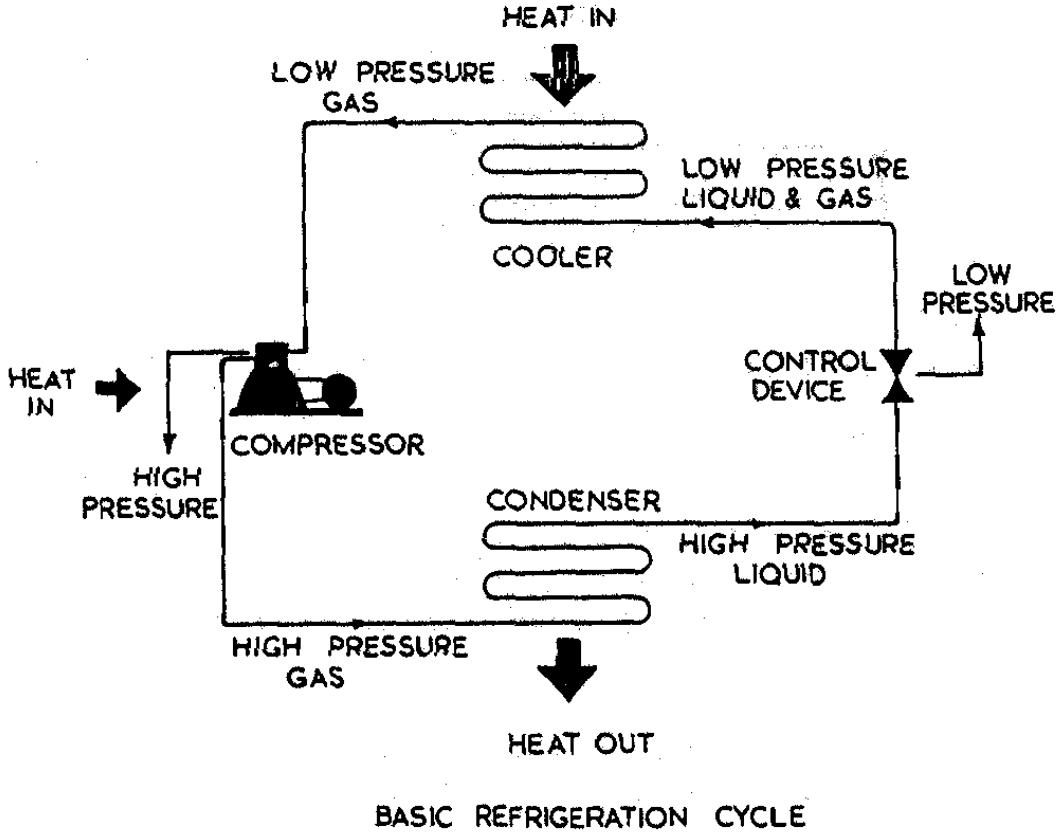

Fig -2: Refrigeration cycle

This evaporation of liquid extracts the heat from the water in the cooling chamber and cools the water. The cold low-pressure gas coming out of cooling coil. Lower pressure refrigerant liquid then enters the cooling coil wrapped around the water storage chamber, boils and evaporates into a cold low-pressure gas. This evaporation of liquid extracts the heat from the water in the cooling chamber and cools the water. The cold low-pressure gas coming out of cooling coil removes some of the heat from the liquid passing through the capillary tube before it enters into the compressor shell. The cold gas passes over the compressor motor, cooling it, before entering the compressor cylinder again.

6. CONCLUSION

There are hardly any chances to refuse that this device is portable for its simple design which can be implemented for extreme situation, to use during flood, in desert areas, and in rural areas. The water of basic in nature can be achieved by this water generator at very low cost and very low electricity rates. Many company like 'Watermarker India Ltd.', 'Aerowater', etc have already this type of device for domestic purpose. It can be implemented for industrial development where water is a matter of crisis.

7. ACKNOWLEDGEMENT

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We would like to acknowledge Dr. Arun Kumar, principal of VIVA Institute of Technology and Prof. Niyati Raut, HOD of Mechanical Department for helping us out in this project. Their contribution in this project is invaluable. We would also express our gratitude to our fellow students who helped us out in completion of this project.

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PORTABLE HOME

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ABSTRACT

There are many places in world where heavy natural calamities occur like earthquakes, cyclones, tsunami, floods, landslides or even draughts which forces people to leave their home and in turn leads to heavy loss of property and disruption of daily life. There are no appropriate solutions to these problems, the solutions available are temporary, and so a valid solution is needed to prevent or minimize the losses caused.

The paper focuses to minimize the problem caused due to these natural calamities. It aims in developing portable homes. The portable home in turn will try to minimize losses caused by transporting the whole house to another place this is done with the help of mechanisms which shrink the house to such a level that it can be loaded on a container and moved to a safer place in case of emergency.

The various mechanism used are tenfold mechanism, sliding mechanism, hinges etc. The project may be built of various materials depending on the cost of building the house, the geographical conditions, frequency of natural calamities, space required, etc. The project is not only intended for natural calamities but also due to its modular nature it is highly customizable. Due to all of the above reasons the portable home is an excellent solution where there are possibilities of a natural hazard, thus portable home can be a perfect backup plan. This aims at presenting concept of alternative design of portable home

Keywords— *tenfold, portable, design, flexible, house, modular*

1. INTRODUCTION

A good, affordable housing in India, in its most busy and developing areas, is as expensive as it is hard to fine. In prime cities like Mumbai, even a cramped little room will have a stunning price tag. however, at certain places where the cost of the land is low, there are often certain shortcomings like floods, draughts, earthquakes, etc. which in turn leads to loss of property when such calamities occur and rendered them homeless, giving them no option but to find shelter in new places.

A much recent example of such an event is of the floods that stuck in south of India in 2015, primarily Chennai with 14,000 people evacuated during the terrible event, we can imagine their struggles in finding shelter and then later, restarting and rebuilding their lives but wouldn't it be really simple if victim of such disasters could merely uproot their homes and plant them elsewhere? Wouldn't it be super simple if they could just fold their houses like tents and carry on to a new location

A portable, demountable or transportable building is a building designed and built to be movable rather than permanently located. A common modern design is sometimes called a modular building, but portable buildings can be different in that they are more often used temporarily and taken away later. Portable buildings (e.g. yurts) have been used since prehistoric times. The most familiar modern type of portable buildings are designed so that one can be carried to or from site on a large lorry and slung on and off by a crane

2. LITERATURE REVIEW

Joel Gratz, 2008 [1] After more than two decades of relatively little Atlantic hurricane activity, the past decade saw heightened hurricane activity and more than $150 billion in damage in 2004 and 2005. This paper normalizes mainland U.S. hurricane damage from 1900–2005 to 2005 values using two methodologies. A normalization provides an estimate of the damage that would occur if storms from the past made landfall under another year's societal conditions. Our methods use changes in inflation and wealth at the national level and changes in population and housing units at the coastal county level. Across both normalization methods, there is no remaining trend of increasing absolute damage in the data set.

S. N. Jonkman 2005, [2] Every year floods cause enormous damage all over the world. This study investigates loss of human life statistics for different types of floods and different regions on a global scale. The OFDA/CRED Database contains data on international disasters and is maintained by the Centre for Research on the Epidemiology of Disasters in Brussels (CRED) in cooperation with United States Office for Foreign Disaster Assistance (OFDA). Information from this source on a large number of flood events, which occurred between January 1975 and June 2002, is evaluated with respect to flood location and flood type. Due to the limited availability of information on coastal flood events, the scope

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of this study is limited to three types of freshwater flooding: river floods, flash floods and drainage problems. First, the development of loss of life statistics over time is discussed. Second, the dataset is analysed by region, by flood type and by the combination of type and region. The study shows that flash floods result in the highest average mortality per event (the number of fatalities divided by the number of affected persons). A cross analysis by flood type and location shows that average mortality is relatively constant for the different types over various continents, while the magnitude of the impacts (numbers of killed) and affected for a certain type varies between the different continents. On a worldwide scale Asian river floods are most significant in terms of number of persons killed and affected. Finally, a comparison with figures for other types of natural disasters shows that floods are the most significant disaster type in terms of the number of persons affected.

Robert J. Nicholls, 2003 [3] Recent improvements in mapping of global population distribution makes it possible to estimate the number and distribution of people near coasts with greater accuracy than previously possible, and hence consider the potential exposure of these populations to coastal hazards. In this paper, we combine the updated Gridded Population of the World (GPW2) population distribution estimate for 1990 and lighted settlement imagery with a global digital elevation model (DEM) and a high resolution vector coastline. This produces bivariate distributions of population, lighted settlements and land area as functions of elevation and coastal proximity. Lighted settlements are concentrated within 5 km of coastlines worldwide, whereas average population densities are higher at elevations below 20 m throughout the 100 km width of the near-coastal zone. Presently most of the near-coastal population live in relatively densely-populated rural areas and small to medium cities, rather than in large cities. A range of improvements are required to define a better baseline and scenarios for policy analysis. Improving the resolution of the underlying population data is a priority.

3. EXISTING SETUP

Fig 1 Tiny leaf house

Leaf House is the creation of small home enthusiast Laird Herbert from Whitehorse, Canada, who was inspired by the idea of building his own home. After testing out several prototypes, Herbert has finally finished work on what he calls Version 2 and the result is a tiny portable home design that takes up a small amount of space, is big enough to live in comfortably, and reportedly accommodates a family of four. When you look at it this way, living in a home that's less than 500 square feet sounds simple, frugal, and blissfully stress-free. Living in a tiny home does have compelling benefits, but it is not without its challenges as well.[4]

4. DRAWBACK OF EXISTING SETUP

- The leaf house has also quite area of applications due to its cramped design
- Organization Is a Must. You need to utilize every organising idea for small spaces otherwise your tiny home will look like a cluttered closet. You won't want to spend time there.
- You Can't Have It All. It can be difficult to decide what possessions to take with you into this tiny space, especially if you have abundant or large family heirlooms.
- Entertaining Is a Challenge. Entertaining in a tiny home has limits. In warm months you can go outside, but winter can force you to limit your guest list.

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5. ALTERNATIVE DESIGN

5.1 Tenfold mechanism

Fig 2 Tenfold Mechanism

The Ten Fold initiative innovates by creating and designing various relocatable buildings and structures. Its enormous self-deploy mechanism generates various combinations of space and facilities.The main mechanisms this project utilizes is the tenfold mechanism. Using patent-protected mechanical linkages and counter-balanced folding systems, Ten Fold has designed products that deploy automatically from a highly compacted state for ease of transport, to a highly expanded state for use, in a few minutes. This process is reversible and is highly reliable for daily purpose.

Tenfold is technology that offer new ways to improve performance, agility and save time.Tenfold family of counterbalanced folding linkages are design to bring mobility, speed, ease and reliability to your products and services [5]

5.2 SCISSOR MECHANISM

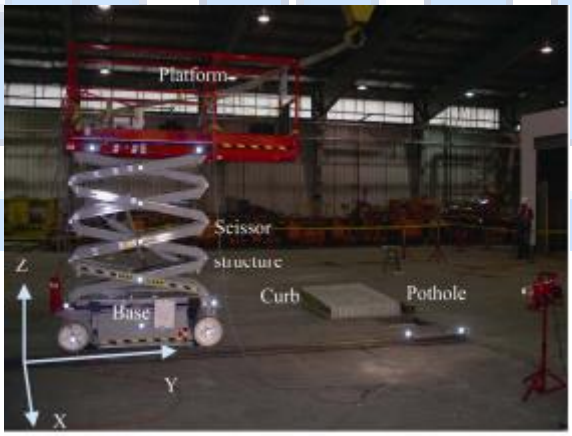

Fig 3 A pictorial view of the scissor lift.

Extension is achieved by applying pressure to the outside of a set of supports located at one end of the mechanism elongating the crossing pattern. This can be achieved through hydraulic, pneumatic, mechanical or simply

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muscular. It may required no power to return to its original position, but simply a release of the original pressure also used in kinematic of mechanisms.[6]

Scissor lifts are type of equipment designed for lifting objects or individuals according to one's preferences. Unlike other platforms, these lifts move only vertically to transport materials, people or equipment. Scissor lifts are widely used in construction and manufacturing industry where it is a need for workers to do job in hard to reach heights and spaces

The body of the scissor lift that is holding the platform used to carry materials or people has foldable support that looks like a criss-cross pattern linked together. The body is known as the pantograph which is the lifting mechanism. Pantograph functions like a spring wherein the elevation or upward motion takes place due to the application of pressure. Its length and size is defined by the expansion and contraction of the body of the scissor lift

- This mechanism is used in devices such as lift tables and scissor lifts.
- Modern low-profile computer keyboards make an extensive use of it as well, installing each key on a scissor support to ensure their smooth vertical movement, allowing the use of a cheap and reliable rubber dome contact set, instead of expensive and complex array of mechanical switches.

5.3 LINKAGE MECHANISM

Fig -4 linkage Mechanism

A mechanical linkage is an assembly of bodies connected to manage forces and movement. The movement of a body, or link, is studied using geometry so the link is considered to be rigid. The connections between links are modeled as providing ideal movement, pure rotation or sliding for example, and are called joints. A linkage modeled as a network of rigid links and ideal joints is called a kinematic chain.

Linkages may be constructed from open chains, closed chains, or a combination of open and closed chains. Each link in a chain is connected by a joint to one or more other links.

The movement of an ideal joint is generally associated with a subgroup of the group of Euclidean displacements. The number of parameters in the subgroup is called the degrees of freedom (DOF) of the joint. Mechanical linkages are usually designed to transform a given input force and movement into a desired output force and movement. The ratio of the output force to the input force is known as the mechanical advantage of the linkage, while the ratio of the input speed to the output speed is known as the speed ratio. The speed ratio and mechanical advantage are defined so they yield the same number in an ideal linkage.

A kinematic chain, in which one link is fixed or stationary, is called a mechanism, and a linkage designed to be stationary is called a structure[7]

- Four-bar linkage used to amplify force in a bolt cutter or to provide independent suspension in an automobile, to complex linkage systems in robotic arms and walking machines.
- Interesting examples of linkages include the windshield wiper, the bicycle suspension, and hydraulic actuators for heavy equipment
- The 4-bar linkage is an adapted mechanical linkage used on bicycles.
- The modern study of linkages includes the analysis and design of articulated systems that appear in robots, machine tools, and cable driven systems.

6. CONCLUSION

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The paper report presented aims at highlighting the problems related to natural calamities occurring near coastal region. It also aims at solving the problem by developing a design for portable home.

Even in today's date there are many areas where there are heavy natural calamities like earthquakes, cyclones, tsunami, floods, landslides or even draughts which forces people to leave their home and in turn leads to heavy loss of property and disruption of daily life, at that time the portable home is a good option.

Instead of building conventional houses, if create a portable homes it could save a lot of damage being done. These portable home are quite customizable and construction is also cheap. Depending upon the luxuries you need the price may vary but the basic cost is minimum as compared to conventional home.

The main motto behind this is to minimize the damage caused during such conditions and help people at the time of natural calamities, not only this but also if we create portable home is can be a nice solution due to modular design and at the same time it can be a safe bet as problems do not come with an announcement so it is better being prepared beforehand. It can be as attractive as you can make it and can be folded as per your convenience as per your convenience. This paper also compare existing setup and mechanisms used for portable home.

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CAR CONTROL SYSTEM FOR HANDICAPPED PERSON

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ABSTRACT

We are developing a car control system for persons who are unable to work with their lower body. We are not changing any internal mechanism of vehicle control. We are just changing the way of applying power to the vehicle control. The person who can't press the accelerator, brake pedals will be able to operate the vehicle with the help of our modification. The vehicle has auto gear system i.e. CVT (Continues Variable Transmission) engine so that the operation of clutch will be eliminated. It is possible with help of programming and servomotors. The operations will be done by the control buttons or pedals provided on the lower side of steering wheel. Pulling the pedals towards driver will be accelerate or retard the vehicle depending upon side of steering wheel i.e. right or left.

Keywords: - *control system, brake pedals, CVT (continues variable transmission), servomotors, steering wheel, etc.*

1. INTRODUCTION

The vehicle is originally operated with the coordination of hands and legs with parts of car like clutch, brake and accelerator. But it is difficult for physically handicapped person to operate the car. That's why we are designing a new control system for a person who is handicapped by legs.

1.1 Our Idea

Originally the car is driven with the help of clutch, brake and accelerator which is needed to push by legs. But a physically handicapped person by legs failed to do that. Hence we design hand operated car control system with the help of electrical actuators. We are taking idea from steering wheel of Ferrari..

1.2 DESIGN OF STEERING WHEEL

Based on our application of vehicle we designed a steering wheel which will serve our purpose. Given below are some views of the steering wheel

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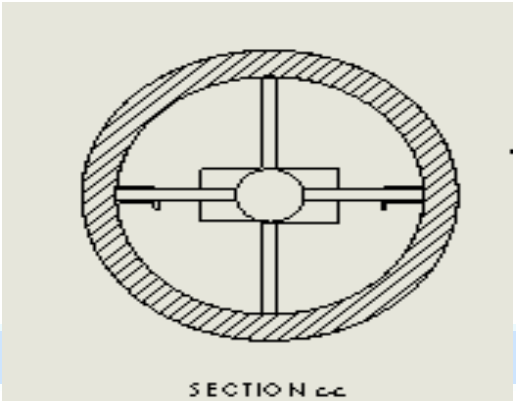

fig-1 : Sectional top view

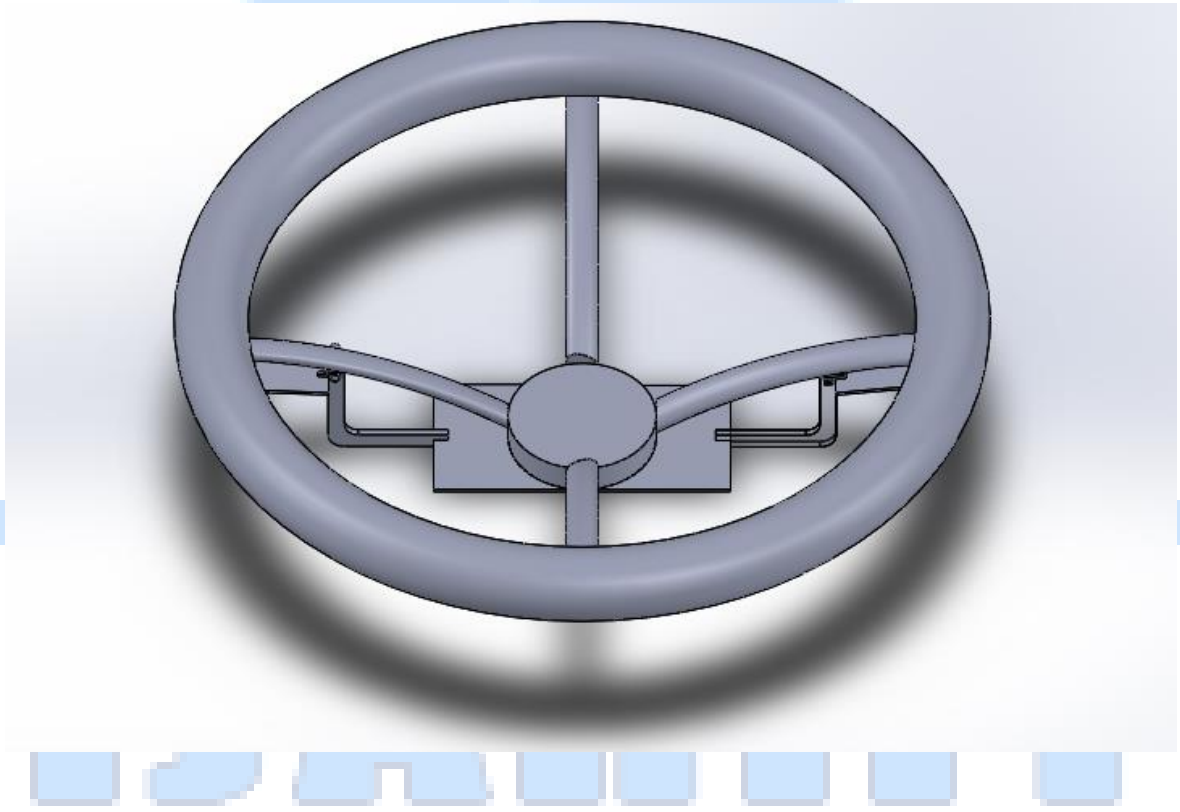

figure-2 : Three dimensional view

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Table-1: Necessary parts

PARTS	MATERIAL	QUANTITY
Steering wheel	fiber	1
Moving plates	Alloy steel	2
Basic structure	Mild steel	1
Wires	Insulated copper	6
Servomotor		2
Accelerator, brake pedal	steel	2
Arduino		1
Wheels	Alloy steel	4

2. LITERATURE REVIEW

2.1 Review

Raymond 'K. Wilson, Louisville, stated that the present invention relates to a control mechanism for an automobile, to enable physically handicapped persons to drive, and relates in particular to a hand control mechanism for operating the so-called clutch less or hydraulic clutch type automobiles. It is an object of the present invention to pro - vide a hand control mechanism for an automobile which allows one hand to concurrently or independently control the throttle and brake. Another object is the provision of a hand _ operated 'control mechanism for an automobile which has a direct mechanical action so that it can be operated when the engine is not operated. A further object is the provision of a hand operated control which does not interfere with the usual foot control of the automobile

Monroe Arnold Lerman, Sunnyside, N.Y. a separate hand control has been provided for the brake, throttle and shift of automobiles intended to be driven by persons incapable of using their legs for driving. The disadvantage of using separate hand controls resides in the fact that the driver is compelled to move his hand or hands from one control to another during the driving operation. With some arrangements, when the hand controls are situated on opposite sides of the steering wheel there is a tendency for the operator to release the steering wheel completely while operating the controls, Sometimes the operation of the separate controls partially overlap each other. These deficiencies place an undue handicap on the driver. The dominating object of this invention resides in the construction of a hand control for the brake and throttle of an automobile which is operated with but one hand lever. With this arrangement the brake and the throttle may be operated without releasing the hand lever. It is proposed that the hand lever be moved in one direction for

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operating the brake, and in another direction for operating the throttle. It is proposed that these directions be opposite to each other so that automatically the brake is released when the throttle is depressed, and vice versa, the throttle is released when the brake is depressed.

Theodore W. Sell, Fargo, N. Dak stated that object of this invention is to provide an improved control for the brake and accelerator of an auto mobile, the control being of such a nature whereby it may be operated by a single hand and requires only the movement of a handle in one direction for controlling the accelerator and the movement of the hand in the opposite direction for controlling the brake. A further object of this invention is to provide a hand control for the brake and accelerator pedals of a vehicle, the control being of such a nature whereby it is retained in an adjusted position when controlling the operation of the accelerator pedal so that it may be released when driving extended distances and will retain the vehicle at the desired speed without constant manipulation of the control by the operator of the vehicle.

Walter S. Pawl, Adelphi, The main object of this invention is to make driving of motor vehicles safer and easier by placing -all the controls on one hand lever, which automatically assumes a normal brakes-on position whenever the lever is released. Another object is to simplify driving automatic trans mission vehicles, by eliminating the -brake and power control foot pedals and the steering wheel, and mounting a simple steering lever in a vertical steering post within reach of the driver, and an operating handle with a control lever interlocked with said hand lever for steering operation, said control lever being movable relatively to said hand lever for simultaneously controlling As power brake system i-n one range of movement and the power control in another range, t-he brakes-released position of" the -power brake range being adjacent the idling position of the power control range of said movement, this movement being normally biased toward t-he brakes-on end' of the range when the operating handle is released from the operator's grip.

Anton J. Reichenberger, New York, stated an automotive control system for use by handicapped drivers who have lost the functional mobility of the lower extremities. A second wheel concentric with the steering wheel is added such that it is reachable by either the thumb of fingertips when hands are on a steering Wheel in normal fashion. Movement of this second control wheel in a direction away from the driver actuates the automotive braking system through an electro-hydraulic servo system.

3. PROBLEM STATEMENT

The persons with the problem of lower body failed to drive vehicle even if they want to do so. The main problem of the conventional system is it requires the person to operate the vehicle by use of legs mainly The major effect of the conventional control system is on those person who has desire to drive the car but can't drive because loss of functional mobility of lower extremities. Other effect is on the competitive side of vehicle companies.

4. METHODOLOGY

4.1 Existing Method

In conventional car control system, the pedals are pressed by legs of driver. So the human power is applied on the pedal and the vehicle is driven. The coordination of driver is important as well as judgment of force on pedal is also important.

4.2 General Process

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The general process of driving CVT vehicle:

- Start the car.
- Push gear shifter at auto mode
- Press accelerator pedal by legs to move the vehicle forward
- Use combination of brake and accelerator to drive the vehicle

4.3 Proposed method and alternative

There are lot of alternative methods to replace the function of human legs;

- With the help of mechanical linkages
- With hydraulic or electro-hydraulic system
- With pneumatic or electro-pneumatic system
- With the help of electrical motor and programs

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4.3.1 Selection of solution

Out of all the alternatives shown the most feasible and appropriate method is

" With the help of electrical motors and programs "

This system has below mentioned advantages over other

- It has compact size so it can use as a accessory
- It doesn't has leakage problems like pneumatic and hydraulic system
- The programming is simple as compare to electro-pneumatic and electro-hydraulic
- It consume less electricity compare to compressor and pupms used in other system
- It is less noisy
- It is cleaner than other system
- The cost of implementing such system is much less than other systems

5. CONCLUSION

Conventional car control system is best for driving the car but our system can work as a substitute for the conventional system. It is for those who wants to do something new by accepting and modifying old one. This system can also be used in the vehicles running on fuel cell. As we all know the conventional engines will be replaced by fuel cell our modification will definitely achieve success in future. It can be used as an attachment in the car so people can use it whenever they want. It is compatible with the vehicle of the future that will run on fuel cell instead of conventional engines.

6. RESULT

We have successfully implemented car control system for physically challenged people, so it can be helpful for the persons who are unable to work with their lower body.

6. ACKNOWLEDGEMENT

I would like to express my special thanks of gratitude to my teacher prof. Chinmay Pingulkar as well as our principal

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Dr. Arun kumar who gave me the golden opportunity to do this wonderful project on the topic "Car control system for handicapped person", which also helped me in doing a lot of research and I came to know about so many things I am really thankful to them. Secondly I would also like to thank my parents and friends who helped me a lot in finalizing this project within the limited time frame.

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Design of Modification of TEC

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ABSTRACT

Air cooling system is having high demand all over the world. The demand is obviously expected due to the changing working times,increased comfort expectations and global warming. Air cooling system are most often built around a vapour compression system driven by grid electricity. However , there are many ways of generating electricity today, as well as the refrigerants being used in traditional vapour compression styem. But refrigerant have a negative impact on environment leading to global warming. Thus the other alternative for building up air cooling system leading to eco friendly environment are using renewable resources for generating electricity. Solar air cooling system might lead to the reduction in the high consumption of energy. In additional many solar air cooling system are constructed to eliminated the need of CFC, HCFC or HFC refrigerants. This projects work is based on the peltire effect with which we can cool a specific area without using compressor which takes a huge consumption of electricity, suitable for local cooling applications. And this system is driven by solar energy using solar panel, battery, thermoelectric cooler, water block and heat sink. The project aims to design and build a miniature prototype of thermoelectric cooling system for a conventional cool air to provided air cooling to reduce the consumption of electricity and to reduce the pollutions.

.

Keywords: *Mechanical, Air cooling, Refrigerant.*

1. INTRODUCTION

The TEC cooler is one of the earliest methods employed by men for conditioning their houses. Only in recent years, it has been put on sound footing thermodynamically. It is a process of adiabatic saturation of air when a spray of water is made to evaporative into into it without transfer of heat from or to surroundings. The initial investment cost of such a system is low and the operation is simple and cheap. TEC cooler is achieved by direct contact of water particles and a moving air stream. If water is circulated without a source of heat and cooling, dry air will become more humid and will drop in temperature. In a complete contact process the air would become saturated at wet bulb temperature of the entering air. They know how much their utility bills rise in the summer months. Some have added TEC for use during the hot, dry summer months and switch to air conditioning during the “monsoon” season.

2. LITERATURE SURVEY

1 A review on study and analysis of modification of tec [1].

[1] We can install thermostatic expansion valve for auto cut off for the heater coil so that the temperature of the heater coil can be set at the required and desired value as per the temperature conditions.

[2] We can regulate the capacity of the blower run by measuring potentiometer so that as per the requirement the flow of air can be regulated.

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[4] The tank material can be replaced by stainless steel to save it from the environmental corrosion and erosion.

[5] The front side air diverting strip mechanism can be made out of diverting as well as manually operated by coupling the liver using belt and Pulley drive.

[6] The temperature can also be controlled by controlling and regulating the speed of the roller and drive motor.

Thermoelectric cooler :

Since the cooling load of most typical battery compartments is not high, thermoelectric coolers are a possibility. These are systems where cooling is achieved electrically using the electromagnetic thermodynamics).

Although reliable, thermoelectric coolers are inefficient and not well-suited for remote outdoor cabinets.

In many cases, since cooling loads are not very high, flow through fans can be used to remove excessive heat and moisture build-up in the battery compartments. Fans can also be used for the thermal management of the compartment using thermal inertia.

Thermoelectric cooling relies fundamentally on the Peltier effect. Electrons passing through semiconductor materials with alternating conductive properties absorb ambient heat energy in order to travel through one of the materials and expend this energy as they travel through the other material.

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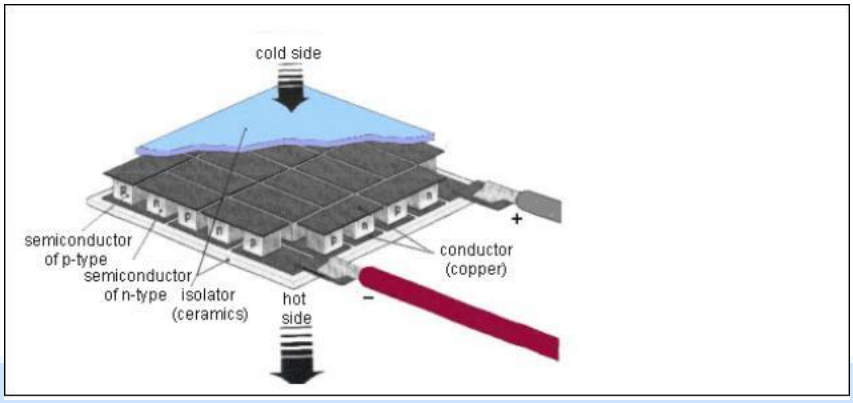

Fig.3-1 Sketch of a thermoelectric cooler (TEC) with three thermo-elements

3. METHODOLOGY

3.1 Existing Method :

Which is an assembly of n Geneva Peltier effect is the phenomenon used in the thermoelectric refrigeration, with the rate of reversible heat absorption. When current passes through the junction of the two different types of conductors it results in a temperature change the peltier effect—occurs when you take any two members of the thermoelectric-series— and connect wires made of them to form a circuit with two junctions. In the presence of a current a temperature difference between the junctions is produced. Thermoelectric Coolers (AKA Peltiers or TEC for short) are solid state heat pumps, which operate on the Peltier effect. The Peltier effect is a theory that there is a heating or cooling effect when electric current passes through two conductors. The TEC is consists of a number of p- and n- type semiconductor pairs (referred to as couples) connected electrically in series and sandwiched between two ceramic plates)

3.2 Design:

Copper has metals are used for application of heavier Pressures. Tin base, lead base and cadmium base metal are also known as white metal all The general steps to be followed in designing the machine are as followed:-

i. Preparation of a statement of the problem indicating the purpose of the machine.
ii. Selection of groups of mechanism for the desire motion.
iii. Calculation of the force and energy on each machine member.
iv. Selection of material.
v. Determining the size of component drawing and sending for manufacture.
vi. Preparation of component drawing and sending for manufacture.
vii. Manufacturing and assembling the machine.
viii. Testing of the machine and for functioning.

3.3 TEC cooler working:

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- Here we have a water reservoir which is connected to the pump
- The pump is submerged inside the water reservoir.
- The pump is then attached to the water block and TEC assembly through the water pipe.
- Wherein the hot side of TEC is attached to the fin in order to dissipate the heat which is generated in the system while the worki is carried out.
- The cold side of TEC is connected to the water block which cools the water and then it is passed through the condensing copper pipe connected to the fan.
- Due which it draws cold air inside the room thus achieving the moderate cool air.
- This all assembly runs on a 12v battery which is through a polycrystalline solar panel using a charge controller which cuts off the connection between the battery and solar panel when the battery is fully charged.

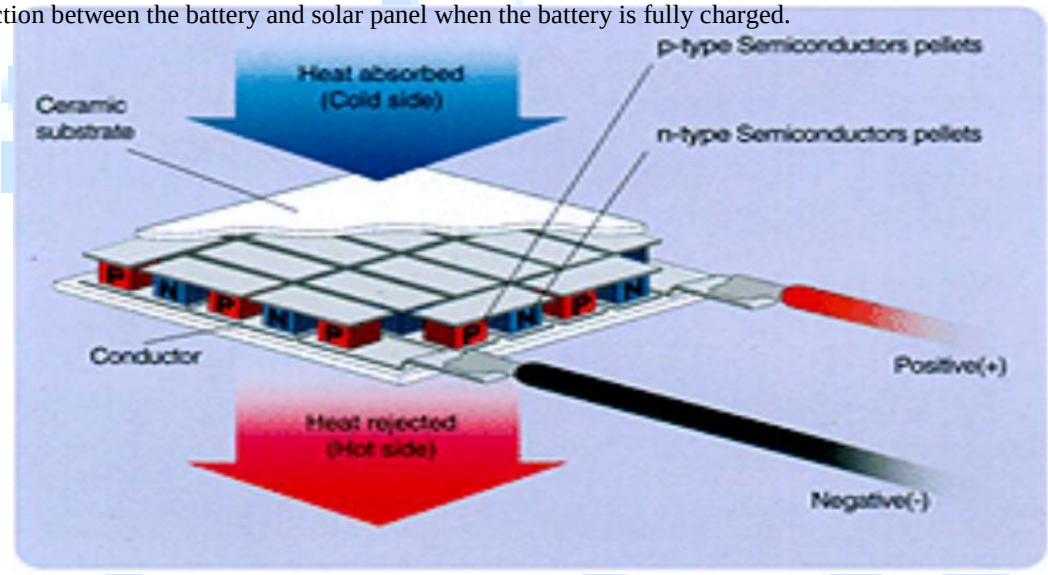

Fig 2. Thermoelectric cooler

4. EXPECTED RESULT

With the help of this air cooling system we can get the cooling effect without help of compressor. A TE module must not be operated without a sufficient heat rejection from the hot side. peltier devices are commonly used in camping and portable cooler and for cooling electric component and small instruments. The output of the project is comfort thermal conditions achieved in living room. That is room temperature of 25 degrees Celsius.

5. CONCLUSIONS :

6. ACKNOWLEDGMENT

We would like to express a deep sense of gratitude towards our guide Mr. Chinmay pingulkar Department of Mechanical Engineering for her constant encouragement and valuable suggestions. The work that we have been able to present is possible because of her timely guidance and support.

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Compressed Air Bike

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ABSTRACT

The bike is powered by compressed air, driven by a rotary valve. This project is to show that responsibility to create awareness among the people about the importance of vehicle trends and show them what lies ahead. We hereby present bike of the future-The Pneumatic Bike and proceed with sense of awakening ideas on Eco Friendly Vehicles.

Keywords— ***Mechanical, pneumatic, compressed air, innovation, rotary valve, eco-friendly***

1. INTRODUCTION

A compressed air vehicle is powered by a rotary sequence valve, using compressed air. Instead of mixing fuel with air and burning them in engine to drive the piston, it runs on air. Air is present around us and it is long lasting, so we are using it for obtaining motion. It is an eco-friendly vehicle which makes use of expansion of compressed air to control the pistons there by controlling the motion of vehicle. This project is majorly based on propulsion by compressed air (pneumatic).

In this project we are going to modify a bicycle into a pneumatic bike, so in future it is possible to use this technique in two-wheeler vehicles.

2. OBJECTIVE

The main objective of the project is to design and fabricate a bicycle fully running on compressed air which will be a non-pollutant vehicle.

Following are the objectives of the project –

1. To conserve fuel by using renewable source of energy
2. To design and fabricate a non-pollutant vehicle
3. To design a low-cost vehicle

3. LITERATURE REVEIW

Gaurav Kumar tandan1, Gopal Sahu, [2015]**,** The air engine is currently the most generally used device to convert potential energy of compressed air into mechanical energy. Nevertheless, the compressed air vehicle will contribute to reducing air pollution and tend to zero pollution level and promoting great environment. No combustion process is occurring there. If further improvement is carried out with stress analysis, thermodynamic analysis, minimize compressed energy loss and other losses then efficiency of CAE may be further increases.

DICK STRAWBRIDGE, JEM STANSFIELD [2015]**,** If this energy that is wasted in traditional internal combustion engines (ICE) could be saved, the fuel economy would improve. Today there are several solutions to meet the demand for better fuel economy and one of them is the pneumatic hybrids. In this project modification of an old moped was done and successfully implied in a sandwich delivery shop. IC engine was removed and an air tank was fitted at the bottom of the moped. Air motor was used to drive the moped. This construction has a flaw that I could not be used for heavy transportation but the project implementation was successful

4. PROBLEM DEFINATION

1. PROBLEM STATEMENT

Conventional vehicle which runs on the petroleum/diesel fuel by means of burning them end up producing many unwanted elements like pollutants for e.g. CO_2. Increase in the pollution is affecting into global warming. Avoiding use of such energy sources is what we can do to reduce pollution. Also, there is need of alternate fuel in order to conserve the conventional energy source.

2. Problems and its Effects

Problem faced in a general pneumatic vehicle is that it requires tanks to store compressed air and as we have seen in the literature review many of the pneumatic bike are made by modification of an IC engine chamber or use of an air motor which requires highly compressed air in the range of 25-30bar and these all vehicles was hybrid (need an electric motor

to overcome the inertia). Hence It is necessary to find a solution which can optimize these pneumatic bikes and make them totally depend on pneumatic energy

1. Hike in petroleum fuels due to heavy use and depletion of sources
2. Emission of pollutants from the traditional fuel vehicles
3. Recent driving units for bike like IC engine and Air motor requires large amount of pressure to move the piston
4. Air loses its pressure after some working cycle

5. METHODOLOGY

1. Existing Method

As studied in all the case papers for the project, many designers choose the method of modification of existing IC engine of the bike in Air engine in order to make it work. Another approach for the same cause is to use an air motor with multiple pistons i.e. up to 3 pistons in order to generate greater torque. In both the cases working pressure was up to 20-30 bar.

2. Adapted Method

Adapted method for this project is quite different from other methods. For ease of manufacturing and costing purpose we are going to modify a bicycle into a pneumatic bike. In this project the rotary motion is generated with help of rotary valve. Rotary valve is connected with a sprocket through a shaft, and this arrangement is connected with the main driving unit of the bicycle. Together all the components make this assembly as an air motor or an air engine which drives the bike

Components of the air engine:

1. Rotary Valve
2. Sprocket and flywheel
3. Pneumatic Cylinders

Components

A. Rotary Valve

It's a DCV with a shaft that guides the timely opening of the valve ports. This valve is primarily connected with the main supply tank of compressed air. Shaft is designed such that it will provide opening to only one port at inlet and one port at outlet. Outlets are connected to pneumatic cylinders by means of hoses.

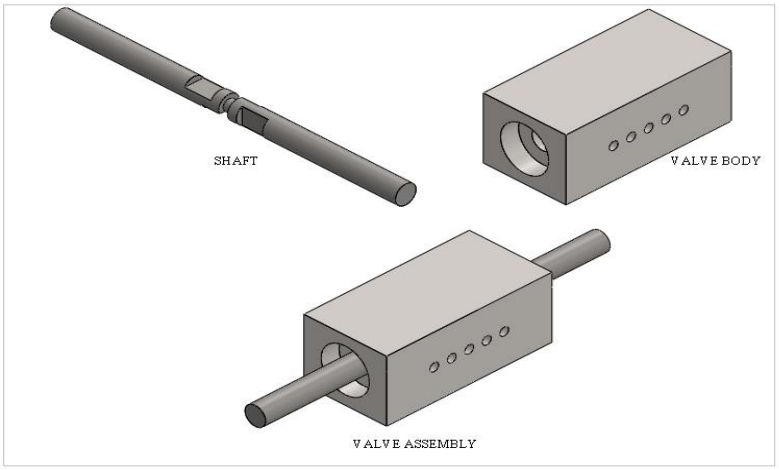

Fig.1 Valve Assembly

B. Sprocket and Flywheel

Sprocket is fastened to the one end of the valve shaft and sprocket is attached to the flywheels by means of connecting pins or welded joints. Due to the mutual motion of shaft and pneumatic cylinders flywheel rotates and it drives the main chain wheel of bicycle. Flywheel has a pivot point on it where it can be fastened with the end rod of pneumatic cylinder's stroke. There are two flywheels and only one sprocket is used.

C. Pneumatic Cylinders

Two Pneumatic cylinders are used for the mechanism each one of them is pivoted with flywheel. Both are pivoted with 180° angular gap between them such that when one flywheel rotates 180° then other one rotates remaining 180°. Its helps the mechanism to run smooth without jerks.

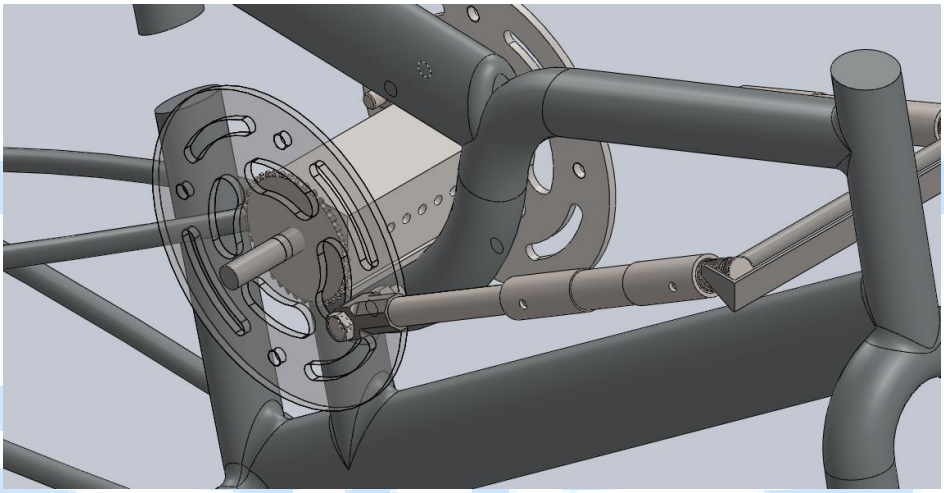

Fig.2 Sprocket and flywheel pivoted with pneumatic cylinders

Working

When compressed air enters the cylinders through rotary valve, piston expands and as it expands the sprocket is rotated from its pivot point on flywheel, because of it sprocket rotates and drives the main chainwheel. In second stroke when air enters the other cylinder (which is connected to opposite flywheel pivot end) its pistons expands and simultaneously other cylinders piston contracts inside cylinder. This cycle helps in providing necessary remaining rotational moment of the shaft. This cycle is repeated again and again which causes continuous rotation of valve shaft. Due to changing position of shaft it acts as a direction control valve which guides the air to flow one by one in both the cylinders. To attain required speed which is transmitted by means of a chain drive it is necessary to have a calculated amount of pressure supply.

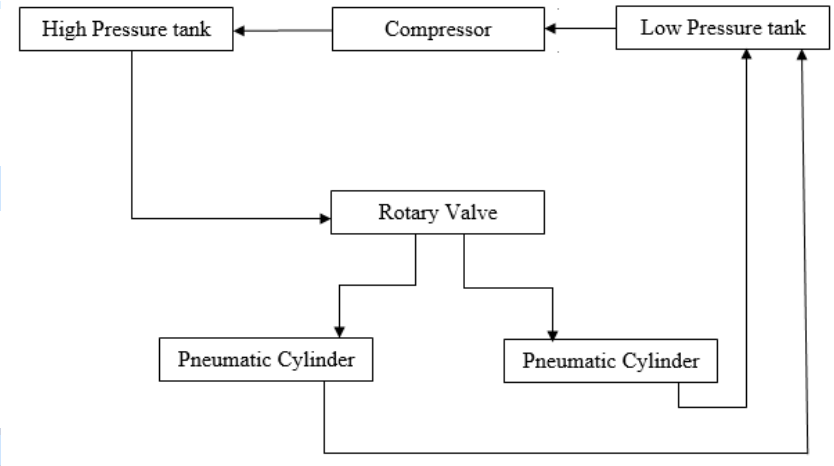

Fig3. Flowchart of air flow through system

6. CONCLUSION

Compressed air is good alternative for the conventional fuels. Pneumatic bike is eco-friendly and the design is simple and cheap compared to other which involves modification of IC engines. Advantage of this design is that the construction is light weighted. The cost of production is low enough to enable the creation of completely sustainable air powered machines at a lower cost than gas or electric. Working pressure is 125 psi (up to 8 bar) which is much less than the existing methods which is safer and also efficient than conventional designs

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LOW COST COMPACT 3D PRINTER

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ABSTRACT

3D printers in recent years have become extremely popular. Even though 3D printing technology existed since the late 1980's, it is now considered one of the most significant technological breakthroughs of the twenty-first century. The only and most important drawback of this is the very high initial cost due to which not everyone can easily adopt it. So, we builded a low-cost 3D printer which will be affordable by small scale industries. 3D printing is called as desktop fabrication. It is a process of prototyping where by a structure is synthesized from a 3D model. The 3D model is stored in as a STL format and after that forwarded to a 3D printer. It can use a wide range of materials such as ABS, PLA and composite as well.

Keywords— ***3D printing, Rapid Prototyping, ABS, PLA, Low-cost.***

1. INTRODUCTION

In 1981, Hideo Kodama of the Nagoya Municipal Industrial Research Institute (Nagoya, Japan) has studied and published for the first time the manufacturing of a printed solid model, the starting point of the "additive manufacturing", "rapid prototyping" or "3D printing technology". In the next decades, this technology has been substantially improved and has evolved into a useful tool for researchers, manufacturers, designers, engineers and scientists.

Since 1984, when the first 3D printer was designed and realized by Charles W. Hull from 3D Systems Corp. 3D printing is diversifying and accelerating our life, letting various qualities of products to be synthesized easier and faster. Along 3D printing, companies can extract and innovate new ideologies and various design replications with no time or tool expense. 3D printing possibly challenges mass production processes in future. Nowadays, rapid prototyping has a wide range of applications in various fields of human activity: research, engineering, medical industry, military, construction, architecture, fashion, education, computer industry and many others.

2. OBJECTIVE

1. To study the working procedure of each component of a 3D printer and the evolution of 3D printer.
2. To design and fabricate a low-cost 3D printer.
3. To make it portable and easy to use.
4. To develop Eco-Friendly and low maintenance product.

3. LITERATURE REVIEW

Ramya, Sai leela Vanapalli [2016], it is possible to 3D print in a wide range of materials that include thermoplastics, thermoplastic composites, pure metals, metal alloys and ceramics. Firstly, we have printers that extrude a molten or otherwise semi-liquid material. Secondly, there are printers that solidify a photo curable resin. Thirdly, there are printers that bind or fuse the granules of a powder. And finally, there are printers that stick together cut sheets of paper, plastic or metal. New 3D printing processes have reduced the time it takes for designers and engineers to conceptualize, create, and test prototypes.

Sachidananda Hota [2015], it is a process of prototyping where by a structure is synthesized from a 3D model. It can use a wide range of materials such as ABS, PLA, and composites as well. 3D printing is a rapidly developing and cost optimized form of rapid prototyping. 3D printing significantly challenges mass production processes in the future. This type of printing is predicted to influence industries, like automotive, medical, education, equipment, consumer products industries and various businesses.

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4. PROBLEM DEFINATION

PROBLEM STATEMENT AND ITS EFFECTS

During the use of conventional method, the cost per product was high also the time required for such process was very high. To tackle such issue the 3D printer was invented. But the current 3D printing technology is time consuming along with high manufacturing cost. Even printers available in market are also has high cost.
Due to such high cost 3D printers cost of product increases which ultimately increases manufacturing cost. Thus, it could not be affordable for low cost manufacturing or small-scale manufacturers.

5. METHODOLOGY

1. EXISTING METHOD

3D Printing, also known as Additive Manufacturing in which layers of material are formed under computer control to create an object. For the 3D printers available in the market different processes are used such as Stereo lithography, Selective Laser Sintering, Laminated Object Manufacturing, Fused Deposition Modeling etc. All these processes use different methods to print the product even materials used are different.

2. PROPOSED METHOD

Current 3D printers available are very high in cost and require more time to complete product. Also, material used by SLA, SLS printers is high in cost and are difficult to store. To tackle this, we are supposed to use Fused Deposition Modeling method which uses thermoplastic filament in form of wire which is easy for storage. Also, we are trying to lower the cost of printer, so product cost will reduce, and it can be used for small scale production too. Fused Deposition Modeling is an additive manufacturing technique, which uses layer manufacturing technique for build part, is commonly used for modeling, prototyping & production application. It involves three basic steps Pre-processing, Production & Postprocessing.

Construction

Our printer has a great number of various parts, the design can be easily separated into 4 separate sections.

1. Frame
2. XY Carriage
3. Z Carriage
4. Other essential components

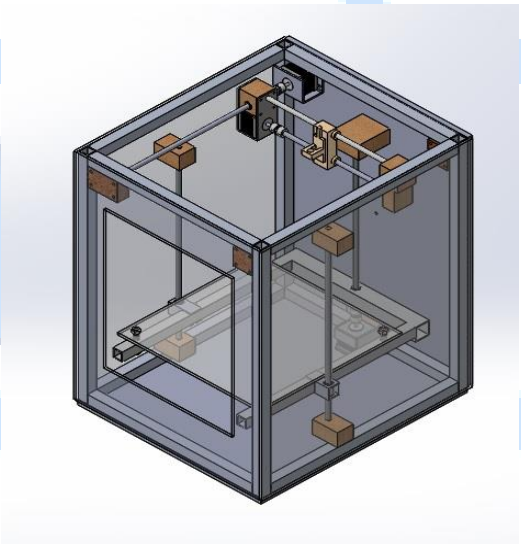

Fig. 1 CAD Model of Printer

1. *Frame:* - The frame being the only element to hold all components into its right place which will be constructed of wood or plastic.
2. *XY Carriage*: - The XY Carriage is what allows the printer to locate in both the X and Y directions. The XY carriage are constructed from steel rods which carries extruder unit which is movable in X-Y direction as per specified in the

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program. The Hot End being one of the most important component of 3D Printer is used during extrusion of material while printing. It works just like a hot glue gun, heating up the plastic and positioning it with the nozzle.

3. *Z carriage:* - The Z carriage is responsible for moving the bed in the Z axis (up and down). It also holds the heat bead which is a device that keeps the printing surface warm, preventing the part from warping. The bed will move with respect to the lead screw it up & down direction as specified in program. For leveling of the bed, we will provide steel rods at each corner due to which during our operation there won't be any moment of the bed.
4. *Other Essential components*: - It consist of following units
    a) Arduino 2560
    b) DRV8825 Stepper Motor Driver
    c) NEMA 17 Stepper Motor

7. PROCESS

With help of FDM you can print not only functional prototypes, but also concept models and final end-use products. What is good about this technology that all parts printed with FDM can go in high-performance and engineering-grade thermoplastic, which is very beneficial for mechanic engineers and manufactures. FDM is the only 3D printing technology that builds parts with production-grade thermoplastics, so things printed are of excellent mechanical, thermal and chemical qualities.

3D printing machines that use FDM Technology build objects layer by layer from the very bottom up by heating and extruding thermoplastic filament. The whole process is a bit like stereolithography. Firstly, special software "cuts" CAD model into layers and calculates the way printer's extruder would build each layer. Along to thermoplastic a printer can extrude support materials as well. A plastic filament or metal wire is unwound from a coil and supplies material to an extrusion nozzle which turns the flow on and off. Then the printer heats thermoplastic till its melting point and extrudes it throughout nozzle onto base, that can also be called a build platform or a table, along the calculated path. A computer of the 3d printer translates the dimensions of an object into X, Y and Z coordinates and controls that the nozzle and the base follow calculated path during printing. To support upper layer the printer may place underneath special material that can be dissolved after printing is completed

.

8. CONCLUSION

Hence, we fabricated the low-cost 3D printer by using materials which are easily available and cost effective & succeeded in attaining this goal. We have been successful in reducing the cost to a considerable extent i.e. about 10-15 %. We used Fused Deposition Modeling (FDM) technology in 3D printing. The parts made in 3D design software are successfully imported in the printing software and the product obtained has the same dimension given during the design stage of the product i.e. accuracy close to 100%. Due to this, the printer can now also be effectively used for even smallscale industry. We can now successfully fabricate the 3D printer according to its virtual design proposed at reduced cost.

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Refrigeration System in Fishing Trawlers

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ABSTRACT

The use of refrigeration on board smaller fishing vessels is increasing. The reason for this is the decrease in near-shore fish resources that is forcing the anglers to make longer fishing trips and to conserve the catch on board during the trip. One more reason is the increasing demand for good quality fresh fish and the growth of the markets for these products with increased quality control.

Now a day in our country, most of fishing industry uses ice storage system. Storage of ice requires more space as well as in our country; temperature is high so ice melts quickly. Therefore, ice storage system is not much convenient. On board refrigeration will reduce this entire problem and gives much better result than ice storage system

This project describes the requirements for the use of refrigeration on board fishing vessels, from small-insulated containers in dugout canoes, to refrigerated tanks on bigger vessels.

Keywords – *Refrigeration, Fishing trawlers, RSW system, Fishing techniques in India, VCC, Fish storage system*

1. INTRODUCTION

All categories of fish, when properly preserved, will stay fresh for longer extent than those, which are not preserved. The use of refrigeration techniques such as cold storage will adequately extend the amount of time available for fishing trips and makes it possible to increase the catch with optimum benefits for the vessel and crew. Products brought to market in a better-stored condition will generally acquire higher prices, both at wholesale and retail markets, and thus gives better returns to the fishing industry.With increasing demand for good-quality fresh fish, there is a growth in the market for these products and increasing awareness of angler, the use of cold storage on board is growing. Increase in the use of cold storage creates a need to ensure that it used efficiently. Ice production consumes a lot of energy, so unnecessary waste of energy can be averted. The optimum way to reduce this waste of energy for fishing vessels is to use proper storage, such as adequately insulated iceboxes, containers and fish holds using refrigeration to preserve the fish.

2. EXISTING METHOD

In our country, many fishing industries use ice storage system. For such storage, more space is required. On small research in a local area of anglers, we found that most of fishing trawlers use approx. 4 tons ice for 10 – 12 days fishing trip. The storage of 4 tons ice requires a separate store box, which limits the storage capacity of fish. If the fish cached exceeds the capacity then there are chances of wastage of remaining fish. Considering the climate conditions of seashore, the ice may melt early and will not remain for longer time. Hence, there are time limitations for the duration of fishing trip.

Another research on the anglers says that the most of the people are illiterate who works in this particular field of fishing. The methods used for storage depends on their personal experience and not the research. Therefore, the different methods where found in the research. Some of which were good where as others where poor. The fig shown below indicates the poor, good as well as best practice of storage system using ice, which is currently used.

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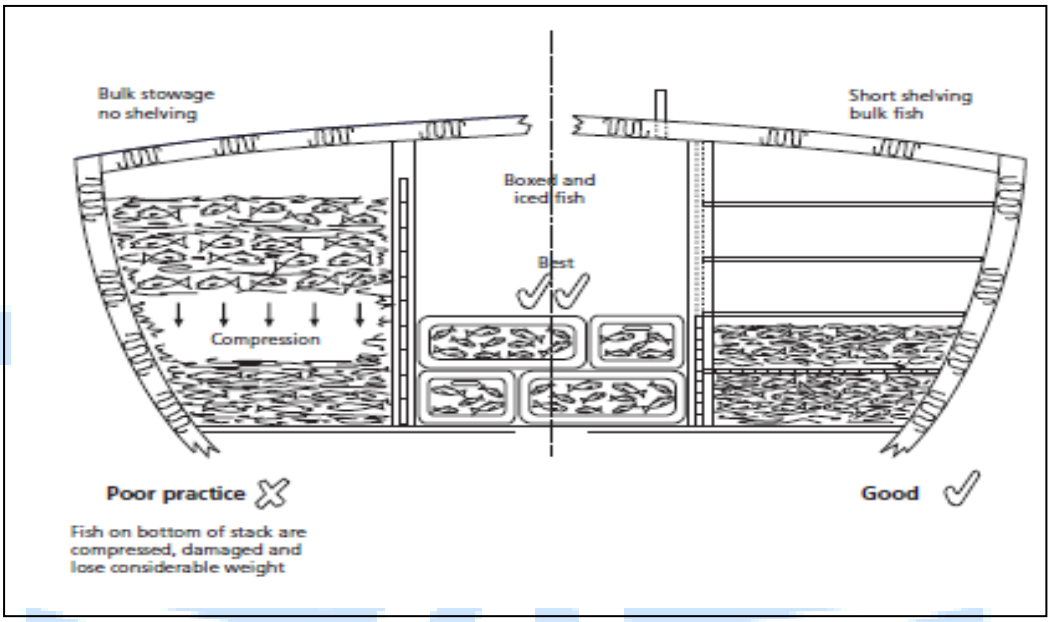

Figure -1 Different Methods for Storage of Fish

By considering the problems faced by anglers, we decided to build an on-board refrigeration system for fishing trawlers. In this method, we used vapour compression cycle. The vapor-compression uses a circulating liquid refrigerant as the medium, which absorbs and removes heat from the space that is to be cool and subsequently rejects that heat elsewhere.

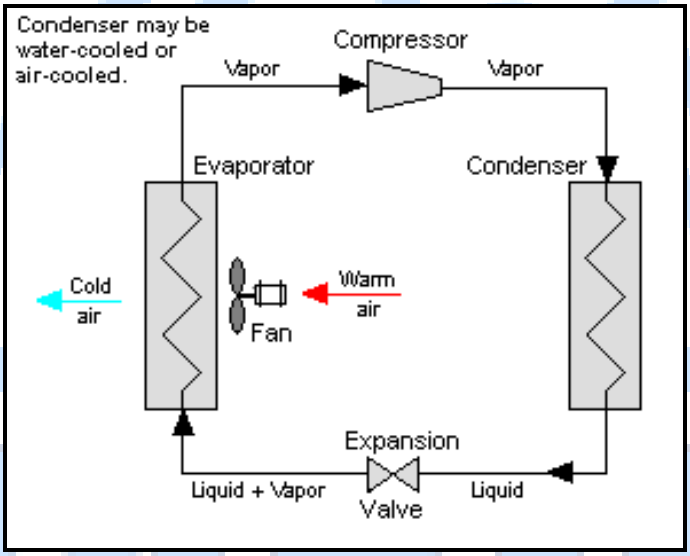

Figure -2 Single Stage Vapour-Compression System

Figure 1.2 depicts a typical, single-stage vapor-compression system. All such systems have four components: a compressor, a condenser, a thermal expansion valve (also called a throttle valve or metering device), and an evaporator. Circulating refrigerant enters the compressor in the thermodynamic state known as a saturated vapor and is compresses to a higher pressure, resulting in a higher temperature as well. Then the hot, compressed vapor is in thermodynamic state known as a superheated vapor and it is at a temperature and pressure at where it can condense with either cooling water or cooling air flowing across the coil or tubes. This is where the circulating refrigerant rejects heat from the system and either the water or the air carries the rejected heat away (whichever may be the case).The condensed liquid refrigerant, in the thermodynamic state known as a saturated liquid, will then route through an expansion valve where it undergoes an abrupt reduction in pressure. That pressure reduction results in the adiabatic flash evaporation of a part of the liquid refrigerant. The auto-refrigeration effect of the adiabatic flash evaporation lowers the temperature of the liquid and vapor refrigerant mixture to where it is colder than the temperature of the enclosed space to be refrigerated.

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The cold mixture then routed through the coil or tubes in the evaporator. A fan circulates the warm air in the enclosed space across the coil or tubes carrying the cold refrigerant liquid and vapor mixture. That warm air evaporates the liquid part of the cold refrigerant mixture. At the same time, the circulating air will have cooled and thus lowers the temperature of the enclosed space to the desired temperature. The evaporator is where the circulating refrigerant absorbs and removes heat, which will subsequently have rejected in the condenser and transferred elsewhere by the water or air used in the condenser.

To complete the refrigeration cycle, the refrigerant vapor from the evaporator is again a saturated vapor and will routed back into the compressor.

In the above complete refrigeration cycle we are using brine solution as a secondary refrigerant. This is because while fishing the sea water is easily available and hence it is used as a secondary solution.

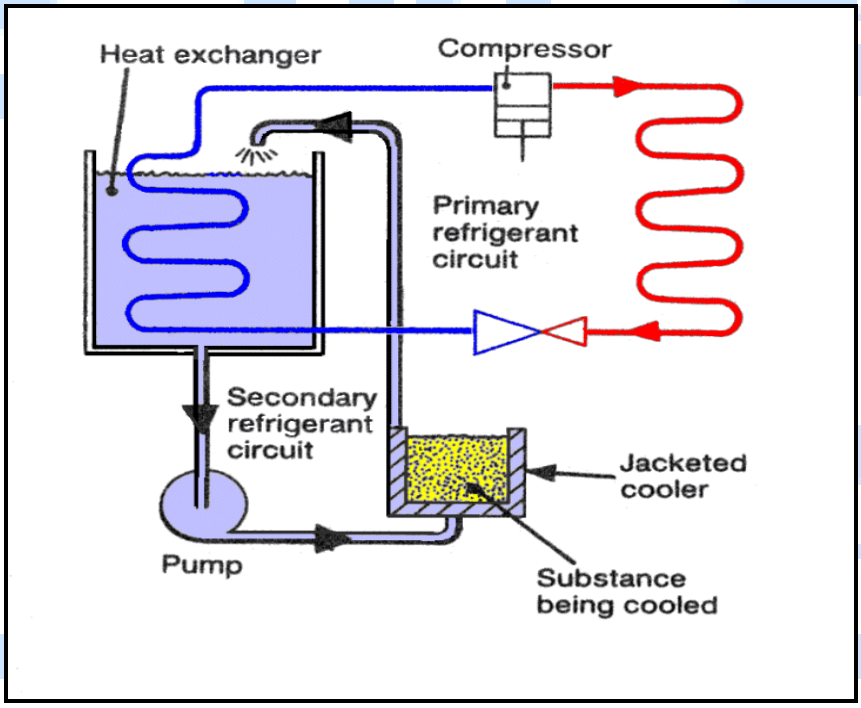

Figure -3 Vapour Compression Cycle using Brine as a Secondary Refrigerant

3. RESULT AND DISCUSSION

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As we said earlier in our country, most of fishing ships use ice storage for chilling the caught fishes. They take 3-4 ton of ice for a single trip of 10-12 days so; the cost of ice for one trip is approx. ₹ 5500. In our country, fishing season is about 7-8 months so; total cost of ice goes up to 88,000 approx.

On board refrigeration i.e., freezing is one-time investment. Maintenance of refrigeration system on fishing trawlers is not that much costly comparatively to the ice storage and it requires less space so, there will be more space to store the fish.

The initial cost of on board refrigeration for fishing trawlers is high but it is one-time investment. After installation for several years, it becomes beneficial for the fishing industries. As it works on battery power, so we can install on small ship so that it will be beneficial for small scale fishing ships.

4. CONCLUSIONS

After all, above research we conclude that on board refrigeration using vapour compression cycle is beneficial method for freezing the caught fish than chilling them by ice storage system. This vapour compression cycle is easy to install and working of the system will be easier. All though instalment cost of this project will increase but running cost will be negligible, hence this project will help to the anglers in their business and also quality of fish in the market will improved.

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Mathematical Modelling and System Analysis of Quarter Car Passive Suspension Model Using MATLAB

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ABSTRACT

The purpose of a vehicle suspension system is to minimize vibrations transmitted to body from road while maintaining stability. In this we simulated and analyzed the handling and degree of comfort of a vehicle with passive suspension system for quarter car model which have two degree of freedom. As solving equation mathematical is complex and difficult process we opted for MATLAB software to simulate and analyze system. First we find governing differential equation of system. We find out performance characteristic of system by feeding and running equation in MATLAB using transfer function to Achieve Results by iterating parameters.

Keywords: - *Mathematical Modelling, Quarter Car model, Transfer Function, Laplace Transformation.*

1. INTRODUCTION

There are number of different types of vehicle suspension system which differs depending on the manufacturer. Whichever type of solution or system is adopted to design a suspension system has the primary role to provide comfortable and stable ride. So function of suspension which connects wheel axles to chassis is to transmit minimum vibration and shock occurring due to oscillation of wheel. Which will give passengers comfortable ride, stability and better handling vehicle. Also this will aid in longer life of vehicle as minimum vibration and shock are going to transmitted to the vehicle chassis. This causes, the necessity to design suspension system of a better quality. A well design system is analyzed to ensure that it provides good behavior of vehicle and a specific degree of comfort depending on road uneven surface. When vehicle is run on uneven surface, oscillation transfer to body should be of minimum peak overshoot and should get stable in minimum time. The design of a vehicle suspension system requires a lot of calculations and analysis based upon its purpose or requirement.

So here we are going to design parameters of suspension system to fulfill its purpose and analyzed it with help of MATLAB to verify results. Suspension systems are classified in the well-known terms of passive, semi-active, active and various in between systems. Passive system are the most common. So far, several models have been developed, such as quarter car, half car or full car suspension.

2. MATHEMATICAL MODELLING OF A QUARTER CAR PASSIVE SUSPENSION

For analysis of the vehicle, Quarter-Car modeling was selected due to their simplicity and it also provides qualitative information at the initial design stages of vehicle dynamics. Some assumptions were made before writing the mathematical equations. Comfortable and stable ride. The assumptions are as follows;

1) There are only 2 DOF.
2) Suspension consist of suspension spring, damper, un-sprung mass.
3) Tire stiffness and Tire Damping coefficient are under consideration.
4) We will consider only mass movements on the vertical axis ignoring the rotational movement of the vehicle.

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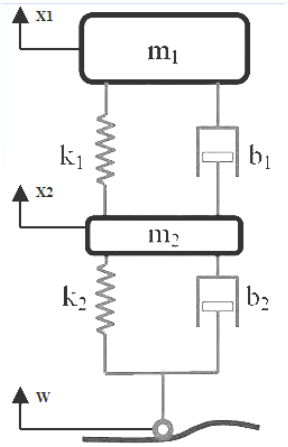

Chart -1: Free Body Diagram

Parameters used for the Mathematical Equation are as follows:

m1 = Sprung Mass

m2 = Un-sprung Mass

k1 = Suspension spring stiffness

k2 = Tire stiffness

b1 = Damping coefficient of absorber

c2 = Damping coefficient of tire

w = Road input (height of speed bump)

X1 = Sprung mass vertical movement

X2 = Un-sprung mass vertical movement

From the free body Diagram, and using Newton's Second law of motion

$$m_1\ddot{x}_2 = -k_1(x_1 - x_2) - b_1(\dot{x}_1 - \dot{x}_2) \quad \text{.....1}$$

The equation of motion for unsprung mass will be:

$$m_2\ddot{x}_2 = -k_2(x_2 - w) - b_2(\dot{x}_2 - \dot{w}) + k_1(x_1 - x_2) + b_1(\dot{x}_1 - \dot{x}_2) \quad \text{.....2}$$

We are solving the system equation by using the "transfer function" in MATLAB.

3. TRANSFER FUNCTION EQUATION OF THE QUARTER CAR MODEL

The governing differential equations above can be expressed in the form of transfer functions by taking the Laplace Transform. The specific derivation from the above equations to the transfer function H1(s) is shown below where each transfer function has an output of X1 and input of W, respectively.

Taking Laplace on both side of Equation 1 & 2, we get equation 3 & 4 respectively

$$m_1x_1s^2 + b_1(x_1 - x_2)s + k_1(x_1 - x_2) = 0 \quad \text{.....3}$$

$$m_2x_2s^2 + b_1(x_1 - x_2)s + k_1(x_2 - x_1) + b_2(x_2 - w)s + k_2(x_2 - w) = 0 \quad \text{.....4}$$

From equation 3, we

$$x_2(s) = x_1(s)\frac{m_1s^2 + b_1s + k_1}{b_1s + k_1}$$

Add equation 3 & 4

$$m_1x_1s^2 + b_1(x_1 - x_2)s + k_1(x_1 - x_2) + m_2x_2s^2 + b_1(x_1 - x_2)s + k_1(x_2 - x_1) + b_2(x_2 - w)s + k_2(x_2 - w) = 0$$

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$$x_2 = \frac{b_2 ws + k_2 w - m_1 x_1 s^2}{m_2 s^2 + b_2 s + k_2}$$

Put x2(s) in above Equation, we get

$$\frac{b_2 ws + k_2 w - m_1 x_1 s^2}{m_2 s^2 + b_2 s + k_2} = x_1(s) \frac{m_1 s^2 + b_1 s + k_1}{b_1 s + k_1}$$

Put rearranging above Equation, we get following transfer function:-

$$H_1 s = \frac{x_1(s)}{w(s)} = \frac{(b_2 s + k_2)(b_1 s + k_1)}{[(m_1 s^2 + b_1 s + k_1)(m_2 s^2 + b_2 s + k_2) + m_1 s^2 (b_1 s + k_1)]}$$

4. ITERATION TOWARDS THE STABILITY OF THE SYSTEM

For normal vehicle 10sec time to get vehicle stable is fine. So in this case for car weighting 2 ton which will be utility vehicle should provide good comfort to achieve that we will try to get stability time under 6 seconds and an overshoot less than 10%. For example, when the vehicle runs onto a 10-cm step, the vehicle body will oscillate within a range of +/- 10 mm and will stop oscillating within 6 seconds. As the suspension system used for the analysis in this paper is passive suspension which does not contain any feedback system to control the system. Therefore, the iteration will depend on the parameters which will be varied accordingly. The parameters spring stiffness, spring damping coefficient which will be iterated to gain the stability and to satisfy the condition as mentioned above.

The transfer function equation we got above will be used in MATLAB for iteration. In MATLAB, All the parameters will be defined and an output will be in a graphical form giving overshoot peak value and time for stability. Iteration will be done until we get a stable system satisfying the condition of stability in 6 seconds and an overshoot less than 10%.

Table-1: Fixed Parameters: Input

Quarter sprung mass of the vehicle (m_1)	500kg
Quarter unsprung mass of the vehicle (m_2)	80kg
Tire Damping Coefficient (b_2)	6000 N.s/m
Tire Stiffness (k_1)	193110 N/m
Road Input (w)	10cm

The varying parameters are spring stiffness, springer damping coefficient. So we have to vary this parameters to achieve desired compromise between stability and comfort while carrying specific load. So next we are doing iteration to optimize our design to achieve our goals that is to get body stable within 6sec and not more than 10% peak overshoot.

4.1 1st iteration:

Table-2: Fixed Parameters: Input

Spring stiffness (k_1)	20000 N/m
Spring Damping coefficient (b_1)	200 N.s/m

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Output:

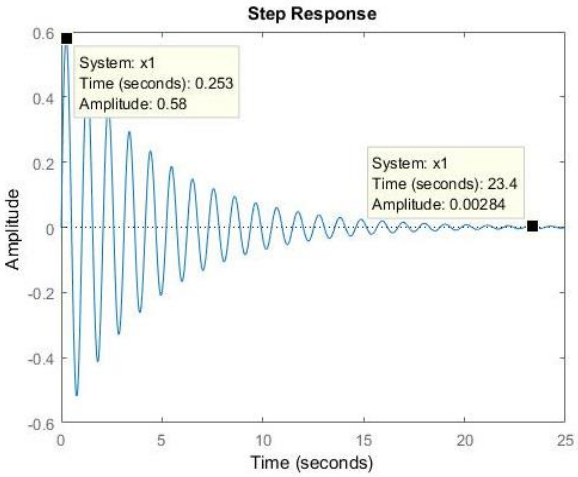

Chart -2: Free Body Diagram

4.2 2nd iteration:

Table-3: Fixed Parameters: Input

Spring stiffness (k_1)	30000 N/m
Spring Damping coefficient (b_1)	400 N.s/m

Output:

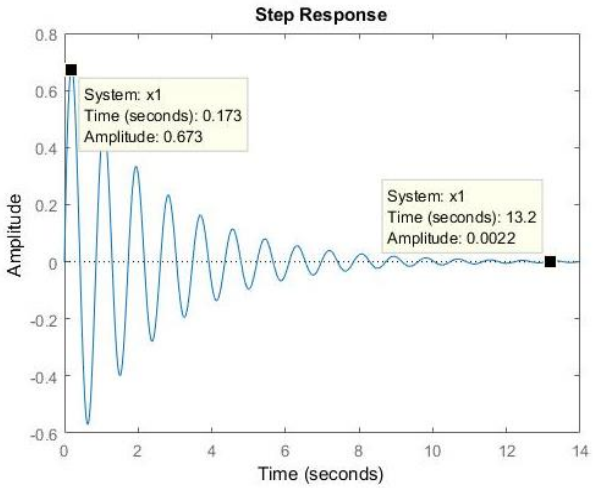

Chart -3: Free Body Diagram

4.3 3rd iteration:

Table-4: Fixed Parameters: Input

Spring stiffness (k_1)	50000 N/m
Spring Damping coefficient (b_1)	600 N.s/m

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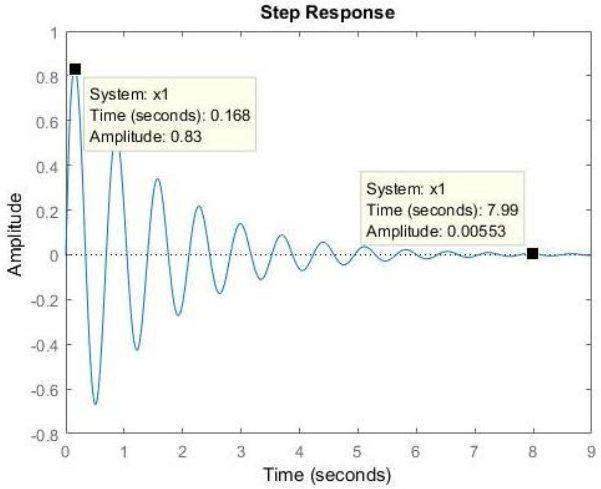

Chart -4: Free Body Diagram

4.4 4th iteration:

Table-5: Fixed Parameters: Input

Spring stiffness (k_1)	80000 N/m
Spring Damping coefficient (b_1)	800 N.s/m

Output:

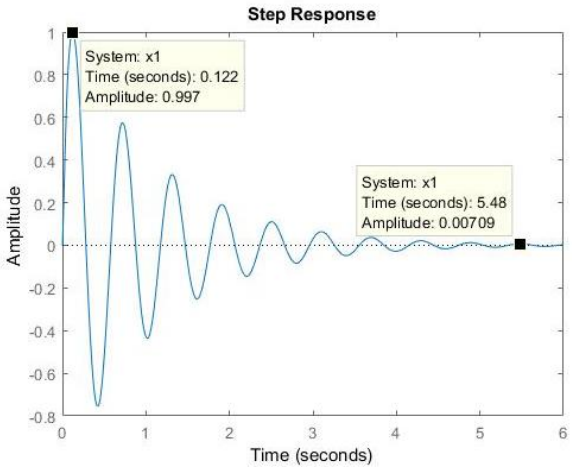

Chart -5: Free Body Diagram

5. RESULT

Stability of the vehicle is achieved. The suspension system is stable in 5.48 seconds and a peak overshoot less than 10% while carrying quarter car weight of 500kg.

6. CONCLUSION

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In this paper we simulated and analyzed a passive suspension system using MATLAB. Results were obtained using the transfer function with the parameters of the suspension system. We used a step type signal to simulate a bump. The parameters of a passive suspension system are generally fixed, being chosen to achieve a certain level of compromise between stability, load carrying capacity and degree of comfort. So by simulating and analyzing we get parameters of suspension to achieve certain degree of comfort and stability while considering specific load on it. Here in this case we achieved stability and comfort with getting body stable within 6sec and 10% of peak overshoot while carrying load of quarter car which is 500kg.

7. ACKNOWLEDGEMENT

This paper would not be possible without guidance of Prof. Niyati Raut, HOD of Mechanical Department. We would also express our gratitude to our Prof. Pratik Raut to guide us in this project. We are grateful to all of those with whom we have had pleasure to work during this project. We are thankful to our college VIVA INSTITUTE OF TECHNOLOGY who provided expertise that greatly assisted in this project.

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Conscious Wheel

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ABSTRACT

According to an international survey made in 2016, 1.2 million people lost their lives due to road accidents of which, 1 in 5 accidents were due to the factor that the driver was unconscious (drowsy). There have been efforts made over the years to curve the number of road accidents and fatality caused. Modern technology offers hope to reduce road accidents. Even we have come up with an idea which could serve this purpose. The objective of our project is to modify the steering wheel which would alert the person driving about their unconscious (drowsiness/sleep). It would involve a heartrate measuring sensor, which would constantly monitor the heartbeat rate and if the driver gets unconscious/ sleep while driving, it will give him a signal(alarm). This project would help to reduce the number of accidents which are caused due to this problem.

Keywords:-*Drowsy driving, heartrate sensor, steering wheel, unconsciousness monitoring, alarm.*

1. INTRODUCTION

According to the National Sleep Foundation's 2005, sleep in America poll, 60% of adult drivers – about 168 million people – say they have driven a vehicle while feeling drowsy in the past year, and more than one-third, (37% or 103 million people), have actually fallen asleep at the wheel! In fact, of those who have nodded off, 13% say they have done so at-least once a month. Four percent – approximately eleven million drivers – admit they have had an accident or near accident because they dozed off or were too tired to drive. The National Highway Traffic Safety Administration conservatively estimates that 100,000police-reported crashes are the direct result of driver fatigue each year. This results in an estimated 1,550 deaths, 71,000 injuries, and $12.5 billion in monetary losses. These figures maybe the tip of the iceberg, since currently it is difficult to attribute crashes to sleepiness. Accidents related to sleep deprivation are most likely to happen in the early to mid-afternoon, and in the very early morning hours.

State news practices are unit inconsistent there's very little or no police coaching in characteristics somnolence as a crash issue. Each state presently addresses fatigue and/or drowsiness in a way in their crash report forms. However, the codes area unit inconsistent and 2 states(Missouri and Wisconsin) don't have specific codes for fatigue and/or fell asleep.

There area unit difficulties in determinative the extent of sleep connected accidents as a result of there's no straight forward, reliable approach for associate in nursing work la officer to see whether or not fatigue was an element in associate in nursing accident, and if it had been, what level of fatigue the motive force was suffering. This leads to varied estimates of the extent of sleep connected accidents, and specially, proof supported accident reports typically produces lower calculable levels than analysis supported in depth studies.

Drowsy driving, conjointly said as 'Driver Fatigue', happens once somebody is simply too tired to control a motorized vehicle and in turn, puts themselves, their passengers and alternative motorists at risk a number of the foremost common causes of drowsy embraces the following:

a. Inadequate, interrupted or fragmented sleep.
b. Chronic sleep disorder, hypersomnia and alternative sleep disorders.
c. a piece schedule that affects quantity of sleep and/or biological time.
d. Driving for too long while not a spare interruption.
e. Use of sedatives, hypnotics and alternative sleep aids before driving.
f. Consumption of alcohol or narcotics.
g. Any combination of those factors.

The effects of drowsy driving can vary from person to person. Most fagged drivers have slower reaction times, and sometimes expertise short term memory loss whereas behind the wheel. Sleepiness has conjointly been connected to too aggressive driving. The following statistics highlight the scope of drowsy driving as a nationwide problem:

a. Roughly 168 million American drivers – or 60% of the population – claim to have operated a vehicle while drowsy in the last year.
b. More than one-third of drivers have 'nodded off' behind the wheel at least once, and 13% report doing so in the past month.
c. Remaining awake for 18 straight hours can cause impairment that is roughly equivalent to a blood alcohol concentration (BAC) of .05, while being awake for 24 hours can cause impairment similar to a .10 BAC. In most states, a BAC of .08 or higher is considered legally drunk.

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2. OBJECTIVE

The objective of our project is to modify the steering wheel which would alert the person driving about their unconscious (drowsiness/sleep). It would involve a heart rate measuring sensor, which would constantly monitor the heartbeat rate and if the driver gets unconscious/ sleep while driving, it will give him a signal (alarm). This project would help to reduce the number of accidents which are caused due to this problem.

3. PROBLEM DEFINITION

The drowsy driving is a major problem. The risk, danger, and often tragic results of drowsy driving are alarming. Drowsy driving is the dangerous combination of driving and sleepiness or fatigue. This usually happens when a driver has not slept enough, but it can also happen due to untreated sleep disorders (Insomnia, one where breathing repeatedly stops and starts, sleep apnoea), medications, Long distance late night travelling, drinking alcohol, or shift work. The number of accidents due to drowsy driving is increasing, because of which people are facing a new threat hence design a system which can help to overcome this problem.

4. LITERATURE REVIEW

Dawson and Reid, Powell [2001] [1], in their work stated that one of the most serious consequences of insufficient sleep is traffic accidents due to drowsy driving. A recent study by the American Automobile Association (AAA) estimates that one out of every six (16.5%) deadly traffic accidents, and one out of eight (12.5%) crashes requiring hospitalization of car drivers or passengers is due to drowsy driving. (AAA, 2010) One analysis estimated the cost of automobile accidents attributed to sleepiness to be between $29.2 to $37.9 billion. (Leger, 1994) Experts suspect that even these disturbingly high figures underestimate the number of accidents or near-miss accidents due to drowsy driving because of drivers being unaware or not admitting they were drowsy at the time of the accident, or police not acquiring that information. Drowsy driving is a prevalent and serious public health issue that deserves more attention, education, and policy initiatives so a substantial amount of lives can be saved and disability averted due to drowsy driving accidents.

Miriam R. Waldeck and Michael I. Lambert [2003] [2], in their work stated that resting heart rate has sometimes been used as a marker of training status. It is reasonable to assume that the relationship between heart rate and training status should be more evident during sleep when extraneous factors that may influence heart rate are reduced. Therefore, the aim of the study was to assess the repeatability of monitoring heart rate during sleep when training status remained unchanged, to determine if this measurement had sufficient precision to be used as a marker of training status. The heart rate of ten female subjects was monitored for 24 hours on three occasions over three weeks whilst training status remained unchanged. Average, minimum and maximum heart rate during sleep was calculated. The range in minimum heart rate variation during sleep for all subjects over the three testing sessions was from 0 to 10 beats·min^{-1} and for maximum heart rate variation was 2 to 31 beats·min^{-1}. In summary it was found that on an individual basis the minimum heart rate during sleep varied by about 8 beats·min^{-1}.

Alessandro D'Aguilar, [2011] [3], in his work stated that typical experiments in psychological and neurophysiological settings often require the accurate control of multiple input and output signals. These signals are often generated or recorded via computer software and/or external dedicated hardware. Dedicated hardware is usually very expensive and requires additional software to control its behavior. He presents some accuracy tests on a low-cost and open-source I/O board (Arduino family) that may be useful in many lab environments. One of the strengths of Arduinos is the possibility they afford to load the experimental script on the board's memory and let it run without interfacing with computers or external software, thus granting complete independence, portability, and accuracy. Furthermore, a large community has arisen around the Arduino idea and offers many hardware add-ons and hundreds of free scripts for different projects. Accuracy tests show that Arduino boards may be an inexpensive tool for many psychological and neurophysiological labs.

Bisco's Group et al, [2013] [4], in their work stated that 10-30 % of road fatalities are related to drowsy driving. Driver's drowsiness detection based on biological and vehicle signals is being studied in preventive car safety. Autonomous nervous system activity, which can be measured noninvasively from the heart rate variability (HRV) signal obtained from surface electrocardiogram, presents alterations during stress, extreme fatigue and drowsiness episodes. We hypothesized that these alterations manifest on HRV and thus could be used to detect driver's drowsiness. We analyzed three driving databases in which drivers presented different sleep-deprivation levels, and in which each driving minute was annotated as drowsy or awake. We developed two different drowsiness detectors based on HRV. While the drowsiness episodes detector assessed each minute of driving as "awake" or "drowsy" with seven HRV derived features

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(positive predictive value 0.96, sensitivity 0.59, specificity 0.98 on 3475 min of driving), the sleep-deprivation detector discerned if a driver was suitable for driving or not, at driving onset, as function of his sleep-deprivation state. Sleep-deprivation state was estimated from the first three minutes of driving using only one HRV feature (positive predictive value 0.80, sensitivity 0.62, specificity 0.88 on 30 drivers). Incorporating drowsiness assessment based on HRV signal may add significant improvements to existing car safety systems.

Ufoaroh S.U, Oranugo C.O et al. [2015] [5], in their work stated that health related issues and parameters are of utmost importance to man, and is essential to his existence and influence and thus he has sought for an improved system that would be able to capture and monitor the changes in health parameters irrespective of time and location so as to provide for measures that will forestall abnormalities and cater for emergencies. This work presents a system that is capable of providing real time remote monitoring of the heartbeat with improvements of an alarm and SMS alert. This project aims at the design and implementation of a low cost but efficient and flexible heartbeat monitoring and alert system using GSM technology. It is designed in such a way that the heartbeat/pulse rate is sensed and measured by the sensors which sends the signals to the control unit for proper processing and determination of the heartbeat rate which is displayed on an LCD, it then proceeds to alert by an alarm and SMS sent to the mobile phone of the medical expert or health personnel, if and only if the threshold value of the heartbeat rate is maximally exceeded. Thus, this system proposes a continuous, real time, remote, safe and accurate monitoring of the heartbeat rate and helps in patient's diagnosis and early and preventive treatment of cardiovascular ailments.

Internet of Things Alarm Clock [6], This is another project based on the concept of IOT. Frederick Vander bosh build this project commissioned by element14 which is just way more than the simple alarm clock. This clock can tell the train timing and may not wake you up if the train is delayed or a lecture is cancelled in the college. Like these Volvo Safety Tool or IOT timepiece, we tend to thought of the necessity of associate degree ugly Watchful device operating with support of IOT primarily based code construct which react on signal given by the deviceby watching driver's alertness or temporary state and beside raising alerting sound it shall conjointly direct the driving force to nearest refreshment spot or location with distance and approximate time to succeed in. F. Fabian and B. Yang under their IEEE paper titled as "Drowsiness monitoring by steering and lane databased features under real driving conditions", Signal Processing, pp. 209-213, 2010 stated that drowsy driving is increasing year by year and because of that accidents are also increasing so there is a need of a safety tool to stop the road accidents happened due to drowsy driving. So, in this paper we propose a safety enhancement that will use the sensors and alert system based on the concept of IOT and on the above related work this safety enhancement will help stop the drivers from getting drowsy while driving and stop the accidents on road.

VOLVO "Vision 2020" Safety tools for Cars [7], Development took place in the field of Safety tools which was designed for cars and was initiated by Volvo back in 2008 when it announced its "Vision 2020" safety endeavor, which offered that Volvo would be able to put safety enhancements on cars on the road by 2020 in which none of the individual would be killed or would get seriously injured in any circumstances, which would provide much more safety than airbags, crumple zones, collision warnings, and automatic braking systems.

Prajakta A. Pawar [2014] [8], in her work stated that presence of doctor is essential for proper patient care. But he cannot be present on each and every place to provide medication or treatment. So remote monitoring of a patient is the right solution. But the problem is availability of internet connection in a rural area. So, this inspired us to use GSM module for this project since the telecom network is widely spread within rural & urban area of the India. This system is used to monitor physical parameter like heart beat and send the measured data directly to a doctor through SMS. System consists of an IR base heart beat sensor, Arduino Uno & GSM module. This device will be able to measure heart beat from an infant to elder person. The low cost of the device will help to provide appropriate home base effective monitoring system.

5. METHODOLOGY

A. Existing Methodology:

I. Anti-Sleep Pilot Drowsy Driving App:

Anti-Sleep Pilot is associate degree app version of a tool designed to stay drivers alert and tell them once to requirebreaks to forestall accidents. whereas the app encompasses a worthy goal, it's got too several bugs and quirks, and too high a value, to advantage a recommendation at this point.

II. Smart Steering Wheel:

The actual device consists of a skinny strip of sensors developed by Guttersberg Consulting that's applied to the withinrim of a manufacturer's existing wheel, to a lower place the animal skin (or other) covering. That "Sensofoil" strip is created from skinny layers of foil, that have a weak electrical current running through them. once pressure is applied and causes the layers to the touch each other, it creates a brief circuit between those layers, abundant within the same method that a resistive touchscreen works. A silicon chip keeps track of the intensity, frequency and site of

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these shorts, and uses it to determine a typical driving pattern for the user. once they deviate from it considerably, the automotivecan then alert them to awaken and channelize.

III. A Few Notable Systems:

The system uses the car's engine control unit to monitor changes in steering and other driving habits and alerts the driver accordingly.

B. Proposed methodology:

The input would be sensed from the measurand (that is from the fingertips of the driver) then this input signal would be converted to electric signals, since there would be continuous contact between the driver and the steering wheel the input signals would also be in continuous format. There would be multiple sensors fitted over the steering wheel from where it would take the electrical signals. Now this multiple signal would then be filtered and sent to an 8:1 multiplexer, where n no. Of inputs would be converted to a single electrical output signal. Then this signal would further be sent to the Arduino which would be pre-programmed, as the range for a normal heartrate is from 60-100 BPM and during sleep it falls down to 40BPM so the Arduino would continuously monitor and would check for the condition whether the input signal is in the given acceptable range or not. If the electric signal does not fall in the given range that is if the condition is not satisfied then a different signal would get generated by the audio and send to the alarm system and would ring to awake the driver so as to awake him up or alert him.

6. WORKING

The device would be install on steering wheel, when the driver would place his/her hands on the steering wheel. The input which would be in the form of pulse will be sensed and measured by the sensor. since there would be continuous contact between the driver and the steering wheel the input signals would also be in continuous format. The sensor would convert input signal i.e. pulse into electric signal, since there would be number of inputs which needs to be converted to one output. Hence n:1 multiplexer would be used. Now the output from the multiplexer would be taken as an input to the Arduino. The Arduino would be pre-programmed, the program would be in such a way that if there would be continues fall in the input for a particular time interval then signal would be send by Arduino to alarm system. If the electric signal does not fall in the given range that is if the condition is not satisfied then a different signal would get generated by the audio and send to the alarm system and would ring to awake the driver so as to awake him up or alert him.

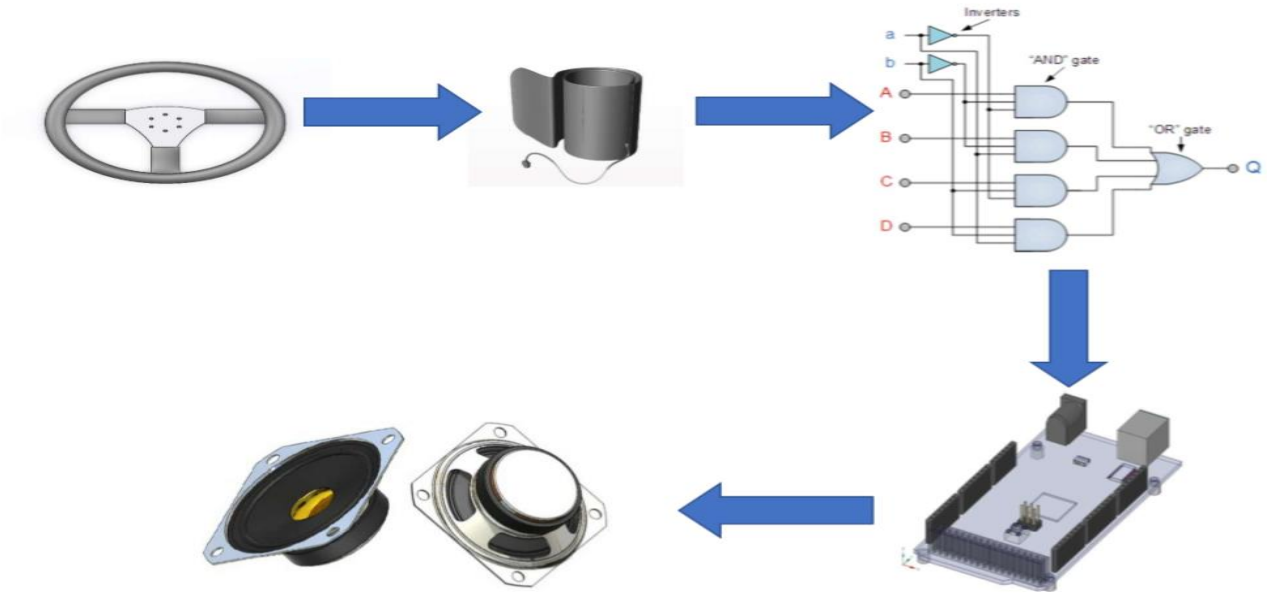

Fig.1: Constructional Diagram

7. CONCLUSION

As from the study we have seen that 1 in 5 accidents were due to the factor that the driver was unconscious (drowsy). There have been efforts made over the years to curve the number of road accidents and fatality caused. Modern

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technology offers some hope to reduce road accidents such as anti-sleep drowsy alarm alert system, nap zapper drive system, eye tracking system monitor system, cockpit cameras face detection system, and various other system. Although having so many systems the number of rate of accidents due to drowsiness have not yet reduced. So, we have come up with the stated idea which could serve this purpose. This project would help to reduce the number of accidents which are caused due to this problem.

8. BENEFITS TO SOCIETY

This new system is suitable for all the drivers, but especially for professional drivers and machinery workers who have long working hours. It provides additional level of protection in the event of a car accidents. System will alert automobile driver if they're asleep, associate advance that will facilitate avoid fatal accidents caused by drowsy driving. it's cost-efficient, easy to work, portable, it may also be used as a standard driving system. This would definitely help to reduce the number of accidents caused by this problem. This added protection can be the difference in some circumstances between life and death.

a. System is suitable for all the drivers, but especially for professional drivers and machinery workers who have long working hours
b. Helps to increase transportation safety and reduces the risk of accidents.
c. It is cost effective hence can be installed in any vehicle easily.
d. It is simple to use (user-friendly) and a portable system.
e. Can be connected to vehicle's music system or Bluetooth device.
f. This system is eco-friendly system.
g. It provides additional level of protection in the event of a car accidents.
h. It helps in protection of properties.
i. Increased accountability with improved safety.

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Design and Solid modelling of Parkinson gear tester

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ABSTRACT

Abstract— "Design and Solid modelling of Parkinson gear tester" is a very great innovation in its own & is specially made for the purpose of checking flank surfaces of gear. Gears are the crucial element of any transmission system which generally used for power transmission. Such type of part must be check by using highly accurate methodology in order to assess its functional performance in advance.

The inspection methodology of gears should be accurate with less time consuming procedure for its inspection. This gear test rig will check the gear in minimum time which results in decrease of non-productive time and improve plant efficiency.

Keywords— Parkinson's Gear Tester, Gear test rig, Gear Metrology, Mechanical project.

1. INTRODUCTION

Today we are in a generation in which we require speed on each and every field. Hence most important part is speed and quick working. For achieving this speed, man manufactures various machines and equipment's are manufactured in order to keep the growth at faster rate. The Engineer must bring new ideas and design into real world. New machines, equipment's and the methods are being developed continuously for production of various product at minimum cost and precise quality. In resembles of this quality our project aims to design and Solid modelling of Parkinson's gear tester for spur gear to check the Flank Surface. The equipment being portable and compact, it is skilful and accurate in testing the manufactured gears.

As most of the required material and equipment could be made easily available by our college and the parts could also be made in our college work-shop. Its price is also significant. This project gives us knowledge, experience, skill and new ideas of manufacturing. It is a working project and having guarantee of success. This project equipment is useful to enhance the gear quality manufactured and is made in much lower time.

Many machines have its ability to check certain parameters only. Highly accurated machine required special installation and space. We require such an arrangement which is strong and rapid for checking gear in machine workshop. This purpose can be solved by using the setup of gear test. This type of gear testing instrument is helpful in manufacturing for mass production of gears of a specific gear box. It works on principle that master gear is attached on a fixed vertically oriented shaft and the gear to be tested on another identical shaft. The first gear acts as a master gear and the other gear is checked by using master gear as a reference gear. This result will help in resulting the composite error. The test rig setup can be used in work floor as it requires less space and worker can use it as per need without wasting much time.

2. LITERATURE REVIEW

R. K. Jain, "Engineering Metrology" Khanna Publishers, twentieth edition [2007], they have presented Parkinson gear tester as an efficient one for checking the flank surfaces of the gear and determine the error significantly. For efficient performance of the gear this test rig is used they have performed three levels of test experiments considering flank surface. It was observed that this test rig can improve life of gear.

Shinde Tushar B., Shital D. Tarawade, "Design & Development of Parkinson Gear Tester for Spur Gear to Check the Flank Surface". International Journal of Advanced Research in Mechanical Engineering & Technology (IJARMET). Vol. 1, Issue 1 [Apr. - Jun. 2015], they have found Parkinson gear tester to be extending gear life and reducing error. Their work aims to understand the accuracy in flank surfaces. This test rig is useful to find out the flank surface and irregularities in gear tooth with ease.

S. D. Kalander Saheb and K. Gopinath, "A comprehensive survey of gear test rigs", Report No 6, IIT Madras, Dec [1990], In this survey they have performed the gear testing experiment and concluded that this test rig is the most easy to use equipment for checking any irregularity in gear tooth.

V. Manoj, "Development Of A Power Re-Circulating Gear Test Rig" M.Tech Thesis, IITMadras, [1999], this paper states that Parkinson gear tester is most suitable equipment which can be used for determination of errors in flank surfaces.

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3. PROBLEM DEFINATION

We are design and developing a "Solid Model on Parkinson gear tester" is being a compact and portable equipment, which is skilful and is having something precise in testing the gears. It checks the profile of the gear tooth and flank surface of gears. It can be used as a device to measure the calibration of the gears.

Objectives:
• Design and Solid modelling of gear test rig.
• It must be easy to use.
• The test rig should give the accurate and precise results.
• It detects the effective error in tooth form.
• It must be robust and insensitive.

Proposed Methodology

A. *Concept Development:*

The Parkinson's gear tester consist of following parts:

- Master gear
- Test specimen-gear
- Dial gauge
- Motor
- Spring
- Floating carriage

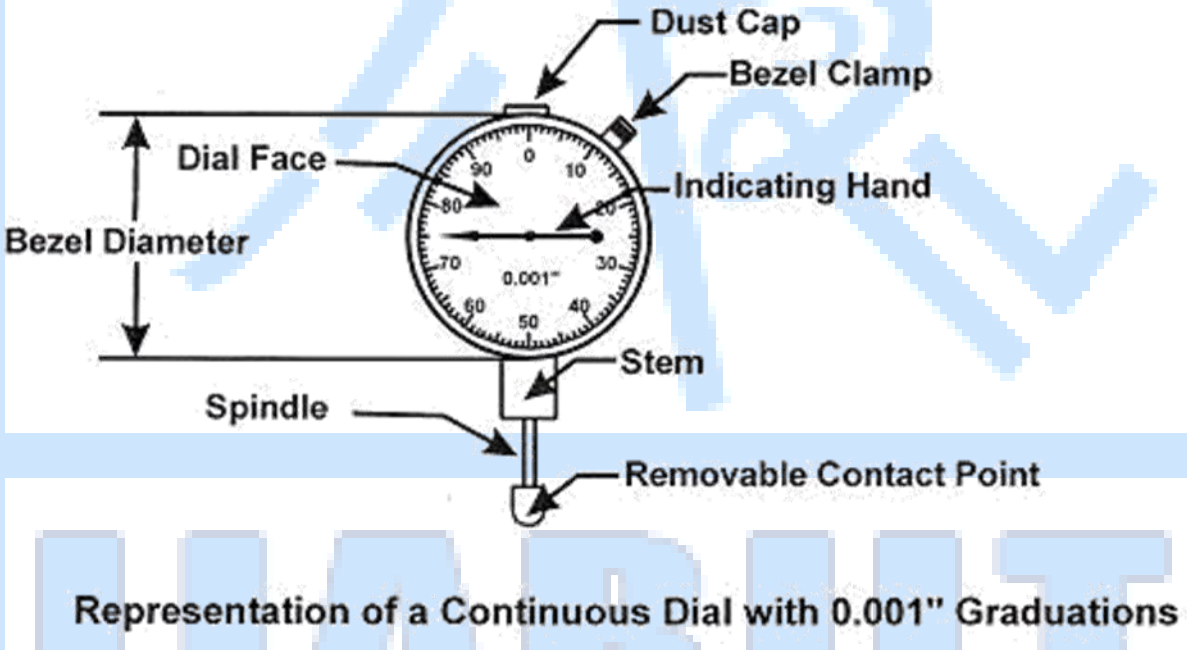

Fig. 1 Specifications of a dial indicator [6]

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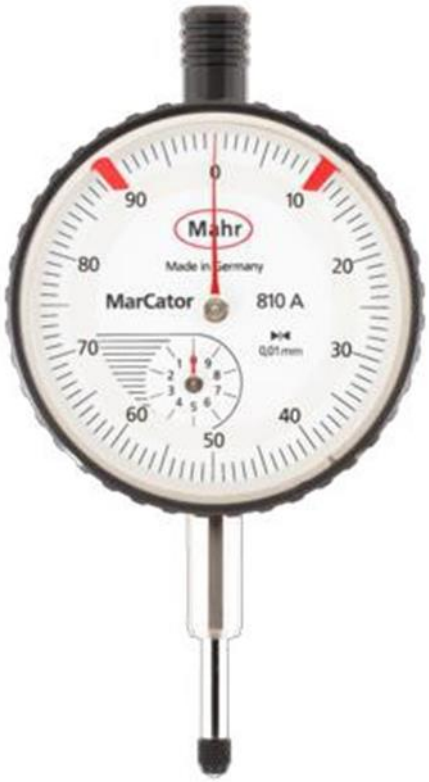

Fig. 2 Dial indicator [7]

B. *Construction:*

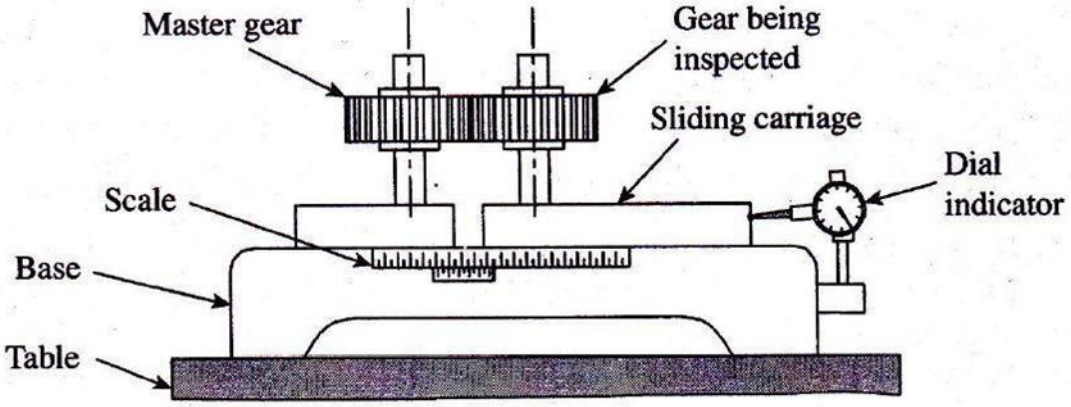

Fig. 3 Experimental set up of Parkinson gear tester [1]

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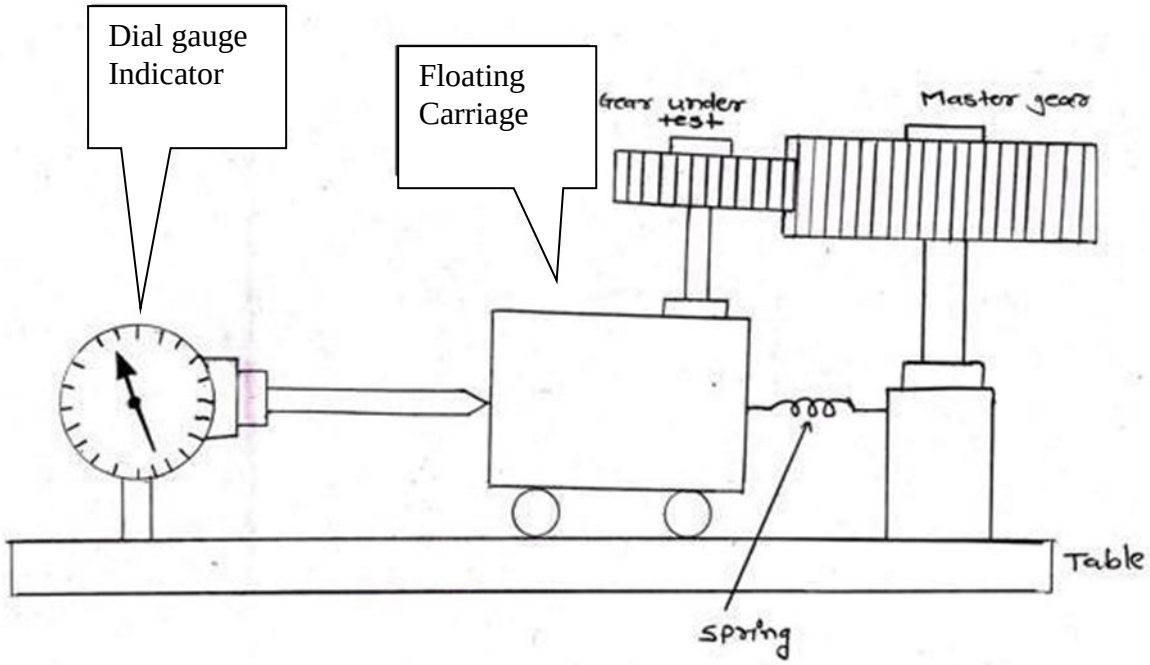

Fig. 4 Sketch of concept model

These gears are attached on two different shafts, so that they are allowed to rotate without any computable allowance. The right spindle can be moved along the table and clamped in any prefferable position and the right spindle slide is free to move.

C. *Working:*

To operate the testing machine, electric motor, which is torque motor having 5kg-m torque capacity, is used to rotate the master gear against the gear to be tested. Also another motor of the same capacity is used to rotate the paper rolling drum to pass the recording paper against the vibrating pen and stylus due to the improper tooth geometry provided.

The gear to be tested is installed on the trolley gear shaft using the fasteners as the nut and bolts. The spring loaded trolley is in uninterrupted close interaction with the master gear. Coupling is used to attach the extended shaft of the master gear as well as the driving D.C motor. When the couple of master gear and the gear to be tested is rotating and if there is some uneven run of the gear to be tested then the stylus and pen arrangement will deflect and the suitable quantity of variation in the graph which is recorded on the moving paper. Thus the working of Parkinson's gear test rig equipment is done.

D. *Selection of material:*

Following are some of the important factors on which selection of material is based:

1. Availability and cost of material
2. Strength and rigidity
3. Resistance to fatigue
4. Impact resistance
5. Hardness
6. Weight
7. Mach inability and weld ability
8. Corrosion resistance

However, the most of the significant reasons affecting the selection of material for engineering design is the properties of metals in relation to their intended use. The properties of metal define a specific characteristic of the material and behaviours of the metal under different conditions. We have selected low carbon or mild steel for fabrications of various component of our project due to following properties and composition of material.

1) *Low carbon or mild steels:* Low carbon or mild steel has carbon content from 0.15 to 0.30%. They are malleable, weld able and can be case hardened only. They are comparable to wrought iron in properties. Both ultimate tensile and compressive strength of these steel can be increased with increasing carbon content. They can be

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simply gas welded or electric arc welded, with the increase in the carbon content its weld ability increases. Mild steels are quite tough but easily machinable. It is cheaply available at reasonable price.

2) *Cast iron:* It is manufactured by melting pig iron with wrought iron in the presence of manganese along with some percentage of phosphorous to have strength along with porosity. It is used to manufacture the components of Robert structure along with heat resistant and of intricate structure. The complex portions are separately cast and welded to the main structure or sometimes fastened using bolts or rivets. We have used following material for different components.

E. *Master Gears:*

Master gears are made with sufficient accuracy capable of being used as the basis for comparing the accuracy of other gears. These are frequently used in composite error determination in these the master gears are rotated in close contact or single contact with the gears under testing. These can also be used for standardization of gear checking instruments used in work-floor. Master gears are made from chromium-manganese steel or high quality gauge steel and are hardened to 62 HRC. These are properly stabilized to release internal stresses. The master gears should preferably have lower module values because with coarse pitches the master gear would have either a very few teeth or else it will be relatively big, making it hard to handle besides high manufacturing cost.

Here we have selected the material as per the following:-

TABLE I

COMPONENTS AND SPECIFICATIONS

Sr. no.	Name of component	Specification	Material
1	Main motor	220V 50Hz 1440rpm	STD
2	Dial indicator	55 MM Dia.	STD
3	Master gear	-	Medium carbon steel
4	Floating carriage	-	-
5	Frame	900x700x465mm	Mild Steel

F. *Gear Design:*

1) Design of Motor speed =1440 rpm
2) Rated power $=10x10^3$ w
3) Io/A = 10 approx.
4) Nominal power= Rated power ×service factor
   $=10x10^3 \times 1.5$
   $=15x10^3$ w
5) Type of gear= Spur gear
   1. Basic requirement:
      - Tooth profile: Involute
      - Pressure angle (α): 20
      - Type of tooth: Full depth
      - Type gearing: SN gearing
   2. No of teeth:
      1. $Z_1 = 2f_0 / \sin^2\alpha$
         $=2x1/\sin^2(20)$
         $=18$
      2. i = Z2/Z1
         Z2 = 73
6) Cal. of Lewis form factor(Y):
   $Y=\pi y$
   y = 0.154 - (0.912/Z)…….P.S.G. 8.50

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For z_1

Y1=0.325

For z_2

Y2=0.445

7) Material selection:

TABLE 2-1

MATERIAL SELECTION

Type	Material	σ_y (N/mm^2)	σ_u (N/mm^2)	BHN
Master gear	C50	380	720	241
Test specimen	C35	310	570	187

8) Permissible bending stresses (σ_{b1}):
Master gear ($\sigma b1$) =1.4/n ×kbl /Kσ ×σ-1
=151.67 N/mm^2
Similarly,
(σ_{b2}) =126 N/mm^2

9) Permissible Crushing stress:
(σc): $\sigma_{c1}=c_B \times H_{B1} \times kcl^{-1}$
=602.5 N/mm^2
Also,
σ_{c2}=469.7 N/mm^2

10) Weaker element:
$S_1=(\sigma_{b1}) \times Y_1 = 49.29$
$S_2=(\sigma_{b2}) \times Y_2 = 56.07$
$S_1 < S_2$,
Thus, Master gear is weaker element.
Nominal power $=2\pi \times N_1 \times M_{t1}/60$
$15x10^3=2\pi \times 576 \times M_{t1}/60$
M_{t1}=248.7 N-m
$M_{t1}=248.7 \times 10^3$ N-mm

11) Design Torque:
$(M_{t1}) = M_{t1} \times k_d \times k$
From (P.S.G. pg.8.15),
$k_d \times k=1.5$
Therefore, $(M_{t1}) = 373.01x10^3$ N-mm.
Module (m) $\geq 1.26 \sqrt{(M_{t1})/(Y_1 \times (\sigma_{b1}) \times \Psi_m \times Z_1)}$
Therefore, m $\geq$ 4.381mm.
To take care of compressive stress due to radial load and the direct shear load which was neglected in the lewis equation, Let us increase this value by around 20.
m $\geq$ 5.257 mm.
Selecting standard module from P.S.G data book = 6 mm.

G. *Solid modelling:*

In this, we assemble the parts to make a Parkinson gear tester. This gear test rig will be equipped with Standard electric motor to drive the driving shaft for Master gear. Thus test rig will be developed to give the maximum accuracy in flank surface of the gears.

H. *Testing:*

After completion of project till January-February, we will check that the listed objectives are achieved or not.

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7. CONCLUSION

While concluding this part, we fill quite contended in having completed the project synopsis well on time. We had enormous practical experience on the manufacturing schedules of the working project model.
In this synopsis, we developed a branch and bound approach which is coupled with quick, gear testing in mass production requirement within a manufacturing cell. The design of control planning was a vital aspect of study because a strong interaction between the many different parts was desirable. We are testing gear with low running cost. Thus we are satisfied with our synopsis of the project.

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DIGITIZING PITCHOETER:A REVIEW

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ABSTRACT

In today's competition, to achieve high productivity and lower cycle time is the need. The main constraint in achieving this goal is cost that has one has to bear. With technology improving every day, the time has come where we should search for an alternative instrument which would be up to industrial standards and very well affordable by everyone in this field.

This project titled "DIGITIZING PITCHOMETER" is an attempt on our behalf to digitize and semi automate the process of pitch measurement of propeller and impeller blades. This project is intended to be done with the purpose of minimizing the overall cycle time in the measurement process as the existing process consumes a large amount of time.

Keywords— pitch ,blade profile, leading edge, pitchometer, trailing edge

1. INTRODUCTION

A **propeller** is a type of fan that transmits power by converting rotational motion into thrust. A pressure difference is produced between the forward and rear surfaces of the airfoil-shaped blade, and a fluid (such as air or water) is accelerated behind the blade. Propeller dynamics, like those of aircraft wings, can be modelled by either or both Bernoulli's principle and Newton's third law. A marine propeller of this type is sometimes colloquially known as a ***screw propeller*** or ***screw***, however there is a different class of propellers known as cycloidal propellers – they are characterized by the higher propulsive efficiency averaging 0.72 compared to the screw propeller's average of 0.6 and the ability to throw thrust in any direction at any time. Their disadvantages are higher mechanical complexity and higher cost. The blades are attached to a *boss* (hub), which should be as small as the needs of strength A propeller is the most common propulsor on ships, imparting momentum to a fluid which causes a force to act on the ship.

2. LITERATRE REVIEW

P. D. Clausen , D. H. Wood, 1999 [1] This is achieved very simply by sensing the turbine shaft speed and then setting the alternator field current proportional to this speed. (It was assumed that sensing the wind speed directly would be too costly in a commercial version of their turbine.) Secondly, a field excited generator can also be used for over-speed protection at high wind speed by loading the blades to drive them away from optimum performance. This again requires sensing the shaft speed and possibly the power level but has been proven to be very effective.

J. S. Carullo, S. Nasir, R. D. Cress, 2010[2] Aerodynamic and heat transfer measurements were made on a turbine blade at flow conditions representative of engine operating conditions. High levels of freestream turbulence were generated by using passive turbulence grids that produced similar turbulence levels, but different length scales. Increasing the turbulence level was observed to augment the heat transfer over the blade surface.

B. Boukhezzara, L. Lupua , H. Siguerdidjanea , M. Hand, 2012 [3] A multivariable wind turbine controller is presented in this paper. A comparative study with some existing monovariable controllers shows that the use of a single control input in pitch for wind turbine control allows to partially satisfy the fixed objectives only. The pitch controllers achieve a good performance in rotor speed regulation, but the power regulation is not satisfactory. Conversely, the nonlinear torque control technique leads to a good power regulation, however it has the drawback of generating large rotor speed fluctuations.

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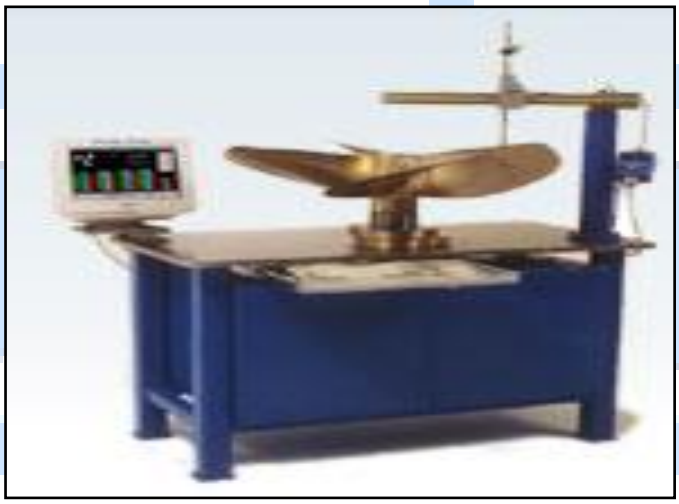
3. METHODOLOGY

A pitchometer adapted to determine contour characteristics of the blades of a propeller, said pitchometer having a base, first and second vertical shafts secured to said base, said first shaft having an axis adapted to coincide with the propeller axis, a. horizontal member secured to said second shaft and operatively engageable with said first shaft, a template provided with an edge adapted to coincide with the transverse surface contour of a blade of the propeller at a known radius thereof, said template being rotatably secured to said horizontal member and having a pitch line adapted to completely coincide with the pitch line of the propeller blade at a known radius for any blade contour, the axis of rotation of said template being located on the generatrix base line projection of the propeller blade, whereby said template provides means for measuring the true pitch of the blade

Alternative design



The Digital Angle Measurement will be done by a **Proximity Switch**.The Digital Linear Measurement will be done by an **Infrared Sensor**. Inductive proximity switch is composed of three parts: oscillator, switch circuit and magnified output circuit the oscillator will generate an alternating electric field. When the metal object approaches this electric field and reaches the induction distance, thirlpool will generate in metal object, resulting in attenuation of vibration and then

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stop. The change of vibration and stop of oscillator is treated by behind stage magnified circuit and converted to switching sign. Triggering driving control for non- contact detection.

4. CONCLUSION

The existing manual pitchometer will be replaced with digital pitchometer .In which it would include,A **proximity switch** for digital angle measurement and an **infrared sensor** for digital linear measurement. A digital display of pitch on LED will be available replacing the manual calculation. Moreover at a greater expense a gear mechanism can be used to rotate the blade automatically instead of moving the blade manually In order to maintain reliable action and long service life, action should be avoided beyond the stipulated ambient temperature. Do not drench it with water or water soluble cutting lubricant when it is used with cover, although the proximity sensor is water proof. It should be used in combination with chemical agents, especially strong bases.

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Coin Based Water Vending Machine

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ABSTRACT

The project aims at developing automated water vending machine. Coin based Water Vending System project is developed for the users to use coin operated water vending machine system. It consists of a coin box, coin sensor, water sensor, microcontroller unit, mineral water tank, pump motor etc. The user can use mineral water by inserting coins in the coin box. A coin sensor is connected in the coin box. According to the coin dropped in the box the sensor sends signal to the microcontroller analyses the number of coins dropped in the coin box and accordingly it operates the pump motor. The pump motor delivers the mineral water from the tank according to the validity of the coin. If the water in the tank reaches minimum level, the microcontroller operates a buzzer. Thus, the tank can be filled immediately. The microcontroller programs are written in assembly language. This will be very useful in industries, houses, institutions, railways etc.

1. Introduction

With the earliest known reference to a vending machine is in the work of Hero of Alexandria, an engineer and mathematician in first-century Roman Egypt. His machine accepted a coin and then dispensed holy water. When the coin was deposited, it fell upon a pan attached to a lever. The lever opened a valve which let some water flow out. The pan continued to tilt with the weight of the coin until it fell off, at which point a counterweight snapped the lever up and turned off the valve.
Coin-operated machines that dispensed tobacco were being operated as early as 1615 in the taverns of England. The machines were portable and made of brass. An English bookseller, Richard Carlile, devised a newspaper dispensing machine for the dissemination of banned works in 1822. Simeon Denham was awarded British Patent no. 706 for his stamp dispensing machine in 1867, the first fully automatic vending machine.
With the advancement of technology, the 'Coin Operated Water Dispenser' provides comfort and it fits well for its users in the era of modernization. Regulated power supply is designed to provide system with constant supply. The dispenser will dispense water only when the correct coin is inserted as well as with the placement of glass below the nozzle. The correctness of coin is detected by the coin sensor and the object detection is done by an IR sensor. If both the conditions are satisfied then a signal is given to the microcontroller and accordingly water pump gets activated and water will be dispensed.

1.1 Applications of vending machines

A. "Automatic Bottle Filling machine"- Amit Chawathe (2016) [1] tells us that Liquid filling machine is used in beverage and bottling industries. Some of the filling machine is commercialized as water vending machine where by Reverse Osmosis water can be brought from by using money. The machine found in the market is high in price, requires complex changes in hardware and program configuration if varied liquid volume is required to be filled and most of the time; it is not fully automatic. The purpose of this project is to develop an automatic liquid filling machine. Microcontroller is used as the controller to control the automatic operation of this machine where the machine consists of conveyor system and filling stations. Microcontroller is selected as the controller because it is easier to learn and the compact size makes it easier to attach it with the system. The automatic liquid filling machine is developed to be lower in price compare to the other filling machines in the market. The machine is also easy to operate and user friendly, where simple steps are needed to operate the machine. The machine controller is also portable and can be attached with conveyor system or can be left standalone.

B. "Automatic Paper Vending Machine"- Kamalanathan P. (2015) [2] tells us that the usage of paper is inevitable and its demand is increasing steadily particularly in the places such as educational institutions, government offices, etc. At the same time, time is a precious thing that one does not want to waste in any way. In stationary shops it is quite difficult to buy papers during rush time period and the counting of the paper depending on the requirement would cause further time delay and there is a chance for the error in the manual counting of paper. To avoid these problems, this project titled

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"Automatic Paper Vending Machine" is proposed to deliver the paper to the public by using the sensors and microcontrollers based on the Mechatronics principles. It will be more cheap and economic for the bulk production and it will be very useful for the college and school students. Here it is designed to deliver sheets by inputting the respective coin in the system. It will help us to save more time and manual work will be nullified.

C. "Design and Fabrication of an Instant Noodle Vending Machine"- *Antonio John Harold A (2015)* [3] tells us that they studied on automated Noodle Vending Machine. Many people love eating noodles since it is easy to produce, delectable, low-cost, and active fast food, thus this project which desired to help people who love eating noodles comfortably and instantly during their break. Certain requirements concerning the appropriate amount of noodle, seasoning, and water were set for business purposes. The dispensing procedure was sequential which started from the detection of the cup, crushed noodles dispensing, seasoning dispensing based on chosen flavour, and the water injection. The fabrication of the machine was divided into three phases: Mechanical Design Phase, Electrical Design Phase and Evaluation Phase. In the Mechanical Design Phase, selection of mechanical components, alternatives, simulations, process description and the mechanical implementation were conceptualized. In the Electrical Design Phase, the operation was set to organize the priorities and set the instructions in the program coding and electronic implementation. The Evaluation Phase was where the data were analysed based on sampling and testing of the machine for the amount of noodle, seasoning, and water dispensing after the assimilation of all components collectively. Based on the results, the researchers were able to design and fabricate the machine based on the given parameters with an acceptable error percentage which was within the limits of tolerance. The final prototype was fabricated and it shows acceptable range of values based on data analysis and statistical results.

D. "Real Time Embedded Based Drinking Water Vending Machine Studies"- Sasikala, G. (2014) [5]

This paper introduces the self-serviced drinking water machine. This machine has numerous input and outputs to provide service to the customer. This machine is similar to vending machine. It is coin operated machine. It accepts only coins as input like Rs.1, Rs.2 in any sequence and delivers drinking water. The main motto of this system is to avoid the environmental pollution and also to avoid the wastage of water with the help of water control valve.

E. "Automatic Pouring Machine"- Adnan Bin Ahmad (2009) [7] tells us that this project is to design and develop an automatic pouring machine that suitable for various kind of container. The machine will be operated by lifting the container in certain height and pour the liquid or water at the same level in any size of container. Because of the wide application in fast food restaurants and also self-service RO water dispenser, state this resulted need consumer to take time and the control machine by itself to ensure there no is wastage happen. Thus, a special system for this machine purposed in this project where consumer that using this machine only need to press a start button and machine would fill the liquid at the same level for any size of the container. For the detail, the machine will operate by move the container at the certain height and pouring liquids or water with the accurate quantity according to size of the container. This project will using a PIC program to control the motor which are used to lift the container to up or down and a detector that using in this machine. This system consists of an Infra-Red (IR) sensor, level sensor and a PIC module, and other mechanical equipment. By utilizing this machine, hopefully it can overcome the current problem encountered in the fast-food restaurant and other industry. Based on the project analysis, this machine will operate effectively by build a program that will control all the activity in the machine and the precise of the sensor that used in this machine.

F. "Vending Machine Food Environment" - Susan Klein (2008) [8] they made surveys in public schools, various restaurants and public places about environmental as well as health issues. Despite vending machines' contribution to the food environment, particularly in places such as workplaces and schools, researchers have yet to develop an instrument that can quantitatively assess the nutritional profile of the food and beverages sold in vending machines. This is essential information, given the evidence that one's food environment does impact dietary behaviours. Further, in order to determine whether or not a food or beverage is 'healthy,' we must find an acceptable way to quantify that term. Finally, much of the research on vending machines and their effect on nutrition environments have been done in schools, largely as a result of the recent legislation regarding vending machines in school settings. While this is certainly an important area for research, similar research must be done in workplace settings to determine if the findings from schools are transferable to a workplace. The development and testing of a valid and reliable instrument for assessing the nutritional quality of foods and beverages offered in vending machines is the next step to a better understanding of how these machines impact people's food choices.

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1.2 Applications of coin based vending machines

G. "Coin Operated Printing Machine "Bennedy R. Manalo (2014) [4] tell us that They studied to design and fabricate a Coin – Operated Printing Machine which will accept payment in the form of coins, has ability return change, print black and white or coloured documents in short or long bond papers. This study will lessen printing documents outside the school which is inconvenient and can compromise to the student's safety. This study also aims to lower the liability of owners of the computer shops by having fewer employees in tending the printing needs of the costumers. PIC microcontroller and Visual Basic programming are used to make software programs for the operations and GUI. PIC microcontroller is used to control the keypad, coin acceptor, and coin dispenser. Visual Basic helps the user interact with the machine in a step by step process. RS232 is an important material in this project as it is the device needed as the instrument for the communication of microcontroller and the system unit. Actual testing was conducted to test and evaluate the acceptability, functionality, and reliability of the machine. This study benefits the students, professors, and people in printing businesses who are involved in printing documents.

1.3 Programming of vending machines

H. "Design and Implementation of Vending Machine using Verilog HDL"- P.Pradeepa (2013) [6]

They studied on vending machines. These are used to dispense small different products, when a coin is inserted. These machines can be implemented in different ways by using microcontroller and FPGA board. Here in this paper, we proposed an efficient algorithm for implementation of vending machine on FPGA board. Because FPGA based vending machine give fast response and uses less power than the microcontroller based vending machine. The
FPGA based vending machine supports four products and three coins. The vending machine accepts coins as inputs in any sequence and delivers products when required amount is deposited and gives back the change if entered amount is greater than the price of product. It also supports cancel feature means a user can withdraw the request any time and entered money will be returned back without any product. The proposed algorithm is implemented in Verilog HDL and simulated using Xilinx ISE simulator tool. The design is implemented on Xilinx Spartan-3A FPGA development board.

2. General Process

2.1 Block Diagram:

The proposed block diagram for Coin operated water dispenser is shown in figure below.

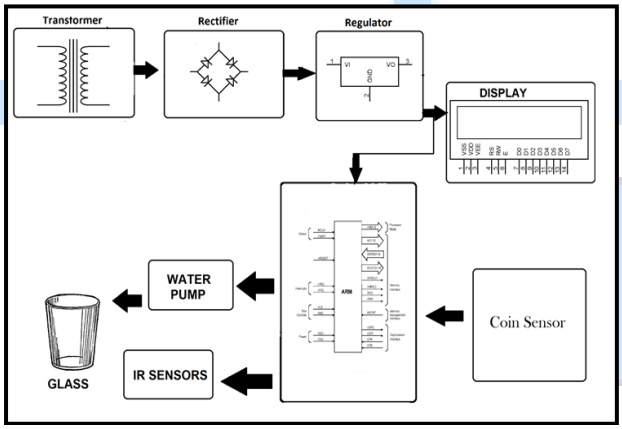

Chart-1 Block Diagram

The first three blocks- transformer, rectifier and regulator are used for getting a regulated power supply. The four blocks- Display, water pump, IR sensor, Coin sensor are interfaced with Arduino.

2.2 General Working:

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Coin operated water dispenser works on the principle of detection and dispensing water. The four interfacing units (IR Sensor, LCD, Water Pump and Coin Sensor) are separately programmed in Arduino IDE. Program is executed in a sequence. The coin sensor has four coloured wires- white, Black, Red and Grey. White coloured wire is connected to Arduino board pin no. 2, red and black wire is connected to vcc and Ground respectively. Coin sensor is a single coin acceptor, so it is programmed for a single coin. When the coin inserted is correct the program jumps to check for the presence of an object (here it is a glass). IR sensor has a separate driver circuit where a LED is connected at the output, when the object is placed in its path, the LED starts glowing which indicates that the output at this state is positive (glass is present). Indication is given to a water pump and it starts pumping out water.

3. Conclusion

This project introduces a water dispensing machine which operates on coin. Various devices like a regulated power supply, IR sensor, coin sensor water pump etc., are embodied to design an efficient dispensing system.
The system can be programmed for different types of coin (also for more than one coin with the help of multi coin acceptor) and for certain duration with the help of algorithm and programming in Arduino. The dispenser can be installed on roads (highways), railway stations and other public places to provide water to people at low cost.

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A REVIEW ON 5S PHILOSOPHY

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ABSTRACT

In Indian economy small-scale and cottage industries occupy an important place, because of their employment potential and their contribution to total industrial output and exports. Now-a -days this sector faces challenges to retain its prosperous position due to uprising of new competitors both in the national and international market. So, continuous improvement is required to overcome these challenges. Hence, a concept like 5S is gaining popularity these days. Quality control techniques aim towards the high quality, low cost, and shortening the production flow by eliminating waste. In this project focus is on implementing quality control techniques such as 5S.

Keywords— *Seiri, seiton, seiso, seiketsu, shitsuke.*

1. INTRODUCTION

This project is based on the implementation of 5S to enhance the productivity and quality of industry products. The 5S philosophy is a way of thinking, focusing on organizing work place in order to simplify the work environment and strives to reduce wastes while improving quality and safety.5S is acronym made of five Japanese words: Seiri (sort), Seiton (set in order), Seiso (shine), Seiketsu (standardize) and Shitsuke (sustain) transliterated and translated into other languages among which English. In essence, these five terms represent the five steps toward operational and process excellence.5S provides the foundation on which other lean methods, such as TPM, cellular manufacturing just-in-time production, and six sigma can be introduced.

2. LITERATURE REVIEW

Mayur L. Mokharkar, Dr. A. R. Sahu, Dr. Achal Shahare, 2016 [1], studied the various literatures related to 5S & Kaizen, and the data is accumulated from different papers, this will help to study success factor of 5S & Kaizen. The data is collected by personal observation of the layout and suggested proper place for every equipment.

Aman Gupta, Sanjeev Verma, Shaman Gupta, 2015 [2], conducted 5s Audit in 5phases &mentioned that workers were comfortable in finding inventories from the store due to proper arrangement of the inventory. Now they don't have to spend time to find the items in the store. Inventories were protected from damage. Paths were clean now and there was not any problem in flow of parts between two stations .Chances of injuries to workers were eliminated from the paths. A habit of cleanliness and discipline was developed among the workers. Morale and satisfaction of employer and workers was increased and they now started doing justice to their jobs respectively.

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Soumya R. Purohit , V. Shantha, 2015 [3],concluded that 5S system is a good starting point for all improvement efforts aiming to drive out waste from the manufacturing process and ultimately improving a company's bottom line production by improving products and services and lowering costs. Many manufacturing facilities ranging from SMEs to large scale industries have opted to follow the path towards a "5S" work-place organizational and housekeeping methodology as part of Continuous Improvement in order to achieve higher levels of quality through minimization of waste.

R. S. Agrahari, P.A. Dangle, K.V.Chandratre, 2015 [4],concluded that 5S led to Process development by cost reduction, Shortening of time required for searching necessary things, The number of customers has been increased after maintaining a clean and neat layout, Travel time of materials is reduced which led to reduction of work hazards, Improvement of the internal communication processes.

Shekhar Shahu ,Lakhan Patidar, 2015 [5], established the relationship among 5S, overall equipment effectiveness and manufacturing productivity. Three hypotheses regarding the relations among 5S, overall equipment effectiveness and manufacturing productivity had been specified and conceptual framework has been proposed for future work.

3. METHODOLOGY

The name 5S refers to a set of five terms borrowed from Japanese, all beginning with the letter 'S' when translated. The equivalent terms in English also begin with an 'S'. In essence, these five terms represent the five steps toward operational and process excellence.

1. Sort: Sort, the first S, focuses on eliminating unnecessary items from the workplace that are not needed for current production operations. An effective visual method to identify these unneeded items is called "red tagging", which involves evaluating the necessity of each items in work area. Separate required tools, materials, and instructions from those that are not needed. Remove everything that is not necessary from work area.

So by using sort we can remove unwanted materials from work area. Hence there will less chances of material damage.

2. Set in Order: Set in Order focuses on creating efficient and effective storage methods to arrange items so that they are easy to use and to label them so that they are easy to find and put away. Set in Order can only be implemented once the 1S, sort, has cleared the work area of unneeded items. Sort and organize all tools, equipment, files, data, material, and resources for quick, east location and use. Label all storage locations, tools and equipment.

So by using Set in Order we can reduce hunting time for tools and equipment, files, data and material.

3. Shine: Once the problem that has been clogging the work areas is eliminated and remaining items are organized, the next step is to thoroughly clean the work area. Daily follow-up cleaning is necessary to sustain this improvement.

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Working in clean environment enables workers to notice malfunctions in equipment such as leaks, vibrations, breakages, and misalignments. Set new standards for cleanliness.

Clean and remove all trash, grease and dirt. Everything must be clean, tidy, and neatly put in its appropriate place. Cleanliness provides safe workplace and makes potential problems noticeable e.g. equipments leaks, loose parts, missing guards, loose paper work or materials.

4. Standardize: Once the first three 5S's have been implemented, the next S is to standardize the best practices in the work area. Standardize the method to maintain the first three 5S's, creates a consistent approach with which task sand procedures are done. Some of the tools used in standardizing the 5S procedures are: job cycle charts, visual cues (e.g. signs, display scoreboards), scheduling of "five-minute" 5S periods, and checklist. The second part is prevention-preventing accumulation of unneeded items, preventing procedures from breaking down, and preventing equipment and materials from getting dirty.

5. Sustain: Sustain, making habit of properly maintaining correct procedures is often the most difficult S to implement and achieve. Changing entrenched behaviors can be difficult and the tendency is often to return to the status quo and the comfort zone of the "old way" of doing things. Make 5 S part of your culture, and incorporate it into the corporate philosophy. Build organizational commitment so that 5S becomes one of your organizational values so that everyone develops 5S as habit. Integrate 5S methodology into performance management system. Sustain focuses on defining a new status quo and standard of work place organization. Without the sustain the achievement of the other 5S's will not last long.

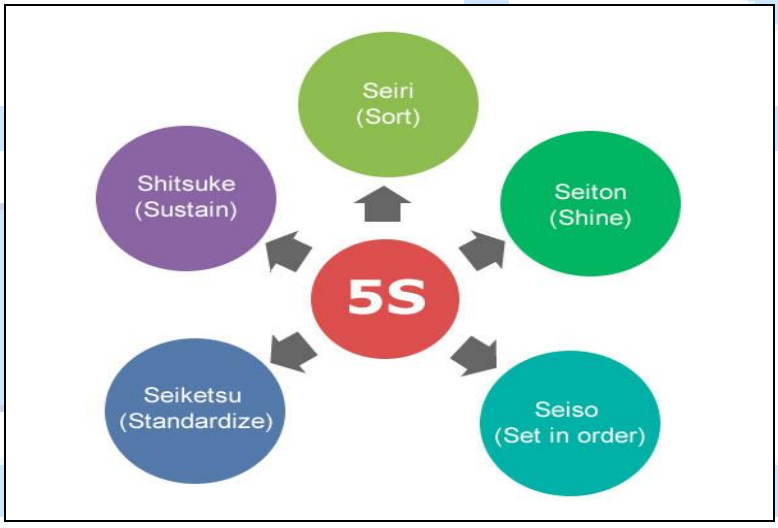

Fig.1 5S

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4. CONCLUSION

The 5S method as a tool of Lean Management and Lean Manufacturing allows to create, implement and maintain and employee-friendly workplace. Acting appropriately in accordance with the 5S principles facilitates the creation of a well structure system, namely the production company.

The implementation of the entire system is relatively inexpensive, because the cost are very low when compare to the benefits achieve after the successful 5S implementation. The appropriate installation and maintenance of activities for the benefit of the system will make it possible to save space in the production hall, in the warehouse and offices so that the potential of the company surface may be fully used without being expanded. The methods can be improved by introducing target-coloring of toolbox table shadows, brushes, and the other tools require for each employee to always know their location.

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Design of Bottle Filling Machine Using Geneva

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ABSTRACT

This project was discussed about the design and execution of programmed multiple water filling machine using Geneva mechanism. Generally, the job of the machine is to fill the water automatically into bottles through a shifting bottle plate. There are many devices available for producing intermitted motion but out of all these devices"Geneva wheel"for intermitted motion is preferred becauseit has a simplicity in design and construction,cheap in cost, commonly used in industries and can be used physically, it requires less maintenance and inspection.This project is the combination of Geneva and electrical synchronous motor system. In this project microcontroller is used for computerisation of control of water. This project is separated into four sections, the loading section, the bottle plate section and filling section, where the whole sections is controlled by Geneva. The total system is more flexible and time redeemable.

Keywords— *Geneva wheel, Bottle Filing Machine, Gear,Pulley,Fixture.*

1. INTRODUCTION

The project on which we functioned is "bottle filling machine with Geneva mechanism" which is based on plain Genevamechanism" computerisation plays an progressively essential role in the world economy.one of the essential functions of computerisation is in the soft drink and other beverage productions, where a precise liquid has to be filled constantly for these types of functions .the drift is moving away from the singular device or appliance toward non-stop computerisation solutions .totally integrated computerisation sets this continuity into reliable practice .totally integrated computerisation covers the full manufacture line, from receipt of goods, the manufacture process, filling and packaging, to consignment of goods.Mass amount of filling packing work is done by with computerisation. Maximum vessels are polyethylene bags or thin walled metallic cans etc. mass manufacture & commodity items save cost of product. While filling liquid or semi liquidmaterials precaution is taken to avoid trickle some chemical liquids are toxic and hence physical handling is difficult .our project is also an function of computerisation wherein we have Advanceed a liquid filling to bottles .the various processes are precise using a Geneva mechanism. This will increase the entire manufacture output; this increase in manufacture can yield essential financial welfares and redeemables. This idea can be used in beverage and food industries, milk industries,medicine industries, mineral water, chemical product industries and manufacturing industries. The main impartial of the project is to Enterprise and Advance a Automated liquid filling in bottles by using Geneva Mechanism.To Advance a filling machine which can fill different sizes of vessels on the bases of height same principle can be used in diverse industries like medicine, oil, chemical industries for filling liquid to dissimilar sized part by one machine.

2. LITERATURE SURVEY

2.1 A review on study and analysis of Geneva mechanism design.

The aim of this paper is to diminish the human fatigue and time redeemables in industries by converting the physical work into computerisation using latest technologies. Here we have analyzed to move conveyor using Geneva Mechanism. This is the mechanism used for material conveying on the conveyor with some sporadic stops. This system consists of the following parts like Geneva wheel, rotating disc, bearing, frame and DC motor. This review paper contracts with Examination and modeling of Geneva mechanism.

2.2 Improvement in Productivity of Bottle Filling Operation by using Multi-Nozzle PLC System.

This paper denotes the study of advancement in operation time for bottle filling procedure by belt conveyer which is functioned by PLC. In the automated bottle filling machine, to make both precision and punctuality in the filling,is a obligation of the time. This can be reached with the help of PLC programming. In this paper PLC is used along with several sensors as input to the system and describes about logic Advanceed to sense the site of the bottle on the conveyor and its ailment, that is whether it is filled or not. This will give exactness of the quantity to befilled and will considerably decrease the cycle time to fill one bottle ultimately resulting in any target of any manufacturing industry that isquantity with excellence. Efficiency is a key factor in utilizing the assets such as labor and material. The extremediminution in the cycle time is promising only after controlling and sinking operation time. Efficiency may be improved by introducing a better method to increasing material utilization, labor effectiveness and effective arrangement of facilities

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2.3. Analysis and Synthesis of Geneva Wheel for Automation of Conventional Paper Cutting Machine.

In this paper they design and manufacturing of Geneva wheel with help of laser cutting technologies for shake less and transitional action. Geneva drive is an indexing appliance that transforms continues motion to sporadicmotion. Due to which paper roll's paper is moved among the periods of cutting retro. Then the paper cutting isaccomplished by cutter which is functioned with equal rpm motor as identical as motor which drive the Geneva driving wheel. Thecutter will be back its prime location by spiral effect or with the help of linking rod. So we can get equal size paper shards. This paper piece is moving other side by nonstop rolling conveyor to filling box. With help of unlike rpm we can get cutting piece and on the base of its superiority and cutting time we can find its efficiency we can achieve optimum rpm of cutting a one cycle and achieve best efficiency of machine

2.4. Development and Application of Geneva Mechanism for Bottle washing.

This paper therefore purposes at Advanceing a Rig (Geneva Mechanism) for bottle washing inbrew industry. A test rig was intended, invented and hired for a performance valuation. The rig activates on the sporadic rotary motion from a four hole outward Geneva Mechanism and needs physical filling and receiving of bottles. Physical washing of beverage bottles does not give the desired efficiency requirement of industrial setting and in the effort to decrease the eco-friendly impact of waste from industrial manufacture, there is an increasing deeply feltneed to recover empty glass and plastic vessels.

2.5. Design and analysis of Geneva mechanism with curved slots.

In the proposed methodology, conjugate surface principle is used to develop an analytical explanation of the contour of the curved slots with and without an equaliser feature. Analytical blueprints are then presented for the pressure angle of the Geneva mechanism and the principal curvatures of the curved slots. The effectiveness of an appropriate offset angle in eliminating the particular points and double-points on the curved slot profile is thenconfirmed.Finally, a Geneva mechanism is formulated in order to establish the viability of the aimed approach. A easy yet inclusive technique is proposed for the design of a Geneva indexing mechanism with curved spaces.

2.6 Development of plc based controller for bottle filling machine.

This paper designates the function of PLC programming and PID controller in the field of bottle fillingoperation. In this paper PLC is used beside with numerous sensors as response to the system and controllers are used as output to the organisation. This paper defines about logic Advanceed to intellect the site of bottle on the conveyor and its situation, that is whether it is filled or not. This paper also describes about the limits like level and flow of a water or liquid to be controlled. These constraints are to be precise with the Programmable Logic Controller (PLC) and the entire procedureis extra controlled by SCADA. PID controllers are used to diminish the fault. The evolution in Food industry and Healthcare industry has seen a speedy 2increase in anxieties of beverages and medicines. Accuracy while filling these beverage vessels is required. Non- accuracy will not only prime the financial damage in the beverage industry but also a threat to consumer health in healthcare industry.

.2.7 Force Analysis of Geneva Wheel and Face Cam Used In Automat.

In this research the main attention is on two parts they are Geneva wheel and Face cam which are used for their respective tasks. Geneva Wheel is used to catalogue the drum which involves of 96 spindles. Due to this Geneva mechanism each of the spindles will hold the ceramic body when the drum is being indexed. Due to which there is a force which is formed in the Geneva wheel in extreme and lowest location. Face cam which is used while indexing the work piece transporter there are 2 peripheral forces which are acting, one at the indexing side and the other at the pushing side /cam side. The active subsequent force which is performing on the face cam while indexing work piece transporter is deliberate. And these forces are analysed using ansys and their respective Von Mises stresses and translation plans are obtained for both the situations based on boundary and loading conditions.

.2.8 Development of a New Geneva Mechanism with Improved Kinematic Characteristics.

Intermittent rotary motion generating mechanism have been presented with Geneva wheel and curved slots.Kinematic characteristics has been vastly improved by this mechanism.Varying the slot shape from a straight radial line to a curved line outcome in the dismissal of shock loading at the intial and end of the motion cycles and decreases the wheel peak velocity and peak acceleration values, making this new mechanism appropriate for high speed applications. This growth provides an essential tool for designing a simple, practical and trustworthy intermittent motion making mechanism with outstanding kinematic characteristics.

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2.9 Multistage Geared Geneva Mechanism.

Geneva mechanism with n stages was designed by this concept.The mechanisms connected by (n-1) gears are proposed in this document.Functionof (n-1) phase angles is the dwell time produced by the system, the joint number of slots on all wheels and the number of pins on all cranks in the system.The introduction of phase angles in the design constraints family is very Important: and it provides the engineer who is working with appropriate design and it gives easy to adjust the dwell time.

3. METHODOLOGY

3.1 Existing Method

For domestic purpose Bottle Indexing & filling machines are widely used.For Medical, Bislery, and Wine industry in industry there is always used of Bottle Indexing & filling machine to fill the bottle in preferred quantity. It can be used for the special purpose machine, out of that there is generally a traditional filling machine is used in the industry. A old-style method contains filling the bottle by hand that will take more time. & also lot of wastage of water.Mostly old-style method takes lot of procedure such as intially cleaning of bottle and then check whether it is crack or not. But there is problem arises with this type process.This procedure usually take more time for setting the machine. So due to this setback the idle time of the method is more as compared to the operational time of the machine this will outcomes in the less efficiency of the machine & also it requires many operative for this method. This will outcome on the efficiency of the machine and it my reduced to 55% just due to the more idling time. By Delivering a Geneva mechanism & one limit switch time of the machine is reduced by providing this the efficiency of the machine is improved up to 94% & also normal skilled operator may be required for operate the machine due to this provision this machine is used for mass production also & it give facility to operate this machine easily. So the important aim of the project is to reduce the cycle time of the machine & attain the high manufacturing rate on old-style machine. This goal of theproject is nearly attained by completion of the project.

3.2 Geneva wheel

To step the film on one frame at a time at cinema film the Geneva wheel is used. This is a mechanism for intermittent motion. Upper one is drive by the lower one. The higher wheel only rotates intermittently (in steps)but the rotational Drive of the below wheel is continuous. For one revolution of the higher wheel it takes four revolutions of the lower wheel to produce. The Geneva drive is also commonly called a Maltese cross mechanism.Intermittent rotary motion is translated from a continuous rotation by a Geneva wheel.

Fig.1: Geneva Wheel

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The rotation speed of a machine shaft are change by the mean of gear. They can also change the movement of rotation in linear Motion and can change the direction of the axis of rotation.But mostly mechanical engineers avoid the usage of gears and are based on the arrival of electronic controls and the availability of toothed belts, because the robust gears for High-speed and / or high-power machines are frequently very difficult to design.For high-speed machines the gears are the ideal medium for less energy losses, high accuracy and reduced space.

3.4 Water Level Controller using 8051 Microcontroller

A microcontroller (or MCU for microcontroller unit) is a small computer on a single integrated circuit. In recent Terminology.It is almost a system on a chip or SoC; a SoC may include a microcontroller as one of its elements.A microcontroller also include more than one CPUs which also contain programmable input/output peripherals and memory. Program memory also include Ferroelectric RAM, NOR flash or OTP ROM on chip. Microcontrollers are designed for embedded applications,in contrast to the microprocessors used in private computers or other usual purpose applications which consist of several Distinct chips.

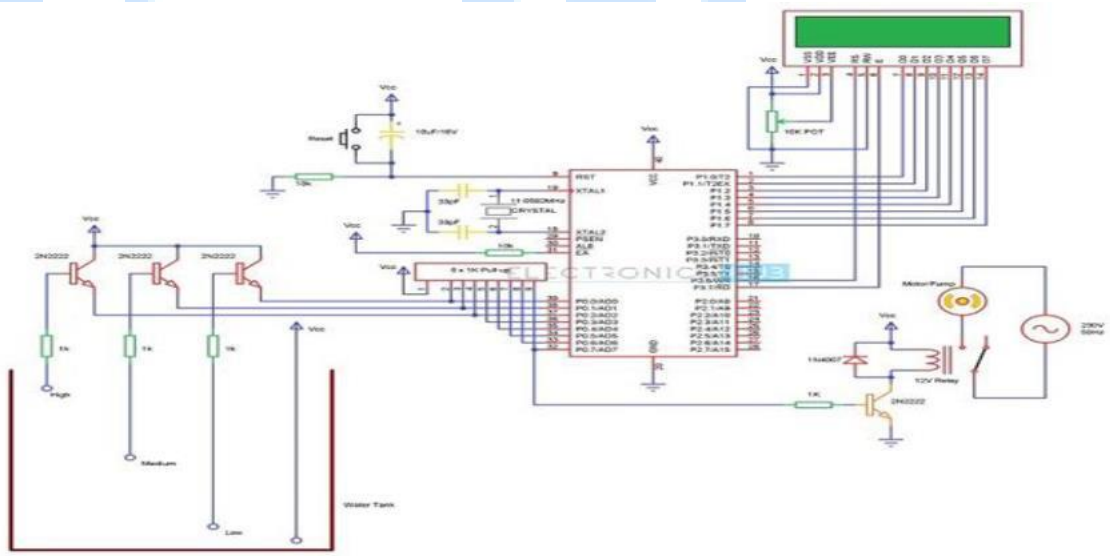

Fig2: Microcontroller 8051 Circuit Diagram

4. Expected result:

Energy consumption is lower, so this system can be used in small industries. If the correct arrangement of all components It is made of what will increase efficiency and the waste of water will be reduced. You will notice that the water filling machine with the Geneva wheel I will give quick results that the machine of manual use. It also reduces the time needed for a particular task. That It is multi-purpose and can be used for various liquids. We can also monitor the amount of water that needs to be filled using the sensor. The current system will provide a large number of applications in the field of automation, particularly in the mass production sectors.

5. CONCLUSION

We would like to express a deep sense of gratitude towards our guide Mr. Nilesh Nagare Department of Mechanical Engineering for her constant encouragement and valuable suggestions. The work that we have been able to present is possible because of her timely guidance and support.

6. ACKNOWLEDGMENT

The current system will provide a large number of applications in the field of automation, especially in mass production industries in which there are many components to be processed and managed in a short period of timeand there is a need for more production. The solenoid valve developed for this system is flexible, fast and easy. This total production output will increase; this increase in production can generate significant financial benefits and savings.

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Implementation of EGR System in Two Wheeler

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ABSTRACT

Pollution from automobile is the crucial source of Pollution. Exhaust gas recirculation or EGR works by recirculating some amount of an engine's exhaust gas back to the engine cylinders. Exhaust gas is sent back into the combustion chamber because the exhausted air is much hotter than the intake air. Usually, an engine recalculates' exhaust gas by piping it from the exhaust manifold to the inlet manifold. This design is called external EGR. A control valve within the circuit regulates and times the gas flow. The exhaust gas is used to rotate the carbon filter with control by gate valve arrangement. Carbon filter used to filter the exhaust gas and pure gas rotate to inlet manifold and undesirable gases are throughout by using gate valve arrangement. Pure gas mixed with inlet air of carburetor. It is also good with regard to economical considerations and engine efficiency. In which the efficiency of the engine can be increased.

Keywords:- *EGR, NOx, HC, CO, SI*

1. INTRODUCTION

Worldwide, the utilization of motorcycle is increasing at a rapid pace, especially in the urbanized areas of Asia. Approximately 200 million motorcycles are estimated to be in use and this number is growing at a rapid rate, mostly in Asia, where the average annual rate of growth for the region is 15%, with annual growth rates at or above 5% in most Asian countries. The majority of these vehicles are powered by two-stroke engines. Two-stroke engines have very high exhaust emissions. The large population of two-wheel vehicles accounts for a significant portion of global mobile source hydrocarbon (HC) and carbon monoxide (CO). NOx emissions from two-stroke engine vehicles are relatively small compared to other mobile sources. Confronted with the need to address deteriorating air quality, a growing number of countries worldwide have implemented, or are in the process of implementing, programs to considerably reduce gaseous emissions from spark-ignition (SI) two-wheel vehicles. Asia accounts for almost 85% of new motorcycle sales and, because of comparatively lower Asian per capita automobile and truck ownership, air quality in Asia is substantially more sensitive to motorcycle emissions impacts than non-Asian cities. Motorcycle emissions are estimated to contribute as much as 40% of PM and CO2, 50% of CO, and 70% or more of volatile organic compounds (VOCs) in some Asian cities. Nitrogen oxide (NOx) emissions can be reduced using Exhaust Gas Recirculation technology in IC engines, in which some of the exhaust gas is redirected into the charge air. This results in the reduction of the combustion temperature and less nitrogen oxide is produced. This process is known as exhaust gas recirculation (EGR) and is one of the principal methods used to reduce nitrogen oxide emissions. Recirculation of exhaust gas into the intake gas of an internal combustion engine is widely recognized as a significant method for reducing the production of nitrous oxides (NOx) during the combustion process. The recirculated exhaust gas partially quenches the combustion process and lowers the peak temperature produced during combustion. Since NOx formation is related to peak temperature, recirculation of exhaust gas reduces the amount of NOx formed.

2. LITERATURE REVIEW

Tairu OO and Tairu OT, [2017] [1], The authors of this research paper did an experimental study and found that when 2.6% of the exhaust gas recirculated into the engine there were following effect on the parameters of the engine: Significant reduction in the exhaust gas temperature the flame temperature of the engine reduced by 22%. The percentage of the flame temperature reduced is more than the percentage of power reduced and fuel economy increased. EGR is the effective way to reduce the pollution of oxides of nitrogen without increase in the other pollutants in the internal combustion engine. There was significant reduction in the flame temperature below 10% EGR

Ramakrishnan V and Dr.Purushothaman K, [2017] [2], The authors of this research paper came to a conclusion that lower emission levels are observed in four stroke engines compared to two stroke engines. Emission control system effectively reduces the exhaust emissions.EGR, during the preliminary studies, shows that HC emissions are reduced by about 20 to 25% and CO emissions are reduced by about 30 to 40%, indicating that it is effective in mitigating the pollution to a substantial degree. There is also a need to install emission control system with proper maintenance at regular intervals.

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K.Dinesh and S.Aravind, [2016] [3], The authors of this research paper found that Exhaust Gas Recirculation is a very simple method. It can be very useful and it is being modified further to attain better standards. It can be easily fitted to two wheelers to eliminate Nitrous Oxides gas from IC Engine.From emission tests we conclude that emissions of NOx decreases with increase in % of EGR due to diminised flame temperature and oxygen concentration. At the same time CO and HC emission raises as the EMF % increases. It is also found that fuel efficiency of engine is slightly increased.

Er. Amit Tiwari and Er. Hemendra Purbia, [2016] [4], The improved engine efficiency modes have also resulted in lowered fuel consumption. In the world of new High-speed cars and bikes to achieve maximum engine power, top fuel efficiency and minimum emission levels during all type of operating condition. The digital spark ignition is the best alternative for conventional ignition control. Computerized control gives accurate timing for all operating condition. At the same time use of two spark plug improves thermodynamic efficiency and power available. Due to magnetic arrangement inside the piston designs is ideal but if work on it gives to high speed because EMF induced by which extra effort apply without any extra fuel used.

V.Ramakrishnan, et al [2015] [5], The authors did an experimental study and concluded that in half throttle conditions SFC is very low. Power output increases in all engine speed conditions since short circuiting of fresh air fuel mixture is avoided and unburned hydrocarbons are reduced by means of improved scavenging technique.Combustion process behaviour influences resulting exhaust emissions. HC emissions are reduced by about 20 to 25% and CO emissions are reduced by about 30 to 40 %.

Anu Nair P, et al[2015] [6], Gasoline consumption with EGR facility is reduced from 5% to 27% for wide throttling to part throttling when compared to normally aspirated engine. EGR at 4.8 percent recirculation is better than other two opening positions so that thermal efficiency of the engine is enhanced by 35%. Gasoline operated EGR system produces CO and HC emission contents about 46% and 58% respectively less than the normally aspirated Non-EGR engine. Ethanol operation stalls the engine with EGR facility. Ethanol operation reduces CO by 85% and HC by 95% when compared to gasoline operation.

Salunkhe Karan et al [2014] [7], The authors of this research paper concluded that Exhaust Gas Recirculation Technique with optimum percentage of flow gives the desired results i.e. reduction in amount of NOx emission from the exhaust gases. As seen, Exhaust Gas Recirculation is a very simple method. It has proven to be very useful. From results we conclude that emissions of CO are reducing with increase in % of EGR. Also emissions of NOx decreases continuously with increase in % of EGR. In case of HC, it increases slowly up to 37.5% and then shows rapid increase.

3. PROBLEM DEFINITION

As we know that Automobile pollution is a major source of pollution. It becomes necessary that we must control the amount of pollution from automobile and try to minimize it to maximum possible level. Mostly two wheelers don't come with an EGR system, so our aim to make a system which can be installed in two wheelers which will help in reducing the amount of NOx generated due to increase in temperature during the combustion process. By recirculating some amount of exhaust gases into the cylinder we can reduce the temperature in the cylinder and as NOx is a function of temperature, its formation will also reduce accordingly. In addition to reduction in amount of NOx the fuel efficiency of the system is also increased. Nitrogen oxides are one of the main pollutants emitted by vehicle engines. Once they enter into the atmosphere, they are spread over a large area by the wind. When it rains, water then combines with the nitrogen oxides to form acid rain. This has been known to damage buildings and have an adverse effect on ecological systems. Too much NOx in the atmosphere also contributes to the production of SMOG. When the sunrays hit these pollutants SMOG is formed. NOx also causes breathing illness to the human lungs.

4. METHODOLOGY

EGR works by recirculating a portion of an engine's exhaust gas back to the engine cylinders. The exhaust gas from the muffler is passed to a Heat exchanger (Coolant Box) and then to the inlet of the IC engine. The Heat exchanger contains coolant (Engine oil), a spiral coil arrangement (like economiser), Fins and carbon filter. Here the temperature is reduced more than 150° from exhaust gas since coolant and Fins absorbs heat while passing through the coil. The activated Carbon filters removes small quantity of carbon monoxide from exhaust gas. Then the low temperature exhaust gas is sent to EGR valve which sends 10 -15 % of exhaust to inlet manifold and remaining to the atmosphere. Inter mixing the incoming air with recirculated exhaust gas dilutes the mix with inert gas, thus lowers the adiabatic flame temperature and reduces the amount of excess

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oxygen. The exhaust gas also increases the specific heat capacity of the mix lowering the peak combustion temperature. Because NOx formation progresses much faster at high temperatures, EGR serves to limit the generation of NOx. NOx is primarily formed when a mix of nitrogen and oxygen is subjected to high temperatures. When the exhaust gas continues to recirculate at each stroke NOx emissions are reduced gradually. The activated Carbon Filters is used in the exhaust pipe which removes small quantity of carbon monoxide from exhaust gas.

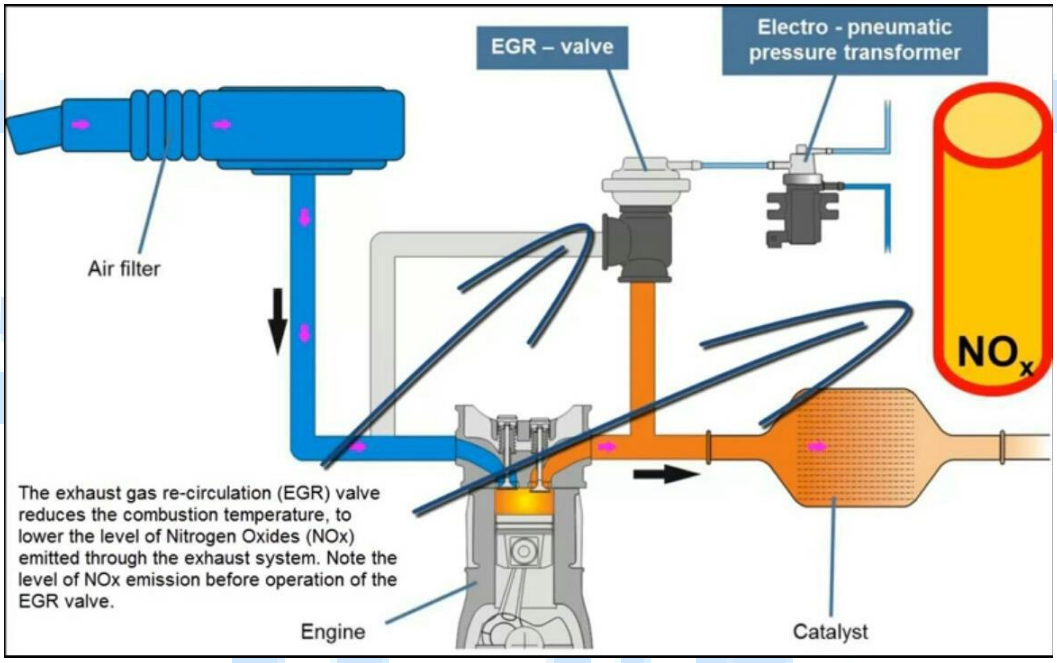

Chart-1: Block Diagram of EGR

5. CONCLUSION

Thus, using Exhaust Gas Recirculation Technique in engines, the emissions can be very much controlled due to lesser amounts of NOx entering the atmosphere. Thus the emission levels to be maintained are attained by the engines.It has proven to be very useful and it is being modified further to attain better standards. This method is very reliable in terms of fuel consumption and highly reliable. Thus EGR is the most effective method for reducing the nitrous oxide emissions from the engine exhaust.

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Naval Gear Orienteer

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ABSTRACT

Early man was an seasoned traveller, and he often come across situations in which natural milestones and guiding references failed him. His first fruitful efforts to devise an artificial heading location to aid him in his expeditions are generally accepted to have been made in ancient China. Mentions to these instruments in original texts are scant and unclear, and are sometimes accredited to legend rather than to fact. The "south pointer" mentioned in these writings was thought by early investigators to refer to the magnetic compass, but modern scholars feel that there have been blunders in analysis, and that the magnetic compass was not developed until a much later era. This report describes the design and manufacture of a working model of a south-pointing carriage based upon a sensible speculation as to the working principles of the original instrument. Evidences derived from ancient texts were used when applicable. This report presents a systematic approach for the reconstruction of all possible topological structures of lost ancient Chinese mechanisms. This paper aims at presenting the approach that utilizes the idea of creative mechanism design methodology to converge the divergent conceptions from the results of literature studies to a focused scope, and then applies the mechanical evolution and variation method to obtain feasible reconstruction design concepts that meet the scientific and technological standards of the subjects' time period.

***Keywords*—reconstruction, design, mechanism, errors, gear, instrument, navigation.**

1. INTRODUCTION

The naval gear orienteer works on standard of south-pointing chariot. It is a jewel of Chinese culture and also an excellent symbol of ancient Chinese technical and scientific achievement. It also has received substantial attention from the academic community both in China and overseas [1].

Chinese ancient south-pointing chariot is commonly regarded as a breakthrough in the development of gear train mechanism and automation. Nowadays many types of assembly of south-pointing carriage have been mended and restored. However, there still remain many problems, such as inconvenient handling and poor orientating accuracy caused by multiple gears and complex structure. Based on the principle analysis of south-pointing chariot, the differential gear train is used in the new orientating structure of south-pointing carriage, which has higher accuracy and simple structure The mechanical orientating function of the new positioning structure is analysed based on the mechanical principle of gear transmission. The structure system transmission error is analysed, and the mathematical connection between orientating structure system miscalculation and transmission fault of gear pairs is derived [2].

Its use affords experimental demonstration and even numerical checking (within a reasonable accuracy) of all the features of curvature and parallel transport of vectors in a two-dimensional surface [3].

2. LITERATURE REVIEW

AC Mitchell 1932 [4]

The science of Terrestrial Magnetism is based on the fact that a magnet, free to move about its centre of gravity, tends to assume a position of relative rest in an approximately definite direction with respect to the geographical meridian and the vertical at the place of observation.

Lu Jingyan 1984 [5]

As to the differential gearing system, an endeavour should be made to get some basis from historical materials. There have been some incorrect descriptions of the south-pointing chariot, too many about differential gearing, and some imprecise words appeared in some articles.

Ravisankar, R , Mruthyunjaya 2006 [6]

They found two main applications: in heavy-duty machines such as mills and irrigation wheels, where they transmitted considerable power.

3. METHODOLOGY

When the carriage with two wheels follows a rounded trajectory, the wheel located on outside of the curve must navigate a larger distance than the wheel on the internal side. One can visualize easily, the carriage can turn in place around one of its wheels, i.e. that one wheel remains secure and the other one traces on the ground a circle which radius is the space between the wheels (a geometric compass to some extent).

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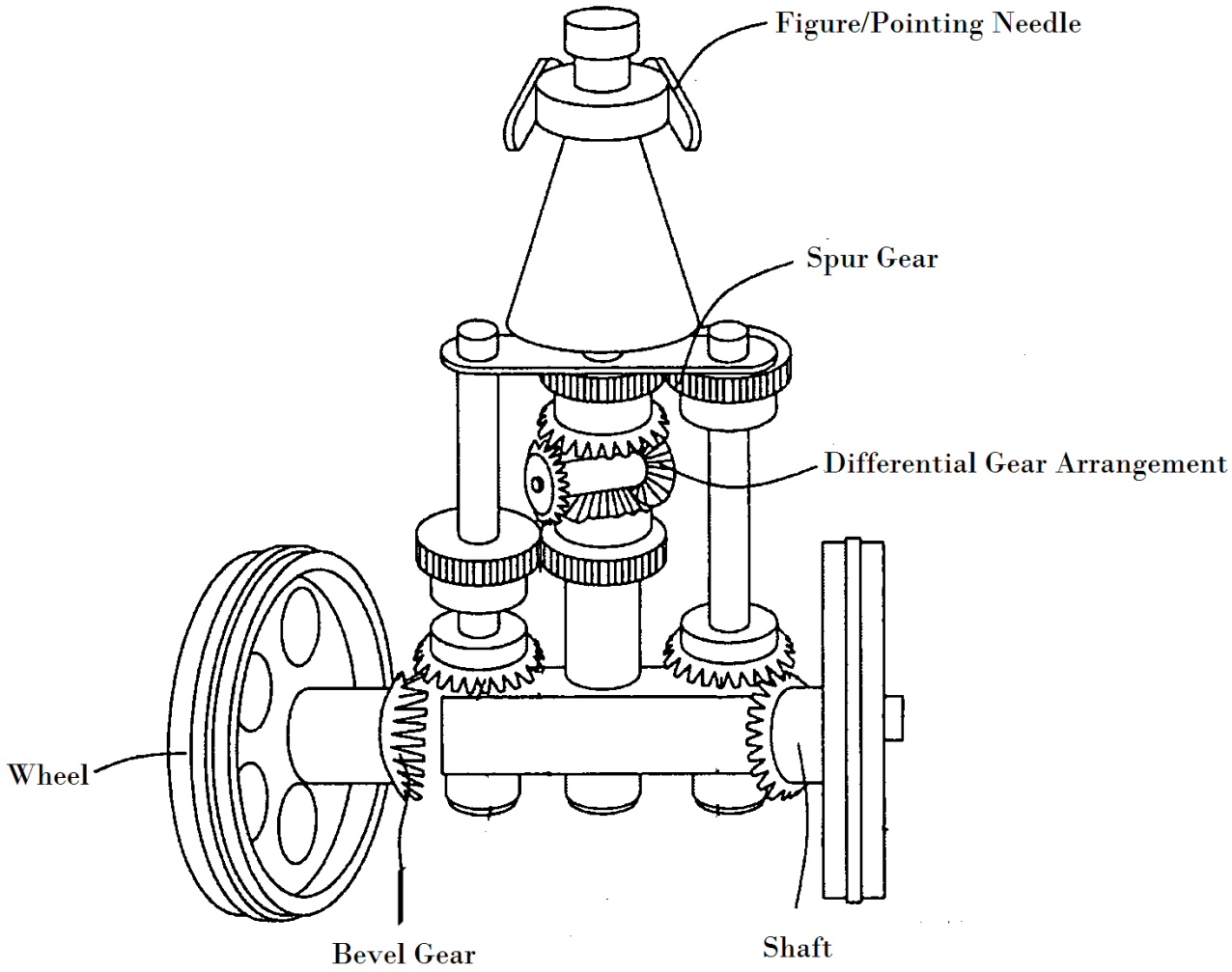

Fig. 1 Mechanism of Naval Gear Orienteer

4. PROBLEM DEFINATION

Magnetic fields from electronics can easily upset the needle, averting it from aligning with the Earth's magnetic fields, instigating inaccurate readings. The Earth's natural magnetic forces are considerably feeble, measuring at 0.5 Gauss and magnetic fields from household electronics can easily surpass it, the compass needle. Contact to magnetic intervention can sometimes cause the magnetic poles of the compass needle to vary or even reverse. For example, certain rocks which contain magnetic minerals like Magnetite. To see if a rock or an area is causing meddling on a compass, get out of the area, and see if the needle on the compass moves.

4.1 Drawbacks of existing method (magnetic compass)

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- Although it is very reliable at temperate latitudes but in geographic regions near the magnetic poles its reliability reduces. The relative difference between the directions to the geographical north and magnetic north, becomes bigger and bigger as we move the compass [7].

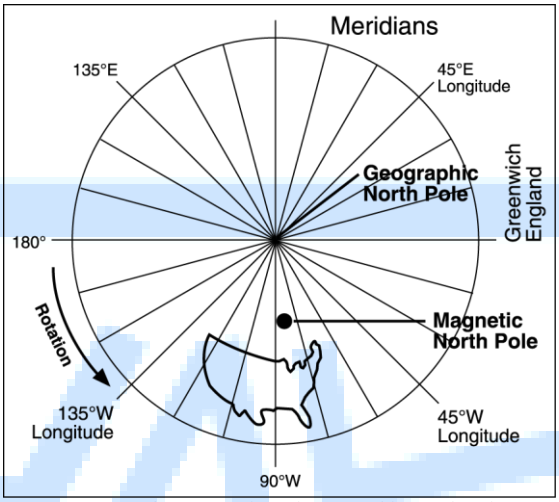

Fig. 1 Earth's Magnetic and Geographic North Pole

- The magnetic pole the compass will not show you a precise direction at certain point but will also begin to drift. Compasses with cheap bearings will get because of this and will indicate a wrong direction [8].
- Native settings may contain magnetic deposits or MRI scanners and large iron or steel bodies, electrical engines or permanent magnets which affect the accuracy of compass [9].
- Magnetic compasses are disposed to to mistakes in the neighbourhood of bodies which are electrically conductive [10].

Fig. 3 Error in Magnetic compass due to proximity of a magnet

- Errors occur when the compass is accelerated or decelerated in a plane or vehicle. Depending on which of the Earth's hemispheres the compass is located and if the force is acceleration or deceleration the compass will increase or decrease the indicated heading [11].
- Magnetic compass has another error that is turning error. The compass will also lag behind the turn when one goes from a heading of east or west [12].

Applications

- It can be used in physical regions near the Earth's magnetic poles where the magnetic compass gives declination fault [13].
- At some places on earth due to anomalies the magnetic compass does not even work, at such places the Naval Gear Orienteer can be proficiently used.

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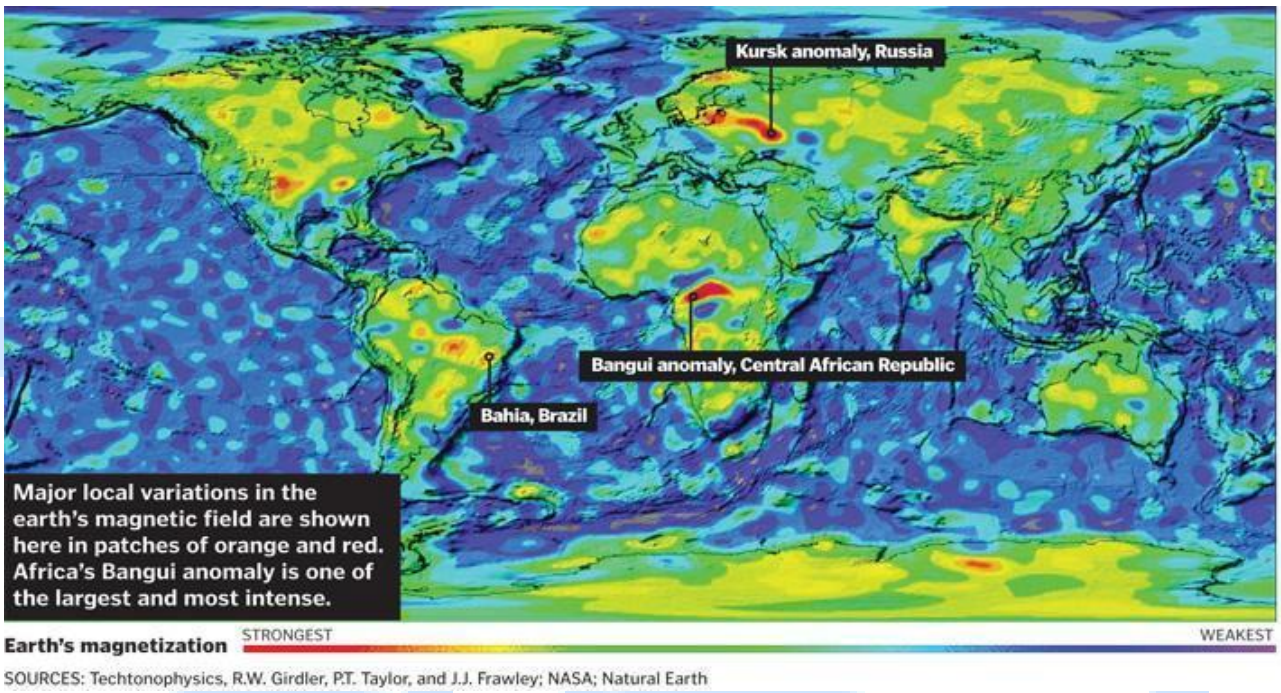

Fig. 4 Places on Earth with Magnetic abnormalities

- The Mars and Venus has no inner dynamo effect to create a major universal magnetic field. The Naval Gear Orienteer can be used by the Organizations to find directions on other planets.
- An electrically conductive body produces faults in any magnetic compass by its own magnetic field due to Faraday Effect which usually affects magnet compasses, does not befall in the naval gear orienteer [14].
- Pauses occur when one turns from a heading of east or west the magnetic compass. Such pauses will not occur in naval gear orienteer [15].

5. RESULTS AND DISCUSSION

Most difficult task of the rebuilding research on antique machinery will be to create the reconstruction designs. In accordance with the historical literature of Naval Gear Orienteer in ancient China, the interior mechanisms are still mysteries. Particularly the study systematically provides a different view for the structural synthesis of the lost ancient machinery.

The following study proposes novel representations for joints and members. Following study not only shows different designs with the same topological structures in the analysis process, but also indicates the parts of the Naval Gear Orienteer. The design constraints of Naval Gear Orienteer are defined according to the geometrical structures of the existing designs. The approach is presented for synthesizing all possible design concepts of the differential-type Naval Gear Orienteer that are consistent with available mechanical members of the subject time period. This result of work provides a novel approach for the study of lost ancient machinery, especially the Naval Gear Orienteers.

6. CONCLUSION

In this paper, a substitute method for navigation "The Mechanical Compass" is discussed and illustrated. The mechanical advancements and science has brought few systems in these fields. Most of them are dependable. Many others have economic benefit. However their applications are constrained in few locations. It puts a restriction in human search. The device proposed in this paper brings a medication on these drawbacks. It makes the current model more accurate and reliable. It opens newer gates of exploration and also will provide new routes for passage. Close by are multiple models presented in this report and one of them is taken into consideration and expounded thoroughly to the vision of making its idea clearer. So use of simple yet effective differential gear drive removes the electrical and magnetic drawbacks and makes the system reliable and quick. Its mechanism along with its operation has been properly clarified along with its progression from its early design which is attempted to enhance.

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Design of analysis of system for steam to air cooling

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ABSTRACT

Now-a-days the refrigeration has become an essential part of human being; it is use for preserving food and cooling purpose. Also fuel availability is less & its consumption rate is more. So we are using waste heat energy for run the refrigeration system. The waste steam energy in the form of exhausted from hotel kitchen, exhaust gas of power plant, automobile IC engine, hot spring (Source of Geo thermal energy), solar energy, etc. In vapour absorption system there is use of generator and pump by using heating coil for generating steam. So we are using waste steam. The vapour absorption refrigeration system is one of the oldest methods of producing refrigerant effect.

The price of fuel is sky rocketing and so is the pollution in the atmosphere. And with the rise in number of vehicles on road the demand for fuel is also increasing rapidly. A large amount of the fuel is used up to run automobiles. These automobiles which use IC engines have a very low efficiency of about 30% to 35%. The rest of the 65% of heat input is lost in various forms to the surroundings through cooling water, exhaust gases and radiation. Still the 35% of work is not utilized completely due to dissipative effect of friction. The present day customer expects his ride to be comfortable. And with rising temperatures automobile air conditioning is a necessity. However, this comfort cooling comes at the cost of higher fuel expenses. The unit needs constant power which is obtained from the engine, thus resulting in loss of engine power as well as mileage. This project aims at reducing the fuel consumption of the vehicle and thus increase fuel economy by reducing the load on the engine by using the excess heat available in the exhaust gases and implementing the vapor absorption system for air conditioning.

Keywords: ***mechanical, refrigerant,.***

1. INTRODUCTION

Air conditioning of a vehicle can be done by two methods. First is Vapor Compression Refrigeration System (VCRS) and another is vapor absorption refrigeration system (VARS).Presently, in the vehicles VCRS is use in most of the cases. In lieu of VCRS, if, VARS is used in vehicles the refrigeration system could be operable in a vehicle without adding running cost for air conditioning. There is a great impact on the running cost of a vehicle due to increasing cost of fuel. The A/C system adds nearly 35 % extra cost in fuel expenses.

Alternately, it becomes a matter of investigation that waste heat recovery of an engine for application in car A/C can reduce the fuel economy of vehicles. Literature review gives that there is an indication that reducing the A/C load decreases A/C fuel consumption. An automobile engine utilizes only about 35% of available energy and rests are lost to cooling and exhaust system. If one is adding conventional air conditioning system to automobile, it further utilizes about 5% of the total energy. Therefore automobile VCRS become costlier, uneconomical and less efficient. Additional of conventional air conditioner in car also decreases the life of engine and increases the fuel consumption. For very small cars compressor needs 3 to 4 bhp, a significant ratio of the power output. Keeping these problems in mind, a car air conditioning system is designed from recovery of Exhaust waste heat using as source / generator for VARS.

The conventional ac system in automobiles uses vapour compression refrigeration system, where the compressor handles refrigerant in vapour form under adiabatic condition, according to adiabatic work relation for open system W = - V. dP (where V is volume in m3, dP pressure rise, W is work required to attain dP) if the fluid require pressure rise is vapour compared to liquid absorb more work, since volume V is much higher for vapour compared to liquid. Thus vapour absorption system is best alternative which handles liquid instead of vapour, but it requirehightemperatureheatsourceforseparationathighpressureend,luckily the availability of high temperature exhaust gas provides solution to this requirement with free of cost. This reduces heat loss to atmosphere and act as Waste Heat Recovery system.

Vapour Absorption Systems offer many advantages like it offers flexibility to utilize any sort of low grade, low cost heat energy available to produce cooling and thus giving a high savings in operating costs. It can operate on steam or any other waste heat source as the energy source instead of costly and unreliable electric power. No moving parts ensure noiseless, vibration-less and trouble free operation. Moreover maintenance costs are negligible as compared to power driven mechanical systems. Refrigerating effect is produced using a clean refrigerant in place of ozone-depleting chlorine based compounds.

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2. LITERATURE SURVEY

1. Liu et al (2010) have studied on active low grade energy recovery potential for building energy conservation and said that the technologies of low-grade thermal energy recovery for refrigeration, heating and dehumidifying are promising. Waste heat and cold recovery facilities in air14 conditioning room and thermoelectric technology are employed to perform the low-grade energy recovery. Novel energy conservation window-type air conditioners were designed and built combining with waste heat recovery facility. Pre cooling/heating fresh air is an effective way to simultaneously enhance ventilation and energy conservation, which is the final objective of this thermal energy recovery window-type air conditioner for an occupied open-plan space. Up to date, technologies of heat recovery, mass recovery and multi-stage recovery are promising for improving the COP of thermoelectric units.

2. Alizadeh et al [1] carried out theoretical study on design and optimization of water – lithium bromide refrigeration cycle.

3. Srinivas (2003) has made several different approaches to meet the related goals of reducing greenhouse gas emissions and ozone-depletion attributable to space-conditioning systems. The approaches include reducing refrigerant inventories, miniaturization of components using micro channel components, increasing energy efficiency through enhanced heat exchanger performance, waste heat utilization, and coupling the heat pump to a ground source/sink.

4. Ercan and Gogus [4] showed the irreversibility's in components of aqua-ammonia absorption refrigeration system by second law analysis. They calculated the dimensionless exergy loss of each component, exergetic coefficient of performance, coefficient of performance and circulation ratio for different generator, absorber evaporator and condenser temperature.

5. Talbi and Agnew [10] carried our exergy analysis on single effect absorption refrigeration cycle with lithium bromide water as the working fluid pairs

6. Horuz [8] explained the fundamental vapour absorption refrigeration system and carried out comparative study of such system based on ammonia-water and water lithium bromide working pairs. The comparison of two systems is presented in respect of COP, cooling capacity and maximum and minimum pressures. He concluded that VAR system based on water-lithium bromide is better than ammonia-water. However, problem of crystallization lies with water-lithium bromide system.

7. Bell et al [7] developed a LiBr-H20 experimental absorption cooling system driven by heat generated by solar energy. The components of the system are housed in evacuated glass cylinders to observe all the processes. They determined the thermodynamic performance of the system by applying mass and energy balance for all the components. Their work was based on the assumption that the working fluids are in equilibrium and the temperature of the working fluid leaving the generator and absorber is equal to the temperature of generator and absorber respectively. They concluded that the COP of the system depends on generator temperature and there is optimum value of generator temperature at which COP is maximum. They also concluded that by operating the system at low condenser and absorber temperatures a satisfactory COP is obtained at a generator temp. as low as 68oC

8. Sozen [13] studied the effect of heat exchangers on the system performance in an ammonia water absorption refrigeration system. Thermodynamic performance of the system is analyzed and the irreversibility's in the system components have been determined for three different cases. The COP, ECOP, circulation ratio, and non dimensional exergy loss of each component of the system is calculated. They concluded that the evaporator, absorber, generator, mixture heat exchanger and condenser show high non-dimensional exergy losses. They also concluded that using refrigerant exchanger in addition to mixture heat exchanger does not increase the system performance.

9. De Francisco et al [15] developed and tested the prototype of a 2kW capacity water ammonia absorption system operating on solar energy for rural applications.

10. Fernandez-Seara and Vazquez [14] studied the optimal generator temperature in single stage ammonia – water absorption refrigeration system.

3. PROBLEM DEFINITION

The price of fuel is sky rocketing and so is the pollution in the atmosphere. And with the rise in number of

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vehicles on road the demand for fuel is also increasing rapidly. A large amount of the fuel is used up to run automobiles. These automobiles which use IC engines have a very low efficiency of about 30% to 35%. The rest of the 65% of heat input is lost in various forms to the surroundings through cooling water, exhaust gases and radiation. Still the 35% of work is not utilized completely due to dissipative effect of friction. The present day customer expects his ride to be comfortable. And with rising temperatures automobile air-conditioning is a necessity. However, this comfort cooling comes at the cost of higher fuel expenses. The unit needs constant power which is obtained from the engine, thus resulting in loss of engine power as well as mileage. This project aims at reducing the fuel consumption of the vehicle and thus increase fuel economy by reducing the load on the engine by using the excess heat available in the exhaust gases and implementing the vapor absorption system for air-conditioning.

- In VARS system generator required to develop steam. So it causes we have to utilize electricity and other medium. So it increase cost of system.
- So we have decide to avoid generating heat we make use of waste heat from other application. So we can run A/C system without consuming external source.
- The R12, R32 etc. refrigerant harmful for environment and depletion of ozone layer (O_3).
- Compressor which is used in VCRS system which require electricity, so that increasing in cost.
- Utilizing exhaust flue gases from chimney and power plant.

4. METHODOLOGY

Existing Method

Simple vapour absorption system

In VARS System, the low pressure Ammonia vapour leaving the Evaporator enters the absorber. Where it is absorb by cold water in the absorber. The water has the ability to absorb very large quantities of Ammonia vapour and solution, thus formed, is known as Aqua-Ammonia. The absorption of Ammonia vapour in water lowers the pressure in the absorber which in turn draws more Ammonia vapor from the Evaporator and thus raises the temperature of solution. Some form of cooling arrangement (usually water cooling) is employ in the absorber to remove the heat of solution evolved there. This is necessary in order to increase the absorption capacity of water, because at higher temperature water absorbs less Ammonia vapour. The strong solution thus form in the absorber is pumped to the generator by liquid pump. The pump increases the pressure of the solution up to 10Bar.

The strong solution of Ammonia in the generator is heated by some external source such as gas or steam. Using the heating process, the Ammonia vapour if driven off the solution at high pressure living behind the hot weak Ammonia solution in the generator. This weak Ammonia solution flows back to absorber. At low pressure after passing through the pressure reducing valve. The high pressure Ammonia vapour from the generator is condense in the condenser to a high pressure liquid Ammonia. This liquid Ammonia if passed to the expansion valve through the receiver and then to the evaporator. This completes the simple vapour absorption cycle.

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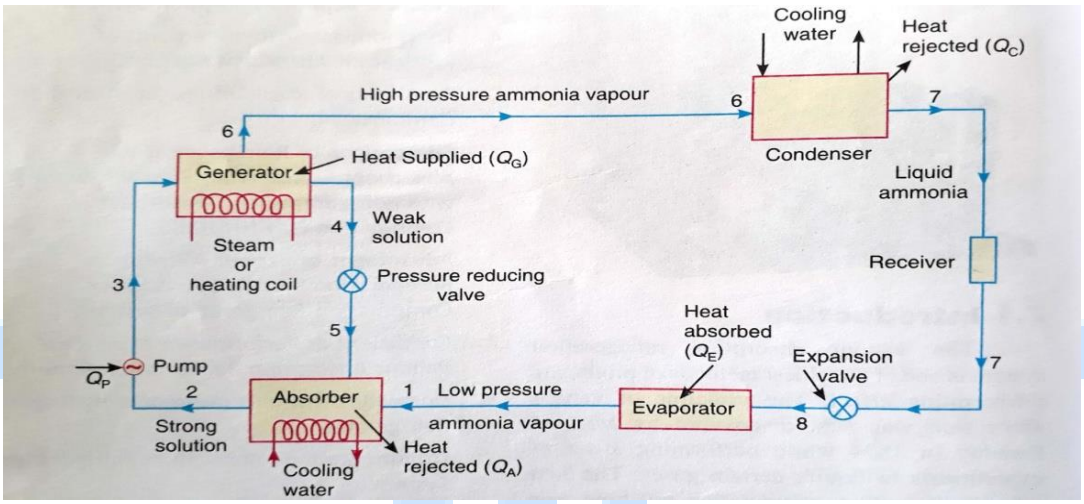

Fig 1. Simple Vapour Absorption System

Components of a Vapour Absorption Cooling System:

Generator: The purpose of the generator is to deliver the refrigerant vapour to the rest of the system. It accomplishes this by separating refrigerant from the solution. In then generator, the solution vertically falls over horizontal tubes with high temperature energy source typically steam or hot water flowing through the tubes. The solution absorbs heat from the warmer steam or water, causing the refrigerant to boil (vaporize) and separate from the absorbent solution. As the refrigerant is boiled away, the absorbent solution becomes more concentrated. The concentrated absorbent solution returns to the absorber and the refrigerant vapour migrates to the condenser.

Condenser: The purpose of condenser is to condense the refrigerant vapours. Inside the condenser, cooling water flows through tubes and the hot refrigerant vapour fills the surrounding space. As heat transfers from the refrigerant vapor to the water, refrigerant condenses on the tube surfaces. The condensed liquid refrigerant collects in the bottom of the condenser before travelling to the expansion device. The cooling water system is connected to a cooling tower.

Expansion Valve: From the condenser, the liquid refrigerant flows through an expansion device into the evaporator. The expansion device is used to maintain the pressure difference between the high-pressure (condenser) and low-pressure (evaporator) sides of the refrigeration system. As the high-pressure liquid refrigerant flows through the expansion device, it causes a pressure drop that reduces the refrigerant pressure to that of the evaporator. This pressure reduction causes a small portion of the liquid refrigerant to boil off, cooling the remaining refrigerant to the desired evaporator temperature. The cooled mixture of liquid and vapour refrigerant then flows into the evaporator.

Evaporator: The purpose of evaporator is to cool the circulating water. The evaporator contains a bundle of tubes that carry the system water to be cooled/chilled. At low pressure existing in the evaporator, the refrigerant absorbs heat from the circulating water and evaporates. The refrigerant vapours thus formed tend to increase the pressure in the vessel. This will in turn increase the boiling temperature and the desired cooling effect will not be obtained. So, it is necessary to remove the refrigerant vapours from the vessel into the lower pressure absorber. Physically, the evaporator and absorber are contained inside the same shell, allowing refrigerant vapours generated in the evaporator to migrate continuously to the absorber.

Absorber: Inside the absorber, the refrigerant vapour is absorbed by the solution. As the refrigerant vapour is absorbed, it condenses from a vapour to a liquid, releasing the heat it acquired in the evaporator. The heat released from the condensation of refrigerant vapours by their absorption in the solution is removed by the cooling water circulating through the absorber tube bundle. The weak absorbent solution is then pumped to the generator where heat is used to drive off the refrigerant. The hot refrigerant vapours created in the generator migrate to the condenser. The cooling tower water circulating through the condenser turns the refrigerant vapours to a liquid state and picks up the heat of condensation, which it rejects to the cooling tower. The liquid refrigerant returns to the evaporator and completes the cycle.

Developing Method

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The working method is vapour absorption system close to the exhaust manifold. Due to the supplied heat to the mixture in the generator the refrigerant is separated from the strong solution and forms vapour. The remaining weak solution flows back through a restrictor in to the absorber. The refrigerant is then allowed to pass through a condenser where the heat of the vapour is extracted and the refrigerant temperature is brought to the desired temperature. This cooled refrigerant is then passed through an expansion device where during expansion the temperature of the refrigerant falls below the atmospheric temperature. The cold refrigerant is then allowed to pass through an evaporator from where the refrigerant absorbs heat and produces refrigerating effect. The refrigerant coming from the evaporator is hot and it is passed to the absorber.

The weak solution coming from the generator mixes with the refrigerant coming from the evaporator in the absorber due to high affinity towards each other for the two fluids, hence forming a strong solution. The formed strong solution is again pumped into the generator and the cycle repeats itself.

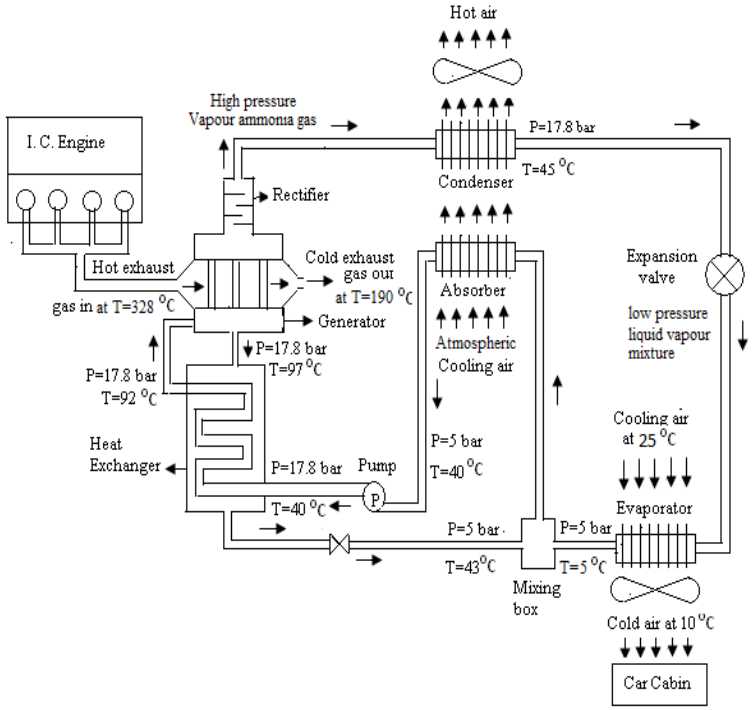

Fig 2. Schematic diagram of air conditioning system.

5. CONCLUSIONS

- Thus we studied that how to use of waste heat energy.
- The waste heat energy which coming from IC Engine, power plants, solar, Hotels Chimney etc. Which we utilized for air conditioning system, so we decrease the operating cost.
- So this waste energy we are using in Vapors Absorption Refrigeration System (VARS).

In which normally generator operated by heating coil, so we replace to it by using waste steam energy.

6. ACKNOWLEDGMENT

We would like to express a deep sense of gratitude towards our guide Mr. Aniket Deshmukh Department of Mechanical Engineering for their constant encouragement and valuable suggestions. The work that we have been able to present is possible because of their timely guidance and support.

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TITLE: Pesticide Sprayer Using Oscillation Mechanism

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ABSTRACT

The India is a land of agriculture which comprises of small, marginal, medium and rich farmers. Due to increase of population in India it becomes necessary to modernize our agricultural sectors. Small scale farmers are yet interested in traditional ways of farming because of its versatility cost and design. But this sprayer has certain limitations like it cannot maintain required pressure also leads to problem of back pain. This traditional ways also lead to misapplication of chemicals and ineffective control of target pest which leads to loss of pesticides or drift during application. This phenomenon causes environmental pollution and imbalance in natural eco system. This paper suggests a model of manually operated multi nozzle pesticides sprayer which will perform spraying at maximum rate in minimum time. Constant flow valves can be applied at nozzle to have uniform nozzle pressure.

For spraying pesticides lever is operated by electrical battery or using man power in Normal Spray pumps. In push operated spray pump a special mechanism is used to translate rotary motion into reciprocating motion and this motion is used to operate pump lever; this pump lever increases the pressure on pesticides and pesticides will be sprayed without more efforts.

Keywords: - *Sprayer, Nozzle, Pesticide, Pump, Mechanical Engineering.*

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1. INTRODUCTION

Agriculture has a significant role in socio-economic development of our country. India has 73% of population directly or indirectly depending on farming. Hence it is said that India is an agricultural based country. But till now our farmers are doing farming in same traditional ways. They are doing seed sowing, pesticide spraying, cultivating by conventional methods. There is a need of development in this sector and most commonly on fertilizer pesticides spraying techniques as it requires more effort and time by traditional ways. Farming has undergone a great evolution since last 50 years. In the modern agriculture the use of pesticide is constantly increasing, moreover 90% of these pesticides are being applied in the form of spraying which maintains an ecofriendly approach. Spraying is one of the important operation in which farmers face economic difficulties in case of chemically of electrically operated sprayers and health issues in case of hand operated pumps. So the one solution to overcome this problem is the use of equipment developed for application of pesticides through the use of mechanical power.

2. PROBLEM STATEMENT

Farmers using these types of conventional sprayers face health issues like fatigue, tiredness, pain in the spinal cord and muscles pain. Problems like heaviness of the sprayer or huge sizes of pumps combine with a lack of awareness and technical knowledge as well as inadequate maintenance has led to unacceptable risk to human health and flora and fauna of our country.

3. COMPONENTS

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There are 8 essential components

Sprockets

Chain

Crank

Connecting Rod

Pump

Nozzle

Wheel

Tank

3.1 Sprockets

The name 'sprocket' applies generally to any wheel upon which radial projections engage a chain passing over it. It is distinguished from a gear in that sprockets are never meshed together directly, and differs from a pulley in that sprockets have teeth and pulleys are smooth. We use freewheel and chain wheel for chain and sprocket arrangement.

3.2 Chain

The chain is made of steel which is used to transmit power from gear sprocket to pinion sprocket, and it has a no sleep.

3.3 Crank

The function of crank is to transfer motion from prime mover to the connecting rod for further operation. Here the circular disc having eccentricity at which rotary motion of crank is converted into reciprocating/linear motion of connecting rod.

3.4 Connecting Rod

The main function of connecting rod is to convert rotary motion into reciprocating/linear motion. Here connecting rod convert rotary motion of crank to reciprocating motion of pump and extension rod.

3.5 Pump

It consists of piston and cylinder arrangement, it has a lever to operate the motion of piston in reciprocating direction. The pump generates the pressure of 2 bar and discharge of 2 lpm.

3.6 Nozzle

It is a device which converts the pressure energy of fluid into kinetic energy, spray nozzle is a precision device that facilitates dispersion of liquid into a spray. Nozzle is used for purpose to distribute a liquid over an area.

3.7 Wheel

Wheel is used to carry the whole assembly and move machine from one place to another by rotary motion of it. A bicycle wheel is a wheel, most commonly a wire wheel, designed for a bicycle. Bicycle wheel is designed to fit into the frame and fork via drop outs, and hold bicycle tire. A typical modern wheel has a metal hub, wire tension spokes and a metal or carbon fiber rim which holds a pneumatic rubber tire. We use a tubeless tire wheel.

3.8 Tank

We want our tank to carry as much fluid as it can be along with its self-weight as less as possible. We have taken a tank which is almost 16 liter capacity. A material for tank used is plastic fiber. Plastic fiber is very low in weight as compared to other materials. It also has very low cost.

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4. Working

Figure shows the assembly of the agricultural reciprocating multi sprayer. The operator grabs the handle and pushes the cycle forward as cycle moves forward, the wheel rotate. When the wheel rotates then the gear sprocket mounted on wheel is also rotate at same speed. The chain drive transfers the motion of gear sprocket to pinion sprocket. The pinion sprocket and crank is mounted on either side of same shaft, the rotary motion of shaft is converted into the reciprocating motion with the help of crank and connecting rod mechanism. The connecting rod is also connected with lever and then the lever oscillates at fulcrum. The piston connected at fulcrum produce reciprocating motion in cylinder and the required pressure is achieved. The pesticide from tank sucks in cylinder and piston forced the pesticide to nozzle through the pipe; the numbers of nozzles are connected to spray the pesticide. We can adjust the pressure, which is required for spraying with the help of special arrangement is to change the length of crank by providing slot on crank. By providing some adjustment at joint of connecting rod and lever free rotation of crank or neutral position can be achieved.

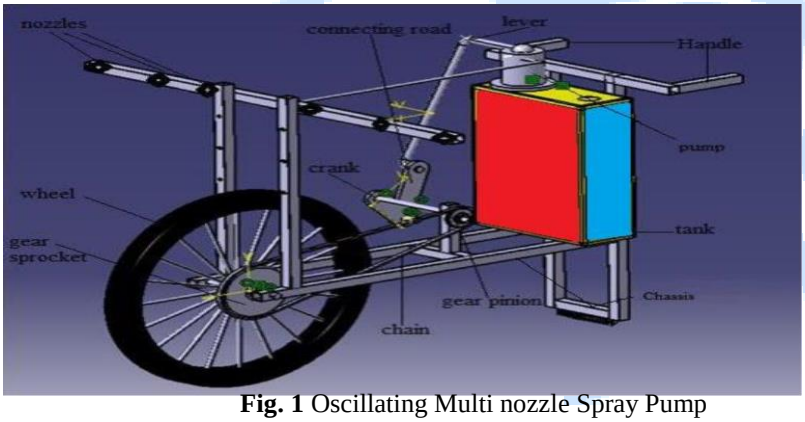

Fig. 1 Oscillating Multi nozzle Spray Pump

Using these adjustments pumping is stop and the wheel rotate freely when you need not spray pesticide. Height, position and angle of the nozzle can be adjustable. This mechanism converts rotary motion into reciprocating motion. So due to reciprocation of piston the pressure develops in the hydraulic pump. In manual operation of pump this pressure can be developed by oscillating the handle of pump. So by this mechanism we can easily develop the pressure in the pump. This pressure chamber and other end is connected with the nozzle. Thus, the pressurized pesticide-water mixture come in the discharge line and from there this mixture is came outside by the help of nozzle. The length of discharge line is adjustable so by adjusting the position of delivery pipe we can adjust the length of discharge pipe. When the distance between two rows of plant is more(Max. 0) then we can increase the length of discharge pipe, so we can easily spray the pesticide to these rows and when this distance is so closed(Min. 0) then we can decrease the length of discharge pipe and spray the pesticide easily. So in both situation we can easily spray pesticide very effectively. This is advantage of this mechanism.

5. CONCLUSION

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It is upgraded design of manually operated sprayer which will be helpful for small land farmers. It consumes less time and saves money as compared with traditional spraying techniques. This machine does not require any fuel or power so maintenance is less. This model removes problem of back pain, vibrations and noise. This alone pump can used for multiple crops. The model has provided multiple nozzles, which has continuous spray over crop and this process takes less time than other sprayers for spaying.

6. ACKNOWLEDGEMENT

We would like to acknowledge Dr. Arun Kumar, principal of VIVA Institute of Technology and Prof. Niyati Raut, HOD of Mechanical Department for helping us out in this project. Their contribution in this project is invaluable. We would also express our gratitude to our fellow students who helped us out in completion of this project.

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Design and Analysis of Cooling Tower

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ABSTRACT

Cooling tower is a vital element of power plants, petrochemical plants, petroleum refineries, semi-conductor plants, natural gas processing plants, food processing plants, etc. The major function of a cooling tower is to discard heat into the environment. The major types of cooling towers are mechanical draft (induced draft) and natural draft cooling towers. Very large concrete chimneys are used by natural draft cooling tower to introduce air through the media. They are usually used for high water flow rates, i.e.above 45,000 m3/hr., due to large size of these natural draft cooling towers. These types of natural draft cooling towers are used only by utility power stations. Mechanical draft cooling towers use large fans to suck or force air through circulated water over fill. The water falls downhill over the fill media, which helps to increase the contact time between the air and the water, this helps to maximise heat transfer between them. The counter-flow and cross flows are two elementary designs of induced (mechanical) cooling tower. It is well known that heat exchange in counter flow is more effective than heat exchange in cross flow or parallel flow. This paper includes the performance study, working principle and analysis of induced draft cooling tower, which is one of the deciding factors used for increasing the power plant efficiency. A setup is fabricated and various parameters of cooling tower are observed and calculated i.e. effectiveness, range, approach and evaporation loss.

Keywords— *Mechanical, Thermal, Cooling Tower, DBT (dry bulb temperature), WBT (wet bulb temperature), effectiveness, evaporation loss, experiment, numerical, natural draft, induced draft.*

1. INTRODUCTION

1.1 Introduction

Cooling towers are a very essential part of Power plants. The primary job of a cooling tower is to discard heat into the environment. Hot water from Condenser is sent to the cooling tower. The water exits the cooling tower and is sent back to the boiler for further process. In cooling towers, air is passed alongside or counter at present with water. The heat gained by air is the heat lost by water. The effectiveness of cooling tower depends on water and air flow rates and working temperatures.

In the chemical industries, utilities plays an important role in plant tasks. Two types of utilities are used in industries, i.e. heating utilities and cooling utilities. Cold water is required for condenser, reactors, heat exchangers and other cooling purposes. Cooling towers are used to cool the water for its various applications. The high temperature water used for various applications can be cooled and reused. Various types of cooling towers include Natural draft, forced draft and induced draft cooling towers. Various researchers have carried out studies and investigation on various characteristics of cooling tower which impact the effectiveness and functioning of cooling tower.

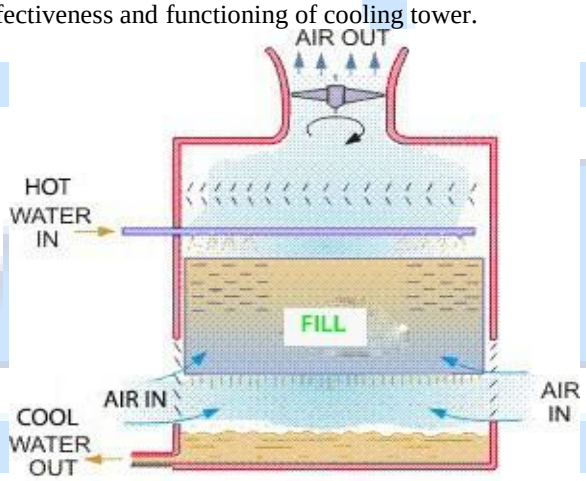

Figure 1.1 Cooling tower

1.2 Components of Cooling Tower

The basic components of an evaporative tower are:

Fill: Most towers use fills to facilitate heat transfer by increasing water and air contact. Fills are of two types, i.e. splash or film type. With splash fill, water falls over successive layers of horizontal splash bars, continuously breaking into smaller droplets, while also wetting the fill surface. Plastic splash fill promotes improved heat transfer than the wood splash fill. Film fill consists of thin, closely spaced plastic surfaces over which the water spreads, forming a thin film in

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contact with the air. These surfaces may be flat, corrugated, honeycombed, or other patterns. The film type of fill is the more efficient and provides same heat transfer in a smaller volume than the splash fill.

Cold water basin: The cold water basin, located at or near the bottom of the tower, receives the cooled water that flows down through the tower and fill. The basin usually has a sump or low point for the cold water discharge connection. In many tower designs, the cold water basin is beneath the entire fill .In some forced draft counter flow design, however, the water at the bottom of the fill is channelled to a perimeter trough that functions as the cold water basin. Propeller fans are mounted beneath the fill to blow the air up through the tower. With this design, the tower is mounted on legs, providing easy access to the fans and their motors.

Drift eliminators: These capture water droplets entrapped in the air stream that otherwise would be lost to the atmosphere.

Air inlet: This is the point of entry for the air entering a tower. The inlet may take up an entire side of a tower–cross flow design– or be located low on the side or the bottom of counter flow designs.

Louvers: Generally, cross-flow towers have inlet louvers. The purpose of louvers is to equalize air flow into the fill and retain the water within the tower. Many counter flow tower designs do not require louvers.

Nozzles: These provide the water sprays to wet the fill. Uniform water distribution at the top of the fill is essential to achieve proper wetting of the entire fill surface. Nozzles can either be fixed in place and have either square or round spray patterns or can be part of a rotating assembly as found in some circular cross-section towers.

Fans: Centrifugal fan is used in towers. Generally, propeller fans are used in induced draft towers and both propeller and centrifugal fans are found in forced draft towers. Depending upon their size, propeller fans can either be variable or fixed pitch. A fan having non-automatic adjustable pitch blades permits the same fan to be used over a wide range of kW with the fan adjusted to deliver the desired air flow at the lowest power consumption. Automatic variable pitch blades can vary air flow in response to changing load conditions.

Digital Thermometer: 2 Digital thermometer are used to detect the inlet water temperature to the cooling tower and outlet water temperature out of the cooling tower.

Figure1.2 Digital Thermometer

Pump: Pump is used to lift the water from heating basin to the inlet of the cooling tower.

1.3 Tower Materials

In early days, towers were constructed primarily of wood. Wooden components included the wooden plates, casing, fill, and often use chilled water basin. The basin was of concrete. Nowadays, tower manufacturers design towers. Tower components from a variety of different materials. Often several materials are used for corrosion resistance, reduce maintenance, increase reliability and more service life. Galvanized steel, various grades of iron and stainless steel, and concrete are widely used in tower construction. Plastic, fibre and aluminium also use for other components. The inlet air louvers made from glass fibre, the fill made from plastic, and the cold water basin made from steel. Bigger towers are made from concrete .Galvanized tower made from stainless steel basin.

Glass fibre is widely used for cooling tower basin and casting, they give long life, protection from the harmful effects of many chemicals. Plastics material widely used for fill. Film fill use because it offers greater heat transfer efficiency. Plastics also find wide use in nozzle materials. Many nozzles are being from, ABS, polypropylene, PVC and glass-filled nylon. For fan material Aluminium, glass fibre, and hot-dipped galvanized steel are used. Centrifugal fans are made from galvanized steel. Propeller fans made from galvanized, aluminium or glass fibre reinforced plastic.

1.4 Problem Statement

The general construction of a cooling tower it has been governed by different decisions. Not only cooling towers are used in nuclear power plants but also they are used in many other conventional power plants to remove excess process heat from system. It is most important to construct the tower in a way that it must live up to all the demands the different parties have towards it. Cooling towers are divided into two different kinds:

1) Natural Draught Cooling Towers (NDCT) and

2) Mechanical Draught Cooling Towers (MDCT).

Dry cooling towers are a radiator like most of every car or truck uses one. The hot water is pumped through an array of pipes with attached metal plates then radiate the heat to air that flows in the cooling tower. Mechanical Draught is just

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indicates that the convection in the tower is not natural but also induced by a fan. From the movement of air and water is the reason for another classification which divides them into cross flow and counter flow towers. And if one considers the mechanism of the cooling in the tower they can be divided into wet, wet-dry and dry cooling towers.

The most disadvantage is that its cooling capacity is below from the other two designs. The water in the cooling circuit is not evaporated and hence there is problems with mineral deposits can be avoided. In the Wet cooling tower uses of parts of the hot water that must needs to be cooled to evaporate and to support the cooling effect of air by adding extra evaporation cooling to the process. The advantage of the wet cooling tower is its simplicity and low cost, but its disadvantage is it has just that what makes it so effective. The water that evaporates has must to be refilled, since evaporating water does not take it is dissolved minerals with in it, the water is deposits its minerals in the pipes and then the tower if the mineral level is not controlled.

When wet and dry cooling towers are combine the disadvantages of both other designs is they are use part of the water to evaporate and cool the water itself plus water that is being pumped through pipes in so called as the filling of the cooling tower. This generates on the one hand less steam and therefore there is lost water, on the other hand is the mineral deposit problem still present in it, it is expensive to build and the cooling effectiveness is not good as that purely wet cooling tower.

We are going to make a lab model of Test rig of cooling tower and we are going to do the design and analysis of induced mechanical draft cooling tower. We are going to predict the air flow velocity and temperature at the exit of the cooling tower. The cooling tower efficiency can be increased by increasing heat transfer area with fins and these will result in increase in the heat transfer rate of cooling tower. Results of this study are expected to be useful for future work on the development of cooling towers.

1.5 Methodology

The selection of cooling tower depends on the many factors and application. An improper selected cooling tower will cause a loss in production, increase in energy consumption. Properly designed cooling towers that require minimum maintenance. For selecting proper cooling tower many choices and decisions are required. The required cooling tower size and performance depends on:

- Mass flow rate of water.
- Hot water temperature.
- Cold water temperature.
- Cooling range.
- Wet bulb temperature.
- Tower type.
- Materials use for construction.
- Total heat rejection.
- Water quality.
- Air flow rate.
- Wet bulb temperature.
- Fill media.

There are 2 types of cooling tower-:1) Natural

2) Mechanical-: i) Induced draft cooling tower

ii) Forced draft cooling tower

We are study about mechanical induced draught cooling tower.

Mechanical draught which is used for power driven motor to force or draw air through tower is known as induce draught cooling tower.

This fan is located near the bottom and on the side. This fan forces air from bottom to top. An eliminator is use in cooling tower to prevent loss of water droplets along forced air.

In this fan induce hot moist air out from the discharge. This is produce low entering and high exiting air velocity and reduce the possibility of circulation in which discharge air flow back into air intake. The main purpose of this is improving efficiency of cooling tower with reducing energy consumption.

Efficiency of cooling tower can be improved by following points-:

1) Check cooling water pumps regularly.
2) Optimize cooling tower fan blade angle on seasonal or load basis.
3) Replace splash bar with self-extinguishing PVC cellular film fin.
4) Install a nozzle that spray in a more uniform wear pattern.
5) Correct excessive or uneven fan blade tip clearance and poor fan balance.
6) Consider COC improvement measure for water saving.
7) Clean plugged cooling tower distribution nozzle regularly.
8) Clean plugged cooling tower distribution nozzles regularly.
9) Balance flow to cooling tower hot water basins.
10) Restricts flow through large load to design values.

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11) Cover hot water basins to minimize algae growth that contributes to fouling.

1.5 Preliminary Analysis of Cooling Tower

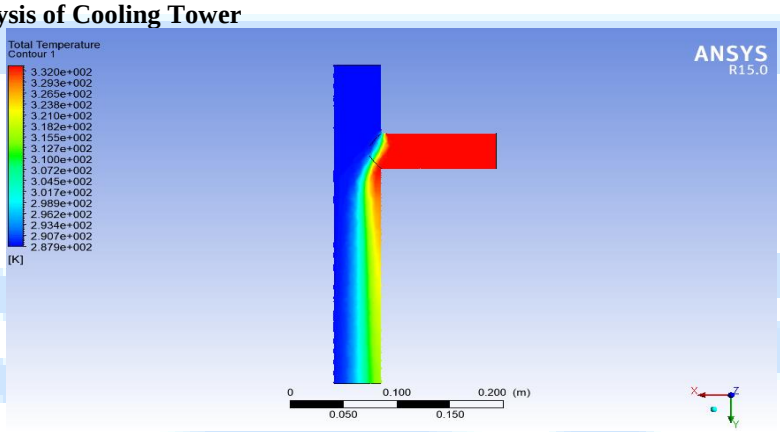

Figure1.3 Temperature Analysis of water in tower

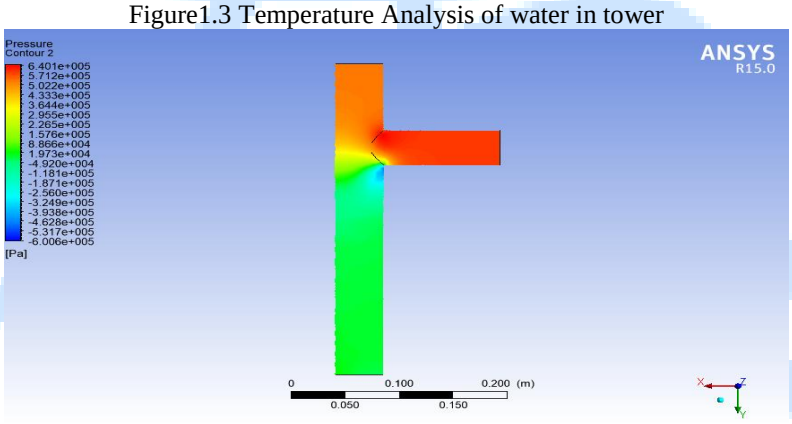

Figure1.4 Pressure Analysis of water in tower

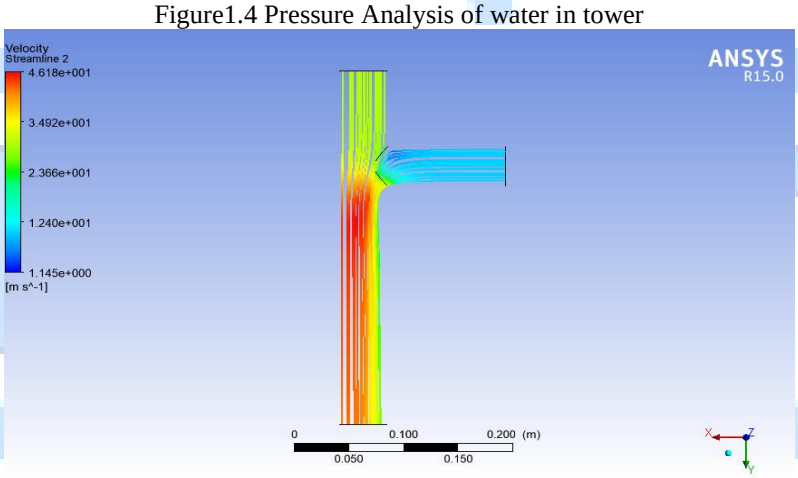

Figure1.5 Velocity Analysis of water in tower

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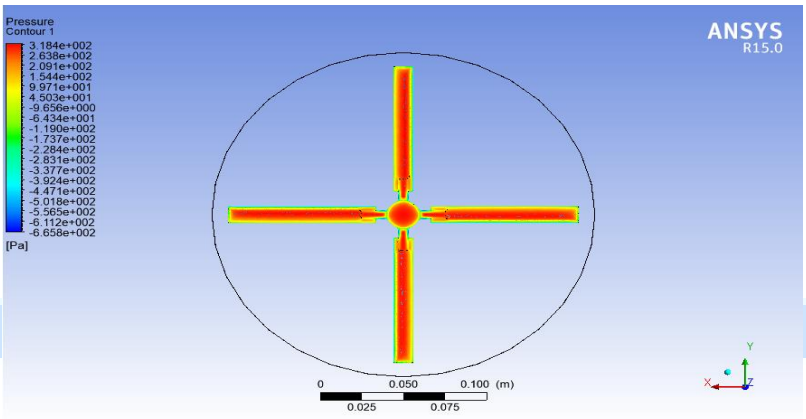

Figure1.6 Pressure Analysis in fan

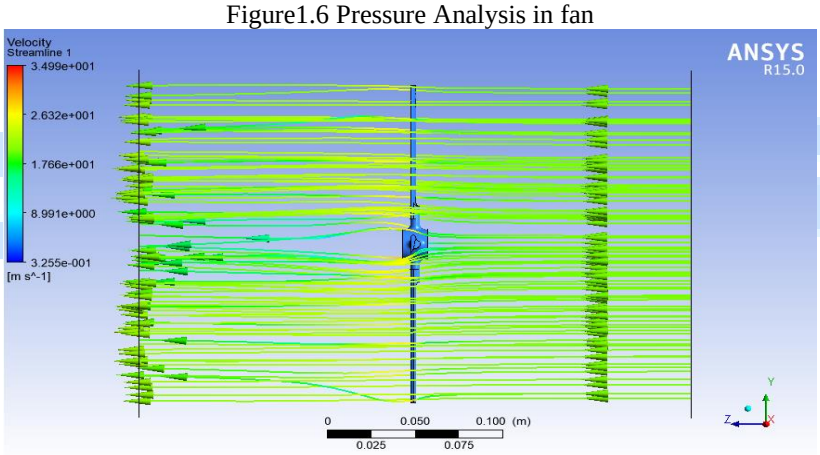

Figure1.7 Velocity Analysis of air in fan

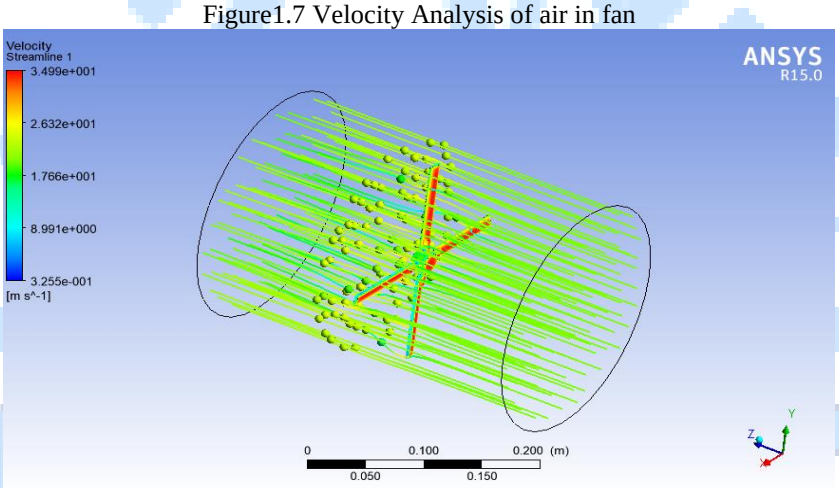

Figure1.8 Velocity Analysis of air in fan

2. CONCLUSIONS

We have studied the way of increasing the efficiency of the cooling tower by enabling more volume of air to pass through the tower and hence more heat will be dissipated. The zigzag water flow pattern has made the water movement to slow down and longer time of water exposure to air is achieved.

The importance of a cooling tower in industries has motivated us to study its performance and look for possible ways to increase its efficiency.

3. ACKNOWLEDGMENT

It gives us immense pleasure to express our sense of gratitude and sincere thanks to our respected guide prof. Suneet Mehta, Mechanical department, VIVA Institute of Technology, Virar, for his valuable guidance.

We would also like to thank Dr. Arun Kumar, Principal, whole hearted support. We also wish to express our sincere thanks to prof. Niyati Raut, HOD Mechanical department, for her kind hearted support.

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Cleaning Of Water Droplets On Side Mirror Of A Car By Using Air Venturi

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ABSTRACT

The purpose is to construct side-view mirrors that are optimized as well satisfy today's demands and can remove water droplets formed on mirror during rain using an air venturi. The Aim of the present study is to clean the water droplets from a area which is necessary to see the rear view mirror and the crossing roads at the corners. From all the possible alternates to perform this operation, the use of air venturi is more economical, simple in design, easy to fit in small area and offers no obstruction in normal operation of side view mirror.Visibility in the automotive industry is a major source of concern for car manufacturers and safety design engineers.water film and water droplets that forms on the car side view mirror during rain would reduce and disturb drivers.visibility formation of water droplets on side mirror affect the visibility.due to such formation of droplets ,it becomes very tough for the driver to have a view of side of the car. The automobile side-view mirror is a device for indirect vision that facilitates observance the traffic area adjacent to the vehicle which cannot be observed by direct vision. Being able to see what is behind the car is vital when reversing or changing lanes. The mirrors are often situated on, just in front of, the driver's and front passenger's doors. Due to legislation, today's cars have two mirrors. There are many regulations and laws when it comes to mirrors, mainly due to safety factors. Today's mirrors are made up of more than a reflective glass. The mirror housing often holds the indicators, illumination features and a blind spot alarm.Visibility in the automotive industry is a major source of concern for car manufacturers and safety design engineers.water film (fog) and water droplets that forms on the car side view mirror during rain would reduce and disturb drivers.visibility formation of water droplets on side mirror affect the visibility.due to such formation of droplets ,it becomes very tough for the driver to have a view of side of the car.

Keywords: -*Water droplet removal, Air Venturi, Sideview Mirror, Fog Removal, Pressurized Air*.

1. INTRODUCTION

Mirrors are important parts of a car's guiding system. For the first time, a looking glass was used in a car as rear- view mirror by Marmon Motor Car Company's engineer ,Ray Harroun, in 1911. He installed this mirror in order to see back. After that, from 1912 car manufacturers began to install this kind of mirror as a usual piece. Another type of mirror was used on the exterior part of motor vehicle to create better vision of behind and sides of the car. It was called side-view mirrors.

Aim of the present study is to clean the water droplets from a area which is necessary to see the rear view mirror and the crossing roads at the corners. From all the possible alternates to perform this operation, the use of compressed air jet is more economical, simple in design, easy to fit in small area and offers no obstruction in normal operation of side view mirror.

The automobile side-view mirror is a device for indirect vision that facilitates observance the traffic area adjacent to the vehicle which cannot be observed by direct vision. Being able to see what is behind the car is vital whenreversing or changing lanes. The mirrors are often situated on, just in front of, the driver's and front passenger's doors. Due to legislation, today's cars have two mirrors. There are many regulations and laws when it comes to mirrors, mainly due to safety factors. Today's mirrors are made up of more than a reflective glass. The mirror housing often holds the indicators, illumination features and a blind spot alarm.

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2. OBJECTIVE

The objective is to construct side-view mirrors that are aerodynamically optimized as well satisfy today's demands and can remove water droplets formed on mirror during rain using an air venturi.Driving in wet conditions often results in dirty windows and mirror glasses. Having dirty windows reduces the visibility for the driver, which then affects the safety. There are two main types of soiling; dirty water drops from surrounding vehicles or rain, and soiling from dirt kick up and dirty water from ones own wheels.Thus, we reduce soiling on rear side mirrors using air venturi.

3. PROBLEM DEFINITION

Visibility in the automotive industry is a major source of concern for car manufacturers and safety design engineers.water film (fog) and water droplets that forms on the car side view mirror during rain would reduce and disturb drivers.visibility formation of water droplets on side mirror affect the visibility.due to such formation of droplets ,it becomes very tough for the driver to have a view of side of the car.
For removing the rain water droplets and fog from a specific area to have a clear view of the side view mirror to avoid the accidents during rain and also avoid soiling on side view mirror

4. CONCEPT OF EXPERIMENT

The air for removing the water droplets from the surface of the window glass is supplied from the atmosphere through the vent pipes. The air is being supplied with the velocity of vehicle at that moment to remove the water droplets.The settings for changing the angle of the nozzle can be done by twisting the arrangement fixed at the bottom right corner of the apparatus. The amount of the air supplied to the nozzle can be varied with the help of the valve provided in the air compressor. When the amount of air required at the nozzle is more, the valve can be opened to fulfil the demand of air and when the amount of air required at the nozzle is less, the valve can be closed to control the amount of air.The velocity of air at the inlet and outlet of the air can be measured with the help of anemometer. Anemometer is the device used to measure the velocity of air. Hence the air at the desired velocity can be supplied to the nozzle for removing the water droplets from the surface of the side mirror.

5. OVERVIEW AND METHODOLOGY

The main objective of this work is to find the possible solution for removing the rain water droplets and fog from a specific area to have a clear view of the side view mirror to avoid the accidents. In the present work, compressed air utilised as a working fluid to impinge on the side glasses with the help of converging nozzles. The various combinations of nozzle design, air velocity and impinging angle are studied for obtaining maximum clearing area. Computer simulated results are verified with the help of experimental results. Rear view is possible with the help of left and right rear view mirrors fitted outside the front doors. Visibility of rear view mirror depends upon the visibility of the front side window glasses. Driving through rain, produces more challenging situation when water droplets on outside surface of side window glass obstruct the vision through rear view mirrors as well as the left and right side vision at cross roads.
This problem becomes more dangerous when light gets scattered through water droplets and obstruct the vision during rainy night.

- To model the nozzle of different parameters for the analyses purpose in Fluent.
- To analyse the effect of air through the nozzle on the side window glass in Fluent
- To compare the results obtained above and pick the best nozzle for the experimentation.
- To manufacture the nozzle for performing the experiment to check the efficiency of the analysed nozzle.
- To develop a set up made of wood on which a side window is mounted and this set up replicates the side window glass of a vehicle.
- To perform experiment on this set up by setting an arrangement at the corner of this set up to mount the nozzle for impinging an air jet.
- To measure the velocity of impinged air at different locations.
- To check whether required region is cleaned by the nozzle.

6. RESULT

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The objective of the experiment was fulfilled as we were able to clean water droplets and soiling on the side mirror of car using air venturi and surrounding air

7. CONCLUSION

The nozzle at different impinging angles, different outlet diameters and inlet diameters, throat length and converging section length have been investigated with the help of a CFD solver- Fluent. The major focus of the study was to analyse the droplet cleaning action of air jet by varying different parameters and to evaluate the nozzle with the effective specifications, which can spread over the maximum possible area on the side view mirror. Proposed system will help to overcome the short comings of the previous inventions. It provides an air jet clearing system for a vehicle which facilitates improved visibility through the external rear view mirrors of that vehicle in the different weather conditions (rain, fog).

According to the results obtained, the proposed system is capable of blowing compressed air onto the surface of the mirror to be cleared. The main components of the system are small enough, which can fit inside the cavity provided for external mirror housing. They can be mounted universally as an add-on component onto a variety of existing vehicles having mirrors and windows of different designs and sizes. Rear view Mirrors are used in the vehicles (both two wheeler as well as four wheeler) for the safety of the rider in case of two wheeler and driver in case of four wheeler. In the caseof four wheeler, there are two types of rear view mirrors i.e. inside rear view mirrors (flat type) and side view mirrors (Convex type). In the case of two wheeler, there is only one type which is side view mirror (Convex type). These mirrors provide the rear view to the Rider/ driver and thereby he can take precautions and drive safely.

Since safety of the driver is at stake, the quality of these rear view mirrors is of at most important. So the authorities have laid down some guidelines in terms of some key parameters of the rear view mirrors such as Distortion factor, Radius of curvature, Reflectance etc. These guidelines specify that the rear view mirrors manufactured by various manufacturers should be within certain limit and then only such rear view mirrors which satisfy these limits can be fitted on the vehicle.

7. ACKNOWLEDGEMENT

This paper would not be possible without guidance of Dr.Arun Kumar. We would also express our gratitude to our Prof. Sushil Mishra to guide us in this project. We are grateful to all of those with whom we have had pleasure to work during this project. We are thankful to our college VIVA INSTITUTE OF TECHNOLOGY who provided expertise that greatly assisted in this project.

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Design and Fabrication of Cooling Tower

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ABSTRACT

Cooling towers are heat removal devices used to transfer process waste heat to the atmosphere. Cooling towers may either use the evaporation of water to remove process heat and cool the working fluid to near the wet-bulb air temperature or in the case of closed circuit dry cooling towers rely solely on air to cool the working fluid to near the dry-bulb air temperature. Common applications include cooling the circulating water used in oil refineries, chemical plants, power stations and building cooling. Industrial cooling towers can be used to remove heat from various sources such as machinery or heated process material. The primary use of large, industrial cooling towers is to remove the heat absorbed in the circulating cooling water systems used in power plants, petroleum refineries, petrochemical plants, natural gas processing plants, food processing plants, semi-conductor plants, and for other industrial facilities such as in condensers of distillation columns, for cooling liquid in crystallization, etc.

Over a last decade, great strides have been in improving the performance of conventional cooling towers. Heat is dissipated from the surface of a body of water by convection, evaporation and radiation. This offers an inherent advantage in making it possible to cool the water to a temperature lower than the dry bulb temperature. A mechanical draft cooling tower is used to increase the cooling capacity. The fabrication of the designed cooling tower was carried out using locally available materials such as mild iron sheets, pipes and fittings, extraction fan, angle iron, fiber glass, plastics etc. Various production processes such as cutting, welding, drilling and plumbing were employed. The fill materials are increase the liquid and gas contact. For the increasing of L/G ratio the heat transfer rate between liquid and gas also to be increase. The ultimate aim of this project is to fabricate and performance analysis of induced forced draft cooling tower by changing fill material there by studying the increase in efficiency of cooling tower. By using induced forced draft fan waste water can be reduced.

Keywords— Mechanical, Thermal, Cooling Tower.

1. INTRODUCTION

Cooling towers are a very important part of Power plants. The primary task of a cooling tower is to reject heat into the atmosphere. Hot water from Condenser is sent to the cooling tower. The water exits the cooling tower and is sent back to the boiler or together units for further process. In cooling towers, air is passed concurrently or counter currently with water. The heat gained by air is the heat lost by water. The efficiency of cooling tower depends on air and water flow rates and operating temperatures.

In the chemical industries, utilities play an important role in plant operations. Two types of utilities are used in industries. Cooling utilities and heating utilities. Cold water is required for condenser, heat exchangers, reactors and other cooling purposes. Hot utilities include steam and other hot liquid used for heating in heat exchangers and to maintain reaction conditions. Cooling towers are used to cool the water for its various applications. The used water from various applications at higher temperature can be cooled and reused. Various types of cooling towers include Natural draft, induced draft and forced draft cooling towers. In cooling towers, air is passed concurrently or counter currently with water. The heat gained by air is the heat lost by water. The efficiency of cooling tower depends on air and water flow rates and operating temperatures. Various researchers have carried out studies and investigation on various aspects of cooling tower which influence the effectiveness and working of cooling tower.

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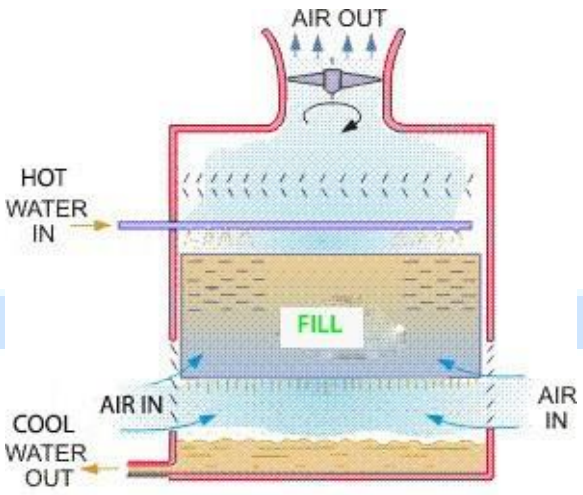

Figure 1.1 Cooling tower

1.2 Components of Cooling Tower

The basic components of an evaporative tower are: Frame and casing, fill, cold water basin, drift eliminators, air inlet, louvers, nozzles and fans. Frame and casing: Most towers have structural frames that support the exterior enclosures (casings), motors, fans, and other components. With some smaller designs, such as some glass fiber units, the casing may essentially be the frame.

Fill: Most towers employ fills (made of plastic or wood) to facilitate heat transfer by maximizing water and air contact. Fill can either be splash or film type. With splash fill, water falls over successive layers of horizontal splash bars, continuously breaking into smaller droplets, while also wetting the fill surface. Plastic splash fill promotes better heat transfer than the wood splash fill. Film fill consists of thin, closely spaced plastic surfaces over which the water spreads, forming a thin film in contact with the air. These surfaces may be flat, corrugated, honeycombed, or other patterns. The film type of fill is the more efficient and provides same heat transfer in a smaller volume than the splash fill.

Cold water basin: The cold water basin, located at or near the bottom of the tower, receives the cooled water that flows down through the tower and fill. The basin usually has a sump or low point for the cold water discharge connection. In many tower designs, the cold water basin is beneath the entire fill .In some forced draft counter flow design, however, the water at the bottom of the fill is channelled to a perimeter trough that functions as the cold water basin. Propeller fans are mounted beneath the fill to blow the air up through the tower. With this design, the tower is mounted on legs, providing easy access to the fans and their motors.

Drift eliminators: These capture water droplets entrapped in the air stream that otherwise would be lost to the atmosphere.

Air inlet: This is the point of entry for the air entering a tower. The inlet may take up an entire side of a tower–cross flow design– or be located low on the side or the bottom of counter flow designs.

Louvers: Generally, cross-flow towers have inlet louvers. The purpose of louvers is to equalize air flow into the fill and retain the water within the tower. Many counter flow tower designs do not require louvers.

Nozzles: These provide the water sprays to wet the fill. Uniform water distribution at the top of the fill is essential to achieve proper wetting of the entire fill surface. Nozzles can either be fixed in place and have either round or square spray patterns or can be part of a rotating assembly as found in some circular cross-section towers.

Fans: Centrifugal fan is used in towers. Generally, propeller fans are used in induced draft towers and both propeller and centrifugal fans are found in forced draft towers. Depending upon their size, propeller fans can either be fixed or variable pitch. A fan having non-automatic adjustable pitch blades permits the same fan to be used over a wide range of kW with the fan adjusted to deliver the desired air flow at the lowest power consumption. Automatic variable pitch blades can vary air flow in response to changing load conditions.

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Digital Thermometer: 2 Digital thermometer are used to detect the inlet water temperature to the cooling tower and outlet water temperature out of the cooling tower.

Figure1.2 Digital Thermometer

Pump: Pump is used to lift the water from heating basin to the inlet of the cooling tower.

1.3 Tower Materials

In the early days of cooling tower manufacture, towers were constructed primarily of wood. Wooden components included the frame, casing, louvers, fill, and often the cold water basin. If the basin was not of wood, it likely was of concrete. Today, tower manufacturers fabricate towers and tower components from a variety of materials. Often several materials are used to enhance corrosion resistance, reduce maintenance, and promote reliability and long service life. Galvanized steel, various grades of stainless steel, glass fibre, and concrete are widely used in tower construction as well as aluminium and various types of plastics for some components. Wood towers are still available, but they have glass fibre rather than wood panels (casing) over the wood framework. The inlet air louvers may be glass fibre, the fill may be plastic, and the cold water basin may be steel. Larger towers sometimes are made of concrete. Many towers–casings and basins–are constructed of galvanized steel or, where a corrosive atmosphere is a problem, stainless steel. Sometimes a galvanized tower has a stainless steel basin. Glass fibre is also widely used for cooling tower casings and basins, giving long life and protection from the harmful effects of many chemicals. Plastics are widely used for fill, including PVC, polypropylene, and other polymers. Treated wood splash fill is still specified for wood towers, but plastic splash fill is also widely used when water conditions mandate the use of splash fill. Film fill, because it offers greater heat transfer efficiency, is the fill of choice for applications where the circulating water is generally free of debris that could plug the fill passageways. Plastics also find wide use as nozzle materials. Many nozzles are being made of PVC, ABS, polypropylene, and glass-filled nylon. Aluminium, glass fiber, and hot-dipped galvanized steel are commonly used fan

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materials. Centrifugal fans are often fabricated from galvanized steel. Propeller fans are fabricated from galvanized, aluminium, or moulded glass fibre reinforced plastic.

1.4 Analysis of Cooling Tower

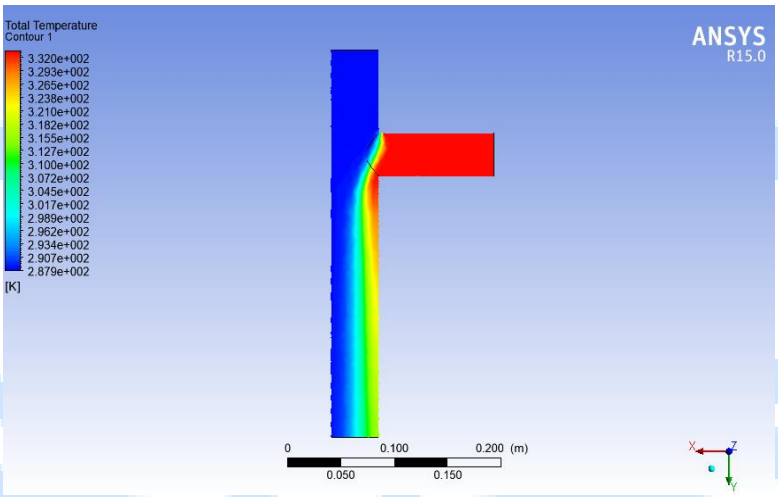

Figure1-5 Temperature Analysis of water in tower

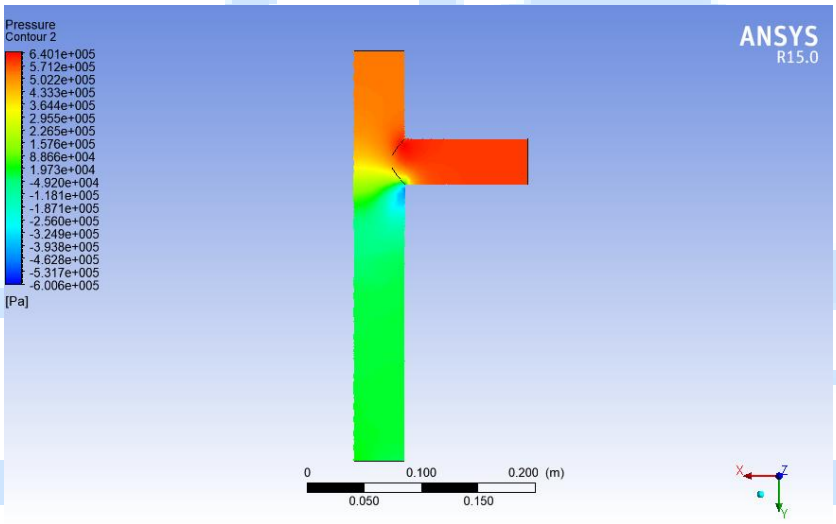

Figure1-6 Pressure Analysis of water in tower

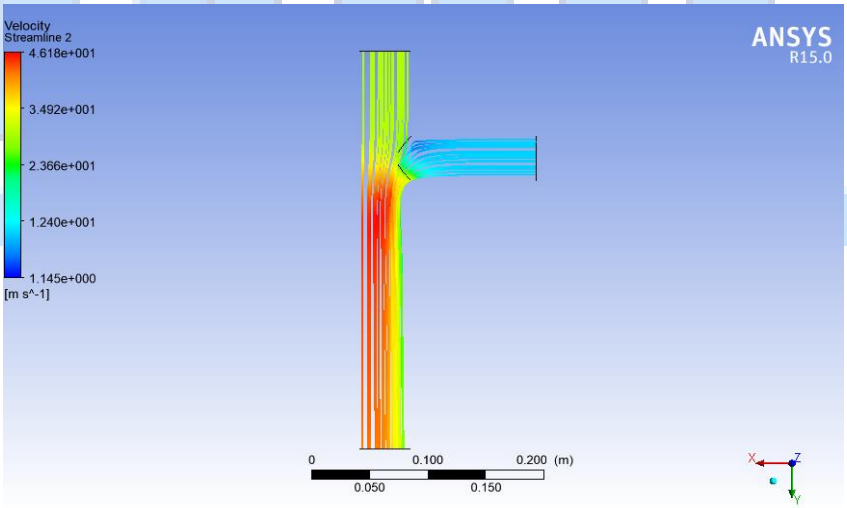

Figure1-7 Velocity Analysis of water in tower

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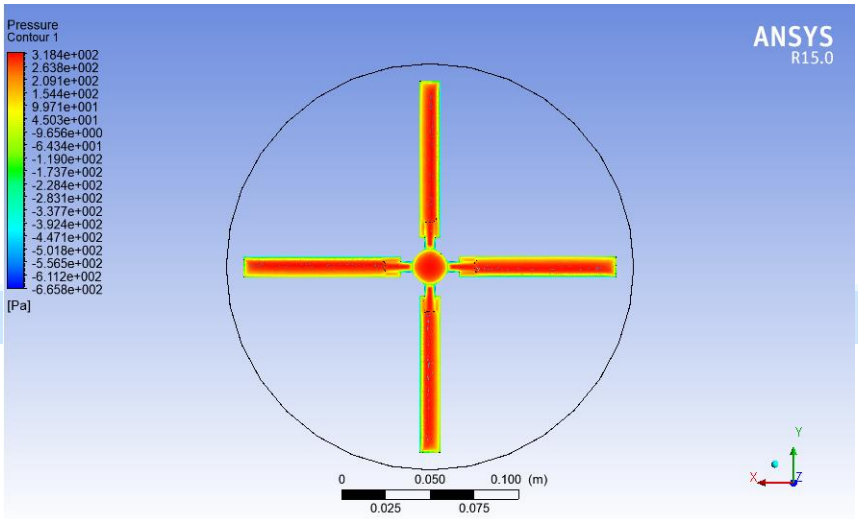

Figure1-8 Pressure Analysis in fan

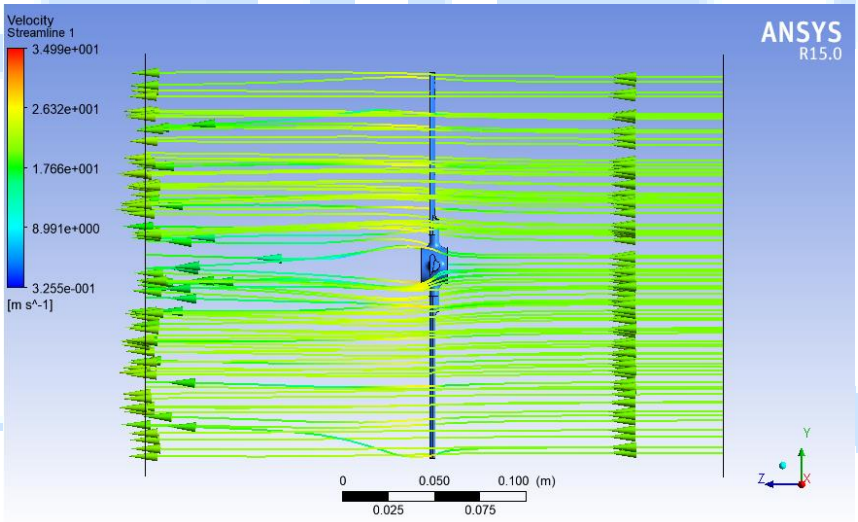

Figure1-9 Velocity Analysis of air in fan

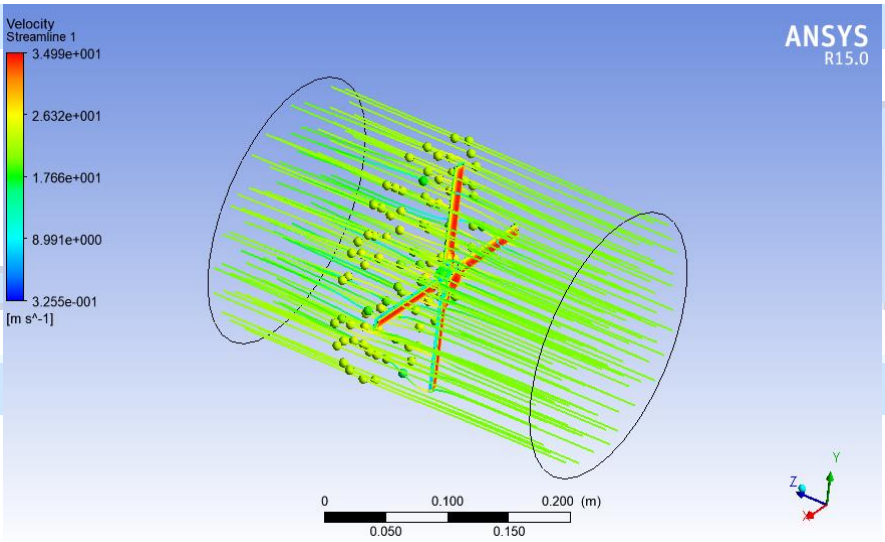

Figure1-10 Velocity Analysis of air in fan

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Conclusions

We have studied the way of increasing the efficiency of the cooling tower by enabling more volume of air to pass through the tower and hence more heat will be dissipated. The zigzag water flow pattern has made the water movement to slow down and longer time of water exposure to air is achieved.
The importance of a cooling tower in industries has motivated us to study its performance and look for possible ways to increase its efficiency.

ACKNOWLEDGMENT
It gives us immense pleasure to express our sense of gratitude and sincere thanks to our respected guide prof. Suneet Mehta, Mechanical department, VIVA Institute of Technology, Virar, for his valuable guidance.
We would also like to thank Dr. Arun Kumar, Principal, whole hearted support. We also wish to express our sincere thanks to prof. Niyati Raut, HOD Mechanical department, for her kind hearted support.

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Increasing Efficiency of Reciprocating Compressor by Use of Diffuser

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ABSTRACT

Most troublesome part of compressor technology depends strongly on improvement of its performance. A performance characteristic evaluation of two stage-reciprocating compressor is being executed in this paper. The project aims at the design of diffuser, which converts the imparted kinetic energy of the compressed air to the pressure energy to compensate the pressure loss created in intercooler.

Keywords— *Reciprocating compressor, diffuser, Mechanical, Computational fluid dynamics, diffuser design*

1.INTRODUCTION

The Compressors are multipurpose tools used widely in industry for a variety of purposes. Most industrial plants, from a small workshop machine to an enormous power plant, pulp, and paper mill, have some type of compressed air system wherein the energy generated from these compressors is essential to operate the mechanical equipment and power tools. In view of that, plant air compressor can vary in size from a small unit of 10 horsepower (HP) to huge systems with more than 50,000 HP.

Running air compressors often uses more energy than any other equipment Industrial facilities. Energy savings by means of system improvements of air compressors can range from 30 to 50 percent or more of the electricity consumption. For many facilities, this is equivalent to thousands, or even hundreds of thousands of rupees of potential annual savings, depending on use. Since compressing air is one of the most expensive sources of mechanical energy in the industrial setting, it is often financially beneficial and more energy efficient to use all possible methods to reduce the energy consumption. The energy consumption of any compressed air system depends on several factors: the compressor type, model and size, the motor power rating, control mechanisms, system design, and performance

2.OBJECTIVE

The project aims at the design of diffuser, which converts the imparted kinetic energy of the compressed air to the pressure energy thus improving the overall efficiency of the compressor without any input of work.

3. OVERVIEW

The main aim of this experiment is to increase the pressure energy by the use of diffuser between the two consecutive stages, which will help in increasing the pressure energy by reducing the velocity. Diffusers are used to slow the fluid's velocity while rising its stagnant pressure. The pressure rises as it passes through a duct referred as pressure recovery. In contrast, a nozzle helps in increasing the fluid velocity and lower the pressure while flowing through a one direction.

Frictional effects during analysis are neglected. Ducts containing fluids flowing at low velocity can usually be analysed using Bernoulli's principle. Analysing ducts flowing at higher velocities with Mach numbers in excess of 0.3 usually require Compressible flow relations.

3.1Compressor

Two stage, three cylinders, positive displacement type reciprocating compressor is used for various industrial applications. The suction takes places at room temperature and pressure and compresses it up to its pressure ratio. As the air is compressed in first stage there is significant rise in temperature following the polytrophic rule of compression and also the hot air is difficult to compress. This difficult compression lowers the efficiency of the plant. Hence to achieve near isothermal compression of the air an intercooler system is used in two stage compressors. Further the air is passed on for the final stage compression and the required pressure output is achieved and is made available for application purposes after passing through an aftercooler.

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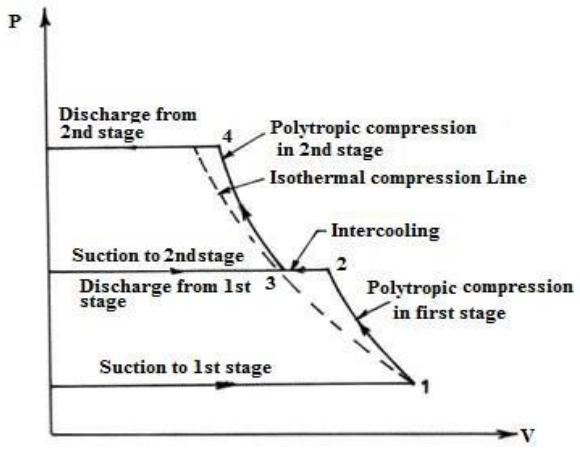

Figure 1 P-V diagram for two stage compressor

3.2Diffuser

A diffuser is an expanding duct. The primary objective of a diffuser is to recover fluid static pressure from a fluid stream while reducing the flow velocity the fluid slows as it passes through a diffuser, and a portion of kinetic energy is converted into pressure energy. The efficient diffuser is one which converts the highest possible percentage of kinetic energy into pressure within a given restriction on diffused length or expansion ratio.

In a diffuser, the pressure gradient opposes the flow as a result boundary layer in a diffuser decelerates and thickens rapidly, and it can separate from diffuser walls to form large unsteady eddies of the diffuser flow. The separation of flow from diffuser wall is called diffuser stall, thus the limit of diffuser performance is largely governed by boundary layer growth and onset of stall.

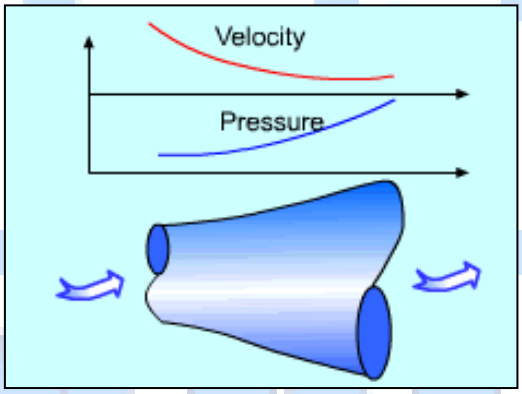

Figure 2 Diffuser with velocity and pressure variation along the length

3. PROBLEM DEFINITION

The inlet pressure of the intercooler and the outlet pressure of the intercooler aren't same in practical application. It is because the intercooling reduces the temperature of the compressed gas. According to the Boyle's law, pressure and temperature are directly proportional to each other. Hence, there is a pressure drop in the intercooler. This reduces the overall efficiency of the intercooler**.**

Since the pressure at the inlet of intercooler and outlet of intercooler is not equal, the work done has to be increased to make the gas available at the stated output pressure. This results in more consumption of energy. At high pressure this losses play a major role as it becomes difficult to reduce the temperature of the inlet air at very high pressure. In addition, the operating conditions of the reciprocating compressor play a significant role in conservation of energy**.**

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4.METHODOLOGY

- The detailed study on reciprocating two stage reciprocating compressor would give the idea of working of different components of the compressor. To get the idea of various effects on work done, power consumed, various parameters, various inlet and outlet conditions are studied.
- Further, we studied the working of diffuser to get the knowledge of the parameters that can be useful to get the expected results
- Design procedure started with the theoretical calculations for design of diffuser. A detailed CAD model was developed according to the output of calculations
- After getting a CAD model, a detail CAE was performed to get the optimized design confirming to the theoretical calculations
- A CFD analysis was performed to predict the flow of air through diffuser
- Final optimized design was made and confirmed

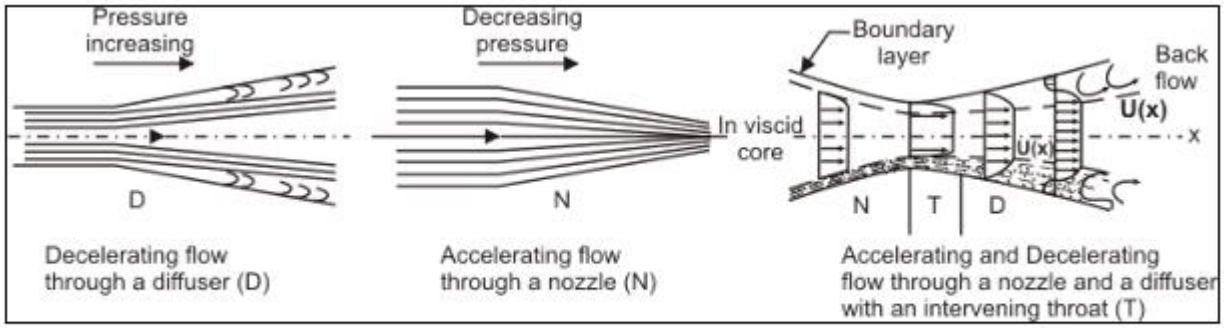

Figure 3 Comparison of flow of fluid through nozzle and diffuser

5.CONCLUSION

A two-stage reciprocating compressor was investigated experimentally in this work in order to develop and performance enhancement. Various system criterion were carried out to study the performance and efficiency.

Examining of background conditions on compressor performance shows that the temperature of the inlet air has an effect on overall system performance. Greater efficiency is obtained with low backdrop temperature thus concluding that the energy required to compress the low temperature air is much less than that required compressing the high temperature air. There by, reducing the air intake temperature by shifting the compressor intake into a shaded area may acutely improve efficiency and, thus work for the compressor is reduced hence power savings. No influence on the outlet pressure from the first and second stages.

The same findings of background condition are applicable for the long run compressor. Longer the running duration, hotter compressor systems and equipment's and that leads to reduced performance and competency. However, the output pressure does not affect the performance. Hence, for steady performance, using a larger storage tank where compressor works for shorter periods and rest for a long period and, accordingly, decreasing system and equipment temperature.

6. ACKNOWLEDGEMENT

We would like to acknowledge Dr.Arun Kumar, principal of VIVA Institute of Technology and Prof. Niyati Raut, HOD of Mechanical Department for helping us out in this project. Their contribution in this project is invaluable. We would also express our gratitude to our fellow students who helped us out in completion of this project.

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mechanical

ABSTRACT

In this new era of technology even though there are technological advancements in almost all fields there is one area which is yet to be researched fully i.e. safety precautions. There are no satisfactory solutions to ensure the safety of human beings, animals, and property against the fire hazards. Fire can happen at any time at any place irrespective of in-occupancy status. You can expect a fire at any structure may be at your home or your workplace or in hospital or in public places. There are 5.9% of deaths caused among the total deaths in India. Proper attention must be paid to the fire to minimize the losses caused by it. The current fire extinguisher comes with various drawbacks. The needs of new fire extinguishing techniques are vital as fire accidents cause death and injuries. Sound wave could be one of the potential alternatives in putting off flames. A simulation of sound wave was carried out to study behavior of acoustic wave propagation in the collimator and surrounding environment. Number of experiments and test were done to find suitable frequency range and dimensions of collimating drum. Three different sources of flame were used with three different state of fuel (solid, liquid and gas). In the experiment the sound wave manage to extinguish all flames of different fuels with converged collimator design and cylindrical collimator design. This mainly is due to the converged collimator gives a higher air velocity output as compared to an ordinary cylindrical collimator design, which was verified through simulation result. The fire is extinguished by the high and low pressure wave disturbing and thinning flame boundary region. In both experiments, the frequency range needed suppress the flames was found to be between 20Hz to 60Hz. However, in both experiments the flame boundary used was relatively small as compared to real life accidents due to safety considerations. Nevertheless, this sound wave based fire suppression technology could be used to combat early stages of fire accidents.

***Keywords*: -** *Converge collimator, cylindrical collimator, sound waves put off flames, fuel boundary, frequency range needed to suppress the flame.*

1. INTRODUCTION

This project uses sound wave of particular frequency to suppress the flame. Instead of using the traditional equipment's to extinguish the fire which can harm indoor equipment's and assets severely by leaving extinguishing agent behind, we are using a clean medium to extinguish fire which does not leave any residue behind and protect the equipment's from further damage. This project uses the scientific principle and phenomenon of physics and engineering aspects of electronic to efficiently extinguish a flame. Based on the physical aspects of acoustic waves, it is important to understand that acoustic wave patterns are nothing but a series of high pressure and low pressure waves moving back and forth which agitates the surrounding air molecules which also disturbs the flame and cuts off the supply of oxygen by separating the fuel particles from it. The best known frequency to extinguish the fire is in the range between 30Hz to 60Hz i.e. low frequency sound waves. This wave agitates the air molecules and increases the air velocity around a flame thinning out the boundary layer of the flame. This is the layer where combustion occurs. As it thins out the air it is easier to disturb the flame separating oxygen molecules from fuel molecules. Present fire extinguishers are bulky, heavy and have limited source of extinguishing element Therefore the ultimate aim of the project is to make an extinguisher which is handy, lightweight and it should have more than enough amount of fire extinguishing element. Since the sound is just a physical aspect generated by the mechanical movement of the diaphragm of a speaker which uses the energy from the battery will last long as per the capacity of battery. From the advancements in electrical field there are some batteries which can lasts long keeping the size and weight in enough control with respect to the power of that battery.

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2. DESIGN OF ACOUSTIC FIRE EXTINGUISHER

2.1 Subwoofer speaker

Subwoofer speaker is used to create the desired low range frequencies. To suppress the fire using the subwoofer it should be capable of producing low frequency ranging between 20Hz and above. Also the dimensions of the speaker
Must be enough large so that it can cover large area of flame and at the same time it should weigh less for easy handling. Material of the diaphragm should be made of Kevlar, polypropylene, etc. having better strength and low density to perform better and high endurance. There are some high quality standard speakers available in the market.

Figure-2.1: subwoofer speaker

2.2 Collimating Drum

Collimating drum plays an important role by guiding the acoustic pressure waves from the source to the flame. The time required and the distance from which the flame is suppressed is highly dependent on the design of collimating drum. From experiments it is found that effective shape for the collimating drum is cylindrical with a circular opening at the end. The dimensions are found to be best are as shown in figure below.

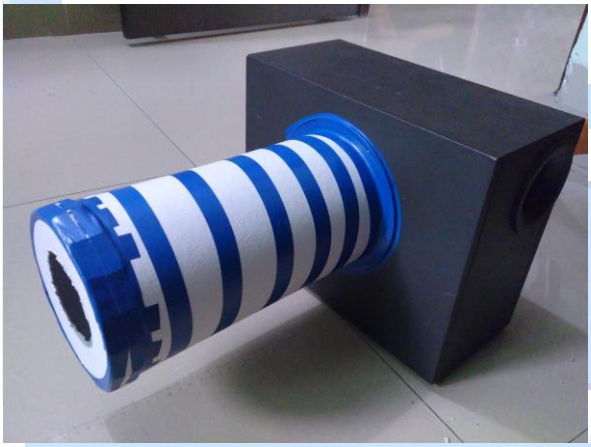

Figure-2.2: Collimating drum

2.3 Power and amplifying unit

Power unit of AFE is dependent upon the specifications of the speaker used. Generally power can be supplied directly from of 240V, 50-60 Hz but it will not be handy to use. So AFE focuses to use a portable power unit as battery. There are different types of batteries like lithium ion, lead acid, etc. Whereas the amplifying unit amplifies the output signal produced from the frequency generator using integrated circuits.

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3. EXPERIMENTAL SETUP AND PROCEDURE

The following image describes the experimental setup used for different frequencies and collimating drum shapes.

Figure-3.1: Experimental setup

The subwoofer is controlled by an android device where the desired frequency is generated. A candle is used as a fire source. All the experiments are done in closed and controlled conditions assuming NTP. From the study we know that the effective range for extinguishing fire is in between 30 Hz to 60Hz. So we started the experiment from 30 Hz and moderate intensity sound. Since there are several variable parameters such as dimensions of collimating drum, shape of collimating drum and distance of drum from flame, etc. we made a cylindrical collimator drum with following dimensions. At first a candle is lit at a random starting distance of 25 cm. then the sound of 30 Hz frequency is focused on the flame through collimating drum. The results are observed and noted down. The same procedure is followed for the same frequency and different distances with increment of 5cm between the two successive distances. To observe the optimal range of frequency for maximum distance the above procedure is repeated for different frequencies. Second to find the optimum shape of collimator drum we tried different shapes of collimator drum. The first part of experiment is done using the cylindrical collimating drum and the second part is done using a converged collimating drum.

4. RESULTS AND CONCLUSIONS

As per the experiments performed on the prototype following results were obtained:
When frequency used between 30Hz to 33Hz with the help of cylindrical drum of dimensions shown above time required for extinguishing the fire from particular distance are

Distance (cm)	Time in seconds (Nature of wave: sine)	Time in seconds (Nature of wave: rectangular)
5	0	0
10	0	0
15	0	0
20	0	0
25	0.15	0.11
30	0.2	0.18
35	0.27	0.23
40	0.4	0.3
45	0.51	0.39
50	0.63	0.48
55	0.89	0.8
60	1.36	1.06
65	2.3	1.5
70	3.5	2.6
75	4.8	4.2
80	7.2	6.2

Figure-4.1: Distance vs Tim

5. Conclusion

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- Until now by experimenting on the prototype it is found that the rectangular wave of 30 Hz is efficient than the sine wave.
- Shapes of drums used were cylindrical, convergent, divergent from which the cylindrical drum with the hole provided at one end is the efficient than others.
- By keeping the length and major diameter of drum same and varying the hole diameter for the constant distance it is observed that as hole diameter increases intensity required increases and when hole diameter decreases the intensity required decreases which results in less power consumption.

7. ACKNOWLEDGEMENT

I would like to express my special thanks of gratitude to my teacher prof. Chinmay Pingulkar as well as our principal Dr. Arun kumar who gave me the golden opportunity to do this wonderful project on the topic "Acoustic Fire Extinguisher", which also helped me in doing a lot of research and I came to know about so many things I am really thankful to them. Secondly I would also like to thank my parents and friends who helped me a lot in finalizing this project within the limited time frame.

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DESIGN AND ANALYSIS OF WIND TUNNEL

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ABSTRACT

A wind tunnel is a tool used in aerodynamic research to study the effects of air moving through solid objects. Even though it predicts accurate results and flow parameter it comes with the disadvantage of high cost, large space utilization, noise problem. Hence the productivity and use of wind tunnel are limited.
The existing wind tunnel model is much complicated to compute and to obtain necessary results. Also, this wind tunnel is not portable and generally manufactured for the large industrial testing purpose. Power required to test a small aerodynamic model is large in such wind tunnel. Hence, to test any small-scale graduate level project become unaffordable due to the cost of testing.
This project describes the design and analysis of the open circuit, small size, economical wind tunnel used for testing of the Aerodynamic model. This project uses computational fluid dynamics to determine the theoretical values for specimen in wind tunnel which will be compared to actual values of fluid flow. An overall analysis and simulation of flow will also be performed. Aerodynamics of any high-speed car or airplane can be studied by using a scale model of an actual model by this apparatus.

Keywords: - *Mechanical engineering, Aerodynamics, Design, Wind tunnel, Fluid dynamics, Analysis, Simulation.*

1. INTRODUCTION

Wind tunnels are one of the important tools for aerodynamics studies wind tunnel is used to similitude the actual flow condition of a prototype on a scale model by facilitating the actual flow conditions of a prototype on a scale mode one can study the aerodynamic property experienced by the prototype on the scale model with reasonable accuracy.

It is a device in which air of uniform property is produced past the model. Basically it a tubular passage for air or any other gases which are forced to produce a flow of uniform properties in the test section. The model which has to undergo for aerodynamic studies are mounted in the test section with suitable instrumentation for measuring the forces, pressure distribution and other aerodynamic characteristics.

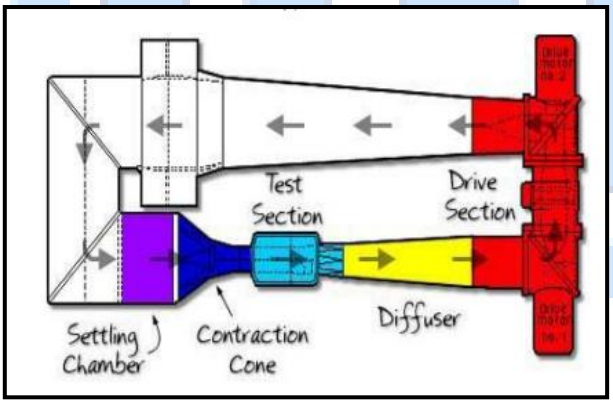

Fig. 1: Closed circuit wind tunnel

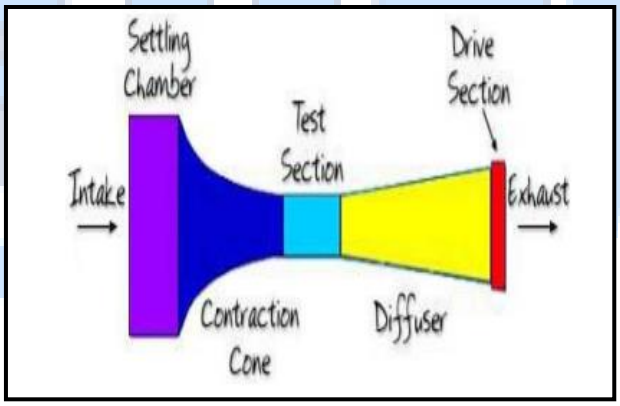

Fig. 2: Open circuit wind tunnel

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2. OBJECTIVE

The following objectives of the project are as follow

1. To design the wind tunnel using various parameters.
2. To Study the velocity profile using the air/smoke on an airfoil.
3. Calculate lift, drag and moment coefficient for different velocities.
4. To obtain the considerable results of scale aerodynamic model for graduate project study purpose.

3. LITERATURE REVIEW

P.Karava,T. Stathopoulous and A.K. Athienitis, [2016] [1], this paper reviews considerable variation in discharge coefficient with opening porosity configuration, wind angle, and Reynolds number. Comparison of various study indicates significant differences in wind-driven cross ventilation.

Mansi Singh, Et Al., [2013] [5], have concluded that models suitable for an aerofoil should have the weight less than 0.15 kg in a small sized subsonic wind tunnel. And velocity profiles can be studied for the design of car and airplane using this model. Due to their ability to combine both types of data i.e. quantitative data and visualization, a tunnel is a critical instrument in the quick and thorough design process of anything that involves fluid dynamics.

Robert Howell, Ning Qin, Et Al., [2010] [9], have carried out research of small model on VAWT turbine was been manufactured and tested over a range of operating condition. Computational forecasted of the performance coefficient of this turbine was carried out and a 3D simulation was shown to be in good agreement with the experimental measurement, considering errors and uncertainties in both CFD simulation and the wind tunnel measurement.

Keisuke NISUGI, Et Al., [2004] [13], have developed a flow analysis system, Namely the Hybrid wind tunnel, which integrates the experimental measurement with a wind tunnel and the corresponding numerical simulation with a computer. A specific feature of the hybrid wind tunnel is an existence of the feedback signal to compensate the error in the pressure on the side wall of the cylinder and the feed forward signal to adjust the upstream velocity boundary condition.

4. PROBLEM DEFINITION

After carrying out several search we found the following problem associated to existing wind tunnel are as follow

1. The primary problem associated with wind tunnel is high cost.
2. The Existing Wind tunnel are not portable and consume large space.
3. This Model consumes high power to test even small sized aerodynamic model.
4. Also this wind tunnel is generally manufactured for industrial testing purpose this led to lack of study about wind tunnel testing.
5. Wind tunnel wall influence the flow boundary layer and some sort of clogging.
6. Maintenance time is high.

All the above mention will be overcome by designing this wind tunnel to test Aerodynamic model based on various design parameter while considering the cost parameter as criteria which is to be minimized but also maintaining the efficiency of wind tunnel.

5. PROPOSED METHODOLOGY

In order to overcome problems mentioned in the previous chapter, a research was done to design and simulation of the configured wind tunnel model. This Wind tunnel will be further manufacture for testing of the scale aerodynamic model such as aerofoil, fins, scale car design, etc.

The Designing of wind tunnel would be carried out in a systematic order for which the flow chart is given below

1. Selection of primary Parameter
   The constitutional consideration was to determine a mass flow rate for this testing rig for a given range of airspeed. This led to the selection of axial fan which is supposed to be used. All Other parameters like Drop in pressure, head losses, Reynolds number, prandl number, Froude number can be calculated also the fluid is assumed to be incompressible.

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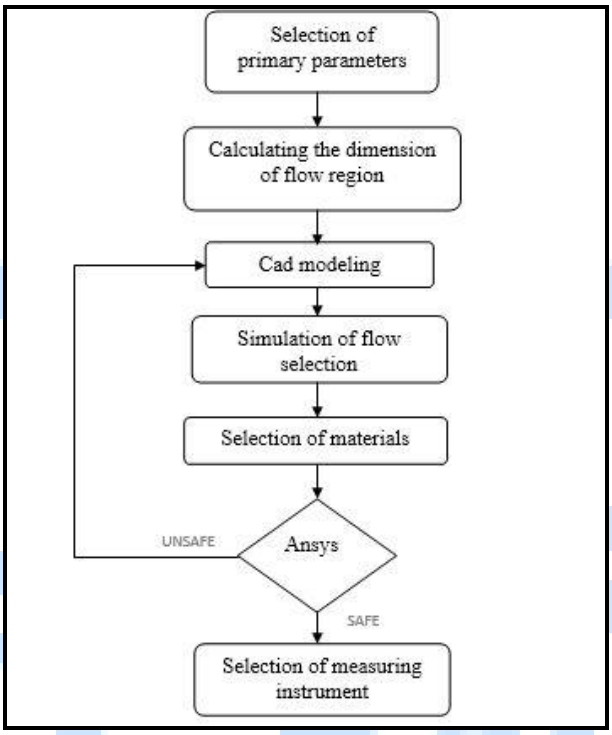

Fig. 1: Flow chart of Wind tunnel design

2. Calculating the dimension of flow region
   Once all primary parameters are found the dimension of the flow section or the flow region. Can be calculated by using the various equation like continuity equation, Bernoulli's equation.

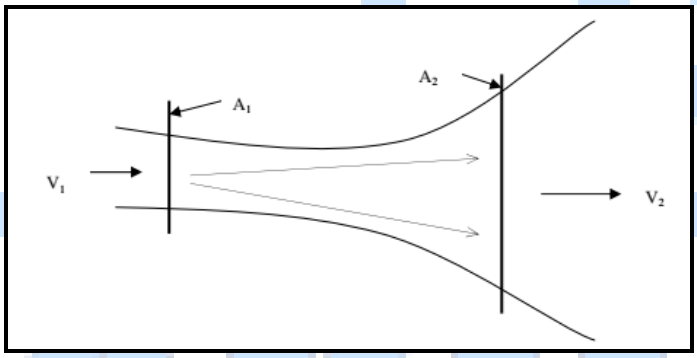

Fig. 4: Continuity equation diagram

Bernoulli equation with losses – $$p_1 + \frac{1}{2}\rho V_1^2 + Z_1 - h_f = p_2 + \frac{1}{2}\rho V_2^2 + Z_2$$

3. CAD Modelling
   From above calculation, a CAD model was developed using Solid Works Which will be used for better visualization and simulation which will be performed in latter stages.

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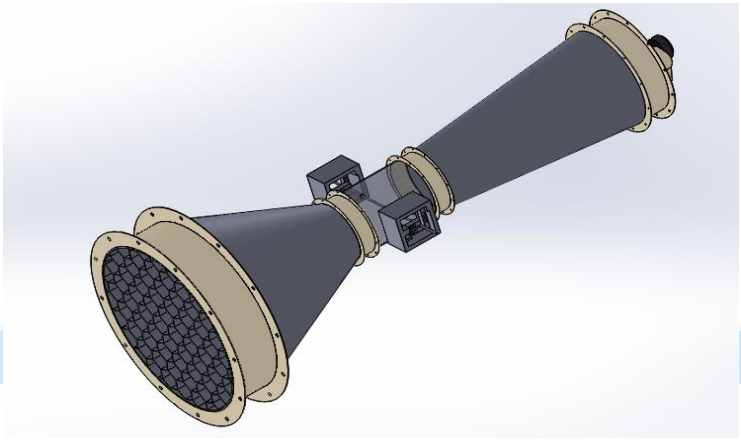

Fig. 5: 3D CAD Model of Wind tunnel

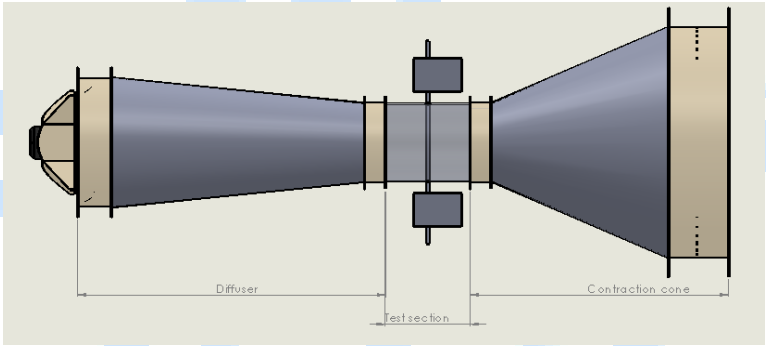

Fig. 6: 2D Layout of Wind tunnel

4. Material Selection
   After conducting initial material research considering cost manufacturability and structure strength. We determine following material to be best suitable.
   a) Wood
   b) Acrylic
   c) Aluminum
   d) Steel

5. Flow Simulation and Structural analysis
   After preparation of CAD model, a flow simulation would be performed which would provide suitable data like pressure which can be used in later stages to perform structural analysis and determine whether the given dimension of the wind tunnel is safe against Hydrostatic pressure.
   If in any stages the design is found to be failing, then the thickness of the structure is to be recalculated and another CAD model is to be designed following by flow simulation and analysis until the Design is safe. All the simulation and structural analysis would be performed using software called as Ansys Workbench.

6. Selection of Measuring Instrument
   This is an important section as it provides the actual reading which can be compared with theoretical reading. This reading can be calculated by using following measuring instrument.

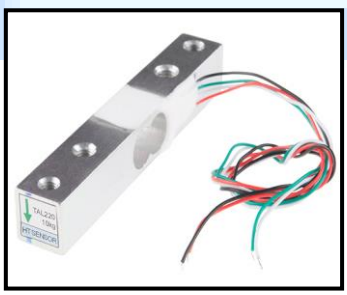

Fig.7: Load cell

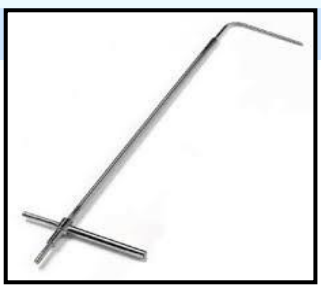

Fig. 8: Pitot tube

Fig. 9: velocity meter

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6. CONCLUSION

The following conclusions would be derived from the above results after model testing for our project. The designing and fabrication of the wind tunnel are done for the subsonic velocity of fluid inside the tunnel.

1. The velocity profile will be depicted by the graphs which will be plotted. The profile will show that the fluid i.e. smoke flowing inside the tunnel has high turbulence.
2. Lift and drag coefficients for the test section can be calculated for the air foil.
3. This model is suitable for an air foil of weight less than 0.15 kg. And the study can be done using different air foils with variant weights, materials and designs.
4. By looking at the way the smaller model acts in the wind tunnel, we get an idea of how a real life-sized airplane of the same design will probably fly.
5. Aerodynamics of any high speed car or airplane can be studied using this model.
6. Velocity profile can be studied for the design of cars and air planes using this model.
7. The testing of the air foil, propeller blades and turbine blades can be done through this apparatus.

7. ACKNOWLEGMENT

We would like to express our special thanks to our Principal, Dr. Arun Kumar and H.O.D., Prof. Niyati Raut who encouraged us and gave us the necessary permission to work on this project. We are extremely grateful to our Technical Project Guide – Prof. Swapnil Raut, who gave us the golden opportunity to do this wonderful project on the topic 'Wind Tunnel Testing Rig', which also helped us in doing a lot of Research. We learned a lot about so many new things and are really thankful to them.

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NUMERICAL SIMULATION OF BUFFETING EFFECT ON WINGS

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ABSTRACT

The one of the major problem in the aircraft while accelerating in transonic regime the aircraft's wing gets shock waves due to change in velocity from sonic to supersonic regime. The critical Mach number is that free stream Mach number at which sonic flow is first achieved on the aerofoil surface. In order to fly the aircraft in transonic regime or above transonic speed we will analyse the critical Mach number. The analysis of buffeting effect on the particular type of wing of the aircraft while predesigning is required to avoid any unpleasant conditions. In this project work numerical method will be used to analyse buffeting effect on wing of the aircraft. Using CFD technique numerical model of aerofoil (2D) and wing (3D) will be generated and iterations will be carried numerical equations by applying appropriate Boundary conditions. The results thus obtained will be compared with those available in previous research work. Thus, validating the project work.

Keywords: - *Buffeting, wings, aerofoil, simulation, mach number.*

1. INTRODUCTION

The Buffeting is high-frequency instability, caused by airflow separation or shock wave oscillations from one object striking another. It is caused by a sudden impulse of load increasing. It is a random forced vibration. Generally, it affects the aircraft structure due to air flow downstream of the wing.

During the world war a British engineer named Frank Whittle invented the jet engine. He produced jet plane named as Vampire that exceeds the speed of 500mph. then he builds experimental DH 108 and release it to young son named Geoffrey. For the first cautious trials the plane behaved beautifully, but has Geoffrey speed up unsuspectingly drew close to an invisible wall in the sky and later that named as the sound barrier. Which can destroy a plane not design to pierce it. One evening he hit the speed of sound and the plane disintegrated. Young Geoffrey's body was not found for ten days.

Consider an aerofoil in a low-speed flow, say, with M∞=0.3, as sketches in fig.1.1a. In the expansion over the top surface at the aerofoil, the local flow Mach number M increases. Let point A represent the location on the aerofoil surface where the pressure is a minimum, hence where M is a maximum. In figure.1.1 (a), let us say this maximum is MA=0.435. Now assume that we gradually increase the freestream Mach number. As M∞ increases, MA also increases. For example, if M∞ is increased to M=0.5, the maximum local value of M will be 0.772, as shown in fig.1.1b. let us continue to increase M∞ until we achieve just the right value such that the local Mach number at the minimum pressure point equals 1, that is, such that MA =1.0, as shown in fig.1.1c. When this happens, the freestream Mach number M∞ is called the critical Mach number, donated by Mr. By definition, the critical Mach number is that freestream Mach number at which sonic flow is first achieved on the aerofoil surface. In fig.c, Mcr=0.61.

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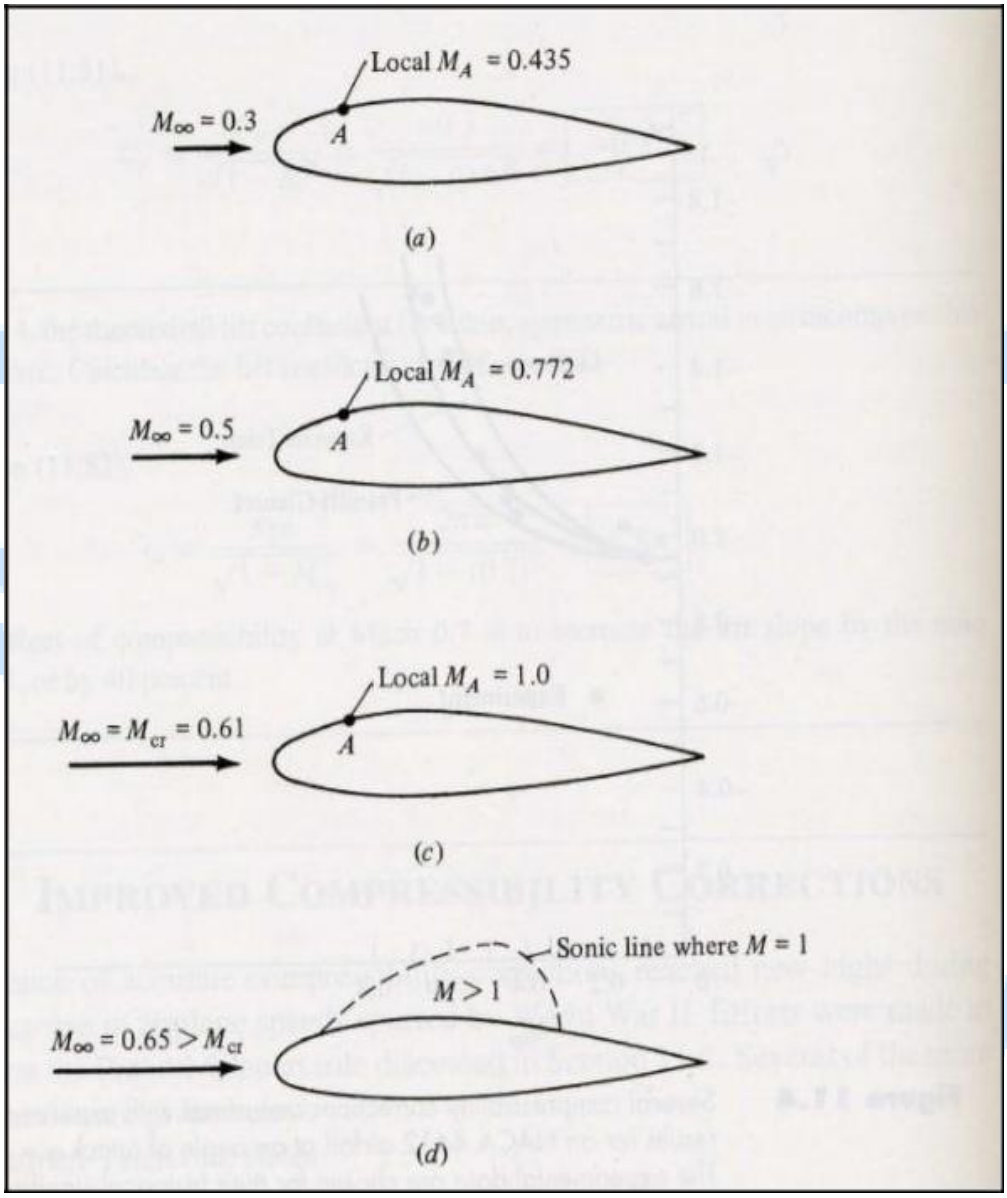

Fig 1: Critical mach number

2. OBJECTIVE

The following objectives of the project are as follow

1. To predict the relation between wind tunnel results and CFD results.
2. To accurately deduce the numerical equations to analyse the buffeting effect.
3. To minimize the residual error from numerical solutions
4. To predict the boundary conditions for wing to analyse the buffeting effect
5. To calculate critical mach number while considering physical aspects of aircraft and surroundings.

3. LITERATURE REVIEW

Damien Szubert, Et Al. [2016] [3], have presented an analysis on the turbulent flow around a supercritical aerofoil at high Reynolds number and in the transonic regime, involving shock-wave/boundary layer interaction and buffet, by means of numerical simulation and turbulence modelling. They carried URANS simulation and OES approach. The URANS simulations based on the k−epsilon SST model have indicated a high turbulence diffusion level and a decrease in the appearance of instabilities pas the trailing edge, as well as a short shock amplitude. The OES approach provided an intermediate behaviour between the two mentioned with a reasonably extended shock amplitude and capturing of the von Karm´an and shear- layer vortices downstream and of the trailing edge.

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Azizul Hasan [2016] [4], have introduced, numerical study of some iterative methods for solving non-linear equations. Many iterative methods for solving algebraic and transcendental equations is presented by the different formulae. Using bisection method, second method is the Newton's iterative method and their results are compared. Newton's method always uses two iterations whereas the others take only one. They have concluded that the secant method is formally the most effective from the Newton method, as iterating only a single function evaluation per iteration. Analysis of efficiency from the numerical computation shows that bisection method converges too slow but it will converge.

V.Nikolic, Et Al. [2014] [7], they have concluded dynamic models which represent the real systems. As an example, one gear couple has been presented. They performed operation on a gear couple. They used Finite Elements Method to develop the real model of the geared set. On the basis of the results, they concluded that the methodology developed to study the dynamic behaviour of complex systems is very efficient. It gives a lot of possibilities and can be easily upgraded for analysis of other effects.

Keisuke NISUGI, Et Al., [2004] [13], have developed a flow analysis system, Namely the Hybrid wind tunnel, which integrates the experimental measurement with a wind tunnel and the corresponding numerical simulation with a computer. A specific feature of the hybrid wind tunnel is an existence of the feedback signal to compensate the error in the pressure on the side wall of the cylinder and the feed forward signal to adjust the upstream velocity boundary condition.

4. PROBLEM DEFINITION

After doing literature review mentioned in previous chapter. We analyzed that one of the major problem in aircraft while accelerating in transonic regime is that aircraft's wing gets shock waves due to change in velocity from sonic to supersonic regime.

The problem associated with existing wind tunnel testing method is as follows

1. This method can only be done after post design which is not suitable as far as time & cost is concern.
2. Wind tunnel testing method requires large space and expensive equipment, which is why it is only conducted by several large international firms and universities.
3. Highly skilled Engineers and scientist are required to conduct the experiments.
4. Physical model of test specimen is required hence re-alteration is not possible.
5. Since, the results are in photograph and video recording format hence not easy to analyse.

Therefore, we are proposing another method called numerical method which can be done while pre-designing. So, we can reduce the cost & the time required.

4.1 Proposed methodology

In order to overcome problem mentioned in the chapter Problem Definition, we are going to carry out Numerical Simulation of Buffeting effect on wings for which the flowchart is shown below

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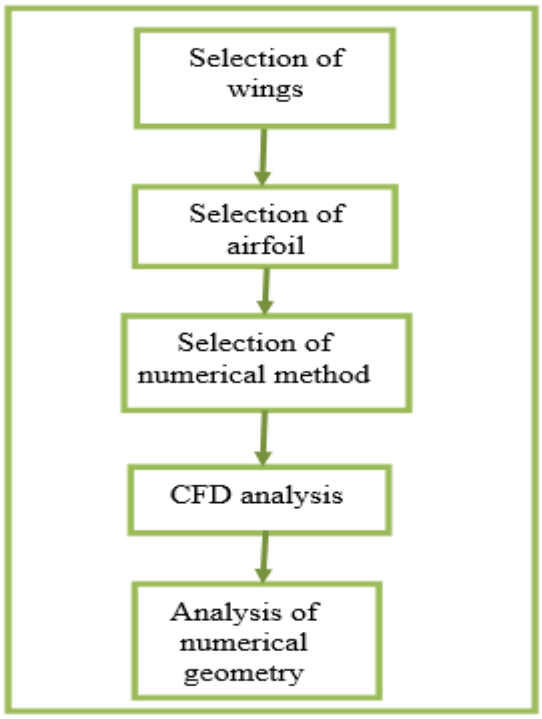

Fig. 2: Flow chart

Selection of wings

1) Straight wing 2) Swept wing

Selection of airfoil

1. High lift low Reynolds number airfoil
2. Super critical aerofoils

Selection of Numerical Method

There are different types of numerical method:

- Finite Element Method
- Boundary Element Met
- Finite Difference Method
- Finite Volume Method
- Meshless Method

CFD METHOD

The general process for performing a CFD analysis is outlined below so as to provide a reference for understanding the various aspects of a CFD simulation. The process includes:

1. Formulate the Flow Problem
2. Model the Geometry and Flow Domain
3. Establish the Boundary and Initial Conditions
4. Generate the Grid
5. Establish the Simulation Strategy
6. Establish the Input Parameters and Files
7. Perform the Simulation
8. Monitor the Simulation for Completion
9. Post-process the Simulation to get the Results
10. Make Comparisons of the Results

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11. Repeat the Process to Examine Sensitivities

5. CONCLUSION

By analyzing numerical method, we will compare the result with the wind tunnel testing results of the same aerofoils

1. By solving numerical method, we will minimize the residual error.
2. We can get the numerical method to analyse the buffeting effect on wings while pre-design
3. We can predict the boundary conditions for wing to analyse the buffeting effect.
4. We can calculate critical Mach number while considering physical aspects of aircraft and surroundings.

6. ACKNOWLEGMENT

We would like to express our special thanks to our Principal, Dr. Arun Kumar and H.O.D., Prof. Niyati Raut who encouraged us and gave us the necessary permission to work on this project. We are extremely grateful to our Technical Project Guide – Prof. Swapnil Raut, who gave us the golden opportunity to do this wonderful project on the topic 'Wind Tunnel Testing Rig', which also helped us in doing a lot of Research. We learned a lot about so many new things and are really thankful to them.

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Solar Grass Cutter

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ABSTRACT

The absolute main aim of the project is to replace the conventional source of energy to renewable source of energy. The has been a significant increase in use of renewable energy like hydro energy, solar energy, geothermal energy, bio energy and wind power due to the decrease in conventional energy sources and due to the effect of it on the environment. The conventional sources are getting depleted day by day and will get exhausted in some years which will create a need of energy to suffice the human need for energy. The most available renewable energy source is Solar which is the energy we get from the sun. The energy we get from the sun is sufficient to fulfil human need. Hence our project 'Solar Grass Cutter' which is going to run on solar energy and will be used to cut the grass effortlessly.

Key Words- Mechanical Engineering, Aim, Renewable Energy Source, Suffice, Conventional Energy Source, Solar, Sun.

1. INTRODUCTION

As in today's era, it is needed to reduce the efforts of farmers as well as having a view of the environment. So, we are heading towards having a sustainable development by using Solar energy to generate power for cutting the unwanted grass and reducing farmers fatigue to an extent.

In previous time IC engine used as a source to generate power which creates noise pollution due to the sound of an engine, And local air pollution due to the combustion in the engine. Also, an engine requires periodic maintenance such as changing the engine oil even though electric grass cutter are environmentally friendly, they too can be an inconvenience. Along with engine powered grass cutter, electric grass cutter also hazardous and cannot be used by all. The project is an autonomous solar grass cutter that will allow the user to the ability to their grass with minimal effort.

Main Components are: -

i. Solar Panel

In our project we are using the polycrystalline type solar panel. The solar panel works on the photovoltaic principle which generates electricity and then is used to store in the battery or is used to run the DC Motor. Polycrystalline solar panels have the efficiency of 80%.The solar panel we using is of 100W.

ii. Battery

Battery is one of the most important components of our design as it is used to store the excess of energy and also to supply the energy when required. The battery we are using is a 12V deep cycle battery that can withstand numerous charge and recharge cycles. These batteries are designed to be fully discharged and then replenished without and damage to the electrolytes or internal plates.

iii. **Charge Controller**

A charge controller or a charge regulator is a device which is a voltage or a current regulator which keeps the battery from overcharging. It also regulates the flow of voltage and current that is coming from the solar panel to the batteries.

iv. DC Motor

On the basis of our application, we are selecting the DC Motor. We are using a 100W DC motor as per requirement required to cut the grass. The control of the DC motor is much more convenient and easy than any other motor.

v. Blade

Blade is used to cutter which is mounted on the motor shaft.

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2. PROBLEM IDENTIFICATION

In the previous technology instead of solar energy the main source of energy was conventional energy. Previously IC Engine was used which converted the conventional energy to mechanical power which was further used to cut the energy. For a long time, it uses to consume a lot of fuel and was getting uneconomical and also required lots of maintenance.

3. PURPOSE

The major purpose of energy is getting scarce. Because Solar energy is a renewable source of energy. Solar power is an alternative for fossil fuels to generate energy by using solar panel. The energy used is directly from heat and converts into electricity. It is a clean source of energy, non-polluting. It does not pollute the air by releasing harmful gases like carbon dioxide, nitrogen oxide or Sulphur oxide. So, the risk of damage to the environment is reduced. As our non-renewable resources are set to decline in the years to come, it is important for us to move towards renewable sources of energy like wind, hydropower, biomass and tidal. The main benefit of solar energy is that it can be easily deployed by both home and business users as it does not require any huge set up like in the case of wind or geothermal power. Solar energy not only benefits individual owners, but also benefit the environment as well. Solar energy is one of the most widely used renewable energy source

4. LITERATURE REVIEW

In our project solar grass cutter with the help of solar panel we have generated electricity, which is directly used to run the motor during the time when there is sufficient sunlight. In the early morning when there is scarcity of sunlight the motor can be run with the battery backup. This battery is charged with the help of solar panel only. For our design of the solar grass cutter we referred various articles and paper. The review for those are given below: The previous project based on the solar grass cutter were about on lawn mower types. The overall project became bulky and was also complicated in design. The component required were also more and the overall cost of the project also increased. In another paper we found that the cutting process was made automatic which again increased the overall cost if the project and was also not affordable to the farmers.

Equations

Force required by cutting blade to shear the grass is given by;

$F = T/R$ (1)

Where,

T = Shaft torque

R = Radius of cutting blade

But shaft torque is given by;

$T = P/2\pi N$ (2)

Electrical Power is given by; $P = I * V$ (3)

Torque of motor is given by;

$P = 2\Pi NT / 60$ (4) $T = (P*60) / (2\Pi N)$

5. METHODOLOGY

The working of the solar grass cutter is that it has panels mounted in a particular arrangement in such a way that it can receive solar radiation with maximum intensity easily from the sun.

These solar panels convert solar energy into electrical energy. Now this electrical energy is stored in batteries by using a solar charger.

The main function of the solar charger is to increase the current from the panels while batteries are charging, it also disconnects the solar panels from the batteries when they are fully charged and also connects to the panels when the charging in batteries is low.

The motor is connected to the batteries through connecting wires. Between these a two-motor driver is provided. It starts and stops the working of the motor.

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From this motor, the power transmits to the mechanism and this makes the blade to rotate with high speed and this makes to cut the grass.

6. CONCLUSION

Our project Solar Grass Cutter has been successfully fabricated and the result that we obtained we quite acceptable. We successfully made the project handy and less bulky for the operation. And the whole project is using clean, green energy and is zero emission. There is a battery facility provided so it would run the motor in the absence of the sunlight. The project which we have done surly reaches the average families because the grass can be trimmed with minimum cost and with minimum time Finally, this project may give an inspiration to the people who can modify and can obtain better results.

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Test rig on Eddy Current Braking System

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ABSTRACT

"Design on braking system using eddy current" is an ingenious revolution on its own and is specially made for the purpose to stop the disc in minimum time. Brakes are the important constituents in any automobile which are basically used to stop the motion of any mobile. Such kind of constituent should be tested by using the highly precise method in order to access its functional performance in advance. The examination method of brakes should be precise with minimum time consuming procedure for its inspection. This design will check the brake in the least time which leads to a reduction of time and improves brake efficiency.

Keywords— Eddy Current Braking System, design, Lorentz Force, permanent magnet,Magnetic field .

1. INTRODUCTION

In the process of any mechanism, the most crucial security system is the braking system. The change in kinetic energy to heat energy by friction is the most basic designs of the braking system. It is achieved by friction between rubbing surfaces. These problems can be solved by, a contactless magnetic brake. Concept contains a metal disc which will conduct eddy currents produced by magnets.

Contactless brakes can be used in applications like automobiles, locomotives, roller coasters, hydraulic machines, elevators, etc. These brakes are widely applicable due to their effectiveness and simplicity. The braking force can be accustomed to control higher torque loads by shifting the coil turns or by increasing the voltage. This gives flexibility of process of the system and makes it reliable even in varying loading patterns. A study of eddy current braking system is performed to find out the practical boundary of using an electromagnetic braking system.

2 .PROBLEM DEFINATION

Development of a "Design on Eddy-Current braking system" a transportable equipment, which can be used as a frictionless braking system. This method is based on the principle Faraday's law and Lorentz principle.

Objectives:

Development of design

The design should give an accurate and precise results

It must be tough and insensitive

3. PROPOSED METHODOLODGY

A. Concept Design

Eddy current brake mechanism works according to Faraday's law o. According to this law, whenever a conductor enters into magnetic lines of forces, an electromotive force of the magnitude of which is proportional to the strength of magnetic field and the speed of the conductor.

The rotating disc is slow down by the magnetic field contact between the practical field ad eddy current. Thus the wheels of the vehicle also slow down since the wheels are directly attached to the disc of the eddy current brake, thus creating smooth stopping motion.

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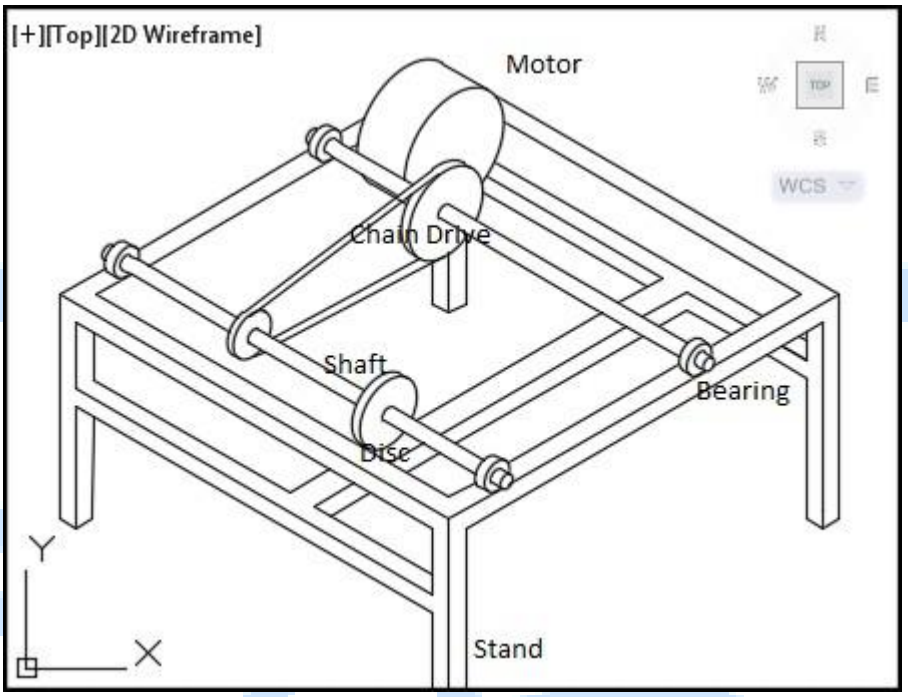

Fig: 2D Wireframe diagram of eddy current braking system

B. Market Survey

According to our model of the project, we study many sorts of eddy current braking system and relate the design of our braking system. On the basis of the study, we have carefully chosen the data which is further discussed in material selection.

C. Selection of material

1) Rotor Disc: The rotor is typically made of cast iron, but may in some cases be made of compounds such as reinforced carbon–carbon or ceramic matrix composites. This is associated to the wheel or the axle. To hinder the wheel, friction material in the form of brake pads, attached on the brake caliper, is forced mechanically, hydraulically, pneumatically, or electromagnetically against both sides of the rotor. Friction effects the rotor and attached wheel to slow or stop.

2) Shaft: A shaft is a spinning machine element, commonly circular in cross section, which is used to transfer power from one part to another, or from a machine which produces power to a machine which absorbs power. The several components such as pulleys and gears are attached on it. The material used for conventional shafts is mild steel. When high strength is mandatory, an alloy steel such as nickel, nickel-chromium or chromium-vanadium steel is used. Shafts are generally designed by hot rolling and completed to size by cold drawing or turning and grinding. C45 is a medium carbon steel is used when superior strength and hardness is desired than in the "as rolled" condition. Extreme size precision, straightness, and concentricity combine to minimize wear in high speed uses. Turned, ground and polished.

3) Permanent Magnet: In an eddy current brake the magnetic field may be formed by a permanent magnet, or an electromagnet so the braking force can be revolved on and off or diverse by varying the electric current in the electromagnet's windings. Another benefit is that since the brake does not work by friction, there are no brake shoe surfaces to wear out, requiring replacement, as with friction brakes. A drawback is that since the braking force is proportional to velocity the brake has no holding force when the moving object is fixed, as is provided by static friction in a friction brake, so in vehicles, it must be accompanied by a friction brake.

D. Available Method

1) Eddy Current Brakes: If the conductor we are moving through the magnetic field isn't a wire that permits the electricity to flow effortlessly. We still get electric currents, but in its place of flowing off somewhere, they spin about inside the material. These are what we call eddy currents.

They're electric currents produced inside a conductor by a magnetic field that can't flow away so they spin around instead, disintegrating their energy as heat. One of the fascinating things about eddy currents is that they're not completely arbitrary: they flow in a particular way to try to stop whatever it is that causes them. This is an example of another bit of electromagnetism called Lenz's law (it monitors from another law called the conservation of energy, and it's made into the four equations summarizing electromagnetism that were set out by James Clerk Maxwell).

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Here's an example. Assume you drop a coin-shaped magnet inside a plastic pipe. It will take about a half second to get to the bottom. Repeat the same testing with a copper pipe and you'll find your magnet takes a while (maybe three or four seconds) to make exactly the same passage. The reason for this are eddy currents. When the magnet falls through the pipe, there is a magnetic field moving through a stationary conductor. That creates electric currents in the conductor—eddy currents, in fact. According to the laws of electromagnetism that when a current flows in a conductor, it creates a magnetic field. So the eddy currents produce their own magnetic field. Lenz's law tells us that this magnetic field will try to restrict its motion, which is the dropping magnet. So the eddy currents and the second magnetic field generates an upward force on the magnet that tries to stop it from falling. Hence, the eddy currents produce a braking force on the falling magnet. It's because eddy currents always oppose whatever causes them that we can use them as brakes in automobiles, engines, and another device.

E. Calculation

Mild steel C-45 is selected for our project.

1. Easily available in all sections.
2. Welding ability
3. Machining ability
4. Cutting ability
5. Cheapest in all other metals.

Material = C 45 (mild steel) Take

F.O.S. 2

$\sigma_t = \sigma_b$ = 540/F.O.S. = 270 N/mm^2

$\sigma_s = 0.5\ \sigma_t$

= 0.5 x 270

=135N/mm^2

DESIGN OF MOTOR

Power of motor = 373 N- m /s

Rpm of motor = 1140 rpm

Calculation for final speed & torque Power of motor = P = 373 watt.

$P = 2\pi N T / 60$

Where,

N→ Rpm of motor = 1140 rpm

T →Torque transmitted

$373 = (2\pi \times 1140 \times T) /60$

T = 3.12 N-m

T1= 3124 N-mm

Now, pulley of 75 and 125 diameter is mounted

So, ratio: 1.66

T2 = 5206.6 N-mm

N2= 686.7 rpm

4. CONCLUSION

While concluding this part, we feel quite satisfied with having completed the project synopsis well on time. We had enormous practical experience on the manufacturing schedules of the working project model. Thus we are, pleased to state that the use of such mechanical ability proved to be very useful. We are overwhelmed at the arriving of the directed mission. Undoubtedly the shared endeavor had all the facts of interest and enthusiasm shown by all us the acknowledgement goes to the strong coordination of our batch colleague in bringing out a creative execution of our assignment designated by the university.

Thus we have learned that by the use of eddy current braking system we can reduce the wear, maintenance cost, increased durability is achieved. Hence, due to all these factors, overall cost is reduced. Eddy current braking system is used for active braking. Due to its various applications as discussed earlier, it can use as a secondary braking system.

5. ACKNOWLEDGMENT

We thank our faculty advisor Prof. Pratik Raut in Mechanical Department for his profound and valuable insight and comments on our project.

And sincere thanks to all the faculty and staff associates of the branch of mechanical engineering for assisting and managing us to finish project with great accomplishment.

We express our gratitude to our parents who have encouraged us greatly in our education and prosperity. We also thank everyone those who have supported directly or indirectly in this mission and bringing out this successful report.

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DESIGN OF "I-BICYCLE"

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ABSTRACT

"I-Bicycle" refers to a bicycle with a hub-less rear wheel. The main ideology for this project is to cultivate a hub-less or spoke-less wheel. This bicycle disables some drawbacks of the conservative bicycle such as heavy design due to involvement of spokes, power consumption issues, space issues. The advantages of this bicycle are light weight due to absence of hubs or spokes, additional space in the wheel due to absence of spokes, aesthetic look to the design and lowered center of gravity. The bicycle runs with a "rack and pinion arrangement system" connected to the rear-wheel. The paddle gear is connected to the pinion whereas the pinion is meshed with the internal teeth of the rear-wheel rim. This bicycle can be used to overcome the above cited matters and it's a great invention in the design of the conventional bicycle which gives the operator a fresh feel while using it and it's awesome and very aesthetic when it comes to the appearance of the bicycle.

Keywords— Bicycle, Hub-less wheel, I-Bicycle, Spoke-less bicycle

1. INTRODUCTION

Nowadays, most of the vehicles are reliant on non-renewable fuels such as petroleum or diesel. Such problems result in an increase in toxicity in the atmosphere, traffic issues, global warming and other environmental dangers. In this era of mass-fuel ingesting, a bicycle can be a release to the environment and can decrease the load on petroleum and diesel reserves.

In order to eradicate the limitations of the bicycle being used presently, we, as a group of Mechanical Engineers have came up with an ideology of a spoke-less bicycle, which we have named as "I-bicycle". Modification in the design of the conventionally used bicycle is possible. The general idea is to design a bicycle with a spoke-less rear wheel, using a "sprocket and pinion mechanism" controlled with the help of chain drive. Idea is that, the constraints occuring on a wheel are at ground level, on the outer periphery. A wheel without x axis enables to support the vehicle at the lowest point. The center of gravity is sank for better grip. This design lessens the weight as well as it reduces human effort. The concept is to develop a spoke-less wheeled bicycle. The welfares desired of this bicycle is to reduce the material used in the bicycle, to reduce the weight of the bicycle as there is absence of hubs or spokes, to provide increased safety while riding and to deliver some space to the user so that he can escort a storage box or can even connect an electric motor if obligatory. In calculation to this, the development of a hub-less wheeled bicycle results in reduction in effort applied by the driver while riding the bicycle.

2. LITERATURE REVIEW

S.Mohindar, M.Vinoth Kumar, A.Tamil Arasu, S.Tamizhmaran, R.Tarun, B.Tilak [2017] [1], explained in journal"design and fabrication of lunartic hubless wheel bicycle" states that "Lunartic is a compact urban bicycle concept exploring the combination of different tyre sizes a toothed belt drive and hub less rear wheel as a unique working prototype. The design aims to combine benefit of both wheel sizes for a balance of speed, size and ride quality. Larger wheels travel faster and are more stable and give comfortable ride while small wheels are light compact and more maneuverable. But small wheeled bikes takes up less space and are very maneuverable. Belt drives are clean quiet and maintenance free and hub less wheel creates extra space. Big wheels are very stable due to gyroscopic effect of larger wheel. By using belt drive it replaces the drawbacks made by using a chain drive for transmission of power from driver to driven. By using toothed belt pulley it increase the efficiency of power transmission which intently reduces the work and gains energy."

Andrew J. Horst [2013] [2], in the paper "hubless wheel and related stroller" states that "A seat is disposed on the frame. The Hub less Wheels are disposed on the frame. The Hub less Wheel includes a rim, an internal sliding structure and at least one bridging component. A tire is disposed on the Hub less Wheel. The rim has an external sliding structure on an inner surface of the rim. The internal sliding structure is disposed inside the external sliding structure. The bridging component is disposed between the external sliding structure and the internal sliding structure. The bridging component revolves on its own axis."

Bennett Ross [2001] [3], in the paper "spokeless bicycle system" states that "A spoke less bicycle system for providing a bicycle that does not have spokes within the wheels- The inventive device includes a frame having a seat structure and handle bars, a rear bracket having rear bearings within that rotatably engages a rear wheel, a front bracket having front bearings within that rotatably engages a front wheel, and a drive train that engages the rear Wheel for driving the rear wheel. The rear rim of the rear wheel includes a rear groove that receives the plurality of rear bearings. The rear rim of the rear Wheel includes a rear gear that is engaged by a drive sprocket from the drive train. The front rim of the front wheel includes a front groove that receives the plurality of front bearings."

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Paul E. Lew [1995] [4], in the paper "hubless wheel" states that "A Hub less wheel for a vehicle which provides advantageous weight and aerodynamic properties. The wheel includes a rotationally stationary inner hoop, coupled to the vehicle, and a rotatable outer hoop, concentric with the inner hoop. The inner hoop and outer hoop are both fabricated with a woven fiber composite shell. A ground engaging tread is disposed on the radial periphery of the outer hoop. Bearings, preferably three rotating bearings spaced circumferentially around the inner hoop at approximately 120° intervals, are mounted on the inner hoop to be rotationally stationary therewith and each include a support surface on their respective radial peripheries. The support surface is particularly contoured to operatively engage a bearing engaging surface located on the inner periphery of the outer hoop. The outer hoop is axially and radially supported relative to the inner hoop through this engagement to allow rotation there between."

3. PROBLEM DEFINATION

The main aim of our project is to design a drive-system of a bicycle consisting of a spoke-less wheel. This spoke-less wheel consist of a "rack and pinion" arrangement, wherein the pinion (sprocket) acts as the driving element and the rack (rear wheel rim with internal gears) acts as the driven element.

Objectives:
- To develop a drive-system with a hub-less rear wheel.
- To decrease the effort of the driver.
- To reduce the total weight of the bicycle by removal of spokes from the rear wheel.
- To enhance the gear-ratio of the bicycle.

4. PROPOSED METHODOLODGY

A. *Concept Design:*

This project mainly aims at developing a drive-system of a bicycle with a spoke-less rear wheel by applying a rack and pinion arrangement in the rear wheel. The project focuses on transmission of power by connecting the sprocket to the pinion with the help of chain drive which meshes with the rear wheel-rim having internal gears. The rim of the rear wheel has internal gear that are attached to the internal diameter of the wheel, and in order to rotate, you have a pinion connected to the sprocket with the help of chain drive. You look at a picture of the bike and see we have this big wheel at the back and a tiny little sprocket working with the pedals. Reduction ratio of gear was also mandatory condition to be considered for the design.

B. *Market Survey*:

According to our idea of project we studied many spoke-less and hub-less bicycle design from various journal papers as discussed above and compared the design of sprocket and chain with regular road bicycles to find out the limitations in the designs normal road bicycle and changes to be made in previous spoke-less bicycle design. We have been trying to avoid all the limitations of the earlier bicycle. It is important to find out the material suitable to make the bicycle much more efficient and low weight. On the basis of our analysis we selected the data which is further discussed in material selection.

C. *Material Selection:*

1) *Design of Sprocket:* For the given bicycle to be more efficient, sprockets should be as large due to which the working load will be less for a given amount of transmitted power, allowing the use of a minor pitch chain.
Calculation of proportions of sprockets are as follows
Where P = pitch of the chain,
N = number of teeth on the sprocket;

Pitch Diameter = $\frac{p}{\sin(\frac{180^\circ}{N})}$

Outer Diameter = $p \times [0.6 + \cot(\frac{180^\circ}{N})]$

Sprocket Thickness = $0.93 \times Roller\ Width - 0.006"$

2) *Design of Chain:* Identification of chain is done by using numbers; i.e. a number 40 chain. The digit to the right is 0 for chain of the standard dimensions; 1 for lightweight chain; and 5 for rollerless bushing chain. The digits to the left indicate the pitch of the chain in eighths of an inch. For example, a number 40 chain would be having a pitch of four-eighths of an inch, or 1/2", and would be of the standard dimensions in width, roller diameter, etc.

The roller diameter is "nearest binary fraction" (32nd of an inch) to 5/8ths of the pitch; pin diameter is half of roller diameter. The width of the chain, for "standard" (0 series) chain, is the nearest binary fraction to 5/8ths of the pitch; for narrow chains (1 series) width is 41% of the pitch. Sprocket thickness is approximately 85-90% of the roller width.

Plate thickness is 1/8th of the pitch, except "extra-heavy" chain, which is designated by the suffix H, and is 1/32" thicker.

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TABLE 1-1

ANSI STANDARD CHAIN DIMENSIONS

Chain No.	Pitch	Roller Diameter	Roller Width	Sprocket Thickness	Working Load
25	1/4”	0.130”	1/8”	0.110”	140 lbs
35	3/8”	0.200”	3/16”	0.168”	480 lbs
40	½”	5/16”	5/16”	0.284”	810 lbs
41	½”	0.306”	¼”	0.227”	500 lbs
50	5/8”	0.400”	3/8”	0.343”	1400 lbs
60	¾”	15/32”	½”	0.459”	1950 lbs

3) *Design of rear wheel:* The spoke-less wheel is the main drive that is to be rotated by the pinion. For this, teeth were made on the inner circumference of the wheel. The gap between the holes made is the same as the pitch of the pinion gear. The perfect meshing is made so that the gears engage smoothly and helps in driving so that the drive is smooth.

For this, mild steel was used with density being 7850kg/m3 and Young’s modulus E = 210GPA

Outer Diameter (OD) =0.4064m
Inner Diameter (ID) =0.36836m
Thickness =0.0254m
Weight =4.62kgs
Here we use 200 full depth involute for weight bearing and less friction.

Minimum number of teeth to avoid interference on pinion is 18.

Assuming, minimum number of teeth =32
D1 = Inner diameter of Rack = 0.3683m
D2 = Diameter of Pinion = 0.1016m

As we know,

$$\frac{D1}{D2} = \frac{T1}{T2}$$

$$\frac{0.3683}{0.1016} = \frac{T1}{32}$$

$$\text{Module (m)} = \frac{D}{T} = \frac{0.4064}{116} = 3.175 \times 10^{-3}$$

TABLE 1-2

REAR WHEEL PINION DIMENSIONS

Addendum	1 m	3.175×10^{-3}
Dedendum	1.25 m	3.968×10^{-3}
Working Depth	2 m	6.35×10^{-3}
Min. Total Depth	2.25 m	7.143×10^{-3}
Tooth thickness	1.5708 m	4.98×10^{-3}
Min. Clearance	0.25 m	0.79×10^{-3}
Filter radius at root	0.4 m	1.27×10^{-3}

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5. CONCLUSIONS

Hubless wheel is a revolutionary wheel which abolishes the boundaries of any orthodox hub motored vehicle. In the current situation, where safety, quality, and convenience are major worry, it provides solution to each of them. The present wheel design exhibits its uniqueness in terms of mode by which the power is getting transferred. The exclusion of hub and spokes announces safety in the device and ride understanding enhances as the use of hubless wheel offers better vehicle stability. The presence of non-complex components in the design makes it more serviceable and accessible. Hubless bicycle can be commercialized in order to replace Hub wheel into Hubless wheel. Hubless bicycle is groundbreaking design, which required less effort and speed will increase compared to old-style bicycle as per customer gratification. The maximum speed limit of drive mechanism is enhanced. Storage space is also available. It can save the energy and also result in reduction pollution.

6. ACKNOWLEDGEMENT

We would like to thank our project guide, Prof. Pratik Raut sir and our H.O.D. Prof. Niyati Raut for helping us in the project related queries and giving their valuable suggestions to our group which helped us a lot in the designing of our project.

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Multi Axis Drilling Machine

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ABSTRACT

The industrial sectors greatly demands for productivity and quality. Productivity and quality, both should be maintained in order to endure in market. One of the key factor on which productivity depends is manufacturing competence with which the operation are carried out in some organisation. It can be increased by reducing the total machining time. The best method to improve the productivity along with quality is by use of special purpose machine. In the existing radial drilling machine performance can be increased by design and development of multi axis drill machine. In small scale industries and automobile maintenance shops, there are many needs of drilling multiple holes. In order to create multiple hole at certain distance at a same time than the usual method followed is changing the position of the workpiece in order to satisfy the hole position. The main disadvantage of altering the position of the workpiece is that it reduces the accuracy of the finished components. So in our project we have planned to use multi spindle drilling head instead of using single spindle. If we use multiple spindles we can decrease the time required to complete the operation. This helps in reducing the cost of drilling operation. So this system is one of the efficient process with increase in the accuracy of the operation.

Keywords— Mechanical, Design, Drill, Productivity, Fabrication

1. INTRODUCTION

Machines help us to decrease the human efforts. 1st electric drill machine was invented by Arthar Arnott & William blench in 1889.First portable drilling machine came into use after year 1895. In current situation various type of drill machines are available with various features. There is need to increase the productivity to survive in current competitive environment and it can be only possible by using proper production technology. To make work easier & to achieve more accuracy there is need to upgrade the design of available machine.

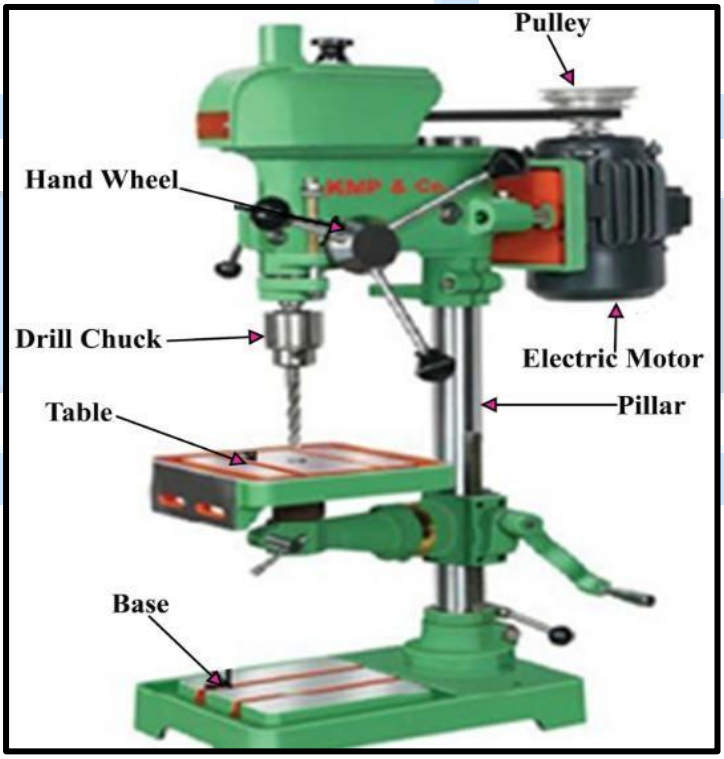

Figure 1: Different Parts of Drilling Machine

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1. **Introduction to drill Machine**.

Drill machine is machine which is used to rotate the drill bit at specific speed & to feed it into the workpiece being drilled. Diameter of hole is depends on size of drill bit (tool). In conventional methods drill machine is consist of the single spindle but Nowadays multiple spindle drilling is used to increase the productivity. In multiple spindle drilling machine multiple holes are produced simultaneously in the same workpiece with same accuracy.

2. Introductions to multi axis drill machine.

In multi axis drill machine we use multiple spindles which are fitted on the columns. All this columns are arranged in circular pattern to drill multiple holes on lateral surface of workpiece. We can change the angular distance between the two columns and height of the column is adjustable, hence we can drill a hole at different angular distance and at different height**.**

2. LITERATURE REVIEW

Prof. Ms. A. A. Shingavi, in this paper they given productivity will increase with the help of multi spindle drilling machine, because using conventional drilling machine four minutes required for produce single hole with tool changing take place for different diameter hole i.e. Only few component produce in one hour. By using multi spindle drilling head production rate is approximately double. Also chance of hole missing is eliminated because multiple holes drilled at a time. By using multi spindle drilling head machine hour cannot changed.

P. Kishor Kumar, studied on thrust force and torque in drilling on aluminium 6061-T6 alloy. In this case study they show that as diameter of hole increases, thrust force and torque in drilling also increases. They predict the value of the thrust force and torque by using equation and then they measure the actual value by using a drill dynamometer setup. Predicted value of a thrust force and torque is nearly equal to the observed value.

G. Niranjana, from this paper we studied that drilling depth can be controlled by programmable microcontroller circuit. It is very difficult to control and measure the drilling depth of hole manually .in this paper they design and develop drilling machine which used to drill holes with its different depths using programmed microcontroller system. They integrate all necessary features of IC's to control the depth of holes. This paper is integration of production using technology.

R. Anandhan, in this paper they given idea about angular drilling machine, which is used to drill hole in any direction it is very complicated to setup job .also time required to setting job is large, angular motion of drilling head is controlled with the help of bevel gears. Indexing plate and up and down mechanism is used to drill holes at different angles. With help of this machine they eliminate geometrical error of drill hole. It is efficient and quick response machine

Mr. K. I. Nargatti, in this paper they introduced multi spindle drilling head with varying centre distance. With the help of this machine we can produce two holes at same time with varying centre distance between them. Size of this machine is compact then conventional drilling machine. It has better accuracy taking position from one place to another place. So machine can be easily transported. Efficiency of multi spindle drilling machine is better than conventional drilling machine. It is power saving machine

Geetanjali R, in this paper they give idea about special purpose machine for drilling and reaming. The purpose of this paper is to reduce the cycle time by replacing drilling machine and reaming machine by special purpose machine (SPM) for drilling and reaming operation. The concept is that the component having different size and thickness, which are drill on drilling spindle first and then reamed. Both the operation performs on same machine having two separate spindles.

N. U. Kakade, in this paper we studied fabrication of combine drilling and tapping machine. In this machine they introduce gearbox for achieving different speed reduction. Drilling a hole required high rpm than tapping and threading. They introduce worm and worm gear for large speed reduction .the main aim of this machine is to locate and hold the work do drilling and tapping operation perfectly.

Santosh Athashere, in this paper they develop special purpose machine for drilling an angular hole. The main purpose of this machine is that to drill an angular hole on workpiece with different size and shapes. In this paper we study the design and manufacturing special purpose machine for various drilling operations like reaming, boring, spot facing and counter boring. In this project they develop six way drilling machine tables with automatic feed motion. This machine is compatible for both straight as well as inclined hole job.

M. Narasimha, in this paper they give design adjustable multi-spindle attachment for machining T-slots in a bolster plate. They have designed milling machine for milling of three T-slots in a single pass. The range of T-slot spacing for the present design is 40 mm – 160 mm. This study concluded that due use of this attachment three T-slots is done in single pass which saves the time as compared to individual milling, due to this production rate is increased.

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3. PROBLEM DEFINITION

A. Problem Statement

In simplified manner only single hole can be drilled at a time which does not satisfies the need for increase in productivity demand. To increase productivity we need special purpose machine which will increase productivity by performing multiple operations in one cycle. Also to make the efforts of human less, there is a requirement for better equipment which is the sole concern behind every invention that we see in our day to day life. Similarly in our project we are giving rise to a cost effective and simpler solution to currently present radial drilling mechanism.

Our project is made by keeping in mind of the needs of those small scale industries and provide them the ease of working which was previously benefited only by the large scale industries which was having a huge capital investment. The difficulties faced before of dismantling the work piece is removed because of our portable type of design of machine.

B. Solution of problems

In today's market the customer demands the product of right quality, right quantity and right cost and at right time. Therefore it is necessary to improve productivity as well as quality. The special purpose drilling machine is a best solution to the above problem which is used to perform multiple drilling operations at a time. In the multi-spindle drilling machine multi spindles are driven simultaneously which carry multiple chucks. Therefore it takes less time and it requires less human efforts as compared to conventional machining.

4. METHODOLOGY

A. Existing Method

There are mainly two types of multiple spindle drilling head are available

a. Fixed multiple spindle drilling head

In this type of drilling head, multiple spindles are attached at fixed position. Therefore flexibility in operation is less but due to multiple spindles total time required to complete the whole operation is less i.e. time needed to drill multiple holes with multiple spindle drilling head is same as time required to drill single hole by using conventional drill machine. This helps to increase productivity but it has lower flexibility hence fixed multi spindle drilling head is only used for mass and batch production.

b. Adjustable multiple spindle drilling head

Adjustable multiple spindle drilling head consist multiple spindles which are connected by means of planetary gear. All this spindles are arranged in circular manner. In this type of drilling head we can change centre construction hence it has more flexibility than fixed multi spindle drilling head.

B. Proposed Method

By using multi axis drill machine we can drill multiple holes on lateral surface at a same time. In multi axis drilling machine by considering cost we are using three spindles, to drill three holes simultaneously on single work piece or job. Feed is given manually to drill machine by rotating the handle which rotates the bevel gears, and power is transmitted to lead-screw with the help of miter gear. The radial travel of a spindle is controlled by lead-screw mechanism, were lead screws are driven by set of bevel gears.

To control depth of the hole we use limit switch which controls ON/OFF action of drill machine. That limit switch can be adjusted in radial direction as per requirement of depth of hole, hence we can drill a hole with higher accuracy. Drill machines are mounted on a stand so by varying height of a stand we can control vertical movement of a drill spindle. Therefore we are able to vary the distance of hole from base also we can vary the angular distance between two holes.

5. RESULT AND DISCUSSION

In current scenario, for increasing productivity we have to reduce the machining time. For reducing machining time we have to perform multiple operations simultaneously. In our design we can able to drill three holes at a time. There are various method available for multiple hole drilling, but most of them are not able to drill on lateral surface and at various angular distance. Most of these mechanisms are able to drill holes only on one plane as well as by using this mechanism we are not able to vary the height of hole from base.

In our design, we facilitates to the operator to drill multiple hole, with various angular distance and at various height from the base of the job. Therefore by using this mechanism we are able to increase the flexibility of operations as well as productivity.

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7. CONCLUSIONS

By using Multi Axis Drilling Machine we can drill three holes simultaneously on lateral surface. Therefore possibility of hole missing is eliminated, cost per piece is reduced, cost of labour is reduced and increased in productivity. In our project we can vary the angular distance and vertical height of drill spindle, therefore we are able to perform drilling operation on different size of work piece at any height. Medium scale industry can use this machine for job production. By using our machine, industries are able to reduce the total production cycle time as compared to conventional machining. Also skilled labor is not required, because use of limit switch for controlling depth of holes makes operation easier than conventional machining.

8. ACKNOWLEDGMENT

I have immense pleasure in expressing thanks to our Principle, Dr. Arun Kumar, VIVA Institute of technology, MUMBAI University, for providing us an opportunity to carry out this project work and for his motivating support, keen interest which kept our spirit alive all through. I am extremely thankful to Prof. Niyati Raut, HOD of Mechanical Department, Prof. Chinmay Pingulkar, our guide, Prof. Varghese Koshy, co-guide for constant encouragement, direction and support throughout the course.

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VEGETABLE CUTTING MACHINE

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ABSTRACT

In the era of industrialization, automatic machines become an integral part of human life. These machines help to reduce the time needed to do a specific task. Nowadays, human life becomes more competitive and faster than the previous. Automation brought about by technology has saved human effort and time to a large extent. Slicing vegetables are a risky and time-consuming task in our busy life. This project is aimed at solving above stated problems by introducing a special product named Automatic Vegetable Cutter Machine. This machine is mainly designed to reduce human effort and make the job of chopping vegetables much easier and faster. Its main features are fully automated, easily portable, cost efficient, less power consumption and changeable sharp blade, etc. The cutter will operate on the concept of rotating grid. The cutting grid will be rotating inside a casing, powered by an ac motor. The vegetables will be fed via the hopper arrangement, at the top. The cutting grid will rotate at a high speed which will cuts the vegetables as they pass through them. The cutting grids will be varied according to the need of customer. The shape of the cut vegetables vary with the change in cutting grids.

Keywords – compact, portable, semi-automatic, slicer, dicer.

1. INTRODUCTION

Automation was the rage of the engineering world. By using automatic machines, it reduced man power, time etc. Now we are in the stage where everything needs to be automatic and faster. So everyone needs to do work in less time. In our busy life for the cooking purpose, cutting vegetables is also a tedious and time consuming. So lot of innovations made, many researched vegetable cutting machine are came into the market or competition world. These machines were having drawbacks such as high investment cost, non-detachable blades, additional man power and time consumption caused by manual processing. By considering that we will design this machine called “Vegetable Cutting Machine”.

2. OBJECTIVE OF THIS STUDY

The main purpose of the machine is to reduce human effort and make the job of chopping vegetables much easier, faster and effectively. In this machine, we will provide a hopper for the feeding of vegetables and separate blades for slicing and chopping. Different shapes of blades are available which can attach for different shapes of vegetables. The chopped and sliced vegetable pieces will come out of the outlet which will be provided on the housing. Its main features are fully automated, easily portable, cost effective, less power consumption and changeable aluminium disc, sharp blade, guide blade etc. The time required for slicing the vegetable will be less as compared with traditional method. In this project we will make the job of cutting vegetables easier and also the machine is easy to use that an unskilled labour can easily operate the machine. The present work focuses on design and development of an improved version of a multipurpose vegetable cutter that takes care of the problems mentioned above.

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3 .LITERATURE REVIEW

Balaji b., hari narayanan u., jagadeesh shanmugam h., et al [2017] [1], they have presented research paper on automatic vegetable cutting system. they have chosen the slider crank mechanism to convert motor's rotary motion into linear reciprocating motion. the automation of the vegetable cutting mechanism is possible by combining the mechanical and electronic control mechanisms by means of instructions through programming. time consumption is less when compared to the manual cutting operation. this work provides the desired output and the variety of the cuts is done by use of different cutting grid.

Kamlesh Pradhan, Amar Dandale, Akshay Dhenge, et al [2017] [2], they have presented research paper on semi-automatic chips machine. They provide the best combination of traction, speed of movement, load of the bearings, and long service life. It cuts three slices of potato in single revolution. The potato slicing machine is simple workable and efficient machine, which can be adopted to reduce mechanical energy input in potato processing and also to improve product quality.

F.H.C.A. Silva and D.N. Jayatissa [2017] [3], they have presented research paper on design and development of a ginger slicer for small scale spice processors. The ginger slicing mechanism for achieving uniform slices of ginger was successful. The obtained values shows that the overall efficiency of the machine was higher while the machine is operating at a lower speed. The average machine capacity was 7 times higher compared to the labor capacity of 10.28 kg/h with a higher uniformity on slicer thickness. The objective of their study was to design and develop a cost effective and efficient mechanical solution to slice the fresh ginger with high quality output.

Gunjal A.V., Shinde K.L., Sonawane R.V., Dike A.P., et al [2016] [4], they have designed automatic pneumatically operated lemons cutting machine for saving time; improve safety, continuous flow of material etc. The machine is working on pneumatic energy so it requires air compressor for working. As well as solenoid valve is also plays an important role in their machine. Solenoid valve consumes electricity for working. So compressor as well as electricity is required for working of their project.

Roshan M. Hatwar, Kunal. T Rahandale, Mohan G. Trivedi [2016] [5], they have presented research paper on concept, design and development of semi-automated potato slicing machine. The design of the semi-automated potato chips machine is based on the technical idea of the combination of rotary and longitudinal motion produced by electric motor and leverage mechanism, blade angle and the rotation of the wheel provides required slice thickness. This machine allows in its simplicity of design and modest cost with the ability to generate thin uniform slices. Cutting involves principally the application of shearing force on potato with the help of a blade.

4. PROPOSED METHOD

Modern methods of cutting have greatly improved production rates and reduced slicing, dicing and chopping time. The main objective of this study is to design and fabricate vegetable cutting machine so as to optimize its efficiency at low cost, reduce total time of slicing and produce hygienic and quality cutting. The machine will consist of different cutting discs, cutting chamber, feeding hopper, the main frame and power transmitting unit. The maintenance cost of machine will cheap, slicing time of plantain chips will be reduced, operation of the machine will not require special skill. The machine is easy and safe to operate, it will be free of noise and vibration, the slicing method will be continuous with two

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slicing blades provided inside the cutting chamber and energy for loading and unloading will reduce since feeding hopper and large discharged outlet will be provided. It is observed that the traditional method of cutting vegetables into pieces is stressful leading to drudgery and prone to finger injury, time consuming, does not produce uniform size of cut pieces.
The design of various component of the unit is mainly based on the functional and structural strength. Different types of vegetables put into the hopper manually. Vegetables will push towards cutting wheel by applying force on vegetables with help of leverage mechanism. When vegetables come in contact with cutting blade of cutting wheel, it will cut into thin slices.

5. RESULT AND DISCUSSION

By using the proposed machine, it will lot more easy to cut vegetables in large quantity. The machine will be able to cut thin and uniform pieces of vegetables. Different types of blades will be used for cutting vegetables in different sizes and shapes such as slices and dices. We will use hopper system to feed vegetables which will reduce the time required for manual feeding. We will make this machine easily portable by using light weight material for manufacturing. We will make this machine more compact than existing machines, so it will require less space. Due to cost reduction and compact size, it is easily accepted for household uses also.

6. CONCLUSION

The proposed machine will provide an alternative to the existing automatic vegetable cutter, in terms of automating the vegetable entry into the cutting apparatus, eliminating power fluctuation and lesser initial investment. This machine will help in reducing human effort and make the job of chopping vegetables much easier, faster and effectively. Time consumption will be less when compared to manual cutting. This work will provide the desired output and the variety of the cuts will be done by use of different cutting grid. It will be easy to handle as it is fully automated. It will be portable and will require less space. The innovative machine can be effectively used by any food processing industry.

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Elevator For Specially Abled Person

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ABSTRACT

A elevator for a disabled person has a seat comprising a stationary horizontal rear seat portion. An assembly may be provided for adjustably elevating the seat to accommodate persons of different heights. A sling is provided between the back and the front seat portion to close the space defined there between when they are rotated upwardly.

Keywords— *Wheelchair, Lift, Disabled, Wheels, Scissors Lift, Gear Box*

1. INTRODUCTION

A wheelchair is a wheeled mobility device in which the user sits. The device is propelled either manually or via various automated systems. Wheelchairs are used by people for whom walking is difficult or impossible due to illness (physiological or physical), injury, or disability. The patient is incapable to move due to his/her diseases and are unable to do day to day activities.

Elevator for special abled person is one which enables people with disabilities to move safely and freely and to use the facilities within the environment. Elevator is used for lifting purpose and can be used for especially abled person for the upright motion. This elevator is used for abled person to elevate at particular height.

A wheelchair lift for a disabled person has a seat comprising a stationary horizontal rear seat portion which elevates the wheelchair vertically up and down. This wheelchair elevator comprises scissor mechanism. This helps disabled person to elevate and look after day to day activities. The elevator elevates the disabled person at a certain floor without climbing staircase without assistance.

2. OBJECTIVE

This project is related to equipment's used to lift people confined to wheelchairs in order to help them function normally within the constraints provided by appliances and apparatus designed without regard to the special requirements resulting from their disabilities. In particular, it provides a new and improved way of lifting a wheelchair to a variable height for use either as an adjustable chair or as a means for ramping to a higher elevation.

Objective evaluation of manual elevator is spanning the spectrum from those as basic as applying to difficulties of climbing curbs. The elevator is design to meet the need for a comprehensive but practical instrument for the evaluation of manual lifting. The elevator is to be practical, well tolerated, safe, and to have good measurement properties.

Information via survey and consultation to determine the type and extent of difficulties experienced in relation to wheelchair provision and current prescription practices for aboriginal people in rural and remote communities. It engage suppliers, manufacturers and steering committee members in problem solving wheelchairs and options that would improve function of wheelchairs used in rural and remote communities and identify solutions to wheelchair prescription and maintenance to support users in rural and remote areas.

3. PROBLEM DEFINITION

Transportation being an essential component for all peoples to provide access to basic facilities, goods and services. By using transportation facilities people can access education, employment, health services, social events and community life. Therefore, based on the barriers that hinders the daily activities, it is a necessity to provide a transportation system which is easily accessible for the disabled people in our society. Provision of accessible transportation, from disabled person's view is his human right. Transportation leads them to independent life and mobility without the need for assistance by an attendant, caretaker or family member with the tasks of daily living. Many disabled people find it difficult to live up to the demands on mobility placed by the complexity of today society as a prerequisite for participation in social activities. These groups are thereby at risk of becoming disintegrated.

The possibility to live an independent and active life as long as possible with mental and physical abilities enable them to participate actively in society is considered to be a crucial element of human life and is thus also one of the basic elements of the contemporary concept of quality life.

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4. METHODOLOGY

Fig No: 01 Mini Elevator

A scissor lift is a type of platform that can usually move vertically. The mechanism is achieved by the use of linked, folding supports in a criss-cross "X" pattern, known as a pantograph (scissor mechanism). The upward motion is achieved by elongating the crossing pattern, and propelling the work platform vertically. This mechanism has a self-locking properties and have a compact design.

5. RESULT AND DISCUSSION

The proposed elevator lift contains multiple stages of cross bars which can convert a linear displacement between any two points on the series of cross bars into a vertical displacement multiplied by a mechanical advantage factor. This factor depends on the position of the points chosen to connect an actuator and the number of cross bar stages. The amount of force required from the actuator is also amplified, and can result in very large forces required to begin lifting even a moderate amount of weight if the actuator is not in an optimal position. Actuator force is not constant, since the load factor decreases as a function of lift height.

The elevator lift can be used for high loads by including a hydraulic mechanism. The hydraulic scissor lift is simple in use and does not required routine maintenance. The main constraint of this device is its high initial cost.

Scissor lifts provide a mobile means of reaching areas that are very high. In the materials handling industry, these include tops of storage racks. These machines vary in size. Small lifts, four feet wide, are often used to help navigation within warehouses. Scissor lifts allow workers to work at areas high above ground level without any concern for balance that they would have to exercise if they were using a ladder. One of the basic safety rules forbids operators and users of scissor lifts to move the machine while the platform is in the up position.

6. CONCLUSION

The proposed scissor jack lift can carry loads and it is used to lift disabled person from one place to other place with less human effort. A worm and worm wheel gearbox is used in scissor jack lift, which have self-locking properties that help the disabled person or patient to reach a certain height and to lock the scissor jack in the desired position. The scissor jack is operated by the patient or the disable person himself, so he can achieve mobility without the need for assistance by an attendant, caretaker or family member with the tasks of daily living.

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TO STUDY THE IMPACT OF BIODIESEL AND ETHENOL AS A FUEL ADDITIVE WITH DIESEL ON SINGLE CYLINDER DIESEL ENGINE

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ABSTRACT

Biodiesel can be used as an alternative fuel in diesel engines due to environmental and energy concerns. Considering the existing resources in India, To meet the increasing energy needs of the country and to provide Energy Security, National Policy on Biofuels was announced in December 2009. The major goals of the policy are Development and utilization of indigenous non-food feed stocks raised on degraded or waste lands, thrust on research and development on cultivation, processing and production of biofuels and a blending mandate of 20% Ethanol and Bio-diesel by 2017. So, in this study the effect of biodiesel from non edible oil and diesel fuel blends (B0, B20, B50, B80 and B100) on the performance characteristics (brake power, brake torque, BSFC and brake thermal efficiency) of a diesel engine will investigated. The experiments are conducted at rated engine speed. The results will showed whether an increase in brake power, brake torque and brake thermal efficiency and a reduction trend in brake-specific fuel consumption at higher engine loads for all the biodiesel-diesel blends or not.

The performance and emission characteristics of a direct injection variable compression ratio engine when fueled with pre- heated palm, jatropha, karanja oil and ethanol and its 5%, 10%, 15%, 20% blends with diesel (on a volume basis) will be investigated and compared with standard diesel.

Keywords— *NOx, HC, CO, CO2*

1. INTRODUCTION

Generally, biodiesels are fatty acid esters produced from vegetable oils or animal fats through a chemical process known as transesterification. The differences in the composition and properties of biodiesels produced from soya bean oil, rapeseed oil, karanja oil, jatropha oil or animal fats, from pure diesel will influence the engine performance, combustion and also the emission characteristics. Experimentally observed that the increase in the content of biodiesel in diesel, biodiesel blend decreases engine power. This loss in engine power with the use of biodiesel is mainly due to the reduction in heating value of biodiesel compared to diesel. The same reason can be accounted for the increase in the brake specific fuel consumption. On the other hand, Canaki and Van Garpen stated that compared to the fossil diesel fuel, biodiesel improves thermal efficiency as it gets injected earlier, resulting in an earlier start of combustion. Also, the shorter delay time of fuel combustion due to the higher cetane number of biodiesel provides more time for complete combustion. However, the low calorific value and high viscosity of bio-fuels again tend to decrease the thermal efficiency. Biodiesel and its blend have larger cetane number than that of diesel, resulting in earlier combustion. Due to this difference in cetane number, the use of biodiesels decreases the ignition delay period compared to pure diesel. The higher cetane number and the reduced ignition delay for the biodiesels tend to increase the in cylinder pressure. The higher oxygen content in biodiesels, leading to improved combustion may be another reason for this. In comparison with conventional diesel fuels, biodiesels promote more complete combustion and thus effectively reduce emissions of particulate matter (PM), carbon monoxide (CO) and smoke.

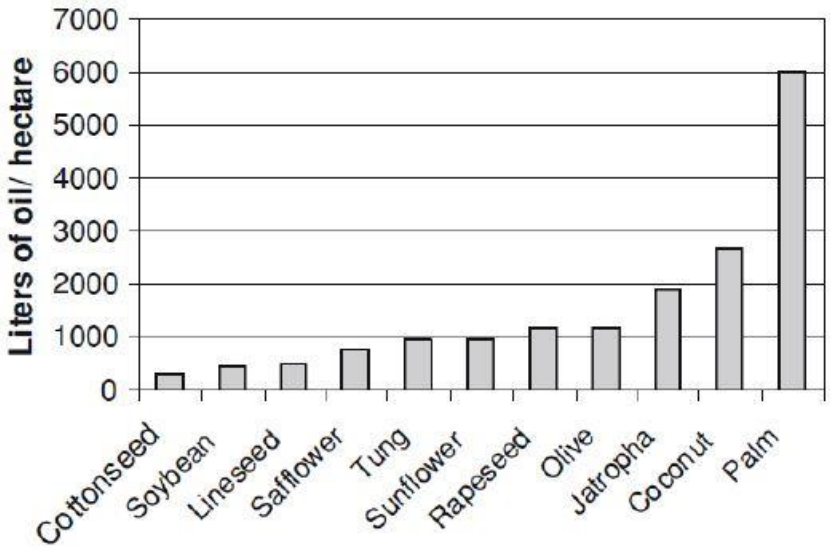

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Table 1.1 Oil content in different seed

1 .OBJECTIVE

1. Identification and selection of feedstock for preparation of biodiesel
2. Collection and purification of seeds.
3. Preparation of biodiesel by using esterification and trans-esterification reactions.
4. Preparation for blends of biodiesel with diesel fuel.
5. Quality testing of all biodiesel with blends along with diesel fuel.(Density, viscosity, flash point, fire point, cetane no, calorific value, cloud point, moisture)
6. Engine performance analysis of all blends. (Brake power, brake thermal efficiency, indicated power, brake specific fuel consumption, braking torque.)
7. Combustion analysis-preparation of heat balance sheet.
8. Search of best blends that will substitute diesel fuel without modification in diesel engine.
9. Smoke analysis for all blends with diesel fuel.

2. LITERATURE REVIEW

International Journal For Technological Research In Engineering (IJTRE), June 2007:
The experimental study is conducted on four strokes, variable compression ratio diesel engine using Jatropha biodiesel blends with diesel. The emission analysis is evaluated by running the engine at different combination of preset CRs and varying load. The emission constituents measured are HC, CO, CO2 and NOx. Based on the experimental studies, following are the important observations made and conclusion drawn thereon. From the large number of experimental data for emission constituents obtained for various input parameters such as load, CR and blend, picking up an optimum combination of the input parameters manually is not possible.

International Journal For Technological Research In Engineering (IJTRE),Volume 2,March-2015:
With the increasing demand for fuel and depleting fossil fuel resources, biofuels can act as a perfect substitute for gasoline and diesel in the future.
I.Derived from bio sources, these have least environmental effects.
II. While biodiesel remains more expensive than regular diesel, consumers need to look beyond the cost per gallon to really gauge the economic benefits. Biodiesel vehicles get 30 percent better fuel economy than gasoline-powered vehicles [Consumer Reports].
III. Above all, biofuels can be readily considered as renewable sources of energy.

NOVATEUR PUBLICATIONS, International Journal of Research Publications In Engineering And Technology [IJRPET], Volume 1, ISSUE 2, -2015:
I. Properties of Biodiesel Blends-
Increasing concentration of biodiesel in base diesel, increases density and on the other hand decreases heating value.
II. Brake specific fuel consumption- Increased fuel density causes higher brake specific fuel consumption. Higher fuel density gives poor spray formation and combustion characteristics.
III. Brake thermal efficiency-
Additional lubricity given by the biodiesel blends decreases frictional losses, increases brake thermal efficiency up to 25%. On the other hand lower heating value and inferior combustion combined gives lower brake thermal efficiency for higher concentration.
IV. Mechanical efficiency-
Addition of cetane improver sometimes called as ignition enhancer reduces ignition delay period and improve combustion quality.
V. Exhaust gas temperature-
Cetane improver which gives better combustion characteristics reduces ignition delay and maximum amount of fuel burnt nearer to TDC. Lower heating value give lower heat generation which causes lower exhaust gas emissions.

Ain Shams Engineering Journal, Effect of pongamia biodiesel on emission and combustion characteristics of DI compression ignition engine, K. Nantha Gopal *, R. Thundil Karupparaj,(2015) :
The performance, emission and combustion characteristics of biodiesel derived from pongamia oil and its blends as follows:

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I. Diesel engine can perform satisfactorily with pongamia oil methyl esters and their blends without any engine modifications.

III. It is also observed that there is significant reduction in CO, UBHC and smoke emissions for all biodiesel blends when compared to diesel fuel. However, NOx emission of PME biodiesel is marginally higher than that of petroleum diesel.

IV. The combustion analysis showed that the biodiesel added to the conventional diesel fuel decreased the delay period and lowered the heat release rate of the premixed combustion.

Thus, results indicate that pongamia oil methyl ester can be used as an alternative and environment friendly fuel for a diesel engine.

3. PROBLEM DEFINITION

1. Recent studies show that oil is the main source of energy for many countries.
2. Due to increasing demand from end customers for renewable fuel sources with low
3. negative environmental impacts biodiesel has become greater relief source for the problem.
4. The use of biodiesel from reuse of cooking oil presents a proposal for the minimization of waste to be disposed of in sewage systems and contaminating rivers and Groundwater, taking into account that a litre of such waste oil can contaminate thousands of litres of water source.
5. The development of this work aims at exploring alternatives for the use of biofuels and evaluating the environmental impact as well as performance of engine.
6. Hence various alternative methods for production of biodiesel must be searched which don't lead to any harmful impacts and no compromise in the energy obtained. This lead us to foundation of extraction of of biodiesel from non-edible oil seeds.

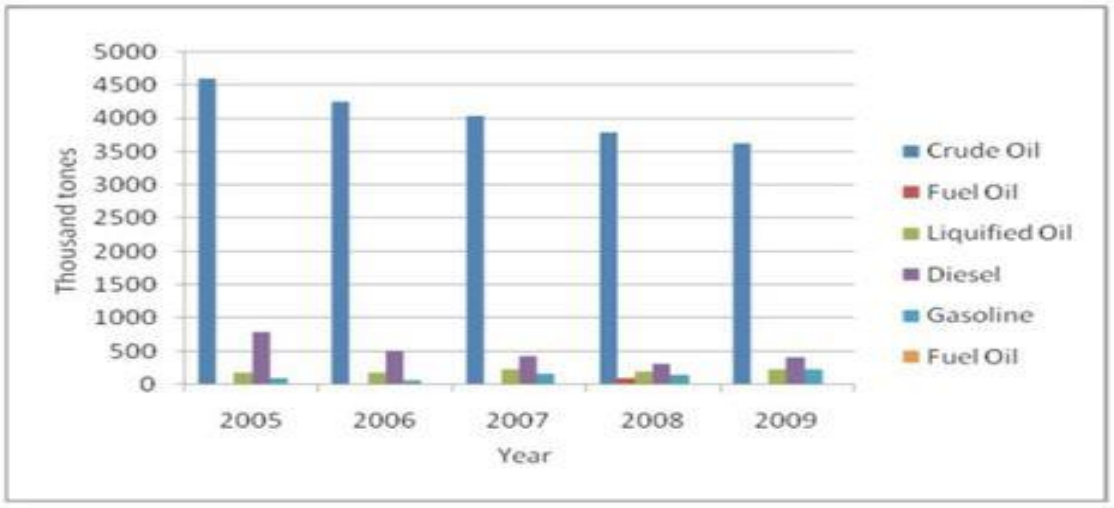

Table 1-2 World oil consumption

4. METHODOLOGY

The biodiesel fuel used in this study (methyl ester) is obtained from pongamia(Karanja) oil by transesterification process. It is the process by which fatty acid is converted into its corresponding ester. The mixture of pongamia oil, methanol (molar ratio of 6:1) and sodium hydroxide (NaOH) (1% w/w) as catalyst is taken in the reaction chamber fitted with condenser and thermometer. The entire mixture is heated at a temperature of 65C for 2 h and then cooled down to room temperature. After cooling, two layers are observed with top layer identified as methyl ester and bottom layer as since it has more density. Then the top layer is washed with distilled water and drained out. Finally, pongamia oil methyl ester (PME) is obtained as product and is used in the present study.

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Property	Test method	Preheated palm oil at 90°C
Density kg/m3	ASTM D1298	856.1
Viscosity at 40°C mPas	ASTM D445	8.087
Flash point ° C	ASTM D93	195
Cetane number	ASTM D 976	49
High calorific value kJ/kg	ASTM D2382	39500
Carbon residue %wt	ASTM-D5291	0.09
Sulfur content %wt	ASTM-D5453	0.04
Acid value Mg KOH/g	ASTM- D664	0.6
Pour point ° C	ASTM D 97	16

Table 1.3 Palm oil specifications

Proper-ties	Kine-matic Visco-sity at 40°C (mm^2/sec)	Density (kg/m^3)	Calorific Value (MJ/kg)	Flash Point (°C)	Cloud Point (°C)	Pour Point (°C)
JB0 (Diesel)	3.0699	828	45.265	72.5	8	6
JB100	4.7227	865	39.827	182.5	5	3
JB5	3.1382	829.2	45.023	82.5	6	0
JB10	3.1908	831.5	44.728	85.3	6	1
JB15	3.2288	832.7	44.709	83.5	6	0
JB20	3.2879	834.6	44.191	87.5	6	0

Table1.4 Jatropha specifications

Table 1 Properties of fuels.

Properties	Diesel	PME20	PME40	PME60	PME80	PME100
Acid number (mg of KOH/g)	Nil	0.033	1.41	1.53	> 1.53	> 1.53
Ash (% by mass)	Nil	0.021	0.028	0.035	0.053	0.085
Pour point (°C)	< −3	−3	−2	−2	−2	−1
Distillation (a) at 350 °C	84	75	75	59	32	31
(b) At 370 °C	93	90	90	80	48	46
Flash point, °C	53	56	56	60	80	175
Kinematic viscosity at 40 °C (CSt)	2.30	2.85	3.22	6.37	8.35	10.29
Moisture content (% by volume)	Nil	0.1	0.2	0.2	0.2	0.4
Density at 15 °C (kg/m^3)	824	844	852	875	889	912
Lower heating value (kJ/kg)	44,450	41,200	39,100	38,000	35,700	34,220
Oxidation stability at 110 °C, h [19]	–	–	–	–	–	2.3–11.6

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Table 1.5 Karanja specifications

5. CONCLUSIONS

In this project various type of blends from jatropha, karanja, palm oil are made and their performance characteristic on IC Engine are tested, to compare the result between all different type of blends. And finally to decide which blend of these oils are effective in economy as well as safe from environment point of view. This will lead to reduction in pollution due to biodiesel.The use of these seeds as a raw material for biodiesel production has proved to be of substantial value as compared with other choices of raw materials of various origins. Hence there is a need of producing alternative fuel which in this case biodiesel which will solve the problem. For greater efficiency multiple blends should be tested for different feasible and infeasible properties.

6. FUTURE SCOPE

Biodiesel and waste oils may not eradicate the world's energy problem, yet it could be a good fuel additive and alternative fuel for many uses. As the stock of fossil fuel is getting depleted, emphasis should be given to renewable sources of fuel such as sustainable bio-fuel crops and tree-borne oilseeds.It is expected that the price of biodiesel will be lower than the price of conventional diesel fuel in the near future. The small partial replacement of diesel with biodiesel will alleviate the pressure on existing diesel oil resources and decrease import case of diesel fuel.

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Soybean Milk Extracting Machine

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ABSTRACT

Protein is one of the important constituent of human diet. It is required for appropriate growth, for repairing body cells, creating enzymes and it perform various other functions which is obligatory for proper functioning of life. The protein of soybean is called a whole protein. Soybean is a rich source of edible oil comprising no cholesterol and almost none of the saturated fats. One of the nutritious products of soya bean is "Soya milk". Its nutritional remunerations are fascinating many the masses at large. This is the best substitute for cow's milk. A stable mixture of oil, water, and protein, it is produced by soaking dry soybeans and grinding them with water. Soy milk contains about the same proportion of protein as cow's milk.

Keywords— *Mechanical Engineering, Manufacturing, Nutrition, Soya bean, Protein, Milk*

1. INTRODUCTION

Soybean is a species of bean inborn to East Asia, widely grown for its comestible bean which has plentiful uses. The plant is grouped as an oilseed. It also known as soy beans plant is sometimes referred to as greater bean which in Chinese is called dodudu and in Japanese daizu. Both young soybean and its dish are called edamame in Japan. Soy. Oil and protein content of dry soybeans is about 60% by weight; protein at 40% and oil at 20%. The remainder consists of carbohydrate 40% and about ash 6%. Most soy protein is a comparatively heat-stable storage protein. This heat stability enables soy food products requiring high temperature cooking, such as tofu, soy milk and coarse vegetable protein to be made. Soy milk is a drink made from soybeans. A stable mixture of oil, water, and protein, is produced by soaking dry soybean and grinding these soya beans with water. Soy milk contains about the same amount of protein as cow's milk: around 3.5%; also fat, 2.9% carbohydrate, and 0.5% ash. Soy milk can be made at home with old-fashioned kitchen tools or with a soy milk machine. Soy milk has about the same amount of protein (though not the same amino acid profile) as cow's milk. Soy milk does not contain any lactose hence it is suitable for lactose intolerant people.

2. OBJECTIVE

The main objective of this project is to design and fabricate a soya milk making machine which will combat malnutrition in our country by providing good nourished soya milk at reasonable cost. This Soya milk Machine is designed in such a way that all the process such as grinding, filtration and heating of grinded soya bean take place in only one stage in machine and machine has highest rate of milk production which result in decrease in cost of soya milk. Soya milk produced from this machine is very nutritious.

3. LITERATURE REVIEW

B.O. AKINNULI, O.M. OLABANJI [2013]: Soy bean was invented in China in 2853BC, Emperor of china named five blessed plants; soya beans, rice, wheat, barley, and millet. Soya bean milk making machine was designed from locally available material. In this machine soya bean passes through a two stages which are milling and a compression. A soya bean is grated in a first stage along water; wet grated soya is further passed to a compression chamber where milk is extracted with the help of metallic sieve. By using this process a soya milk extracting machine was manufactured at a cheaper cost. The grinding rate of this machine is 4.151 kg of soya bean in one hour and can produce a 33.26 litres of milk in an hour. The soya bean milk machine does not require expertise, hygienic and there is no need of further processing after use.

Johanna Lampe, [2004]: The research community, health professionals, and the public have high interest in the health benefits of soya bean. At the same time, potential anxieties related with soy consumption, especially as related to soy isoflavones, have tempered the gusto for making public health recommendations. On both accounts, the primary soybean isoflavone, genistein, has established the most attention. Because consumers are becoming more and more confused by the often contradictory dietary messages, a balanced and accurate view of the risks and benefits of soy foods and soy food components is essential. Even among health professionals, mistake exists about correct terminology and about the exact composition of the agents under examination. Levels of isoflavones are often assumed to be constant within classes of soy foods, and consumptions are predictable rather than being directly analyzed.

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4. PROBLEM DEFINITION

India is protected at a nationwide level; the effects of deficiency present strongly as a lack of domestic food security and are protuberant precisely in rural areas. Children symbolize one of the vulnerable groups and worsening the child health, in spite of the application of numerous national nutrition and main healthcare programmes, is of concern and needs to be improved. In the short term, malnutrition influences on the growth, well-being, school attendance and performance of children, whilst longer-term consequences based on poor dietary habits manifest as nutrition-related chronic diseases of lifestyle. Soybeans are the only plant source providing complete protein. Soya bean contain high percentage of protein, carbohydrates and has very less amount of fat in it. Simultaneously, a appreciated contribution is made to the intake of almost all of the micronutrients that are most conceded in the diets of low-income communities, namely total dietary fibre, iron, magnesium, zinc and etc. Soymilk is a food commodity that could plausibly be used in various forms on a daily basis by all age groups. For example, drinking as is, flavoured, in tea or coffee or in food preparation, to supplement or to replace the very limited habitual intake of cow's milk by the target population. Hence there is a need to develop soymilk extracting machine in such region for combating malnutrition. As it is cheaper and contain same amount of nutrition as that of cow milk.

5. METHODOLOGY

1. Existing Method

Traditional Processing of soymilk was started by the Chinese, as long as 2,000 years ago. Today the similar method or modern differences of the same basic process, are still used in Asia and by many tofu producers in the rest of the world. This traditional method, which is also the simplest and least expensive, can be done both manually, in a simple kitchen, or by commercial equipment in a modern plant. This process has four steps:

1. Immerse soybeans (4-12 hours depending on water temperature)
2. Grind soaked soybeans into a crush or pulp (electric blending) with the addition of water.
3. Cook the resulting slurry (Stove top or commercial steam injected vessels).
4. Separate the cooked soymilk from the residual "Okara" fibers. (Filter press or centrifuge.)

2. Proposed Method

Soybean varieties: This is very first step involve in built-up soya bean milk this includes selection of best variety of soya bean so that milk obtained is of good quality and best colour.

Storage: Insects and moulds present in the soya bean detoriates its quality. These are favoured by high water content (moisture), hot temperatures and the presence of damaged soybeans and extra undesirable material. This being the case, it is important that soyabean is properly cleaned and stored at clean place to preserve it for long period of time. Controlling the moisture content of soya bean is key to success.

Cleaning: Commercial Soya bean comprises huge amount of external particle such as stones, dirt, dust and etc. Therefore it is required to take away such particles in order to gain a high quality of soya milk. It is as important as the removal of spoiled soybeans from the supply to the soymilk processing plant. This is necessary because the enzyme lipoxidase will act on the fatty acid of spoiled soya bean and will result in the oaky flavour.

Dehulling: Soybean hulls contain unwanted substances. Also the hulls are barricade to continued processing, particularly in the decanter. Also soil microorganisms are present in the soybean hulls. Bodies should be removed in order to reduce the soil microorganisms which results in better flavour of soymilk. Dehulling of soya bean results in shortest heat treatment time required to denature enzyme which produces odd flavour. This will decrease protein denaturation and browning of the soymilk. Dehulled soybeans produce a white, good-looking, appetizing soymilk.

Grinding: Grinding in a hot water result changes the soya beans into a colloidal solution which does not contain enzymes.

Fibre Separation (decanting): In order to avoid chalkiness and gain a good mouth feel of the soymilk, the undissolved fibres are filtered away. To achieve best possible results, a decanter centrifuge is used.

Standardization: To obtain a desired protein content of soymilk water is added in it.

Flavouring and Formulation: One of the solutions to far-reaching receiving of soymilk is good formulation, using sweetener and flavouring agents of the natures and in the quantities right to local tastes. The addition of oil to soymilk marks in increased rich milk and add calories.

Homogenization: Homogenization breakdowns the fat drops present in the soy milk by passing it through a huge pressure valve Otherwise the fats would form a layer in the soymilk and they will separate out as a lump. Homogenization gives soymilk a waterier, more uniform consistency.

UHT (Ultra-high temperature) Treatment:

Direct method UHT treatment of soymilk serves two purposes:

(1) Inactivate the bacteria present in soymilk.

(2) Freshens the soymilk.

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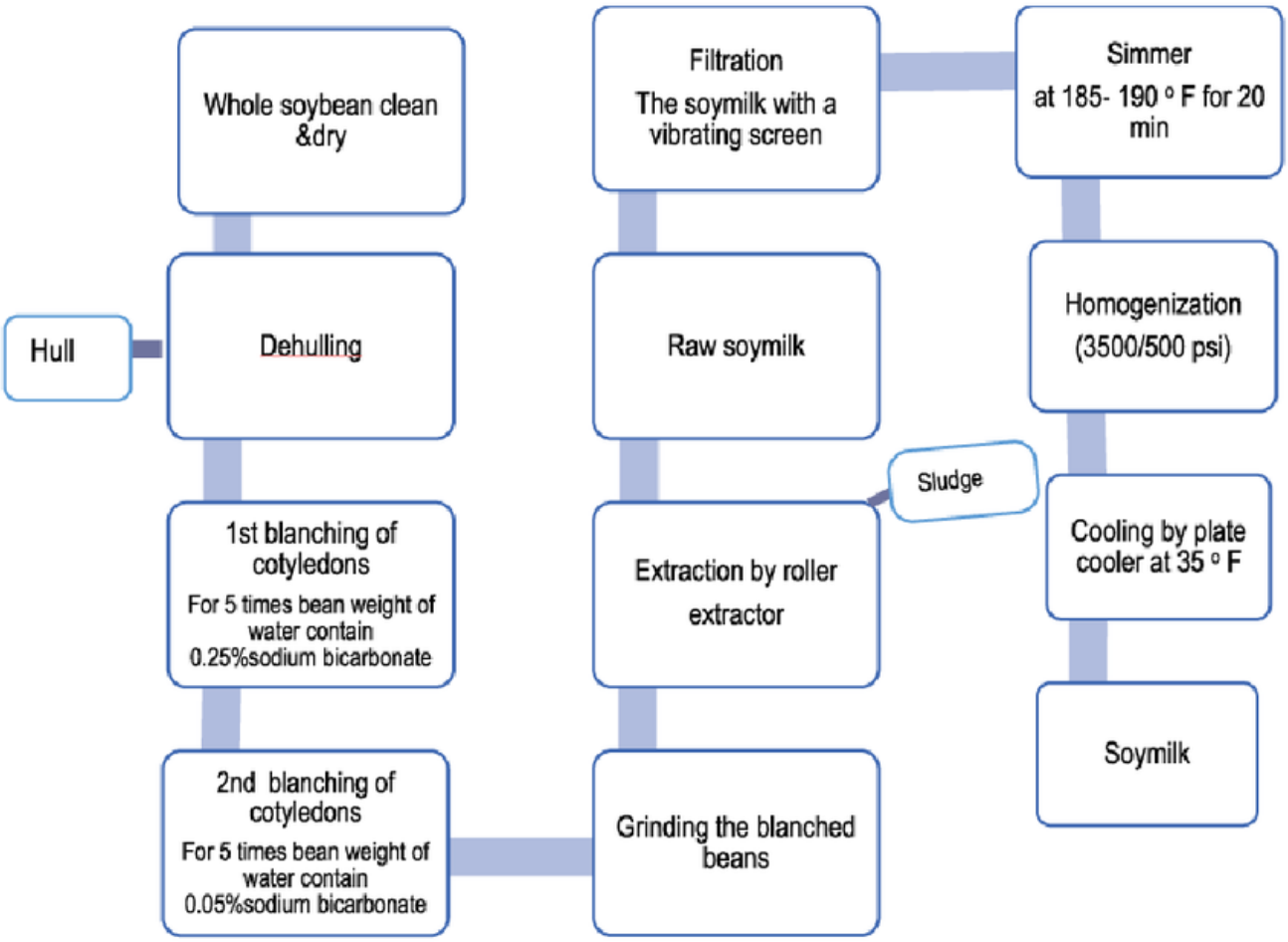

FIG.1: Flowchart of Extraction of Soymilk

6. CONCLUSIONS

Soy milk is a healthy product which is preferred an alternative to the dairy milk product. It can be added to your daily breakfast cereal and smoothies that offer the required nutrients and energy that help in the body growth and overall health. The large amount of soya bean is grinded by the milling grinder which is further heated and centrifugation results in production of soymilk. The rate of production is high and therefore the machine will facilitate high volume of soya bean milk.

7. ACKNOWLEDGEMENT

We would like to acknowledge Dr. Arun Kumar, principal of VIVA Institute of Technology and Prof. Manoj Yadav assistant professor of Mechanical Department for helping us out in this project. Their contribution in this project is invaluable. We would also express our gratitude to our fellow students who helped us out in completion of this project.

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Sand Filter & Separator Project

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ABSTRACT

Sand is used in construction, manufacturing and many industries. Sand needs to be filtered and separated from unneeded particles, stones and other large particles before it is put to use. Our system puts forward a fully automated sand filtering and separator system that automatically filters sand poured on it. Here we use a shaft that is mounted incline using mounts & bearing. The shaft is connected to a filter frame (net) with mesh below and enclosing frame on the sides. We now have a rod connected from the shaft to the filter frame in a way such as to achieve the best rotational motion. Also we have a frame to hold the filter frame in place while ensuring proper rotational motion at the same time. On rotating the pulley using our crank arm, the system allows to operate the pedal. This allows us to operate the sand filter rotational motion for appropriate sand filtering needs.

Keywords— *Mechanical Engineering, Manufacturing, Sand Separation, pulley, motor, belt.*

1. INTRODUCTION

Filtration is the removal of stone particles from sand by passing the sand through a filtering medium or net, in which the stones and other large particle are separate, example of such filtering medium, is known as sand filter.

In construction site or manufacturing and many industries. They are use thin net as sand separator a man will throws a sand mixture on net, this process they will do twice for 1 packet. They do this twice because some sand will came back because of stones in mixture. So it will require lots of time and human effort.

2. PROBLEM DEFINITION

Problem Statement-Among different component of mixture there are many substances which are harmful or not useful for us. To remove this harmful and not useful component we need to separate them. In water there are sand or small particle which are harmful for health. Not only that in wheat there are stones pieces are available again this harmful for health.in construction site there are if there are stones in mixture then it will harm for humans life.

Its effect-The use of such sand in construction was dangerous as it affected the reinforcements used in concrete works. It might lead to development of cracks in structures, thus reducing its compressive strength and life. People in the villages should also stop such illegal activity as it was hazardous to their life.

3. OVERVIEW AND METHODOLOGY

So we developed mechanism that reduces human effort and separation time. Our process sand filtering and separation system that filter sand and remove the stone quickly not only that it will reduce the human effort or work. In this this process we use a shaft that is mounted incline using mounts & bearing. The shaft is connected to a filter frame (net) with mesh below and enclosing frame on the sides. We now have a rod connected from the shaft to the filter frame in a way such as to achieve the best rotational motion. Also we have a frame to hold the filter frame in place while ensuring proper rotational motion at the same time. On rotating the pulley using our crank arm, the system allows to operate the pedal. This allows us to operate the sand filter rotational motion for appropriate sand filtering when it needs.

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Fig 1 model of sand filter and separation

Amount of mixture	Man requirement	Time require
1 tank 100 kg	2	25 min

Result analysis shown in above table of our tilted separation.

4. EXPERIMENTAL PROCEDURE

In here first we select the proper net that will able to filter the sand. Next on stand we fit the mount on stand, and then we attached the bearing on it. After this we insert the shaft into it. We connect crank arm to the shaft and pedal is fit on it. After this process we insert the net in circular form and round support ring attached on it for proper fit. The fig 2 is shows the experimental setup.

Fig 2 experimental setup of sand separator

After all components get fit properly we throw the sand on it. After throwing sand we rotate the pedal it may cause the rotation of shaft and net. Because of bearing shaft will rotate smoothly. It will reduce friction and power require. Hence by this action pure sand are we get and stones are separated from the mixture.

5. EXISTING METHOD

1)There are more method are use in different industries. By using sieve we can separate the sand or filter the sand. There are two man stands and they hold sieve in hand then another man will throw the sand on sieve then two man are vibrating the sieve then sand and stone are separated. This method takes lots of time and human effort. The following fig 3 shows the manually separation.

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Fig 3 manually sand separation

Amount of mixture	Man requirement	Time require
1 tank 100 kg	2	45 min

The above table shows the time required for filter the sand by using manually.

2) Reciprocating sand separator

Here we demonstrate the design & fabrication system. Sand is used in construction, manufacturing and many industries. Sand needs to be filtered and separated from unneeded particles, stones and other large particles before it is put to use. Our system puts forward a fully automated sand filtering and separator system that automatically filters sand poured on it. Here we use a motorized shaft that is mounted horizontally using mounts. The shaft is connected to a filter frame with mesh below and enclosing frame on the sides. We now have a rod connected from the shaft to the filter frame in a way such as to achieve the best horizontal motion. Also we have a frame to hold the filter frame in place while ensuring proper horizontal motion at the same time. On switching on the motor using our motor controller circuit, the system allows to operate the motor. This allows us to operate the sand filter motion for appropriate sand filtering needs. The following fig 4 shows the reciprocating sand separator machining process.

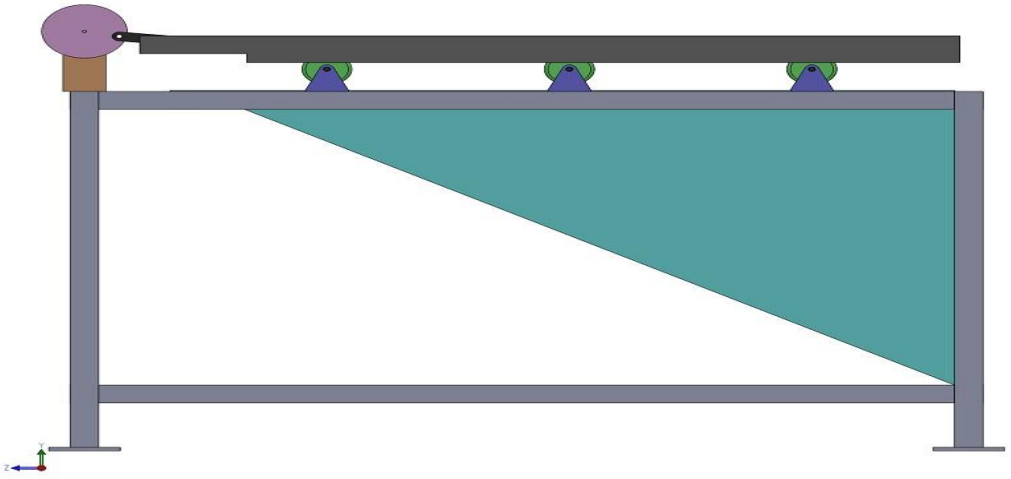

Fig 4 reciprocating sand separator with electric motor

Amount of mixture	Man requirement	Time require
1oo kg	1	30 min

This table shows the result analysis of reciprocating separator.

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6. CONCLUSION

By using sand filter and separation machine we separate the stone easily and get pure sand. This pure sand is used in mega construction, roads, bridge & infrastructure project for supporting the giant horizontal and vertically inclined suctrures (like wise angle of repose). This machine will reduce the time. We get pure sand in lowest time as compare to manually separation. It will reduce the human work and produce the high rate of sand separation in low cost.

7. ACKNOWLEDGEMENT

We would like to acknowledge Prof. Manoj Yadav, assistant professor of VIVA Institute of Technology and Prof. Vinit Raut, assistant professor of Mechanical Department for helping us out in this project. Their contribution in this project is invaluable. We would also express our gratitude to our fellow students who helped us out in completion of this project.

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DESIGN OF PORTABLE CNC

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ABSTRACT

"Portable CNC machine" is very great innovation idea made in this modern world. As considering the drawbacks of conventional CNC machine, the purpose of making Portable CNC machine is based on overcoming the problems and efforts of conventional CNC machine. The Portable CNC machines are the best option in small scale industries. As small scale industries are having less space and less capital budget hence they cannot use conventional CNC machine. Hence the Portable CNC machine is been used as its size is small and compact easily portable, Portable CNC machine are easy to handle and the small complicated jobs can be done accurately and easily. The ideas on fabrication of low cost CNC machine come forward to reduce the cost and complexity in conventional CNC system

Keywords— ***Lead screw, Stepper motor, DC motor, HSS Milling tool, Mechanical Engineering***

1. INTRODUCTION

There are various type CNC machine are available in industry for manufacturing various products. But they are very expensive and their capital cost is high. They are generally use for large production that's why the portable CNC machines is the best option for low production volumes .With the help of portable CNC machine you can manufacture product at minimum cost. Portable CNC machine are the best option in small scale industries. The portable CNC machine are easy to handle and the small complicated jobs can be done accurately and easily.

2. ABOUT THE CONVENTIONAL CNC MACHINE

Since thousand years ago, human tried to find ways to make their work easier. Thus, variety of techniques and inventions are created to reduce the human work. Nowadays, CNC Machine is most popular in manufacturing sector. So as to reduce the burden on the people, portable CNC Milling machine this is the best option because it can be removed easily, saving time and reducing the use of space. CNC milling machine is a very important technology in the manufacturing industry nowadays. Operating Portable CNC milling machine with low cost and simply in design will be a good news for the developers of small- scale industries.

3. DRAWBACKS OF CONVENTIONAL CNC MACHINE

a. Its big in size.
b. More space is required.
c. Maintenance Cost is high.
d. It is not suitable for low volume production.

4. ADVANTAGES OF PORTABLE CNC MACHINE

a) It is small in size
b) Easy to handle.
c) Suitable for low volume production.
d) It occupy less space.
e) Maintenance cost is high.
f) It can be easily transportable.

5. WHAT IS PORTABLE CNC MACHINE?

In order to overcome the above mentioned drawbacks of the CNC being used nowadays, we a group of mechanical engineers have come up with an ideology of a machine called portable CNC machine. The concept of this project is to concern the use and benefits to the small scale industries. The portable CNC machine can be used in a small surfaces it does not need the high power voltage. It can be consider or been used for small and proper machining parts. The portable

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CNC are being used in small parts and the jobs are done properly. The main advantage of this machine is that it is easily handle and it is affordable. It can also be transported easily.

6. PROBLEM DEFINATION

The CNC machine is large in size and it occupies more space, because of this it is suitable for large production units. If we have to produce small production and the space is also less than the portable CNC machine is the best option. With the help of this we will increase the productivity of the production units. The portable CNC machine is easy to handle and the cost is also less.

7. OBJECTIVE

- To design portable CNC machine which will be able to do milling and drilling on small sized jobs
- To reduce the size required by a CNC machine
- To reduce the cost of a CNC machine
- To fabricate the portable CNC machine of sufficient accuracy.

8. LITERATURE REVIEW

Manjuthona C.T, manjunthonasuresha I, 2015[1], In this paper have observed that cost of milling machine is low which is compare to 3-oxis operation simultaneously. This low cost is achieved by converting the features of PC interface with micro converter based upon ardino based system. In this system allows a code person and then infuriated on micro controller through USB. It allows 3-axis CNC machine

Manish Patil Prof. Hredrya Mishra june 2017 [2]. The demand for high production and also the tolerance between the tools it's to have become a faster and also accurate. To achieve all of the conditions ball screw drive system is used in more number of machines to have a low cost high degree of productivity also the generation of heat in ball screw drive system is more and its causes a problem also affecting the accuracy of achieved parts. In this paper we have seen that selection

Dr. Yakin Ertekin, Dr. Richard Chion, 2013 [3], in this paper the design towards the development of milling CNC machine. Since the instructing cause of any CNC machine is become an other. The develop CNC machine which is developed by student design team it's an standard or table, could interface with commonly available CNC computer aided software, would be easy to use and cause is also low. Such project are shown how to use student brain in different types of technologies overall many fields of Engg. Gets benefits from this application. This is lead to help and improve manufacturing process facilities.

Markku Sahakangas, 2015[4], the machine was planned to have three linear axes and a separate control. In the thesis the basic principle of CNC machine components. Function and relevant standard are studied. An electric circuit and as well as a PL security classification were made for the machine. It improves the productivity of a system and also manufacture the product at lowest cost.

Siti Aina Mardhia Binti Dol Haji (MA10104), 2013[5], this project describe a design and fabrication of portable CNC milling machine. Milling machine where it can move in 3 axes especially X, Y and Z. For this project matter CAM software was uses to generate the G-code for milling cutting construction testing. This project develops a CNC machine in combination with a computer. The purpose of the project is to develop low cost project portable CNC milling machine. It can be transported using minimum manpower, easily handled and also suitable for small industry. AC power supply is used machine structure movement is controlled by the DC stepper motor. When is stepper motor gets signal, it was sent to the gear box and turn the ball screw that connect with each drivers X,Y and Z through the bearing. Then, the driver X, Y and Z moving to start cutting process according to the computer instruction until the cutting done.

9. PROPOSED METHODOLOGY

To fabricate the portable CNC machine following steps are to be followed:

- Concept design
- Market survey
- Material selection
- Calculation
- Prototype design
- Prototype testing
- Result and analysis
- Fabrication

10. CONCEPT DESIGN

This project mainly aims at designing and fabricating a portable CNC machine which will able to do milling and drilling

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operation with required accuracy also it has to be small and compact compared to conventional CNC machine, to that it will be easily portable

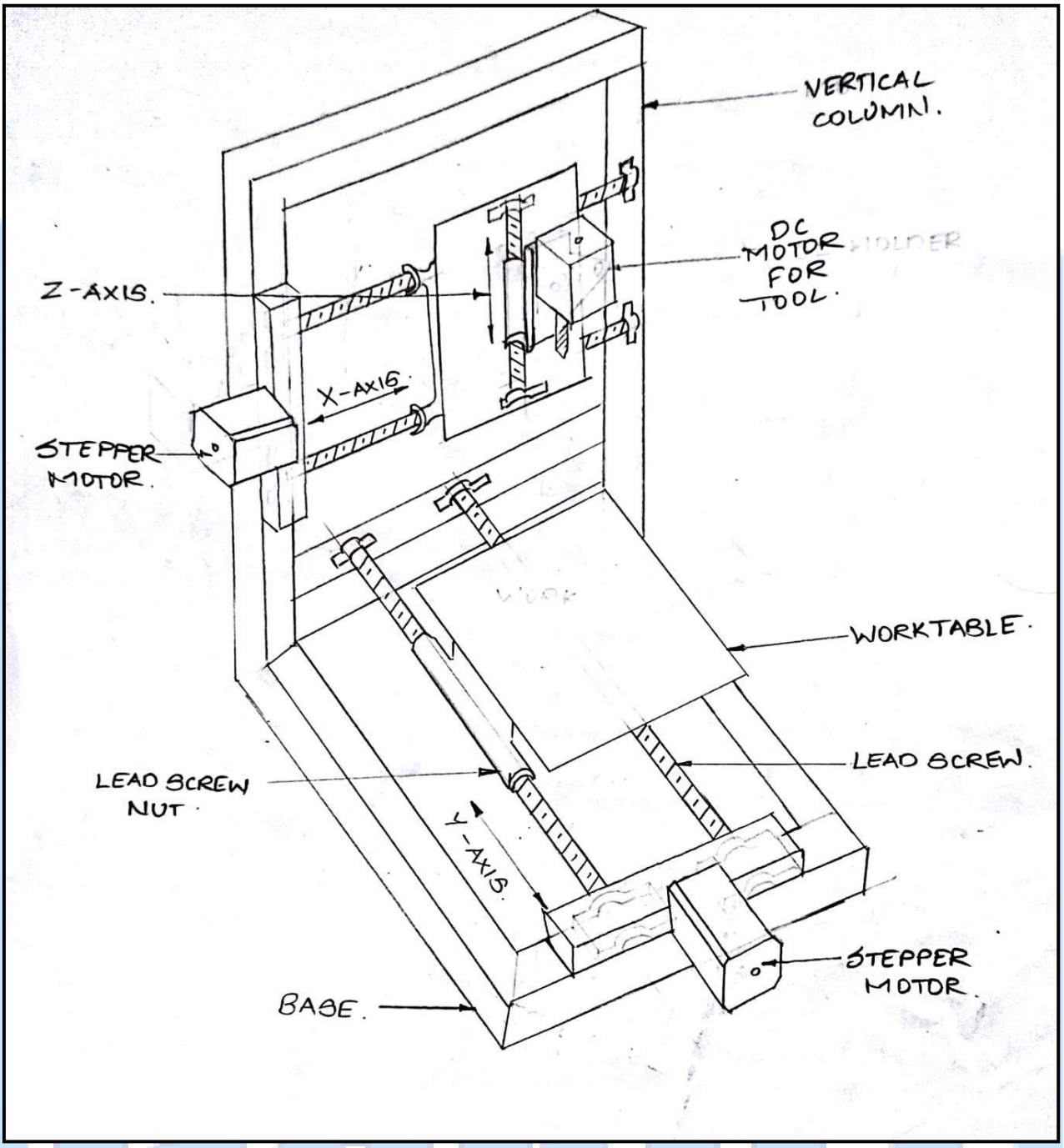

Chart-1: Conceptual Design

The conceptual design consist of following elements: Lead screws: Essentially, lead screws are simply screws are simply screws that can provide linear motion when a turning motion is applied. It is used for positioning with the help of stepper motor.

- Stepper motor: A stepper motor is basically a synchronous motor, it rotates in the form of pulses. It is used for positioning with the help of lead screws.
- DC motor: DC motor is an electric device which gives rotary mechanical movement when a current is applied. It is used to rotate a tool.
- Work table: The component to be machined is placed on work table. It is moved with the help of lea screws in stepper motor.

11.MARKET SURVEY

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According to our concept of project we studied many compact and handled. Automatic machines and compared it with the conventional CNC machine. On the basis of our survey we selected the data which is further discussed in material selection.

- Material selection

1. Tool selection: -

There are three types of end mill cutter. 1] HSS end mill cutter
2] Cobalt end mill cutter 3] Carbide end mill cutter

1] HSS end mill cutter HSS is used for general purpose milling of both Monterrey materials. It is inexpensive compared to other. HSS does not offer the tool life or speed advantage of cobalt and carbide end mills.
2] Cobalt end mill cutter it is a tool steel with 8% cobalt content. It is more expensive but has better wear resistance and toughness than HSS. It can run 10% faster than HSS.
3] Solid Carbide end mill cutter it is harder, more rigid, and more resistant than HSS however carbide is brittle. They can run 2.5 times faster than HSS end mills.

The HSS tool can be used to easily machine materials like cast iron, carbon steel and alloy steel. Also our smaller milling machine will not be capable of reaching spindle speeds recommended for cobalt and carbide end mills. Hence, we have used a HSS square end mill cutter. Cutter dia. 13/64 to 5/16 inches approx. (5 to 10 mm).

2. Selection of motor for tool spindle:

Machines of alloy steel required about of 75 N.mm of torque and a power of 0.29 kW. Therefore selecting a standard 7.2volt DC motor.

3. Stepper motors:

Stepper motors are used for high torque at low speed. They have low efficiency then servo motor they produce loud noise and have heating problems. But they are simple to operate are inexpensive and are accurate. Hence we will use a stepper motor with torque of about 70N.mm, with step angle 1.8º steps per revolution.

4. Selection of Positioning Motors:

Servo motor is a DC or AC motor connected to an encoder so that it rotates through the specific angular rotation which we require. These are accurate but costly. They develop their peak torque only at high speeds, Also they are subjected to overheating. They require more expensive controllers but operate very smoothly and quietly. They are good for big CNC mils. But for smaller mills they can be too big and not very cost effective.

5. Lead Screw:

Lead screws are simply screws that gives linear motion when a turning motion is applied. The theoretical formula to calculate column strength of a lead screw:

$$P = \frac{14.03 * 10^6 * F_C * d^4}{L^2}$$

Where,
P=Max. Strength in Pounds
Fc = End fixity factor= 1 for both ends supported d = Root diameter of screw in inches
L = Distance between nut and load carrying bearing in inches Selecting standard diameter of
d = 16mm.

6. Microcontroller for positioning motor:

The 8051 microcontroller is one of the basic type of microcontroller. It was designed by Intel in 1980s. It has four I/O ports which are connected to four ports of stepper motor to turn them ON/OFF.

12. CONCLUSION

The portable CNC machine is the best option for small production volume units. With the help of this, the cost of the production becomes low and increases productivity of the production. It can be easily transportable as compared to conventional CNC machine. The design creation imposed challenging problems which however were welcome by us due to availability of good research papers. The selection of choice of raw materials helped us in machining of the various components to get finite tools and making the machine in a proper size and ways to complete the complicated jobs in a proper ways and easily.

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13. ACKNOWLEDGEMENT

We would like to acknowledge Prof. Chinmay Pingulkar, Assistant Professor of VIVA Institute of Technology and Prof. Pratik Raut, Assistant Professor for helping us out in this project. Their contribution in this project is invaluable. We would also express our gratitude to our fellow students who helped us out in completion of this project.

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Auto-Composting Machine

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ABSTRACT

Biogas technology is an efficient solution to address the issue of more stable and efficient renewable energy source through its potential ability to keep pollution free environment. Besides being a renewable energy source, the biogas digester systems would prevent the direct exposure of methane, carbon dioxide and other pollutant emissions into the atmosphere. Moreover, the combustion of biogas displaces the use of fossil fuels for energy generation hence contributes to additional emission reductions of greenhouse gases (GHG) and other air pollutants. For complimenting the increasing interest in renewable energy, an increasing number of centralized biogas plants have been installed in recent years for their cost efficiency to convert livestock manure into renewable energy products, like electricity or bio methane products. In order to assess the true efficiency of an animal manure based biogas plant under public private partnership framework, the potential environmental externalities of animal manure should be taken account of in a socio-economic analysis.In the present scenario of dwindling petroleum resources and global warming, exploring other avenues for ecofriendly fuels became essential. Biogas which is a clean and environmental friendly fuel emerged as one of the potential alternative fuels. Raw biogas contains about 60-70% methane (CH4), 30-40% carbon dioxide (CO2), traces of hydrogen sulfide (H2S) and fractions of water vapours. But its wide spread use is hampered by the associated problems like low energy density due to the presence of impurities, generation at low pressures and the absence of means for storing and transporting. In this context this work intends to design and establish a facility at the site of biogas production in the campus for purifying, compressing, bottling and making it transportable. This can be done by compressing the gas in cylinders which was possible only after removing its CO2, H2S and water vapour components.

Keywords— *Mechanical, Compost, Degradation, Organic waste, Green house.*

1. INTRODUCTION

Organic residues-wastes from human, animal, agricultural and industrial establishments-posing serious environmental and health problems like dispersing foul odours, forming breeding grounds for most pathogenic micro-organisms, occupying vast areas, etc. can be converted into wealth as biofertilizers and biofuels, if tapped intelligently and managed scientifically. It has already been demonstrated experimentally that all crops respond to organic manuring and that their application can help to provide renewable sources of plant nutrients, and improve the physical, biological and physico-chemical properties of the soil. The extent of response, no doubt, depends on several factors, such as method of application, soil type, agroclimatic conditions, moisture regime of soil, etc. A variety of global and national policies are being developed and proposed to address these problems throughout the world. Various research and development efforts have been made to conserve organic wastes and recover useful by-products and, in some cases, to combat disposal problems and minimize pollution effects.

1.1 Objective of project

Organic residues-wastes from human, animal, agricultural and industrial establishments-posing serious environmental and health problems like dispersing foul odours, forming breeding grounds for most pathogenic micro-organisms, occupying vast areas, etc. can be converted into wealth as biofertilizers and biofuels, if tapped intelligently and managed scientifically. It has already been demonstrated experimentally that all crops respond to organic manuring and that their

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application can help to provide renewable sources of plant nutrients, and improve the physical, biological and physico-chemical properties of the soil. The extent of response, no doubt, depends on several factors, such as method of application, soil type, agroclimatic conditions, moisture regime of soil, etc. A variety of global and national policies are being developed and proposed to address these problems throughout the world.

2. PROBLEM DEFINITION

Organic residues-wastes from human, agricultural and industrial establishments-posing serious environmental and health problems like dispersing foul odours, forming breeding grounds for most pathogenic micro-organisms, occupying vast areas, etc. can be converted into wealth as biofertilizers and biofuels, if tapped intelligently and managed scientifically.

3. CONCEPT OF EXPERIMENT

Converting the organic waste into the useful compost. The resources for organic waste are the diverse types of raw materials available in the country can be classified into two main categories like

(1) agro-industrial and

(2) Those derived from civil establishments. More precisely, the wastes can also be classified into the following main groups:

(1) Animal wastes;

(2) Crop residues;

(3) Fruit and vegetable wastes;

(4) Aquatic biomass and biofertilizers;

(5) Fish and marine wastes;

(6) Industrial wastes;

(7) Human habitation wastes, etc.

4. COMPOST

Compost is a stabilized and sanitized product obtained from the corn posting of organic substances derived from urban and agro-industrial biodegradable solid wastes, free from heavy metals, glass pieces, plastic and sometimes cellulose materials with pH value around 8 and subjected to partial microbial fermentation. Compost characteristics are essentially dependent upon the raw materials and the factors that affect the progress of the process. Fresh compost is an intermediate product of the thermophilic stage, whereas mature compost is the end-product of the stabilization stage. Fresh compost may be used in agriculture with further decomposition and stabilization occurring in the soil with beneficial effects on soil.

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fig.no.1.1 Organic waste pyramid

5. COMPOSTING PROCESS

Composting process Cornposting is generally defined as the biological oxidative decomposition of organic constituents in wastes of almost any nature under controlled conditions. Since composting, as mentioned above, is a biological process of decomposing organic materials, it requires special conditions, particularly of temperature, moisture, aeration, pH and C/N ratio, related to optimum biological activity in the various stages of the process. The process is accomplished through different phases, i.e. Initial phase during which readily degradable components are decomposed. Thermophilic phase during which cellulose and similar materials are degraded by a high bio-oxidative activity of micro-organisms. Maturation and stabilization phase. The process can also be discussed in terms of two well defined phases, namely, (1) mineralization and (2) humification. Mineralisation is a very intensive process involving the degradation of readily fermentable organic substances like sugars, amino acids, etc. The degradation is followed by intensive microbial activities producing heat, carbon dioxide and water, along with a partially transformed and stabilised organic residual. . This is necessary to avoid excessive mineralisation of the organic substance. In the maturing phase, the oxygen requirement is less, biological processes become very slow and the temperature partially reduces.

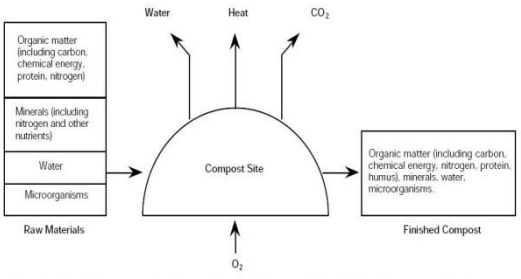

Fig.no.1.2 Composting process

Major application of biogas has only been in cooking and lighting. Commonly the gas produced in the digester is transported to desired place say kitchen by pipe line, on the pressure developed in the biogas digester dome itself. But this is not sufficient to transport gas to farther distances from the generation site. This is why, uses of biogas are hindered. Moreover, due to its limited use biogas until now is not produced at a persuasive amount.

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Fig.no.1.23 Composting process machine

Importance of composting Machine

Composting is simply the process of turning organic matter that is ready for disposal into something beneficial. Basically, organic materials like vegetable matter, eggshells, coffee grinds, tea bags (anything that is not animal-based) is placed in a suitable container or pile to decompose. Over time, these materials turn into a rich form of soil that is absolutely chock-full of vitamins and can help you grow amazing plants in any space. Amazingly, compost can also have the power to ward .

6. CONCLUSION

Composting reduces landfill waste and incineration, and therefore emissions.

Composting saves money on garbage removal.

Composting enriches the soil and saves water.

Composting cultivates healthy plants.

Reduces need for chemical fertilizers.

Composting is economical and saves environment.

7. ACKNOWLEDGMENT

Our thanks to Dr. Arun Kumar, Mrs. Niayati Raut, Mr. Sushil Mishra for contributing towards the development of this project. It is under their guidance and knowledge that the entire project was well completed

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Transportation by Cam Mechanism

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ABSTACT

The purpose of this project is to design and suggest a new mechanism other than the very conventional methods used material transportation. Nowadays value and requirement of land in India has grown very rapidly. Thus effective space utilization has given prime importance in industrial organization .The project is all about lifting up the products and transfer them to desired height within a short floor space. We have to use connecting rod and crank mechanism in this project. Various manufacturing processes are carried out on multiple floors. These stations are built on multiple floors for optimizing the space utilization. Also the finished goods are stored at a higher level on racks. The paper involves the design of an efficient system which will transfer the material from lower level to higher level. It also includes the static analysis carried out on the most critical component, crank using Solid works and Ansys.

Keywords— *Material Transportation, Cam, floor space, follower, vertical motion*

1. INTRODUCTION

Nowadays value and requirement of land in India has grown very rapidly. Thus effective space utilization is given prime importance in industrial design. Various manufacturing processes are carried out on multiple floors. For example while manufacturing wafers, soaps, biscuits and other cookies and also on various assembly lines different processes are carried out at multiple stations. These stations are built on multiple floors for optimizing the space utilization. Also the finished goods are stored at a higher level on racks. Thus the need of an efficient and compact material handling system in vertical direction is arising day by day which will transfer the material at higher rate than some existing material handling system.

We are using cam follower mechanism after analyzing various other mechanisms. The part on which the objects will be loaded is called follower. An eccentric cam is a disc with its centre of positioned offcentre. This means as the cam rotates the roller follower rises and falls at a constant rate. This movement is smooth and at a constant speed.

2. LITERATURE REVIEW

Kumbhar P.M., Ballal Y.P and Pawar G.B,[2015] In evaluation and implementation of material handling system, multiple factors should be considered, including the plant facilities, the machinery, the material handling equipment and of course people involved. In this paper the overall revive of principles of material handling systems and various material handling systems used in foundry is taken. That's why we need material handling equipment's. Any type of industry whether small or big, productions plant or process plant, agriculture industry or service sector in which such application there is only one common thing, movement of material, material handling. Different MHSs were considered and discussed. They were mentioned as theoretical, ultimate, and technologically workable. However, the suggestion was that companies should focus on and implement a MHS that is cost effective and is able to function at the present time without any obstacle and failure. There are various principles and factors on which Selection material handling system depends. By studying these parameters, selection of proper material handling system can be done.

Ghazi Abu Taher, Yousuf Howlader, Md. Asheke Rabbi, Fahim Ahmed Touqir [2014]: Bucket elevator are the media of transportation of material from one location to another in a commercial space. Belt conveyor has huge load carrying capacity, large covering area simplified design, easy maintenance and high reliability of operation. Belt Conveyor system is also used in material transport in foundry shop like supply and distribution of molding sand, molds and removal of waste. On the other hand Bucket elevator can be of great use during bulk material handling. This paper is mainly based on the combination of Belt & Bucket Conveyers to perform complex task within a short time and successfully in a cost effective way. On account of this, a machine and its physical description is covered here with some basic calculation. The conveyor belt changed the face of the industrial economy around the world. Today, it has applicable uses in countless industries, such as transportation and food services. A bucket elevator or conveyer is a mechanism for hauling flow able bulk materials by following an assembly line in horizontal, vertical or inclined direction. According to the survey performed 85% industrial units face difficulties in handling bulk material packaging. The problem occurs when it is necessary to convey a bulk material through a linear distance as well as a certain height. Conventional ways are responsible for material wasting, time wasting & above all a poor management. In order to overcome those draw backs not only Belt & Bucket conveyers are combined but also artificial intelligence brought in use.

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Garg Uttam, Bhowad Rugved, Rahul Chorghe, Yadav Sachin,[2015] Conveyors take longer to transfer material and also consume more space. Thus we have developed a system working on a mechanism which is obtained by fixing the crank of a single slider crank chain. The system is compact and works on inversion of single slider crank chain similar to piston cylinder arrangement in I.C. engine. The system transfers the material vertically in n number of steps. Each step consists of crank, connecting rod and piston arrangement. As the crank rotates piston reciprocates inside the guides provided. Height of piston is increased in every step. Here six cranks are mounted on one crankshaft at 180 degree to each other. Resembles to six piston cylinder mounded on one crankshaft. The top of piston is inclined at an angle with the horizontal. The object is transferred from one piston to next piston after every 180 degree of crankshaft revolution. Thus after every step a certain height is achieved by object. After reaching the peak in every step the material is transferred to the next piston which is at its bottom most position. To move the material up, piston height is increased in every step by certain calculated value. The height achieved by piston in every step is equal to diameter of crank. To transfer the objects with small width this system is more effective. As the width of the object goes on increasing the length of system will also increase. The length can be reduced by increasing the crank diameter which will reduce the number of steps required and thus reduces the length.

3. PROBLEM DEFINATION

1. Problem statement

Material Handling Systems used nowadays are Lifts, AGVs, Robots and Conveyors. These systems are of complex mechanism. The initial cost and maintenance cost of such systems is very high. They can only be installed and used in large industry. So our project is to make a transportation system which will take less floor space and low cost. Also it can transfer the material very efficiently in the industries where multiple floors are present

2. Problems and its Effects

Lift is a material handling system in which object is loaded on a base and then base is lifted by giving power to it. But the lift can carry one object at a time. It requires more floor space so that equipment can move properly. Also it consumes very high electricity and the initial cost of the lift is very high. The robots work efficiently but they are used in limited industries because they are very expensive. Main drawback of the robots is that they do not transfer continuously. Also the maintenance cost of robots is very high and the parts are not easily available in the market. Conveyors are used in multiple ways from warehouses to airport baggage handling systems. Conveyor takes more space to transfer material vertically and the space required is directly proportional to the height being lifted. In some industries for example mining industry the length of conveyors used is very high. So in this system the material has to travel more distance and because of this the production cost increases. AGVS require fast data tracking and processing. They require reliable and fool-proof inventory management system. AGVS take more floor spaces so that equipment can move properly. Buying a material handling equipment in large numbers may require you to raise bigger funds or initial capital.

3. Drawbacks Of Existing Method

1. Limitation to the angle of inclination in inclined conveyor
2. Discontinuous operation in Lift
3. Lower speed, long run in case of forklift
4. Higher cost and longer distance travelled by object in spiral conveyor

4. METHODOLOGY

Consider the smallest box pipe which is attached to the roller follower at the bottom most position which picks up the object to be transferred from lower level. Then its forward stroke begins when it reaches the top most position its top surface coincides with that of the next piston. At that time the second box pipe will be at its bottom most position. The camshaft will rotate until the object is transferred from first piston to second piston. As the transfer is complete the follower will start falling along the cam. As the second box pipe reaches its top most position the object will slide down to third box pipe which will be at its bottom most position. Similarly material is transferred from one step to other till the last step. In this mechanism if the box pipes at odd position are having bottom most position, the box pipes at even position will have top most position and vice-versa**.**

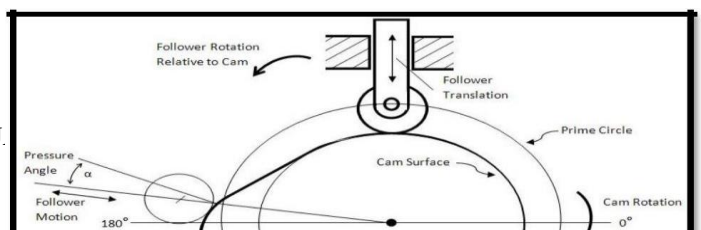

Figure-1: Cam Profile

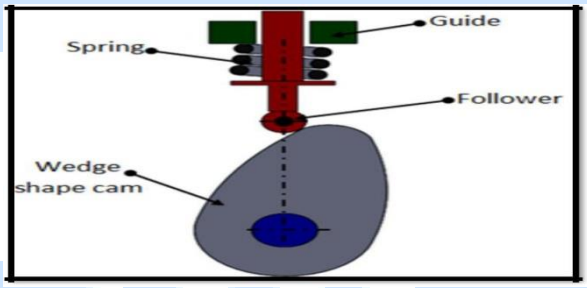

Figure-2: Cam Mechanism

A cam changes the input motion which is usually rotary motion to a reciprocating motion of the follower. A cam mechanism is a rotating piece in a mechanical linkage used especially in transforming rotary motion into linear motion. It is often a part of rotating shaft that strikes a lever at one or more points on its circular path. Here the follower moves in plane perpendicular to the axis of rotation of the camshaft. Here we are using a roller follower. The contact end of the follower is roller and the rolling motion exists between the cam and follower. Compared to knife edge followers, the rate of wear and tear is less due to less friction. The cam rotates continuously. The follower is a roller that rests on the edge of the turning cam. The follower moves up and down, but cannot move to the side because of slide or guide.
This means the follower can only-

1.RISE : The part of the cam that causes follower to rise
2.FALL : The part of the cam that causes follower to fall

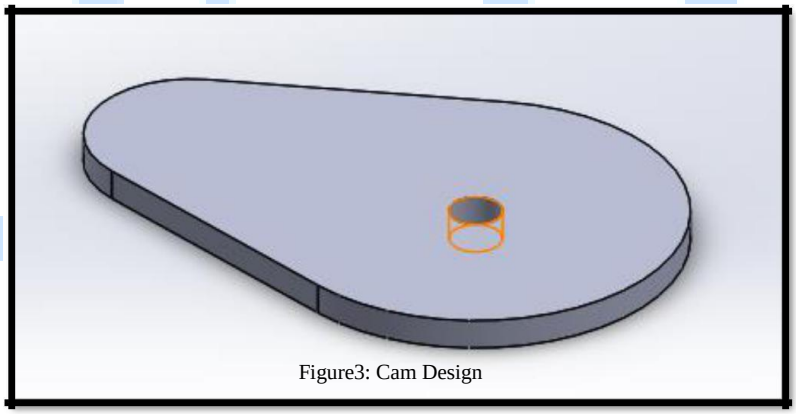

Figure3: Cam Design

Advantages

a. Efficient and safe movement of materials to the desired place.
b. Timely movement of the materials when needed.
c. Supply of materials at the desired rate.
d. Storing of materials utilizing minimum space.
e. Lowest cost solution to the materials handling activities.
f. An efficient and safe transport method for materials
g. Timely movement of the materials when needed
h. A steady supply of materials
i. A material storage system that utilizes minimum space
j. A low cost system with high-quality results

5. CONCLUSION

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An efficient and fast system has been developed for material handling in vertical direction. The designing of each and every part has been carried out as per the standards used globally. The structural analysis of the crankshaft has been carried out using Ansys and Solid works. The system is a better option for current methods used for material transfer in vertical direction such as inclined conveyors, lifts etc. which consume more space, time and money.

6. FUTURE SCOPE OF DESIGN

1. To transfer the liquid object we have to make the follower top face horizontal. So to transfer the object we can design a roller system which will roll the object to the next follower. So there will be no need to provide an inclination.
2. We have to design an object loading system which will mount the object on the first follower at lower level. The system will mount objects linearly, aligned in proper position

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Fabrication of Wind Tunnel Testing Machine

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ABSTRACT

A Wind Tunnel Testing Machine is a machine which is used to test the aerodynamic shapes as in how they are going to act practically in the environment. In today's world, everyone's main focus is to save time, material and money which have compelled us to opt for the experimental testing for the scale models, before the final product is to be shaped. At education level, it is a tedious task to get the small aerodynamic projects to be tested in the large scale wind testing machine which are scarcely available. Testing of small projects in large scale wind tunnel testing machine gives less accurate results. We are going to fabricate a small scale wind tunnel testing machine according to the design of the same provided by our colleagues. This is a low speed open circuit wind tunnel testing machine.

Keywords— *Aerodynamics, Drag, Lift, Honeycomb, Fabrication*

1. INTRODUCTION

A wind tunnel is used to study the effects of air moving through solid aerodynamic objects. Air is passed through the object by a powerful air system. The wind tunnel, is equipped with suitable sensors to measure aerodynamic forces, pressure distribution, fluid flow, etc.

A powerful fan system consisting of one or multiple fans moves 3 air past the object. This type of full scale model becomes very expensive in practice and some of their functions have been taken over by computer modelling.

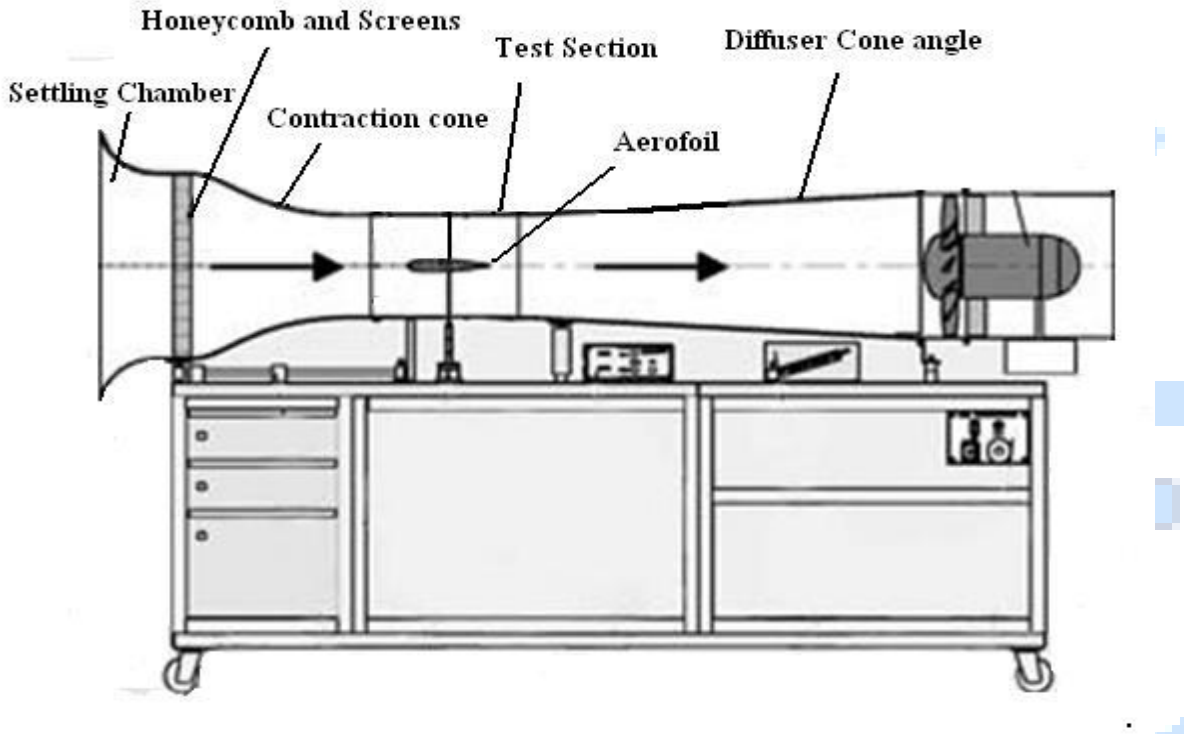

Fig. 1 Wind Tunnel Testing Machine

2. LITERATURE REVIEW

Sahith Reddy Madara, et al. 2017 [1], made a little subsonic tunnel passage to confirm its ampleness for streamlined aerodynamic investigation applications and also to reproduce the speed profile at various position of the test area. They said that when compared to the wind tunnels in NASA and MIT, which was fabricated in a much more sophisticated, large and tested in a controlled environment, the modification made on the wind tunnel gets the aerodynamic results as close as possible on any object.

John Rajadas and Bradley Rogers 2017 [2], concluded that this wind tunnel and its support facilities like the instrumentation systems reflect positively on the hands-on type of education the students receive in the MMET Department at ASU Polytechnic. In addition to playing a vital and central role in delivering a meaningful engineering

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technology program, the tunnel was also an asset for conducting graduate thesis work as well as funded applied projects that are of immediate utility to the industry in general.

Mahesh K. Panda and Amiya K. Samanta 2016 [3], said that to ensure good performance of the structures subjected to wind loads, the model's behavior must be anticipated in advance by the design engineer. Model studies through wind tunnel facilitate the same for the intended structure. So it is a useful tool in wind engineering.

Md. Arifuzzaman and Mohammad Mashud 2015 [4], fabricated short length subsonic wind tunnel which was about 7.35 m and free stream velocity found out approximately 30 m/s. They said that the wind tunnel is designed considering a mean test section speed 40 m/s and all factors were considered to make it short as possible then fabricated as accurately as possible.

3. OBJECTIVES

1. To develop a small scale open circuit sub sonic low speed wind tunnel testing machine for educational and research purpose.
2. To get an impression of fluid flow around a scale model of a real object.
3. To successfully fabricate the wind tunnel testing machine according to the given design.
4. To help students participating in events such as aero modelling for checking there aerodynamic models.

4. PROBLEM STATEMENT

After carrying out several search we found the following problem associated to existing wind tunnel are as

1. The primary problem associated with wind tunnel is high cost.
2. The Existing Wind tunnel are not portable and consume large space.
3. This Model consumes high power to test even small sized aerodynamic model.
4. Also this wind tunnel is generally manufactured only for industrial testing purpose. This leads to lack of study about wind tunnel testing.
5. The wind tunnel wall influences the flow boundary layer and some sort of clogging.
6. Maintenance time is more.

All the above mentioned points will be overcome by designing this wind tunnel to test Aerodynamic model based on various design parameter while considering the cost parameter as criteria which is to be minimized but also maintaining the efficiency of wind tunnel.

5. PROPOSED METHODOLOGY

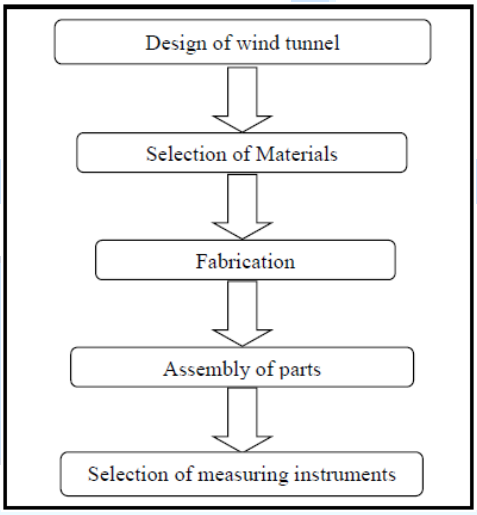

Fig. 2 Steps for Fabrication of Wind Tunnel

5.1 Designing of Wind Tunnel

According to the requirements of the project, our colleagues will design the optimum structure of the wind tunnel testing machine and with the help of that CAD model and its dimensions our main aim is to construct or fabricate the same Low speed Subsonic Wind Tunnel Testing Machine.

5.2 Selection of material

After conducting initial material research considering cost manufacturability and structure strength. We determine following material to be best suitable.

I. Wood
II. Plastic
III. Aluminum

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Further Material selection would be determining in later stages.

5.3 Fabrication

This is the main part of the project where we are going to put some light on. Based on the given dimensions by our colleagues we are going to fabricate the wind tunnel testing machine which is divided into following parts.

a. Settling Chamber

The settling chamber is most often placed at the entrance of the contraction cone. The settling chamber straightens the air flow. The uneven turbulent forces can cause unpredictable forces to be experienced in the test section. The settling chamber usually includes the honeycomb flow straightener and wire mesh smoothing screens that produces a smooth air flow. The honeycomb material can be made of hexagonal cells, like normal honeycomb, but it can also be circular or square cells. Researches show that the length should be 6/8 times the cell diameter.

b. Contraction Cone

The purpose of this section is to compress the air to form a higher velocity in the test section. As discussed above, the settling chamber is normally placed at the very beginning of the wind tunnel; making up the front part of contraction cone

.

c. Test Section

The test section is the chamber in which measurements and observations are made and its shape and size are largely determined by the testing requirements. However, care should be taken not to make this section too long as this will lead to detrimental boundary layer growth which can separate when it enters the exit diffuser and create a power loss.This can be avoided by increasing the tunnel diameter at the exit end of the tunnel to create more pressure.

d. Diffuser

Diffusers are chambers that slowly expand along their length, allowing fluid pressure to increase and decreasing fluid velocity. Exit diffusers are located downstream of the test section and are used to recover pressure flow.

e. Drive section

In a drive section there is a fan situated inside according to the required flow and discharge of air. Axial fans are popular in open circuit tunnels, and are almost always found in closed circuit tunnels. In larger tunnels, pre-rotation vanes called stators are commonly positioned upstream of the fan, substantially decreasing swirl in the exit flow. Axial fans have a relatively limited effective operating range as the reduction it pressure increase through the fan as the blades approach stall speeds is far more abrupt than in centrifugal blowers. Care must also be given to choosing the proper blade size, shape and spacing in order to prevent shock wave production, stalling, and backflow.

f. Smoke Chamber

The smoke chamber is the section which can be incorporated outside or along with the wind tunnel. The smoke is produced in it and then projected over the aerofoil in the test section. Velocity profile is thus studied through it.

5.4 Assembly of parts

As our parts are finished fabricating one by one, we will start assembling them with the suitable fasteners.

5.5 Selection of measuring instruments

This is an important section as it provides the actual reading which can be compared with theoretical reading. This reading can be calculated by using following measuring instrument.

a. Load cell

A load cell is a transducer that is used to create an electrical signal whose magnitude is directly proportional to the force being measured. This load cell can be used to calculated values of lift force, drag force and moment.

b. Pressure sensor

A pressure sensor is a device for pressure measurement of gases or liquids. Pressure is an expression of the force required to stop a fluid from expanding, and is usually stated in terms of force per unit area.

c. Velocity sensor

It is the sensor which is used to measure the air velocity to a specific value, or to balance out pressure fluctuations.

6. CONCLUSIONS

The following conclusions would be derived from the above results after model testing for our project. The designing and fabrication of the wind tunnel is done for subsonic velocity of fluid inside the tunnel.

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a) The fabrication of the low speed open circuit wind tunnel testing machine would be successfully completed.

b) Lift and drag coefficients for the test section can be calculated for the airfoil.

c) This model is suitable for an airfoil of weight less than 0.15 kg. And the study can be done using different airfoils with variant weights, materials and designs.

d) Aerodynamics of any high speed car or airplane can be studied using this model.

e) By looking at the way the smaller model acts in the wind tunnel, we get an idea of how a real life-sized airplane of the same design will probably fly.

f) The testing of the airfoil, propeller blades and turbine blades can be done through this apparatus.

7. RESULTS

We have successfully done fabrication of wind tunnel testing machine.

8. ACKNOWLEDGEMENT

I would like to express my special thanks of gratitude to my prof. Swapnil Raut as well as principal Dr. Arun Kumar who gave me the golden opportunity to do this wonderful project of the topic" Fabrication Of Wind Tunnel Testing Machine", which also helped me in doing a lot of research and I came to know about so many things. I am really thankful to them.

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Multi Degree Freedom Benchvise

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ABSTRACT

A bench vice or fixture is a production tool. The main aim is to locate, support and hold the work securely so we can perform the required machining operations. A bench vice must be easily fastened with the machine and the table. It can be used for the other operations on most of the standard machining tools like drilling machine. Bench Vices are available in different size and shapes ranging from cheap and simple devices to very expensive and complicated devices. Bench vices can also help to simplify the metal working operations which are performed on the special equipment. The upper part of bottom assembly is free to rotate and lower part of bottom assembly is fixed to the bench. This type of assembly will assist to top assembly which consist jaws. These jaws are like pipe vice & conventional bench vice. Lead screw is provided for engagement & disengagement of the jaws.

Keywords— Mechanical, Benchwise,Society Of Automotive Engineers,Multi-degree, Rapid Prototyping.

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1. INTRODUCTION

A vice is a mechanical device used to secure an object to allow work to be performed on it. Vises have two parallel jaws, one fixed and the other movable, threaded in and out by a screw and lever. It is sometimes made of cast steel or malleable cast iron, but most are made of cast iron. However, most heavy-duty vises are 55,000 psi cast steel or 65,000 psi ductile iron. Some vies have a cast iron body but a steel channel bar. Cast iron is popular because it is typically 30 ksi grey iron which is rigid, strong and inexpensive. The jaws are often separate and replaceable, usually engraved with serrated or diamond teeth. Soft jaw covers are made of aluminum, copper, wood (for woodworking) or plastic may be used to protect delicate work. The jaw opening of bench vise is almost always the same size as the jaw width, if not bigger.

A bench vise is bolted onto the top surface of a workbench, with the face of the fixed jaws just forward of its front edge. The vise may include other features such as a small anvil on the back of its body. Most bench vises have a swivel base. Some bench vises marketed as "Homeowner Grade" are not made of steel or cast iron, but of pot metal or a very low grade of iron, typically with a tensile strength of under 10 ksi.

1.1 Objective Of Project

- One side locking arrangement for bench vise to make it portable & fix bench vice on different tables at any location.
- Making bench vise more cost effective and reliable.
- To reduce clamping time.
- To increase the holding capacity by providing extra grooves on the clamping jaws.
- To increase the load holding capacity by making the benchvise more rigid.

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1.2 Problem Definition

Initially when bench vise was invented most of the motions were restricted also degree of freedom was only limited to two. Clamping of work piece was slightly difficult. Holding a pipe for operation was not possible. To perform number of operations, the work piece was to be removed and re-clamped again as per requirement. It was difficult to calibrate with another machine. While operating vise if it breaks we cannot repair it by welding. The bench vise cannot be welded to any metallic surface. After number of operating cycle jaws becomes loose and it is difficult to hold a job at particular fixed position.

Finished job with high smoothness cannot be further operated on bench vise also job with threading cannot be used for further operated. While fixing the job extra force with some another equipment's should not be applied, the tightening should be done with normal hand pressure only otherwise the job may get damaged. We cannot use bench vise as an anvil. Bench vise requires maintenance and lubrication periodically. One side locking arrangement is not for bench vise to make it portable& fix bench vice on different tables at any location.

1.3 Overview

Vise is a mechanical screw apparatus used for holding or clamping a work piece to allow work to be performed on it with tools such as saws, planes, mills, drills, screwdrivers sandpaper, etc. Vises usually have one fixed jaw and another parallel jaw which is moved towards or away from the fixed jaw by the screw. Vises are used as holding device on machines like lathes, milling machine, drilling machine etc. Three types of vises are very common in use namely plain vise, swivel vise and tool maker's vise which is commonly known as bench vise. Vise is usually referring to a bench vise with flat, parallel jaws, attached to a workbench. There are two main types: a woodworking vise and engineer's vise. An engineer's bench vise is usually clamped or bolted onto the top of the bench. The handle is usually adjustable so that it can be tightened in small places.

There are two main types of jaws used on vises: hard and soft. Hard jaws are available with either a coarse gripping surface or are ground flat and smooth to increase accuracy. The latter relies on pressure for gripping, instead of a rough surface. An unskilled operator has the tendency to overtighten jaws, leading to part deformation and error in the finished workpiece. Soft jaws are usually made from a soft metal (usually aluminum), plastic, or Wood they are used to either hold delicate workpieces. These specifically cut jaws are often used in place of fixtures and most commonly used in gang

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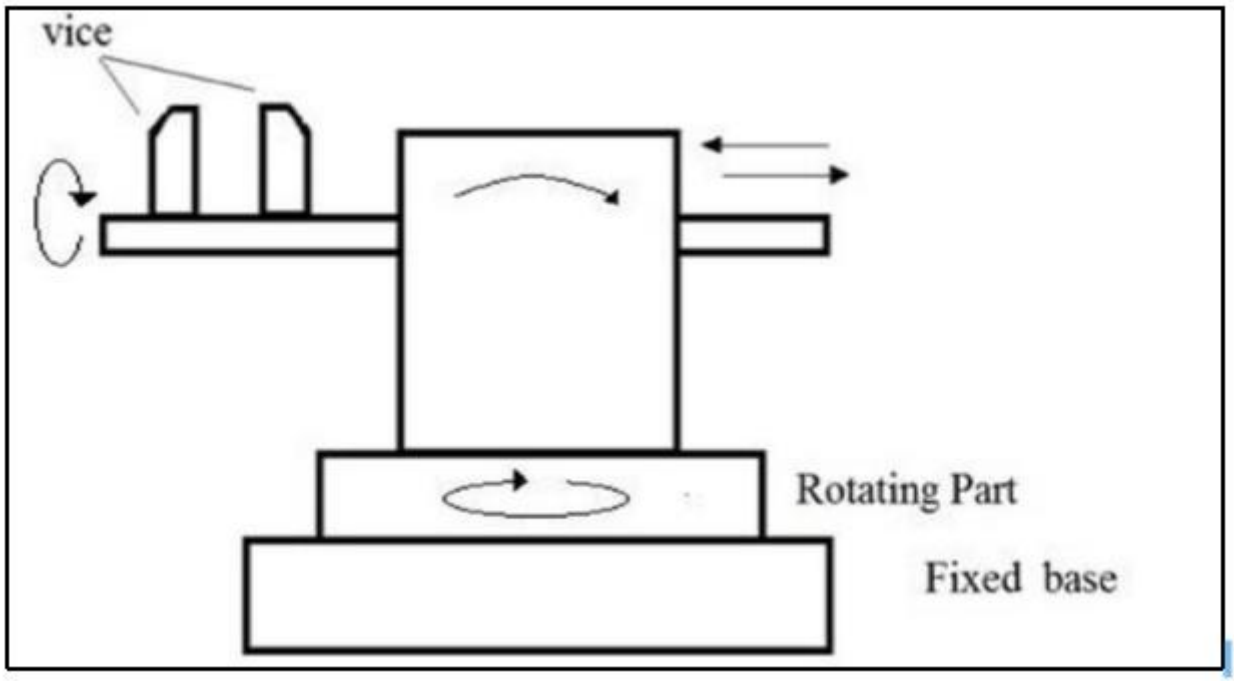
operations. They are also used for rapid change over type setups since they can be easily engraved with the part number, the job number, or other information relevant to the job being run. Soft jaws are considered a consumable item, because they are discarded or recycled after multiple uses.

2. PROPOSED METHOD

Benchvise has a small crank handle which allows the user to get maximum clamping force when working without turning the handle excessively. This is because the crank handle provides extra leverage when rotating, meaning the screw can provide the greater pressure onto the jaws but without any extra effort from the user.



Multi degree freedom benchvise

Benchvise is manufactured with a flat bottom base design which fits firmly against the machine's table. This allows the vice to fit firmly on the table in horizontal alignment with the drill bit. Spherical or Rolling pair is required to tilt both jaws in desired angle. Fixed jaw can be tilt without any extra effort because of the swiveling attachment is provided. Once desired angle is achieved movable jaw is fixed with help of locking Pins.
The clamping jaws of all other benchvise are just above the fixed base and rotating part due to which bottom part of the workpiece is not reachable. Here, the jaws will be provided at certain distance from the fixed base and rotating part with the help of which the workpiece can be rotated at any desired angle for operation.

3. ACKNOWLEDGMENT

Our thanks to Dr. Arun Kumar, Mr. Chinmay Pingulkar, Mr. Varghese Koshy for contributing towards the development of this project. It is under their guidance and knowledge that the entire project was well completed.

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Test Rig On Heat Treatment Under Laminar Flow

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ABSTRACT

The convective heat transfer coefficients of several nanoparticle-in-liquid dispersions have been measured under laminar flow in a horizontal tube heat exchanger. The nanoparticles used in this research were graphitic in nature, with aspect ratios significantly different from one. The graphite nanoparticles increased the static thermal conductivities of the fluid significantly at low weight fraction loadings. However, the experimental heat transfer coefficients showed lower increases than predicted by either the conventional heat transfer correlations for homogeneous fluids, or the correlations developed from the particle suspensions with aspect ratios close to one. New correlations on heat transfer need to be developed for nanofluid systems.

The nanofluid is a solid–liquid mixture in which metallic or nonmetallic nanoparticles are suspended. The suspended ultrafine particles change transport properties and heat transfer performance of the nanofluid, which exhibits a great potential in enhancing heat transfer. The mechanism of heat transfer enhancement of the nanofluid is investigated. Based on the assumption that the nanofluid behaves more like a fluid rather than a conventional solid–fluid mixture, this article proposes two different approaches for deriving heat transfer correlation of the nanofluid. The effects of transport properties of the nanofluid and thermal dispersion are included.

This appears to be a consequence of the gradual change from laminar to turbulent flow brought about by the variation in local Reynolds number from zero to a maximum value within the eccentric annulus. It is believed that sufficent experimental data are now available for the pressure gradient to be predicted for flow in eccentric annuli of unit eccentricity over a relatively wide range of Reynolds number.

***Keywords*:-** *Nanoparticles, Conductivities, Nanofluids, Heat transfer, and Reynolds Number, etc.*

1. INTRODUCTION :

In fluid dynamics, laminar flow occurs when a fluid flows in parallel layers, with no disruption between the layers. At low velocities, the fluid tends to flow without lateral mixing, and adjacent layers slide past one another like playing cards. There are no cross-currents perpendicular to the direction of flow, nor eddies or swirls of fluids. In laminar flow, the motion of the particles of the fluid is very orderly with particles close to a solid surface moving in straight lines parallel to that surface. Laminar flow is a flow regime characterized by high momentum diffusion and low momentum convection.

When a fluid is flowing through a closed channel such as a pipe or between two flat plates, either of TWO types of flow may occur depending on the velocity and viscosity of the fluid: laminar flow or turbulent flow. Laminar flow tends to occur at lower velocities, below a threshold at which it becomes turbulent. Turbulent flow is a less orderly flow regime that is characterised by eddies or small packets of fluid particles which result in lateral mixing. In non-scientific terms, laminar flow is smooth while turbulent flow is rough. The type of flow occurring in a fluid in a channel is important in fluid dynamics problems and subsequently affects heat and mass transfer in fluid systems.

2. REYNOLDS NUMBER:

The dimensionless Reynolds number is an important parameter in the equations that describe whether fully developed flow conditions lead to laminar or turbulent flow. The Reynolds number is the ratio of the inertial force to the shearing force of the fluid—how fast the fluid is moving relative to how viscous the fluid is, irrespective of the scale of the fluid system. Laminar flow generally occurs when the fluid is moving slowly or the fluid is very viscous. As the Reynolds number increases, such as by increasing the flow rate of the fluid, the flow will transition from laminar to turbulent flow at a specific range of Reynolds numbers, the laminar-turbulent transition range depending on small disturbance levels in the fluid or imperfections in the flow system. If the Reynolds number is very small, much less than 1, then the fluid will exhibit Stokes or creeping flow, where the viscous forces of the fluid dominate the **inertial forces.** The specific calculation of the Reynolds number, and the values where laminar flow occurs, will depend on the geometry of the flow system and flow pattern. A common application of laminar flow is in the smooth flow of a viscous liquid through a tube or pipe. in that case, the velocity of flow varies from zero at the walls to a maximum along the cross-sectional centre of the vessel. the flow profile of laminar flow in a tube can be calculated by dividing the flow into thin cylindrical elements and applying the viscous force to them. another example is the flow of air over an aircraft wing. the boundary layer is a

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very thin sheet of air lying over the surface of the wing (and all other surfaces of the aircraft). because air has viscosity this layer of air tends to adhere to the wing. as the wing moves forward through the air, the boundary layer at first flows smoothly over the streamlined shape of the airfoil. here, the flow is laminar and the boundary layer is a laminar layer. prandtl applied the concept of the laminar boundary layer to airfoils in 1904.laminar airflow is used to separate volumes of air, or prevent airborne contaminants from entering an area. laminar flow hoods are used to exclude contaminants from sensitive processes in science, electronics and medicine. air curtains are frequently used in commercial settings to keep heated or refrigerated air from passing through doorways. a laminar flow reactor (lfr) is a reactor that uses laminar flow to study chemical reactions and process mechanisms.

3. FACTORS AFFECTING MAGNITUDE OF LAMINAR FLOW:

The principal factors affecting the magnitude of the laminar-flow properties of flocculated suspensions were the concentration and particle diameter of the solid phase. the range of variables included concentrations from 0.02 to 0.23 volume fraction solids and particle sizes from 0.35 to 13 mu. materials tested included thorium oxide, kaolin, titanium oxide, aluminum oxide, graphite, magnesium oxide, and uranium dioxide. at high rates of shear the data were fitted satisfactorily with The bingham plastic model. the yield stress was directly proportional to the cube of the volume fraction solids and inversely proportional to the first or second power of the particle diameter, depending on the particle shape. the logarithm of the ratio of the coefficient of rigidity of the suspension to the viscosity of the suspending medium was directly proportional to the volume fraction solids over the complete range of concentrations studied. although specific electrolytes (such as oxalate or pyrophosphate) deflocculated the suspensions even at low concentrations, the suspensions remained flocculated both in the presence of up to 0.1 m of 1: 1 electrolyte and over a ph range of 4 to 12. wu and cheng (2003), based on the laminar convective hea transfer and pressuredrop of water in 13 different trapezoidal silicon microchannels, proposed that the average nusselt number increased nearly linearly with the reynolds number at low reynolds numbers (re <100) but increased slowly for reynolds numbers greater than 100. however, the conjugate heat transfer effects at low reynolds numbers were not identfied) conducted an experimental and numerical analysis on the single-phase flow through rectangular microchannels with the . lee et al. (2005) reynolds number ranging from approximately 300 to 3500. the numerical predictions, such as the average nusselt number, obtained based on a classical continuum approach, were in good agreement with the experimental data.laminar flow in a straight pipe may be considered as the relative motion of a set of concentric cylinders of fluid, the outside one fixed at the pipe wall and the others moving at increasing speeds as the centre of the pipe is approached. smoke rising in a straight path from a cigarette is undergoing laminar flow. after rising a small distance, the smoke usually changes to turbulent flow, as it eddies and swirls from its regular path.

4. CONCLUSIONS:

Heat treatment done centrally will heat the throughout system within shortest time. While the heat treatment done tangentially will heat the throughout system in more time compared to centrally heated system. We conclude that heat flowing when heated centrally is at faster rate then heat flowing when heated tangenti .When the heated fluids will be impacted on different material surfaces centrally and tangentially it will affect the strength, appearance, size, surface finish, etc. It will affect the wear and tear of materials making it either more stronger or weaker as per its properties.

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Design And Manufacturing Of Biogas Plant

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ABSTRACT

Biogas technology is an efficient solution to address the issue of more stable and efficient renewable energy source through its potential ability to keep pollution free environment. Besides being a renewable energy source, the biogas digester systems would prevent the direct exposure of methane, carbon dioxide and other pollutant emissions into the atmosphere. Moreover, the combustion of biogas displaces the use of fossil fuels for energy generation hence contributes to additional emission reductions of greenhouse gases (GHG) and other air pollutants. For complimenting the increasing interest in renewable energy, an increasing number of centralized biogas plants have been installed in recent years for their cost efficiency to convert livestock manure into renewable energy products, like electricity or bio methane products. In order to assess the true efficiency of an animal manure based biogas plant under public private partnership framework, the potential environmental externalities of animal manure should be taken account of in a socio-economic analysis In the present scenario of dwindling petroleum resources and global warming, exploring other avenues for ecofriendly fuels became essential. Biogas which is a clean and environmental friendly fuel emerged as one of the potential alternative fuels. Raw biogas contains about 60-70% methane (CH4), 30-40% carbon dioxide (CO2), traces of hydrogen sulfide (H2S) and fractions of water vapours. But its wide spread use is hampered by the associated problems like low energy density due to the presence of impurities, generation at low pressures and the absence of means for storing and transporting. In this context this work intends to design and establish a facility at the site of biogas production in the campus for purifying, compressing, bottling and making it transportable. This can be done by compressing the gas in cylinders which was possible only after removing its CO2, H2S and water vapour components. To increase the energy density of the gas, different experiments were conducted in removing incombustible and corrosive gas. To remove this impurities steel wool, water and silica gel was used. The steel wool is to react with the hydrogen sulphide, the water is to reduce the percentage of carbon dioxide and the silica gel is to reduce the presence of water vapour in the purified biogas.

Keywords: Mechanical, Scrubing system, Biogas, Manure, Cowdung.

1. INTRODUCTION

Due to this lack of portability of biogas there have been no efforts what so ever to commercialize the use of biogas. Also, Biogas plants significantly lower the greenhouse effects on the earth's atmosphere. Biogas burns cleanly, the rural homes will not suffer from smoke and consequently denizens people will suffer less from physical problems like bronchial complications. 1 biogas plant is computed to save 32 liters of kerosene and 4 tons of firewood every year.Biogas is a mixture of colorless, flammable gases obtained by the anaerobic digestion of plant-based organic waste materials. Biogas is typically made up of methane (50-70%) carbon dioxide (30-40%) and other trace gases .It is generally accepted that fuel consumption of a nation is an index of its development and standard of living. There have been increases in the use of and demand for fuel in terms of transportation and power generation in many nations. There are abundant agricultural residues and municipal solid wastes, whose potentials are yet to be fully tapped for energy generation–. The possibility of using such wastes for biogas production should be explored. The raw materials used in commercial methane generation include plant residues, animal waste like cow dung and various urban wastes which are available. Biogas technology has advantages which include the following: generation of storable energy sources, production of a stabilized residue that can be used as a fertilizer, an energy-efficient means of manufacturing nitrogen containing fertilizer. Main products of the anaerobic digestion are biogas and slurry. After extraction of biogas (energy), the slurry comes out of the digester as a by-product of the anaerobic digestion system. The main constituents of biogas are the CH4 and CO2 gas. The biogas burns very well when the CH4 content is more than 50% and therefore biogas can be used as a substitute for kerosene,

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charcoal and fire wood for cooking and lighting. This saves time and money and above all it conserves the natural resources from cutting trees to get firewood.

2. MECHANISM OF THE CONCEPT

2.1 Purification

A large scale biogas plant producing a large amount of biogas is often rendered and valueless due to the lack of its effective and efficient use. Production of biogas could be a continuous process. The utilization of biogas as an efficient energy source depends strongly on its methane concentration. Therefore, biogas purification is essential in order to have more energy per unit volume of compressed biogas and to get rid of the corrosive effect of Hydrogen Sulphide. The designed biogas scrubbing and storage facility is composed of two units, namely the scrubbing unit and the storage unit. The biogas scrubbing system consists of three units, the hydrogen sulphide removing unit, Carbon dioxide removing unit, and moisture trapping unit. The three units are interconnected with plastic hoses. In the purification process of biogas which was conducted; steel wool, pure water and an adsorbent material (silica-gel) were used. The steel wool is to react with the hydrogen sulphide, the water is to reduce the percentage of carbon dioxide and the silica gel is to reduce the presence of water vapour in the purified biogas. The experiment was done by taking the raw biogas with pressure builds up in the digester head and forced through the steel wool on its way to the biogas scrubber unit to remove hydrogen sulphide. After the hydrogen sulphide was removed by the steel wool, the raw biogas passes into the water scrubbing unit for further purification. When carbon dioxide dissolved in water carbonic acid is formed. It is a weak acid.The liquid leaving the scrubbing unit will thus contain increased concentration of carbon dioxide, while the gas leaving the scrubbing unit will have an increased concentration of methane. The purified biogas that was collected at the top of the scrubber unit has some water vapours. Water vapour is the leading corrosion risk factor. To reach water contents as low as in the purified biogas, silica gel was used in this experimental set up. Silica gel is a material that has a capability of absorbing moisture.

2.2 BIOGAS COMPRESSION AND STORAGE

The biogas storage system consists of three units; a pedal mechanism , a pressure gauge and an LPG cylinder. The pressure of the gas at various points of compression can be noted using a pressure gauge. For storing the gas after compression, a normal LPG cylinder was used. The method is based on Shaper Mechanism. Shaper is a reciprocating machine tool intended primary to produce a sliding motion. It consists of a bearing attachment to the driving sprocket which is connected to individual crank of piston cyclinder mechanism. Rotary motion is transferred from one sprocket to another. We make use of chain drives instead of belt drives to avoid slipping.

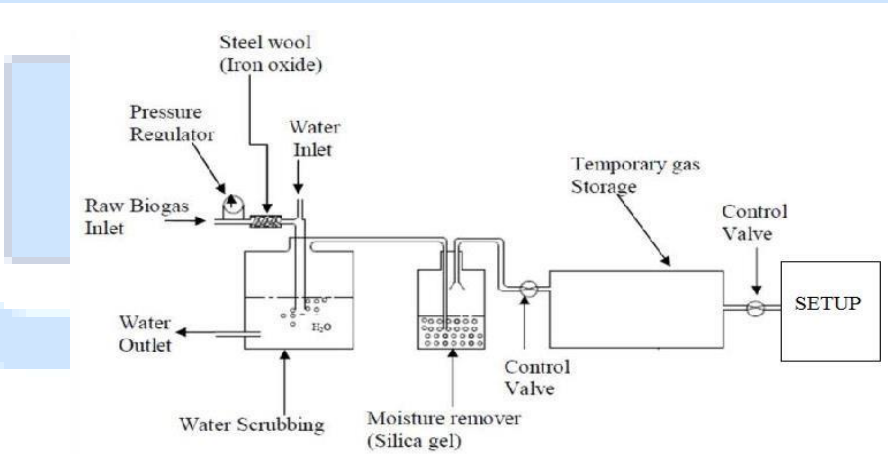

fig no 1.1 Biogas stora

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3. COMPONENTS

1) Sprocket
2) Chain
3) Bearings
4) Piston cylinder arrangement
5) Connecting pipes
6) Link

4. CONCLUSION

As a matter of fact, the biogas-bottling plants are one of the most potent tools for mitigating climatic change by preventing black carbon emission from biomass chulha since biogas is used as a cooking fuel and methane emissions from untreated cattle dung and biomass wastes are also avoided. The purified biogas can be bottled in CNG cylinders and wherever CNG is currently used; compressed biogas can be used as an alternative. There is a vast potential for the production of biogas in the country. In addition to the energy production, biogas plants also provide bio-manure and are helpful in dealing with the problems of waste management, providing clean environment and mitigating pollution in urban, industrial and rural areas. Biogas is also a prominent alternative to petroleumfuels.

5. ACKNOWLEDGMENT

Our Thanks to Dr. Arun Kumar, Mrs. Niyati Raut, Mr. Sushil Mishra for contributing towards the development of this project. It is under their guidance and knowledge that the entire project was well completed.

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TESTING & ANALYSIS OF WIND TUNNEL

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ABSTRACT

Wind tunnel testing is an important technique used for testing various parameters of actual model in the wind tunnel and observing the effect of wind on model. These testing are necessary to capture more accurate and high quality test results by eliminating the uncertainties in testing and to facilitate verification of the test model for design. According to the designer formulation, his design should get a specific theoretical value of its input and output through the calculations. But after the product is fabricated how do we get to know that the model satisfies the designers design parameters? These can be done by actual testing of the model & by using some software. This project discusses the actual testing and software analysis of wind tunnel and airfoils by passing wind on the walls of wind tunnel to carry out test of boundary layer, operating speed, velocity and pressure & on the model to check the effect of lift and drag.

Keywords: - *Aerofoil, drag, lift, simulation, boundary layer, ansys.*

1. INTRODUCTION

A wind tunnel is a tool used in aerodynamic research to study the effects of air moving past solid objects. A wind tunnel is an assembly of three section. A convergent cone, divergent cone and a test section under which a model is tested. Air is made to move past the object by a powerful fan system or other means. For testing of a model, instead of moving the object in air it is kept stationary and air is been passed over it. By this method the aerodynamic forces can be easily studied keeping the observer stationary. Wind tunnel are classified into subgroups which are open and closed, laminar and turbulent, subsonic and supersonic. This report provide brief information about testing and analysis of open wind tunnel. In open wind tunnel, air is sucked by axial fan from one end and is been thrown out from the other end and in between this air is used for testing of various model. As the wind is not circulated again in the tunnel it is called open return tunnel.

2. LITERATURE REVIEW

Royson Donate Dsouza, Samiya Salim, Atul Shankar, Mohammed Safwan, et al [APR 2016] [1] - By constructing a wind tunnel they carried out experiments on different types of airfoils in the laboratory. The current research can be extended to include other parameters like flow visualization over test specimens of different materials through smoke, installing six force sensors for measurement of yaw, pitch and roll & automation of tunnel for data acquisition. Improvement of different mechanism models by using miniaturized strain gages, and a variety of dynamic characterization tests.

Tomar Vishvendra Singh, et al [JAN 2014] [2] – have developed design of Low cost SOWT model. The main considerations like Boundary Layer Separation, Controlled Air Flow, Turbulence Intensity, Strems Line Flow, Cost effectiveness etc. were taken and the model was designed. The contraction cone and the test chamber section were given special attention as they have direct influence on the scale model. The velocity variation and Static Pressure changes through the model were simulated. With final design the maximum operating speed obtained at the test chamber was 49.12m/s. The flow obtained is smooth and free from boundary layers.

V.L. Kakate, D S Chavan, P.B Karandikar, et al [MARCH 2014] [3] - have presented the Measurement and control aspects on basics of wind tunnel, need of wind tunnel, its construction, applications and associated parameters. Exhaust fan speed control, air flow measurement are critical systems in wind tunnel design. This helps in the building a safe model and its balancing with each parameters related to the wind tunnel.

Ishan M Shah, S A Thakkar, et al [JULY 2013] [4] – have taken readings on airfoil model in Wind Tunnel Testing Machine at different air velocity and different angle of attack. The airfoil provide lift creating a situation where the pressure above is lower than below of the airfoil. The wind tunnel air pressure and velocity reading shows that the maximum performance of airfoil is achieved at 10^{o} on angle of attack.

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3. OBJECTIVES

- Aerodynamic testing has been a primary method of assessment and verification of the aerodynamic models.
- This is essential for modern aerospace, automotive and construction engineering as all kinds of objects such as aircraft and space vehicles or buildings and bridges can be tested in this way.
- Calculating the strength of structures especially during high-speed winds. Determining the aerodynamic forces acting on a given structure in a wind tunnel testing.
- The values of aerodynamic forces are also used to reduce the intensity of flow energy around objects, moving elements in particular by developing their geometry as close as possible to the ideal shape.

. 4. PROBLEM DEFINITION

After researching on different papers we found some problems while testing and analysis on wind tunnel and aerodynamic
shape structure.
Uncertainty:-Any unusual small change in the may lead an unwanted aerodynamic force acting on that model. And this uncertainties should be eliminated for smooth and steady flow.
Uncertainty is classified into some types:-

- Flow Quality:- This state about your flow (laminar, turbulent, velocity, viscosity)
- Boundary Layers: - A boundary layer is an important concept and refers to the layer of fluid in the immediate vicinity of a bounding surface where the effects of viscosity are significant here we have boundary layer on the surface of wall.
- Uncertainty on model: - An unusual small change on the model.
- Leakage: - This wind tunnel is been design into different parts (convergent section, divergent section and test section) and also fabricated individually. Now during meshing these parts to form a whole test rig ,if dimensional error occurs or develop it might lead to leakage problem in a test rig and even a small leakage or leak can cause a big variation in the testing to overcome this we perform rig test.

5. METHODOLOGY

Existing Method As per the given problem mention in above chapter. To overcome that problem we will make analysis on the wind tunnel model and the other aerodynamic shape structures like aero foil, fins, scale car design, etc. which we will test in the wind tunnel.

Steps of testing and analysis on a wind tunnel:- For analysis and testing on wind tunnel and analysis and testing the other aerodynamic shaped structures we have to develop a CAD model of these structure by using SOLIDWORKS which will be useful for better visualization and simulation which will be perform later on.

5.1 Selection of software for analysis:- Software selection is the most important step for analyzing the model we are going to test. Among all ANSYS is the most preferable software as it is fast and accurate one

5.2 Conceptual design:- After selecting the proper analysis software we have to make a conceptual design of wind tunnel and the other aerodynamic shape structures which we have to test in the tunnel. The parameters which we required for build a conceptual design are dimensions such as height, width, length, angle etc. this wind tunnel is open circuit wind tunnel with drive section, diffuser, test section, contraction cone.

5.3 Cad definition:- In cad definition by using the parameters such as dimensions we build a wind tunnel cad model and other aerodynamic shape structures model by using cad software for better visualization and simulation on which we will make analysis on later stages.

5.4 Mesh generation:- Afte1r building a cad model we have to use ansys for further process, in which we will use mesh generation. It will produce the most appropriate mesh for accurate, efficient Multiphasic solution. CFD analysis:- Computational fluid dynamics process passes a fluid over the generated CAD model which gives each parameters and reference value which will be obtained when we use a wind tunnel. Also we get the graphical representation of the flow, what forces are acting on that model

5.5 Post processing:- After performing all the CFD analysing the next part is conforming the result data obtained. The results which we get from the analysis are compare with the results which we get after actual testing in wind tunnel.

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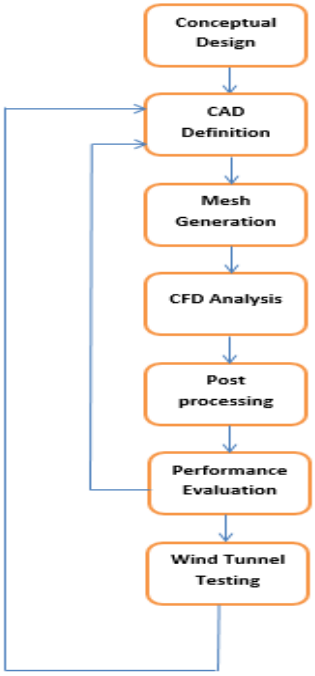
5.6 Performance evaluation:- When we compare the analysis results and the actual testing result we will then easily find out the problems related to the wind tunnel structures and aerodynamic shape structures. We can easily define the life of structure, how this structure perform in actual condition and what changes is needed in structures.



Flow chart: steps of testing and analysis of wind tunnel

5.7 Other method:- Soapy Water Test- We perform a soapy water test to check the air leakage in wind tunnel model. These test is very useful because the one small leak is present in wind tunnel then the flow of air will change and we did not get the required output.

6. CONCLUSION

- After soapy water test we conclude that in wind tunnel no leakages are present.
- Lift and drag coefficient for the test section can be calculated for the aerodynamic structures in this tunnel
- This wind tunnel testing and analysis can be used for studding of different aerodynamic structure with variant weights, material and designs.
- Aerodynamics of high speed car or aerodynamic structure can be studied using this testing in wind tunnel.
- Study of the airfoil, F1 small scale cars etc. can be done through this analysis.

7. ACKNOWLEDGEMENT

I would like to express my special thanks of gratitude to my teacher prof. Swapnil Raut as well as our principal Dr. Arun kumar who gave me the golden opportunity to do this wonderful project on the topic "Testing & Analysis of Wind Tunnel", which also helped me in doing a lot of research and I came to know about so many things I am really thankful to them. Secondly I would also like to thank my parents and friends who helped me a lot in finalizing this project within the limited time frame.

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Design and Analysis of Triplex Suspension

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ABSTRACT

The triplex suspension system designed is a combination of coil springs, shock absorbing dampers and an extra shock absorber known as triplex. It has been designed keeping in mind the need of a passenger vehicle considering the road conditions.Main objective of the project is to design and analyze the entire triplex suspension system for a four wheeler automobile for improving the stability and comfort level of the vehicle. A certain amount of development is seen in the suspension system. The topic is focused on designing the triplex suspension system considering the generalized forces on the vehicle. The suspension system of the vehicle needs to be durable, efficient and less expensive. The vehicle must be able to withstand the harsh off road environment on occasional basis. Stability and comfort is given prominent importance in this project. Furthermore, the addition of triplex aims at the reduction of ground clearance of the car. The ground clearance can be brought to an optimum level where it is not too low neither too high. Low ground clearance puts the lower end of car consisting of fuel tank to the risk because of the humps on the road. If the clearance of car is too high then it creates a moment while turning on roads which could result in rolling accident. All the modifications proposed increases the performance of the car and its comfort level.

Keywords— *Suspension, Ground clearance, Shock absorbers, Automobile.*

1. INTRODUCTION

Suspension system is referred to the springs, shock absorbers and linkages that connect the vehicle to the wheels and allows relative motion between the wheels and vehicle body. Suspension system also keeps the driver or the operator isolated from bumps, road vibrations, etc. also the most important role played by the suspension system is to keep the wheels on the ground

In triplex suspension, an extra shock absorber is placed so as to provide better stability to the vehicle, a lower ground clearance and better passenger comfort.

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2. OBJECTIVE

Triplex suspension is a system designed to provide extra comfort and stability to the vehicle by modifying certain aspects of the design. A suspension does not only absorb the shocks caused because poor road condition but also provides stability to the car.

Main objective of the project is to design and analyze the entire triplex suspension system for a four wheeler automobile for improving the stability and comfort level of the vehicle. A certain amount of development is seen in the suspension system. The topic is focused on designing the triplex suspension system considering the generalized forces on the vehicle. The suspension system of the vehicle needs to be durable, efficient and less expensive. The vehicle must be able to withstand the harsh off road environment on occasional basis. Stability and comfort is given prominent importance in this project.

3. PROBLEM DEFINITION

The roads have a lot of humps and that creates a problem to the operator. By using the new type of suspension the jerks on the operator are considerably reduced. The extra shock absorber absorbs the jerk and provides comfort to the operator.

The main reason of developing the suspension system is to provide better stability, more comfort for the passenger and better control over the vehicle. There are various problems in the existing model

4. OVERVIEW AND METHADOLGY

IV.A Construction of triplex suspension

1) *Anti-roll bar*: An anti-roll bar (roll bar, anti-sway bar, sway bar, stabilizer bar) is a part of many automobile suspensions that helps reduce the body roll of a vehicle during fast cornering or over road irregularities. It connects opposite (left/right) wheels together through short lever arms linked by a torsion spring. Anti-roll bars provide two main functions. The first function is the reduction of body lean. The reduction of body lean is dependent on the total roll stiffness of the vehicle. Increasing the total roll stiffness of a vehicle does not change the steady state total load (weight) transfer from the inside wheels to the outside wheels, it only reduces body lean. The total lateral load transfer is determined by the CG height and track width

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1) *Coil springs*: A coil spring, also known as a helical spring, is a mechanical device which is typically used to store energy and subsequently release it, to absorb shock, or to maintain a force between contacting surfaces. They are made of an elastic material formed into the shape of a helix which returns to its natural length when unloaded.

Knuckle: In automotive suspension, a steering knuckle is that part which contains the wheel hub or spindle, and suspension, the knuckle is shown attached to the upper control arm at the top and the lower control arm at the bottom. The wheel assembly is attached to the knuckle at its center point. The arm of the knuckle that sticks out, to which the steering mechanism attaches to turn the knuckle and wheel assembly.

2) *Triplex:* Triplex is a shock absorber between the two knuckles placed with the help of a rod. The triplex serves as an extra shock absorber to provide extra comfort to the passengers and add stability to the vehicle. It also neutralizes the force acting because of the anti-roll bar on flat roads and thus provides smooth functioning of the vehicle. With help of triplex the ground clearance of the car can also be reduced so as to reduce the probability of car rolling .with an ideal ground clearance the traction offered to the wheels also increases. This is important as cars with powerful engine should have a suspension system which compliments it

IV.B Working of triplex suspension

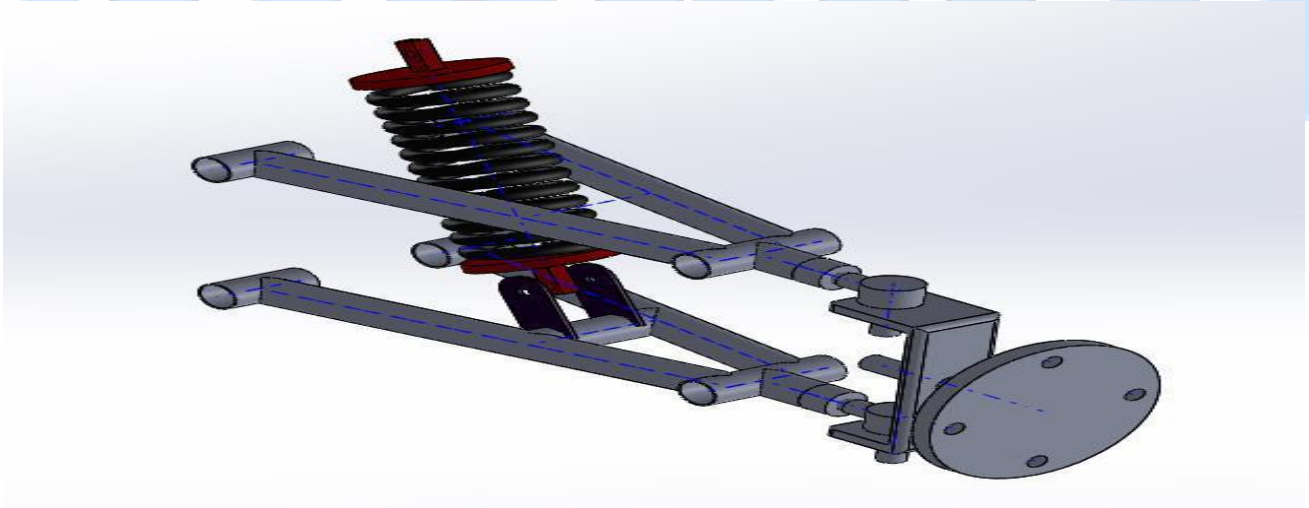
Suspension is the system of tires, tire air, springs, shock absorbers and linkages that connects a vehicle to its wheels and allows relative motion between the two. Suspension systems must support both road holding/handling and ride quality, which are at odds with each other. In triplex suspension system, when a hump is present on the road the wheel moves in a vertical direction this movement is resisted by the coil springs. But all the force cannot be absorbed by the coil springs which usually causes discomfort to the passengers inside the vehicle, to solve the problem triplex is introduced, a third shock absorber, which absorbs the remaining force caused because of the bad road quality

In the project the model which we are going to use is different and has certain modifications. The model has an extra damper present with the existing pair of springs and shock absorber dampers. There is also a unique anti-roll bar which is z shaped to help the car during turns by providing a certain amount of torsion.

The method followed for the project until now has been

1. Study of the existing model of suspension system.
2. Study of the new modified model.
3. Design of the basic suspension model on cad software
4. Design of modified model on cad software
5. Simulating the designs suspension parts on ANSYS

Chart 1: Suspension design



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Analysis of spring

Spring is being analyzed in ANSYS analysis software so as to determine the actual maximum deflection of spring corresponding to the maximum spring force. Also, the maximum stress value corresponding to the maximum spring is determined.

Design considerations in spring

Sprung mass = 240kg

Unsprung mass = 80kg

Wheel displacement = 228 mm

Table 1: Specifications of springs

PARAMETERS	VALUES
Motion Ratio	0.46
Spring Displacement	105.156
Spring Rate	14.26 N/mm
Wheel Rate	67.39 N/mm
Wire Diameter	8 mm
Coil Mean Diameter	64 mm
Number of coils	11 active + 2 inactive
Solid length	104 mm
Free length	245.15 M

Chart 2: Spring analysis

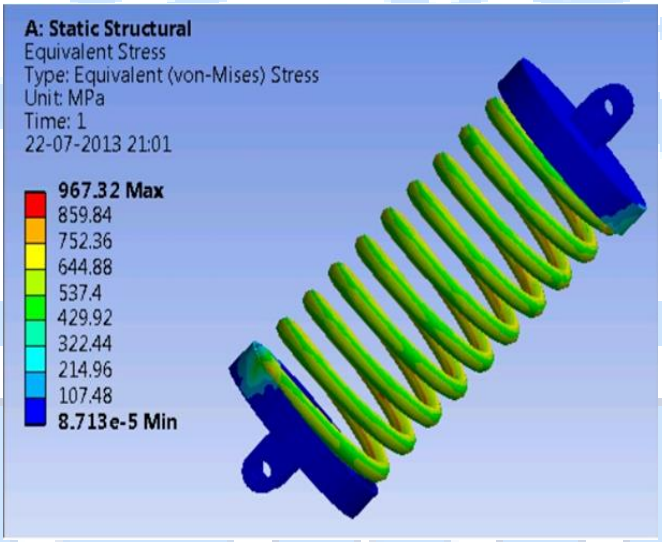

Table 2: Resultant force and deflections

Parameters	Value
Maximum Force	1500 N
Maximum Deflection	106 mm
Maximum Stress	967.32 MPa

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5. CONCLUSION

The design of the basic suspension and the modified model has been compared on some points. The design modifications provided have thus far worked properly and have given satisfactory results. The modified suspension system has provided more stability, better comfort and higher steering quality. The stability and comfort which were given prominent importance have shown better results.

There is a lot of future scope on the topic. The suspension system can be further modified for decreasing the weight and the cost. Pneumatic suspensions can be incorporated in the future for better performance.

6. ACKNOWLEDGMENT

We would like to acknowledge Dr. Arun Kumar, principal of VIVA Institute of Technology and Prof. Vinit Raut,for helping us out in this project. Their contribution in this project is invaluable. We would also express our gratitude to our fellow students who helped us out in completion of this project.

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GEAR PUMP TEST RIG

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ABSTRACT

In the past decades, many impressive progress had been made in the field of simulation and analysis, even though experiments are necessary in many fields to conduct investigation on mechanical components. Gears are one of the components that needed to be tested experimentally. Therefore, test rigs are required with the possibility of varying speed and torque during the test, based on the requirement. In this report, development of test rigs for evaluating the performance of gear will be studied. The main objective of this report is to give researchers an idea about the physical development of a gear pump test rig. Test rig developed by various researchers based on the parameters to be tested were discussed with schematic representation and test procedure. A new gear pump test rig is going to be fabricated by the students mentioned and development procedure of the same will be discussed.

Keywords: *Gear Pump Test Rig, Gear Methodology, Gear Test, Test Rig, Mechanical Project, Gear Mechanism*

1. INTRODUCTION

Many challenges that industrial enterprises faced in order to maintain their competitiveness. Just running industrial operations effectively is not enough in the long run. Capabilities of innovation and utilizing innovativeness in new ways are also required in future competition. Power transmitted by Gear boxes were fluctuating strongly in many of the applications. For example, in automobiles, based on the condition of driving, torque and speed varies. In machining operations, based on the material to be machined, torque and speed changes. This proof show that, test rigs are required for checking such gear boxes. Performance of gears depends on parameters like its design, material, manufacturing and working environment. The highly precise machine required special installation and space. We required such an arrangement which is strong and rapid one to the purpose of checking gear in machine workshop. This purpose will be solved using gear test setup.

Sometimes noise from the gearbox becomes a dominating one this creates a bad impression over the gear quality. To overcome this noise from the gear to be reduced 10–15 dB compared with other noise sources like engine noise. So gears to be tested for noise under controlled environment .Other than that when the gear pair exceeds its load carrying capacity different modes of failure will occur like, micro-pitting, pitting, tooth breakage, scuffing, excessive wear, etc. other parameters like the gear‟ s dynamic behavior and its efficiency also to be investigated experimentally. Therefore, a test rig which allows to test gears under controlled environment is needed

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Figure 1:- Gear Pump Test Rig Model

2. PROBLEM DEFINATION

We are designing and developing a "Gear Pump Test Rig" which is skilful and is having something precise in testing the gears. It checks Performance of gears depends on parameters like its design, material, manufacturing and working environment. Can also predicts the life of gears, different modes of failure will be check and can be avoided like, micro-pitting, pitting, tooth breakage, scuffing, too much of wear, etc.

Objectives:
1. Tank design issues
2. Suction line leaks
3 .Suction line restriction
4. Insufficient head
5. Air release problems
6. Water vapour problems
7. High viscosity problems

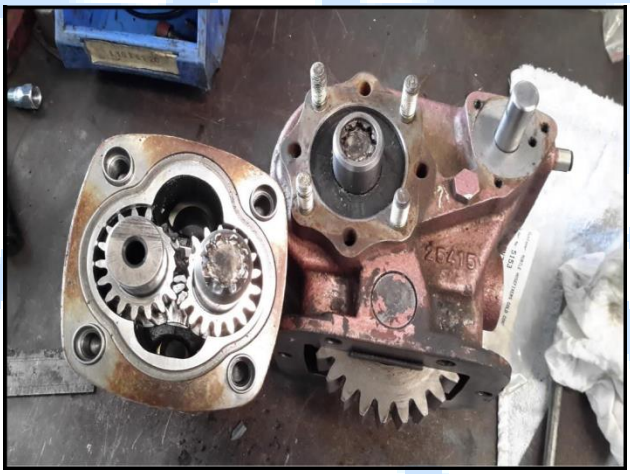

Figure 2:- Cavitation in Gear Pump Test Rig

3.PROPOSED METHODOLODGY

Concept Theory:

A gear uses the meshing of gears fluid by displacement. They are one of the most common types of pumps for hydraulic power applications. Gear pumps are also widely used in chemical installations to pump high viscosity fluids. There are two main variations; external gear pumps which use two gear, which will use an internal and external spur gears. Gear pumps are displacement positive, meaning pump discharge equal amount fluid for each revolution.

Mechanism used:

When the gears starts rotating, they separated on intake side of the pump, making a void and sucked and filled by fluid. The fluid is taken by gears to the delivery side of the pump, where the gear deliver the fluid on discharge side. The clearances of mechanical are kept small— in the order of 10 μm. The close clearances, with the speed of rotation, will stop the fluid from leaking backwards. The strong and effective design of the gears and housing allows for high pressures and pump high viscous fluids. Variations will exist when herringbone and helical gear are fixed instead of spur gears, lobe rotors same as Roots blower can be used as super gears and stacking of pumps occurs due to design. An outer précised gear is normally has a limit of a maximum working pressure of 210 bars and a maximum speed of 3,000 rpm. Some manufacturers manufactured gear pump with higher working pressures and high speeds but has disadvantage of to be noisy and need to be take an important precautions may have to be made. Pressure and suction valve need to interface where the meshing of gears occurs. While some gear pumps have an additional, crescent-shaped sealed.

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Steps involved in a gear pump test rig

1. Fill the reservoir tank with oil inside it of test rig to the level indicator.
2. Now, with the help of motor the fluid will be sucked in the suction pipe due to meshing of gear in Gear pump
3. As soon as the gears separate from each other, the fluid will get sucked in the gear chamber of the Gear pump
4. When entry of fluid takes place from nozzle the inlet pressure (p1) will be obtained
5. Similarly now when gear meshed again fluid is removed from the exit nozzle of the pump
6. Now intermediate pressure (p2) and the discharge (Q) at the outlet is obtained.
7. Finally the fuild is collected at the end of set up in a sump tank where the fluid is discharge final pressure at the end can be obtained
8. Now we can note down the different parameters from gear pump test rig, the power output of the gear pump can be obtained

4. CONCLUSION

Various kinds of gear test rigs developed by various authors were discussed in this report. Based on the review a new test rig will also developed with available equipment's inside the laboratories and the data acquired from the test rig will be more reliable. The developed test rig will be ready for conducting research on gears. This report will be more useful for researchers in the field of gears. Based on the parameters to measure and the test procedure, researchers can develop their own gear test rig. The design analysis, fabrication and testing of an external gear pump will be successfully carried out in this work. This work indicated will be a good prospect for the design and fabrication of small machines/equipment which will serve as a spring board for technological transfer and development of our country. Gear pump test rigs will be beneficial for testing different types of gear pumps & their characteristics such as the pressure the gear pump can sustain by the liquid flow forced upon it & also the discharge rate of the fluid flow through the input & output of the gear pump may be known. In our report we will look upon various factors related to gear pump problems such as cavitation problem & its effect. The wear & tear rate of the gear pump & its abrasitivity may be known with the help of this study thus making it more simpler for a customer to choose a desired gear pump for industries or self-use.

5. ACKNOWLEDGEMENT

Our first and foremost thanks to the almighty for giving the opportunity to completing this work With great pride and pleasure we express our gratitude and thanks to Prof. Niyati Raut, Head of the Department, and Assi Prof. Rajkumar Devkar, in Mechanical Engineering Department, VIVA Institute of Technology for their kind advice, and encouragement throughout the work.

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Theory of Constraint as an Emerging Manufacturing Philosophy

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ABSTRACT

Theory of constraints (TOC) is a technique, which produces correct solutions for every kind of bottleneck in short time. The philosophy of theory is to determine the weaker part of process chain and to eliminate this constraint point by taking actions, after improved bottleneck point in the process chain, another process point would be weaker part of process chain and it would be necessary to take improvement action to eliminate new constraint point, so constraints theory continue continuous. The main goal is to applicate improvement actions continuously to reach excellent system structure.

Keywords— *Theory of Constraints, Drum-Buffer-Rope Methodology, Process Improvement, Process System Performance, Bottlenecks*

1. INTRODUCTION

The theory of constraints (toc) is a remarkably successful operations philosophy, centered on the idea of focusing managerial attention to the local constraints that inhibit the global performance of an entire system (linhares, a., 2009; goldratt and cox, 1984; goldratt and fox, 1986; goldratt, 1990a, b) toc can be defined as a management approach which focuses on improving bottleneck processes to improve continuously the performance of manufacturing operations. toc had its beginning in israel in the 1970s. eliyahu goldratt applied a technique for predicting the behavior of a heated crystalline atom to optimize the large number of variables in a work schedule (watson, et. al. 2007).r. eliyahu goldratt examined the manufacturing firms in 1970s and asserted that they were doing many mistakes while applying processes and philosophy of toc base on this assertion. dr. eliyahu goldratt invented software that is called as "optimized manufacturing technology" (opt) and he expelled this software to market under license. because of the fact that the software was under license, the main topics of theory had not been understood clearly and although the software had good level of success in practical applications, it could not receive the attention of scientists. he published his book named as 'the goal' in 1987, he suggested and explained toc in this book, after this phase the theory was understood and applied in different areas by applicants.there are many reports of successful toc implementations mainly from manufacturing organizations, especially in the aerospace, apparel, automotive, electronics, furniture, semiconductor, steel and heavy engineering sectors (mabin and balderstone, 2003). toc has also been implemented in diverse non-manufacturing industries, including financial institutions, enterprise software (ioannou and papadoyiannis, 2004), health services (ronen et al. 2006), the public sector (shoemaker and reid, 2005) and in education (goldratt and weiss, 2005).

Toc techniques have been applied at a number of fortune 500 companies; 3m, amazon, boeing, delta airlines, ford motor company, general electric, general motors, and lucent technologies have publicly disclosed significant improvements achieved through deployment of toc solutions. additionally, a number of adopting companies state an opposition to disclose improvements for competitive reasons. application of toc is not limited to for-profit companies; not-for-profit organizations and government agencies such as habitat for humanity, pretoria academic hospital, british national health service, united nations, nasa, united states department of defense (air force, marine corps, and navy), and the israeli air force all have successfully employed toc solutions (watson, et. al. 2007).

2. THEORY OF CONSTRAINT

The Theory of Constraints is a methodology for recognizing the most important limiting factor (i.e. constraint) that stands in the way of achieving a goal and then systematically improving that constraint until it is no longer the limiting factor. In manufacturing, the constraint is often referred to as a bottleneck. The Theory of Constraints takes a scientific approach to improvement. It hypothesizes that every complex system, including manufacturing processes, consists of multiple linked activities, one of which acts as a constraint upon the entire system (i.e. the constraint activity is the "weakest link in the chain"). So what is the ultimate goal of most manufacturing companies? To make a profit – both in the short term and in the long term. The Theory of Constraints provides a powerful set of tools for helping to achieve that goal, including:

a. The Five Focusing Steps (a methodology for identifying and eliminating constraints)
b. The Thinking Processes (tools for analysing and resolving problems)
c. Throughput accounting (a method for measuring performance and guiding management decisions)

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A. Concept of TOC

The core concept of the Theory of Constraints is that every process has a single constraint and that total process throughput can only be improved when the constraint is improved. A very important corollary to this is that spending time enhancing non-constraints will not provide significant benefits; only improvements to the constraint will further the goal (achieving more profit). Thus, TOC seeks to provide precise and sustained focus on improving the current constraint until it no longer limits throughput, at which point the focus moves to the next constraint. The underlying power of TOC flows from its ability to produce a tremendously strong focus towards a single goal (profit) and to removing the principal impediment (the constraint) to achieving more of that goal. In fact, Goldratt considers focus to be the essence of TOC.

B. Five focusing steps[2]

The Theory of Constraints provides a specific methodology for identifying and eliminating constraints, referred to as the Five Focusing Steps. As shown in the following diagram, it is a cyclical process.

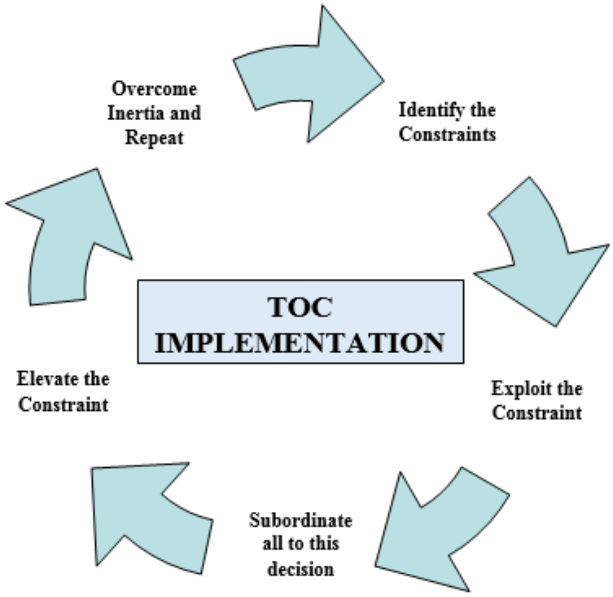

Fig. 1 Five focusing steps

i. **Identify the Constraint**: Identify the current constraint (the single part of the process that limits the rate at which the goal is achieved).
ii. **Exploit the Constraint:** Make quick improvements to the throughput of the constraint using existing resources (i.e. make the most of what you have).
iii. **Subordinate all to this decision**: Review all other activities in the process to ensure that they are aligned with and truly support the needs of the constraint.
iv. **Elevate the Constraint:** If the constraint still exists (i.e. it has not moved), consider what further actions can be taken to eliminate it from being the constraint. Normally, actions are continued at this step until the constraint has been "broken" (until it has moved somewhere else). In some cases, capital investment may be required.
v. **Overcome Inertia & Repeat:** The Five Focusing Steps are a continuous improvement cycle. Therefore, once a constraint is resolved the next constraint should immediately be addressed. This step is a reminder to never become complacent – aggressively improve the current constraint…and then immediately move on to the next constraint.

C. The thinking process

The Theory of Constraints includes a sophisticated problem solving methodology called the Thinking Processes. The Thinking Processes are optimized for complex systems with many interdependencies (e.g. manufacturing lines). They are designed as scientific "cause and effect" tools, which strive to first identify the root causes of undesirable effects (referred to as UDEs), and then remove the UDEs without creating new ones.

The Thinking Processes are used to answer the following three questions, which are essential to TOC:

- What needs to be changed?
- What should it be changed to?
- What actions will cause the change?

D. Throughput Accounting

Throughput Accounting is an alternative accounting methodology that attempts to eliminate harmful distortions introduced from traditional accounting practices – distortions that promote behaviors contrary to the goal of increasing

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profit in the long term. In traditional accounting, inventory is an asset (in theory, it can be converted to cash by selling it). This often drives undesirable behavior at companies – manufacturing items that are not truly needed. Accumulating inventory inflates assets and generates a "paper profit" based on inventory that may or may not ever be sold (e.g. due to obsolescence) and that incurs cost as it sits in storage. The Theory of Constraints, on the other hand, considers inventory to be a liability – inventory ties up cash that could be used more productively elsewhere. In traditional accounting, there is also a very strong emphasis on cutting expenses. The Theory of Constraints, on the other hand, considers cutting expenses to be of much less importance than increasing throughput. Cutting expenses is limited by reaching zero expenses, whereas increasing throughput has no such limitations. These and other conflicts result in the Theory of Constraints emphasizing Throughput Accounting, which uses as its core measures: Throughput, Investment, and Operating Expense [3].

TABLE 1-1
CORE MEASURES OF THROUGHPUT ACCOUNTING

Core Measures	**Definition**
Throughput	The rate at which customer sales are generated less truly variable costs (typically raw materials, sales commissions, and freight). Labor is not considered a truly variable cost unless pay is 100% tied to pieces produced.
Investment	Money that is tied up in physical things: product inventory, machinery and equipment, real estate, etc. Formerly referred to in TOC as Inventory.
Operating Expense	Money spent to create throughput, other than truly variable costs (e.g. payroll, utilities, taxes, etc.). The cost of maintaining a given level of capacity.

In general, management decisions are guided by their effect on achieving the following improvements (in order of priority):

- Will Throughput be increased?
- Will Investment be reduced?
- Will Operating Expenses be reduced?

The strongest emphasis (by far) is on increasing Throughput. In essence, TOC is saying to focus less on cutting expenses (Investment and Operating Expenses) and focus more on building sales (Throughput).

I. THE NATURE OF CONSTRAINTS

Constraints are anything that prevents the organization from making progress towards its goal. In manufacturing processes, constraints are often referred to as bottlenecks. Interestingly, constraints can take many forms other than equipment. There are differing opinions on how to best categorize constraints; a common approach is shown in the following table:

TABLE I
TYPES OF CONSTRAINTS

Constraint	**Description**
Physical	Typically equipment, but can also be other tangible items, such as material shortages, lack of people, or lack of space.
Policy	Required or recommended ways of working. May be informal (e.g. described to new employees as "how things are done here"). Examples include company procedures (e.g. how lot sizes are calculated, bonus plans, overtime policy), union contracts (e.g. a contract that prohibits cross training), or government regulations (e.g. mandated breaks).
Paradigm	Deeply engrained beliefs or habits. For example, the belief that "we must always keep our equipment running to lower the manufacturing cost per piece". A close relative of the policy constraint.
Market	Occurs when production capacity exceeds sales (the external marketplace is constraining throughput). If there is an effective ongoing application of the Theory of Constraints, eventually the constraint is likely to move to the marketplace.

There are also differing opinions on whether a system can have more than one constraint. The conventional wisdom is that most systems have one constraint, and occasionally a system may have two or three constraints. In manufacturing plants where a mix of products is produced, it is possible for each product to take a unique

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manufacturing path and the constraint may "move" depending on the path taken. This environment can be modeled as multiple systems – one for each unique manufacturing path.

3. IMPLEMENTING TOC

An excellent way to deepen understanding of the theory of constraints is to walk through a simple implementation example. in this example, the five focusing steps are used to identify and eliminate an equipment constraint (i.e. bottleneck) in the manufacturing process.

A. identify the constraint

In this step, the manufacturing process is reviewed to identify the constraint. a simple but often effective technique is to literally walk through the manufacturing process looking for indications of the constraint. look for large accumulations of work-in-process on the plant floor. inventory often accumulates immediately before the constraint. look for areas where process expeditors are frequently involved. special attention and handholding are often needed at the constraint to ensure that critical orders are completed on time. review equipment performance data to determine which equipment has the longest average cycle time. adjust out time where the equipment is not operating due to external factors, such as being starved by an upstream process or blocked by a downstream process. although such time affects throughput, the time loss is usually not caused or controlled by the starved/blocked equipment. ask operators where they think equipment is not keeping up with demand. pay close attention to these areas, but also look for other supporting indicators. the deliverable for this step is the identification of the single piece of equipment that is constraining process throughput.

B. Exploit the Constraint

In this step, the objective is to make the most of what you have – maximize throughput of the constraint using currently available resources. The line between exploiting the constraint (this step) and elevating the constraint (the fourth step) is not always clear. This step focuses on quick wins and rapid relief; leaving more complex and substantive changes for later. Create a suitably sized inventory buffer immediately in front of the constraint to ensure that it can keep operating even if an upstream process stops. Check quality immediately before the constraint so only known good parts are processed by the constraint. Ensure that the constraint is continuously scheduled for operation (e.g. operate the constraint during breaks, approve overtime, schedule fewer changeovers, cross-train employees to ensure there are always skilled employees available for operating the constraint). Move routine maintenance activities outside of constraint production time (e.g. during changeovers). Offload some constraint work to other machines. Even if they are less efficient, the improved system throughput is likely to improve overall profitability. Offload some work to other companies. This should be a last resort if other techniques are not sufficient to relieve the constraint. The deliverable for this step is improved utilization of the constraint, which in turn will result in improved throughput for the process. If the actions taken in this step "break" the constraint (i.e. the constraint moves) jump ahead to Step E. Otherwise, continue to Step C.

C. Subordinate and Synchronize to the Constraint

In this step, the focus is on non-constraint equipment. The primary objective is to support the needs of the constraint (i.e. subordinate to the constraint). Efficiency of non-constraint equipment is a secondary concern as long as constraint operation is not adversely impacted. By definition, all non-constraint equipment has some degree of excess capacity. This excess capacity is a virtue, as it enables smoother operation of the constraint. The manufacturing process is purposely unbalanced: Upstream equipment has excess capacity that ensures that the constraint buffer is continuously filled (but not overfilled) so that the constraint is never "starved" by the upstream process. Downstream equipment has excess capacity that ensures that the downstream process continually processes material from the constraint so the constraint is never "blocked". Some useful techniques for this step include:

- Implement DBR (Drum-Buffer-Rope) on the constraint as a way of synchronizing the manufacturing process to the needs of the constraint [1].
- Subordinate maintenance to the constraint by ensuring that the constraint is always the highest priority for maintenance calls.
- Add sprint capacity to non-constraint equipment to ensure that interruptions to their operation (e.g. breakdowns or material changes) can quickly be offset by faster operation and additional output.
- Operate non-constraint equipment at a steady pace to minimize stops. Frequent inertial changes (i.e. stops and speed changes) can increase wear and result in breakdowns.

The deliverable for this step is fewer instances of constraint operation being stopped by upstream or downstream equipment, which in turn results in improved throughput for the process. If the actions taken in this step "break" the constraint (i.e. the constraint moves) jump ahead to Step E. Otherwise, continue to Step D.

D. Elevate Performance of the Constraint

In this step, more substantive changes are implemented to "break" the constraint. These changes may necessitate a significant investment of time and/or money (e.g. adding equipment or hiring more staff). The key is to ensure that all such investments are evaluated for effectiveness (preferably using Throughput Accounting metrics). Use performance

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data (e.g. Overall Equipment Effectiveness metrics plus down time analytics) to identify the largest sources of lost productive time at the constraint. Target the largest sources of lost productive time, one-by-one, with cross-functional teams. Implement ongoing plant floor reviews within shifts (a technique called Short Interval Control) to identify tactical actions that will improve constraint performance. Implement a setup reduction program to reduce the amount of productive time lost to changeovers. Evaluate the constraint for potential design updates and/or component upgrades. Purchase additional equipment to supplement the constraint (a last resort). The deliverable for this step is a significant enough performance improvement to break the constraint (i.e. move the constraint elsewhere).

E. Repeat the Process

In this step, the objective is to ensure that the Five Focusing Steps are not implemented as a one-off improvement project. Instead, they should be implemented as a continuous improvement process. If the constraint has been broken (the normal case), recognize that there is a new constraint. Finding and eliminating the new constraint is the new priority (restart at Step A). If the constraint has not been broken, recognize that more work is required, and a fresh look needs to be taken, including verifying that the constraint has been correctly identified (restart at Step A).

4. CONCLUSION

The implication of the study is that using Theory of Constraints technique, factory throughput can be increased using small investments and changes in the way things are done instead of resorting to heavy investments in machinery in small scale industries as well as in complex manufacturing environment. By applying some changes even in scheduling of activities may result in reduction in average WIP inventory and better control over operation of constraint resources. Also, TOC when compared with other methods of production management emphasis more on increasing throughput rather than cutting expenses. Cutting expenses is limited by reaching zero expenses, whereas increasing throughput has no such limitation. Hence the scope of improvement by TOC is always greater than any other production management system.

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Optimization of Plate Bending machine through Finite Element Approach

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ABSTRACT

In Plate bending machine, the generation of force, its transmission and amplification are achieved using fluid. The liquid system exhibits the characteristics of solid and provides a positive and rigid medium of power transmission and amplification. In a easy application, a smaller piston transfers fluid under high pressure to a cylinder having a comparatively larger piston area, thereby amplifying the force. Thus resulting in easy transmissibility of large amount of energy with unlimited force amplification. It also has a very low inertia effect. The aim of the project is to modify the major component of one cylinder four post hydraulic press so that rigidity and strength is increased by using minimum material. The function of the major components like frame, bottom plate, bed, top box is to absorb forces to provide precise slide guidance and to support the drive system and other auxiliary unit. The structural design of any component depends on the pressing force this determines the rigidity. The machine currently under use does not have high rigidity and needs to be redesigned.

Keywords— Plate bending machine, FEA, Machine design

1. INTRODUCTION

Fabrication of sheet metal plays an important role in the metal manufacturing world (Cloutier, 2000). Sheet metal is used for production of varied materials ranging from tools, to hinges, automobiles etc. Few application of Sheet metal fabrication is deep drawing, stamping, forming, and hydro forming, to high-energy-rate forming (HERF) to create designs (Cloutier, 2000). Unique, intricating and elegant shapes may be folded from a single plane sheet of material thereby not causing stretching, tearing or cutting, if one incorporates curved folds into the desired shapes (Martin et al., 2008). Rolling of sheet metal also known as shape rolling is the bending continually along a linear axis.

When usually dealing with such types of presses, press-body is of C Shaped. When free space required from three directions of press table for loading and unloading of pressed component then this type of presses are designed. As main cylinder placed eccentrically to central axis of press-body, it applies eccentric load on press-body hence heavier press body is required in comparison to same capacity of other type of press. These types of presses are also called as single press.

2. OBJECTIVE

The aim of the project is to modify the major component of one cylinder four post hydraulic press so that rigidity and strength is increased by using minimum material. The function of the major components like frame, bottom plate, bed, top box is to absorb forces to provide precise slide guidance and to support the drive system and other auxiliary unit. The structural design of any component depends on the pressing force this determines the rigidity. The machine currently under use does not have high rigidity and needs to be redesigned.

3. METHODOLOGY

1) Data collection from site.
2) CAD modelling of existing system.
3) Finite Element Modelling.
4) Analysis of the press machine in FEA.
5) Optimization of design.
6) Results discussion.
7) Conclusion.

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4. CAD MODEL

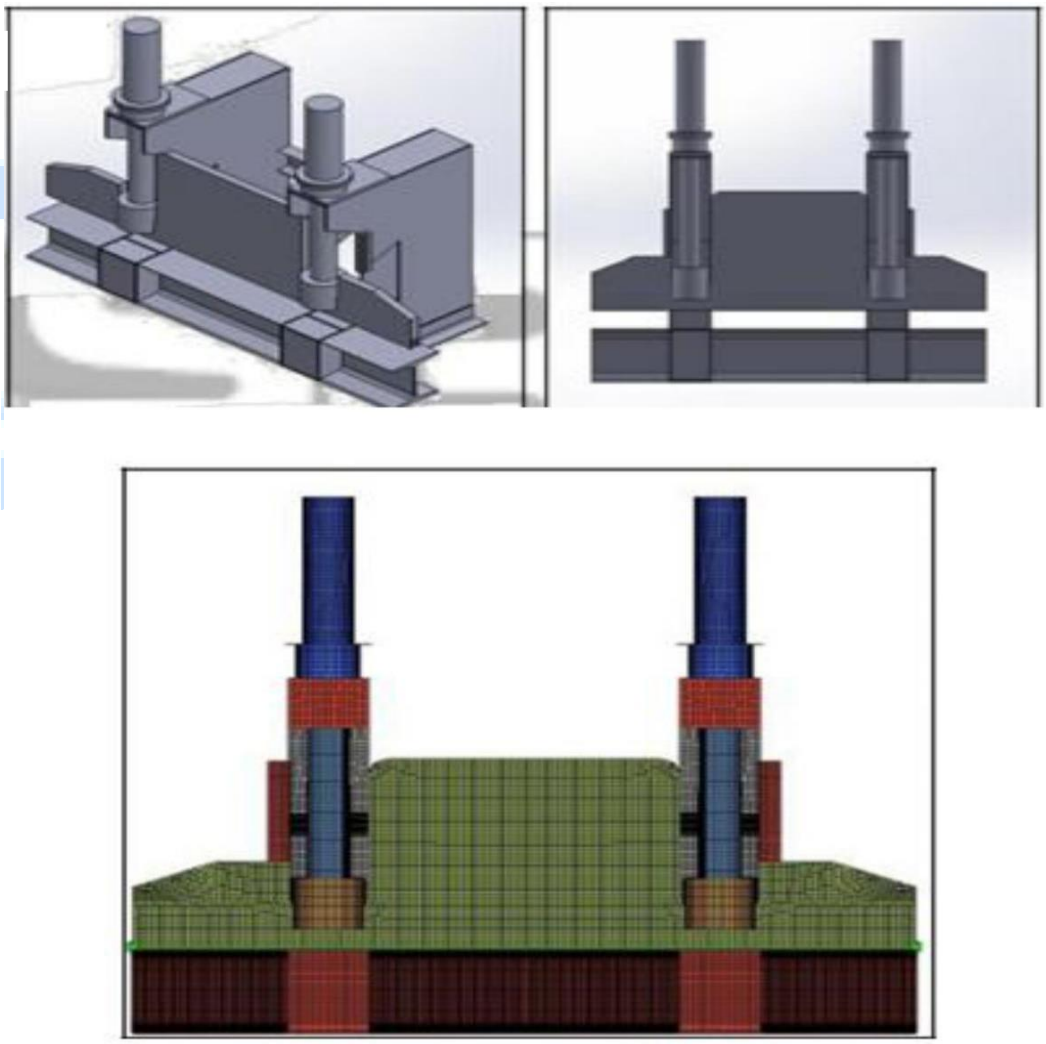

Fig. 1 Plate bending machine Model

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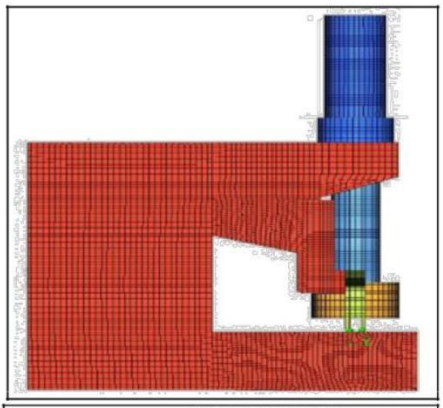

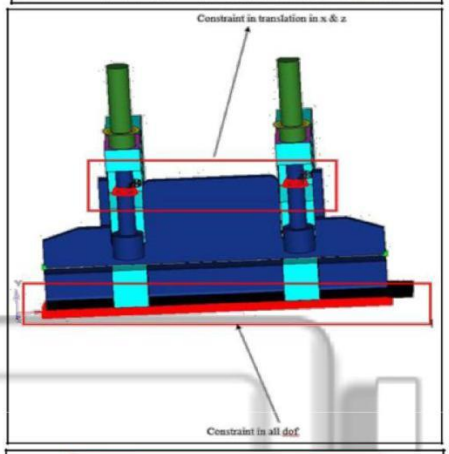

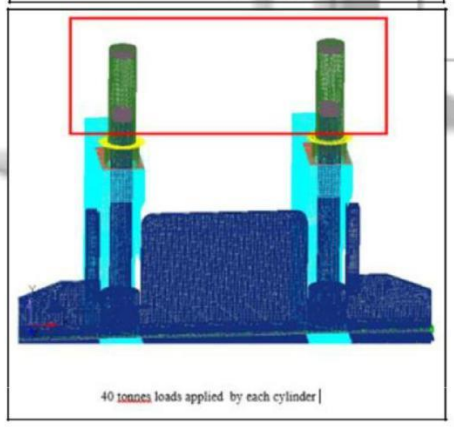

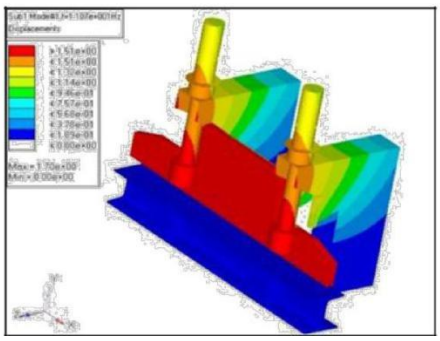

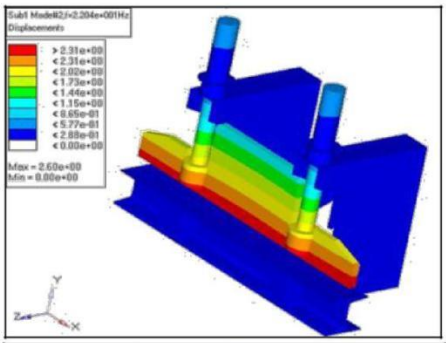

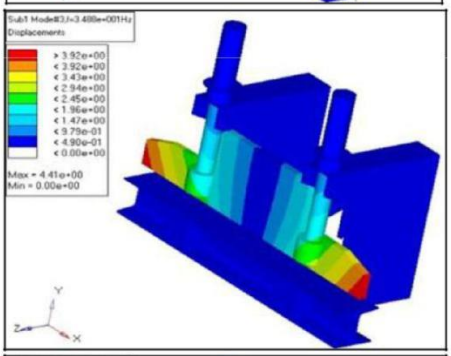

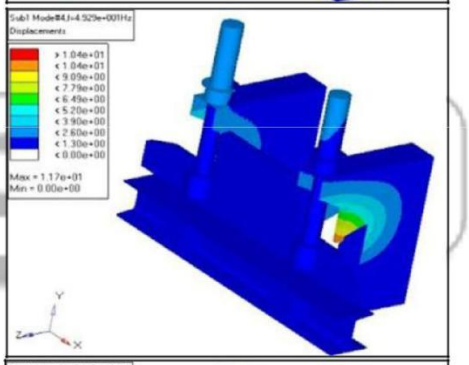

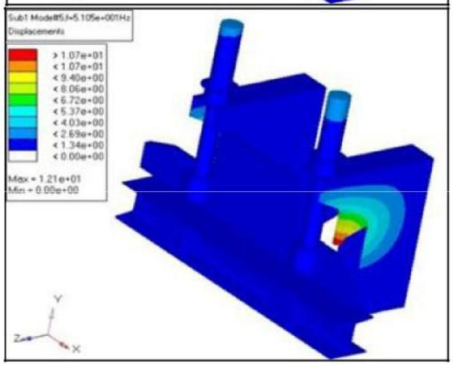

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5. CONCLUSION

In modal analysis we obtained natural frequencies and mode shapes.Displacement,stresses and strains obtained by performing static analysis of existing model. For existing model stresses were outside the safe limit. Thus it is important to redesign the structure of the bending machine to reduce the induced stress within the elastic limit. This will be covered in the next publication

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TUBE HYDROFORMING AN EMERGING FORMING TECHNOLOGY IN AUTOMOTIVE INDUSTRIES

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ABSTRACT

Hydroforming forms the basis of metal forming industries. The complex geometry of the parts is obtained by hydroforming easily which is otherwise a difficult task with lots of processes stepwise. Tube hydroforming thus replaces the ancient forming methods with the efficient results obtained due to its use. Hydroforming can be classified under various categories depending on the way the pressure is used for forming the blank i.e. High pressure Hydroforming, Low pressure Hydroforming, depending on the types of products required i.e. Sheet hydroforming, Tube hydroforming. There are some pre-processes that are to be performed on the raw materials before feeding them to Hydroforming processes. These pre-processes include Slitting of the mother coil, rolling it, Welding the roll and finally bending the fresh tube for performing hydroforming.

Keywords— *Hydroforming, Hierarchical Evolutionary Engineering Design System, Genetic Algorithm*

1. INTRODUCTION

Metal Forming contrives directly with the automotive industries which has the fastest growth of new technologies. Tube hydroforming forms the foundation to the pillars of automotive industries. Many of the chassis parts, engine cradles, side members of the cars are produced through Hydroforming. Sheet metal hydroforming and Tube hydroforming have their advantages depending on the application for which they are used. The area of interest of this paper is Tube hydroforming. Tube hydroforming is used where complex geometry is required with least use of different machining processes so as to obtain accurate and perfect results. The process is cost effective although the capital cost of such plant having more than 2-3 Hydroforming plant is high. Thus depending on the use of the process, the more frequently it is used, more cost effective it will be. The products obtained are light in weight.

Tube hydroforming gives complete idea about how a metal or an alloy can be formed using fluid. The study gives explanation to how the process is better than any other process for a complex part generation. Tube hydroforming makes the analysis work of different products and process far easier than any other conventional method could have. In the following study, a tube is hydroformed using water pressure, the compressive axial force, die load. The fluid pressure applied is in the range that allows the material to reach the corners of the die and cavity without causing buckling, wrinkling or bursting.

Tube hydroforming is done using a tube of specific cross-sectional diameter which is further formed into a different cross sectional shape using the fluid pressure that flows through the tube, the force acting compressive on both the ends of the tube, force from the upper die.

The aim of the study the effect of loading path of hydroforming on the thickness of the tube.

2. PROBLEM STATEMENT

A square shaped die and a circular tube blank are considered in the present work. Displacement and internal pressure curves sought during the optimization are such that the circular tube can expand into a square shaped die to a maximum extent without bursting, buckling, or wrinkling. Considering a point ‘P’ on the tube as shown in Fig. 1, as the tube expands in the die, the distance ‘U’ travelled by the point increases.

The optimal rates and values of axial feed and internal pressure are determined so as to maximize the distance ‘U’ while avoiding severe thinning and satisfying the forming limit diagram (FLD). The FLD provides information about how much a particular structure can be deformed before necking occurs. Principal strains for each element of the hydroformed tube must lie under the major strain versus minor strain curve of the forming limit diagram to avoid bursting. The characteristics of the design space associated with the current optimization problem are not known a priori. In this case, it is advisable to employ a combination of global and local search techniques in order to achieve a broad and effective search for an optimal solution. For such problems, HEEDS utilizes a combination of evolutionary, gradient based, and design of experiments search heuristics [7]. Since primarily evolutionary search was used in the present study, a brief description of this search technique is presented in the next section.

Evolutionary Search

HEEDS (Hierarchical Evolutionary Engineering Design System) is an optimization software package

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that allows designers to automatically and concurrently explore hundreds of design parameters and their relationships in product and process design scenarios, and intelligently seeks optimal values for parameters that affect performance and cost. HEEDS can be used to improve any engineering system (structural, thermal, fluid, electrical, etc.), including multidisciplinary problems. It can be applied to parts and processes for any manufacturing process, including stamping, casting, hydroforming, and more. By automating the iterative manual process normally used to search for designs that simultaneously meet all of the design specifications, engineers can greatly decrease the time required to identify a set of feasible, or even near-optimal, designs prior to building and testing the first prototype. The HEEDS advanced design search algorithms and strategies effectively and efficiently search over a large number of possible design scenarios while performing a relatively small number of design evaluations. HEEDS software operates in a highly parallel computing environment, taking full advantage of powerful and inexpensive computers and networks to modify virtual structure models while simultaneously searching for optimal values of design parameters. By intelligently coupling global and local search techniques, the HEEDS optimization algorithms are able to find excellent solutions to even the most challenging design problems. Local optimization methods (e.g., nonlinear sequential programming, response surface methods, etc.) are valuable for fine-tuning a design, but not for exploring different design concepts in an effort to identify a much better design. Because the mathematical cost or objective functions associated with many practical design problems are multi-modal (i.e., they have many peaks and valleys) or even discontinuous, the use of global search methods (e.g., parallel genetic algorithms) improves the likelihood of achieving significant design innovation. While global methods search broadly over a large design space, local optimization methods simultaneously focus on promising sub-regions of the design space to identify the best designs in that region. HEEDS applies several optimization methods simultaneously, allowing each method to take advantage of the best attributes and solutions found from other parallel searches. The multiple semi-independent search processes exchange information about the solution space with each other, helping them jointly to satisfy multiple constraints and objectives. This search method is called a heterogeneous multiagent approach. This approach quickly identifies design attributes with good potential and uses them to focus, improve and accelerate the search for an optimum solution.

3. METHODOLOGY

Genetic Algorithm Mutation

HEEDS employs a Genetic Algorithm (GA) to perform evolutionary search. GAs are particularly useful when the design space is large and complex. The main problem with using a simple GA is the potentially large number of design evaluations required to obtain a set of satisfactory solutions. HEEDS reduces the number of evaluations required to obtain a set of satisfactory solutions by hierarchically decomposing a problem with multiple agents that represent the problem in various ways, while combining efficient local search methods (e.g., response surface methods, nonlinear sequential quadratic programming, and simulated annealing).

Mutation is a reproduction operation that produces a new solution from a single existing solution, through any of several ways. Mutation can change the value of one design variable or of many simultaneously, and can change them in uniform random ways, or by a normal distribution, for example around the current values of the design variables. Mutation helps maintain diversity and reduces the possibility of premature convergence (the tendency of a set of solutions to come to closely resemble each other, thereby making it difficult for crossover to generate solutions that differ very much from the current set). A set of co-existing designs defines a population, while successive populations are termed generations. That is, each period during which a set of existing solutions are evaluated then used with natural selection, crossover, and mutation to generate a new set of solutions, is called a generation. A large population typically contains more genetic diversity (i.e., different values of design variables) that typically improves the ultimate results of the GA search. However, the newer individuals created in each generation, the more computer time must be spent evaluating the constraints and objectives of the new individuals, so there is a trade-off that must be made.

A GA is a search procedure that is based on the mechanics of natural selection. Specific knowledge is embedded in a chromosome (or design vector), which represents a possible design with a set of values of all the design variables. The number of choices per design variable determines the fidelity (or resolution) of each design variable. These design variables are the building blocks used to construct a particular design. The GA creates and destroys designs during a process that involves decoding each chromosome, evaluating its satisfaction of constraints and its performance relative to the objectives, then allowing a simulated "natural selection" to determine which designs are eliminated and which survive to generate other derivative designs. Designs that perform well (relative to constraints and objectives) have a higher probability of surviving to influence future designs (their "offspring"). During reproduction, the two genetic operators commonly modelled that produce new chromosomes (or design vectors) are called crossover and mutation.

Within each agent, a GA search begins by creating a single initial population, wherein chromosomes (vectors of design variable values) are randomly created. At this point the performance (constraint satisfaction and objective values of each design is evaluated. Biased by the evaluations obtained, the GA uses unary (mutation) and binary (crossover) operators on these designs to create another population. This population probabilistically maintains the previously high performing designs while discarding poorly performing designs. New population members are evaluated, and then additional rounds of generation and selection are performed. This is repeated until satisfactory solution(s) are obtained. Incorporating these processes in a computer routine produces an algorithm that solves problems in a manner reminiscent of natural evolution. Independent GA searches in several agents can share information with each other through a user-defined migration process.

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Crossover

The crossover operation (sometimes also called "recombination") forms a new solution by combining parts of two existing solutions. A high crossover rate (fraction of population replaced by crossover during one generation of reproduction) will produce many new designs in each generation, but will also have a high probability of disrupting (and potentially losing, at least temporarily) higher-performance designs already found, and requires more evaluations of constraints and objectives in each generation, which are typically the costliest computing operation in the entire problem.

Definition of Performance

The "goodness" of each design is represented with a single scalar value called the performance measure or the objective function. The performance measure is a composite of a number of subsidiary measures, a set of objectives (each of which may be targeted for maximization or minimization) and a set of constraints, for which violations are to be minimized. The constraints enter into the performance according to the penalty method, which gives them no influence so long as they are satisfied, but gives them increasing importance to whatever extent when they fail to be satisfied. Within any single agent, to evaluate the performance measure (or fitness) of a design, the objective and constraint functions are normalized, weighted, and aggregated as follows:

$$P = \sum_{i=1}^{Nobjs} \left(R1_i \frac{f_{oi}}{|n_i|} + R2_i \left(\frac{f_{oi}}{|n_i|} \right)^2 \right) - \sum_{i=1}^{Ncons} C \left(P1_i \frac{|f_{ci} - t_i|}{|t_i|} + P2_i \left(\frac{f_{ci} - t_i}{|t_i|} \right)^2 \right)$$

Where P is the performance measure, Nobjs is the number of objectives, and Ncons is the number of constraints. R1i is a constant used to linearly reward a design's performance due to extremizing of the ith objective function. R2i is a constant used to quadratically reward a design's performance due to extremizing of the ith objective function. The i th objective function (f0i) is normalized by the absolute value of ni. P1i is a constant used to linearly penalize a design's performance for violating the ith constraint function. P2i is a constant used to quadratically penalize a design's performance due to the violation of the current constraint function. The ith constraint function ($f$ci) is normalized by the absolute value of its target ti. If the constraint is satisfied C is set to zero; if the constraint is violated C is set to unity.

4. CONCLUSION

Hydroforming is an emerging technology that meshes well with the automotive industry's drive to achieve part reduction and more efficient use of material. By using finite element analysis methods in conjunction with automated design optimization procedures, it has been demonstrated here that optimal hydroforming process parameters can be determined very efficiently. In the present study, a 55% increase in expansion of a circular blank in a square die was achieved compared to manual optimization.

5. ACKNOWLEDGMENT

The authors gratefully acknowledge the co-coordinative support and complete guidance throughout the project, for providing various reports to KLT Automotive and Tubular products ltd.

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SECTION E

ATMOSPHERIC WATER GENERATION

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ABSTRACT

This project describes how drinkable water can be generated from the atmosphere. In this project we are going to use solar energy as a renewable energy source. As we know in highly humid areas such as a place closed to sea contains more humid air, this air can be converted into water droplets. This project mainly works on the principle of condensation, in which the condensation plate extracts the water vapour from humid ambient air. The condensation plate is made up of peltier modules which brings the heat from one side to other and can convert the water vapour to liquid water. The thermo electric effect is done by peltier module which is direct conversion of temperature difference to electrical voltage. A scale of model has been made in the project which converts water droplets out of humid air.

Keywords: - *Solar Energy, Humidity, Condensation, Peltier Module, Dew Point Temperature.*

1. Introduction

97% of water on earth is saline and the remaining 3% of water is drinkable or which can be used for daily work. In the remaining 3% out of which 1.75-2% of rest water is in form of snow or ice in glacier. Increasing population causes the shortage of drinking or fresh water and this is a major problem. Water vapor or moisture is in large amount in atmosphere. Within this 35% of water is wasted. This 35% of water can be used if we able to convert it in form of water. The project is used to extract water from the atmosphere with the help of peltier effect. In most of the countries in India, the many states are experience lack of water supply they even not get the pure and fresh water to drink. This project is very useful in flooded areas, or the areas where the climate is very humid. The module will convert humid ambient air into water droplets by using principle of condensation. Hence this project is very needful and increase the use of such devices in future. The objectives of this project are to avoid scarcity of water. Also to generate water droplets from the atmospheric humid air. This project can save electricity by using solar energy.

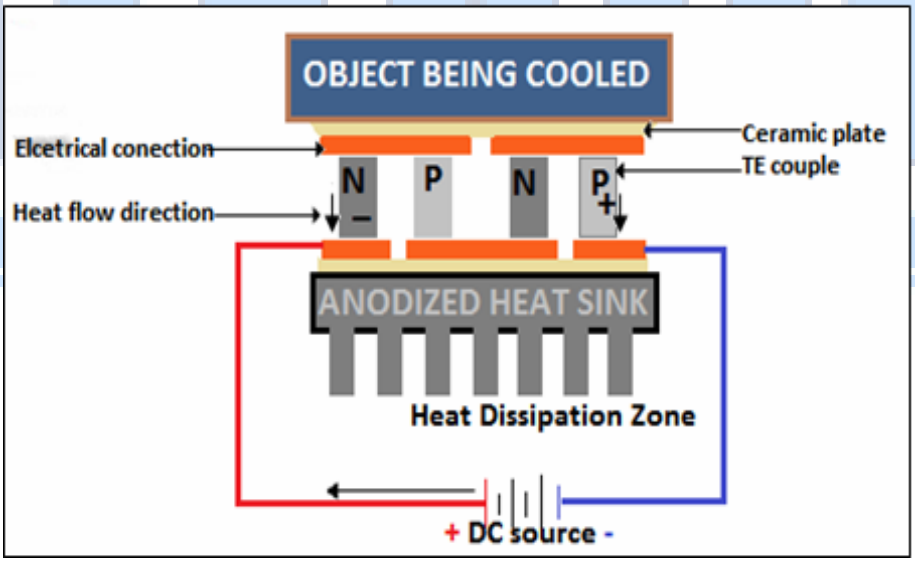

Fig.1: Principle of Peltier module

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2. Working

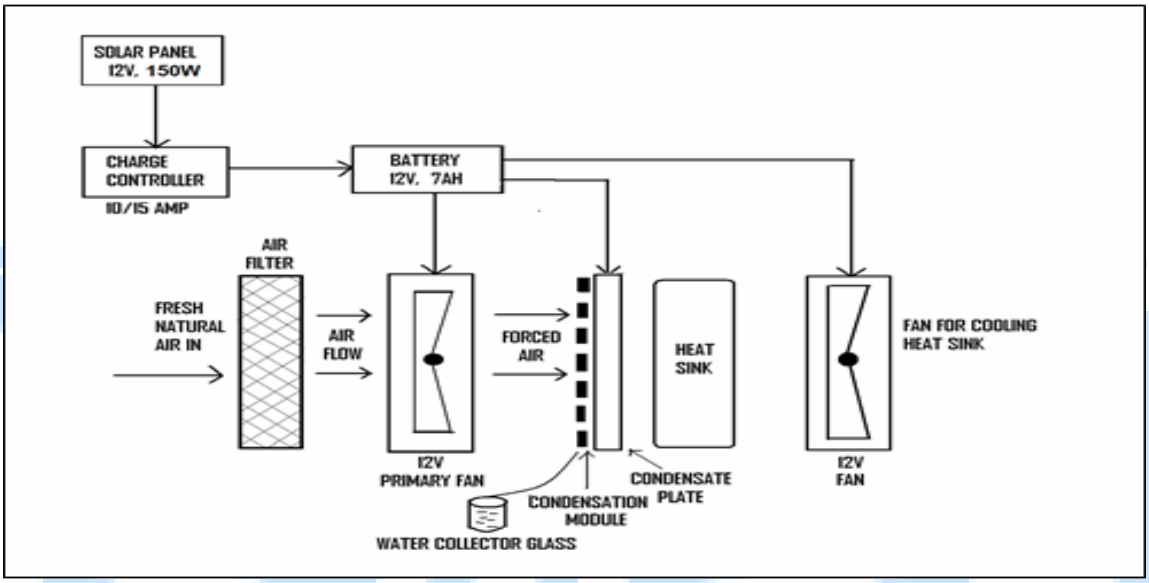

Fig.2: Block diagram of atmospheric water generation

i. In this project first we use solar energy as an input for this we use solar panel which is connected to solar charge controller which supply power to main module and battery.

ii. In the time of event the atmospheric air drawn into condensation plate which is set of Peltier modules with 12V primary fan and to avoid the dust particles air filter used so that only natural fresh is used.

iii. The Peltier modules are used to converts humid air into water droplets. The Peltier is basically thermoelectric device which has two sides i.e. p-type and n-type. The one side of Peltier module gets cooled and other side gets hot when we give the 12V supply to the module.

iv. As the one side of Peltier module gets too hot after some time hence it should be cooled, for this we have used heat sink and 12V fan also.

v. The equipment's required for this project are Solar panel (12 v, 150 watt), Solar charge controller (10 or 15 amp), SMF battery (12 v, 25ah), Cooling fan (12v,0.22a=2.64w) (80×80mm), Condensation modules (12v,5a=50w) (40×40×4.2mm) (3pcs)

3. Peltier Module Effect

The Peltier modules are used to converts humid air into water droplets. The Peltier is basically thermoelectric device which has two sides i.e. p-type and n-type. The one side of Peltier module gets immediately cooled and other side at the same time gets hot when we give the 12V supply to the module. The Thomson effect, see back effect also the Peltier effect are combine to form the thermoelectric effect. But the problem is that one side of the Peltier module which getting hot the temperature of that sides increases rapidly after some time hence it should be cooled, for this we have used heat sink and 12V fan also. Peltier cooler bounded by Peltier element and power heatsink or fan or combinations.

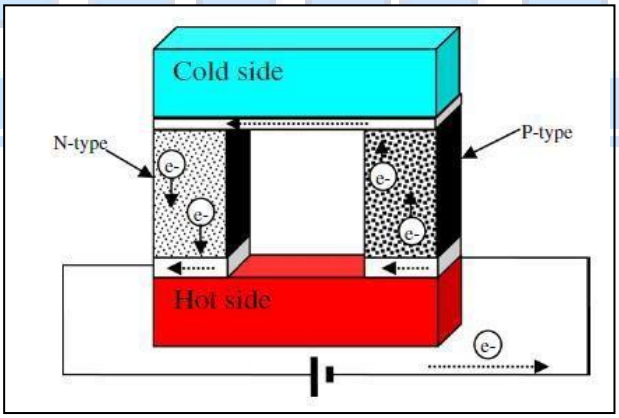

Fig.3: Peltier module layout

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4. Observations

The Table.1 given below shows the observation from our research work.

Table.1: Temperature and Humidity Readings

MONTH (2017)	RH	T	B	D
	Relative Humidity	Temperature	Intermediate value	Dew Point Temp.
MARCH 1-15	44	31	0.068004344	17.31492076
MARCH 16-31	70	34	0.104669658	27.74183866
APRIL 1-15	72	32	0.099804928	26.30953004
APRIL 16-30	63	33	0.095332925	25.00644015

5. Conclusion

The project is useful for in isolated and desert region to condensate water from atmospheric surface. If this project is done in highly humid areas then we will get sufficient amount of condensate water per hour during sunlight. The economic advantage of this kind of system is still obscure due to the relatively high installation cost. We can get high condensation rate on an inclined plate at optimized 5.2 m/s wind speed. The aim of the system is to get more volume of condensed water with minimum consuming energy.

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PREVENTIVE MAINTENANCE OF POWER TRANSFORMER

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ABSTRACT

Transformer is an extremely important part of power system. Power transformer failure effects the entire operation of the power system unit. It is necessary to prioritize transformer maintenance to ensure effective functioning of the power system. Preventive maintenance is one of the best ways of protecting the power transformer. This method is any ways cost effective and time saving. This paper explains entire method of preventive maintenance of power transformer with real life cases. Therefore the paper will build a deep understanding of this maintenance procedure.

Keywords: - *Power transformer, Transformer failure, Preventive Maintenance, System overhaul, Transformer protection.*

1. Introduction

Power transformer is one of the most important equipment of Power Station. In order to get maximum efficiency for longer operational life, it is very necessary to plan and perform all the required maintenance. Checking the machine and all the parameters on a routine basis becomes must. Any difference in the operation indicates problem and action has to be taken promptly. Preventive maintenance consists of regular inspection. The main point of concern is ageing, the life expectancy of transformers and the condition of the insulation system, which seriously depends on organic products. The organic items in a power transformer degrade over time and finally they lose the capability to withstand the stresses. Ageing of paper insulation is an irreversible process and is considered one of the life-limiting processes of a transformer.

2. Causes of Initial Damage

Life of a power transformer depends mainly on operating temperature, ambient condition quality of transformer oil and moisture content in the insulation. The design of the transformer cooling system should be such that it is able to provide the transformer a favorable operating condition.

Fig.1: Example of catastrophic insulation failure of power transformer

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Oil quality deterioration has severe implication and results in the damage of transformer. Thus oil sampling, quality analysis, acid level measurement, PCB, Furan detection testing of moisture content etc, becomes very important and needs to be done on routine basis.

Any abnormality in the readings of the measuring devices must not go unobserved and reasons for changed readings must be detected. Proper solution plans has to be drafted and scheduled and actions should be taken.

3. Methods of Preventive Maintenance

In order to expand the life of the transformer, preventive or curative maintenance has to be performed on site to maintain the performance efficiency. In order to do this, high degree of expertise is required. Diagnosis tests are performed engineering research and studies are done to determine the most appropriate solution and ensure a condition based on the power transformer maintenance. Methods of preventive transformer maintenance are as follows.

- Visual inspection
- Checking discoloured bushing top terminal
- External terminal connector or bolts
- Cracks, blisters, peeling, displacement and erosion on the insulator
- Insulator cleaning
- Examination of terminals for loose connection
- Replacement of damaged cooling gaskets
- Oil reclamation
- Low frequency heating (LFH) and hot oil spray or hot oil circulation
- Proper Load and/or On-Load Tap Changer (LTC / OLTC) maintenance
- Maintenance Report

4. Overhauling

4.1 Cooling System overhaul

The requirement of replacement or upgradation of the cooling system can arise from a verity of situations, such as ageing, general wear and tear, shifting of transformer, upgradation to new design and technology. Upgrading the cooling systems enables an increase in loading capacity of the transformer.

Fig.2: Example of cooling system of power transformer

The malfunctioning cooling system can cause significant disturbance to the transformer as well as the remaining life of the transformer will also be hampered. By upgrading the cooling system and its capacity, capital optimization could also be achieved and this will also increase the rated capacity of the power transformer. A well-functioning cooling system requires regular maintenance. Depending on the type of the transformer, the life expectancy of the cooling devices can be much shorter than the transformer active part and tank.

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4.2 Bushing replacements

High operating condition, thermal stress and electrical stress put high pressure on the transformer bushing. Because of the high electrical stress levels in bushings, failures in oil impregnated bushings with porcelain insulators tend to result in sudden and catastrophic failure. These failures are catastrophic and explosive in nature.

Fig.3: Bushing installation of power transformer

The risk of transformer failure can be drastically reduced by regular Condition assessment and replacement of defect bushings. Certain types and applications may have a higher risk which is yet another reason for condition assessment. Knowing the health of your bushings allows you to take planned precautionary actions in time, be in maintenance or replacement. Bushings exposed to salt spray, cement dust, and other abnormal deposits are subject to a special hazard and must be cleaned regularly to prevent flashover and corrosion of parts. Oil-filled bushings may be considered for exchange to dry-type with composite insulators to both reduce the consequences of failures and the need for maintenance. Repair of high-voltage condenser bushings is normally not economically justifiable, however exceptions exist.

4.3 Oil Regeneration

Oil ages in the transformer for the entire operating period. By carrying out oil reclamation, where the oil is passed through an absorbent, the oil can be reinserted in the transformer. The reinserted oil will be in completely new state. Oil is a natural material which ages due to the operating environment and transformer properties. Through oil sampling and analysis, the condition of the oil can be inferred. Aged oil demonstrates higher concentration of oxidation and acids.

Oil reclamation or oil regeneration is a process whereby oil is processed to achieve a significant condition improvement, aimed at being as close to “as new” as possible, by removing the aging products. The processing is performed while a transformer is in service to achieve maximum effectiveness, with minimum impact to site operations. The oil effects the insulation in the transformer and the insulation affects the oil, hence the condition of the oil impacts the expected life of the transformer.

Fig.4: Power transformer oil sampling

The modern reclaiming technology with the reactivation of the absorbent makes it economically feasible to use much more active absorbent material. Typically 5-10 times more absorbent is used compared with the old conventional

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systems. This leads to a much better cleaning effect of the paper and to an excellent long-term stability of the reclaimed oil.

4.4 Tap changer Overhaul

Tap changers are very important components in transformers and the power grid. As they are of mechanical construction, they cause concern due to their maintenance needs and their failure probability. It is therefore important to be able to assure the integrity of tap changers as cost effective and reliably as possible. Moreover, reports from international studies made.

Fig.5: Tap changer Overhaul of Power transformer

Tap changer services increase transformer life, reliability, and lower overall maintenance and operating costs. A wide range of monitoring and diagnostic tools becomes the simple way to monitor the temperature difference between the LTC/OLTC and the transformer main tank up to the most advanced solutions on the market. This allows more refined diagnosis of LTC/OLTC problems to predict maintenance/overhaul needs based on actual condition and not on the number of switching operations.

5. Conclusion

In order to prevent damaging of the most important equipment of the generating station, it is very important plan, schedule daily maintenance of the power transformer. Knowing operational features and function of the individual parts of the transformer becomes very important. Preventive maintenance of the transformer not only keeps the station in good health but also does a lot of saving. It reduces the chances of any accident or any kind of catastrophic failure of the system.

6. ACKNOWLEDGEMENT

My sincere thanks to the experts, scientists and research scholars, who have contributed towards development of this paper.

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CLOSED LOOP CONTROL OF SPEED FOR A BRUSHLESS DC MOTOR

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ABSTRACT

The dynamic performance of BLDC motor to control and measuring the speed. In today's combative world of application of electrical appliances, needs an instant work with least cost margin. To fulfil this requirement, drives and control came into existence. There is need of controlling speed of DC motor in industries in applications of drilling, spinning, elevators, etc. Henceforth this system gives a decisive mechanism to rise or to down the speed. The project consists of three phrases. In first phase where the aimed speed entered using keyboard. The second step where processing enables revolution per minute (RPM) of motor's reference by interfacing infrared sensor mounted on shaft and µc 8051 family in the circuit. The PWM pulse produced by microcontroller providing the regulation in the supply of dc power to motor. The last phase i.e. output uses and opto-isolator as well as MOSFET for driving motor. The Infra-red's strength decides the speed and dispatch it to microcontroller that displays it on LCD screen.

Keywords*: - BLDC motor, Feedback control system, Microcontroller, Control and drives, Electrical engineering*

1. Introduction

The new technological era is looking forward to take benefit of contemporary ideas and combined to form advanced multifunction. Here it is proposing an idea of governing the speed of motor automatically at desired requirement. In our project, prominent work on BLDC motor. Brushless motor is electronically capricious motor. The power is supplied by AC electricity which gives a DC electric current to drive each component of motor by means of using a closed loop controller. The controller gives pulses of current to motor winding which controls the speed of motor. Every motor has its synchronous speed so in this project we are trying to get desired speed of the motor. The controlling of motor is based on principle of PWM technique. This all operation is done by using one opto-isolator, MOSFET, IR sensors and microcontroller.

2. Design Methodology

The design diagram to govern the speed of BLDC motor consisting various elements to carry out this successful operation. Detailed analysis proposed for investigating the impact of load on speed of motor. Therefore it is required to select parameters of each element which is going to be used that conforms to the acceptable performance and indeed improved system performance for improved accuracy and efficiency.

2.1 Transformer

The AC electricity is converted by transformer from one voltage to another with a small power loss without changing its frequency. They are of two types namely Step-up transformers and Step down transformer. Voltage is increased by step up transformer, and decreased by step-down transformers. In most of supply of powers uses step-down transformer to diminish the dangerously higher voltage to a safer voltage.

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Fig. 1: A Typical Transformer

2.2. Rectifier

A rectifier is an electrical component which having the property of converting from alternating current(AC), which periodically changes in contrary direction, to direct current(DC), current that flows in only single direction, a process known as rectification. Rectifiers have many applications comprising as parts of power supply and detector of radio-wave signals. It is possible that rectifiers may be manufactured of solid state diodes, vacuum tube diodes, mercury arc valves, and other electronic components. The output from the transformer is fed to the rectifier. It is converted from A.C. into pulsating D.C.

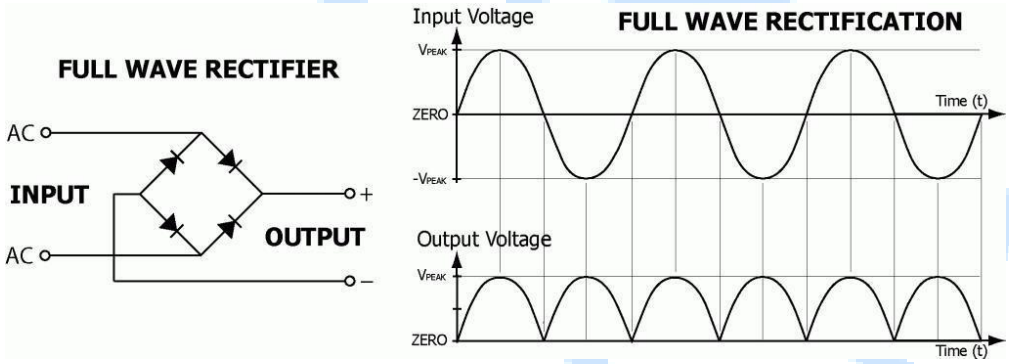

Fig. 2: Full Wave Rectifier

2.3. Voltage Regulator

Voltage regulator, any electrical or electronic device that keeps the voltage of a power source within acceptable limits. The voltage regulator is needed to keep voltages within the prescribed extent that can be beared by the electrical equipment using that voltage.

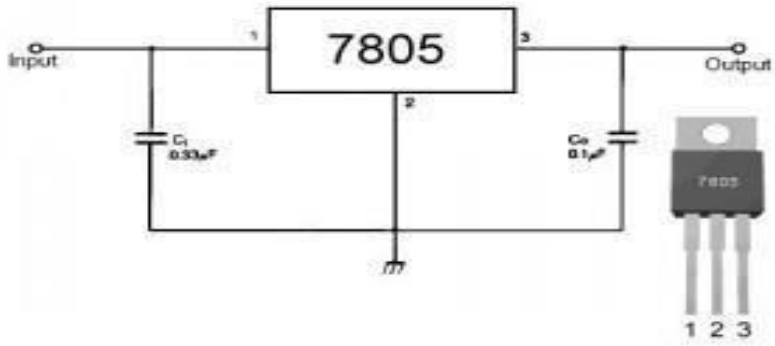

Fig. 3: Voltage Regulator

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2.4. Microcontroller 8051

It is operated on low-power having high-performance CMOS (complementary metal oxide semiconductor)8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured by using Atmel's high-density conventional ROM technology and is compatible with the industry standard instruction set and pin out. The program memory to be reprogrammed in-system allowed by the on-chip Flash memory.

2.5. BLDC Motor

Brushless DC motor is also known as electronically commutated motor and synchronous electric motor powered by direct-current (DC) electricity and having electronic commutation systems, rather than mechanical commutators and brushes. The current-to-torque and frequency-to-speed relationships of BLDC motor is linear.

3. Construction and Working

3.1. Block Diagram

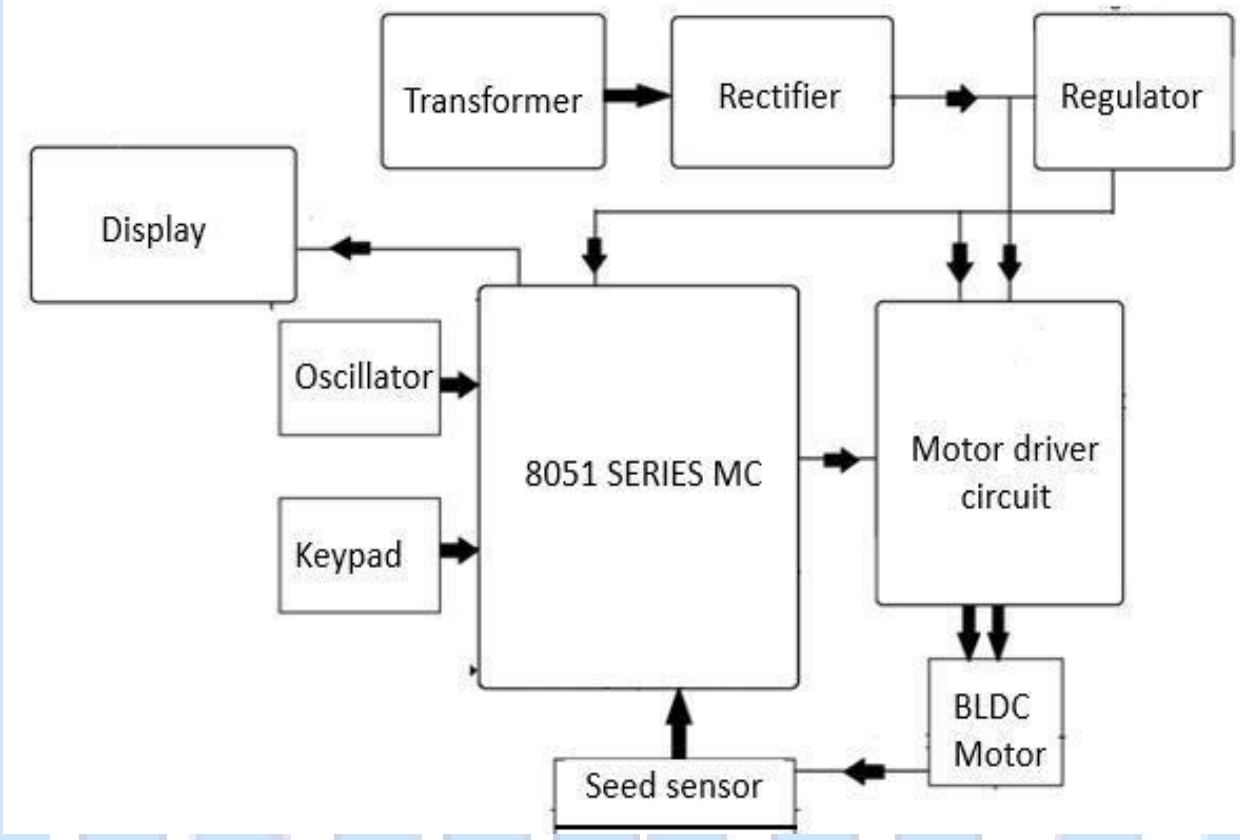

Fig. 4: Block Diagram

The block diagram representation of speed control circuit is shown as above. Circuit consisting of three main block viz. transformer, rectifier and regulator. After regulation supply given to microcontroller and before regulation supply given to DC motor block.

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3.2. Circuit Description

The circuit consists of transformer, rectifier, filter, regulator, microcontroller, numeric keypad, opto-isolator and motor drive circuit. The 230V AC supply is first stepped down to 12V AC using a step down transformer.

This is then converted to DC using bridge rectifier. The AC ripples is filtered out by using a capacitor and given to the input pin of voltage regulator 7805.At output pin of this regulator we get a constant 5V DC which is used for MC and other ICs in this project.

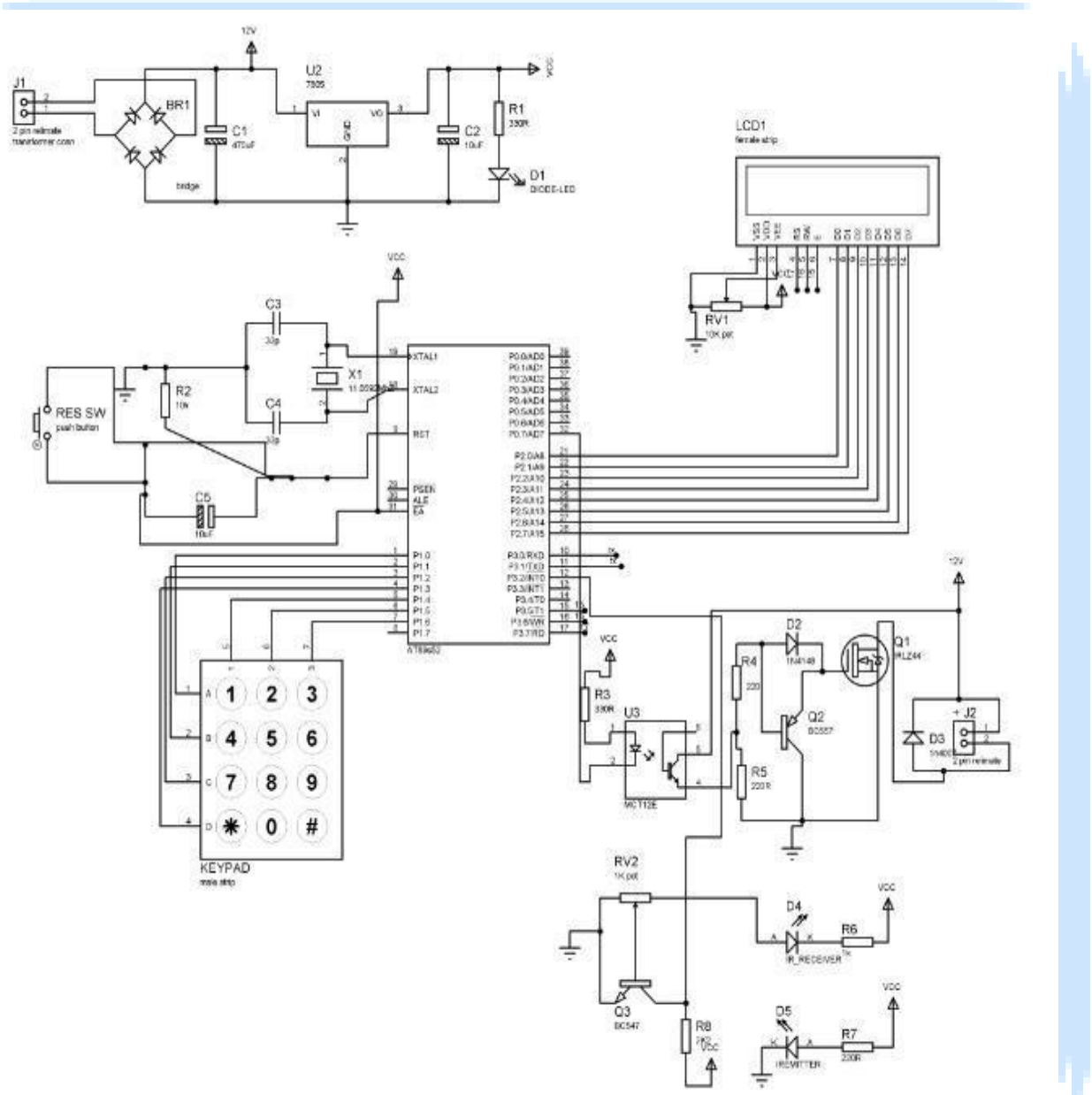

Fig. 5: Circuit Diagram

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4. Conclusion

This project of closed loop control of speed for a brushless dc motor is a cost effective, practical, ecofriendly and the safest way to save energy. Now-a-days electronics is becoming very popular in automated world because everything in the life was being automated to meet the human requirements. Here in this project we are designing a product which is automated in measuring the speed of motor rotating with high frequency using a Remote IR module which is being kept on the either sides of the motor shaft. This IR module will interrupt the micro controller which acts as the main heart of the project. By that action of the IR module with the controller at a time being is measured and the result is displayed on the LCD.

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AUTO SELECTION OF ANY AVAILABLE PHASE, IN 3 PHASE SUPPLY SYSTEM

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ABSTRACT

The concept of Auto selection of any available phase, in 3-phase supply system is to design and construct a circuitry which instinctively transfers the control over to the substitute (alternative) phase that has current in the event of power outage in the phase to which the load is attached without the power being off. 70% of the total faults that take place in an electrical system comprises of single phase faults i.e. the remaining two phases in the system are healthy. Hence where 3 phases are available for the supply purpose, it is obligatory for any domestic or commercial power delivering system to employ such circuits for continuous power to essential and critical loads due to the failure of power in any of the working phase. The need of any alternative power supply for such single-phase priority loads can be eliminated by the implementations of such technology. So basically, it is a concept of a phase selector switch which is basically designed with a moto to serve three phase A.C input power to single phase output applications.

Keywords: - *Automatic phase selector, power outage, ULN-2003, single phase load, Logic Gates.*

1. Introduction

In today's world, power failure for a moment is considered as an inevitable issue for loads which require an un-interrupted supply. Hence, some firm developments have been done in electric systems to overcome this issue.

The major concept behind the development of this idea is to deliver continuous supply to the single-phase load. For large and priority electricity consuming bodies like hospitals, schools, where there is incoming 3 phase supply, if any of the phases, amongst the 3 phases fails, then the supply will be automatically shifted to the succeeding available(active) phase out of the poly(3) phase supply system.

In most cases, many manufacturing companies, whether they are domestic or industrial, which employ single phase equipment for its operation sometimes experience challenges during failures in power supply.

2. Block Diagram

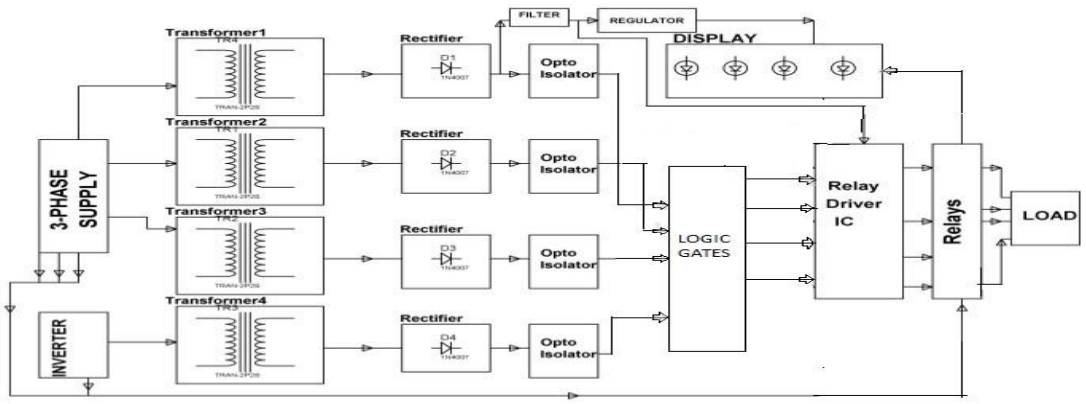

Fig.1: Block diagram

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The basic equipment's/devices required in the block diagram are as listed below

- TRANSFORMERS
- RELAYS
- LOGIC GATES
- OPTO-ISOLATOR
- VOLTAGE REGULATOR
- ULN 2003 (RELAY DRIVER)
- LED's
- DIODES
- RESISTORS
- CAPACITORS

3. Circuit Diagram

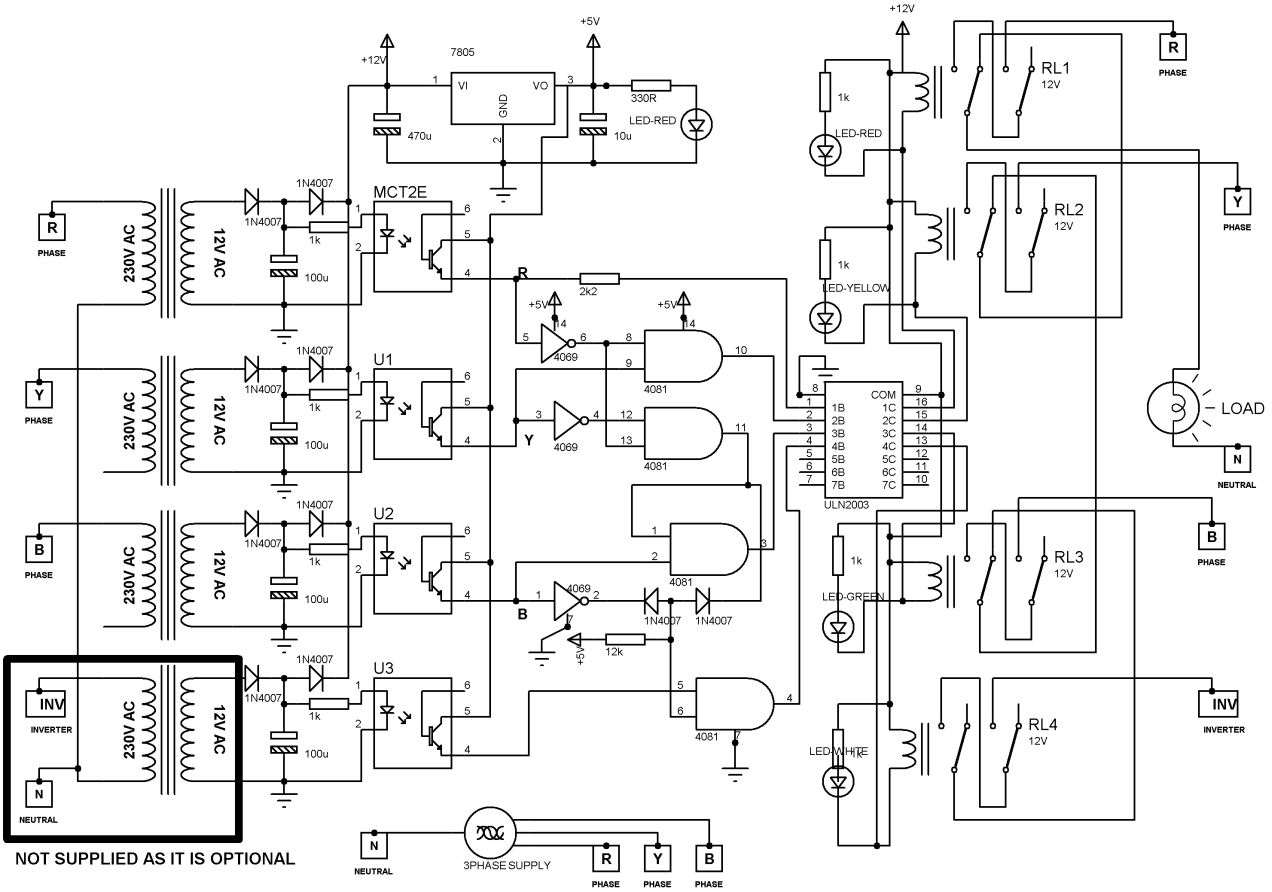

Fig.2 Circuit Diagram

In the circuit diagram, we can observe that the input terminal is connected to the 3- phase supply followed by the opto-isolator through the transformers. Each phase is supplies energy to an individual transformer and their respective opto-isolator. Further a rectified output of the transformers is given as an input to the voltage regulator whose constant 5V output is used to run the logical circuitry. Further from the logical circuitry, its output is supplied to the RELAY DRIVER-ULN 2003 which further drives the relays on the basis available phase which operates the load.

4. Working Principle

The 3-phase supply is stepped down to 12V by 3 single phase transformers attached to each phase.
Then the 12 volt is passed through full bridge rectifier and we obtained 12-volt dc supply which is required for running optocoupler relay drivers and NOT gate. The opto-coupler insulate the circuit from the supply. The three phases are connected with the ULN-2003 IC via the NOT GATE.

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In normal working conditions, in the absence of fault, the first phase supplies the single-phase load and the relays of other phases remains normally open. When fault occurs in that phase, the NOT gate sends a low signal to the relay driver and the relay which is connected to next healthy face becomes normally closed and thus the supply to the single-phase load remains unaffected. If the 3-phase fault occurs and all the phases becomes unavailable then a separate connection can be made by other port of relay driver, relay and NOT gate connected to alternate power source like inverter or battery.

5. Selection of Healthy Phase

The selection of the healthy phase is initiated by operation of logic gates using following technique.Assume that R phase is faulted, the output from optocoupler 1 goes to LOW i.e.0. Hence the output at N1 (NOT GATE) is 1 and the output at optocoupler 2 goes to HIGH i.e. 1.
Hence, we get HIGH output at N4 (AND GATE) and Output of N2 (NOT GATE) is LOW which is then supplied to N5 (AND GATE). Then another INPUT to N5 gate is from N1 and thus we obtain LOW output at N5 gate which is again fed to N6 (AND GATE). So another INPUT to N6 (AND GATE) is fed from optocoupler 3 which is HIGH. Thus, the overall output of N6 gate goes to low.
Hence the phase in ACTIVE condition is **Y-PHASE.**

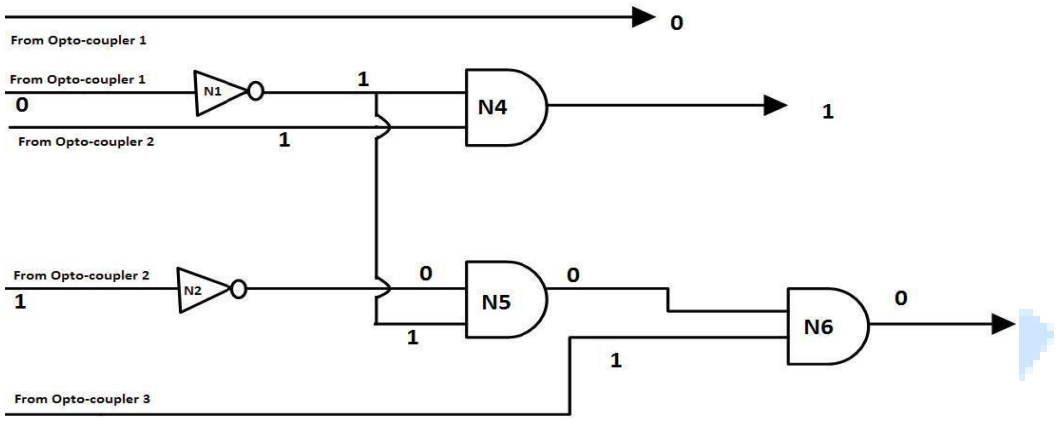

Fig.3: Selection of healthy phase

6. Priority Selection of Healthy Phase

Table.1: Truth table

R	**Y**	B	**SELECTION OF PHASE**
0	0	1	B Phase Active
0	1	0	Y Phase Active
0	1	1	Priority Selection Required (1)
1	0	0	R Phase Active
1	0	1	Priority Selection Required (2)
1	1	0	Priority Selection Required (3)

7. Conclusion

We aimed at developing something that aim to reduce the problem of sudden power failure. Often, we read news about operations being stalled, malfunction of life saving equipment's due power outages at hospitals, exams being interrupted in schools and colleges overall everyone gets affected due to this power failure. We hope that Auto Phase Selector can minimise the problems arising due to Single Phase Faults**.**

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A REVIEW ON ENERGY EFFICIENT TECHNOLOGIES IN ELECTRICAL MOTOR SYSTEM FOR DEVELOPING COUNTRIES

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ABSTRACT

The electrical motor consumes a healthy amount of electrical energy in the industry. Because of undemanding construction and the ability to withstand the three phase squirrel cage induction motor converts electrical power into mechanical power in the modern industry. The electrical motor manufacturing process implementing the different methods for improving the motor efficiency, so that the efficiency of electrical motor system in industry. This paper reviews about the different technologies and policies for energy conservation. There is a high possibility for energy efficient improvement in motor systems in developing country. Most of the energy efficient investment shows only a few year payback time. So it is very interesting to study about the different energy efficiency technologies in electrical motor system.

Keywords: -*Energy conservation and audit, Energy efficiency, induction motor, energy saving, Future technologies, policies*

1. Introduction

In future the cost of energy will increase because of environmental problem and limitations of resources. A healthy part of the electrical energy in the industry consumed by the motor runs on electricity. Because of the popularity induction motor is the important and main driving system in the modern industry. Electric motor drives both main industrial processes, like presses and rolls, and auxiliary systems also, like compressed air system, ventilation and water pumping system. They are used throughout all the industries world while, though the main applications vary. Due to various advantages of electrical motors over diesel engine or other types of engine, is the main source for the mechanical energy in modern industry.

Still, investments in improvement in the efficiency of electrical motor are often delayed and most of the rejected in favour of some other investments. Different barriers and market failures were found responsible for that. Among them is a poor of attention and interest of the manager, principal agent dilemmas, due to higher initial cost for efficient motors and many more. Especially in developing countries like India, access to high initial costs of highly efficient motors are a very big barrier. In most of the cases, broken motors are rewound for cost cutting even though motor rewinding often reduces its efficiency.

In last few years, many studies show the result that there are large energy saving potentials in electric motors and motor systems with many energy saving opportunity with very short period of payback and high cost-effectiveness.

2. Characterization of Electricity Uses in India

Implementing the energy efficient induction motor can save a valuable amount of electricity. It would also reduce the demand and the total environmental cost of electric energy as shown in fig. which get double in year 2000-2013. Also EEM improves the operation in industry by reducing the maintenance cost. India has a great dependence on electrical energy. Therefore it is an important task to the promotion of use of energy efficient motors to be applied in the industry.

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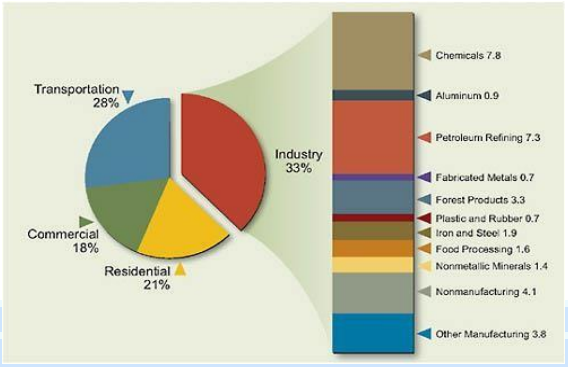

Fig.1: Characterization of electricity uses in India

3. Energy Efficient Motors

3.1 Definition

An EEM uses input power than a standard efficiency motor is less but produces the same amount shaft output power. Standard motor compromises efficiency, durability, starting torque, maintenance and initial cost. Standard motor mostly competes on cost, not on efficiency. On other hand, EEM competes on efficient output, not on cost.

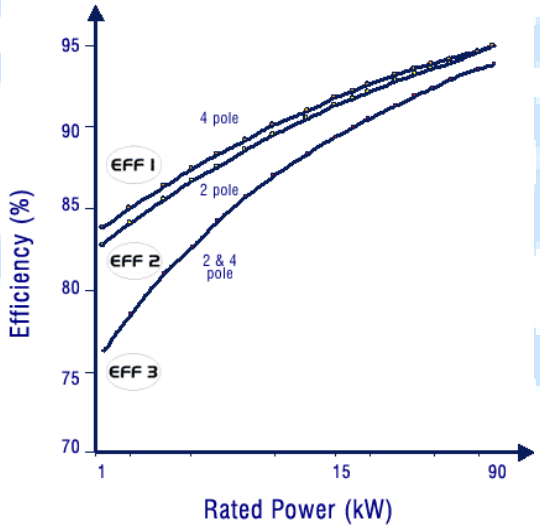

Fig.2 : Curves Efficiency-Rated Power

The term energy efficiency is preferred by manufacturers because it is recognized by NEMA as defined in NEMA Standards Publication MG 1-1993 Motors and Generators, and because it is clearly describes the feature: energy efficiency.

3.2 Constructive description

EEM is manufactured using the same frame as a standard motor, but they have some differences:

- Higher in quality and fine thin steel laminations in the stator.
- More and thick copper in the windings.
- Minimum air gap between the rotor and the stator.
- Use of efficient fan for cooling.
- High tolerances.
- A greater axial length.
- Use of high quality material in rotor.

3.3 Advantages

- The EEM has a high efficiency than a standard motors. Therefore having less running costs.
- EEM has a lower slip value so they have a higher speed than standard motors.
- EEM can provide low running maintenance costs and improved operations in industry due to robust design and reliability.
- Increasing the production in industry due to high reliability.

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4. Recommendations for Applying EEM

EEM should be considered in the following cases:

- For every new installations.
- When major replacement of spare part is required to existing facilities or processes.
- For all new purchases of accessories that contain electric motors.
- When purchasing spares and replacing failed motors.
- Instead of rewinding old motors.
- Replacement of oversized and under loaded motors.
- At the time of a preventive maintenance program.
- When utility conservation programs, rebates or incentives are to be planned that make energy efficient motor cost-effective.

5. Barriers for Energy Efficiency

A number of different types of barriers may hamper the installation of energy efficient systems. Some of the barriers are particularly common for electrical motor systems. Among these are principal agent problems, lack of information, transaction costs or organizational structures.

Electrical motor markets generally have a principal agent barrier: most electric motors are purchased from original equipment manufacturers and unite into, e.g. pumps and fans. The end user is paying the electric bill, often has no information about the motor that has been united into the pump or fan and, thus, investment is not based on decision of the output efficiency of the electrical motors. On the next side, pump/fan manufacturers are primarily competing on the basis of product price, meaning that the cheap motor is also the most attractive one.

The investment decision is mainly dominated by the high initial cost of the motor, and less importance is given to the motor's running costs, which are the major cost component over a motor's lifetime. Thus, a typical cost of 25 to 35 percent for high efficiency motors represents an obstacle for companies in choosing the more efficient motor.

The knowledge and capacity of operators is crucial for a system operating efficiently. It is necessary for system optimization. In developing nation, it is more difficult for companies to find experts on motor system optimization.

As motor system optimization requires the application of high efficiency equipment, the availability of such equipment at equitable prices is an essential for an investment. However, in developing nation, the high efficient equipment is generally not developed locally but has to be imported at high prices which are not reasonable.

6. Policies for Improvement in Energy Efficiency

Several policies or schemes are there to overcome these hurdles and to make the utilization of energy efficient technologies in electrical motors.

6.1 Minimum standards and labelling

Implementing labels and minimum energy efficiency schemes for the improvement of energy efficiency in electrical motors in the market. This scheme aims to remove out the less efficient motor classes by making minimum standards for the output efficiency of motors being to be sold in to a market. By labelling motors, can try to overcome the information hurdle that made it impossible for company decision makers to do investment in high efficiency motors. Labelling on motors provides the necessary information in a transparent way and allows for easy comparisons of efficient motor among manufactures.

6.2 Energy efficiency audits and capacity development programs

There is a huge saving potential by improving the entire electrical motor system plant by plant approach is assured.

The system analysis and improvement is related to an industries' capacity development and energy management practices. Different policies were proposed and implemented to guide the system perspective in electrical motor system optimization. Among these are energy audit scheme.

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In India, the Energy Conservation Act (EC Act) of 2001 provided the legal basis for a broad variety of energy efficiency policies. The EC Act established the Bureau for Energy Efficiency (BEE), is responsible for introducing the proposed energy efficiency activities. The act also requires companies from a defined list of energy intensive branches to:

- Set goals for energy consumption reduction,
- Appoint internal energy managers, and
- Carry out necessary energy audits by external accredited auditors.

6.3 Energy management

Energy management policies are well suited to handle efficiency improvements from system optimization.
These schemes help industries to overcome some of the often observed organizational barriers that prevent energy efficiency projects from being realized. They aim to integrate energy efficiency into the industries management process. Most energy management schemes consist of five distinct steps that can be summarized as follows:

- Implementation of an energy policy within the industry
- Planning distinct projects with improved results
- Implementation of the projects
- Checking the energy efficiency and adapt the plan
- Review the processes.

Energy management systems require the appointment of an energy manager who coordinates the whole process, but also require the broad involvement of employees at all levels of the industry.

7. Conclusions

Energy saving opportunity in industrial motor systems is very huge; in particular if a system optimization approach is pursued. Furthermore, many of the energy efficiency implementation have payback period of a few years only.
Developing countries with high growing rates and a fast growing industry can be benefited from policies for energy efficient motor systems. Using system optimization and highly efficient components for the construction of new plants is the least costly and most efficient way to improve the energy efficiency. Many of the components have life span of up to 20 years and not choosing energy efficient components results in inefficient production for a longer period of time and makes future optimization more costly.
Policies for improvement in motor system efficiency are placed in many countries worldwide like minimum energy performance standards for electric motors on the market, as well as audits and energy management standards. The success of energy auditing and energy management in industries is depends the availability of skilled staff and experts.

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A SCALE MODEL OF GRID CONNECTED PV MICROGRID

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ABSTRACT

As the population of the world is increasing rapidly it is puuting a shear pressure on the natural resources, minerals and fossil fuels to fullfill it's need. As the lifestyle of the people is on the pace to achieve high level of luxuries with the help of modern amenities, electrical energy plays an important aspect in achieving so at a cheaper and reliable rate . There is no doubt that conventional grid provides the best and reliable source of energy to most of its consumers, but to reach each and every corner of the region has yet not been economically feasible due to certain issues. A better way to realize the emerging potential is to take a systematic approach which views generation and associated loads than that provided by the power system as a whole. The future of the modern electricity network must be flexible, easily accessible, reliable, and economic according to the worldwide smart grid initiative. In order to facilitate these objectives and to reduce greenhouse gas (GHG) emission, Microgrid system is gaining importance, particularly with high penetration of renewable energy sources. Depending on the resource availability, geographical locations, load demand, and existing electrical transmission and distribution system, microgrid can be either connected to the grid or can work in an autonomous mode with Storage as a part of the microgrid architecture. This paper presents a critical literature review of the microgrid architectures. The benefits of grid-connected or isolated microgrid with storage have also been identified. It is a small scale version of the main grid and can operate either in addition with the larger grid, else in "standalone mode." Where necessary and practical it can also switch between the two.

In our project we propose to make a model of solar microgrid along with its various Parameters being taken into consideration. This work will provide as a handy tool to the students and the engineers in the actual designing of a microgrid.

Keywords: - *islanded mode, smart grid, reliability, resource availability, medium voltage grids localised generstion.*

1. Introduction

1.1. General

A microgrid refers to distributed energy resources and loads that can be operated in a controlled and properly coordinated way; they can be connected to the main power grid or can operate in "islanded" mode or be completely off-grid.

Microgrids are low- or medium-voltage grids located at or near the consumption sites/consumer. They can generate power from both renewable and conventional sources and although they are mainly electrical systems, they can also incorporate a thermal energy component, such as combined heat and power. Micro grids are increasingly being equipped with energy storage systems, as batteries become more cost competitive. Micro grid is not a new idea, what is new is their changing and expanding role, in the face of rising power demands, the falling cost of renewable sources, and the increasing need for supply resilience and autonomy – both on- and off-grid.

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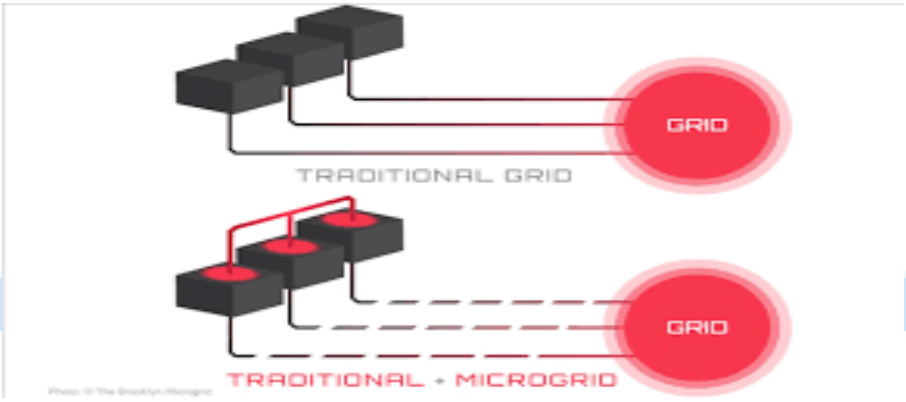

Fig.1: Concept Of Microgrid

1.2. Scope of the Project:

- To convert the solar energy to electrical energy by using solar panels and then utilize this energy in the conventional grid and the regional consumers.
- To find an alternative source for power generation.
- To maintain the economic and environmental balance.
- To ensure a continuous and reliable source.
- To encourage the mass usage of green energy.

1.3. Objectives of Project:

- To overcome the problems of environmental disturbance and pollution and to reduce the stress on the conventional grid to minimise the use offossil fuels and provide a less polluting and a sophisticated design of the solar microgrid.
- To design a standalone power system.
- To create a central hub for roof/building mounted solar panels.
- To minimize the use of non-conventional source of energy.
- To have a localised generation, for easy access.

2. Block Diagram

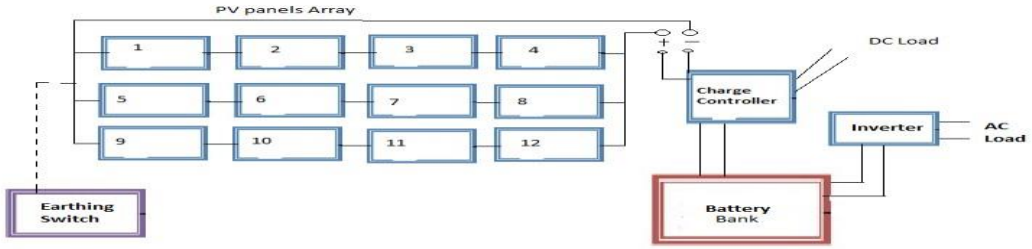

Fig.2:. Block Diagram Of Solar Microgrid

Our project aims at making a microgrid in which the source of power generation is only through solar energy with the help of solar photovoltaic cells.

The numbers 1-12 displayed inside the blue box indicate the number of photovoltaic cell that is to be used to represent a community/societies which we are considering as twelve. To demonstrate the working of the actual microgrid a combination of 4 panels are connected in series and such same combination are arranged in parallel to obtain a constant of 24v from each series. The output through these panels is given to the charge controller which give the best and optimised power output and can

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be used to charge the battery of can be use to run an AC load with the help of inverter or can be supplied to the main grid via a common coupling point. The Earthing switch provide a safety aspect to the system by interconnecting all the metallic parts of the panels and the racks.

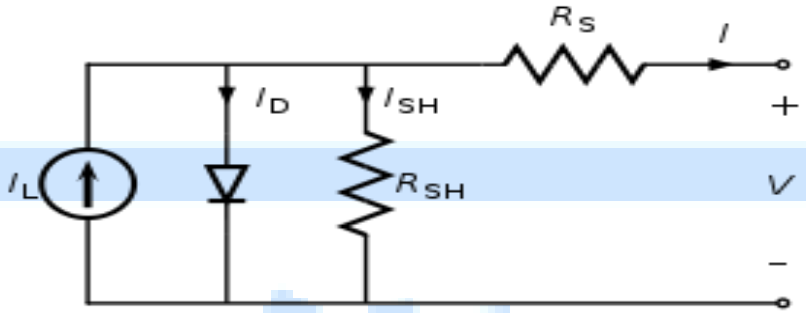

Fig..3. Equivalent Circuit Of A Solar Cell

3. Working

3.1 Solar Panels.

A combination of 16 panels of 6 volts each arranged in the series parallel combination is used to replicate the various sources of collection and unified at a common place and stored in the battery via the controller.

3.2 Charge Controller

A charge controller or battery regulator limits the rate at which electric current is added to or drawn from electric batteries. It prevents overcharging and may protect against overvoltage, which can reduce battery performance or lifespan, and may pose a safety risk.

3.3 Batteries

A battery is simply a DC energy storage device that emits DC power when called upon to do so. • Within the DC micro-grid infrastructure, a battery (or series of batteries) can play a key role in providing consistent DC power to the DC devices when there is a downward spike in available Renewable Energy, such as night time or cloudy days. • The Solar Energy sources continually recharge the batteries, so unless there is a prolonged deficiency in Solar Energy, the batteries will provide the DC power to the DC micro-grid.

3.4 Inverter

The inverter converts DC to AC, and also changes the voltage and act as a power adapter.

It can allow a battery-based independent power system to run conventional appliances through conventional home wiring.

3.5 Point of common coupling

It is the point in the electric circuit where a Microgrid is connected to a main grid. These point provides a link between the microgrid and the main grid.

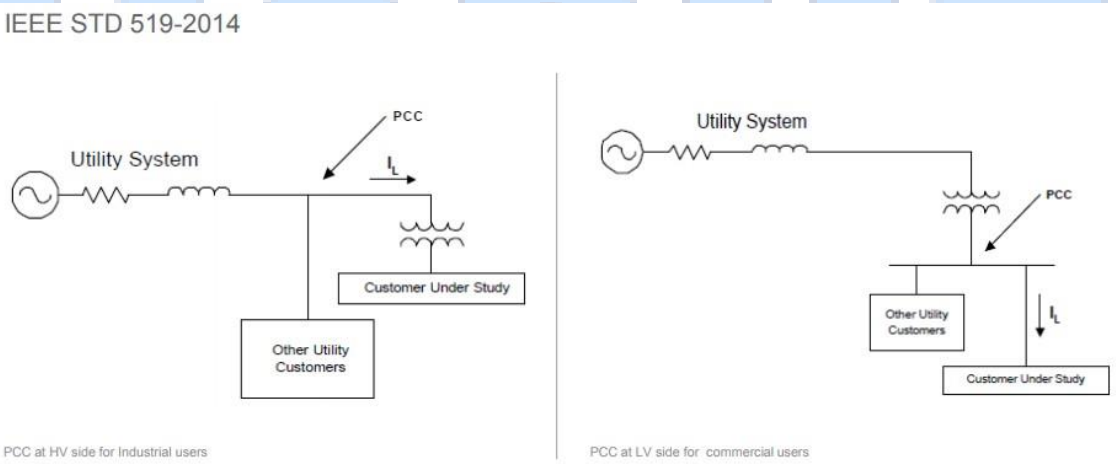

Fig.4: Point Of Common Coupling

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4. Practical Consideration

4.1 Calculation

a. Selecting of solar Panel:

We are selecting 6v 5watt solar panel
Maximum current that can be obtained= 5w/6v =0.8A
Let us assume minimum current obtained = 0.5A
4 parallel panels combination of 24v are used
Total current output of the panels = 0.5 x 4 = 2Amp

b. Selecting of battery:

Considering 2 12v 4.5Ahr battery connected in series
Total capacity of battery = 2 x 4.5 = 9Ahr
Charging time = 9 / 2 = 4.5hr

c. Load consideration: we assume to drive a load of 20watt current drawn by load I = 20 / 230 = 0.1Amp

5. Conclusions

Depending upon the load profile of a typically located village, a scale model Micro-grid system based on solar energy sources is to be implemented. Based on the conditions of the model and availability of solar energy sources, a solution is presented. The ability of Microgrid to load together has a potential to provide a higher local reliability than that provided by the power system. To sum up solar energy in developing countries promises a cleaner, cheaper and more democratic way of the quality standard of an important section of the world's population.

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VOICE CONTROLLED HOME AUTOMATION

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ABSTRACT

Automation is a trending topic. In today's world Automation play an important role. To reduce human labour, effort, time and also errors due to human negligence Automation System is used and this is the main attraction of any automated system. Voice controlled Home Automation System has some feature So that we can achieve the simplicity Using this effective ingredient like Adriuno and Bluetooth module. Home Automation System with Voice controlled develop the use of voice to control devices. Home Automation systems has seen as a rapid changes due to introduction of various wireless technologies. Nowadays technology has become advanced. Due to the continuous updating of wireless technology, there are several different types of connections are introduced such as GSM, WIFI, and Bluetooth. For senior citizen category and people who belong to physically handicapped persons because they are unable to do different activities effectively when they are at home and need one's help to handle those tasks Controlling The Home appliances by using wireless communication system is an simple system which is most advantageous for them.

Keywords: -*GSM (Global System for Mobile), PAN(Personal area networks),PWM(pulse width modulation), Arduino Uno, Bluetooth module.*

1. Introduction

Now a day's most of the systems are now getting automated because it is the world of automation where most of the systems are now getting automated, such as industrial automation, homes and other business sectors. For the mechanization processes wherein human efforts are needed with the machinery equipment's to operate various loads in homes the Home automation systems are advantageous. Home automation system is use to makes the operations of various home appliances more conveniently assist and saves energy by switching equipment as per demand. With the energy saving concept and fast operation, home automation or building automation makes human life very simple nowadays. It consist automatic controlling of all electrical or electronic devices in homes or even remotely through wireless automation like voice command. Centralized control of lighting equipment's, air conditioning and heating, audio/video systems, security systems, kitchen appliances and all other equipment's used in home systems is now possible with this system.

2.Block Diagram

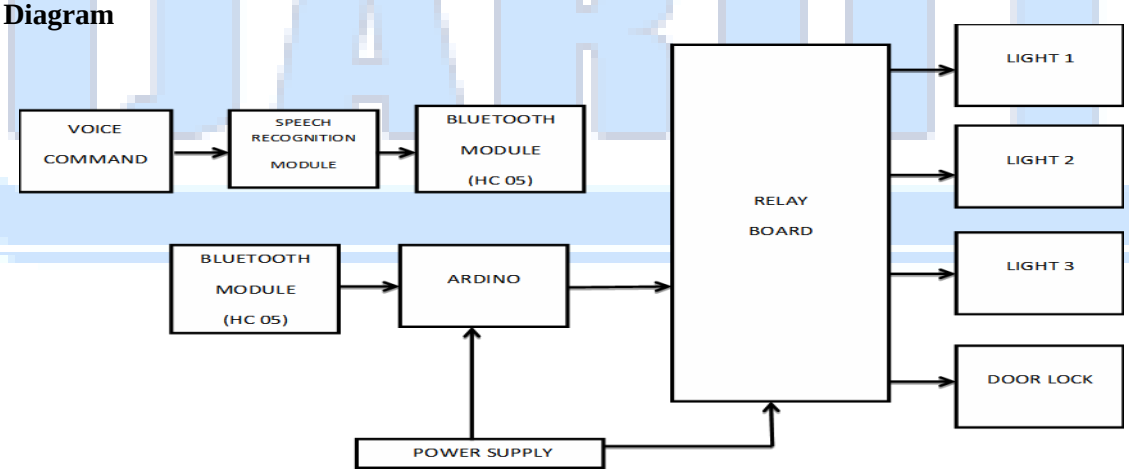

Fig.1: Block Diagram

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The basic equipment's/devices required in the block diagram are as listed below

- ARDUINO
- BLUETOOTH MODULE
- RELAYS
- LAMP
- DOOR LOCK
- ANDROID PHONE

4. Working Principle

4.1 Arduino Uno

The Arduino Uno is a microcontroller board based on the ATmega328p. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an sICSP header, and a reset button. We either need to connect it to a computer using a USB cable or power it with an AC- to-DC adapter. It contains everything needed to support the microcontroller.

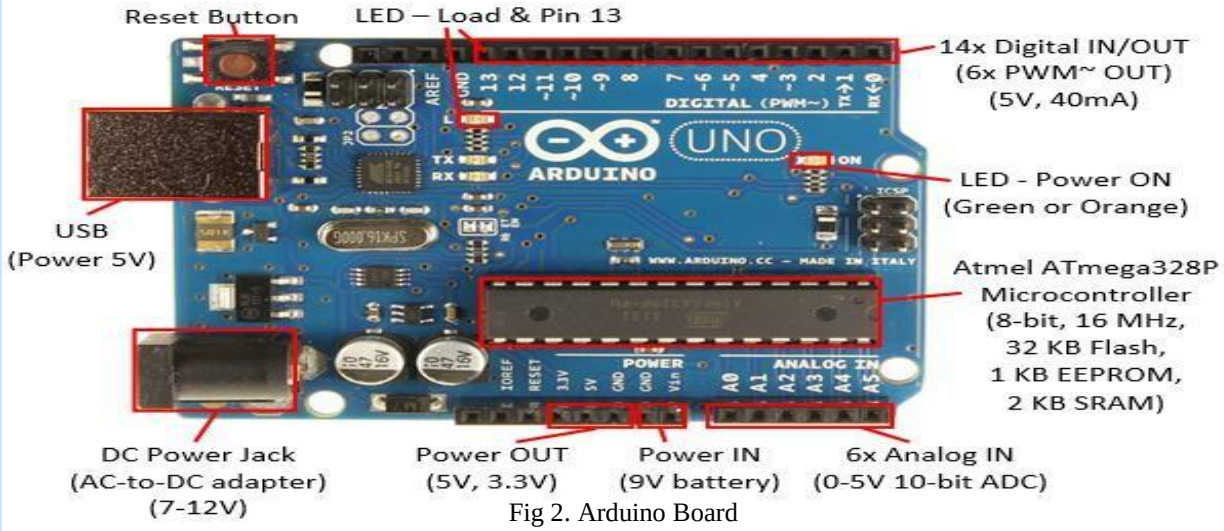

Fig 2. Arduino Board

4.2 Bluetooth module

Bluetooth module is an advanced wireless technology used nowadays standard for transmission of data over short distances using short frequency wavelength from static and movable devices, and for building personal area networks (PANs). The Bluetooth module being used to allows us for the transmit and receive signals. It receives the text from the Android phone and transmits it to the serial port of the Arduino Uno. The Bluetooth module being used here is the HC- 05 module.

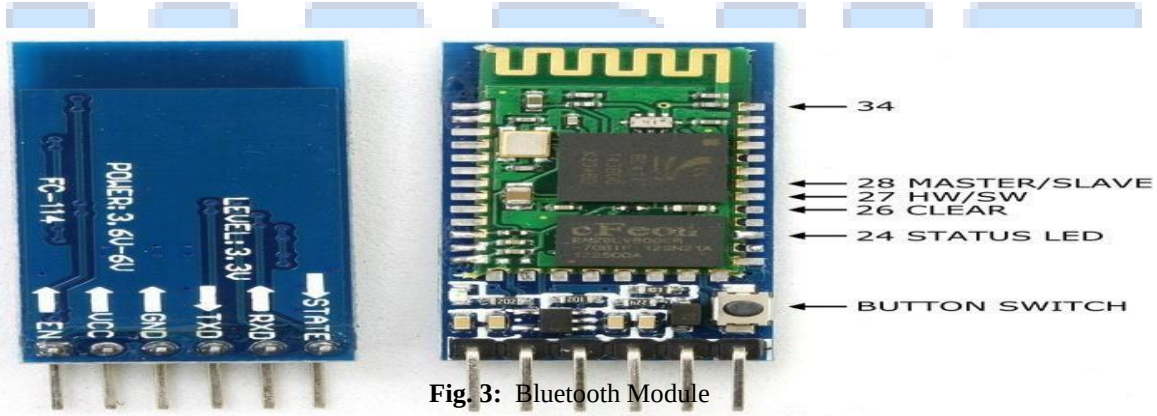

Fig. 3: Bluetooth Module

4.3 Relay

Relay is an electromagnetic switch, which is controlled by small current, and used to switch ON and OFF for the load which require much larger current. Means by applying small current we can switch ON the relay which allow much larger current to flow. Relay is the good example of controlling the AC (alternate current) devices, using a much smaller

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DC (Direct current) current. Relays are like remote control switches and are used in many applications because of its simplicity, long life, and proven high reliability.

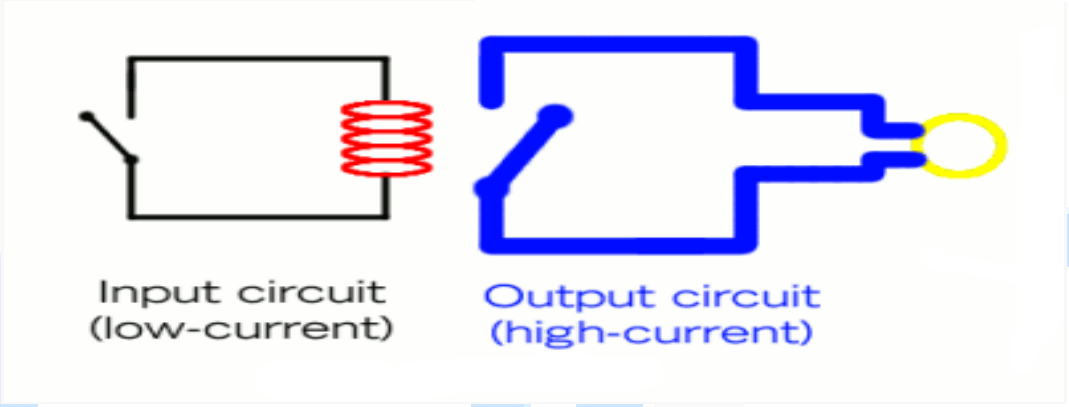

Fig. 4: Relay

4.4 Four Channel Relay Board

This is an easy to use 4 channel relay board that works on 12V. We use it to control four 240V power appliances directly from microcontrollers or low voltage circuits. The board uses high quality relays, which can handle a maximum of 7A/240 V AC or 7A/24V DC. Each relay has three connections - Common, Normally Open (NO), Normally Closed (NC) brought out to 3 pin screw terminals which makes it simple to make connection and to remove connections. The board has a power indication and a relay status LED to ease operation. The board has input voltages ranging from 4V to 12V.

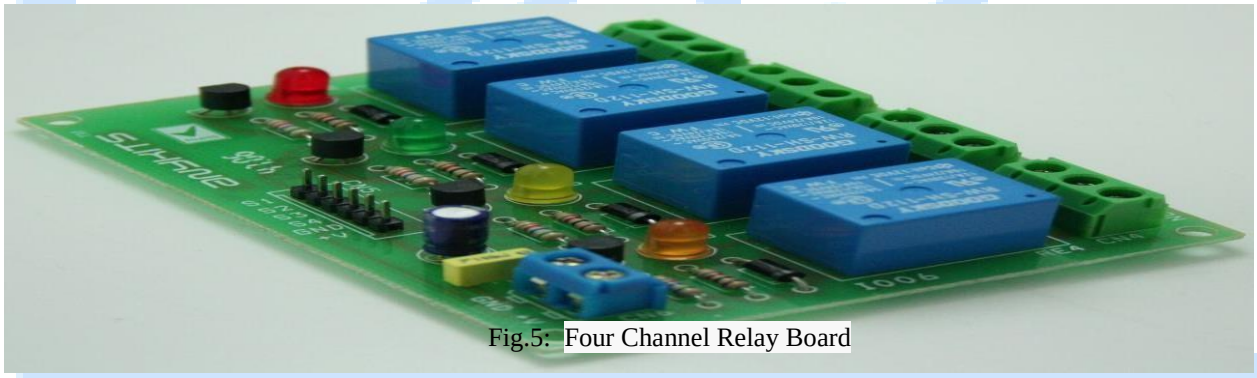

Fig.5: Four Channel Relay Board

4.5 Electric Door Lock

Some smartphone control lock which required to replace you entire lock system to our traditional old lock. To made this thing we use Arduino. Using the Android application we required to send password through Bluetooth to open and close the lock.

5. Scope of Project

People who are disabled, handicapped or deaf can't operate the appliances in the home or they can't reach those things. So home automation is not done by the efficient way. It becomes difficult and unsecured. To minimize mentioned problems a simple home automation system designed in which the modem of Bluetooth interfaced with door lock device controlled

- We can increase the number of device according to future demand
- We can include sensors like LPG sensor, temperature sensor
- We can improve the security feature as per requirement
- We can installed it at cheap price.

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6. Objectives of project

People who are disabled, handicapped or deaf can't operate the appliances in the home or they can't reach those things. So home automation is not done by the efficient way. It becomes difficult and unsecured. To minimize mentioned problems a simple home automation system designed in which the modem of Bluetooth interfaced with door lock device controlled

- To develop smart home, environmentally friendly and cheap.
- The Main advantage of "Home automation using android device" is for the physically challenged and disabled people.
- Control is centralized through one common device.
- Fast enough to realize the true power of wireless technology.
- Economical design.
- To achieve high speed operation with wireless communication.
- Reduced the physical effort to operate home appliances.

7. Conclusion

We can achieve our aims, and we believe that we have a system that will be effective in providing mobility for persons who is handicapped.
One of the major lessons we have learned is that designing an appropriate technology is a huge challenge.

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DIAGNOSIS OF STATOR FAULTS OF INDUCTION MOTOR USING MATLAB SIMULINK

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ABSTRACT

This paper presents simulation results of the effect of voltage unbalance and stator inter-turn fault on the various characteristics of a three phase induction motor. The induction motor for unbalance supply is simulated by decreasing the voltage of the any phase of motor. A comparison between inter-turn short circuit and the characteristics of an induction motor with only voltage unbalance is also presented. Voltage unbalance and inter-turn fault produce negative sequence current. The effect of negative sequence current on motor is presented in this work. For this purpose, an induction motor model with equal number of stator turns has been developed and is then modified to develop a second model which can incorporate stator inter-turn short circuits. Simulation results obtained are observed and verified.

Keywords*: -* *Induction Motor, Voltage Unbalance, Inter turn faults, negative sequence current, phase current*

1. Introduction

Although induction motors are reliable, they are subjected to some modes of failure. 30 % - 40 % of the induction motor failures are caused by the failure of stator winding. Thus, for safety and economic considerations, there is a need to monitor the behavior of induction motors, working in critical production processes in order to detect shorted turns within a stator winding coil.

Stator inter-turn fault results in asymmetry in the motor impedance causing the machine to draw unbalanced phase currents. This is the result of negative-sequence currents flowing in the line that produces pulsations in the torque at twice the supply frequency. If the voltages applied at the terminals of a three phase induction motor are unbalanced, it produces high currents on the stator windings, which considerably exceed the rated currents. These currents result in a negative sequence current, similar to the case of a stator inter-turn fault, which in turn produces twice the supply frequency torque pulsations. Voltage unbalance also results in reduced net torque which forces the motor to run at higher slip, thus increasing the rotor losses and heat dissipation. The aim of this dissertation work is to analyze the effects of voltage unbalance and stator inter-turn fault on the various characteristics of an induction motor with. Inter-turn fault has been created by shorting few turns making up a stator phase winding and also voltage unbalance has been introduced by decreasing the voltage of any phase.

For the purpose of this analysis, two models have been developed. Firstly, an induction motor model with equal numbers of stator turns has been developed. It is then modified to develop a second model to simulate stator inter-turn short circuits. The first model has been used to obtain the characteristics of a healthy motor and that with only voltage unbalance and the second model has been used to observe the inter-turn fault[1].Models are simulated in Matlab/Simulink and the simulation results are presented. Results obtained are verified.

2. Equivalent Circuit of a Three Phase IM

To calculate the equivalent circuit parameters of three phase IM, equivalent circuit is used. In this case three tests are performed viz, No load test, Block rotor test, stator resistance Test.

2.1. No Load Test

The no load test is similar to the open circuit test on a transformer. It is performed to obtain the magnetizing branch parameters (shunt parameters) in the induction machine Equivalent circuit. In this test, the motor is allowed to run with

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no-load at the rated voltage of rated frequency across its terminals. Machine will rotate at almost synchronous speed, which makes slip nearly equal to zero. Therefore, the rotor equivalent impedance can be considered to be an open circuit

2.2. Block Rotor Test

Blocked rotor test is similar to the short circuit test on a transformer. It is performed to calculate the series parameters of the induction machine i.e. its leakage impedances. The rotor is blocked to prevent rotation and balanced voltages i.e.at a voltage where the rated current is achieved are applied to the stator terminals. Under the reduced voltage condition and rated current, core loss and magnetizing component of the current are quite small percent of the total current. The Slip for the blocked rotor test is unity since the rotor is stationary. The resulting speed dependent equivalent resistance $r'2(1/s-1)$ goes to zero and the resistance of the rotor branch of the equivalent circuit becomes very small. Thus, the rotor current is much larger than current in the excitation branch of the circuit such that the excitation branch can be neglected. Voltage and power are measured at the motor input.

2.3. Dc Resistance Test

The following steps are perform to conduct the DC resistance test for three phase IM, are;

1. Determines $R1$
2. Connect any two stator leads to a variable-voltage DC power supply.
3. Adjust the power supply to provide rated stator current.
4. Determine the resistance from the voltmeter and ammeter readings.

3. Mathematical Modelling Of A Three Phase IM.

For the purpose of this analysis, two models have been developed. Firstly, an induction motor model with equal numbers of stator-turns has been developed. It is then modified to develop a second model to simulate stator inter-turn short circuits. The first model has been used to obtain the characteristics of a healthy motor and that with only voltage unbalance and the second model has been used to observe the combined effect of voltage unbalance and inter turn fault. Models are simulated in Matlab/Simulink and the simulation results are presented.

3.1. Induction motor model with asymmetrical stator winding

The model for a symmetrical three-phase induction motor is well known. To derive equations for asymmetrical stator winding and rotor, the following assumptions have been made;

i. Each stator phase of the motor has a different number of turns, but uniform spatial Displacement is present.
ii. Magnetic saturation is not present.

With the appropriate subscripts *as*, *bs*, *cs*, *ar*, *br* and *cr*, the voltage equations of the magnetically coupled stator and rotor circuits can be written as follows;

$$V^{s}abc = r^{s}abci^{s}abc + psabc$$
$$0 = r^{s}abci^{s}abc + psabc$$

Where $p = d/dt$

4. Induction Motor Model with Stator Inter Turn Short Circuit

In order to develop an induction motor model with a stator inter-turn short circuit, it has been assumed that phase *as* has two windings in series comprising *Nus*= un-shorted turns and *Ns*=shorted turn(s),where *Nas=Nus+ Nsh=Ns*, the overall number of turns *Ns*. The phases bs and cs have *Nbs=Ncs=Ns*. By assuming the unequal numbers of stator turns, the first model can be used for induction motor model with inter-turn short circuit to transfer motor equation from abc axes to qd0 axes. By doing this, the *Nsh*=turn shorted winding can be introduced in *qd*0 axes. The fault severity can be changed by varying the number of shorted turns, and by a current limiting resistance across the short circuit windings. The same assumptions that were made for the first model are valid for this model as well.

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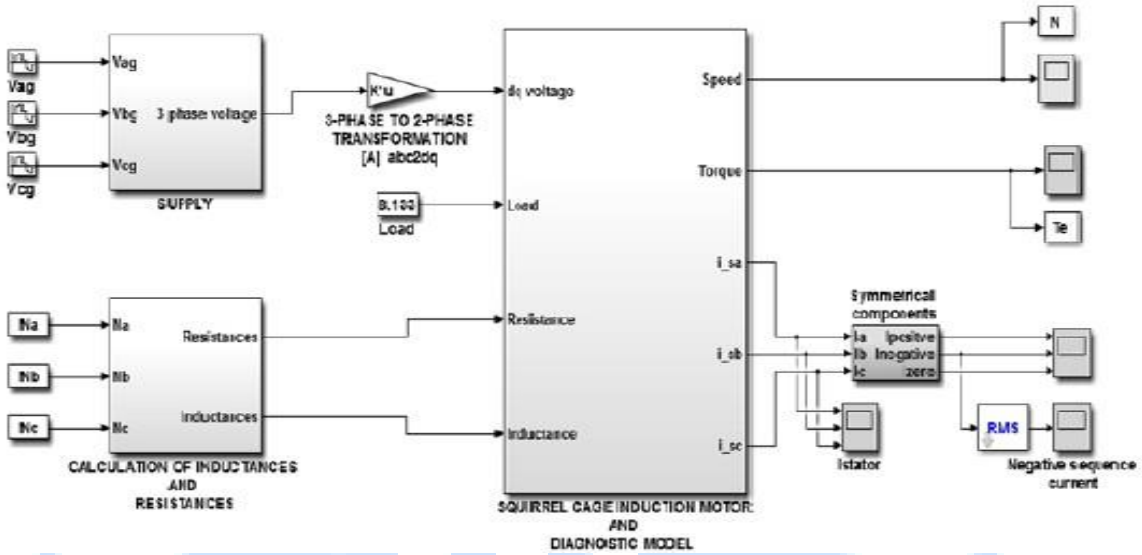

Fig.1: Simulation of asymmetrical induction motor model

5. Causes and Negative Effect of Voltage Unbalance on The Three Phase Induction

Even unbalanced voltage applied to the motor is small, large unbalanced motor current can be flowed because of relatively low negative sequence impedance. The large unbalanced current makes difficult problems in induction motor applications, such as a heat problem, increases of losses, vibrations, and acoustic noises, shortening of the life, a decrease of the rotating torque. The voltage unbalanced can also cause an increase in current imbalance and a temperature rise far greater than voltage imbalance percentage, we can calculate the increased temperature in winding as a result of voltage imbalance.

6. Induction Motor (Squirrel Cage) Model with Stator Inter Turn Short Circuit

Firstly an induction motor model with unequal numbers of stator turns is developed. Then using this model, a second is developed to simulate inter-turn short circuits. Models are simulated in Matlab (Simulink) and simulation results are presented. To develop an induction motor model with a stator inter-turn short circuit. It has been assumed that phase as has two windings in series comprising un-shorted turns and shorted turns, where *Nas =Nus + Nsh*, the overall number of turns *Ns*. By assuming the unequal number of stator turns, the first model can be used for induction motor model.

7. SIMULATION RESULTS FOR STATOR SHORT CIRCUIT AND VOLTAGE UNBALANCE

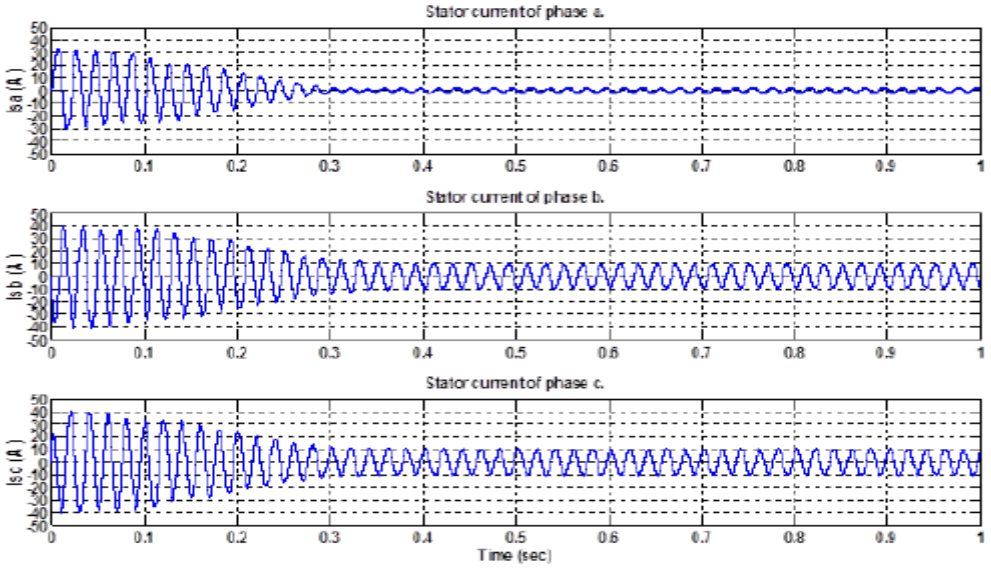

Fig.2: Stator current for phase a, b and c characteristic under voltage unbalance condition on phase a.

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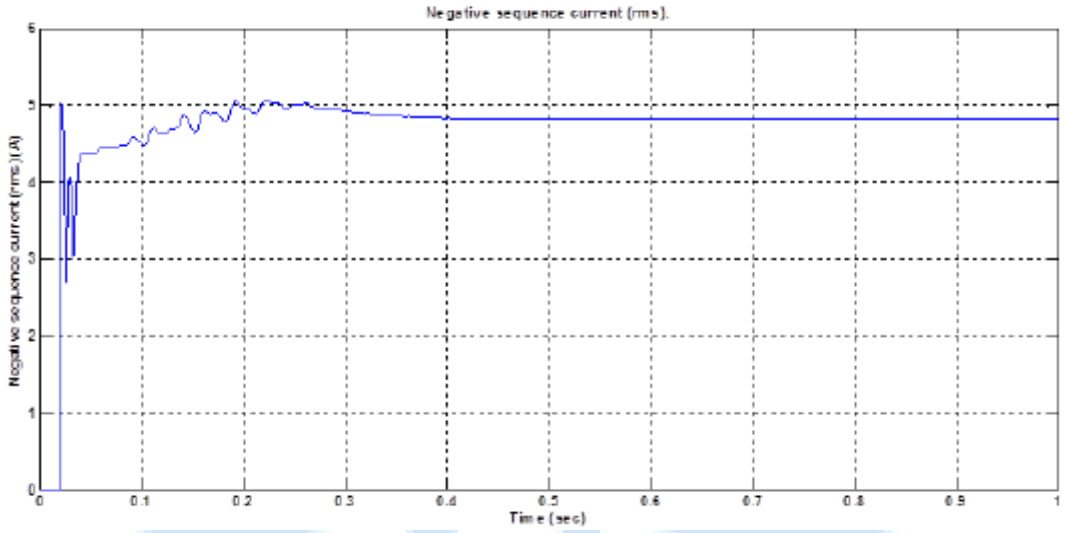

Fig.3: Negative sequence component of stator current under voltage unbalance condition on phase a.

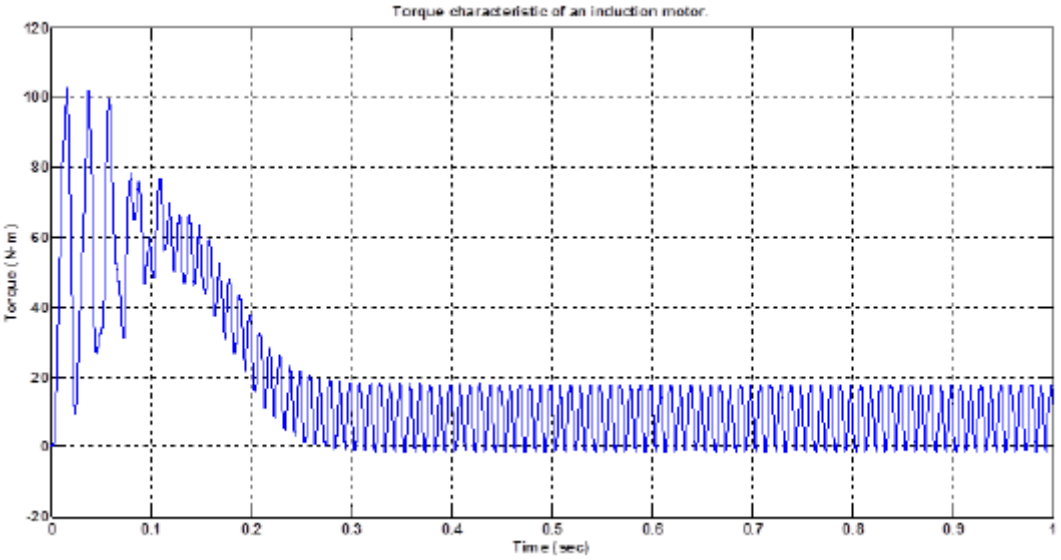

Fig.4: Torque characteristic of an induction motor in voltage unbalance condition on phase a.

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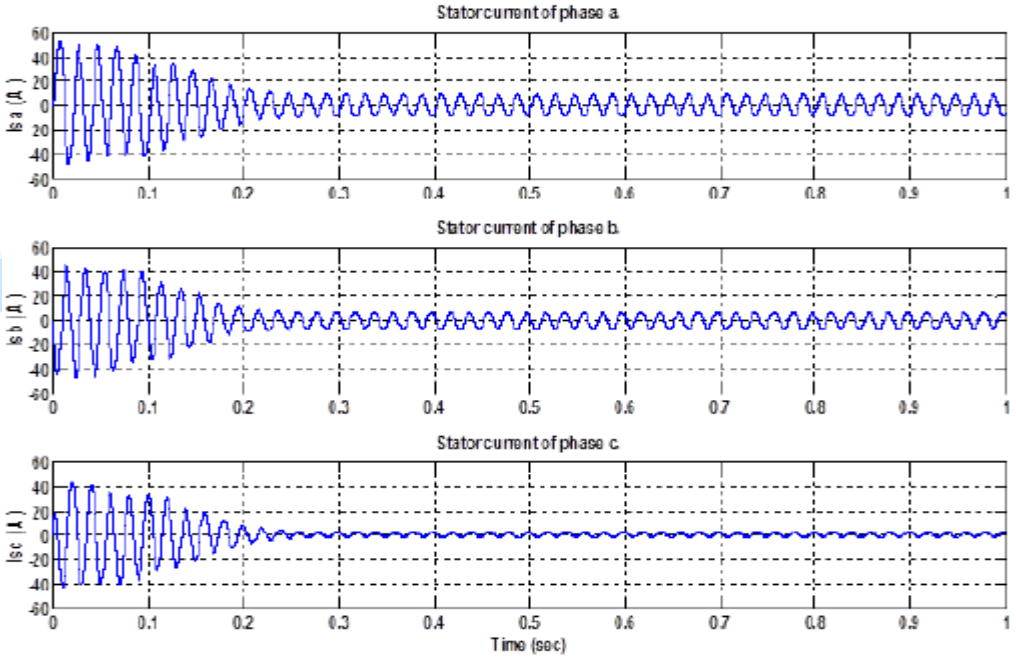

Fig.5: Stator current for phase a, b and c characteristic under short circuit (40 turns) condition on phase a.

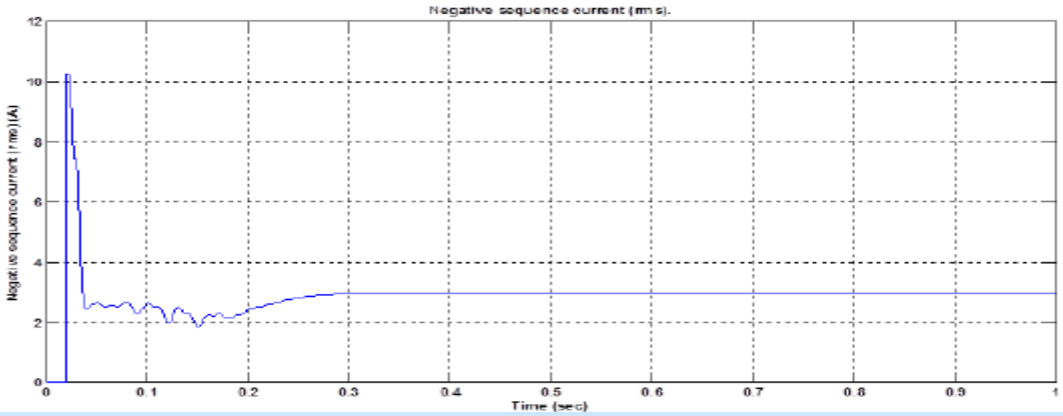

Fig.6: Negative sequence component of stator current under short circuit condition on phase a.

8. Conclusion

The following observations have therefore been made;
When voltage unbalance is present, the torque-speed characteristic follows a lower characteristic compared to that of a healthy motor because as the voltage decreases, the resultant flux decreases. Hence, the motor approaches the steady state at a lower speed. But due to the presence of even inter-turn fault the decrement in torque and speed is lesser. If the intensity of the inter turn fault is increased by increasing the number of shorted turns then the torque speed characteristic follows a higher characteristic and hence the motor approaches steady state at a higher speed than that of a healthy motor. The twice the supply frequency torque pulsations arise as result of the negative sequence current and the negative sequence voltage. In all the cases considered, the motor draws unbalanced phase currents which result in the appearance of a significant magnitude of negative sequence current. The comparison of the results showed that negative sequence current is less in the case of a motor with both voltage unbalance and inter turn fault compared to that of only voltage unbalance. This observation can be used by the fault detection systems based on negative sequence current monitoring.

9. ACKNOWLEDGMENT

It is privilege for me to have been associated with Prof. S. S. Dhamal, my guide, during this dissertation work. I am thankful to him, for his consistent inspiration and valuable guidance, carefully reading and editing my work. I would be failing in my duties if I do not mention of my family members including my parents, my supporting husband and my brother for providing moral support, without which this work would not have been completed. This kind of work cannot be finished without many others help, even some of them have not aware of their contribution and importance in

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producing this dissertation. It is a great pleasure for me to take this opportunity to express my gratefulness to all of them.

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ELECTRIC VEHICLE USING RENEWABLE ENERGY SOURCES

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ABSTRACT

The project is developed to design the electric tricycle for handicap person. The electric tricycle drives on renewable energy source. Solar plays an important role in our daily life .We have to develop solar tricycle for handicap person because manually drive tricycle requires large amount of human power to drive. In this project it is discussed that how the human work is reduce by using renewable energy source. Comfort of the person is an important point in the tricycle and we have given importance to it. Firstly we have analysed the problems of handicap person and then with proper considerations we are designing the electric tricycle. The main component of the tricycle is Solar panel, Brushless DC motor, Charge controller and battery.

Keywords*: - SOLAR PANEL, PMDC MOTOR, TRICYCLE, BATTERY, CHARGE CONTROLLER*

1. Introduction

1.1 General:

In INDIA, the tri-cycle is widely used for handicap person. The tricycle is a three wheel model and which operate by hand power. Varieties of tricycle that are categories as paddle tricycle, motorized tricycle, and electric tricycle. Paddle tricycle needs a lot of energy to paddle the tricycle. The user will be tired after using the tricycle. Motorize tricycle uses fuel as a prime mover which is very costly. On the other hand, motorize tricycle causes pollution which is harmful for environment and hence global warming causes to earth.

Electric tricycle that works on battery can be used for minimum hour. Either power supply is required to charge the battery or we need to cudgel the tricycle. Hence we are using solar powered electric tricycle to charge the battery. Solar panels converts solar energy into an electrical energy which is applied to battery through charge controller.

1.2 Scope of Project:

To convert the solar energy to the electrical energy by using photovoltaic cells, then converting this electrical energy to mechanical energy by using dc motor to run the tricycle instead of conventional the human paddling.

- To find the substituent of conventional fuel.
- To level the ecological balance.
- To make the economical tricycle.
- There is a requirement of green energy.

1.3 Objectives of Project:

To deal with the problem and the weakness, this project requires some research and study to develop this technology. To make this project successful there are several thing that we need to know such as what will be prime mover and the advantages of this new vehicle. The list of the objectives are:

- Develop a vehicle which use renewable energy, eco-friendly and cheap.
- Develop an electrical tricycle that charges the battery when it is not in working condition.
- Develop low speed tricycle which can travel a longer distance.
- Develop an electrical tricycle that reduces physical efforts.
- To minimize the pollution due to IC engine drive tricycle.

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2. Block Diagram

Fig.1 Block Diagram of Electric Tricycle By Using Renewable Energy Source

3. Working

3.1 Solar vehicle

It is an electric vehicle completely powered by direct solar energy. Generally photo voltaic cells contain in solar panel converts the sun energy into electrical energy. This available electrical energy is of 12V i.e. output of solar panel.

3.2 Solar charge controller

It is used to extract maximum power from solar panel throughout the day. A charge controller takes the uncertain voltage from solar panel & conditions it to charge the lead acid batteries safely.

3.3 Battery

Two 12V batteries are connected in series combination to obtain 24V supply. This 24V is applied to PMDC motor through the motor controller.

3.4 Motor controller

To start and stop the motor, to select forward and reverse rotation, to regulate the speed, to regulate or limit torque and to protect against overload and fault motor controller is required which provides manual or automatic operation.

3.5 Motor

The output of motor controller is given to the PMDC motor. When the dc supply is given to the PMDC motor a mechanical force will be experience by the conductor and the direction of this force is govern by Fleming left hand rule.

PMDC motor

The armature rotate in the direction of the generated force which is placed inside the magnetic field of permanent magnets in permanent magnet DC motor. Hence each conductor of the armature experiences the mechanical force;

F=BIL newton

Where, B=Magnetic field strength in Tesla

I=Current in Ampere flowing through that conductor

L= length of the conductor in meter comes under the magnetic field.

Each conductor of the armature experiences and produces a torque, which rotates the armature.

A DC motor located in front wheel is controlled by the throttle. The rider can switch on the accelerator to start the cycle and when not in use, the solar panels continue to recharge the batteries.

Table -1: Ratings and Components Of Tricycle

Sr. No.	Components	Ratings
1	Solar panel	12V,75W
2	Charge controller	24V
3	Battery	12V,14A-H
4	Motor controller	24V
5	Motor	24V,350W,324rpm
6	Throttle	24V
7	Cables	24V DC
8	Tricycle	3 Wheels

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4. Conclusion

We can achieve our aims, and we believe that we have a system that will be effective in providing mobility for persons who is handicapped. One of the major lessons we have learned is that designing an appropriate technology is a huge challenge.

5. ACKNOWLEDGEMENT

On this occasion of presenting our project report, we express our deep sense of gratitude and personal regards to a few people who helped us during our project and shared their knowledge and precious time. It is indeed with utmost pleasure and pride; we extend our deepest gratitude to Dr. Arun Kumar, Principal, Viva Institute of Technology for his motivation and credence in us. Our sincere thanks to Prof. Bhushan Save, H.O.D. of Electrical Department, Viva Institute of Technology and our project co-ordinator Prof. Bhushan Save and co-guide Prof. Rahul Abhyankar for their immense help and support during our course. We would like to express our gratitude towards all our faculty members for enlightening and guiding us throughout our course and helping us to solve the problems we faced during our project. Our indebtedness and reverence to all our friends for being a constant source of inspiration and encouragement.

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AUTO-IRRIGATION SYSTEM BY MEASURING MOISTURE LEVEL IN SOIL

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ABSTRACT

In this paper this method employed to continuously monitor the soil moisture level to decide whether irrigation is needed, and how much water is needed in the soil. A pumping mechanism is used to deliver the needed amount of water to the soil. We have focused on a smart irrigation system which is cost effective and a middle class farmer use it in farm field. The need of water conservation, saving of power consumed by the water pumps, had led to replacement of conventional irrigation techniques to automatic irrigation methods

Keywords: - *water conservation, soil moisture sensor, automatic, irrigation, arduino*

1. Introduction

Irrigation in India includes a network of major and minor canals from Indian rivers, groundwater well based systems, tanks, and other rainwater harvesting projects for agricultural activities. Of these groundwater system is the largest. In 2010, only about 35% of total agricultural land in India was reliably irrigated. Dams used for irrigation projects help produce electricity and transport facilities, as well as provide drinking water supplies to a growing population, control floods and prevent droughts.

1.1 Objectives

An automatic irrigation control system has been designed to facilitate the automatic supply of adequate of water from a reservoir to field or domestic crops in all agricultural seasons. One of the objectives of this project is to see how human control could be removed from irrigation and also to optimize the use of water in the process. The method employed is to continuously monitor the soil moisture level to decide whether irrigation is needed, and how much water is needed in the soil. This project focus on a smart irrigation system which is cost effective and a middle class farmer use it in farm field. Today we are living in 21st century where automation is playing important role in human life. Automation allows us to control appliances automatic control. It not only provide comfort but also reduce energy, efficiency and time saving. Today industries are use automation and control machine which is high in cost and not suitable for using in a farm field. So here we also design a smart irrigation technology in low-cost which is usable by Indian farmers. The objectives of this project are to control the water motor automatically and select the direction of the flow of water in pipe with the help of soil moisture sensor.

1.2 Scope

In our country Agriculture is major source of food production to the growing demand of human population. In agriculture, irrigation is an essential process that influences crop production. Generally farmers visit their agriculture fields periodically to check soil moisture level and based on requirement water is pumped by motors to irrigate respective fields. Farmer need to wait for certain period before switching off motor so that water is allowed to flow in sufficient quantity in respective fields. In an open loop system, the operator makes the decision on the amount of water to be applied and the timing of the irrigation event. The controller is programmed correspondingly and the water is applied according to the desired schedule. Open loop control systems use either the irrigation duration or a specified applied volume for control purposes. Open loop controllers normally come with a clock that is used to start irrigation. Termination of the irrigation can be based on a pre-set time or may be based on a specified volume of water passing through a flow meter.

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6th National Conference on Role of Engineers in Nation Building, ISBN: (978-93-5288-028-7) IJARIIT (ISSN: 2454-132X)

2. Significance

The conventional irrigation systems are generally operate by a user but a smart irrigation tells that the total system is controlled by autonomous mean automatically control the total irrigation system whether the farmer is not present his farm field ,Which require no worker for operating, and also less waste of water with compared conventional methods.

The significance of the project is to provide the following benefits:

a) Increase in quality of crops
b) Increase in quantity of crops
c) Requirement of manpower will reduce
d) Conservation of water will increase
e) Increase in farming efficiency
f) Less chances of crop destruction due to human error
g) Low cost smart irrigation system

3. Advantages

- Feasible for farmers to start operation in the field
- Minimizes the labour cost
- Solution to energy crises

4. Disadvantages

- Increase in cost due to use of Arduino & solar panel
- Maintenance is required for solar panel
- Use of solar panel is limited as per availability of natural light i.e. SUN

5. Conclusion

The need of water conservation, saving of power consumed by the water pumps, had led to replacement of conventional irrigation techniques to automatic irrigation methods. An automation of irrigation systems has several positive effects. Once installed, the water distribution on fields or small-scale gardens is easier and does not have to be permanently controlled by an operator. There are several solutions to design automated irrigation systems. Automation allows us to control appliances automatic control. It not only provide comfort but also reduce energy, efficiency and time saving.

6. ACKNOWLEDGEMENT

It has been great pleasure to present in this conference. We would like to thank management of VIVA INSTITUTE OF TECHNOLOGY for giving us golden opportunity. We express our gratitude towards our department for supporting us in all manners. We would also like to thank the honourable judges. We are thankful to all of you for listening to us, we always welcome feedback from your side.

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SMART WHEELCHAIR FOR PATIENT

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ABSTRACT

There are some peoples who cannot walk because of some problems such as accidents, health issues, and age. So there should be some mechanism that can be used to remove these defects. The Android Controlled Wheelchair is used to remove these defects and people can survive in the environment easily. The android application is created and installed on the Smartphone and connection is done using Bluetooth. The wheelchair can move in two modes first is touch mode and second is motion mode. In the touch mode when user want to change the direction, by using the touch screen of the Smartphone the user has to choose the direction specified within the four quadrants on the screen. In the second mode user just have to give the motion input whether he wants to go such as left, right, up, down. The proposed wheelchair contains the ATMega328p microcontroller which is used to execute all the commands. The device motor driver L293D is used and HC05 Bluetooth module is used. This wheelchair will help the people with lower extremities, older people to survive in the environment.

Keywords: - *Android Apps, Motor Driver, IOT & Wheelchair, Gear Motor Controller*

1. Introduction

People have disabilities with their hands, foots, lower extremities so that they are unable to perform the regular task in their daily life. Many of the technologies are available to overcome this problem. In this paper the Android Controlled Wheel Chair is developed to help the people with their disabilities and survive in the world effectively. Android application is created and it is installed in the android Smartphone. People use their Smartphone for doing the regular tasks such as calling, texting, listening music and sending emails and other files. Now a days the Smartphone is not just used for talking purpose many other works are based on Smartphone such as web browser, games, and online videos. So with the help of this Smartphone user can direct the chair in four different directions. The wheel chair can move in two different modes. First mode is touch mode as the touch screen is available in every Smartphone so it will be easy for user to use it. On the touch panel four different quadrants are given for LEFT, RIGHT, FORWARD and BACKWORD [1]. The users just have to move his finger across the quadrant to select the direction and wheel chair will move. The connection between android application and the wheel chair is done using Bluetooth. The HC-05 Bluetooth module is used for this purpose. The user commands first given using application and then it is send to the microcontroller via Bluetooth. Bluetooth converts these commands in binary format send to the microcontroller. Then microcontroller execute the command and send the digital values to the device motor driver and at last device motor driver used to move the wheel chair.

2. Literature survey

There are several applications are there in the market so that handicapped people can use these applications for their daily tasks. One of the major android applications is motion controlled application created for the blind and handicapped persons so that they can use their computer in an appropriate manner. Person can give commands to application and that motion commands are filtered into different frames. These frames are then encoded and given to the computer system and final output is given. There is another wheel chair is also developed in which the wheel chair is controlled by the motion of the hands or head. The transmitter is mounted on the user head with accelerometer and the transmitter continuously transmits the signals. The receiver mounted on the wheel chair and receives the signals and control the movements of the wheel chair based on control or signal commands. The transmitter and receiver receive the commands wirelessly by using Wireless Radio Frequency Module. The system is developed for the handicapped people are the Hephaestus Smart Wheel chair. This Hephaestus system consists of the different sensors to receive and transmit the commands. In this system the hardware device joystick is mounted on the wheel chair and Hephaestus system acts as the interface between the joystick and the wheel chair.

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The joystick is connected to the computer system and it receives the input from the user and these commands are given to the computer system and by using Hephaestus system these commands are executed and controls the movement of the wheel chair. The major limitation of this system is cost [2]. The cost of the hardware devices such as joystick is very high so that wheel chair cost increases and the normal people cannot afford it. So that the proposed system is developed by considering all aspects so that it will be useful to the people.

3. Design

The Android application contains the functionality of handling the movement of wheel chair and additional features like Emergency calling to the care taker and it can also send the emergency message to the intended person whose number is given when we starts the application. We have used incremental model to design application because if we want to make any changes in future then it will be easily accommodated. Incremental model should be used in such a project where requirements are well defines, but the realization will may be delayed.

In Incremental model the whole requirement is divided into various builds. Multiple development cycles take place here, making the life cycles take place here, making life cycle a "Multi-waterfall" cycle. Cycle are divided up into smaller, more easily managed module passed through requirements, design, implementation and testing phases A working version of software is produced during the first module. So we get working software early on during the Software life cycle [3]. Each subsequent release of module adds function to previous release. The process continues till the complete system is achieved. Incremental model is more flexible and less costly to change scope and requirements. In this model it is easy to test and debug during a smaller iteration.

4. Methodology

In this project Android application is connected to the wheel chair via Bluetooth. For connection the HC-05 module is used inside Microcontroller. The figure shows the system architecture which defines the actual working of system. User can use two features provided in application either Motion or Touch mode and these commands will be forwarded to the Microcontroller mounted on wheel chair via Bluetooth. We have used battery as power supply which helps to accommodate large distance.

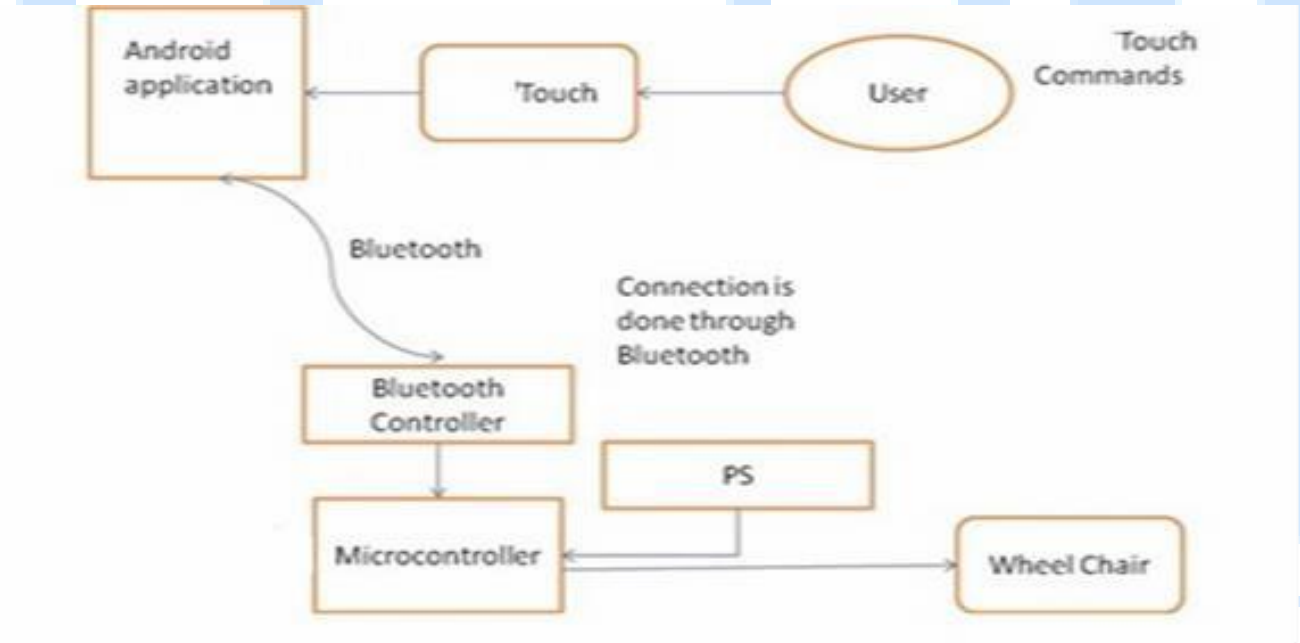

Fig.1: Block diagram

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6. System Architecture

For implementation of hardware part we have used four ICs these are: 89C51 the main microcontroller, L293D the DC motor driver, MAX232 for serial communication and ADC0808 for analog to digital convertor. 89C51 is 40 pin IC which has 4K byte of memory and it has less cost.

The work is mainly divided in three modules in which first are: creation of application and User interaction with application. This module creates Graphical Interface for any non-technical user can also interact with application. It will also provide options like select different modes of controlling wheel chair like (motion and Touch commands) for controlling. In this microcontroller maintains unique information of commands and match that commands with user input and perform actionLike moving Left, Right, Forward, Reverse, Stop. The second module is Connection of application to microcontroller. In this Module Android application is started first and then it is connected to the Microcontroller via the Bluetooth. After starting the Bluetooth we will get the list of devices near available and need to pair with the Microcontroller and then after connecting it becomes ready to perform action on wheel chair. And third module is Connection of Microcontroller to the Wheel chair. This module describes the working of microcontroller and actual connection with Device Driver and wheel chair. After forming connection with application, microcontroller initializes the connection with device driver (i.e. Left and right side Motor) and after taking the input from user it will send that input in the form of bits to the Device driver[3,4]. Sensors are attached to the microcontroller they work as follows: Sensors are the integral part of the system. This helps to detect whether there is any obstacle present or not. Sensor detects obstacle by sending continuous signal from transmitter and if there is obstacle then that signal will be reflected back to the Receiver. If receiver receive signal then there is obstacle and it will notify about this to the user and this helps to avoid accidents.

7. Implementation

For the implementation of Microcontroller the main parts are the ICs and as mentioned earlier 89C51 is main microcontroller to handle the integral functionality of system.

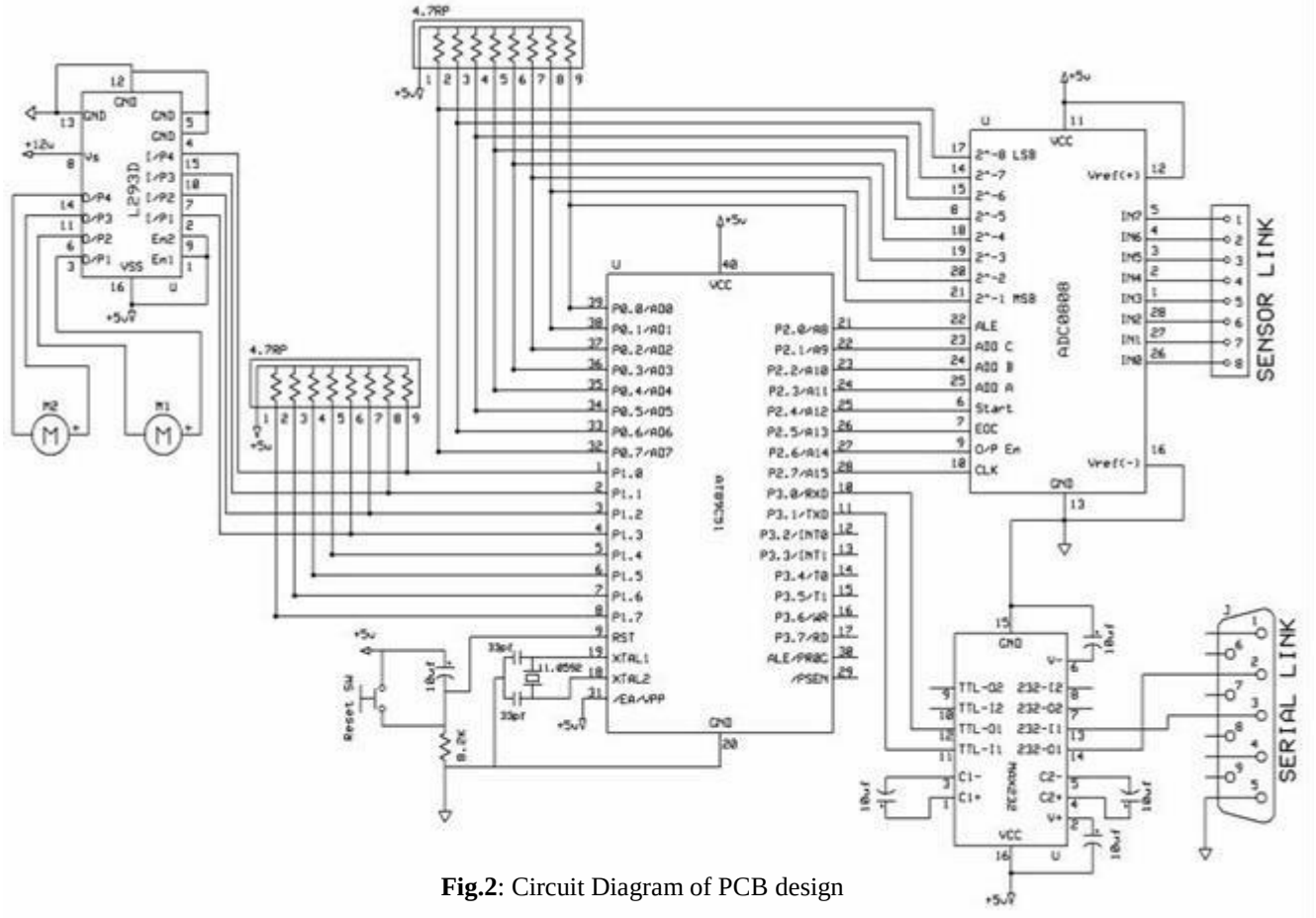

Fig.2: Circuit Diagram of PCB design

ATMega328p IC: The ATMega328p is a low-power, high-performance CMOS 8-bit microcomputer with 4K bytes of Flash programmable and erasable read only memory (PEROM). The device is manufactured using Atmel's high-density non-volatile

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memory technology and is compatible with the industry-standard MCS-51 instruction set and pin out. The on- chip Flash allows the program memory to be reprogrammed in-system or by a conventional non-volatile memory programmer. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel ATMega328p is a powerful microcomputer which provides a highly-flexible and cost-effective solution to many embedded control applications.

L293D IC: L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors. L293D contains two inbuilt H-bridge driver circuits. In its common mode of operation, two DC motors can be driven simultaneously, both in forward and reverse direction. The motor operations of two motors can be controlled by input logic at pins 2 & 7 and 10 & 15. Input logic 00 or 11 will stop the corresponding motor. Logic 01 and 10 will rotate it in clockwise and anticlockwise directions, respectively.

Table 6.1: Working of Device Motor driver

A1	B1	A2	B2	Motor 1	Motor 2
0	0	0	0	NA	NA
0	1	0	1	Forward	Forward
1	0	1	0	Reverse	Reverse
1	0	0	1	Reverse	Forward
0	1	1	0	Forward	Reverse

As given in the table there is two motors attached to the wheel chair and L293D handles the movement of wheel chair according to the commands given via application [5].

MAX232 IC: The MAX232 IC is used to convert the TTL/CMOS logic levels to RS232 logic levels during serial communication of microcontrollers with PC. The controller operates at TTL logic level (0-5V) whereas the serial communication in PC works on RS232 standards (-25 V to + 25V). This makes it difficult to establish a direct link between them to communicate with each other. The intermediate link is provided through MAX232. It is a dual driver/receiver that includes a capacitive voltage generator to supply RS232 voltage levels from a single 5V supply. Each receiver converts RS232 inputs to 5V TTL/CMOS levels. These receivers (R_1 & R_2) can accept ±30V inputs. The drivers (T_1 & T_2), also called transmitters, convert the TTL/CMOS input level into RS232 level [6, 7].

8. Conclusions

From the prototype proposed, it is noticed that the touch screen control has high accuracy when compared to voice recognition system. This paper presents a system which is driven by the touch input to mobile app movements. Major objective of this system was to provide a system so that the blind and physically disabled population can easily use it in their daily use. The system is very efficient for the general population as well. Guardians require a mobile device to communicate with the wheelchair and get patients health status. This project implementation will help all the people who are dependent on wheelchair for their basic needs. Wheelchair is simple to operate and does not need any external help. All common man can reach out for this wheelchair to become independent if they hold a smart phone.

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HALBACH ARRAY PRINCIPLE BASED BLDC MOTOR

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ABSTRACT

Brushless motors have many advantages than brushed DC motors; fixed armature surrounded by permanent magnets, discarding problems integrated with supply current to the rotating armature is a construction of normal brushless motor. The brush/commutator combination of the brushed DC motor is replaced with an electronic controller, which continuously provides the phase sequence to the terminals to keep the motor rotating. The controller is use as time based power distribution by using a stationary circuit instead of old system. This means that the motor's inner components can be completely enclosed and protected from atmospheric dirt or other foreign matter, as the title suggests, the neodymium magnets of the rotor are arranged as 'HALBACH ARRAY'. Permanent Magnets, ball-bearings and winding are normal parts. The motor runs with a standard ESC widely used in different RC-applications (plane, drone and car).

Keywords*: -Halbach array, BLDC, ESC controller, commutator, collar. Areomodelling, cordless tool.*

1. Introduction

This is a well performing, 3D-Printed BLDC motor. It works on 600 Watts and its efficiency is 80%. The important parts like stator and rotor can be printed with a normal FDM-printer. An act of arranging magnets that tends to concentrate the magnetic field on either side of the array while cancelling the field near to zero on the another side is called as Halbach Array. The effect of this arrangement is same as many U-shaped magnets placed nearby each other, with same poles in contact. Because of this more magnetic fields available in air gap, speed achieved due this is very high for low power input.

2. Block Diagram

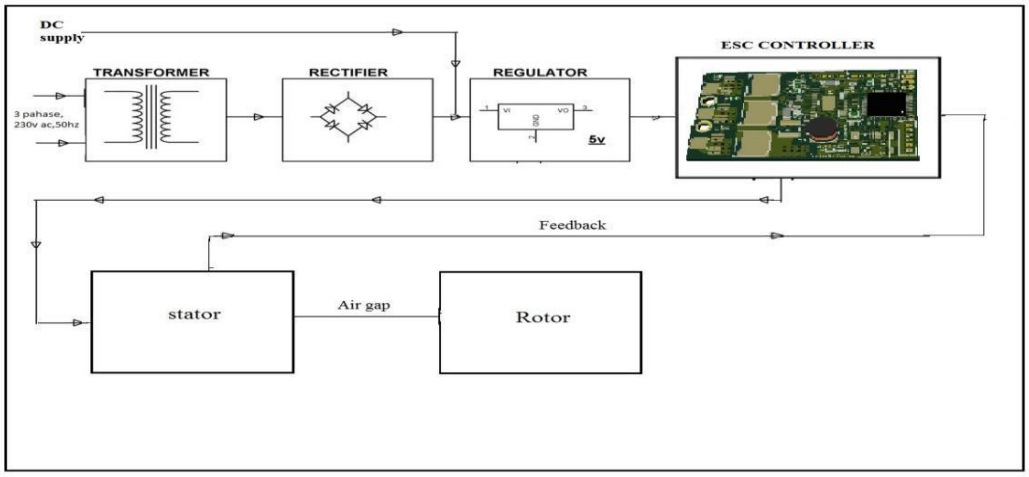

Fig.1 Block Diagram of The System

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It can be directly supplied with a DC supply or a rectified AC supply can be used, which is further passes through a regulator for stabilized operation. The regulated power operates the ESC controller which works as an electronic commutator for phase changing operation, which is connected to the stator of the motor i.e. two input terminals.as soon as the supply starts the motor starts rotating. The Hall Effect sensor can be used for detecting the starting operating location of the poles.

3. Working Principle

The rotating sequence of permanent magnets i.e. left, up, right, down, can be carryon infinitely and have the similar effect. There are mainly two ways to use halbach array as per the construction -1) linear Halbach array 2) Halbach array cylinder, out of which the second type has to be used for motor application. It is a hollow cylinder of ferromagnetic material which producing an acute magnetic field concentrated entirely within the cylinder with zero fields outside, the reverse case is also true. The stator is surrounded by rotor (outer body is rotating) as soon as the stator gets excited by dc supply it forms electromagnets. The poles of rotor have opposite polarity of rotor poles. Unlike poles get attracted by each other and the rotor starts rotating in clockwise direction with high speed.

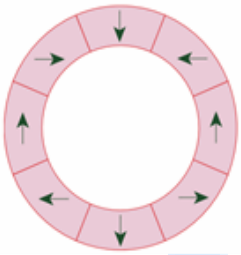

Fig.2:-halbach array cylinder

4. List of various components

4.1 3D Printed components:-

- Rotor A
  It has Slots for magnets, ventilation outlets and fixed to shaft. It should be strong and withstand high centrifugal forces.
- Rotor B
  It encloses the rotor and locks the magnets similar to the lid of a jar, having ventilation inlets & big ball-bearing.
- Collar
  It locks the rotor with shaft also have 2 (smaller) metal shaft collars and Option to attach another component (propeller, pulley) with 4 M3 bolts.
- Mount(Stator)A & B:-
  Chassis mount, Ball-bearings, Base for winding core, big vibrations, when rotor badly balanced.
- Washer M50, 0.75mm:-
  If the rotor can move along the rotation axis, one (or more) washer is needed.
- Stator Core A & B:-
  It provides slots for winding of stator.

FIG.3:-3D PRINTED PARTS

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4.2 Normal Components:-

- Neodymium Magnets (40 x 10 x 4 mm):-18 nos.
- Neodymium Magnets (20 x 5 x 3 mm):- 36 nos.
- Enameled Copper Wire (0.45mm Dia.):-150g.
- Ball-Bearing (688ZZ):-2 nos.
- Ball-Bearing (6710ZZ):-1 nos.
- Shaft (8 mm Dia.):-1 nos.
- Shaft Collars (8 mm ID, 13 mm OD, 5 mm W):- 3 nos.
- Studs (M4):-85mm x 4 nos.
- Nuts (M4):- 4 nos.

4.3 Specification for 3d printing:-

Table -1: 3D printing details.

Sr. No.	Component	Material	Layer	Shells	Infill in %	Support
1.	Rotor A	PETG	0.15mm	4	60-80	NO
2.	Rotor B	PETG	0.15mm	2	50	NO
3.	Collar 2x8 mm-13	PETG	0.15mm	3	70-90	YES
4.	Stator Mount A	PETG	0.15mm	3	70-90	NO
5.	Stator Mount B	PETG	0.15mm	3	70-90	NO
6.	Washer M50,0.75mm	PETG	0.15mm	2	50	NO
7.	Stator Core A	mPLA(*)	0.15mm	2	95	NO
8.	Stator Core B	mPLA(*)	0.15mm	2	95	NO

5. Rating and dimension of the motor.

- Power (maximum) - 600 W
- Nominal Voltage - 30 V
- Nominal Current - 20 A
- Max. Speed - 6500 rpm
- Efficiency (at maximum) - 80 %
- Total Weight - 900 g
- Diameter - 105 mm
- Length - 85 mm
- Shaft Diameter - 8 mm

6. Costing of the motor.

- 3D printing : - Rs.4500/-
- Neodymium Magnets : - Rs.565/-
- Enameled Copper Wire : - Rs.330/-
- Ball-Bearing (688ZZ): - Rs.170/-
- Ball-Bearing (6710ZZ): - Rs.288/-
- Shaft : - Rs.162/-
- Shaft Collars : - Rs.289/-
- Studs (M4) : - Rs.600/-
- Nuts (M4) : - Rs.50

7. Advantages of the motor.

- Brushless operation therefore no commutator losses.
- Rotor body can be made with PETG material.
- High speed for low input.
- It is economical.
- Construction is very easy.
- Light weighted and compact size motor.
- Needs less maintenance.
- It is efficient.

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- Higher power to weight ratio.

8. Limitations of the motor

- 3D printing operation is time consuming.
- The material used should sustainable in all manners.
- The permanent magnet used does not have same magnetic properties.
- The overall design is difficult therefore accuracy is the major thing.

9. Applications of the Motor

- Transport
- Cordless tools.
- Heating and ventilation.
- Aeromodelling.
- Radio controlled cars
- Industrial engineering.
- Motion control system.
- High speed applications, etc.

10. Future of the Motor

It will provide better and compact option to the currently used motor manufacturing system. We can't use it in lathe machine; in future it can be used by some modifications in design. In future we can use it as a traction motor of electric vehicle.

11. Conclusion

This project is a perfect archetype how we can use 3d printing for some powerful and practical printable objects. This motor is not only compact but also very efficient and economical. Halbach array principle provides a very high and concentrated magnetic field. The phase changing can be achieved by regular ESC. The overall cost of the motor and the copper losses of the motor are also very low. It is a light weighted motor that's why can be used in various light weight applications. This motor can be used as a traction motor of electric car with further modifications in the design.

12. ACKNOWLEDGMENT

We shall be failing in our duty, if we will not express our heartful gratitude to all those distinguished personalities with the help of whom we have successfully completed our project. Our deep thanks to Dr. Arun Kumar, principal, viva institute of technology, who always been playing a great role in all round development of the student. Our sincere thanks to Prof. Bhushan Save, the Head of electrical department and our project coordinator Prof. Pratik Mahale who always been playing a great role in all side. We also would like to thank my Project Guide Prof. Anojkumar Yadav for his valuable guidance, advice and constant aspiration to our work, teaching and other staff members for their kind support, help and assistance, which they extended as and when required. Last but not the least we want to thank our friends for providing technical and moral support. We hope that this project report would meet the high standards of all concerned people and for their continuous co-operation during the whole period of period of project that helped us in enhancement of this project.

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SEA WAVE POWER GENERATION

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ABSTRACT

The intention of this project is to serve society without causing any harm to environment. This project is based on the renewable sea wave energy. Fossil fuel are the main pillar of power generation but unfortunately, emission of harmful gases is a major concern. Nuclear power plants are hazardous for entire ecosystem due to formation of radioactive waste, and the efficiency of solar and wind power plant is poor. The power generation from sea wave has growth a huge potentiality as the operating cost of sea wave power plant is low and it uses renewable source of energy. 24% of India do not have electricity. India has got 9 coastal states therefore it is possible to produce electricity at low cost using sea wave plant and deliver it to the rural parts of India. It is reliable, sustainable, efficient, environment friendly power generation procedure from sea wave. This paper presents brief overview about the sea wave power generation plant.

Keywords: - *Sea wave power generation, DC to AC Inverter, PWM, Renewable energy, Environment friendly.*

1. Introduction

Energy is a basic input to the national economy. The primary commercial energy inputs to the Indian economy are from coal, oils, and hydroelectricity and to a limited extent nuclear energy. In India there is very large scope for the energy generating from ocean as it has coastline of 7500km and about 336 islands. The average solar power flux onto the surface of the ocean at 150 North latitude is about 0.2 kW/m2, but this is typically converted to trade winds of about 20 knots, which have a power flux of 0.6 kW/m2. To produce this energy using fossil fuels it would result into an emission of tones of CO2. Fossil fuels are the main pillar of power generation but unfortunately, emission of harmful gases is a major concern .In most of power generation plants fossil fuels are mainly used to generate mechanical energy. The ocean can produce two types of energy, tides and waves produce mechanical energy whereas temperature difference produces thermal energy. The burning of fossil fuels produces largest emission of carbon dioxide which is a greenhouse gas that contributes to global warming. In this project we are not using any fossil fuel to generate mechanical energy by ocean so this means that we are using mechanical energy by ocean so this means that wave energy can highly contribute for attenuation of pollutant gases.

2. Block diagram

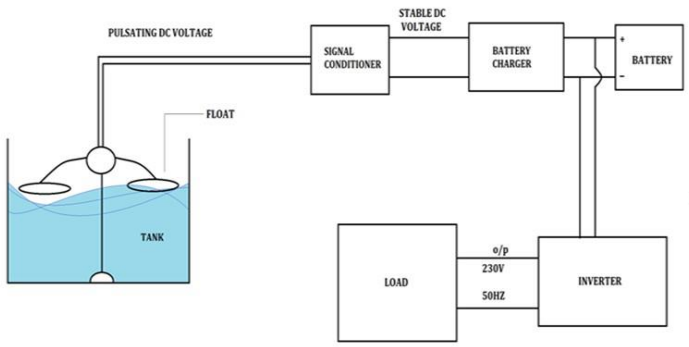

Fig 1: Block diagram of sea wave power generation

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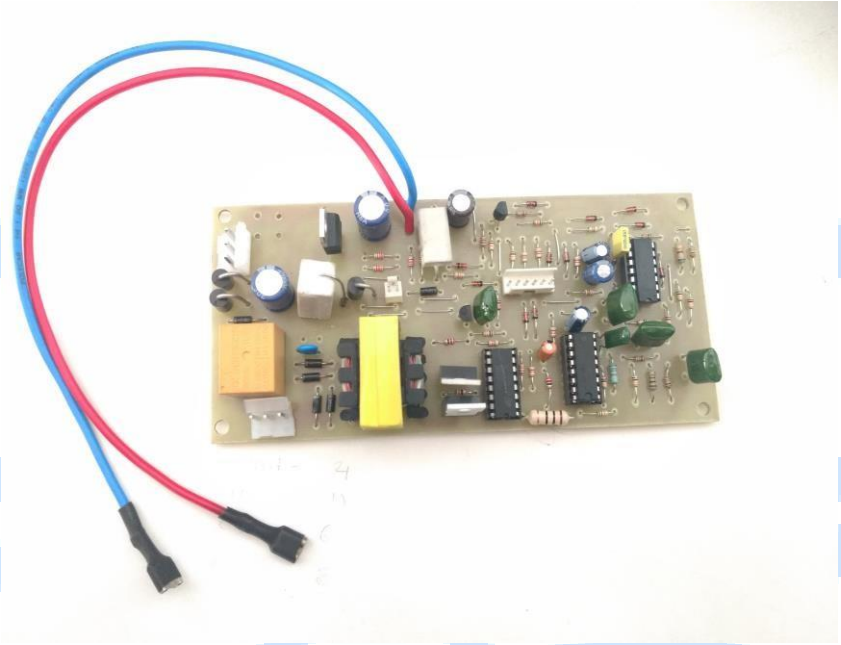
3. Circuit diagram



4. Design methodology

4.1 Reservoir tank

The tank is made up of plastic which is used to store the water for the generation of electricity.

4.2 Generator

The generator or the motor is the final component where the conversion of energy takes place into electricity. The generator used in a permanent magnet type synchronous brushed motor. The shaft of generator is coupled with crank shaft and crank shaft is connected to float. The generator output terminals are then connected to battery terminals using flexible wires to store the electricity produced.

4.3 Battery

After the electricity is generated from generator it is stored in a battery. The battery used is Accuplus++ AP 12- 1.3 maintenance-free sealed lead-acid battery. The battery can store up to 130mA of charge current for 10-14 hours. Since the demonstration is done on a small scale it is convenient to provide power to the testing device through a battery than to give direct power to the device. If direct power is given to the device then it may fail due to sudden changes in potential difference from the generator. While testing the battery will be completely discharged so as to get the exact results. For large scale applications the power output is given to the power grid via various transforming devices.

4.4 Inverter

Inverter is a device that converts electrical power from DC to AC using electronic circuits. Its typical application is to convert battery voltage into conventional household AC voltage allowing you to use electronic devices when an AC power is not available.

4.5 Pulse width modulation

Pulse width modulation, or PWM is used to generate unique signals, due to the advancement of microcontrollers and its power efficiency. To create a sinusoidal signal, PWM uses high frequency square waves with varying duty cycles. Duty cycle is the percentage of time the signal is on relative to the period. As the duty cycle increases, more power is transmitted. PWM requires rapid on and off signals, which can be achieved using high power MOSFETs. MOSFETs are ideal switches due to the low power loss when the device is activated.when a MOSFET is in transition between on and off, the power loss can be significant. For this reason, the transition times and frequency should be engineered to be as short as possible. This can be achieved by minimizing the amplitude between the on and off stages and lowering the PWM frequency; however as the frequency decreases so does the signal quality. Pulse width modulation inverter can be classified as;

i. Analog bridge PWM inverter

ii. Digital bridge PWM inverter

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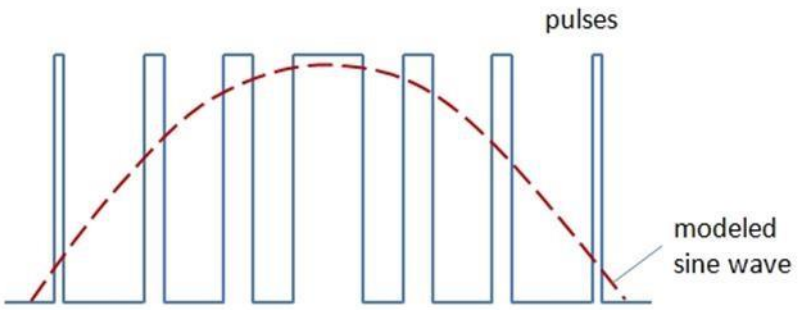

Fig 2: Basic diagram of Pulse width modulation

5. Working

Sea waves are the result of the concentration of energy from various natural sources like sun, wind, Depending on the actuating motion used in capturing the wave power, these devices are classified as (i) heaving float type, (ii) pitching type, (iii) heaving and pitching float type (iv) Oscillating water column type, and (v) surge devices. The wave energy conversion device used in proposed project is heaving float type. In this float is connected to crank shaft which is then connected to the generating device. Due to oscillatory motion of waves float moves up and down and shaft connected to generator starts rotating and it produces dc voltage. The output of generator is then given to the input of signal conditioner to convert pulsating dc into pure dc. Here battery is used to store the generated power. Then inverter is used to convert DC to AC. The inverter used in this plant is MOSFET Tech inverter IRF Z-44 whose input in 12v and output will be 230v 50 Hz.

6. Future scope

If The Indian Government is ready to invest and apply the advanced technologies to harness the energy from sea waves, it will become the first because 70% of the Indian coastline is covered by sea only. Therefore we can say that the coming future is waiting for the renewable energy resources with the augmentation of wave energy. But to achieve this the skill full technology is needed. The benefits to society offered by wave energy include:

1) Avoiding the aesthetic concerns which plague many infrastructure projects,
2) Reducing dependence on imported energy supplies, increasing national security and reducing the risk of future fossil fuel price volatility,
3) Reducing emissions of greenhouse gases by displacing fossil fuel-based generation,
4) Stimulating local job creation and economic development; which are very much necessary for the nations like India.

7. Conclusion

The energy generated in proposed plant is not expensive to operate, maintenance is very low and no waste is produced. The production of energy depends on the intensity of waves and it should be planted on suitable site. The design of this plant is very simple and it is easy to operate and running cost is low. This plant is environmental friendly as it does not produce any waste or hazardous gases which can be harmful for habitat. Since it is renewable energy it can be everlasting.

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POWER GENERATION BY VORTEX PRINCIPLE

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ABSTRACT

Power generation by vortex principle uses a Bladeless Windmill which is a new era of conventional wind turbine and uses a new approach to capturing wind energy. The device captures the energy of vortices created by wind, an aerodynamic effect (vortex shedding effect) that produced when wind bypasses a fixed structure, wind breaks and its flow changes and generates a cyclical pattern of what is known as vortices. Once these forces are strong enough, the fixed structure starts oscillating. Flow over this conical structure will generate an irregular vortex pattern which creates alternating high lift forces on the body and pushing it up and down perpendicular to wind flow. The alternating movement of this body will produce fluctuating kinetic motion which can be converted into electricity. In conventional wind turbine this effect is a problem but Instead of avoiding these aerodynamic instabilities this new design maximizes the resulting oscillation and captures that energy. Generally, the design of such typical device is absolutely disparity from existing traditional turbine. Instead of the big tower, nacelle and large blades, the device has a fixed mast, a power generator and a hollow, lightweight and fiberglass cylinder on top. This provides, the technology used in such project has capital intensity in low range, it also makes it highly competitive not only against generations of alternative or renewable energy, but even compared to conventional technologies.

Keywords-*: -VORTICITY, VORTEX SHEDDING, BLADELESS WINDMILL, LINEAR GENERATOR.*

1. Introduction

1.1 General :

Wind power has become a legitimate source of energy over the past few decades as larger, more efficient turbine designs have produced ever-increasing amounts of power. Bladeless turbines will generate electricity for 40 percent lesser in cost compared with conventional wind turbines. In conventional wind power generation transportation is increasingly challenging because of the size of the components: individual blades and tower sections. Generators and gearboxes assembly sitting on support tower can weigh in 100 tons also cost is more expensive.

The alternative energy industry has repeatedly tried to solve these issues to no avail. But this latest entry promises a radically Different type of wind turbine: a bladeless cylinder that oscillates or vibrates. The Bladeless Turbine harness vorticity, the spinning motion of air as the wind blows past the turbine, little Whirlwinds are created behind it, and when they get big enough, they cause the structure to oscillate. This kinetic energy of the oscillating cylinder is converted to electricity through a linear generator.

It consists of a conical cylinder (mast) fixed vertically with an elastic rod. The mast oscillates in the wind, the outer conical cylinder is designed to be substantially rigid and has the ability to vibrate and remaining anchored to the bottom rod. The top of the mast is unconstrained and has the maximum amplitude of the oscillation. The structure is built using resins reinforced with carbon and/or glass fiber. Spring mechanism is also given at the center and below the mast to restrain it from swaying away. And then comes the generator responsible for developing electrical power.

1.2 Scope of Project:

The cost reductions come from reduced manufacturing costs: the tower and the generator equipment are, basically, one and the same. This allows us to bypass the need for a nacelle; the support mechanisms and the blades, manufacturing savings are

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roughly estimated at around 51 % of the usual wind turbine production cost. The manufacturing, transportation, construction and assembly are also simplified and are typical for the wind industry.

The bladeless turbine currently takes up as much as 30% of the area of a conventional generator, with maximum amplitude around a diameter at the top. The design is so focused on avoiding and wear and tear, it aims to be a "greener" wind alternative.

2. Block Diagram:

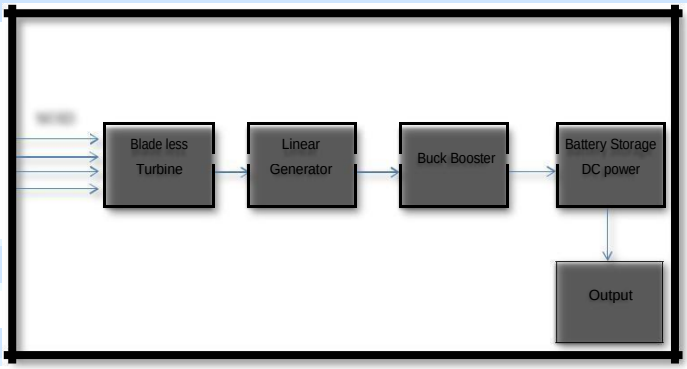

Fig. 2.1: block diagram of bladeless windmill

3. Elements of Bladeless Windmill

3.1 Mast

The mast is a conical shaped, rigid structure made up of fiber glass carbon fiber which oscillates when subjected to wind. The Mast is lighter in structure in order to increase the oscillations also decrease the mechanical stress on the suspension spring as well as the base.

3.2 Spring

Spring is mounted at the below and center of the mast which provides the strength and flexibility to the movement of the mast in any of the direction. This spring is capable to withstand the weight of the mast.

3.3 Linear Generator

It is the energy conversion device and is four-sided permanent magnet linear generator, with the windings on stator elements. Use to convert the linear motion of mast movement into electric power.

3.4 Foundation

It is made up of the rigid iron structure. This provides the strong foundation to the mast and spring. It is capable of tolerating the mechanical stress acting on it.

4. Technical Consideration

4.1 Method & calculation of natural frequency of cylindrical body:

The natural frequency of the body is calculated by using torque method.

$$wn = \sqrt{\{(K L^2 - 2Mc \times g L)/4\}/I}$$

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fn =1/2 π√{**(K L^2 −2Mc ×g L)⁄4}/I**

Where,

I –Moment of inertia of cylindrical body about perpendicular axis rotating its one end.
I =1/3* Mc × L^2
K – Spring stiffness.

L - Length of cylindrical mast. Mc – Center of mass of cylindrical g - Acceleration due to gravity.

From this relation, we get natural frequency of cylindrical.

4.2 Linear Generator

While considering, some parameters, including Ra, Rl and Ls are dependent parameter that will change with the physical design of the generator, but are considered to be fixed here for the specific generator design. This assumption simplifies modeling.

The model in this paper is permanent magnet linear generator with the windings on the stator element. The pole pitch Tp is the overall width of the each pole. It may be expressed as a function of stator core length L and the number of poles p;

$$Tp=L/P$$

In a slotted armature, effective area of the magnetic flux path is substantially reduced due to its geometry. This results in increase in gap reluctance. This can be understood by carter's coefficient Kc. In this approach we account for increased air gap reluctance by computing an equivalent air gap **geq=Kc*ga**

Which then influences flux density calculations. Where carters coefficient
obtained by evaluating Kc=Tt(5ga+bg)/Tt(5g+bd)-bs^2

Output of the linear generator is obtained by the following formula:

$$e=-N.d\ \Psi/dt$$

Where,
e=induced emf in volts
N=number of turns
d Ψ/dt= rate of change of flux linkage

5. Advantages

- Energy produce with vortex is 40% less expensive than conventional turbine.
- Very low maintenance cost as there are no gears and moving parts in contact which require lubrication.
- Weight of the whole structure is 80% less than the traditional wind turbine.
- It reduces the foundation by 50% because vortex has the center of gravity at the bottom.

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- The impact sound level is nonexistent due to absence of gears opening the possibility to make the future wind farms completely silent.

6. Disadvantages:

- The Vortex system is estimated to be 30% less efficient that a traditional turbine.
- It isn't competitive with the fossil fuels.
- In order to generate a significant amount of power, the mast has to sway at a reasonably high speed. But those speeds of oscillation increase stresses on mast and on the foundation.

7. FUTURE TENDS:

- No gears or bearing, reduces manufacturing and maintenance drastically.
- No lubricants needed, noiseless thus more environment friendly.
- More efficient than conventional wind turbine

8. Conclusion

The bladeless wind generation system configuration has been considered and the obtained results appear to be very encouraging, even though they are based on simulations and model taken from the literature, which certainly can give only approximate description of involved dynamics. Tapping the wind for renewable energy using new approaches is gaining momentum in the recent years.

The purpose of this paper is to provide some fundamental results on the bladeless wind system and serve as stepping stones for the future development of bladeless wind power generating system. The forces that is beneficial or useful to generate power in bladeless are different from those in conventional horizontal axial wind turbines. Our device captures the energy of vorticity, an aerodynamic effect that has plagued structural engineers and architects for ages (vortex shedding effect). As the wind bypasses a fixed structure, its flow changes and generates a cyclical pattern of vortices.

Overall the project has been a success with all of the project requirements achieved. As the wind energy is powerful and consistent, the usage of conventional wind turbine for utilizing the wind energy in lesser area and cost is not possible. Hence bladeless wind energy helps us to achieve these criteria. In summary, the generation of electricity is made possible by the small structure of bladeless turbine. It consumes less area, less maintenance and great future expansion scope. Output can be improved by implementing modern technologies and by changing the components used in bladeless turbine.

9. ACKNOWLEDGEMENT

It has been great pleasure to present in this conference. We would like to thank management of VIVA INSTITUTE OF TECHNOLOGY for giving us golden opportunity. We express our gratitude towards our department for supporting us in all manners. We would also like to thank the honorable judges. We are thankful to all of you for listening to us, we always welcome feedback from your side.

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SCOTT CONNECTION OF TRANSFORMER

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ABSTRACT

Although there are now no 2-phase transmission and distribution systems, a 2-phase supply is sometimes required. We can convert 3 phase supply into 2 phase supply through scott or T-T connection of two single phase transformers. The heart of this system is nothing but the 'SCOTT CONNECTION'. Here we use two individual single phase transformers, designed & connected in such a manner that the output will be balanced there phase supply of equal voltage & phase difference. Also it incorporates the control unit i.e. required to switch over to & from this system as soon as there is a phase failure & phase restore respectively. This project is no substitute for the application where in the three phase motor keeps delivering power in spite of the phase loss. Here the motor is safe from the hazards of single phasing, which may cause the damage to motor winding. Due to this capability these systems makes it suitable for rural areas for pumping application, which is of prime important.

Keywords— *Teaser transformer, Main Transformer, Three phase, Two-phase, Balanced load.*

1. Introduction

In the later part of 19th century, two phase generators were used to drive three phase motors. for this Edison's rotary convertors were used. As the usage of rotary convertors were expensive, an engineer from Washington House 'Charles F. Scott' designed a transformer that converts three phase to two phase or vice versa. Hence the transformer is named after him as a Scott connection of a transformer. Now as most of the equipment runs on either single phase or three phase, Scott connected transformers became obsolete. However still in some places like the electrical locomotive stations, these transformers have relevance. Scott transformer is one of the most commonly known transformer type used with the purpose of mitigating voltage unbalance problems. It consists of two single-phase transformers connected in a special way that the Scott connected transformer has the capability of converting a balanced three-phase system to a balanced two phase system. If the two loads on the secondary side are balanced then the line currents drawn from the three-phase network will also be balanced.

2. Working principle & technology

This is a connection by which three phases to three phases transformation is accomplished with the help of 2 transformers as shown in figure.

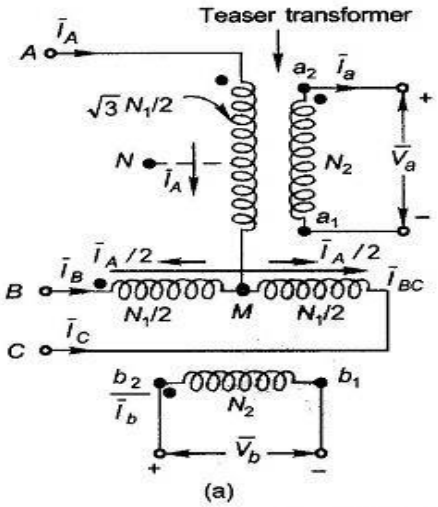

Fig.1: Scott connection circuit diagram

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Since it was first proposed by Charles F Scott, it is frequently referred to as a Scott Connection. This connection can also be used for 3 phase to 2 phase conversion and vice versa. One of the transformers has centre taps both on primary and secondary windings and is known as the main transformer. It forms the horizontal member of the connection. The other transformer has 86.66% tap and is known as teaser transformer. One end of both the primary and secondary of the teaser transformer res .as shown in fig.

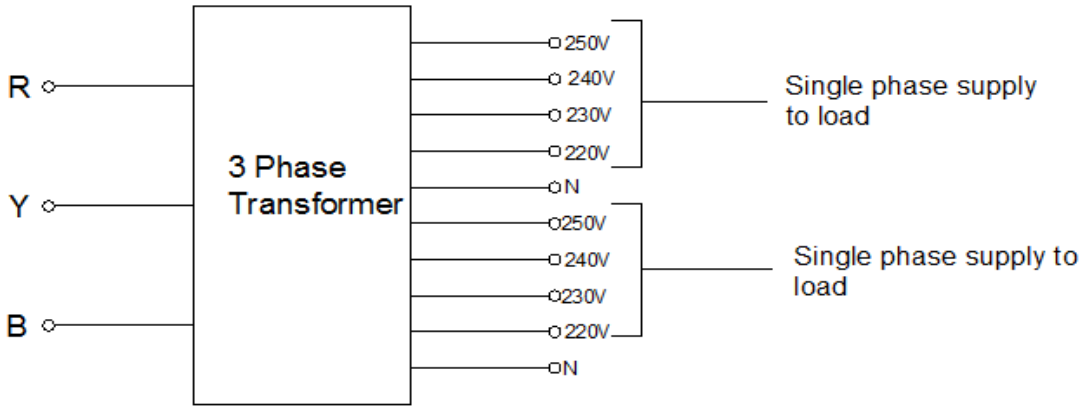

Fig 2: Tappings on transformer

The other end 'A' of teaser primary and the two ends 'B' and 'C' of the main transformer primary are connected to three phase supply.

Notation-

K: Transformation ratio.

M: Main Transformer

T: Teaser Transformer

N1: Turns primary transformer

N2: Turns of secondary transformer

3. Design of transformer

3.1 Data available:

KVA=0.5

i.e. S=0.5KVA, Core type

440/230V,

F=50Hz

K_s=0.9

Natural cooled power Transformer

3.2 Design:

3 phase core type power transformer

k = 0.0715

B_m = 1.126 Tesla

K_i = 0.45 (square core)

K_s = 0.9 always

δ = 1.2 to 2.3 = 1.8 A/mm^2

3.3 Main dimension:

(1) $E_t = k\sqrt{s} = 0.0715\sqrt{500} = 1.6$

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(2) $A_i = \frac{E_t}{4.44 \times f \times B_m} = \frac{1.6}{4.44 \times 50 \times 1.126} = 0.0064 m^2$

(3) $d = \sqrt{\frac{A_i}{K_i}} = \sqrt{\frac{0.0064}{0.2}} = 0.1192m$

(4) $A_{gi} = \frac{A_i}{K_s} = \frac{0.0064}{0.2} = 0.0071m$

(5) $K_w = \frac{8}{30+K_v} = \frac{8}{30+^{440}/_{\sqrt{3}}} = 0.029$

(6) $A_w = \frac{S}{3.33 \times f \times B_m \times A_i \times K_w \times \delta \times 10^3} = 0.00823\ m^2$

$A_w = h_w \times w_w$

Assume $\frac{h_w}{w_w} = 3$

i.e. $h_w = 3w_w$

$A_w = 3w_w^2$

$\therefore w_w = \sqrt{\frac{A_w}{3}} = \sqrt{\frac{0.00823}{3}}$

$= 0.0523$ m

$H_w = 3w_w$

$= 3 \times 0.0523 = 0.1569$

(7) For Square core

$W_c = h_y = 0.71d = 0.71 \times 0.1192 = 0.0846m$

$H = 2h_y + h_w$

$= 2 \times 0.0846 + 0.1569$

$= 0.3261m$

$D = w_w + w_c$

$= 0.0523 + 0.0846$

$= 0.1369$ m

$W = 2D + w_c$

$= 2x0.1369 + 0.0846$

$= 0.8266m$

3.4 Design of lv & hv winding:

Assume Δ/ϒ Connection

Primary (Δ) = 440 V → H.V winding

Secondary (ϒ) = 220/230/240/250 V → L.V winding

3.5 For l.v. winding:

(1) $N_s = E_t \times V_s$

For 220 V $= 1.6 \times 220 = 352$ Turns

For 230 V $= 1.6 \times 230 = 368$ Turns

For 240 V $= 1.6 \times 240 = 384$ Turns

For 250 V $= 1.6 \times 250 = 400$ Turns

(2) $I_{lv} = \frac{VA}{V_{LV}}$

For 220 V $= \frac{250}{220} = 1.136$ Amp

For 230 V $= \frac{250}{220} = 1.086$ Amp

For 240 V $= \frac{250}{220} = 1.0416$ Amp

For 250 V $= \frac{250}{220} = 1$Amp

(3) $a_{lv} = \frac{I_{lv}}{\delta}$

For 220 V $= \frac{1.136}{1.8} = 0.6311\ mm^2$

For 230 V $= \frac{1.086}{1.8} = 0.6033\ mm^2$

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For 240 V =$\frac{1.0416}{1.8}$ = 0.5788 mm^2

For 250 V =$\frac{1}{1.8}$ = 0.55 mm^2

(4) $A_{lv} = 2 \times T_{lv} \times a_{lv}$

For 220 V=2 × 352 × 0.6311=444.294 mm^2

For 230 V =2 × 368× 0.6311=444.0288 mm^2

For 240 V =2 × 384 ×0.5786=444.3648 mm^2

For 250 V=2 × 400 ×0.5786=444.3648 mm^{2}mm^2

3.6 For h.v. winding:

(1) $N_s=E_t \times V_{s=1.6} \times 440$=704 Turns

(2) $I_{hv} = \frac{VA}{Vhv} = \frac{500}{440}$ = 1.136 Amp

(3) $a_{hv} = \frac{I_{hv}}{\delta} = \frac{1.136}{1.8}$= 0.6311mm^2

(4) $A_{hv} = 2 \times T_{hv} \times a_{hv} = 2 \times 704 \times 0.6311$ = 888.58 mm^2

4. Applications

1. To give supply to an existing two phase system from a new three phase source.
2. To supply two phase furnace from three phase source.
3. To supply single phase for traction purpose.
4. To interlink a two phase system with a three phase system.

5. Future prospects

1.Two phase supply can be obtained by using single 3 phase transformer by placing winding on R amd B limbs of 3 phase transformer while current in Y phase increased upto 50% that of R and B phase.

2.Polyphase supply can be obtained because of high efficiency, transformers serve a excellent polyphase transformation devices in providing higher polyphase systems.

3.By using balance 3 phase contactor to the output supply, the 3 phase supply from main can maintain the output constant. Because of this unbalancing, low voltage or single phasing or two phasing can be avoided.

6. Conclusion

It has been proved that by using the scott connection of transformer or T-T connection we can get 2 phase supply by providing three phase supply as an input to the scott connected transformers. Here there are two single phase transformers are connected in such a fashion that it converts 3 phase supply into equivalent 2 phase with a phase difference of 90^0.It may be argued that 1 phase supply can also be taken from 3 phase supply by using any lines or any line and the neutral.

7. ACKNOWLEDGEMENT

We are thankful to all who helps us in all manners. I would also like to thank Mr. Charles F. Scott for developing such a good device .I express my gratitude towards my college management and my department authority for allowing me to work on this concept. I would like to thank all of them who involve in this concept with me directly and indirectly.

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ENERGY EFFICIENT DUAL AXIS SOLAR TRACKING SYSTEM USING LDR AS A LIGHT SENSING DEVICE

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ABSTARCT

The aim of this project is to present a solar energy collection technology using LDR. To present this solar based generation system, a dual axis solar tracker is designed. Solar energy is the most convenient technology to enhance the electricity production. The tracker actively tracks the sun and changes its position accordingly to maximize the power output. To develop this dual axis tracking system, Light dependent Resistor (LDR) is used as a sensor and DC geared motors to rotate the solar panel. The main objective of this project is to improve the gain by accurate tracking of sunrays. The reason of using solar energy is, it is free from pollution, cost of fuel used is free and also it is reliable. The dual axis tracking technology has higher energy gain as compared to fixed and single axis tracking system. It can be used for medium as well as large scale power generation depending on the availability of land, it can be installed at places of higher altitudes plateau and also, can be used as a domestic backup power system.

Keywords: - *Solar energy; Dual axis; LDR; Tracker; Solar panel; the sun.*

---

1. Introduction

In the recent times there have been many advancements in the automation systems. Instead of using artificial energy resources we can use renewable energy resources for automation. Among the most used renewable resources used we use solar energy because of its abundant availability. Researchers have recently used this energy resource and have over-come many limitations of solar energy. Solar panels are generally used for tracking of sun rays. The main objective of dual axis solar tracking system is to track maximum rays at any given time. Here we expose solar panels to maximum radiation or sun rays at any given time and location. We use LDR'S i.e. light dependent resistors for sensing the emitted light from the sun. These LDR'S constantly monitor the sunlight. It also adjusts the position of solar panel according to the intensity of sun rays being emitted. The solar panel moves in the direction of maximum sunlight horizontally as well as vertically. The focal point of this tracker is that it takes the sun as a guiding source unlike the other stationary solar trackers. Its light sensors constantly monitor the sunlight and adjust the position of the panel where the intensity of the light is maximum. The job of sensing the change in position of the sun is done by LDRs. It empowers the panel the energy throughout the day which increases its efficiency. The control circuit execute fetching the input from sensor and gives command to the motor in order to set the panel according to the position of sun. The project, therefore, gives design and materialization of solar tracking circuit mainly using LDR sensors, ICs and permanent magnet DC motor with gear arrangement to make it simple avoiding the complications of using microcontroller and to enhance the power output of solar panels. This method is very efficient and can be used on large scale.

Advantage is Solar energy creates absolutely no pollution. This is perhaps the most important advantage that makes solar energy so much more practical than fuel. Solar panels and solar lighting may seem quite expensive when you

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first purchase it, but in the long run you will find yourself saving quite a great deal of money. Solar trackers generate more electricity than their stationary counterparts due to an increased direct exposure to solar rays. Installation size, local weather, degree of latitude, and electrical requirements are all important considerations that can influence the type of solar tracker.

Solar thermal power plant may be included in large scale power generation. We can use the solar tracker for efficient charging of battery from solar energy. It also helps to generate more power from solar that is, if we want to increase the load this will be one of the most efficient methods. It can also be used for automation of the public gardens to avoid wastage of resources.

2. Construction

The following components are shown on the block diagram provided below:

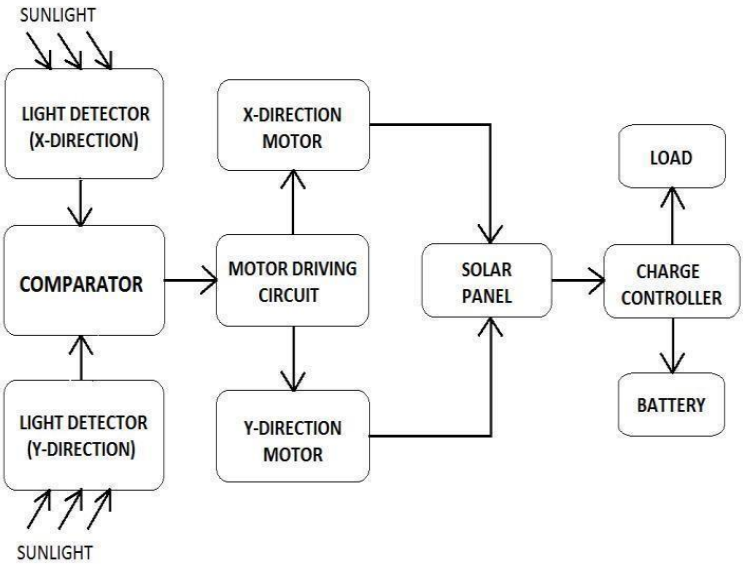

Fig.1: Block diagram

As the block diagram shows, sensors detect the change in intensity of light in X-direction and Y-direction. The output of both sensors is given to comparator which consists of IC LM339 that includes four op-amp comparator circuits. It will analogize both the outputs to decide the final position of solar panel. The compared output is given to the motor driving circuit. It includes motor driving IC L293D which can drive two motors in either direction simultaneously. Two permanent magnet DC motors are allied to this IC- one for X-direction movement and another for Y-direction movement of the solar panel. Motor driving IC coerces both motors with respect to the output of comparator. The combined result of motors sets the final position of solar panel as motors with gear assembly are connected to panel. Then depending on the solar energy grabbed by the panel, it is converted to equivalent amount of electrical energy. Finally, it is connected to load or battery with charge controller according to application and requirement.

2.1 Solar panel:

The single simplest way of getting more energy out of a solar panel is to have it track the sun. In fact solar panels that track the sun create around 30% more energy per day than a fixed panel. So in this dual axis solar tracking system we use solar plate with specific rating. The initial cost of setup is higher since it requires moving parts. Also require maintenance and upkeep since they'd be exposed to outdoors conditions year round. We need to power this equipment in order to keep it running and moving which then takes away from output.

2.2 PMDC Motor:

The permanent magnet dc motor is used in dual axis solar tracking system because it gives constant magnetic field and also we get constant speed not based upon speed control. Brushless DC motors use a rotating permanent magnet or soft magnetic core in the rotor, and stationary electrical magnets on the motor housing. A motor controller converts DC to

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AC. This design is simpler than that of brushed motors because it eliminates the complication of transferring power from outside the motor to the spinning rotor. Advantages of brushless motors include long life span, little or no maintenance, and high efficiency. The main reason for using this motor is that it is highly efficient and the flux density does not decrease with time.

2.3 LDR'S:

LDR (light dependent resistor) it is a one type of resistor whose resistance varies depending on the amount of light falling on its surface. When the light falls on the resistor, then the resistance changes. These resistors are often used in many circuits where it is required to sense the presence of light. This devices depend on the light when light falls on the LDR then the resistance decreases, and increases in the dark. When a LDR is kept in dark place its resistance is high and when it is kept in light its resistance will decrease.

2.4 Motor driver IC:

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single L293D IC. Dual H-bridge Motor Driver integrated circuit (IC). It works on the concept of H-bridge. H-bridge is a circuit which allows the voltage to be flown in either direction. As you know voltage need to change its direction for being able to rotate the motor in clockwise or anticlockwise direction, hence H-bridge IC are ideal for driving a DC motor. Voltage specification 5 v to 36 v.

3. Working

We are using four LDRs for the working of dual axis solar tracker. Out of four LDRs, two LDRs are placed on horizontal sides and two on vertical sides. However, the general points of consideration during the designing of the solar tracker are: simplicity, strength, stability, safety, flexible, ease of control, modularity, efficient extraction of solar energy, effective use of solar energy and energy storage, mobility of solar panel. Specification of the Dual Axis Solar Tracker Components:
Solar panel: 17 Volt, 15 W = 1 No's. Permanent magnet DC motor: 12 Volt, Power rating is 6W, 15 rpm.
Battery: 12 Volt = 1 Nos.
LDR 1 and 2 are used for horizontal and LDR 3 and 4 for vertical tracking operation. When LDR 2 receives more light than LDR 1, it offers low resistance than LDR 1 providing high input to comparators A1 and A2 at pins 4 and 7 respectively. As a result output pin 1 of A2 goes high to rotate motor M1 and hence the solar panel. When LDR 1 receives more light than LDR 2, it offers low resistance than LDR 2, giving a low input to A1 and A2 respectively. As the voltage at pin 5 of A1 is now higher than the voltage at its pin 4, its output pin 2 goes high and hence motor M1 rotates in opposite direction. Similarly LDR 3 and LDR 4 track the sun along Y-axis. In this way, therefore, we can collect maximum amount of solar rays to maximize the generated power output and hence efficiency than the stationary trackers.

3.1 Consideration & Calculations:

To calculate increase in efficiency over the stationary panels, the following method can be used:

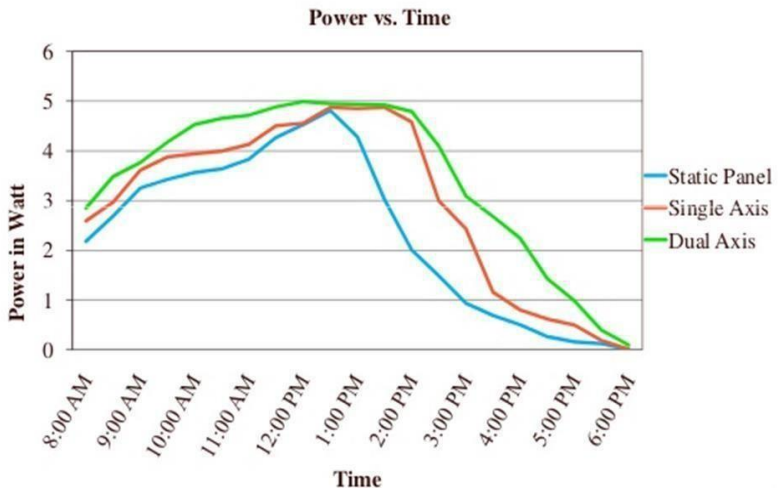

Fig. 2: Graph of output power over a day

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Initially, connect solar panel to the specific load with the help of DC to DC converter. Connect voltmeters and ammeters at the input and output to calculate input and output power. Note the observations at interval of every 30mins from 8 am to 5 pm. Now connect solar panel to the Dual axis tracker and with the whole assembly, repeat the above procedure. According to above values of Wout, plot a graph of output power against time with interval of 30 minutes. We will notice the difference in graph which is the increased efficiency of dual axis solar tracking system. Following graph is a retentive representation of the experiment.

Time taken to consume 1 Whr energy:
1 W-hr = 6 W- x hr
Therefore x = 0.16667 hr
0.16667 * 60 = 10 minutes i.e. 20 parts of half minute (if we assume motor will rotate for half minute in one instance)
And in one day there are 18 instances for which motor is working (assume)
Therefore,
20/18=1.111 day … i.e. 1 day and 16.8 hrs
This means power consumption of motor is very low and therefore efficiency is high.

3.2 Comparison (static panel, single axis, dual axis)

- Average power gain of the solar panel with dual axis tracking system over normal stationary arrangement is increased up to 40 to 50 %.
- Average practical efficiency of solar panel for dual axis tracking system is 7.75%, where 6.55% for single axis and 5.20% for static panel.
- Approximate average output power is 3.5W for dual axis solar tracker, 2.95 for single axis tracker and 2.34 for static panel.

We will get the following statistical graph for average output power:

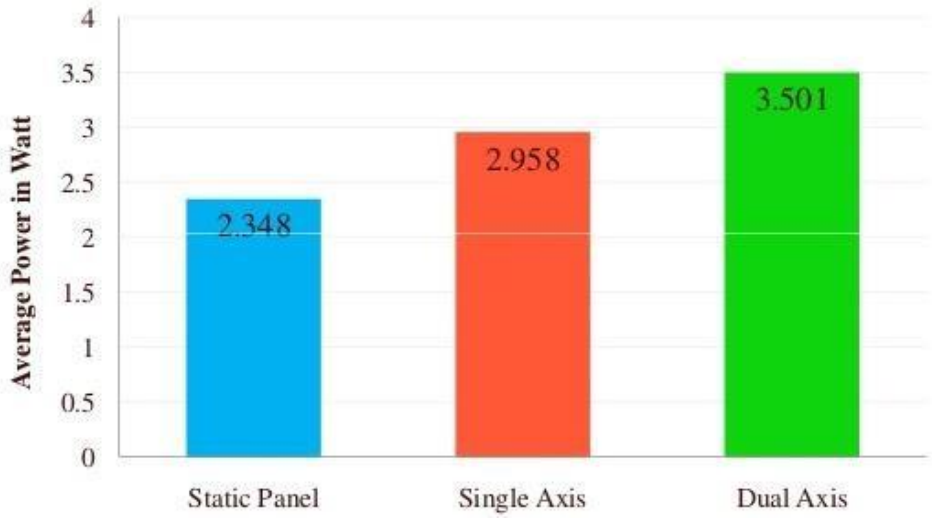

Fig. 3: Average output power

4. Conclusion

By making the use of this dual axis solar tracker the average power gain is increased up to 40%-50% over the stationary arrangement and 15%-20% over single axis tracking system with less consumption by the system itself. Basically, this project is a miniature model of large scale electrical generating system. A considerable amount of power could be obtained if it is implemented on a large scale with conservation of fossil fuels. To promote the ecologically sustainable growth while addressing the India's energy security challenge, the National Solar Mission-a major initiative of the Government of India

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and State Governments- will be constituted by this project. It will also constitute a major constitution by India to the global effort to meet the challenges of climate change.

5. ACKNOWLEDGEMENT

We shall be failing our duty, if we will not express our sincere gratitude to all those distinguished personalities with the help of whom we have successfully completed our project. My deep gratitude to **Dr. Arun Kumar**, PRINCIPAL, VIVA INSTITUTE OF TECHNOLOGY, who always been playing a great role in all round development of the study. My deep gratitude to **Prof. Bhushan Save**, THE HEAD OF ELECTRICAL DEPARTMENT and our project coordinator **Prof. Pratik Mahale** who has always been playing a great role in all round development of the student.

I would like to thank **Prof. Pratik Mahale** who is also my project guide for his valuable guidance, advice and constant aspiration to our work, teaching and non-teaching staff for their kind support, help and assistance, which they extended as and when required. Last but not least I wish to thank my friends for providing technical and moral support. I hope that this project report would meet the high standards of all concerned people and for their continuous co-operation during the whole period of project that helped us in enhancement of this project.

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New Approach of Double Sided Linear Induction Motor

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ABSTRACT

The linear motors are very effective drive mechanism for transformation and actuation systems. The low power linear motors are used in gate control, robotics, curtain movement and high power linear motors are used in conveyers, crane drives, flexible manufacturing systems, baggage handling. In this paper, design of the physical of double sided linear induction motor and study the different parameters of the DSLIM which are different rotary induction motor. As a special design and feature, the double sided linear induction generate attractive force between the primary and secondary. The speed of the motor can be vary by V/F method and the direction of the motor change using phase changer or limiting switch. The design of the DSLIM choosing main factors such air gap, magnetic field, number of turns per coil, number of pole, double or single layer winding, thickness of secondary plate are considered. The main advantage of LIM is that it has no mechanical gears to convert rotary motion to linear motor therefore frictional losses are decrease and efficiency of the motor increase. These motor is less maintenance, less costly, less complicated compare to mechanical rotary to linear converters.

Keywords*: -* *Linear Induction motor, Attractive Force, Magnetic Field, Magnetic Thrust, Motion Dynamics.*

1. Introduction

A Linear Induction Motor **(**LIM) is an advanced version of rotary induction motor. Linear induction motors can be made in many various arrangement as per the requirement in applications. The most uses a linear stator which can conceptually be formed by cutting the stator of a conventional cylindrical induction machine in a radial plane and unrolling it. The secondary member uses a simplified version of an unrolled squirrel cage induction motor rotor that comprises a conducting plate backed by a solid iron core. The polyphase rotary induction motor is shown below.

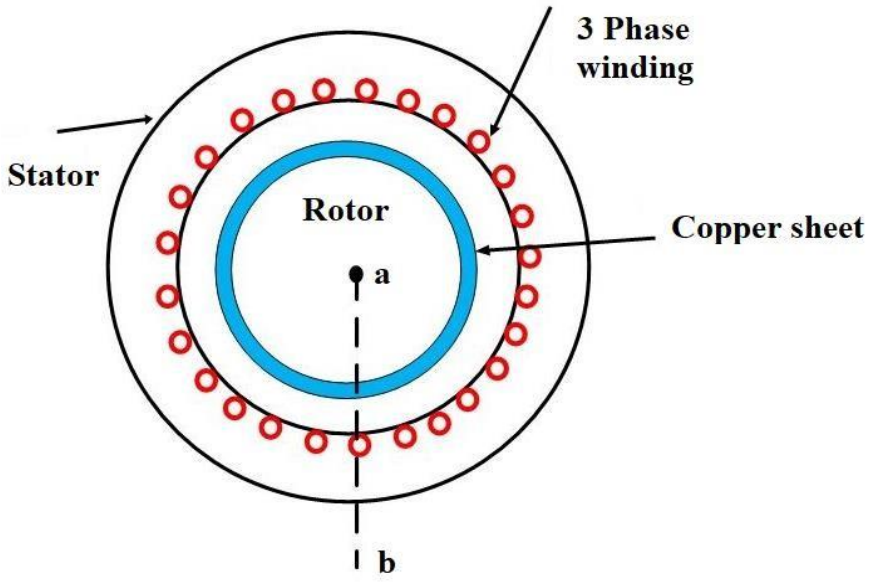

Fig.1: Polyphase rotary induction motor

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The Double-sided Linear Induction motor (DSLIM) is a special type of induction motor which gives linear motion instead of rotational motion, as in the case of conventional induction motor. It operates on the principle of which a conventional induction motor operates. The DSLIM is a LIM with a primary on both sides of a conducting secondary. A DSLIM are the usual choice for high-speed linear motor applications where no levitation is required. Linear electric machines are direct drives, they allow accelerations, and velocity and position-accuracy far better than their rotary counterparts; however, they are usually more expensive. LIM is conceptually a rotary motor is cut and unrolled. The Double sided linear induction motor has primary on both the sides of the secondary.The double sided linear induction motor (DLIM) is shown in the figure below.

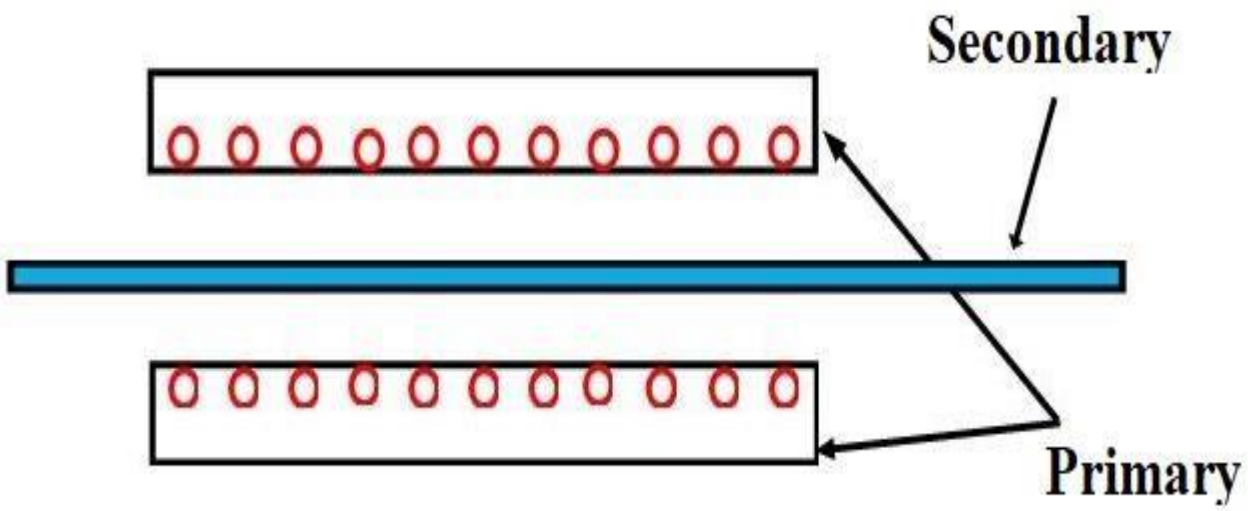

Fig. 2: Double sided linear induction motor

2. Working Principle

If the primary of the linear induction motor is connected to the three phase supply, a flux is produced which travel across the length of the primary. A current is generated in the conductor which is made of the copper material. The current, which is induced in the linear induction motor interacts with the travelling flux produces a linear force. If secondary of the linear induction motor is fixed and the primary is free to move, the force will move the primary in the direction of the travelling wave. The linear synchronous speed of the travelling wave is given by the equation shown below.

Vs=2f (pole pitch) m/s

Where f is the supply frequency in hertz.In the rotary induction motor, the speed of the secondary in the linear induction motor is less than the synchronous speed v_s and is given as

$$Vr=Vs\ (1-S)$$

Where s is the slip of the linear induction motor and is given as

$$S=(Vs-Vr)/Vs\ pu$$

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3. Block Diagram

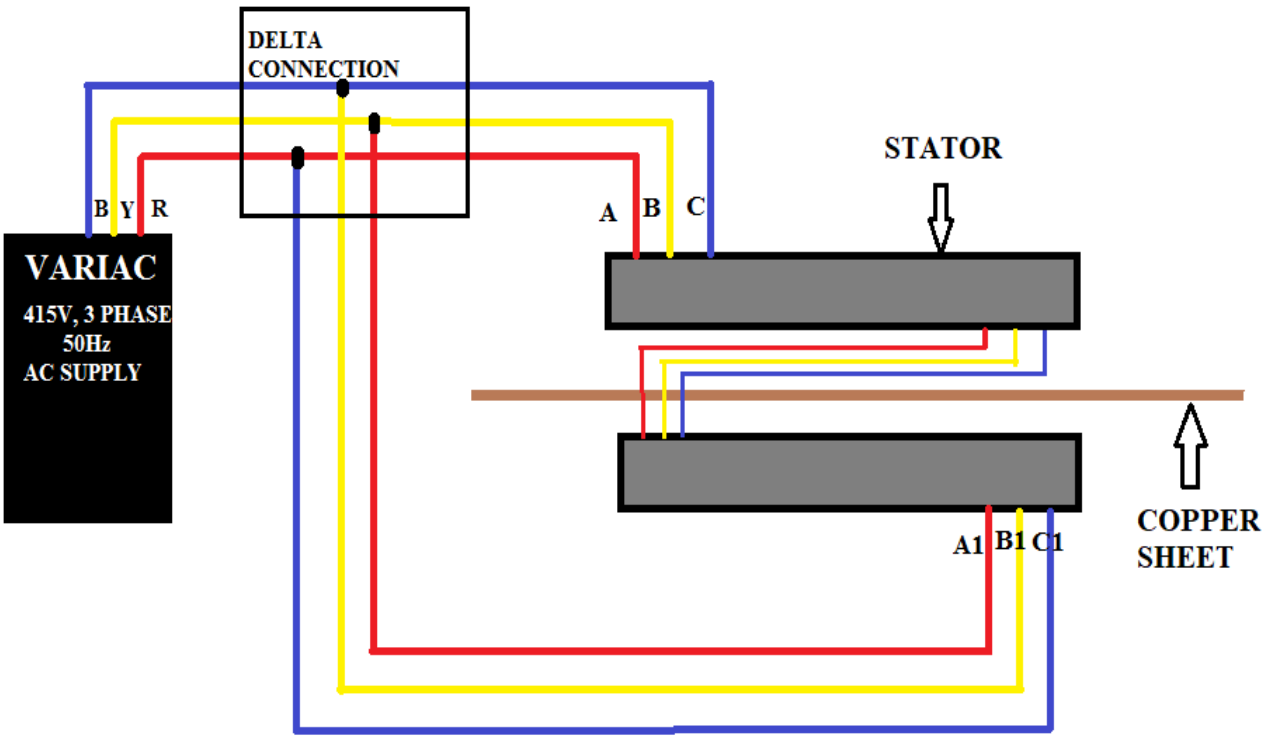

Fig.1: Block diagram of DSLIM

4. Designing and Calculation

4.1 Stator Design

DSLIM consist of two stator, which are made up of CRGO material. In this project we use E shape lamination to design the stator this is shown in below figure.

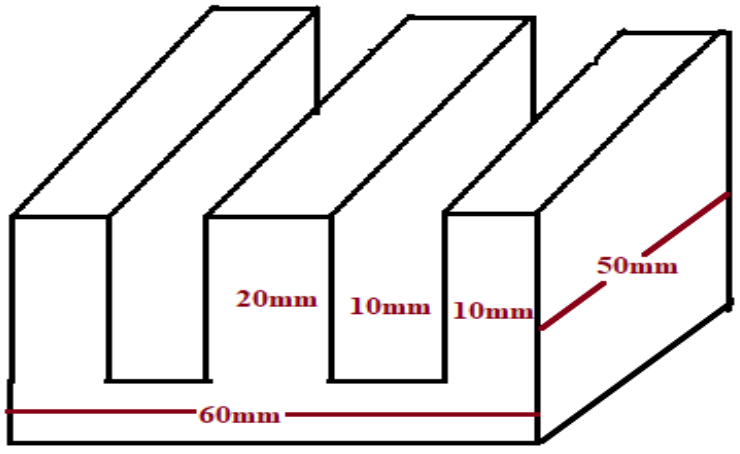

Fig.2: E Shape lamination with dimensions

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4.2 Winding Design

Here in this project we are use double layer winding per slot for better arrangement. Here we arrange in a way that at the end of each coil is underneath start of next coil. Specification of coil is given below.

Table-1: *Winding* Parameter

Parameter	Value
Turns per coil	180
Diameter of conductor	0.457mm
Area of conductor	0.210mm^2
Gauge	26

4.3 Copper Sheet

A moving copper sheet is used for the proper operation of DSLIM. The reaction plate (moving copper sheet) is made up of standard copper. The length of the reaction plate is 2m and thickness of reaction plate is 0.080"(2mm).

5. Designing Steps

A] First of all clean the lamination with paint thinner .Lamination is handle with very carefully to prevent any contaminations.

B] Lamination are made of set and each set contains 90 laminations. To make them tight varnish is applied between the laminations there shouldn't be air gap between the laminations.

C] Now winding of wire is done according to the given data.

D] Slot have two layer and two coil passes through the each slots.

E] Standard insulation paper is used with adhesive spray to cover the slots.it prevent from short circuit in windings.

F] Now next step is to assemble the winding.

G] Now take the reaction plate as mention above and placed it in between two stator with considering the minimum air gap.

H] Now connect the stator with a 3phase autotransformer give supply from stator to the control circuit. We will use limit switch to change the phase so that the direction of the reaction plate will change.

6. Conclusions

The main purpose of the working model of the double sided induction motor is to reduce the mechanical losses. Instead of rotating motion we are going to work on linear motion of rotor that's why we will eliminate the bearings. Therefore rotational and frictional losses are removed So the automatically the cost and size of DSLIM is reduce. This can be used as a conveyer belt in industries as well as escalator .We can change the motion in both direction forward as well as reverse using limit switch.

7. Acknowledgment

On this occasion of presenting our semester report, we express our deep sense of gratitude and personal regards to few people who helped us during our project and shared their knowledge and pervious time. It is indeed with utmost pleasure and pride; we extend our deepest gratitude and thanks to Dr. Arun Kumar, Principal, VIVA Institute of Technology for their immense help and support during our course. Our sincere thanks to Prof. Bhushan Save, H.O.D. of Electrical Department & Project Coordinator Prof. Pratik Mahale, VIVA Institute of Technology for their immense help and support during our course. We would like to express our gratitude to Prof. Anojkumar Yadav our project guide and all our faculty members for enlightening and guiding us throughout our course and helping us to cope up with problems we faced during our project.

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POWER SYSTEM CONTINGENCY ANALYSIS

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ABSTRACT

An important parameter in the operation of a power system is the need to maintain system security. System security involves practices suitably designed to keep the system operating when the components fail. In practical means, "secure" power system is the one with a low probability of system blackout or equipment damage. The security of a power system is very important to be evaluated to make sure whether the system will continue working in case one or more element stops to function properly. Contingency analysis (CA) is one such evaluating program which separates the Energy Management System (EMS) from a SCADA system which is a level low in complexity. Contingency analysis is done to check the system for overloads and other problems arising from a contingency. The purpose of the contingency plan is to check the change in the functioning of the device that will occur after the fault element is removed. Contingency analysis is performed considering the line and generator outage contingencies, in order to identify the effect of an increase in loading to a critical line and generator outages.

Keywords:-*Contingency analysis, Outage schedule, Maintenance, Network model, Power system.*

1. Introduction

Power System Security is defined as the ability of the power system to remain secure without serious consequences to any pre-selected list of credible contingencies. The most common operational problems are transmission equipment overloads and inadequate voltage levels at system buses. The process of diagnosing, whether the system remains in secure (normal) or insecure (emergency) state, is called power system security assessment. The operating states of the power system are as follows:

1.1 Normal or secure state

In the normal operating state, the system is said to be unharmed and all constraints like voltages at nodes, real and reactive power generation are satisfied. The aim of the power system is to keep the operating state of the power system to lie in the normal state. Even any small disturbance in the normal state can lead it to an abnormal state.

1.2 Abnormal or insecure state:

In an abnormal state, when the system is interrupted with disturbances like outages of generator or line, the operating conditions change and the variables like nodes voltages and powers (real and reactive); fail to comply with the operating limits or constraints. The abnormal state or insecure state is further classified into the following states;

a. alert
b. emergency
c. in-extermis (or islanding)

1.3 Restorative state:

When the power system is disturbed, because of its nature, can lead the power systems to a blackout or brownout state. In the blackout state, the entire load is cut-off from the generators by tripping of the generators or the transmission lines and then no load is supplied. In the brownout state, a partial load is supplied through the transmission network from other substation. The blackout state is more severe than the brownout state and requires many stages for restoring it back to the normal operating state. After the disturbance has occurred, by the restorative strategies operator in an EMS tries to bring

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back the power system to normal operating states. In this process, the generators and lines which have tripped will be brought back to service through a sequence of steps known as restorative measures.

Therefore in security study, it is important to focus on the power system's ability to withstand the effect of contingencies. Power system security involves the system monitoring which can be monitored by using telemetry systems or by the SCADA systems. It then studies on the important function of contingency analysis where the simulation is being carried out on the list of "reliable" outage cases so that the operator can have an indication of what might happen to the power system in an event of an unscheduled outage. This analysis gives the system operator the data and allows deciding some remedial action before the outage event can occur.

2. Security Analysis

Systems security can be classified into three major functions that are carried out in an operations control center:

1. System monitoring.
2. Contingency analysis.
3. Security-constrained optimal power flow.

System monitoring supplies the power system operations or sends up-to-date information on the conditions of the power system on real-time basis as load and generation change accordingly. Telemetry systems measure, monitor and transmit the data, voltages, currents, current flows and the status of circuit breakers and switches in every substation in a transmission network.

Contingency analysis is the study of the outage of elements such as transmission lines, transformers, and generators, and investigation of the resulting effects on line power flows and bus voltages of the remaining system. Contingencies referring to disturbances such as transmission element outages or generator outages may cause sudden and large changes in both the configuration and the state of the system. Contingencies may result in severe violations of the operating constraints. Consequently, planning for contingencies forms an important aspect of the secure operation.

The third important security function is security-constrained optimal power flow. In this function, a contingency analysis is combined with an optimal power flow which seeks to make changes to the optimal dispatch of generation, as well as other adjustments, so that when a security analysis is run, no contingencies result in violations. To show how this can be done, we shall divide the power system into four operating states.

A. Optimal dispatch: In this state, the power system is in priority to any contingency. It is optimal with respect to economic operation, but it may not be secure.

B. Post contingency: This is the state of the power system after a contingency has occurred. We shall assume here that this condition has a security violation (line or transformer beyond its flow limit, or a bus voltage outside the limit).

C. Secure dispatch: This is the state of the system with no contingency outages, but with corrections to the operating parameters to account for security violations.

D. Secure post-contingency: This is the state of the system when the contingency is applied to the base-operating condition-with corrections.

3. Methods for Contingency Analysis

Contingency is an unpredictable condition occurring in power system. The major aspect to detect contingency is the big problem to analyse. The analysis to detect this unpredictable condition is called as Contingency analysis. There are different methods to analyse contingency in power system. These methods are as follows:

a. Direct Methods
b. Indirect Methods

1. Direct Methods:

These methods involve screening and direct ranking of contingency cases. They examine the appropriate post-contingent quantities such as power-flows, voltages.

2. Indirect Methods:

These methods give the value without calculating the contingency quantities directly.

Linear Sensitivity Factors:

It becomes difficult to study many number of outages and therefore by using this factors it gives easy calculation of outages that may occur certainly.

There are two types of factors:

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a. Generation shift factors.
b. Line outage distribution factors.

Generation shift factors can be calculated as:

$$a_{\ell i} = \frac{\Delta f_{\ell}}{\Delta P_i}$$

Line outage distribution factor considers the outages in occurring in the line while distribution.

4. Modelling For Contingency Analysis

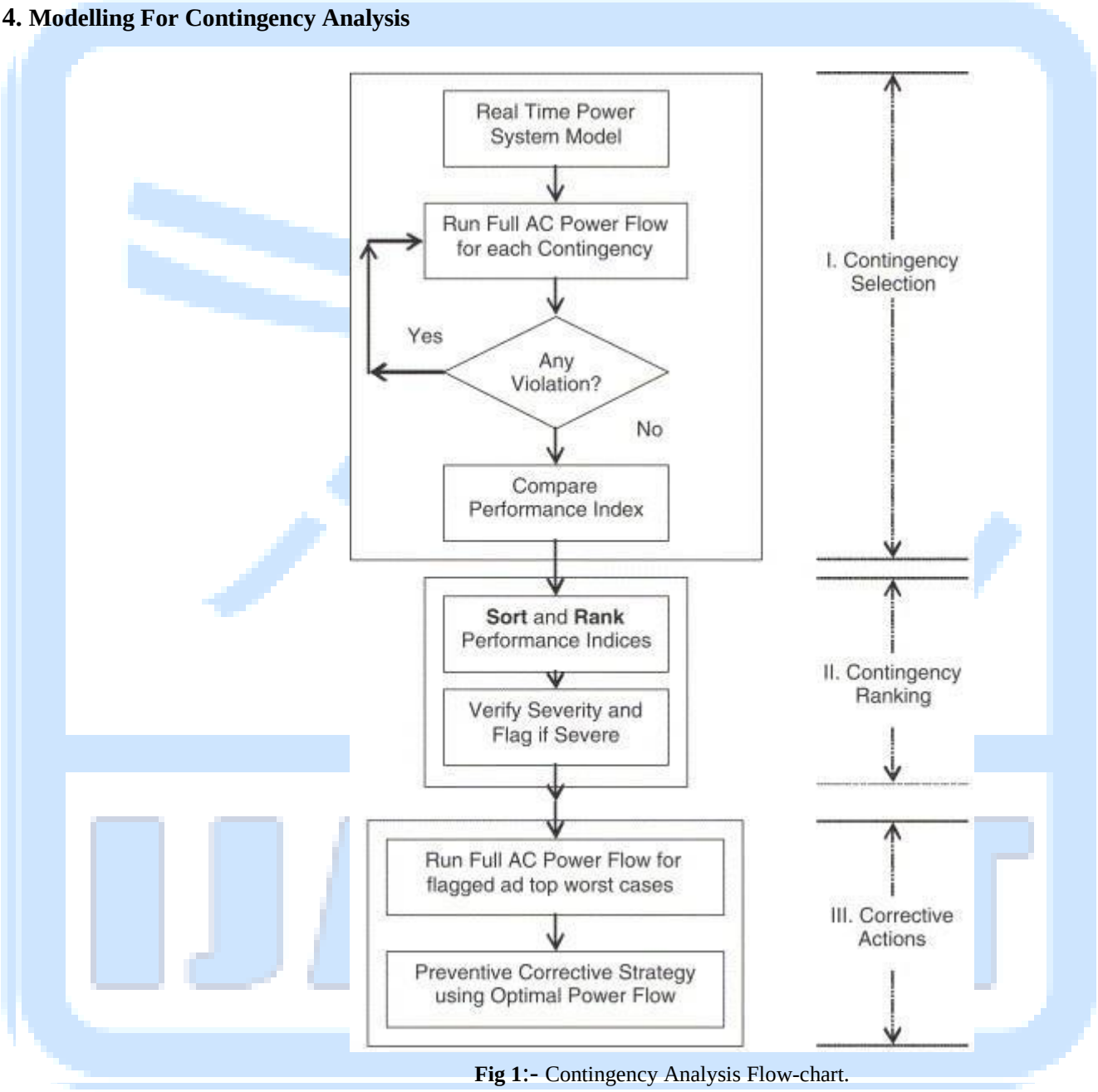

Fig 1:- Contingency Analysis Flow-chart.

Contingency analysis can be done in three steps:

1. Contingency selection.

In this stage, the power system examines the unpredictable condition occurred in real-time and detects the severity or effect of the contingency on the power system.

2. Contingency ranking.

According to the severity, the contingency is ranked and the data is followed by the next stage.

3. Corrective Actions.

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In order to minimize the contingency and make the system secure online and offline security analysis are performed. The corrective methods are planned and implemented and the system is brought back to secure state.

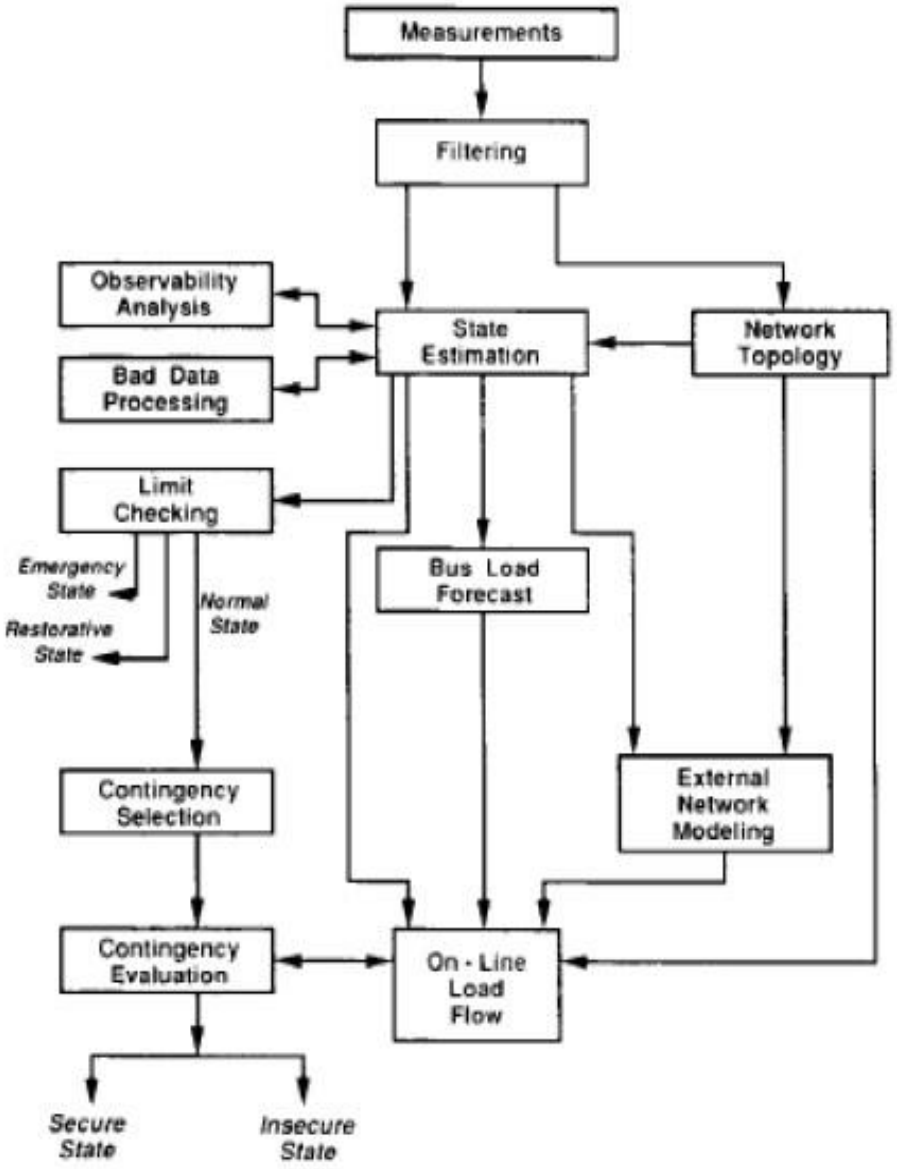

Fig 2: Major Functions of online Security analysis

Fig 2 shows the important functions in a contingency analysis in a flowchart form and how to evaluate whether the system is contingency free or not.
Online security analysis is done by EMS or SCADA which relates the data in real-time and perform the operation control of power system.

5. Conclusion

The increasing demand in the power system presents increasing challenges related to the security of power system. Hence it is important for the power system to be in secure state or normal operating state and fulfill the load demand with minimum outages. The contingency analysis is the correct method to detect the faults or outages in the transmission line or generator sets.

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CLEAN SOLAR ENERGY

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ABSTRACT

The sunlight can be one of the possible world power full renewable Department of Energy sources. Solar muscularity is finite vigour resource to sports meeting up long condition global muscularity crisis. The Holocene energy crisis and environmental encumbrance are becoming increasingly important and drawing enormous care to solar-energy use the present study is intended to review on recent approach in developing the STE and SPV engineering science for solar power generation. Capturing and use just the sunlight which strike the earth in one day could provide sufficient energy for the entire world all year. Solar power has the immense capacity to bring in stability to the fluctuating electrical energy tariffs in Bharat as it is cheaper than thermal and domestic coal. We have realized that solar radioactivity in the worst part of Republic of India is better than the best part of Europe. In India, the electricity demand is drastically increases. Solar Thermal (STE) and Photovoltaic Electrical energy (SPV) engineering can be implemented in India as solar imagination and large wasteland areas are widely available in the country. Solar thermal energy is finite energy resources to meet up long term global energy crisis. The recent energy crisis and environmental luck are drawing enormous attention to photovoltaic utilization. The utilization of solar energy in India has got prime quantity grandness in the present scenario of energy crisis in the country

Keywords*: -* *renewable energy, solar thermal & solar photovoltaic technologies, growth of solar energy in India, global energy crisis, fluctuating energy.*

1. Introduction

The natural world has utilized the sun's energy since the commencement of time, and while there has been lots of discussion about this, the truth is that the sun is both a quandary and a solution. Solar energy is an unchanging constant a staple in Earth's very ease. The sun may not have transmuted, but our construal of it has. We are now harnessing its energy to supersede traditional methods that have taken a toll on the planet. It may seem eccentric, but solar power has become a popular way to provide power to lighting systems that activate after the sun goes down. From street lights to garden lamps, solar power provides the energy needed to illuminate the tenebrosity tardy into the night. These lights contain batteries that charge during the day as sunlight hits the solar cells. At night, a photoresist or detects the absence of light and a circuit board triggers the batteries to discharge and provide power to LED lights, which are efficient and effulgent.

2. PV Cell

Photovoltaics are best kenneds as a method for engendering electric power by utilizing solar cells to convert energy from the sun into a flow of electrons by the photovoltaic effect. Solar cells engender direct current electricity from sunlight which can be acclimated to power equipment or to recharge a battery. The first practical applications of photovoltaics was to power orbiting satellites and other spacecraft, but today the majority of photovoltaic modules are utilized for grid connected power generation. In this case an inverter is required to convert the DC to AC. There is a more diminutive market for off-grid power for remote dwellings, boats, recreational conveyances, electric cars, roadside emergency telephones, remote sensing, and cathodic bulwark of pipelines. Photovoltaic power generation employs solar panels composed of a number of solar cells containing a photovoltaic material. Copper solar cables connect modules (module cable), arrays (array cable), and sub-fields. Because of the growing demand for renewable energy sources, the manufacturing of solar cells and photovoltaic arrays has advanced considerably in recent years. Solar photovoltaic power generation has long been visually perceived as an immaculate energy technology which draws upon the planet's most plentiful and widely distributed renewable energy source – the sun. Cells require auspice from the environment and are conventionally packaged tightly in solar panels. Photovoltaic power capacity is quantified as maximum power output under standardized test conditions (STC) in "Wp" (watts peak). The genuine power output at a particular point in time

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may be less than or more preponderant than this standardized, or "rated", value, depending on geographical location, time of day, weather conditions, and other factors. Solar photovoltaic array capacity factors are typically under 25%, which is lower than many other industrial sources of electricity.

3. Current Development

For best performance, terrestrial PV systems aim to maximize the time they face the sun. Solar trackers achieve this by moving PV panels to follow the sun. The incrementation can be by as much as 20% in winter and by as much as 50% in summer. Static mounted systems can be optimized by analysis of the sun path. Panels are often set to latitude tilt, an angle identically tantamount to the latitude, but performance can be ameliorated by adjusting the angle for summer or winter. Generally, as with other semiconductor contrivances, temperatures above room temperature reduce the performance of photovoltaics.[1] A number of solar panels may supplementally be mounted vertically above each other in a tower, if the zenith distance of the Sun is more preponderant than zero, and the tower can be turned horizontally as a whole and each panels supplementally around a horizontal axis. In such a tower the panels can follow the Sun precisely. Such a contrivance may be described as a ladder mounted on a tunable disk. Each step of that ladder is the middle axis of a rectangular solar panel. In case the zenith distance of the Sun reaches zero, the "ladder" may be rotated to the north or the south to eschew a solar panel engendering a shadow on a lower solar panel. In lieu of an precisely vertical tower one can optate a tower with an axis directed to the polar star, denoting that it is parallel to the rotation axis of the Earth. In this case the angle between the axis and the Sun is always more astronomically immense than 66 degrees. During a day it is only compulsory to turn the panels around this axis to follow the Sun. Installations may be ground-mounted (and sometimes integrated with farming and grazing)[2] or built into the roof or walls of a building (building-integrated photovoltaics). Another recent development involves the makeup of solar cells. Perovskite is a very inexpensive material which is being used to supersede the sumptuous crystalline silicon which is still part of a standard PV cell build to this day. Michael Graetzel, Director of the Laboratory of Photonics and Interfaces at EPFL verbalizes, "Today, efficiency has peaked at 18 percent, but it's expected to get even higher in the future."[3] This is a paramount claim, as 20% efficiency is typical among solar panels which utilize more extravagant materials.

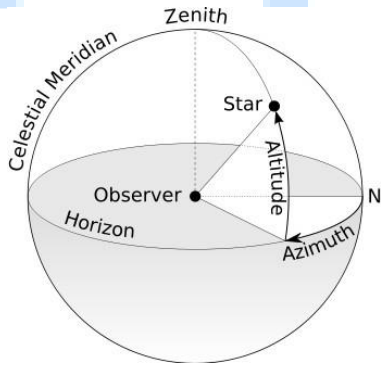

Fig 1: Show the direction of solar plate (Zenith direction)

4. Efficiency

Electrical efficiency (additionally called conversion efficiency) is a contributing factor in the cull of a photovoltaic system. However, the most efficient solar panels are typically the most sumptuous, and may not be commercially available. Ergo, cull is withal driven by cost efficiency and other factors. The electrical efficiency of a PV cell is a physical property which represents how much electrical power a cell can engender for a given insolation. The fundamental expression for maximum efficiency of a photovoltaic cell is given by the ratio of output power to the incident solar potency.

$$\eta = \frac{Pmax}{E.Acell} \quad [3]$$

The efficiency is quantified under ideal laboratory conditions and represents the maximum achievable efficiency of the PV material. Authentic efficiency is influenced by the output Voltage, current, junction temperature, light intensity and spectrum. The most efficient type of solar cell to date is a multi-junction concentrator solar cell with an efficiency of

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46.0%[4] engendered by Fraunhofer ISE in December 2014. The highest efficiencies achieved without concentration include a material by Sharp Corporation at 35.8% utilizing a proprietary triple-junction manufacturing technology in 2009,[5] and Boeing Spectrolab (40.7% withal utilizing a triple-layer design). The US company Sun Power engenders cells that have an efficiency of 21.5%, well above the market average of 12–18%.[6]There is an perpetual effort to increment the conversion efficiency of PV cells and modules, primarily for competitive advantage. In order to increment the efficiency of solar cells, it is paramount to optate a semiconductor material with a congruous band gap that matches the solar spectrum. This will enhance the electrical and optical properties. Amending the method of charge amassment is additionally utilizable for incrementing the efficiency. There are several groups of materials that are being developed. Ultrahigh-efficiency contrivances (η>30%)[7] are made by utilizing GaAs and GaInP2 semiconductors with multis junction tandem cells. High-quality, single-crystal silicon materials are habituated to achieve high-efficiency, low cost cells (η>20%).Recent developments in Organic photovoltaic cells (OPVs) have made consequential advancements in power conversion efficiency from 3% to over 15% since their exordium in the 1980s.[8] To date, the highest reported power conversion efficiency ranges from 6.7% to 8.94% for minuscule molecule, 8.4%–10.6% for polymer OPVs, and 7% to 21% for perovskite OPVs.[9][10] OPVs are expected to play a major role in the PV market. Recent ameliorations have incremented the efficiency and lowered cost, while remaining environmentally-benign and renewable. Several companies have commenced embedding power optimizers into PV modules called keenly intellective modules. These modules perform maximum power point tracking (MPPT) for each module individually, measure performance data for monitoring, and provide supplemental safety features. Such modules can additionally compensate for shading effects, wherein a shadow falling across a section of a module causes the electrical output of one or more strings of cells in the module to decrement.[11]One of the major causes for the decremented performance of cells is overheating. The efficiency of a solar cell declines by about 0.5% for every 1 degree Celsius increase in temperature. This betokens that a 100 degree increase in surface temperature could decrement the efficiency of a solar cell by about a moiety. Self-cooling solar cells are one solution to this quandary. Rather than utilizing energy to cool the surface, pyramid and cone shapes can be composed from silica, and affixed to the surface of a solar panel. Doing so sanctions visible light to reach the solar cells, but reflects infrared rays (which carry heat). [12]

5. Growth

Table-1: Solar PV module demand worldwide year wise in GW

2010	2011	2012	2013	2014	2017	2020
13.6 GW	20.2GW	23.8 GW	33GW	45.3GW	85 GW	200GW

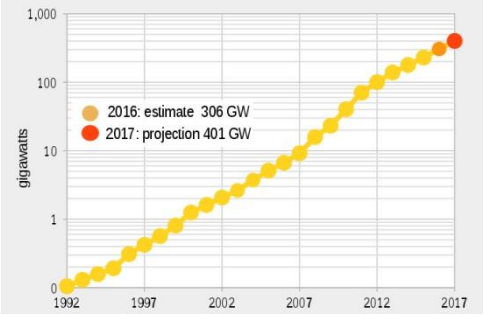

Fig.2: Worldwide growth of photovoltaics on a semi-log plot since 1992

Solar photovoltaics is growing rapidly and ecumenical installed capacity reached about 300 gigawatts (GW) by the cessation of 2016. Since 2000, installed capacity has optically discerned a magnification factor of about 57. The total power output of the world's PV capacity in a calendar year in 2014 is now beyond 200 TWh of electricity. This represents 1% of ecumenical electricity demand. More than 100 countries use solar PV. China, followed by Japan and the Amalgamated States is now the most expeditious growing market, while Germany remains the world's most immensely colossal engenderer, contributing more than 7% to its national electricity demands.[11] Photovoltaics is now, after hydro and wind potency, the third most paramount renewable energy source in terms of ecumenically installed capacity. Several market research and financial companies previse record-breaking ecumenical installation of more than 50 GW in 2015. China is presaged to take the lead from Germany and to become the world's most astronomically immense engenderer of

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PV power by installing another targeted 17.8 GW in 2015. India is expected to install 1.8 GW, doubling its annual installations. By 2018, ecumenical photovoltaic capacity is projected to doubled or even triple to 430 GW. Solar Power Europe (formerly kenned as EPIA) additionally estimates that photovoltaics will meet 10% to 15% of Europe's energy demand in 2030. In 2017 a study in Science estimated that by 2030 ecumenical PV installed capacities will be between 3,000 and 10,000 GW. The EPIA/Greenpeace Solar Generation Paradigm Shift Scenario (formerly called Advanced Scenario) from 2010 shows that by the year 2030, 1,845 GW of PV systems could be engendering approximately 2,646 TWh/year of electricity around the world. Amalgamated with energy use efficiency amendments, this would represent the electricity desiderata of more than 9% of the world's population. By 2050, over 20% of all electricity could be provided by photovoltaics. Michael Liebreich, from Bloomberg Incipient Energy Finance, anticipates a tipping point for solar energy. The costs of puissance from wind and solar are already below those of conventional electricity generation in some components of the world, as they have fallen sharply and will perpetuate to do so. He additionally asserts, that the electrical grid has been greatly expanded ecumenical, and is yare to receive and distribute electricity from renewable sources. In integration, ecumenical electricity prices came under vigorous pressure from renewable energy sources, that are, in part, ebulliently embraced by consumers. Deutsche Bank optically discerns a "second gold rush" for the photovoltaic industry to come. Grid parity has already been reached in at least 19 markets by January 2014. Photovoltaics will prevail beyond aliment-in tariffs, becoming more competitive as deployment increases and prices perpetuate to fall. In June 2014 Barclays downgraded bonds of U.S. utility companies. Barclays expects more competition by a growing self-consumption due to a coalescence of decentralized PV-systems and residential electricity storage. This could fundamentally transmute the utility's business model and transform the system over the next ten years, as prices for these systems are soothsaid to fall.

6. Future Growth of Solar In India

For solar CSP & PV together, National Solar Mission endeavors to reach an installed capacity of 1- 2GW by 2013,4-10GW by 2017 and 20GW by 2020.Thar Desert has been set for solar power projects ample to engender 700 - 2100GW.National Solar Mission & other Generation Predicated Regime Incentives(GBI) are available through Ministry of Incipient & Renewable Energy. Regime is expected to spend $ 19 billion until 2022 on this project. Key bottlenecks and barriers of this project are the cost of solar PV, high population density (land scarcity) and technology obsolescence. It is expected that by 2016 the solar power could be 15% lower than the most extravagant grid connected conventional energy resources. Indian market will optically discern the paramount change.8GW obtained from conventional sources will correspond to 25 to 30 GW from solar generation in near future. The rapid injuctive authorization of electricity & fossil fuel availability could increment the solar power potential to more than 50 GW within 2022.Initiatives taken in lowering the solar costs in amalgamation with elevating price in grid power will convince the distribution companies, private firms utilizing open access & firms putting up their own captive capacity to initiate its magnification phase & make solar power cost-efficient alternative to conventional power source.

7. Conclusion

The incremented collaboration between USA & India, on energy efficiency can drive economic activity & productivity, invigorate energy security & amend environmental impacts. Development of solar sector in India has been visible ever since independence. Solar industry has uplifted the Indian society to an immense socio-economic magnification opportunity. But solar industry requires auxiliary polices for its perpetual magnification. Investors are keen enough toward this sector in our country thereby contributing to the development of economy via three fold return(i.e. economically, convivially & environmentally).The institutional framework & cooperation in Incipient &Renewable energy between U.S.A.& India emboldens & enhances the communication

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GRID POWER QUALITY IMPROVEMENT AND BATTERY ENERGY STORAGE SYSTEM USING WIND ENERGY

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ABSTRACT

It has been known that the maintenance of constant voltage level at grid should be maintained at any case. Power quality of electric supply is very essential term and necessity for today's consumer. Due to some problems the power nature of grid gets affected. Voltage interruption, Overvoltage, under-voltage, Voltage lag is some of the difficulties that occur. For resolving this problem we develop this circuit which generates power from wind energy. The renewable energy of wind resource is most efficient and promising power source worldwide. In this paper we are presenting STATCOM principle with a unique idea of storing power generated from renewable source in battery system whose output is given to the inverter. Now the power in inverter is converted from dc to ac which is then given directly to the grid for constant power regulation.

Keywords: - *Battery energy storage system (BESS), Wind energy Generating System (WEGS), Static Compensator (STATCOM).*

1. Introduction

1.1 General

Power improvement is most essential term for the today's consumer but it is more dependent on operation of a supply network. By Integrating wind energy in present Power system we can technically control voltage regulation, constancy, power quality issues. At present 28000 + wind energy turbines are present all over world, India is on 4th rank in utilizing wind energy. The power which we obtain from wind energy fluctuates because of tower shadow, Turbulence & wind shear causing variation of power on the grid.

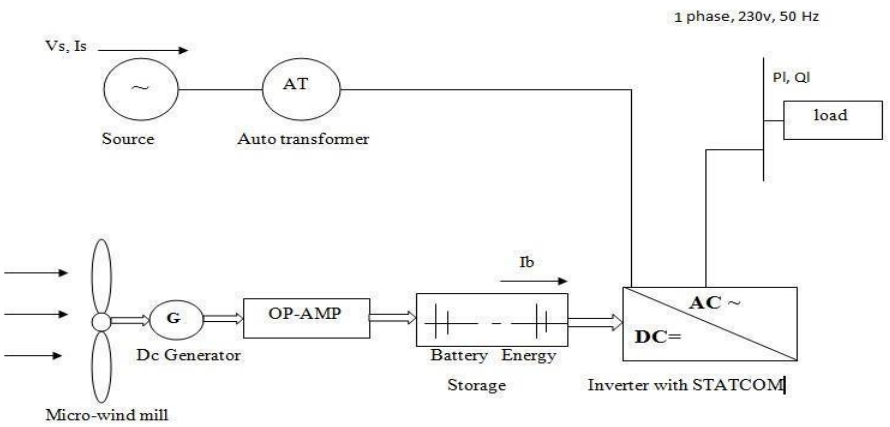

Fig.1: schematic representation of grid power system.

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1.2 Power Quality Issues

Proper power quality is one which has uninterrupted and sinusoidal voltages having equivalent figures of frequency and amplitude. The basement of power quality is dependent on physical qualities and electricity properties etc. We can express it in terms of voltage, frequency and discontinuities rottenly.

1.3 Grid side power quality issues

The problems of quality of power in the grid side that affect the WEG (Wind Electric -Generator) are mostly dependent on the Quality of voltage that is being supplied to the consumers.

Voltage diversion: Active and Reactive power both related with wind sources are affected because of voltage variations. As voltage conditions decrease current through generator increases. Results in heavy line losses. leading to changes in the pf as the installed capacitor generated capacitive VAR decreases as voltage falls.

Frequency Variations: The change in frequency affects the generation of power in WEG greatly by fluctuation in aerodynamic efficiency. Frequency variations lead to inaccurate peak speed ratios and decreased dynamic efficiencies of air. These tends to lessen the energy storage and output power generated from wind turbines.

Voltage transients: Heavy transient voltages could be obtained due to on and off of capacitors with the help of mechanically driven switches, which are the integrated part of WEG for reactive power reimbursement. These internally generated dangerous transients could lead to severe damage to sensitive electronic components and devices of the WEG control system eventually and also may lead to system collapse unfortunately.

Voltage unbalance: Voltage unbalance is result of large imperfect loads. The unbalance in voltage leads to currents which are negatively sequenced to internal induction machines flow eventually, leading to overheating.

2. Extraction of Wind Power With Batteries

The output energy obtained from generator of wind energy and Battery Energy Storage System (BESS) with distributed energy is configured on its mechanism of operation and it consists the control techniques for controlling the inverter. The inverter with STATCOM principle injects which leads to the way that source current are harmonic free and there is phase improves both pf and quality of power. The grid connected electrical system, shows wind energy generation system (WEGS) and battery energy storage system (BESS) with STATCOM type connection.

2.1 Generating system of Wind Energy

We get dc voltage of bus from the wind energy generating system (WEGS) which includes turbine, induction generator mechanically coupled to turbine, step up transformer, and rectifier. We represented stable dc power flow for stable dc bus voltage.

The proposed system with battery energy storage has certain objectives as follows:

- Unity power factor and quality of power.
- Active and reactive power supply coming by means of wind generator and battery storage system to load.
- Self operation when there is failure of grid.

The available system of wind energy is represented as below,

$$Pwind = 1/2\rho\ AV3wind$$

Where ρ (kg/m3) is the density of air and A (m2) is the area swept out by turbine blade, Vwind is the wind speed in m/s. Extraction of all kinetic energy of wind is not possible, thus fraction of power in wind is extracted. This is known as wind turbines coefficient of power Cp. And is given as,

$$Pmech = Cp.Pmin$$

The mechanical energy obtained by wind turbine is given by,

$$Pmech = CP\ (1/2)\ \rho\ AV3wind$$

Where R is termed as blade radius.

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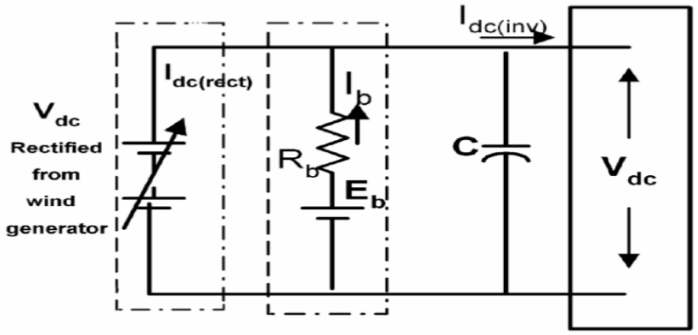

Fig. 2: Battery storage system

2.2 DC Link for Battery storage and Wind energy Generator

For need of voltage regulation we use Battery Energy Storage System (BESS). It immediately infuses or absorbs power which is reactive to stabilize the grid system over a long extent. It also looks after the fast rate of distribution and transmission system genuinely. By charging and discharging operations the BESS can be used to manage the system operations when the power changes are introduced in it. The connection of battery is made parallel to dc capacitor of STATCOM. We can charge the Battery Energy Storage System (BESS) with the help of wind Generator. The use of dc link capacitors is more efficient, less expensive and is expressed as follows.

$$C\ d/dt\ Vdc = Idc(rec)-Idc(inv)-Ib.$$

Where C is electrolytic capacitor, V_{dc} is I_{dc} (rec) is dc-side rectified current, I_b is given which is the current of battery connected in series connected and resistance R_b. Then its voltage level of the battery. The output Voltage V_{dc} can be stated as,

$$Vdc = Eb- Ib*Rb$$

Where battery current is expressed by I_b

3. Future Scope

For better voltage regulation Fuzzy –PI control technique possessed better quality of operation than the conventional controller. The Generation of switching signal is carried out with the help of hysteresis current controller for inverter in a presize way for cancelling the harmonic current present in the system. The basic STATCOM controlled scheme for improving the power quality can also be simulated in MATLAB/SIMULINK.

During the course of this research, the following issues have been observed for the future work.

- The research work can be extendable for the use of wind energy.
- The controlling schemes can be enhanced to design different control schemes.
- The proposed scheme can be used with battery-energy system even in the absence of solar energy during night times and cloudy weather days replacing solar system.

4. Conclusions

This paper is all about the STATCOM based control scheme for improvising the quality of power integrated in a system of wind energy and connected to system grid. The issues related to power quality, its disadvantages, its effects which are faced by the consumer and utilization of electric energy are explained. Quick and effective response is provided by the Battery energy storage system which also enhances the performance at the time of changes of wind turbine output and leads to improvement in the voltage quality of system. This scheme thus provides the system to operate both in power quality mode and also in standalone.

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5. ACKNOWLEDGMENT

On this occasion of presenting our project report, we express our deep sense of gratitude and personal regards to a few people who helped us during our project and shared their knowledge and precious time. It is indeed with utmost pleasure and pride; we extend our deepest gratitude to Dr. Arun Kumar, Principal, Viva Institute of Technology for his motivation and credence in us. Our sincere thanks to Prof .Bhushan Save, H.O.D. of Electrical Department, Viva Institute of Technology and our project co-ordinator Prof. Pratik Mahale and co-guide Prof. Mukesh Mishra for their immense help and support during our course. We would like to express our gratitude towards all our faculty members for enlightening and guiding us throughout our course and helping us to solve the problems we faced during our project. Our indebtedness and reverence to all our friends for being a constant source of inspiration and encouragement.

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A REVIEW PAPER ON MODEL PREDICTIVE CONTROL TECHNIQUE IN POWER ELECTRONICS APPLICATION

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ABSTRACT

This Paper is about the classical converter control methods along with classical electrical drives control methods. Model predictive control technique first looks at control methods for power electronics converters and drives and presents the basic principles of Model predictive control. This technique is also to control of a 3-phase inverter as well as control of a matrix converter and control of a neutral point clamped and etc. While there are also some methods of control of electrical energy like pulse width modulation which is not covered in this paper.

Keywords: - *Model predictive control (MPC), Pulse Width modulation (PWM). Modular multilevel converters (MMC), sub module (SM), three level neutral point clamped (3L-NPC), active neutral point clamped (ANPC)*

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1. Introduction

Model Predictive control is a topic on which research work is having so much scope and from the last so many decades it is happening. Earlier it was mainly for the industry process but now a days it is very important in the power electronics converters. It is a technique in which by making a small change the complete technique can be change or it can be used in different converters. The main focus of this technique is to reduce the transient time of the converters so that it allows the linear as well as nonlinear circuits and give a very fast response.

The main reason of this paper is that the computational power of modern microprocessors has dramatically increased. This made it possible to implement intelligent control strategies and more complex technique, like Model Predictive control, in standard control. Now at this time, Model Predictive control for power electronics converters and drives can be considered as very stable technology in the research and different development stages. Further development and research efforts are still necessary mainly to reduce the process time in order to bring this technology to the industrial and commercial level. The main moto of this paper is to analysis of the most recent advances and current state technique in the application of Model Predictive control for power electronics drives.

2. Operating Principle

In figure 1 the basic of the model Predictive control is shown and applied for the current control in a voltage source inverter with output Resistive and inductive load where the reference and required currents at instant k + 2 are used in order to compensate for the digital implementation delay. The algorithm is repeated for each sampling time and performs the operation.

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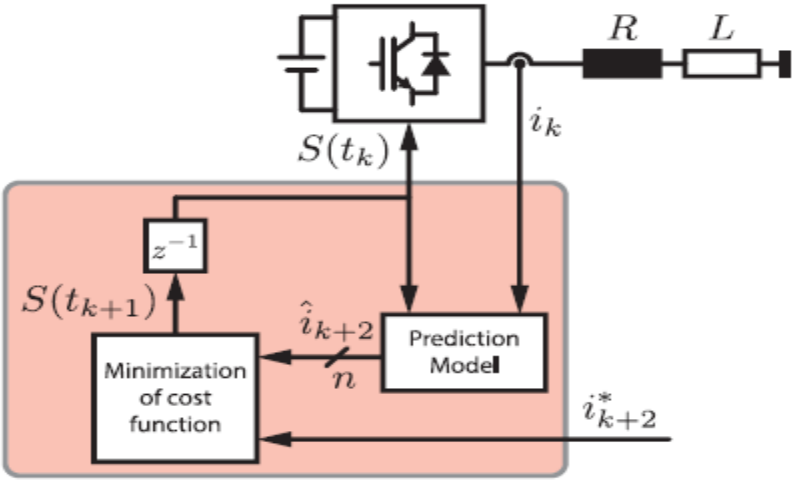

Fig.1: Model Predictive control Basic Block diagram

In the controller we have the family like Model Predictive control which explains the uses of the model of the system to be controlled. Model Predictive control in general defines the control action by reducing the cost function which is desired in the behavior of the system. The cost function compares the predicted system of the power electronics output with a reference. The predicted outputs are generated from the system model. In general the each sampling time Model Predictive control controller calculates a control action sequence which is responsible to reduce the cost function, but there are only this technique is applied to the system. Even Model Predictive control controllers solve an open-loop control problem, the MPC algorithm is repeated in output wise at every sampling time it means it providing a feedback loop and potential output with respect to system uncertainties. The use of Modular multilevel converters for power electronics, a basic Model Predictive control strategy in which a generalized circuit of a three-phase MMC is shown in Figure. The input of this circuit is dc system of MMC is often referred to as a dc-bus or dc-link, and it is connected across the circuit with positive and negative bars of the converter. We also need a 3-phase ac system which is connected to the midpoint of each converter leg (a, b, and c). Each leg of Modular multilevel converters is divided into two arms. The upper arms connected to the positive bars as noted as (u), and lower arms connected to the negative bars as noted as (u).

It is seen that each arm consists of a group of submodule and an inductor. The inductor helps to limit the inrush current because of the instantaneous voltage difference between the different arms. Also, it reduces the magnitude of ac circulating currents in a Model Predictive control. The Model Predictive control can be designed with a different number of submodules, depending on the operating voltage, application, and the rating of insulated-gate bipolar transistor devices.

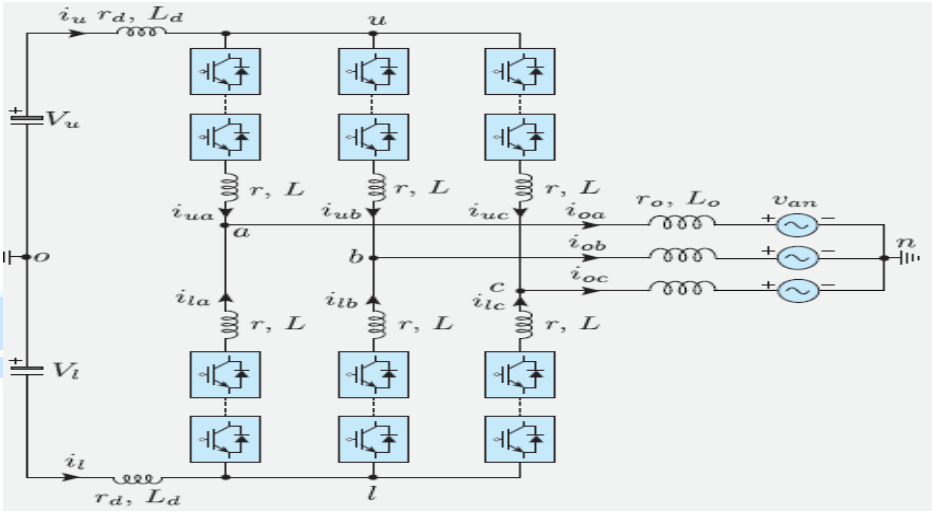

Fig.1: Configuration of a three-phase MMC.

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More precisely, a cost function that reflects the problem of keeping the controlled variables (torque, flux, and converter's neutral point potential) within bounds is used, and the selection of the appropriate voltage vector (combination of inverter switching positions) is done based on a longer horizon. The complexity is kept manageable by introducing the concept of extrapolation of the output trajectories (essentially a version of move-blocking MPC), in order to allow the controller to predict the system's behavior further into the future without the need to branch over an exponentially increasing number of future control input scenarios. The 3L-NPC-SM is constructed with four semiconductor devices, two clamping diodes, and two capacitors. The loss distribution between the devices and the neutral-point voltage balance are the major issues in the NPC-SM. Due to the neutral-point balancing issue, the operating region of NPC-SM is limited at the higher modulation indices. The NPC-SM has higher device power losses and low efficiency compared with the HB-SM. From the control and design perspective, the NPC-SM is not an attractive solution for an MMC. The configuration of 3L-ANPC-SM is shown in Fig. 3(e). The active devices provide the additional redundancy switching states to control the neutral point current and to ensure the equal loss distribution between the devices. The ANPC-SM generates positive voltage levels only. Hence, it cannot block the dc-side fault current. The power losses and efficiency of ANPC-SM is quite similar to the NPC-SM. Another variation of a three-level SM is a neutral-point piloted SM (3L-NPP-SM) and its configuration. In NPP configuration, the neutral point is connected to the output terminal through an anti-series connection of IGBT devices. Also, the devices in each leg should be designed with two times the voltage blocking capability of the NPC and ANPC SMs. The NPP-SM generates three positive voltage levels only. This SM is not suitable for the bipolar operation and cannot block the dc-side fault current.

3. Conclusion

Model predictive control is a very attractive solution for controlling power electronic applications. This paper given an idea about the present state of Model predictive control for power electronics converters and drives, including the most recent technique. The operating principle of Model predictive control has been reviewed, and then it can be concluded that the implementation of MPC depends on three key elements, namely the prediction model, the cost function, and the optimization algorithm. Several issues related to these topics have been investigated by the research and industrial communities. The most relevant issues are cost function selection, weighting factor design, reduction of the computational cost, and the extension of prediction horizons. This paper summarized different solutions for these matters that have been proposed in the literature, introducing the most important advances in MPC applied to power converters and drives.

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A STUDY OF SMART TECHNOLOGIES AND CLEAN ENERGY TECHNOLOGIES TO REDUCE ENERGY DEMANDS

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ABSTRACT

The population in cities and around the cities is increasing exponentially. Due to limited area, cities have been start growing vertically. This has led to numbers of high rise building in cities. The energy requirement of these building is also high. In order to limit energy usage in these building without affecting the needs of residents require the use of smart technologies and clean energy technologies. In this paper it is discussed about different challenges and issues related to fulfil the demand and solution to it. It also provides the information about clean energy technologies like cool roof, roof top solar, solar water heater, water pumping, lighting, and elevators which consume bulk of energy in high rise building. This paper also focuses on the usages of renewable energy and issues related to it.

Keywords*:* - *Energy conservation, energy audit, energy demand, clean energy technologies*

1. Introduction

1.1 Energy conservation and audit

Final energy consumption can be analysed by taking into account the energy demand in each sector like industry, transportation, residential and agriculture. Energy consumption by 2015 year will amount to roughly 70% of the gross world production, because of losses mainly in electric power production plants and in distribution and other transformations inside energy industries. Energy saving is a social responsibility of every individual. In this paper we have analysed the different methods of energy auditing and we have analysed the energy consumption of our EEE department in K. L. University and provided the paths of less energy consumption.

An energy audit is an inspection, survey and analysis of energy flows for energy conservation in a building, process or system to reduce the amount of energy input into the system without negatively affecting the output. It shows where the power consumption is more in the given system. It can also be called as controlling of the power to avoid losses for maximize efficiency

1.2 Need for energy audit

In any industry, the three top operating expenses are often found to be energy (both electrical and thermal), labour and materials. If one were to relate to the manageability of the cost or potential cost savings in each of the above components, energy would invariably emerge as a top ranker, and thus energy management function constitutes a strategic area for cost reduction. Energy Audit will help to understand more about the ways energy and fuel are used in any industry, and help in identifying the areas where waste can occur and where scope for improvement exists. The Energy Audit would give a positive orientation to the energy cost reduction, preventive maintenance and quality control programs which are vital for production and utility activities. Such an audit program will help to keep focus on variations which occur in the energy costs, availability and reliability of supply of energy, decide on appropriate energy mix, identify energy conservation technologies, retrofit for energy conservation equipment etc. In general, Energy Audit is the translation of conservation ideas into realities, by lending technically feasible solutions with economic and other organizational considerations within a specified time frame. The primary objective of Energy Audit is to determine ways to reduce energy consumption per unit of product output or to lower operating costs. Energy Audit provides a "bench- mark" (Reference point) for managing energy in the organization and also provides the basis for planning a more effective use of energy throughout the organization.

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1.3 Energy demand

As the thirst of power grows day by day, Will supply of electricity in the coming time be enough to full fill the need of all? What about the quality of the electrical energy generated? Are they environment friendly? Here's a look at the big challenges facing on the energy front….

- Every day, human beings consume more than a million terajoules of energy. Roughly equivalent to what we would use if all 7.5 billion people on earth boiled 70 kettles of water around the clock.

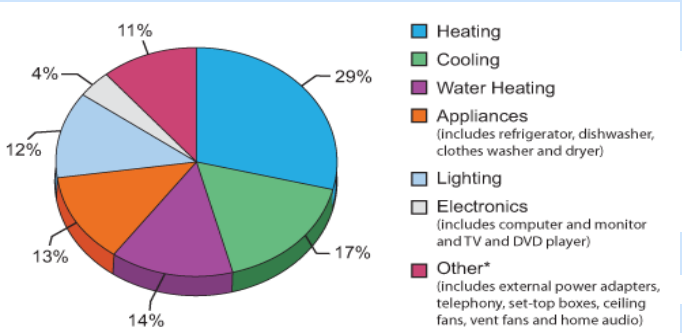

Fig. 1: Energy Consumption

- Over half of our electricity generation from fossil fuel which are extracted from deep within the earth's crust. Coal mining in India began in 1774 when John Sumner and Suetonius Grant Heatly of the East India Company commenced commercial exploitation in the Raniganj Coalfield along the Western bank of Damodar river. As on 31 March 2015, India had estimated coal reserves of 306.6 billion metric tons (338.0 billion short tons), the fifth largest coal reserves in the world.

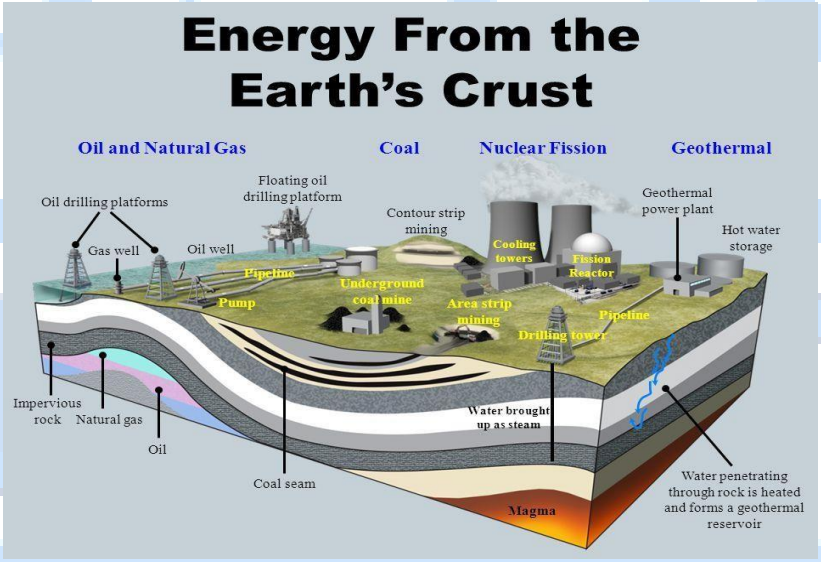

Fig. 2: various fossil fuels from Earth's crust

- A big problem is how to tackle with the immediate hike in electricity demand. There are still about 1 billion people who do not have access to electricity. By 2030 India's energy consumption will have increased by 50%.

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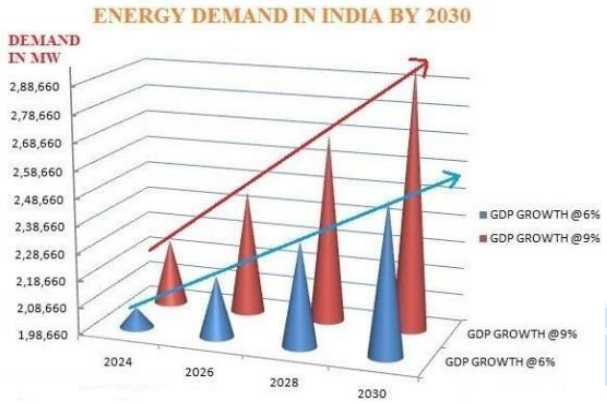

Fig. 3: Energy demand in India by 2030

- Presently cooling is a hot issue. Scientists said "the greatest challenge is approximately 17% of energy is going to be cooling". The growth of the middle class in India will see for air conditioning.

Answer to all above challenges is Renewable energy

Around a fifth of the world's primary energy supply comes from renewable sources like wind, solar, hydro and geothermal. The sector is expected to continue growing by 2.6 % each year until 2040. Worldwide, solar energy production grew by 50% in 2016.

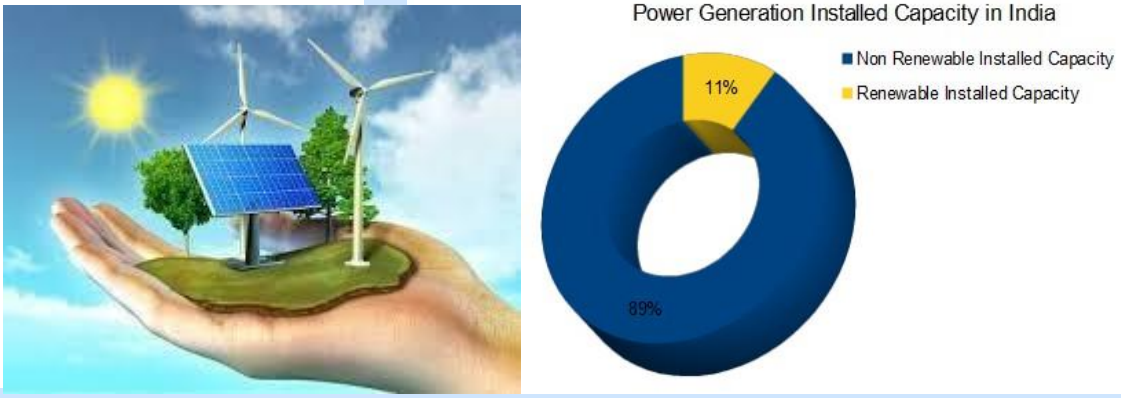

Fig.4: Renewable energy

But questions remain the same due some limitations in renewale energy sources.

- One challenge is that we can not store electricity in large quantities yet. This limits how much renewable energy can be used practically.
- Without energy storage only about 10% of power can come from solar.
- The question what to do when the sun is shining and wind is blowing but demand of electricity is low.

2. Smart technologies

2.1 Smart Power Strip

Many electrical devices continue using power even when they're turned off. Those glowing stand-by lights don't run on air alone, you know. Some of the main culprits include DVD players, printers, TVs, and computers. What smart power strips do is completely cut off the power to these devices when it's sensed that they are not in use. This can shave between 5%-10% of your total energy bill.Some models, such as the Smart Strip 4941 can also be used to sense when, for example, the TV is switched off, and will automatically cut power to your DVD player and game console, too. There are plenty of individual smart plugs you can choose from as well.

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2.2 Solar Panel

By taking energy from the sun to heat water or generate electricity, you can dramatically reduce your carbon footprint. To ensure cost effectiveness, in the Northern Hemisphere face them due South. In the Southern Hemisphere, face them due North. Obviously, this tech works best in sunny climates, preferably with little cloud or shadow cover.

2.3 Electrochromatic Smart Glass

Electrochromatic technology allows a material (in this case glass) to change color when an electric current is applied. This can be done manually via a smartphone app, or set to alter automatically. The variable tint applied to the glass controls the light and heat that passes through, allowing you to substantially save on air conditioning costs while keeping the glass transparent, and minimizing glare. View, the company behind some of this technology claims, "savings on lighting, electricity, heating, ventilation and air conditioning can amount to 23% at peak times". Although electrochromic smart glass is currently many times the price of standard glass, the cost is set to reduce substantially in the future.

2.4 Energy Monitor

By installing a wireless energy monitor in your home, you'll get a better understanding of how and when you're consuming power. The insights you'll gain allow you to make decisions to reduce that overall usage.With a smart energy meter, you can now see your gas and electricity consumption in real time. Many energy companies already offer a basic monitor, but there are more impressive options out there.Efergy's option, the Ego Smart Socket and App (video above) is a great kit. This monitoring system allows you know which appliances are currently on, current and past energy use, as well as the ability to remotely turn off appliances via the system's iOS app. You can even use the Ego as a replacement for smart power strips using the built-in timer functions. Used in conjunction with a smart thermostat, such as Google's Nest, as well as Energy Star Appliances, this could make your home a lot more efficient.

2.5 Cool Roof

A cool roof is one that has been designed to reflect more sunlight and absorb less heat than a standard roof. Cool roofs can be made of a highly reflective type of paint, a sheet covering, or highly reflective tiles or shingles. Nearly any type of building can benefit from a cool roof, but consider the climate and other factors before deciding to install one. Just as wearing light-colored clothing can help keep you cool on a sunny day, cool roofs material that is designed to reflect more sunlight and absorb less heat than a standard roof. Cool roofs can be made of a highly reflective type of paint, a sheet covering, or highly reflective tiles or shingles. Standard or dark roofs can reach temperatures of 150°F or more in the summer sun. A cool roof under the same conditions could stay more than 50°F cooler and save energy and money by using less air conditioning.

A cool roof can benefit a building and its occupants by:

- Reducing energy bills by decreasing air conditioning needs
- Improving indoor comfort for spaces that are not air conditioned, such as garages or covered patios
- Decreasing roof temperature, which may extend roof service life.

Beyond the building itself, cool roofs can also benefit the environment, especially when many buildings in a community have them. Cool roofs can:

- Reduce local air temperatures (sometimes referred to as the urban heat island effect)
- Lower peak electricity demand, which can help prevent power outages
- Reduce power plant emissions, including carbon dioxide, sulfur dioxide, nitrous oxides, and mercury, by reducing cooling energy use in buildings.

2.6 Types of Roofs and How They Can Be Made Cool

There are many types of roof systems available, but the surface exposed to the sun is the one that determines if a roof is cool or not. You can usually make a new or existing roof cool by selecting the appropriate surface.

Cool roof coatings are white or special reflective pigments that reflect sunlight. Coatings are like very thick paints that can protect the roof surface from ultra-violet (UV) light and chemical damage, and some offer water protection and restorative features. Products are available for most roof types.

2.7 Cost and Energy Savings

A cool roof does not necessarily cost more than a non-cool roof, especially if you are installing a new roof or replacing an existing one. However, converting a standard roof that's in good condition into a cool roof can be expensive. Major roof costs include upfront installation (materials and labor) and ongoing maintenance (repair, recoating, and cleaning). Additional cool roof costs include specialized materials and labor.

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Cool roofs can save money several ways, including energy savings, rebates and incentives, HVAC equipment downsizing, and extended roof lifetime. One way to estimate how much energy you would save by installing a cool roof is by using the Cool Roof Calculator.

2.8 Geothermal Heat Pump

If we want to go all out with energy saving, you could consider installing a geothermal heat pump. These geothermal systems collect heat from below the ground to use for heating your house. They can also be reversed in the Summer to cool your house.

Closed geothermal systems are relatively similar to the solar thermal systems mentioned above. The heat-collecting water pipes are below ground however, rather than on your roof.

Another option is an open system, where hot ground water is pumped from the ground through a heat pump located in or near your house, then back into the ground.

2.9 Tesla's Solar Battery

The Powerwall and Powerpack are rechargeable lithium-ion battery stationary energy storage products manufactured by Tesla, Inc. The Powerwall is intended to be used for home energy storage and stores electricity for solar self-consumption, time of use load shifting, backup power, and off-the-grid use. The larger Powerpack is intended for commercial or electric utility grid use and can be used for peak shaving, load shifting, backup power, demand response, microgrids, renewable power integration, frequency regulation, and voltage control.

For a while now, the growth of solar power has stalled due to the unsuitability of many batteries on the market. What Tesla's batteries offer is a more reliable energy supply at night, as well as more reliability during power outages. As more people start to use batteries like these, there will be far less worry surrounding the reliability of solar power, as we'll be confident we have enough energy stored to cover any emergencies.

3. Clean technologies

Clean energy manufacturing involves the minimization of the energy and environmental impacts of the production, use, and disposal of manufactured goods, which range from fundamental commodities such as metals and chemicals to sophisticated final-use products such as automobiles and wind turbine blades. The manufacturing sector, a subset of the industrial sector, consumes 24 quads of primary energy annually in the United States—about 79% of total industrial energy use. Clean energy manufacturing can improve energy utilization and also yield economy-wide reductions in greenhouse gas (GHG) emissions through changes in energy use enabled by the development of new materials and process technologies.

4. Conclusions

Electrical energy is a prime factor in day to day life of human beings and day by day energy demand goes on increasing. This energy demand can be fulfill by renewable energy sources but renewable energy sources having some limitations. These limitations can be overcome by smart technologies and energy conservation techniques to some extent.

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MICRO HYDRO POWER PLANT USING BAVKHAL (PONDS)

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ABSTRACT

Micro-hydropower generation system is the effective way to help the remote communities by generation of electricity using water as a main source. The main objective of this project is to introduce the green technology for the society in order to reduce the cost of fuel consumption. Furthermore, the idea of this project is to generate electricity by develop a prototype of micro-hydro generation system that produce low capacity to be used in rural communities using small ponds. These bavkhals can be used to set a micro hydro power plant. Also water generated in generation of electricity can be further used as a source of potable water for domestic purpose. Because of this plant the automatic conservation of bavkhals can be done.

Keywords: - *Micro hydro power, bavkhal*

1. Introduction

Vasai virar, is located at west side comes under the green zone. According to geographical topography mountain ranges are seen in the east and the elongated sea shore in the west. So the rainwater directly drains into the sea. Vasai virar area is the entrapment region near the Vaitarna creek in north, bhayander creek in south is an abundant source of saline water, but there was no sure resource of potable water. Bavkhal is a circular pit dug to store rain water. Generally Bavkhal in Maharashtra are circular in shape where as in Rajasthan, Gujrat and Haryana its square shaped called as bhavdi.

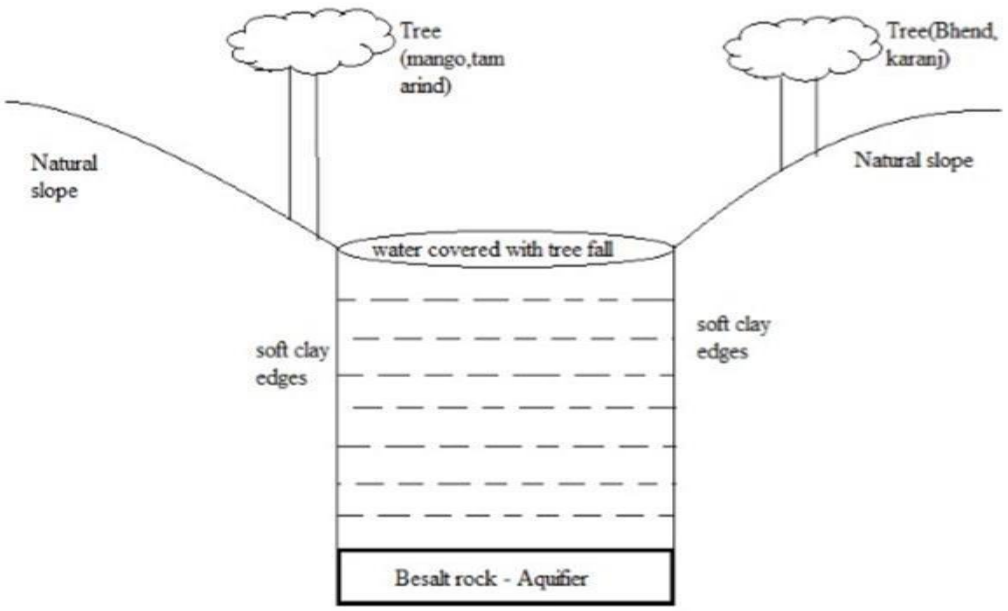

Fig. 1: Charactristis of bavkhal

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2. Characteristics

The bavkhal has following characteristics

- Maximum utilization of slope for easy water accumulation
- Shady trees in surroundings to minimize evaporation from sunlight
- Trees like ‘bhend’ and ‘karanj’ are planted in surrounding which holds soil firmly.
- Soft clay edges of bavkhals helped to sip the rain water
- Basalt rock in base acts as aquifer do not allow the water to sip in the ground

3. Block Diagram

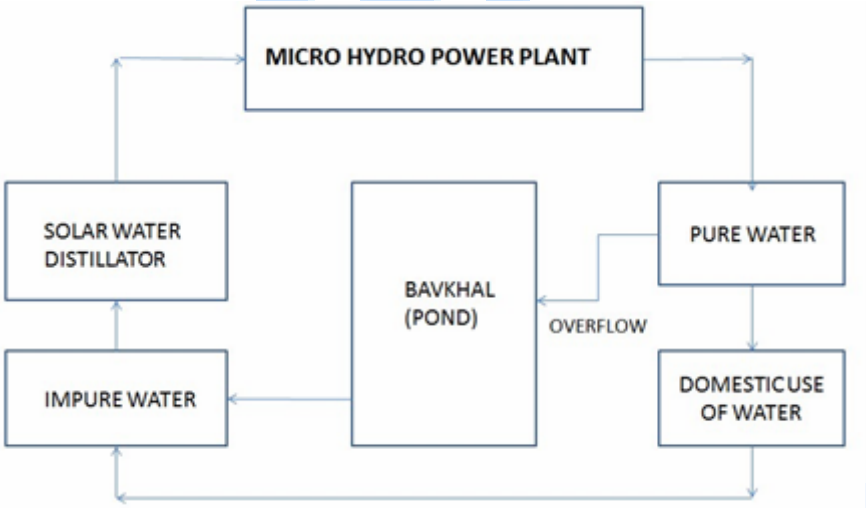

Fig. 2: Block Diagram of Micro Hydro Power Plant Using Bavkhals (Ponds)

4. Working

Bavkhals can be used to set a micro hydro power plant. Also water generated in generation of electricity can be further used as a source of potable water for domestic purpose. Because of this plant the automatic conservation of bavkhal can be done. Impure water tank stores the water which is drawn from bavkhals. It also store the water which is used for household purpose such as dish washing, cloth washing and bathing etc. Solar pump is a motor used to draw water from bavkhal using solar energy. Solar water distillator generates vapours of water. As vapours contains pure water only, that vapours can be condensed to extract pure water. Micro hydro power plant will generate electricity using this pure water and used water can be stored into the another tank for household purpose. This plant is very significant in all the ways as it uses solar energy. So one time investment and lifelong working is available. It works only in day time hence water level of bavkhal can easily be maintained. In this way this plant can solve two social issues of power generation in small scale as well as conservation of water resources.

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5. Conclusions

Bavkhals are enough sources of potable water. Depending on the quality of water it can be used for irrigation domestic use and even for drinking if properly maintained. They can provide water up to the month of April if properly used. In case of water scarcity, bavkhals will play very important role in water management on the local level.

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Automatic Mains Failure Panel (AMF PANEL)

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ABSTRACT

This basically ensures the detailed studies about maintaining continuity of supply by using AMF Panel. Automatic Main Failure (AMF) Panel basically maintains the continuity of supply in any case. It consistent power supply to the load and acts as the switching mechanism between the generator and the mains supply. A study of AMF panel is carried out and a new idea for an AMF panel is considered. This Panel turns ON the generator automatically in cases of mains supply is failed and connects the load to the generator supply, and vice-versa it switches OFF the generator automatically once power is restored and returns the load to the mains power supply with the help of desired range of switching devices that are used in AMF Panel.

Keywords: - *Automatic Mains Failure panel, Diesel Generator (D.G.),Phase Failure Detector, DPDT Relay, Overload Relay, Contactor, Delay Timer, MCB.*

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1. Introduction

Automatic Main Failure (AMF) Panel is a panel which can automatically transfer from Mains supply to Auxiliary when anomaly such voltage drop, over-voltage and outage is occurred at the main power & any Power problem regarding the supply will also cause the system to operate. In the present world, uninterrupted power supplies are inevitable. Nowadays, a power system network is highly vulnerable to large scale failures. A fault in an equipment or apparatus is defined as a defect in the electrical circuit due to which current is diverted from the intended path. However, additional connections to the main supply unit to provide necessary power in case of power failures can be expensive. In such cases, power generation by using D.G sets can be used. In case of power failure, the D.G sets have to be switched on and when the power supply becomes normal, the D.G sets have to be disconnected. However, switching on and switching off a D.G set again and again manually creates discomfort and delay. Thus, the new idea of bringing up an AMF panel has emerged. An AMF panel is fully automatic. It acts as a switching mechanism between the generator, load and the supply. When the supply is available, AMF panel connects the load to the supply, whereas when the mains supply is unavailable, the AMF panel connects the load to the D.G set.These aspects of AMF panel increase the research in the modifications of the existing system. Hardware modelling of the overall system is quite important as it is essential for the performance. Detailed block diagram of the model is presented.

2. Block Diagram

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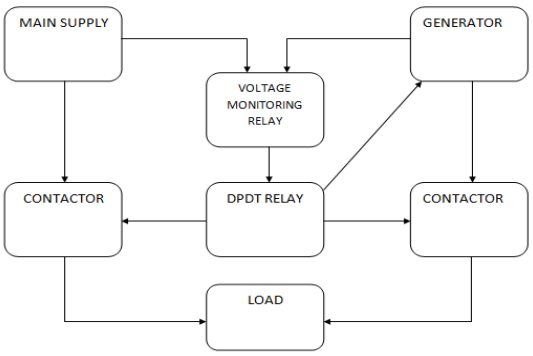

Fig.1 Block-diagram of AMF Panel

3. Elements of AMF Panel

3.1 Panel

A Panel is basically distribution board/cabinet that consist of components of electric supply system and other switching and protective components that are required to transferring supply from one to other.

3.2 Mains Supply

Mains electricity is general purpose alternating-current (AC) electric power supply. The two properties of electric power supply, Voltage & Frequency, differ between regions. This Mains Supply is used as Primary supply source for AMF Panel.

3.3 Generator

Generator is an energy conversion device and is permanent magnet generator. Use to convert the mechanical energy into electric power. It is mainly use for backup/standby.

4. Technical Consideration

4.1 Calculations

The Generator to be used is of rating - 1.5 KVA

We need to convert into KW where power factor is to be considered as 0.8 lagging

Therefore KW = KVA * Power Factor

KW = 1500 * 0.8 = 1200 Watts

Ratings of Main Contactor and Generator Contactor is to be calculated

I = P /V

I = 1200 /415 = 2.89 A

Where Fault Current is to be estimated as 3 times Rated Current so 16 A 4 P MCB is calculated

Flexible Cable = P / (1.732*V*Cos phi)

Flexible Cable = 1200/ (1.732*415*0.8) = 2 A

Cable size is to be considered is (3 * 2.5 Sqmm + 1.5 Sqmm Neutral)

5. Advantages

- Maintains continuity of supply.

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- Very low maintenance 6cost as there are no gears and moving parts in contact which require lubrication.
- Necessary for uninterrupted electrical supply.
- Ideal for efficient switching to Generator Supply
- Ideal for less accessible generators.

6. Future Trends

- May occasionally respond to false signals
- Usually costs more than a manual model.
- Sometimes needs more maintenance than a manual model.

7. Conclusion

AMF Panel is such panel which would maintain the continuity of supply to the Consumer by switching the mains supply and DG supply automatically It would fled to reduction of Human Error. This project work is instrumental in providing knowledge and wide technical data to understand more about the economics of DG operation, sizing of DG set for the given load condition, the requirements of AMF operation etc. AMF panels are highly demanded in apartments, foundations, textile, sugar and chemical industries. The AMF will ensure automatic set while operating in utility supply mode, automatic starting or stopping of generator, automatic shutdown on faults like over speed, under speed, high temperature, low oil pressure, etc. Automation will avoid excessive diesel consumption and ensure high degree of reliability. Thus AMF Panel basically maintains continuity of supply.

8. ACKNOWLEDGEMENT

It has been great pleasure to present in this conference. We would like to thank management of VIVA INSTITUTE OF TECHNOLOGY for giving us golden opportunity. We express our gratitude towards our department for supporting us in all manners. We would also like to thank the honourable judges. We are thankful to all of you for listening to us, we always welcome feedback from your side.

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SPARK GAP COIL

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ABSTRACT

Around 1891 Nikola Tesla invented a Spark Gap Coil which is a type of resonant transformer circuit. It is used to produce high voltage and high current. "A Spark Gap coil is a device producing a high frequency current, at a very high voltage but of relatively small intensity". It is an air-cored resonant transformer. It has some similarities with a standard transformer but the mode of operation is somewhat different. A Spark Gap Coil uses a relatively loose coupling between primary and secondary, and the majority of the voltage gain is due to resonance rather than the turns ratio. The Spark Gap Coil is air-cored to operate efficiently at much higher frequencies.

Keywords: - *spark gap, transformer, coil, turns ratio, high voltage*

1. Introduction

A spark gap consists of an arrangement of two electrodes which are conducting and separated by a gap usually filled with a gas such as air, designed to allow an electric spark to pass between the conductors. A spark forms ionizing the gas and drastically reducing its electrical resistance as the potential difference between the conductors exceed the breakdown voltage of the gas within the gap. The high voltage power supply charges the capacitor, the potential across the static spark gap electrodes increases until the air between the spark gap ionizes allowing a low resistance path for current to flow through; the "switch" i.e spark gap is closed. The potential across spark gap is no longer sufficient to maintain ionized air between the electrodes as the capacitor discharges and the switch is open. This happens hundreds of times in a second producing high frequency alternating current through the primary coil. An LCR (Inductor- Capacitor- Resistor) circuit is produced by the primary coil and the capacitor which resonates at a high resonant frequency. The resonant frequency of the top load and secondary coil which forms an LCR circuit must be equal to the resonant frequency of primary circuit. The high resonant frequency coupling of primary coil with the secondary coil induces very high voltage spikes in the secondary coil. The top load allows a uniform electric charge distribution to build up and lightning like strikes are produced from thisto a period of lower potential, in most cases ground.

2. Block Diagram

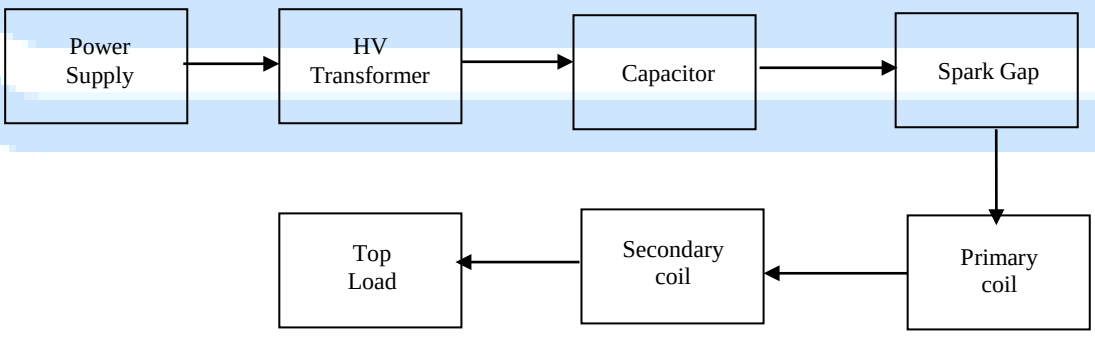

Fig.1 Block-diagram of Spark Gap Coil

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3. Calculation

For Secondary Coil,

Height= 41.85 inches

Diameter = 10.8 inches

Wire = 20 AWG = 0.0320 inch Dia.

Fishing line (for spacing) diameter = 0.54mm = 0.0212 inch

Number of turns = 1(Fishing line Diameter + Wire Diameter +0.000001) × 41.8 × 0.97

= 0.0212+0.0320+0.000001×41.8×0.97

= 764 Turns

Similarly, calculations can be done for primary coil.

4. Advantages

- Generation of high voltage with visible spark.
- It is used for testing purpose.

5. Disadvantages

- A proper care should be taken while operating Spark gap coil.

6. Conclusion

The spark gap coil is capable of producing spark. This spark is limited only by the lack of properly functioning of the equipment. While designing the spark gap coil we learned many things from our high voltage concepts and it is also helpful in brushing up of our knowledge in practical application. This project is also use for testing.

7. ACKNOWLEDGEMENT

It has been great pleasure to present in this conference. We would like to thank management of VIVA INSTITUTE OF TECHNOLOGY for giving us golden opportunity. We express our gratitude towards our department for supporting us in all manners. We would also like to thank the honourable judges. We are thankful to all of you for listening to us, we always welcome feedback from your side.

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ROLE OF ELECTRICAL ENGINEER IN BUILDING MAINTENANCE SERVICE: A SURVEY

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ABSTRACT

An electrical engineer plays vital role in building construction ranges from simple residential project to multi story high rise buildings for residential purpose, commercial, sport complexes, hotels, hospitals, airports. The key role of electrical engineer is to identify the exact requirement of projects. Electrical engineers major responsibilities falls under the following stages of pre-construction, during construction and post construction like conceptual designing , tender stage, contracting, and execution and handover, documentation. In addition, electrical engineers may be responsible for calculating the costs of projects and scheduling delivery dates for supplies. Finally, at the end of a project, the electrical engineer is responsible for making sure that all the applicable standards & codes are met. This paper explains an in-depth knowledge of electrical building codes (NEC/IEC/NBC/NEMA) and detecting building construction issues. Usually an electrical engineer serves as part of a team and provides technical advice within his or her area of expertise. An electrical engineer may work for a particular company, or may hold an in-house position where he or she is available for consulting on whatever issues may arise during construction.

Keywords*: -* *Construction, Design, Planning, Installation. Electrical building codes*

1. Introduction

At very first for maintenance purpose electrical engineer has to identify the temporary load to make site functional. It includes site office load, machinery load, load pattern and hours of operations. Engineers have to assist to get all the statutory approvals for construction purpose. Electrical engineer could be part of team of consultant, client, contractor, and supplier. To get the work done as per the local and application norms, design, in cost and in time is basis responsibility of electrical engineer.

1. Preparation of shop drawings
2. Submission and approval of material submittals, technical data sheet
3. Workout project material quantity
4. Preparation of procurement plan
5. Attend site co-ordination and site progress meeting
6. Material inspection
7. Execution
8. Testing
9. Commissioning
10. Preparation of Check list
11. Billing
12. Preparation of as built drawing
13. Submission of handing over documents
14. Perform workshop to let understand systems

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2. Primary Duties and Responsibilities

1. Identification of project requirements
2. Gathering of project data
3. Preparation of conceptual design
4. Approval of conceptual design
5. Working on preliminary budget
6. Preparation of schematic layouts
7. Design calculations
8. Preparation of Goods for construction
9. Preparation of co-ordination layout
10. Finalization of technical details of products according to specifications and norms
11. Preparation of Bill of Quantities
12. Finalization of makes of material
13. Working on estimation, rate analysis
14. Floating of tender
15. Floating of inquiries
16. Resolving RFI (Request for information) related to tenders
17. Tender/contract award

2. Electrical Planning

Prior to carrying out wiring work, the wireman/contractor should plan and determine the tasks to be undertaken so that the work carried out is tidy, neat and safe to be used. The wireman/contractor shall: - i. Undertake a site visit; ii. Determine the consumer load requirements; iii. Calculate the maximum load demand; and iv. Submit the plans, drawings and specifications. The planning flow chart for building wiring installations is as shown in fig

i) Site Visit The purpose of the site visit is to determine: -

i. Electrical equipment suitable for use; ii. Maximum load demand;

iii. Single or three phase incoming supply;

iv. Type of wiring; and

v. Equipment arrangement.

ii) Determining Consumer Load Requirements With the aid of the building floor plans, the installation requirements such as the proposed load, placement of electrical equipment and installation design plans can be determined.

iii) Calculating Maximum Load Demand

The estimate of the maximum load demand is for determining the specifications of the wiring equipment such as the cables and accessories and subsequently to prepare the electrical installation plans.

3. Features of Electrical Wiring

Electrical wiring composes of electrical equipment such as cables, switch boards, main switches, miniature circuit breakers (MCB) or fuses, residual current devices (RCD), lighting points, power points, lightning arrestors, etc.. Example 1 of a single phase consumer electrical wiring is as shown in Figure 3.2

3.1 Cable Selection

The selection of the cable size has to take into consideration the following:- i. All wiring cables must be PVC or PVC/PVC insulated with copper conductors. Conductors with cross sectional areas of 16mm2 or less must be of copper. Aluminum conductors are not permitted. ii. Cables for swimming pools must be water resistant PE (polyethylene) insulated; iii. The selected cable must be capable of delivering the electrical energy efficiently; iv. The cable size allows it to carry the current without heating the cable; v. The voltage drop must not exceed 4% of the supply voltage.

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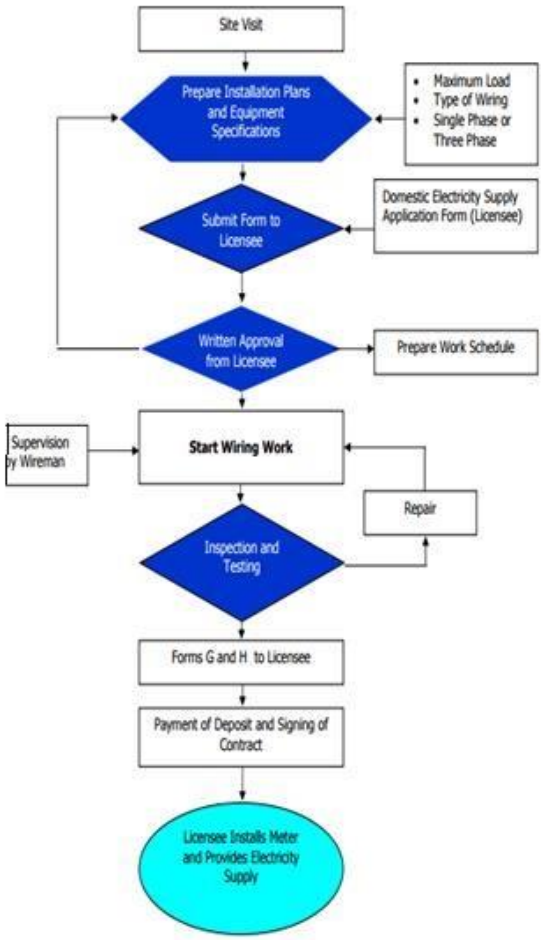

Fig. 3.1: The Planning Flow Chart for Single Phase and Three Phase Supply Building Wiring Installations

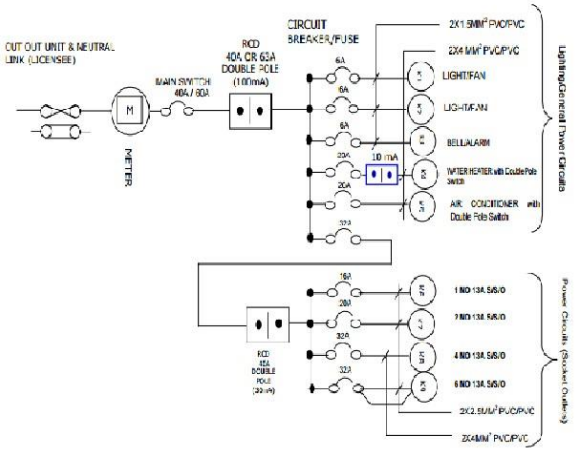

Fig. 3.4: Example 3 of a Single Phase Consumer Electrical Wiring

vi. The cable insulation must be suitable for the surrounding conditions of the installation, such as the ability to withstand the surrounding temperatures and the ability to provide mechanical protection; vii. Each conductor in the installation must be protected from overcurrent by means of overcurrent protection devices needed to prevent damage to the cable insulation.

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3.2 Earthing

Earthing is a connection system between the metallic parts of an electrical wiring system and the general mass of the earth. This will provide an easy path with a low impedance or resistance to earth to enable the protection system to operate effectively. It will thus ensure safety to human beings/consumers from the dangers of electric shocks if earth leakage currents are present. In general, an electrical installation is earthed because of: - i. Safety reasons. ii. Protection system requirements. iii. Need to limit over voltages. iv. Need to provide a path for electrical discharge. v. Legal requirements.

4. Conclusion

The role of electrical engineer is of great importance in the field of building services. Above paper shows an extensive an extensive work of various works and responsibilities that electrical engineer executes in the process of the construction industry. This paper also explains the system in which the electrical engineer faces many problems in the execution of building services and also its solutions.

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EFFICIENT WORK AND ERRORLESS PERFORMANCE OF MACHINE

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ABSTRACT

The present paper is a study of "efficient work and errorless performance of machine" is an effort to use the artificial Intelligence for development of errorless machine or self- operating machine. How artificial intelligence came into existence, what are the advantages of Artificial intelligence and its drawbacks, how in near future these intelligent robots will work in different sectors and will perform the jobs that are today done by human beings with their intelligence. Self-operating machines performance is better from human performance.
This article also compares human with self- operating machines in the different aspects of life, their productivity, their intelligence and potentials to do a particular task. Classification of Artificial Intelligence on the basis of their intelligence is described in short.
This gives an idea about how we, in near future will are going to connect with Artificial Intelligence for research and sustainable development.

Keywords: - *Artificial Intelligence, self -operating machines (robots), Humans, Technology, Research and development*

1. Introduction

The term Artificial Intelligence was first used in 19th century. Artificial Intelligence is a computer system which has intelligence as like human beings and can perform tasks which require human intelligence such as visual perception, making decisions, voice diagnose and ability to think like humans. On 11th may 1997 deep mind became the first computer chess playing system to beat a World Chess Champion of that time.
Artificial Intelligence is classified into three categories namely weak artificial intelligence, strong artificial intelligence, and singularity artificial intelligence, today we are mainly using weak Artificial Intelligence. Singularity Artificial Intelligence is a hypothetical concept. Few examples of artificial intelligence are SIRI (I Phone), Hello GOOGLE, Alpha Go, Alpha Zero Sophia (first Humanoid robot).

2. Need of Machines

There is a chance of doing mistake when human performs certain jobs, but at the same time machines does do any mistake. Humans need everyday rest whereas machines don't need rest. Jobs done by machines are more efficient and are errorless as compared to humans, even robots and machines require less time to do certain task as compared than human beings. Human beings required daily practice to get perfect for their job whereas machines get perfect in their job in very less time. Hard physical jobs can be easily done with help of machines and robots. Thus with the use of robots and machines we can get optimum result. So in order to enhance productivity, efficiency, advancement in communication, technology, research and development and also for human welfare we need self operating machines and robots.

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3. Artificial Intelligence and Human

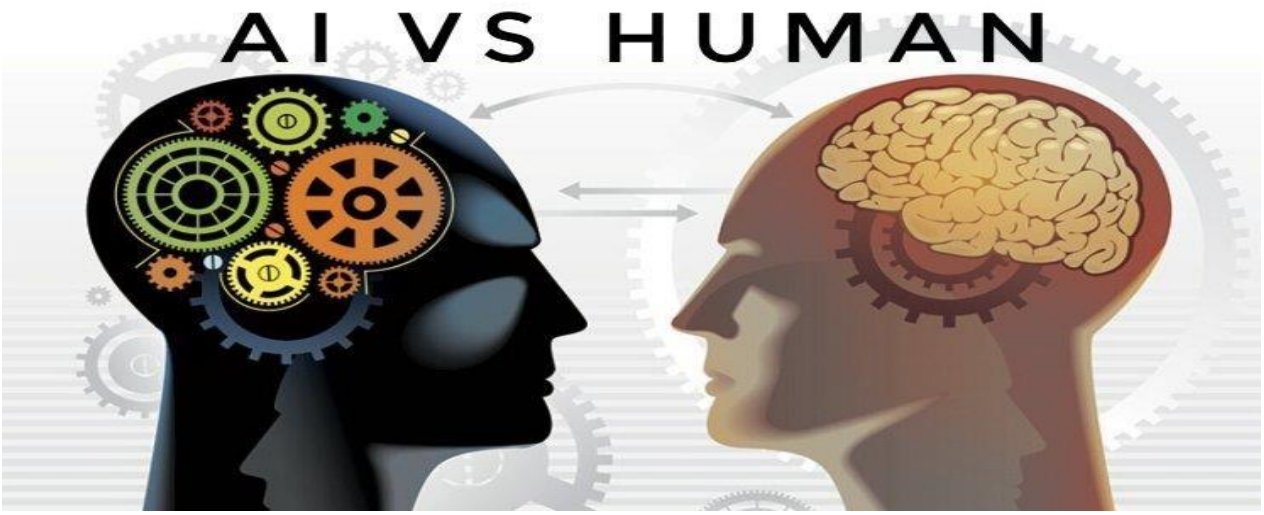

Fig.1: Artificial Intelligence vs Human

Table-1: Comparison between Machine and Human

ARTIFICIAL INTELLIGENCE	HUMAN
• Artificial Intelligence are formed by machinery works done by humans.	• Human beings are formed by biological process occurring in nature.
• Artificial intelligence is not much affected by environmental changes as compared to human beings.	• Human beings are depend upon environmental and much affected by environmental changes
• Artificial Intelligence brain is made up of neural networks.	• Human brain is made up of nervous system, cerebrum and tissues.
• When machines perform certain task they are errorless.	• Human beings do mistakes and learn by their mistakes and improve themselves for their job.
• Learning ability is comparatively high as compared to humans.	• Learning ability is comparatively low as compared to artificial intelligence.
• Maintenance of machine is easy and can easily be recovered with defects if any.	• Human beings get sick due to harmful surrounding, they require time to recover.
• Machine body can be of desired shape and size and is easy to make machine body. Replacement of body parts is possible.	• Body function of human beings are very complex, it is not possible to create human body. Replacement of body parts is not possible.
• Artificial intelligence can work for long hours without rest with same efficiency.	• Human beings cannot work for long hours as they require rest, to regain their efficiency.
• Artificial Intelligence get energy by electricity, they do not require compounds like vitamin, protein, carbohydrates, etc.	• Humans get energy by the food they eat, they require compounds like vitamin, protein, carbohydrates, etc, in proper proportion in their

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	daily diet.
• Artificial Intelligence does not grow physically with time.	• Physical growth takes place in human beings with time

4. Uses and application of Machines

4.1 Agriculture

With the help of A.I. in agriculture we can change agriculture pattern revolutionary enhancement in production, cultivation, fertility of soil maintenance, etc. could be seen. Right from seed plantation to distributions of crops self operating machines and robots can be used. Drones and robots would be supervising farms 24/7 which is not possible for humans. There will be no shortage of food, due to which there will be no inflation on food items.

Fig.2: Unman Aerial Vehicle

4.2 Industries and factories

Every industries and factories pay money to their workers for doing job which is around 8 to 12 hours a day. If workers are replaced by self -operating machines and robots factories and industries need to pay only once to buy machines after which these machines and robots would work for 24/7 without salary and will increase productivity of factories within less time. Only cost for factories and industries will be for their maintenance. Companies and factories will earn more Profit then earlier.

Fig.3: Robotics makaganised Car

4.3 Hospitals and medicals

Best medical facilities can be provided to all with the help of Artificial intelligence. We need specialized doctors for the treatment of diseases like cancer, tumor, heart diseases, surgery, etc. if we develop artificial intelligence as a doctor diseases which are called deadly today will not be any more deadly and can be easily treated with only single Artificial Intelligence robot. In case of communicable diseases there is a chance that human doctor can be affected but machines will not be even touched by such diseases. In operations there is a chance of losing life by even small mistake but with the help of Artificial Intelligence we can overcome with these risks. Operations which require long time and also be done by machines. Sensitive and critical cases can be easily done by Artificial Intelligence.

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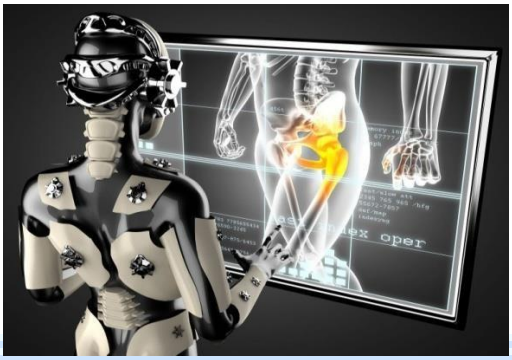

Fig.4: Treatment of Disease with machine

4.4 Education

Artificial Intelligence can improve our educating system with very effective learning techniques. Students can ask their doubts to these self operating machines for any number of times and at any time. We require different teachers for teaching different subjects and every teacher have their own way of teaching but in case of Artificial Intelligence as a teacher, only a single Artificial Intelligence can teach any subject as like expert of subject. Teachers may get tired by teaching one and the same thing again and again which will not be happened in case of these self operating machines.

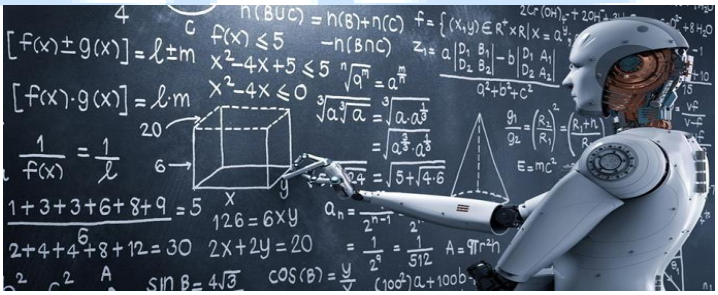

Fig 5: Effective learning through machine

4.5 Defense

Every country want their defense power to be very strong this can be increased exponentially with the help of the machines and robots, border arm forces can be replaced by strong Artificial intelligence robots which will definitely increase defense power but at the same time loss of human life can be prevented. Drones could be used instead of jets, planes. Automatic tanks, submarines, advanced weapons could definitely increase defense power which will much stronger than today's human armed forces.

Fig.6: Drone

Fig.7: Robot Machine gun

4.6 Research and Development

Day by day we are enhancing our technologies, we are developing new technologies we overcomes with drawbacks of previous one, but still we are unable to develop 100% accurate technology for sustainable development, we don't have 100% pollution free gadgets. With help of Artificial Intelligence (self-operating machines) we in near future will be able

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To answer many unanswered questions of Universe and we will be able to develop highly advanced technologies with which human life will be more comfortable and easy as compared with today.

5. Disadvantages of Machine

Today world has total population near around 7.6 billion providing all the facilities to all is very challenging. All we need is money for fulfilling our basic need is money for which we all want job opportunity, with the development of machines and robots jobs which are today done by human beings will be then done by these machines this will lead to unemployment on large scale. Jobs in many sector will we closed for humans due to these machines only few sectors will have jobs like making robots, robot maintenance, etc, and the competition will be very high. The other drawback is human beings will get more depend on machines for their work which will also lead to a big problem for humans. If our self-operating machine (Artificial Intelligence) program another machine which will be more advanced than our developed Artificial Intelligence then how we human will control to that machines. Developing Artificial Intelligence will be very useful for humans at the same time it is dangerous too, we should take each and every step very carefully in development of self- operating machine.

Stockfish is the world's strongest chess engine which can calculate 70 million moves per second whereas Alpha zero is a computer program which is developed by Artificial Intelligence researchers and can calculate 8K moves per second. On 5th December 2017 Alpha Zero and stockfish played 100 chess games out of which 28 games was win by Alpha Zero and remaining 72 games were drawn none of the game was win by stockfish and Alpha zero has learned playing chess just 24 hours before play this shows the ability of Artificial Intelligence. We humans learn chess for year and year to become grand master in chess but Alpha Zero has gained that ability within 1 day. By analysis of this information we can assume that what changes could take place within one year with the help of Artificial Intelligence in human society.

Today in Japan there is a hotel named as "Heen na" in English it is called as wired hotel. In this hotel all the works right form making food till collecting money are done by robots this is the world's first hotel which is entirely operating by robots, only for security purpose there are humans remaining jobs are done by robots. This shows that replacement of human jobs with robots.

6. Conclusion

The aim of this article is an attempt to present applications of Artificial intelligence in various sectors by which how humans can be benefited and how humans can be affected. The article draw attention that what could be happened in near future with the help of A.I. and also what could be happened if we go on depending upon the Artificial Intelligence. We have seen that in comparison between A.I. and human how A.I. is standing at top as compared to humans but we human are the one who is a creator of this Artificial intelligence.

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INDUSTRY LEVEL ELECTRICAL SAFETY FOR HOME

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ABSTRACT

This paper is based on Electrical safety for home using industry level of safety. House electrification is commonly made by local contractors having less knowledge of proper wiring or safety. Our aim is to provide Industrial level safety and monitoring into single device. Industries pay higher degree of attention for electrical safety and periodical maintenances are carried out in order to avoid any accidents. House is a place where generally periodically lookup and maintenance doesn't take place. In this approach we deal with monitoring the parameters like Supply voltage, current, power factor, temperature, humidity, Earth resistance, also our aim to provide Overvoltage, overcurrent protection (MCB) along with RCCB implementation all in a single device that too electronically, which decreases response time and provides higher degree of safety.

Keywords: - *Electrical safety, monitoring, ISM device.*

1. Introduction

Electricity is very important in our life. We cannot imagine a single day without electricity. Such an influence is there with electricity in our life. Electricity is the most important component in modern technology and without it most of the things that we use in our daily life simply could not work and it have not been created. Electricity is the component that saves lives and due to which people can live longer. Our lives become easier due to electricity and it is very true that most people's living quality can be reduced and affected if electricity were to somehow disappear. But we have some misconceptions about electricity and electrical accidents. This project deals with monitoring the parameters like supply voltage, current, power factor, temperature, humidity, earth resistance, also our aim is to provide overvoltage, overcurrent protection (MCB) along with RCCB implementation all in a single device that too electronically, which decreases response time and provides higher degree of safety.

1.1 Aim of the Project

In this project our aim is to give the industry level safety and to monitor the electrical parameters for home like Supply voltage, current, power factor, temperature, humidity, Earth value. Also we aim at providing Overvoltage protection, overcurrent protection (MCB) along with RCCB implementation all in one device that too electronically, which decreases response time and provides higher degree of safety.

2. Block Diagram

2.1 Schematic overview of total home monitoring system

Since it is a protection device, it is installed in series with the energy meter as shown below. The device is named as Industry safety monitoring device for home or ISM Device henceforth. The device is accommodated with 230V/32Amp double pole relay, which is in series to the AC supply and house supply circuit. An additional auto manual change-over is given if in case the ISM device gets failed. This switch bypasses the ISM device and unmonitored power is fed to house supply.

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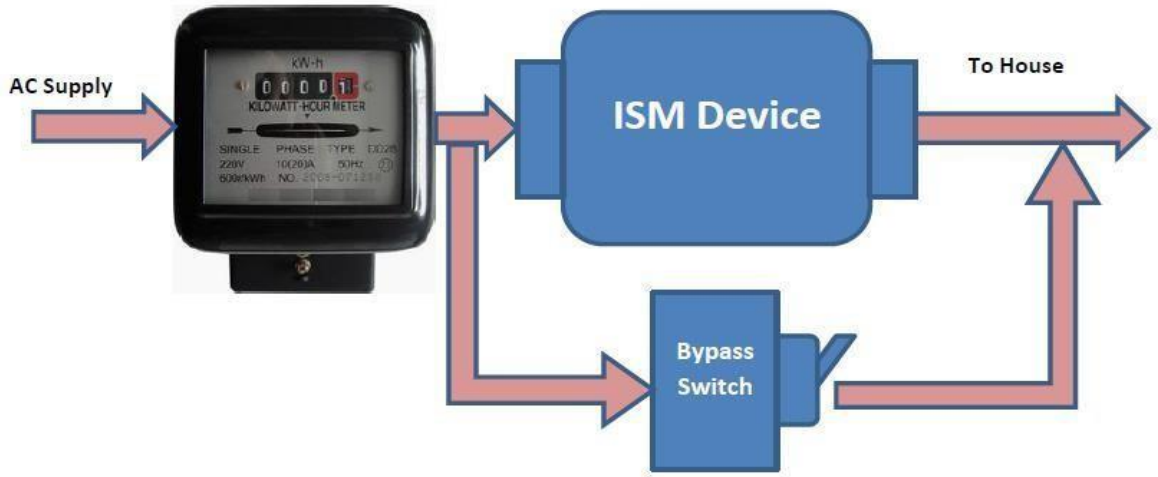

Fig. 2.1: Schematic overview of home monitoring system

2.2 Block Diagram of ISM device

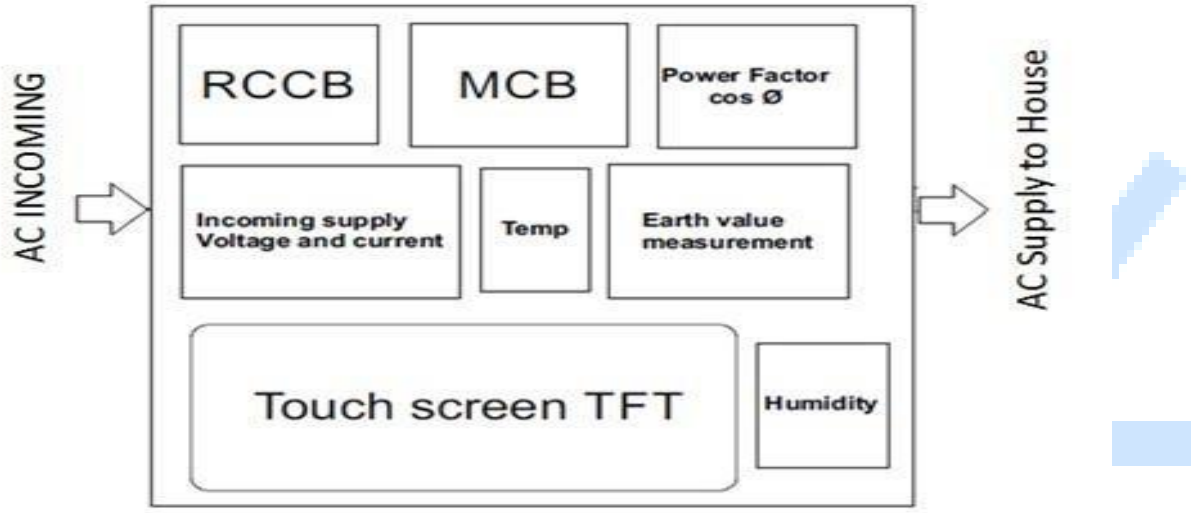

Fig.2.2: Block diagram of ISM device

1. RCCB Block: Residual current circuit breaker (RCCB) works on the principle of measuring the current difference between Line and Neutral rather than earthing leakage current, which makes it different from ELCB. For a safe and stable system the Phase current consumed by load must be equal to the Neutral current consumed by the load. If due to phase touching metal body and getting earthed the small amount of current flows from phase to earth, hence at this time the phase current might be more than neutral current. This differential current triggers the microcontroller (µC) and in turn it operates the contactor. If leakage current is sensed then contactor turns off, else it is kept on. CT1 is used to monitor the residual current.

2. MCB: Miniature circuit breaker (MCB) gives protection against short circuit or overcurrent. Whenever the Load exceeds the acceptable current limit then the bimetal strip inside gets heated up and trips the supply. This is however a mechanical system and not precise and slow. This is here controlled electrically. CT2 is used to sense the AC phase current and it compares internally within the microcontroller. The set value of over current is programmable and we can achieve fast response to excessive current or short circuit.

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3. Power Factor (cos φ): Inductive load such Induction fan, AC compressor coils, Water pump motor, tube light induction choke etc. is made up of copper windings and thereby making the circuit inductive in nature. Hence the current lags the voltage do to its storage capability. Poor power factor leads to higher energy charges and lower efficiency of machines. In order to monitor the power factor of the house electrical system we can use existing CT2 for current measurement along with internally voltage divider circuit for determine the voltage and thereby determining the phase angle between both these parameters we can monitor the power factor of the system.

4. Incoming supply voltage and current: Using CT2 and internal voltage divider used for power factor meter we can indicate and monitor incoming AC voltage and consumed AC current.

Earth Value measurement: Earthing is just another neutral which is grounded at the substation. To avoid fatal shock from the live metal body of any device earthing is provided. This earthing is connected to ground using earth pit (layers of salt, coal and water). This help to make the resistance between earthing and neutral very low. Ideally earth resistance should be 0Ω. But practically it should not exceed beyond 7Ω- 9Ω. With aging and period of thin the pit gets dry and the contact resistance of ground and earth conductor increases and hence the earth value increases drastically. To monitor the same use a constant current source to induce the current from earth to neutral and measure the voltage generated in the same. The earth value can be set inside the device over which it gives alarm if the resistance increases. And this provides additional safety.

5. Temperature & Humidity: DHT11 is the temperature and humidity monitoring sensor. It is used to indicate the temperature of the vicinity of the ISM Device. It is accommodated to detect any fire in the vicinity.

6. Touch Screen TFT: TFT screen provides necessary parameters and status of the device.

2.3 Internal diagram of ISM device

The incoming AC supply is constantly monitored by the ISM Device using the CT (Current Transformers) as the sensors. In total two CT are utilized to determine the Residual current between Line and neutral and line current consumption as shown below:

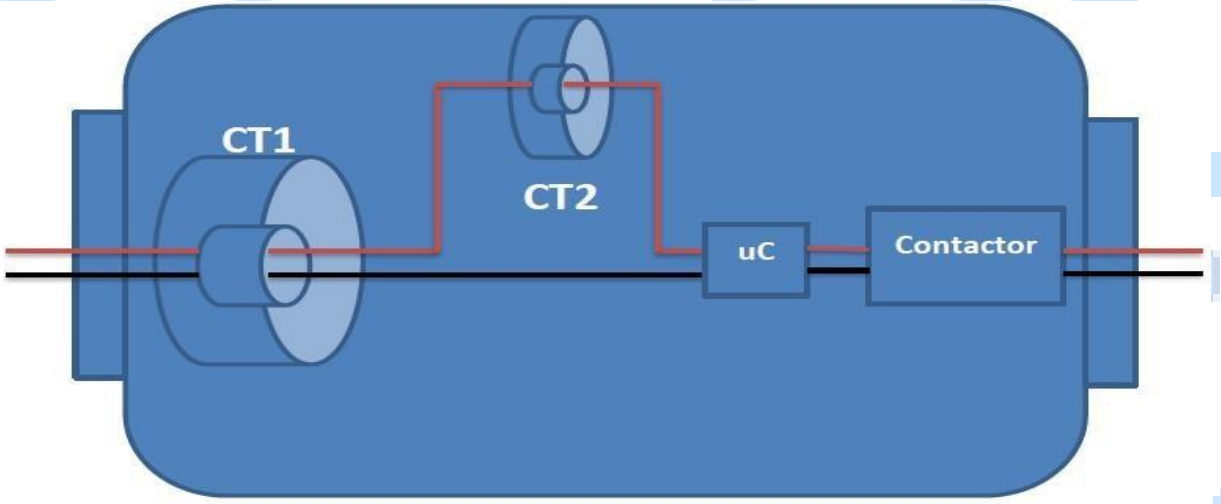

Fig.2.3 Internal diagram of ISM device

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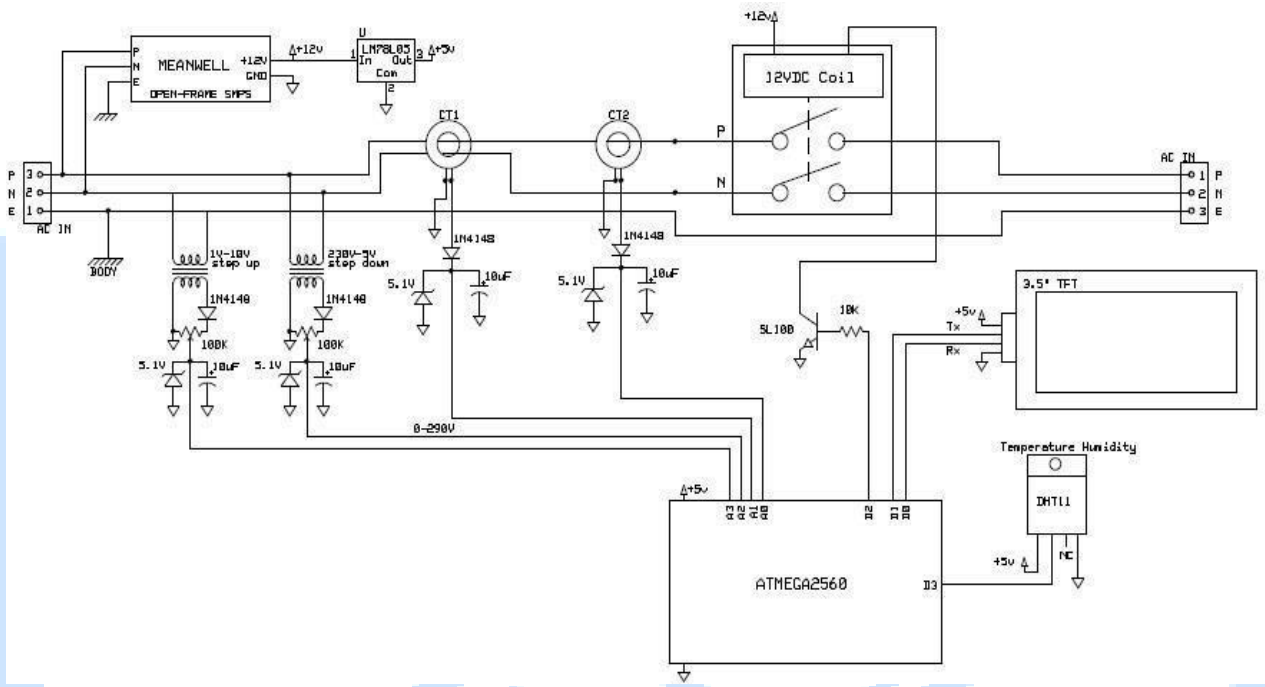
3. Circuit Diagram



1. Power Supply

Incoming AC supply is converted into DC supply by using Switch mode power supply (SMPS). We get 12VDC, 1Amp supply from SMPS which powers the Entire system. Earthing is connecting to device body. SMPS can take voltage fluctuations and provide smooth DC output.

2. Micro-controller

ATmega2560 is the microcontroller which process the device parameters. It has 54 digital input/output pins (in which 15 pins are used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. Microcontroller simply connects to the computer with a USB cable cords or powers with a AC-to-DC adapter or battery to get started.
A0 A1 A2 A3 are analog channel ADC of microcontroller D0 D1…. Are digital channel of microcontroller

3. TFT Touch Screen

TFT screen enables to see the parameters and control the process it has 480 x 320 Resolution, 65K true to life colours, TFT screen with resistive integrated touch panel, 4 pin TTL serial interface, 16M Flash memory it is used for User Application Code and Data, micro-SD card slot is used on board for firmware upgrade, Visual Area: 73.44mm (L)×48.96mm (W).
Adjustable Brightness: 0~180 nit, adjustment interval is 1% , 5V, 500 mA DC recommended power supply, 5V 145mA power consumption.

4. Temperature humidity sensor

Low cost, 3 to 5V power and I/O, 2.5mA maximum current use during conversion, it gives 20-80% humidity readings and 5% accuracy, it gives 0-50°C temperature readings ±2°C accuracy, it is not more than 1 Hz sampling rate (once every second).

5. Contactor

L&T contactor of 230V, 32A is used since single phase allowed till 7.5KW, this contactor does all the work. SL100 is BJT used to turn ON-OFF the contactor.

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6. Sensors

Earth value can be measured by measuring the AC voltage between Neutral and Earth pins. We use Step up transformer to maximize the Minimum AC voltage developed, since ideally 0V develops between Earth and neutral. This AC voltage stepped up at output, rectified and then attenuated by 100K trimmer potentiometer to adjust microcontroller working voltage of 5V, understands variations in 0-5V only. The voltage developed is proportional to the resistance of earth and neutral and should be less then 2VAC. The input voltage measured by using step down transformer by converting input 230V into 5VAC then rectifying it and feed it to microcontroller. The variation in input voltage is measured by this sensory network.

4. Materials and Its Specifications

Table 4.1: Materials and its Specifications

Parts list	Quantity	Specifications
Meanwell SMPS	1	220VAC in-12VDC/1A out
LM7805	1	5V/1A Regulator
T0220 Heatsink	1	Aluminium Heatsink
3pin 5mm pitch connector	2	3 Pin port connector
Device Housing	1	Metal box
CT1	1	5A-5mA Ratio CT
CT2	1	5A-5mA Ratio CT
Step-up T/F	1	1Vin 10Vout Step-up T/F
Step-down T/F	1	230Vin 5Vout Step-down T/F
Diode LN4148	4	Diode
SL100	1	BJT Transistor
Resistor 10K ¼ watts	1	Resistor 1/4W
Trimmer 100K	2	1/4W Potentiometer
5.1V Zener Diode	4	Zener Diode
DHT-11	1	Temperature Humidity Sensor
ATmega2560	1	Microcontroller
Capacitor 10µF	4	Filter capacitor
L&T Contactor	1	Contactor
3.5´´TFT Touch Screen	1	Screen touch function

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5. Conclusion

This project deals with monitoring the parameters like Supply voltage, current, power factor, temperature, humidity, Earth resistance, also our aim is to provide Overvoltage, overcurrent protection (MCB) along with RCCB implementation all in a single device that too electronically, which decreases response time and provides higher level of safety.

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APPLICATION OF GIS AND REMOTE SENSING IN WATER RESOURCE

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ABSTRACT

Water is one of the most important natural elements on earth. Water quality directly and indirectly influences human lives and development. In this paper, a GIS-based system is designed to assist water resources professionals in making economical and efficient decision. GIS and remote sensing techniques are effectively used to replace, complement and supplement data collection in various facets of different kinds of water resources projects. This paper describes the design and implementation of a GIS-based system for water resources management. The system consists of five parts: Geographical Information System (GIS), the database, the mathematical model, the knowledge database and the user graphical interface. The system can help water resource manager to appreciate the potential of remote sensing capabilities for application in the management of precious water wealth. The system can dynamically monitor water and provide decision support for precious water management. It has obvious economic, environmental and social benefits.

Keywords*:-* *GI, Water Sensing Techniques, Water Resource Management*

1. Introduction

Water is the most important natural resources. It's a amount of clean and fresh water in the planet earth is constant irrespective spatial & temporal variation and, in many areas, It is seen insufficient water to fulfill it demand due to rapid increase in population. Drought in one region may coincide with the heavy rain and flood in others. It is a challenge for us to delineate the cause or consequence of the water stress and variability. Moreover, it is the responsibility of H2O scientists, hydrologists and water engineers to make persons know the inherent phenomena, the prevailing ecosystem and the inter-relationship of the components. The application of a Geographic
Information System (GIS) and auto sensor are now commonly applied in the every location of natural and water management resource engineering. - The get together of specialness information and real time follow of the natural environment is now considerably easier due to the use of GIS and developed access to information from satellites.
GIS is a very strong point of managing the aspect of objects or goods and the analysis of their spatial properties. GIS can also provide automated cartographic transformation and generation of graphic products. More specialized analysis functions, like finding the shortest path in a network, or calculating the areal extent of a watershed draining through a specified point given a digital elevation model are also possible. Satellite remote sensing, on the other hand, provides the necessary data in a regular sequence and on a regional, continental or global scale to measure, monitor and model complex natural, hydrological and manmade features. A vast diversity of research has been undertaken in the area of water resource management. Examples include: cloud and snow discrimination, runoff modeling, soil moisture determination, reservoir sedimentation, water quality modeling and sea surface temperature determination. The use of GIS and remote sensing is a rapidly developing area in which data from a number of sources is being utilized. For example, artificial recharge sites have been identified through the use of aerospace imagery and visual interpretation of geological maps [20]. A method has been developed to characterize the sub surface strata using artificial neural network and GIS. Suspended sturdy combination has been modeled in near seaside waters absorbing casually sensed content. A limited shape of shoreline development had been identified using Landsat Multi Spectral Scanner and a GIS package. Secchi disc depth and chlorophyll content in coastal waters have been estimated using multi-date Landsat Thematic mapper data. Applying clear and infrared remote sensing images, the snow melt-runoff modeling has been used on the Italian Alps. An integrated package of GIS has been proposed to upgrade the Hong Kong water supply scheme [.Ground water salinity has been mapped using Indian Remote Sensing-I B Linear Imaging Self-Scanning Sensor II data and a GIS package in Uttar Pradesh India.

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The extent of water vapor transformation over Calcutta had been studied using radiometric studies and experimented on a GIS system. The advancement in auto technology and the rapid changes in the path that content from remote sensed is utilizing in GIS, made it difficult to be careful of the present applications of GIS/remote sensing in the water resource field. This paper summaries many of these applications by way of case studies relating to snow hydrology, snowfall and runoff modeling; reservoir water quality assessment and the identification of the extent of subserve water resources. These case studies have been selected as they cover a range of scales from regional to global and encompass many of the major techniques. Further, the possibility of future uses of these technologies will be reflected in this paper along with predominant use of these tools as an interface and their limitations.

2. Different Issues and Case Studies

2.1 Runoff Modeling from a Snow Covered Area

Most of the earth planet good water is captured in the form of snowfall and ice in north and South Polar Regions. Division of rainfall is made and stored in the high altitudes in the form of snowfall and iceberg. Almost all the continual rivers originate from the snow-capped mountains from where tremendous amounts of electricity can be generated. Moreover, increasingly larger portions of the flowing water are being utilized for drinking, irrigation and navigation. Therefore, ambient information on snow area, snowfall depth and its attributes is essential information if we are to optimize the utilization of the water resource.

Remote or auto sensing satellites can monitor the changes in effulgence. Image processing techniques are then used to transform the radiance to get the information about the snow depth and area. A max amount of research has been undertaken in this area ranging from the Andes and Rock Mountains in America to the Alps and Himalayas in Europe and Asia.The basic idea is to discriminate the cloud from the snow area through the analysing of channel 3 and channel 4 of National Oceans and Atmosphere Administration satellite where, the spectral effluence of cloud in channel 3 (visible band) is much greater than in channel 4 (near- infrared band). Channel, on the other side, provides the extent of snow pack. The daily data taken from the satellite is radiometrically and geom-etrically corrected. The snow and cloud area is discriminated using the spectral signatures and the principle component analysis. In some cases, multi-spectral image divisions is carried out to enhance the satellite imagery.

The assessment of snow depth is further considered by analyzing the spectral signatures of pure snow area. The radiance obtained from channel 1 is categorized into different zones based upon the difference in the radiance between the highest and lowest pixel values. The range of classification is encoded as a snow depth having maximum, medium and minimum coverage, which is compare with the ground truth data from the region under consideration. It is possible to differentiate the dry and wet snow because visible (band 3) and near-infrared (band wavelengths depend on the snow grain size distribution, the depth and density of snow pack, the extent of insoluble and soluble impurities and the liquid water inclusion [25]. Soot concentrations as low as 0.1 ppmw (parts per million by weight) are enough to reduce the reflectance of snow [10, 6 and 2]. The near infrared reflectance of snow decreases significantly with melting [16, 24, 5, and 23]. Negligible melting occurs in dry snow while wet snow is soaked with water during the melt season. The reflectance of wet snow in the near-infrared is lower than that of dry snow due to the micro-structural changes caused by water. The snowmelt and runoff can be modeled using snowmelt runoff modeling (SRM) already performed by World Meteorological Organization, which is a deterministic-semi distributed-temperature index model that takes into consideration the precipitation and air temperature along with other predetermined parameters representing catchments hydro-morphological characteristics. Other models that have been developed independently e.g. by [22] can also be used to forecast the runoff from snow melt. The model performance evaluation of snowmelt run-off indicated most statistically significant correspondence with the correlation coefficient value of 0.94, and percentage volume deviation of +4.6 when compared to a WMO test catchment [22]. High spatial resolution is also important to delineate the areal extent of transition zones represented by mixed pixels and, in turn, to ensure accurate hydrological model performance [22]

3. Flood Mapping

With the help of remote sensing images, particularly with very high resolution, it is possible to demarcate the flood prone areas over wide regions including the main branches and tributaries of a river system. The comparison of the flood stage can then be performed with the values directly measured or calculated from a hydrodynamic model (e.g. HEC-2). The wide application of the European Remote Sensing Satellite-l is occurring in this area of investigation.

The general procedure involves the analysis of satellite image using GIS software to demarcate the bank (at the water's edge) within a specified interval of time. The width of the river at a number of transects is also taken from the satellite imagery. The possible sources of errors are due to topographic map inaccuracies and operator positioning. Error due to altitude and the error due to geometric distortion have to be removed beforehand to compute the discharge in the tributaries and in the main river from the satellite images. Once, the slope of the terrain is obtained (a slope map can be

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readily generated in a GIS from topographic data), the discharge is simply computed from manning's equation or similar for open channel flow. River cross sections are measured from ground survey at a number of transects and are used to calculate the flow from a hydrodynamic model. In normal circumstances, the GIS approach provides results within eighty- percent accuracy of flood profile [3].

The flood prone areas in a similar way can be determined from the satellite imagery. In practice, Landsat TM, Landsat MSS, SPOT, NOAA,. IRS, Japanese Earth Resource Satellite (JERS) and ERS etc images are being analyzed to find out the extent of flood hazard zones within a region of interest. Depending upon the accuracy desired, different satellite images could be analyzed to define the flood prone areas. Simply, the satellite images taken before and after the flood are processed in order to define the boundaries of the flood prone areas. From the multi-spectral classification, principle component analysis and density slicing procedures, the image is geometrically and radiometrically corrected. The image is further scrutinized by analyzing the spectral signature in order to define the flood hazard zones within the pixels. Based on the information on the flood recurrence interval, the area can be further categorized into the areas with different probabilities of flooding.

4. Erosion and Accretion along the Banks and Coastal Areas

It is possible to determine the erosion and sedimentation behavior in rivers and streams using GIS and remote sensing images. The accuracy is generally greater if the area of study is very large. Most studies focus on the coastal belts and river mouths, where morphological changes are significant. Landsat MSS, Landsat TM and SPOT images are very useful for this purpose because of their high spatial resolution. The image obtained within a regular interval is radiometrically and geometrically corrected and then processed further to define the spectral signatures of each pixel. The extent of erosion and sedimentation can be determined by using satellite images collected at different times and processing with a suitable GIS package [8]. The study of the soil type and the morphology (particularly slope) wilt provide an additional information about the type of area that would be eroded or accreted. By making the use of ground cover, elevation, slope and soil type, it is possible to predict erosion and sedimentation [8]. A number of studies demonstrate the capability of remote sensing technique to detect erosional and accretional trends in areas of rapid changes where access is difficult due to transportation or other restrictions. With high resolution satellite images, the prediction of shoreline erosion or accretion can be expected more than eighty percent accurate of the field measurements [8].

5. Water Quality Assessment

The GIS and remote sensing technique is widely applied to define the water quality parameters of lakes, reservoirs, rivers and oceans. The assessment of water quality is mainly carried out by determining the concentration of the suspended solid particles, extent of chlorophyll content, secchi disk depth and surface temperatures.

Suspended solid concentration: The computation of suspended sediment particles can be undertaken by examining satellite images of the region at different times. Practically, Landsat MSS and SPOT images are widely used in order to acquire the data, as these satellites can provide the image with very high spatial resolution. The satellite images are, corrected radiometrically and geometrically, and the image coordinates are converted to the national grid system to delineate the spectral radiance. Normally 3x3, 5x5 or 9x9 pixels (the exact number depends upon the pixel size and resolutions) are averaged around the ground sampling sites. This averaged spectral radiance is then correlated against the suspended sediment concentrations, which are measured in the field at the same time as the satellite pass. The correlation coefficient obtained in this. way is normally more than 0.9 [19].

Chlorophyll content: Similarly to the suspended sediment concentration, the chlorophyll c.ontent can also be determined from the satellite data. Landsat TM and SPOT images are used for areas requiring small areal coverage, whereas, NOAA image can be used for very large areas. In general, the field data at different locations and satellite overpass images are taken at the same times. The satellite imagery is corrected for the error due to attenuation within the atmosphere. It is found that the radiance obtained in channel 3 of TM imagery (620-690 nm), is primarily dependent upon the non-organic suspended matter. The radiance obtained in channel 1 (450-520nm) is transformed by subtracting the radiance obtained from the channel 3 in order to correct the additional radiance obtained due to scattering from non-pigmented suspended particles. The ratio of (TM1-TM3)/TM2 (TM2=530 -610 nm) has been found to be a useful index for the estimation of chlorophyll concentration [15]. The correlation with chlorophyll content is normally carried out by examining the extent of chlorophyll pigment in the laboratory and correlating against the radiance obtained from (TMI-TM3)/TM2.

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Regression analysis is carried out to find out the relevancy of the method applied. The usual range of correlation coefficients are from 0.70 to 0.95 [15 and 17].

Secchi disc depth: Secchi disc depth is a parameter used to infer the turbidity. The greater the secchi disc depth, the clearer the water is. It has been found that the radiance obtained from channel 3 of TM imagery correlates inversely with the secchi disc depth [15]. The comparison is usually made between the measured secchi disc depth at different locations with the radiance obtained from the satellite overpass. The correlation coefficients obtained typically ranges from 0.40 to 0.9 e.g. [15 and 17].Surface temperature: From the use of remote sensing images, it is also possible to identify the surface temperature of large water bodies like lakes, reservoirs and sea. This is possible by analyzing the channel data of infra-red band, which is also termed the thermal band. The temperature is usually calculated using Landsat TM, SPOT, NOAA, ERS, IRS and JERS satellite data. The spatial accuracy of the result being within one pixel size, the choice of the satellite depends upon the type of accuracy desired. The usual procedure is to correct the satellite image for atmospheric effects and then convert the radiance into the brightness temperature [26], which is then converted into the corresponding surface temperatures using a split window method [26]. The split window algorithm is the one in which the sea surface temperature is calculated from the relationships of the brightness temperatures obtained from channel 4 and 5 with some coefficients. The calculated temperature is compared with in -situ surface temperatures. The accuracy obtained in this method is within 0.5 °c [17]. Thus, this method is particularly suited to cases where the temperature differential exceeds 0.5 °c. This often occurs when river water meets the ocean or power station cooling water is discharged to a receiving water body.

6. Identification of Ground Water Zones

By preparing a land use map, land cover map, soil map and a geological map at a certain scale, usually ranging from 1 :30000 to 1: 100000 from the remotely sensed images and conventional techniques, ground water zones can be demarcated relatively precisely. Different researchers have developed the methodologies in this respect, where they have extensively applied the options within GIS software in order to interpret the images/maps and correlate the different features against the presence of groundwater [I, 13, 12 and 4]. The usual procedure is to obtain the data from remotely sensed satellites and ground measurements at certain time intervals. The remote sensing images are

corrected for the geometric and radiometric errors. The image is then converted into the national grid system, which then converted into the different maps e.g. (a) lithology (b) landforms (c) lineaments and (d) surface water bodies. Further, the map of drainage density, slope class and soil map can be developed from the existing topographic map of that region. Based on the soil type and the land use characteristics, the area is divided into regions having high ground water potential, medium to high potential, medium potential, medium to low potential and low ground water potential zones. The prediction is compared with the yield obtained from wells in the field and provides the range of accuracy from 0.65 to 0.9 with regard to the spatial variation of the ground water zones [14].

Besides the above cases, determination of the soil moisture content, analysis of salinity, assessment of land use and land cover map and demarcation of cropping and non cropping areas is also possible from the use of GIS and remote sensing images. Moreover, assessment of irrigated areas, yield from the paddy field, type of vegetation, soil type and delineating the surface area of the large water bodies etc can be made possible applying GIS and remote sensing technology. In addition, the GIS can also be used as an interface e.g., management of water resource potentials (combination of Arc view and Mike basin), flood modeling (combination of Arc view and Mike II), urban drainage water management modeling (combination of Arc view and Mouse) and three dimensional modeling of the subsurface water perspectives (combination of GRASS and Artificial neural network).

7. Limitations

Though GIS and remote sensing have many useful applications, they have some restrictions due to the inherent technology, data types to be considered and other effects.

7.1 Limitations of GIS

The accuracy of the result entirely depends upon the accuracy of the data source obtained from the remote sensing images. Accuracy is further reduced by assignment of average values for some parameters. Many of the analyses required for a water resource assessment are not included in most of the GIS packages developed so far. Moreover, GIS packages are expensive to buy and update, and well-trained personnel are necessary to operate it.

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7.2 Limitations of Remote Sensing

From remote sensing, it is only possible to differentiate between surfaces, which have different spectral signatures. This physical limitation means that toxins in water for example can not be detected unless they have an effect on something that is "visible" to the sensor, such as phytoplankton. Another limitation is that electromagnetic radiation is very poor at penetrating water, it is almost entirely absorbed at the surface for wavelengths of near infrared and longer, and can only penetrate a matter of meters in the visible wavelengths. Regarding land information, it is possible only to acquire the information if the area of interest is larger than the pixel size of the satellite imagery. Further, details of objects within shadows or under the tunnels etc eteras can not, be obtained since the reflectance from these objects can not be sensed by the scanner of the satellite.

There are four main factors that limit the utility of an image data set and these relate to the technology that was used to acquire the data. First is the position and spectral width of specific wavebands, as this will determine if certain spectral signatures can be distinguished. Intimately linked to the spectral resolution is the radiometric resolution (6-bit, 8-bit or l0-bit etc.) which may have a bearing on whether it is possible to distinguish between different surfaces or not. The spatial resolution can be taken in simple terms to be the size of a measured unit on the Earth's surface, the pixel size. The dimensions of pixels for the current generation of satellites range between 10m (SPOT) and 5 km (Meteosat). The size provides a simple guide as to the smallest size of features that can be detected, although the exact relationship is somewhat more complicated. The determination of temporal change of the features at any particular place depends upon the elapsed time between data sets. It is very rare to get the same elapsed time (for the same location) between successive satellite overpasses as this entirely depends upon the orbital period, the direction of movement and atmospheric conditions. Many regions of the world are cloudy for much of the year and the data collection during cloudy days is impossible except from microwave satellites. In addition, the rapid changes can not be monitored as the satellite passes over the same area takes a couple of weeks.

8. Conclusions

Now days, the spatial resolution of satellite images is improving and the number of bands is increasing due to advancement in satellite technology. This further facilitates the collection of data within a very small area of interest. Satellite images can be obtained easily from or via worldwide web sites and the price of the images is getting down. Typical prices range from US dollar 30 to 6000 depending upon the satellite and level of correction.

The GIS packages can handle large amounts of satellite data sets in a window-based environment, as there is continuous improvement in software and computer technology. The task is further simplified by the case with which satellite images can be imported into GIS systems. The problems associated with the water resource engineering encompassing large areas can easily be tackled by the application of GIS and remote sensing. Moreover, the availability of regular temporal data has further facilitated to cope with the problems in a real time manner. For these reasons, GIS and remote sensing is becoming popular among the hydrologists, water scientists and water managers. It can be concluded that GIS and Remote sensing technology will have greater potential to deal with the problems associated with the water resource management in the years to come.

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DESIGN OF INVERTER USING RENEWABLE ENERGY RESOURCE

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ABSTRACT

Our project is to design an inverter that conversion of DC power source, supplied by Solar Cells, to an AC power source used to supply a load.The amount of electric energy is continuously increase, and conservative energy resources are decreases . Their prices are rising. For these reasons, the need for alternative energy sources has become required, and solar energy abundantly available and free from pollution. Due to the increasing efficiencies and decreasing cost of Solar cells and the improvement of the technology used for power inversion, developing an inverter powered by Solar panels

Keywords*: -Renewable source, MPPT , Solar Panel, Battery*

1. Introduction

Solar energy is produced directly by the sun and stored on the Earth. The sun produce its energy from a thermo-nuclear process. The process creates heat. The heat present in the sun and is in maintaining the thermonuclear reaction. The electromagnetic radiation (including visible light, infra-red light, and ultra-violet radiation) streams out into space in all directions. Few quantity of radiation out of total radiation reaches on the Earth. Even fossil fuel give their origins to the sun; they were many plants and animal who survival depend on sun. The whole earth required energy can be supplied directly by solar energy. According to nature of solar energy has two components are required to have a serviceable of solar energy generator. These two constituents are a collector and a storing unit. The collector simply collects the radiation that drops on it and converts a part of it to other forms of energy.

2. Basic Principle of Solar Inverter

A solar inverter transforms the variable direct current (DC) output of a photovoltaic (PV) solar panel into alternating current (AC) that can be used by the connected load. Solar inverters have special roles to' adapted for use with photovoltaic arrays, with maximum power point tracking .

3. Need of Solar Inverter

There are two kinds of sources for electrical power generation. Conventional and other is non- conventional. Some of conventional source are polluted the environment to produce the electricity. And nuclear energy is not much desirable because of its harmful radiation effect. After some of ten years conventional sources will not adequate to fulfill the requirements of the human being. So some of the electrical power should be produced by non-conventional energy sources like solar, wind. Decreasing the cost of solar power generation and the further rise of energy crisis, solar power generation technology obtains more and more application.

There are two ways in which electrical power is pass on. Direct current (DC) comes from a source of constant voltage and is appropriate to short-range or device level transmission. Alternating current (AC) power consists of a sinusoidal voltage source in which a uninterruptedly changing voltage (and current) can be used to employ magnetic constituents. By increasing the voltage, less current is needed to distribute a given amount of power to a load, decreasing the resistive loss through conductors.

The approval of AC power has created a trend where most devices adjust AC power from an outlet into DC power for use

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by the device. However, AC power is not always available and the need for flexibility and ease has given batteries an advantage in transportable power. Thus, for transportable AC power, inverters are needed. Inverters yield a DC voltage from a battery or a solar panel as input, and change it into an AC voltage output.

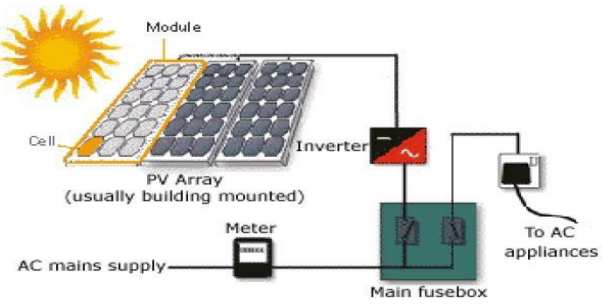

Fig.1: Layout

4. Types of Solar Inverter

Solar inverters may be classified into three general types.

Single-handedly Inverters
Gridiron Tie Inverters
Battery Holdup Inverters

4.1 Single-handedly Inverter

It is used in remote systems where the inverter pulls its DC energy from batteries charged by photovoltaic arrays. Many stand-alone inverters also combine integral battery chargers to replenishment the battery from an AC source, when available.

4.2 Gridiron Tie Inverter

Grid-tie inverters, which equal phase with a utility-supplied sine wave. Grid-tie inverters are designed to shut down spontaneously upon loss of utility supply, for safety reasons. They do not provide backup power during utility shutdown.

4.3 Battery Holdup Inverter

Battery backup inverters, are extraordinary inverters which are designed to draw energy from a battery, manage the battery charge by an onboard charger, and export surplus energy to the utility grid. These inverters are accomplished of supplying AC energy to selected loads during a utility shutdown, and are essential to have anti-islanding protection.

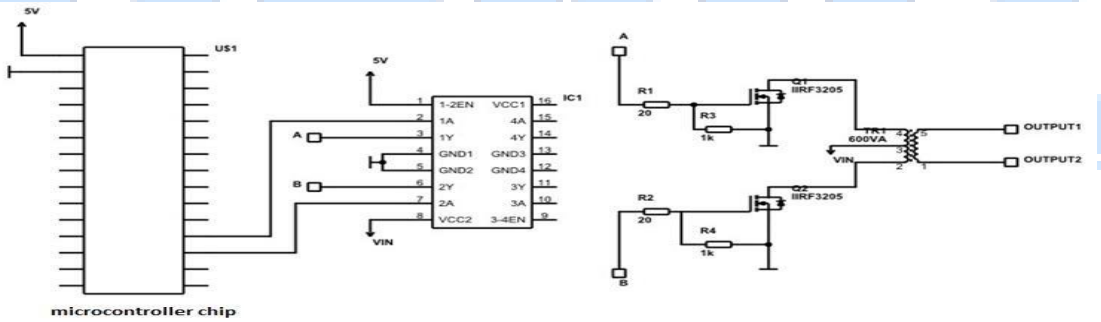

Fig. 2: Circuit diagram of inverter

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5. Design of Solar Inverter

With this inverter, you can control up various electronic Appliances like TV, Fan Etc
The aim of the inverter circuit is to convert 12VDC to 220VAC, Now to accomplish this, we have to first convert 12V DC to 12V AC first followed by 12VAC to 220VAC using a step up transformer.
In short, we can categorize the designing of inverter circuit into three stages:
Driver stage
Power stage
Transformer

Driver stage

The tasks that are accomplished in driver stage are generation of improved sine wave, monitoring the battery voltage, handling the other housekeeping tasks such as short circuit safety, etc. Here I have used an Arduino NANO to complete all these tasks.
Arduino is producing a modified sine waveform of 5V which is amplified to a level of 12V using L293D IC. Battery voltage is observed every 20ms using timer interrupt.

Power Stage

Now this current enlargement task is completed by the power stage. In this stage, two N-MOSFETs are designed in push-pull topology to amplify the current. MOSFET Selected are IRF3205.

Transformer

Now this is very simple, the output waveform from the push-pull topology is served into the transformer to generate the 220V.

6. MPPT Maximum Power Point Tracking

Step 1: extreme power point tracking and its essential.

We have a 12v/100 watt solar panel and it'll provide an output between 18V-21V dependent upon manufactures, but batteries are rated for 12v nominal voltage. At full charge circumstances they will be 13.6v and will be 11.0v at full discharge. Now let's assume our batteries are at 13v charging, panels are giving 18v, 5.5A at 100% working efficiency (not potential to have 100% but let's assume). Normal controllers have a PWM voltage regulator circuit which falls the voltage to 13.6 without any gain in current. It only provides safety against overcharging and leakage current to panels through nights.
So we have 13.6v*5.5A = 74.8 watt. We lost 25 watt.
To counter this issue, I used smps buck converter. This type of converter has above 90% efficiency. Even 90% is measured poor. The Second problem is non-linear output of solar panels. They need to be worked at a certain voltage to produce maximum available power. Their output differs through the day. To solve this problem MPPT algorithms are used. MPPT (Maximum Power Point Tracking) as the name suggests this algorithm tracks the maximum existing power from panels and varies the output parameters to stand the condition. So by using MPPT our panels will be producing maximum available power and buck converter will be putting this charge efficiently into batteries.

Step 2: MPPT Working

Let's say we have 17 V 5 A, i.e. 17x5 = 85 watt, at any period of the day. At the same phase our output is 13 V 6A, i.e. 13x6 = 78 Watt.
Now MPPT will rise or drop the output voltage to by comparing to previous input/output power. If the previous input power was high and the output voltage was lower than present, then output voltage will be lowered down again to get back to high power. And if the output voltage was high, then present voltage will be increased to the previous level. Thus it keeps oscillating around the maximum power point. These oscillations are minimized by efficient MPPT algorithms.

Step 3: Buck Converter

We have used N-channel MOSFET to create the buck converter. Usually people select P-channel MOSFET for high side changing and if they choose N-channel MOSFET for the same purpose than a driver IC will be essential or boot strapping circuit.

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But I better-quality the buck converter circuit to have a low side switching using N-channel MOSFET. I'm using N-channel because these having low cost, high power ratings and lower power dissipation. This project uses IRFz44n logic level MOSFET, so it can be drive by an Arduino PWM pin.
For higher load current, one should use a transistor to apply 10V at gate to get the MOSFET into saturation completely and decrease the power dissipation.
As you can see in circuit above, we have placed the MOSFET on negative voltage, thus using +12v from panel as ground. This configuration allows me to use a N-channel MOSFET for buck converter with least components. But it also has some drawbacks. As you have both sides negative voltage separated, you don't have a common reference ground anymore. So measuring of voltages are very tricky. I have connected the Arduino at solar input terminals, using its negative line as ground for Arduino. We can easily measure the input voltage at this point by using a voltage divider circuit as per our requirement. But we can't measure the output voltage so easily as we don't have a common ground.
Now to do this there is a trick. Instead of measuring the voltage across the output capacitor, I have measured the voltage between two negative lines. Using solar a undesirable as ground for the Arduino and output negative as the signal/voltage to be measured. The value that you got with this measurement should be subtracted from the input voltage measured and you will get the real output voltage across output capacitor.
Vout_sense_temp=Vout_sense_temp*0.92+float(raw_vout)*volt_factor*0.08; //measure volatge across input ground and output gnd.
Vout_sense=Vin_sense-Vout_sense_temp-diode_volt change voltage difference between two grounds to output voltage..
For current measurements I have used ACS-712 current detecting modules. They have been powered by Arduino and attached to input GND.
Internal timers are improved to gain 62.5 Khz PWM at pin D6, which is used to drive the MOSFET. An output blocking diode will be necessary to provide reverse leakage and reverse polarity protection use Schottky diode of desired current rating for this determination. The value of inductor depends upon frequency and output current requirements. You can use online accessible buck converter calculators or use 100uH 5A-10A load. Never cross the maximum output current of inductor by 80%-90%.

7. Modelling of 50watt Solar Inverter

A successful design includes correct knowledge of daily electrical load calculation and accounts for all poorest case scenarios which might possibly occur during procedure. A good designer will be practical and keep the costs down by cutting on superfluous over sizing the system.

Selection of Battery Size And Solar Panel

- Total load = 50 watt
  we have design inverter for 12 volt
  Voltage = 12 volt
  we have to find out current = ????
  power = voltage * current
  50 = 12*current
  Current = 50/12=4.16 ampere
- Battery = total load * no of hours/voltage
  = 40*5/12
  = 16.66
  = 16 Ah or 17 Ah

But efficiency of inverter 85% & DOD = 80%
A-hr=(16A-hr/(0.85*0.8))=23A-hr battery

- Solar panel
  charging current = 1/10 th of its total Ah
  = 1/10 * 23
  = 2.3 Ah

Solar panel need 2.3 amps current to feed our battery bank

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= 2.3 + 4.16
= 6.46
= 6.46 amps

Solar panel should make 6.46 amps

Here 2. 3amps need to feed battery and 4.16 to run electrical load through solar

Power =12 * 5
= 60 watt

50 att pane give output of approx 35 watt so we need 100 watt panel

8. Component Required and Description

Table- 1: Component Required and Description

SR NO	COMPONENT	RATING
1	INVERTER	
	➢ IC L293D	L293D
	➢ ARDUINO NANO(MICROCONTROLLER CHIP)	MICROCONTROLLER CHIP
	➢ RESISTORS	20 Ω,1KΩ
	➢ MOSFET	N TYPE – IRF3205
	➢ TRANSFORMER	230V/12V-0-12V,5A
2	MPPT AND SOLAR BATTERY CHARGER	
	➢ IC	ATMEGA3285 IC27805 ACS712
	➢ RESISTORS	10KΩ,4.7KΩ,1KΩ
	➢ CAPACITORS	0.1µF,1000µF,1µF
	➢ DIODE	1NS908
3	BATTERY	12 VOLT 16 AH
4	MISCELLANEOUS	

9. Cost Estimation and Applications

In the forthcoming, when the prices of relic fuels increase and the economic benefits of quantity production is reduced the peak watt price of the photovoltaic cell, photovoltaic power will become extra price reasonable and more mutual.

Table- 2 : Costing

COMPONENTS	**RATING**	**COST**
SOLAR PANEL	100WATT	4500 TO 5000 RS
SOLAR CHARGE CONTROLLER	12 VOLT 10 AMPERE	800 TO 900 RS
BATTERY	16Ah	1500 TO 2000 RS
INVERTER	150 VA	2000 TO 2500 RS
LOAD(INCANDESCENT BULB)	40 WATT	15 RS
CABLE	POLYCAB MULTI STRAND CABLE 1 SQ MM (5 to 7 meter)	100 RS
MISCELLANEOUS	SOLAR PLATE HANDLING EQUIPMENT NUT BOLTS	500

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		TOTAL – 10000 TO 11000 RS

10. Conclusion

From our project we observed that this solar inverter is generating electricity free of cost by using solar energy so, its eco-friendly, and pollution free and can be used for domestic utilizations as well as for industrial purpose on three phase. In this project, we prepared an inverter which is adequate to supply the power to domestic load Photovoltaic power production is ahead more significance as a renewable energy source due to its many advantages.

11. Future Scope

As entire world is facing a problem of global warming and energy crisis, our project will help to decrease these problems by using solar energy to produce electricity. Main motto of our project is to support use of renewable energy sources. This project is most useful in our life because in this project one time asset fixed on life time. In future one day non-renewable energy will finish then we will use to the renewable energy.
The solar inverter made by us is just a prototype for making future projects which include advanced technologies like micro controlled solar tracking, charge control, etc. this is to show that solar inverters are very low-cost and easy to install so that the energy demands are shifted on using renewable sources of energy.

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SECTION F

WORK ENVIRONMENT AND ITS IMPACT ON WORK PERFORMANCE

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ABSTRACT

The environment of workplace has a remarkable impression on the work efficiency of workers. The environment of organization directly affects employee's determination, efficiency and their performance. Every organization need to generate a healthy atmosphere so the employees or workers senses satisfaction, motivation as the motivated employees are the real wealth of all the business. It is actually the environment of workplace which prominently decides the standard of employee's motivation, work presentation and the productivity, thus overall imprint on the completion level of profession. Thus, the efficient work atmosphere affects not only employee's performance level but, also the overall development of the business of the organization. The research paper endeavors to research the connection amid the workforces and work environmental influence on workers and its impact, positive or negative on the performance level of the workers.

Keywords*: Work environment, Work performance, motivation, determination.*

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1. INTRODUCTION

The competence of the employees prominently hinge on the atmosphere of workplace. The work surroundings is an environment which consists of physical, mental and societal aspects that shake the frame and the mind of the employees either positively or negatively. Therefore, all the factors of the environment of work are of prime importance for the performance of work. The environment of workplace includes organizational culture, decision making process and the various dynamics of the environment, that distress the performance of the workers. If the environment is constructive it will wipe out frustration, stress, and feeling of boredom and will encourage workers to work more happily and freely. As a result, the positive work environment ensures the development and triumph of the organization.

2. THE INFLUENCE OF WORKSTATION ENVIRONMENT ON WORK CULTURE

The endless job opportunities and the changing economy, it's very essential and a challenging task for every management or employers to inspire the workers. Salary increases, extras are some of the common practices which firms have adopted for raising the morale of the employees. But it is equally essential for the management to understand that even work environment affects the worker's inspiration and presentation level on a large scale. The workplace setting must be such where the competency of the worker will be best used. Therefore, the management need to create or construct a work environment which is appealing, encouraging and able to retain its employees. The employer needs to think about the new strategies to improve the environment of workplace which will expand the output and the quality of work performance. As indicated by Pech and slade (2006) the worker's separation is expanding step by step and getting more critical to make working environments that emphatically impact workforce. The workplace is the main driver of worker's engagement or separation. The representatives occupied under badly designed condition, for example, nonappearance or absence of security, wellbeing and inconvenience factors like deficient helping, ventilations, and extreme clamor may wind up with little execution. Accordingly, the workplace has been firmly connected with the activity fulfillment.

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The layout of the workstation is a prominent element that touches employee's efficiency. Therefore, neatly designed office indicates the standard and the image of the company. The office need to be designed in accordance with the type or category of the job and the individuals who are going to work in that office. The strong and harmless setting of the workplace actually raises the individual's performance. So it is the prime responsibility of management to implement new plans and techniques to construct office buildings which can give a great output, increase productivity, and attract more employees. Neatly designed office, proper furniture, good ventilation, appropriate lighting, and adequate safety measures are all important for creating safety and strong setting to improve the presentation of the workers. Many notable writers have stated that the layout of the workplace, along with efficient decision-making processes, are vital in improving employees' productivity and administrative caliber.

Besides the physical factors, the organization must take a vigorous role in changing their style of functioning which will suit to the employees. The management style denotes to the social relationships, code and conduct, and professionalism between employer and employees. The proper changes in the managing style will automatically result in the effective performance of the workers. The organization must give require freedom to the employees to work and should avoid unnecessary interference. By allotting duties to the employees, the management actually ensure their confidence in the ability of their employees and can encourage teamwork. Such a treatment to the employees actually endorses faith and trust among workers and will make the workforces more industrious and loyal towards the organization. The sense of belongingness towards the association will inevitably reduce the rate of errors and upsurge the output and creativity level of the employees. The salary, bonuses are basic factors to motivate the employees. Apart from that the open communication, job security, impartiality, mentoring, and seniors support are also some of the key factors which are motivating the workforces to contribute best from their side in the job. These factors of the workplace setting lead the employees towards engagement or disengagement towards their company and work performance.

3. CONCLUSION

The proficiency and the competence of any organization depend upon satisfaction and motivation level of the employees and thus, the work setting is main element, which plays an outstanding part in motivating the employees. To encourage the workforces, is the prime concern for all the organizations. Effective management and good working atmosphere are major contributing elements to raise the performance of the employees by controlling stress, fatigue, boredom and offering the improved working conditions and work gratification to the workforces.

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IMPACT OF ORGANIZATION' HIERARCHICAL CULTURE ON HUMAN RESOURCE (HR) MANAGEMENT

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ABSTRACT

The fast changes have been seen all around the globe and furthermore the associations and the work culture is confronting a change with the mechanical advancement. The accessibility of substantial open doors and at the same spell different difficulties to the managers and leaders influence the present associations' culture overwhelmingly powerful and it is extremely key to comprehend the dynamism to reach towards the hierarchical targets. Hierarchical culture as far as the blend of contrasts components like convictions, qualities and presumptions, gives shots and wide casing to the HR management abilities to create in an organization. Numerous researchers of HR management have suggested that the different highlights of culture of organization affect esteems, convictions and presumptions of the workforce. The present research paper is endeavoring to think about the work culture and its effect on the HR management of the association. The paper accentuation that works culture has the solid association with human asset.

Keywords: *Work Culture, Management, Workforce, Human Resource (HR), Motivation*

1. INTRODUCTION

The world is changing quickly and the associations and the work culture is likewise changing because of mechanical advancement. Because of substantial open doors and difficulties to the supervisors and chiefs, the present organization Culture is prevalently unique and it is exceptionally indispensable to comprehend the dynamism to accomplish the hierarchical goals. There have been wide inquiries about to investigate the effect of hierarchical culture on HR management of an organization. Hierarchical culture is giving open door and expansive edge to the improvement of HR management aptitudes in an organization which is driven by moral esteems.

An organization can deal with the human asset by inserting moral esteems in its way of life. Be that as it may, hierarchical culture could be shifted since organizations contrast in their social foundations as far as convictions, qualities and suspicions. Organization culture can adapt to the persistent changes and satisfy the requests of the organization to increase aggressive achievement in every one of its exercises. In this way, an organization culture is considered as a motivational instrument which advances the HR management to perform easily and guarantee achievement in every one of its achievements. In this way, the thought process of the paper is to examine the effect of organization culture on the HR management.

2. HIERARCHICAL CULTURE AND HUMAN RESOURCE (HR) MANAGEMENT

Organization culture is a common esteems and convictions that assistance to shape the conduct examples of the workforce inside the organization. It is an aggregate procedure of the brain and heart that separates the people of one gathering from the other one. Accordingly, we can condense that hierarchical culture can be the instrument of keeping up human asset in a connection and quickening them towards organization goals. What's more, making the connection amongst culture and organization achievement through its HR management. These social esteems and HR

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management are solid with hierarchical procedures that prompted effective organizations. The organization culture is comprising of general parts of the organization, for example, characteristic settings, the customs, environment, and qualities and choices of the organization.

Organization culture can relate the workforce to Organization's esteems, convictions, traditions and standards of work outline and incorporate these suspicions into work execution. Hierarchical culture can be arranged as the center of organization's exercises which greatly affects viability and the nature of its efficiency and execution. It is a lively quality which is connecting with and communicating and molding workforce management and workforce demeanors. Organization culture is the fundamental model of shared esteems and suppositions, convictions, amending a method for basic intuition on issues confronting the organization. Organization culture initials with management and conveyed on to the hierarchical individuals. The way of life of an organization makes an effect on various factors some of which incorporate the impacts of the entire culture, over a wide span of time occasions of the organization, the differing identities

Organizations require quality and powerful workforce that can work in a domain of expanding confusion and dynamism. The significance of value and viable workforce for culture can't be ignored due to its effect on HR management. It builds the execution and efficiency and furthermore enables the organizations to expand worker fulfillment and assurance, which tends to better execution and profitability. Persuaded workers are more enthusiastic to assume the liability of their own execution, discover approaches to change, and contribute candidly to their organization's prosperity. Occupation fulfillment is the main source of change and is specifically connected to higher efficiency and spirit. Therefore, the significance of qualities and convictions consolidation all through the HR management is fundamental.

3. CONCLUSION

This investigation exertions demonstrate that a very bonded association between HR management and organization culture. This will help the management and reasonable coordinating of human asset with the organization conviction, esteem, and suppositions. In this way quickening HR management inside the association, which tends to build workforce execution? This will maintain hierarchical culture and assist the HR management with coping with association's way of life. In this manner, being a piece of the hierarchical culture will enable workforce to see organizational occasions to get high work execution and employment fulfillment.

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Biography

Prashant Ramrao Pawar holds a Master's degree in English Literature (2006) and thesis submitted for Doctorate degree (2018) in English (JJT University, Zhunzhunu, Rajasthan). Since January 2010, he has been working as an Assistant Professor within the Faculty of Applied science and Humanities at the Viva institute of technology, Virar, University of Mumbai. This includes the research publications of several national and International Journals. His main research interests and activities are in the field of CLT, Teaching-learning process, quality management and quality assurance for education.

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THE "W's" OF DRUG INTERACTION

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ABSTRACT

Interacting drugs commonly occur when many medications are taken simultaneously or eventually when mixed with specific food, beverages etc. which results in counter-attacking of this medicines and hence can cause some adverse effects. Most tranquilize associations are not genuine, but because of the fact that a couple are, it is imperative to comprehend the conceivable result before you take your medicines. Certain medications can collaborate pharmacologically and influence the movement of different prescriptions. It is conceivable that an association will happen between a medication and another substance already present in the body (i.e. nourishments or liquor). Or then again in certain particular circumstances, a medication may even respond with itself, for example, happens with lack of hydration. In different circumstances, the interaction does not include any impact on the medication. In specific cases, the presence of a medicine in a person's blood may influence certain sorts of laboratory examination giving rise to analytical interference. (diagnostic impedance).

Keywords— *Interactions, medication, beverages, pharmacological, interference.*

1.INTRODUCTION

The growth of pharmaceutical industry in last three to four decades has been a pointer towards the requirement of best drugs to alleviate illnesses, sick health and suffering to animals and mankind. Drug substances are generally dispensed or applied alone, but alternatively as a crucial step in a method, every unique pharmaceutical product is a components precise into itself perceiving their self-formulation similarly to the active ingredient substances, a pharmaceutical method also carries various non-therapeutic agents commonly called pharmaceutical adjuncts, excipients or requirements, also, it is through their utilization that a definition accomplishes its precise composition and distinct physical look. This formulation or even consumption of various medicines simultaneously or few drugs with some eatables can lead to various interactions in between the ingredients giving rise to side effects giving rise to series problems which can be even fatal in nature.[1] - [5]

2.INTERACTIONS

To minimize or control the negative impacts of such interactions it is necessary to find solutions for the questions below:

A) Why do the interactions occur? [6] - [8]
B) When do the interactions occur? [9] - [11]
C) Why it's important to check for interaction? [12] - [14]
D) When does the medicinal interactions arise often? [15] - [17]
E) What other factors cause interactions? [18] - [20]

The answer to all the above W's will be helpful in guiding all for minimizing the drug interactions and hence increasing the safety purpose.

2.1 Why do the interactions occur?

There are 3 ways in which drugs interact with each other and these are as mentioned below:

2.1.1 Drug-drug interactions - Most widely recognized sort of medication connection. The more meds are consumed, the more prominent the shot for your medication interfacing with another drug. Medication tranquilize co-operations can diminish depending upon meds function, may expand minor or genuine sudden reactions, or even increment the blood level and conceivable danger of a specific medication. For instance, when we take an agony drug, as Vicodin, and a steadying antihistamine, for example, Benadryl, which will result you with an added substance measure of sleepiness as the two solutions cause this symptom.

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2.1.2 Drug-food/beverage interactions- You have presumably observed the stickers on your medicine jug to "keep away from grapefruit juice" at some time. This may sense to be very odd, yet certain prescriptions can connect with nourishments or refreshments. For instance, grapefruit juice can work in lowering the levels of catalysts in your liver by separating prescriptions. Blood levels of an associating medication may rise, prompting harmfulness. This association can happen with the generally utilized statins which minimizes cholesterol, similar to atorvastatin, lovastatin, or simvastatin. The outcome can be muscle torment, or even extreme muscle damage known as rhabdomyolysis.

2.1.3 Drug-disease interactions - Medication communications don't generally happen with simply different medications or nourishments. Your current medicinal condition can influence the way a medication works, as well. For instance, finished the-counter oral decongestants like pseudoephedrine (Sudafed) or phenylephrine (Sudafed PE) may build pulse and can be perilous giving rise to hypertension.

2.2 When do the interactions occur?

Medication collaborations can happen by various diverse ways:

2.2.1 A pharmacodynamic connection occurs when given medications acts togetherly at same instance or comparable receptor site and prompt a more noteworthy (added substance or synergistic) impact or a diminished (enemy) impact. For instance, when chlorpromazine, now and again used to help forestall sickness and retching, and haloperidol, an antipsychotic solution for schizophrenia, are given together which can led to more serious hazard for causing a genuine, conceivably lethal sporadic heart cadence.

2.2.2 A pharmacokinetic association may happen in case when one medication influences another medication's assimilation, appropriation, digestion, or discharge. Illustrations can clarify these convoluted components:

2.2.2.1 Absorption*:* Some medications can adjust the assimilation of another medication into your circulatory system. For instance, calcium can tie up with some medicines and square assimilation. The HIV treatment dolutegravir (Tivicay) ought must not be taken with calcium carbonate (Tums, Maalox, others), since it can minimize measure of dolutegravir ingested into the circulatory system and decrease its viability in treating HIV contamination. Dolutegravir might be suggested to be taken 2 hours earlier or 6 hours after prescriptions that composes calcium or different minerals to help keep this connection. In a similar way, many medications can't be brought with drain or dairy items since they will interact with calcium present in them. Medications that influence stomach or digestive tract motility, pH, or normal verdure can likewise prompt medication cooperations.

2.2.2.2 Distribution*:* Protein-restricting collaborations can happen when minimum two profoundly protein-headed medications seek a predetermined number of restricting locales on plasma proteins. One case of a communication is when fenofibric acid (Trilipix), utilized in minimizing cholesterol and triglycerides in the blood, and warfarin, a typical blood more slender to help avert clumps. Fenofibric acid can connect with the efforts of warfarin and make you drain all the more effortlessly.

2.2.2.3 Metabolism*:* Drugs are normally dispensed within the body as either the unaltered (parent) medicate or as a metabolite that has been changed somehow. Chemicals in the liver, for the most part the CYP450 proteins, are regularly in charge of separating drugs for disposal from the body. Be that as it may, compound levels can increase or decrease and influence how tranquilizes are separated. For instance, utilizing diltiazem (a circulatory strain prescription) with simvastatin (a solution minimize cholesterol) may lift the blood levels and symptoms of simvastatin. Diltiazem can repress (obstruct) the CYP450 3A4 chemicals required for the breakdown (digestion) of simvastatin. High blood levels of simvastatin can prompt genuine liver and muscle symptoms.

2.2.2.4 Excretion: Some nonsteroidal mitigating drugs (NSAIDs), like indomethacin, may bring down kidney capacity and influence the discharge of lithium, a medication utilized for bipolar turmoil. We can take help of measurements alteration or more regular observing by our specialist to securely utilize the two meds together.

2.3 Why it's important to check for interactions?

Medication collaborations are essential to check for the following factors:

- •Affect how your pharmaceutical functions by changing levels of the medication blood stream
- •Put our lifes in danger for symptoms and lethality
- •Worsen a therapeutic condition you may as of now have.

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Checking for a medication cooperation before it happens can radically bring down your possibility of an issue. More often than not, our specialist and drug specialist will have effectively done this with our doctor prescribed pharmaceuticals, however it's a preventive measure to twofold check and find out about these medicines ourselves. It is better to utilize any finished the-counter (OTC) solution, including vitamins, home grown or sustenance supplements, make certain to survey these items for collaborations with our medical practitioner recommended drugs, as well. Approach your drug specialist or specialist for guidance are befuddled by the medicinal language.

Medication interactions can likewise add to the costing of medicinal services, as a genuine medication association could bring about damage, hospitalization, or once in a while, passing.

Not all medication associations are awful. A few solutions might be better ingested if brought with sustenance or may have more ideal blood levels if brought with different drugs that influence metabolic catalysts.

2.4 When does the medicinal interactions arise often?

Significant medication co-operations such are reality undermining are not normal, but rather are of genuine concern. Most medication connections recorded in bundle marking might be hypothetical in case of a medication's pharmacology. In any case we can stay away from a conceivable medication association by choosing an alternate drug, that is forever your most logical option.

Since maximum people don't know whether two medications could interreact, it's critical to check the status of medication associations with new medication. Actually, for a few medications, halting the medicine could likewise influence the levels of different medications in your framework. Being proactive is good for our own wellbeing, checking for sedate connections, and talking about worries with your human services supplier can be an existence sparing undertaking.

How frequently a medication cooperation happens, and your hazard for a medication connection, likewise relies on variables, for example,

- Total number of pharmaceuticals you take
- Age, kidney and liver capacity
- Diet and conceivable medication collaborations
- Medical conditions
- Metabolic proteins in our body and your hereditary qualities

2.5 What other factors cause interactions?

Liquor, caffeine and sedative medications of manhandle can prompt genuine medication collaborations, as well. For instance, taking an agony prescription, for example, hydrocodone-acetaminophen (Vicodin) with liquor can cause added substance sluggishness, may hazardously diminish your breathing rate, and in vast measurements might be lethal to the liver because of the blend of acetaminophen (Tylenol) and liquor.

Taking a pharmaceutical that was endorsed for another person or purchased off of the Internet can be perilous, as well and prompt sudden medication communications. Dodge these practices.

3.CONCLUSIONS

These medicinal interactive behaviour can be generally stopped with our energetic attempts. However, if we recognize we are in danger for a possible medical interaction, we must call our doctor or pharmacist as quickly as possible so that they will be able to suggest the next best steps which we should take.

Communication with our healthcare provider is very vital to avoid drug interactions. Stay up with the latest rundown of your prescriptions, over-the-counter items, vitamins, herbals, and medicinal conditions. Offer this rundown with your specialist, drug specialist, and medical attendant at each visit so they can likewise screen for drug interactions.

Review the Medication Guide, medicine data, cautioning names, and Drug Facts Label with each new remedy or OTC item. Marking may change as new data is found out about pharmaceuticals, so it's imperative to survey the data as often as possible.

It's constantly best to approach your medical care taker for the most recent data on sedate associations. In any case, you can likewise utilize online medication association checker to take in more about conceivable medication communications, as well. This device clarifies what the association is, the manner by which it happens, the level of importance (real, direct, or minor) and typically a recommended game-plan. It will likewise show any collaborations between your picked drug(s) and sustenance, refreshments, or a therapeutic condition.

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4.Acknowledgment

My sincere thanks to Mr. Manohar V. Lokhande my research guide for supporting, motivating and helping me for this paper writing.

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Experimental studies on Nano Gel Polymer Electrolytes

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ABSTRACT

Electrochemical capacitors constructed by pressing nano gel polymer electrolyte between two blocking electrodes are showing effectively enhanced charge transportation capacity along with mechanical and geometrical stability. Therefore preparation of such electrolytic system is the vital point of concern. In this paper synthesis of NCPGE comprising of poly (vinylidene fluoride-co-hexafluoropropylene)-propylene carbonate-magnesium perchlorate-nano alumina was done by capitalizing conventional solution cast technique. The resultant complex system emphasizes the good ionic conductivity (of the range ~7x10^{-3} Scm^{-1}), mechanical stability, dimensional stability and vast power window, which are compatible for its implementation in electrochemical double layer capacitors. Detail investigation was carried out by various techniques for the characterization of electrolytic system. Electric conduction plot has been detected at various temperatures (303-373 K). Potential window and ionic transference number was detected to know the potential limitation and ionic stability of optimized NGPE system. Various dielectric constants with respect to temperature and frequency have also been studied and explain by polarization effect in electrode-electrolyte interfacial region. At last optimized complex material was applied to check its compatibility for the fabrication of electrochemical supercapacitor having activated charcoal as electrode materials.

Keywords*:-NGPE, potential window, ionic conductivity, dimensional stability, electrochemical capacitor, a.c impedance technique.*

1. Introduction

In recent years the 'scarcity of electricity' is the main area of concern amongst the researchers and scientists of all the interdisciplinary fields. The electrochemical energy sources which are more commonly used now a day's are rechargeable batteries (possessing high energy density but low power density) and conventional capacitors having liquid electrolytes, which have their own drawbacks such as bulky model, self- discharge, leakage, corrosion etc. Therefore the superionic solid polymer electrolytes are the better alternative electrolyte which can be used as a substitute for existing conducting medium or separator. Superionic solid polymer electrolytes have amorphous nature causing high range of conductivity ~10^{-4} - 10^{-3} Scm^{-1}, along with conductivity other advantages are low glass transition temperature, easy fabrication, flexibility, mouldibility etc. all these characteristic properties make them compatible conducting medium for their use in different electrochemical devices such as rechargeable batteries, fuel cells, sensors, electrochromic devices etc. [1-4]. All PE which are in use at present, for example polymer blend electrolyte, polymer composite electrolyte, PGE, IL-base polymer electrolyte and polymer gel electrolyte, have some problems, such as low mechanical stability, low range of power window, high reaction rate at electrode- electrolyte interface etc. In order to improve the above mentioned drawbacks, number of solid state electrolytes was prepared with different compositions. Brief information about all the solid state polymer electrolytes is given in the first chapter. Preparation of NCPGE is one of the alternative inventions to overcome these problems. Polymer gel electrolyte which is in use, are having very good ionic conductivity of ~10^{-3}Scm^{-1}, flexibility, good electrode-electrolyte contact in fabrication of the device but due to its jelly or semisolid nature they have weak dimensional stability, decline in ionic conductivity with time, less stability towards terminal interface etc. One of the methods to solve these problems of polymer gel electrolyte is to add some organic/ inorganic filler (in micro or nano sizes) to convert polymer gel electrolyte in composite type of electrolyte. When such fillers are added or dispersed to the polymer gel electrolyte, they get adsorbed in between the vicinity of intermolecular space due to which the intermolecular force of attraction between the bonds become weak and hence flexibility as well as amorphous or porous nature of electrolyte increases, which in turn enhances the liquid adsorbing quality of polymer and thus problems of leakage, poor mechanical, dimensional and thermal stability can be sorted out. [5-7]. For the preparation of PE, usually non-conductor thermoplastic materials are considered as host polymer. Their thermal, electrical and mechanical properties can be altered by compounding them with either salts or dispersed fillers as a second phase. For the preparation of polymer electrolytes, two components are very important (i.e. polymer material and salt), characteristic properties of which should be known before taking it as a raw materials for the preparation of PE.

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2. Experimentation

2.1 Synthesis of NCPGE

They have been composed of PVdF-HFP (Mol. Wt. = 400,000) as polymer, Mg $(ClO_4)_2$ as salt and Al_2O_3 (<50 nm) as nano filler, all were obtained from Sigma-Aldrich. PC solvent from Loba Chemie; the intermediate solvent THF from Merck, and all used without further treatment. The [PVdF (HFP)-PC-Mg $(ClO_4)_2$ - Al_2O_3] has been prepared by using standard solution cast-techniques.

Initially the liquid electrolyte was prepared by mixing the different concentration of Mg $(ClO_4)_2$ salts in solvent or plasticizer propylene carbonate (PC) and it was optimized. The host polymer PVdF-HFP was separately dissolved in volatile intermediate solvent THF, in different weight percent using magnetic stirrer at ~60 °C and optimised. After that its different weight was mixed in the optimized concentration of liquid electrolyte. To prepare NCPGE, nano particles of Al_2O_3 in different wt % (0 to 20 wt % w.r.t wt. of polymer) were homogenetically distributed. In the synthesis of PGE, the % of polymer w.r.t the liq. electrolyte was optimized. Finally, the mixtures were poured in glass petri dish and allowed to air cool by self-evaporation of volatile THF to obtain free-standing solid NCPGE films of thickness ~250 µm.

3. Results and discussions

3.1 Studies of optimized composition for Electrolytic system-

Figure **3.1.1** express the change in σ of PC-Mg $(ClO_4)_2$ against salt concentration. At first the conductivity of pure solvent PC at ~25ºC was determine to be 8.3 $x10^{-6}$ Scm^{-1}, as soon as the mixing of Mg salt in PC solvent starts, gradual increase in the σ of the system starts and it continued till the concentration range of 0.3 M, where the ionic conductivity was found to be ~ σ = 3.63 x 10^{-3}S/ cm at R.T, after that the further addition of salt doesn't show any change in practical values of ionic conductivity i.e. it become constant till the salt concentration of 0.8M. successive addition of salt above this concentration, shows the decreasing trend in ionic conductivity, this behaviour of the liquid electrolyte can be demonstrated on the principle of ionisation of solute particles when the concentration of ions are less in solvent initially but as the ionic concentration increases in solvent they start combining or aggregating to form neutral molecule (increase in thickness), which ceases the ionic transportation of liquid electrolytes. Hence the optimized concentration of magnesium salt was taken as 0.3M for the further preperation.

Figure **3.1.2** signifies the alteration in σ of the PVdF (HFP)-PC-Mg $(ClO_4)_2$, (PGE). From the figure it was observe that at first when interaction of polymer and liquid electrolyte starts, the ionic conductivity increases and it continues till the 15 weight percent of polymer (σ = 5.0 $x10^{-3}$ S cm^{-1}) but after that the conductivity decreases drastically and go on decreasing. This can be expressed on the basis of 'breathing chain model' proposed by Chandra and co-workers [8-12] which states that polymer gel are composed of free ions, paired ions, partially dissociated salts, solvents and polymeric chains which either exist in coiled form ,unfolded form or semi coiled form. When the concentration of polymer is less initially, the microscopic molecules open up (breath) or fold and occupy the desired volume at different course of process, due to this contraction and expansion process they exerts localize pressure alteration in the environmental space and tends to dissociate the paired or neutral ions hence the conductivity increases up to 15 weight percent, but, after 15 wt% when the polymeric concentration increases the viscosity increases and this situation leads to cease the ionic mobility and hence above 15 wt % ionic conductivity of the PGE declines. This is the reason why at lower concentration of polymer i.e., below 15 wt% the σ of the PGE is more than that of LPE at R.T and the value were calculated as 5.0 x10-3 Scm-1. Finally from the above observations it was clear that the optimised weight percent of polymer gel electrolyte is 15 wt%.

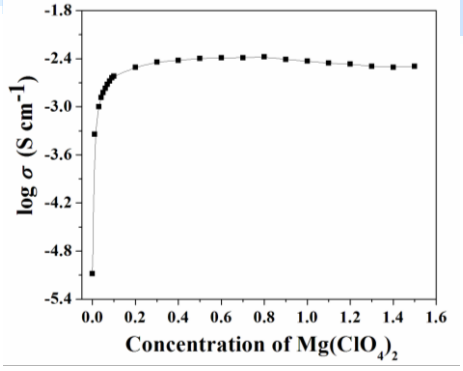

Fig3.1.1

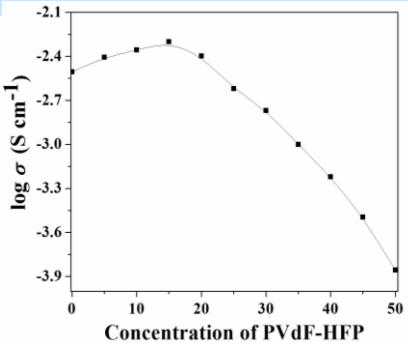

Fig3.1.2

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Figure 3.1.1: Variation of electrical conductivity of liquid electrolytes as the function of salt concentration.**Figure 3.1.2** Variation of ionic conductivity of gel polymer electrolyte as a function of different weight percent of polymer [PVdF (HFP)] concentration.

Figure 3.1.3 shows the change in electrical conductivity of NGPE against different wt. % of nano- Al2O3 filler concentration. As we see from the plot that initially when we started adding the nano particles of - Al2O3 in polymer gel electrolyte, the ionic conductivity of the system was modified, as a result of the interaction of nano particles with paired ions (either with cation or anion), so the magnitude of mobile ions increases resulting into improved ionic conductivity. Fillers also interacts with polymeric chain (PVdF-HFP) as well as salt anions (ClO4)2- to change the structural arrangement of ions in polymeric segment which facilitate the easy and suitable path for magnesium ion conduction on the nano Al2O3 fabricated surface. This increase in ionic conductivity continued till 8 wt% of nano Al2O3 fillers maximum ionic conductivity was found to be ~7.0x10-3Scm-1 at room temperature, the further addition of alumina nano particle shows the decrease in ionic conductivity due to increase in concentration of filler, viscosity of the system increases so the movement of ion become difficult and now the ionic pairing is also started resulting into reduced ionic conductivity. Hence the optimised value of nano Al2O3 filler is taken as 8 wt%.

Hence from all the above studies it is clear that the final optimized composition for nano composite polymer gel electrolyte is [PVdF (HFP)](15 wt%)-{PC-Mg ($ClO_4)_2$}(0.3M)]-nano Al_2O_3(8 wt%)].

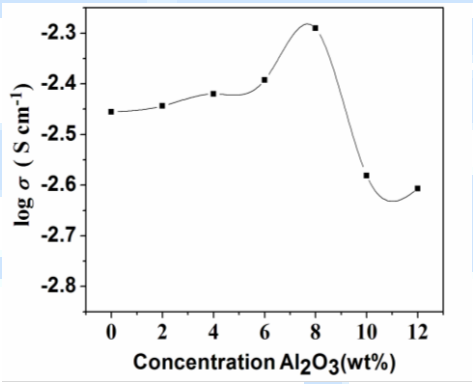

Figure 3.1.3: Variation of electrical conductivity of nano gel polymer electrolytes as a function of Al_2O_3 filler concentration

3.2 Temperature dependence conductivity:

Fig:3.1.3 explains the reliability of σ with change in temperature by NCPGE [PVdF (HFP) (15 wt %)-{ PC-Mg (ClO4)2(0.3M)}-nano Al2O3 (8 wt %)]. In figure 3 the graph shows that there is direct relationship between increasing temperature along with the increasing ionic conductivity of the polymer electrolyte system, till 900C and almost follows the Arrhenius pattern. This increasing trend of ionic conductivity with increasing temperature can be explained by the logic that as the temperature increases the viscosity decreases and flexibility of polymeric chain increases simultaneously, hence segmental mobility of the ion becomes easy resulting into higher ionic conductivity [13].

The σ at any temperature can be calculated by Arrhenius equation as, $\sigma = \sigma 0 \exp(-Ea/kT)$.

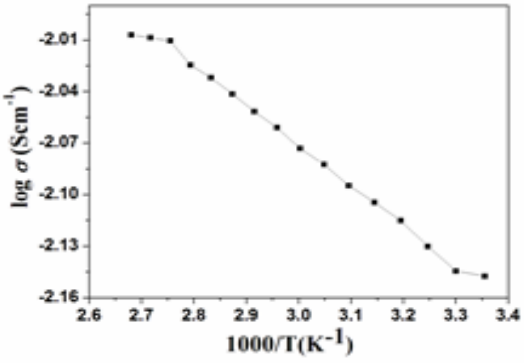

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Figure 3.2.1: Variation of ionic conductivity of optimized nano gel polymer electrolyte [PVdF (HFP)](15 wt%)-{PC-Mg $(ClO_4)_2$}(0.3M)]-nano Al_2O_3(8 wt%)] as the function of temperature.

Where, σ_0 is the pre-exponential factor, 'Ea' the activation energy, and 'T' the absolute temperature in Kelvin scale. The increase in temperature tends to increase the environmental volume of the system in which the excited ions after gaining energy, start expanding and favours segmental mobility through the entire backbone of the polymeric system. [14]. Due to these suitable path as well as activated or excited ions, the overall ionic conductivity of the system increases as the temperature increases.

3.3. Dielectric analysis:

For any electrolyte the transfer of ions or mobility of ions are most important phenomenon, because this is the reason why electrolyte has a ionic conducting capacity and can be used in electrochemical devices as sandwiching component. The transportation of ions is the factor which is very sensitive towards the change in temperature as well as frequency of the system; therefore it is essential to know the consequences of temperature as well as frequency on the ionic conductivity. For the devices using such mechanism system the trend of dielectric constants ant other related electric behaviour should be studied under wide range of temperature and frequencies.

In present work this process is done with the help of Dielectric analysis, which is very useful in calculating various parameters related to dielectric relaxation [15]. The real part of dielectric constant (εr) gives the idea about storage capacity and imaginary part of dielectric constant (εi) gives the idea about the energy loss of the system for every circle of applied electric field. [16].

Fig 3.3.1 and **Fig 3.3.2** express the Dielectric constants: εr and εi against change in frequency at different temperatures for nano polymer gel electrolyte system.

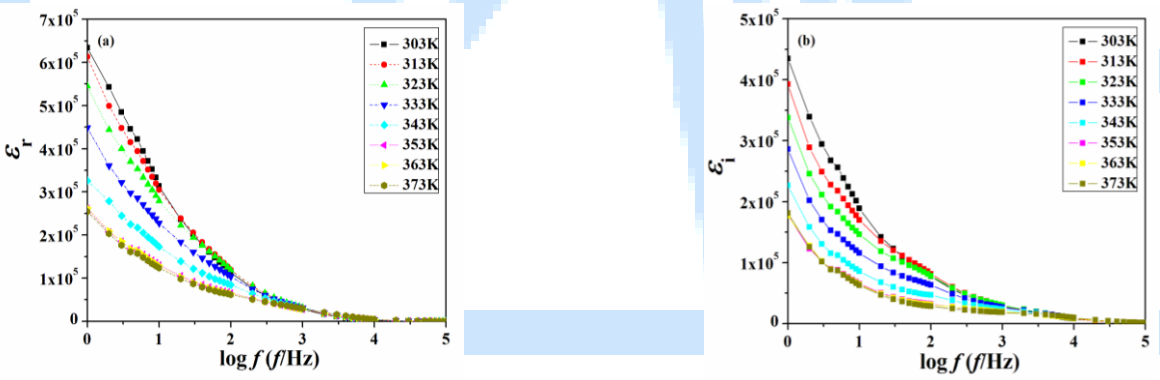

Fig 3.3.1: Variation of dielectric constant and **Fig 3.3.2** dielectric loss of optimized [PVdF (HFP)](15 wt%)-{PC-Mg $(ClO_4)_2$}(0.3M)]-Al_2O_3(8 wt%)] as function of frequency at various temperatures.

From **fig 3.3.1** it is clear that the values of real part (εr) is very high in low frequency region, it is due to large polarization of electrodes [17]. As we know that in the low frequency zone the ion gets enough time to get concentrate or accumulate near electrode- electrolyte interfacial region, so the polarization effect is clearly seen. [18-19]. While in high frequency zone (εr) go on decreasing gradually and becomes constant after some time because in such high frequency zone the periodic reversal of electric field (forward and backward movement of charge carriers, from –ve to +ve and then +ve to –ve terminals , when polarization and de-polarization occurs simultaneously), is so fast that it is not easy for ionic charge carriers to position themselves in the parallel direction of electric field, therefore access accumulation of ionic charges is not possible in the field direction, hence the value of dielectric constant decreases.[20].

From **Fig 3.3.2** it is clear that the values of imaginary part of dielectric constant (εi) is also very high in lower frequency zone while very low or almost constant in high frequency zone this can be explain with the principle of movement of free ionic charge carriers within the polymeric system.[21].

Same mechanism is responsible for energy loss, with only difference is that dielectric loss is not due to bulk action but this is due to the mobility of free ions that accumulate at electrode- electrolyte interface in low frequency zone. This mechanism can be explained by "conductivity relaxation" [22]. According to this phenomenon in low frequency region the free charge carrier gets enough time to accumulate near the electrode- electrolyte interfacial area before the field relocate its orientation, results in large dielectric loss. Further, in both the plot of real region of dielectric constant (εr) as

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well as dielectric loss (εi) the effect of temperature is also detected. As the temperature increases the (εr) as well as (εi) increases because at high temperature the viscosity decreases and free volume increases so ion pairs get dissociated and hence polarisation becomes easy.

3.4 Modulus analysis

Modulus spectroscopy is the complementary characterisation technique to impedance spectroscopy which gives the information about the bulk properties such as electrode and grain boundary effect. Figure 3.10 (a) and (b) signify the Mr and Mi part of modulus as the function of different frequency at different temperatures for [PVdF (HFP)(15%)-PC-Mg(ClO4)2-Al2O3 (8wt%)] system.

From figure **3.4.1** and **3.4.2** it is seen that both real and imaginary modulus value increases as the frequency increases and at lower frequency zone behave like long tail. This increasing trend of modulus with increase in frequency is due to the dominating ionic conductor behaviour of polymer gel electrolyte film or due to bulk behaviour effect. [23]. Electrode polarization phenomenon have negligible effect on modulus behaviour as well as due to the large capacitance value of electrodes, the less value of modulus was seen in lower frequency zone [24]. In figure **3.4.2** we can see a single angular peak and it is seen in every plot at different temperature in almost all the identical peaks, which can be explained by transport of free ionic charge carrier called as "conductivity relaxation" of the mobile ions. The dimension and pattern of all the peaks are same at all temperature in all frequency regions.

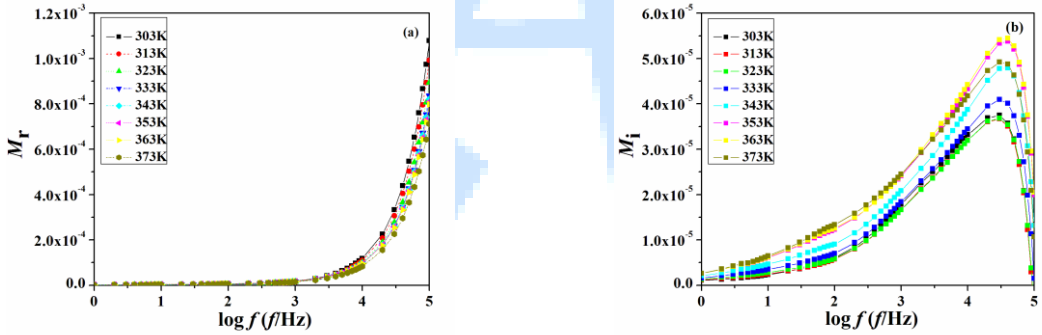

Figure 3.4.1 & 3.4.2: Variation of real part and imaginary part of modulus of optimized nano gel polymer electrolytes[PVdF (HFP)](15 wt%)-{PC-Mg $(ClO_4)_2$}(0.3M)]-nano Al_2O_3(8 wt%)] as function of frequency at various temperatures.

The maximum angular peak (Mi) of imaginary modulus plot represents the relaxation time τc. At this peak there is an angular frequency designated as ωc. At (Mi) the relaxation time and angular frequency shows the relationship as: τc. ωc = 1. [25]. These angular peaks for different temperature are not identical, sometimes they are broad also which may be due to more than one relaxation time or distributed relaxation time, which shuffles in higher frequency zone as the temperature increases.

The wide and asymmetrical peak of electrical modulus plot can be explained by using the following mathematical equation: φ (t) = exp [(-t/□)□] .Where, □= relaxation time and □ = Kohlrausch parameter.'□' is inversely proportional to '□'. Its value(x) is expressed as 1> x <0 for conventional solid electrolyte system, which is depict the deviation from the Debye relaxation (□= 1) [26].

3.5 Conductivity studies

The ionic conduction spectra of [PVdF (HFP)(15%)-PC-Mg$(ClO_4)_2$-Al_2O_3 (8wt%)] system, as the function of frequency at different temperature is drawn in figure **3.5.1**.

As we can see from the plot that almost all the plot are having two different regions one in lower frequency zone and another in higher frequency zone. The lower region enhancement in ionic conductivity is due to electrode- electrolyte interfacial chemical reactions and the higher zone ionic conductivity is explained as dc conductivity. At low frequency zone the accumulation of ionic charge carrier ions at electrode- electrolyte interface is more so the concentration of volatile ions decreases due to which the σ decreases as the frequency decreases. While in high region on account of strong movement of charge carrier the ionic σ increases with increase in freq [24]. At high temperature the viscosity of the system decreases hence the available volume in the vicinity of polymeric chain increases causing the easy mobility of charges through polymeric chain or segment. This phenomenon of dispersion in conductivity is expressed by Jonscher's law. [27].

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Mathematical presentation of Jonscher's law is:□(□) = □dc + *A*□n, Where,□dc = direct current, (dc) = sample conductivity, *A*= constant for a given temp. and n = frequency exponent between 0 - 1. Extent of interaction between the mobile ions and the surrounding environments is represented by the factor 'n', for ionic conductor material the value of 'n' is in between 0.5 to 1, which shows the long diffusion range of ions and this process can be demonstrated by 'hopping models'[27]. According to this model when the value of 'n' is =0 then the ionic movement is totally arbitrary and free from environmental interactions. In general the transportation mechanism in ionic conductor can be expressed by the jumping of exited species among the two energy level having different energy barriers. Frequency dispersion behaviour of ionic conductors can be detailed by the physical model known as 'jump relaxation model',[28] which states that at very low frequency, charges present at one point can migrate to its neighbouring available level very easily, enhancing the dc conductivity.

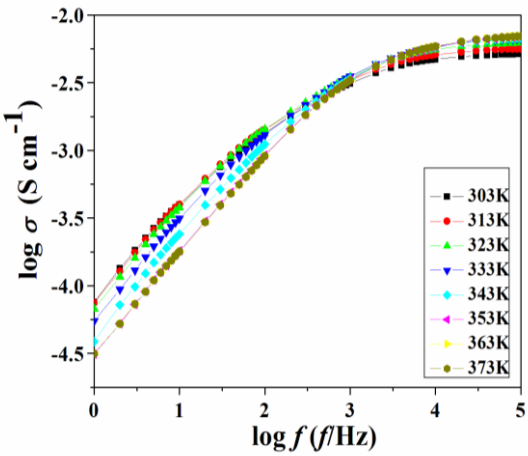

Figure 3.5.1: Variation of ionic conductivity as a function of frequency with temperature for nano gel polymer electrolytes system[PVdF (HFP)](15 wt%)-{PC-Mg (ClO_4)$_2$}(0.3M)]-nano Al_2O_3(8 wt%)].

In higher frequency zone, the excited ion can return back to its actual site on account of minute periodic reversal time period of the electric field. This is the reason of high probability of forward- backward hopping in this region. Along with this, ease in dynamic cage stamina is also one of the reasons for high frequency dispersion in its conduction.

4. Electrochemical characterization

4.1 Analysis of electrochemical potential window of polymer gel electrolytes

Any electrolyte has certain voltage withstanding capacity above or below that voltage range they are going to dissociate in their constituent ions, this voltage scale is known as the electrochemical power window of that system, it is also called electrochemical stability of polymeric system. It is the most essential scale to decide the compatibility of any electrolyte for its use in fabrication of electrochemical devices. In this study the Potential window of the nano composite polymer gel electrolyte is detected by sandwiching the PGE system in the middle of two stainless steel blocking electrodes.

Figure **4.1.1** shows the linear sweep cyclic voltammograms of nano composite polymer gel electrolyte at the scan rate of 5 mVs^{-1}, the observed current (I) and voltage (V) properties are due to combine effort of +ve and –ve terminal, for the two electrode system. From fig: **4.1.1** it is clearly seen that as the voltage supply to the system increases the output of current increases slowly, this trend is continued up to some voltage in the system. After certain voltage the output of current suddenly increases, this voltage at which the sudden increase in current was seen is known as "Electrochemical potential window or Working voltage", for that system. This sudden change in current production was due to decomposition of electrolytic system in its ionic constituent. This also gives the idea about the working voltage range of that device so by this calculation we can able to established the compatibility of electrolyte for the considered device fabrication. In the present work the [PVdF (HFP) (15%)-PC-Mg (ClO4)2-Al2O3 (8wt %)] shows the working potential window of ~3.0 V, which is the indication of its safe use in any electrochemical device.

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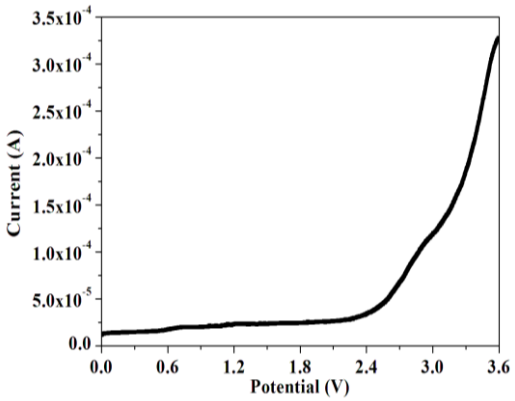

Figure 4.1.1 : Linear sweep curves of nano gel polymer electrolytes Cell SS| NGPE|SS recorded at room temperature at a scan rate 5 mVs^{-1}.

4.2 Ionic transport number measurement

In the arena of solid state Ionics the major particle which is responsible for conductivity is the ions of those systems; therefore the mechanism is referred to as ionic conductivity. Any electrochemical device depends on the conductivity of its all the constituent species ,i.e. electronic as well as ionic (commonly called electrical conductivity), since in present work we are focusing on ionic conductivity so to know the exact amount of ionic and electronic conductivity contribution to the device separately, the polarization method is used. Detail analysis is shown in figure.

Fig: **4.2.1** express the plot of polarization current against time for NGPE-Al2O3 (8wt %). the voltage applied to the system was 1.0 V (within the potential window range).

Calculation of ionic transport number is done by given equation: $ti = \frac{It - Ie}{It}$ Where I_e = current of e- and I_t = total current of the cell: [SS / NGPE / SS]. t_{ion} ~ 0.96 has been obtained by using the above equation which indicates that the majority of the charge carriers (~ 96 %) are cation Mg^{+2}, with only a very small contribution (~ 4 %) of the others**.** $\mathbf{t}_{ion}$ is much close to unity and hence the prepared NCPGE-Al_2O_3 (8wt%)] using magnesium ion salt system is very much suitable for the preparation of solid-state electrochemical cells and other ion conducting devices such as supercapacitors.

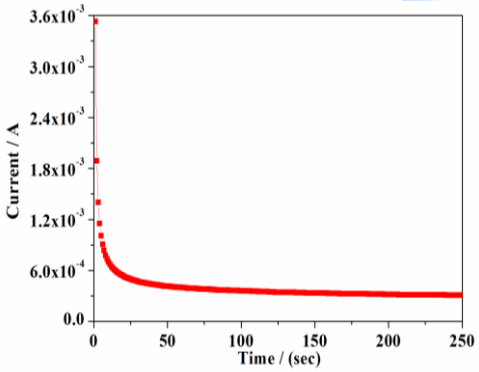

Figure 4.2.1: dc polarization curve as a function of time for nano gel polymer electrolyte [PVdF (HFP)](15 wt%)-{PC-Mg $(ClO_4)_2$}(0.3M)]-nano Al_2O_3(8 wt%)].

The ionic transport number was calculated by using the given equation: $t_{ion} = I_t - I_e/I_t$. where Ie and I_t are electronic and total current respectively. The ionic transport number was found to be 9.6 which shows that nano gel polymer electrolyte [PVdF(HFP)(15%)-PC-Mg$(ClO_4)_2$-Al_2O_3 (8wt%)] using magnesium ion salt is dominantly ionic in nature.

5. Conclusion

Conclusions of all the studies can be summarised as:

- ✓ The NCPGE- Al_2O_3 was prepared by conventional "solution cast" method.
- ✓ The optimized concentration of Mg $(ClO_4)_2$ salts was found to be 0.3M having conductivity in the range of ~3.63 x 10^{-3} S /cm.

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- ✓ 15wt% of polymer PVdF (HFP) is sufficient for the synthesis of PGE having electrical conductivity of ~5.0 x10^{-3}S/cm (R.T) with acceptable stability.
- ✓ 8wt % of nano Al_2O_3 filler was suitable for the synthesis of desired NCPGE.
- ✓ The maximum σ of optimized final electrolytic system was found to be 7.0x$10^{-3}$$Scm^{-1}$ at room temperature.
- ✓ The surface morphology and topography image has been obtained from scanning electron microscopy, which shows the porous texture and hence supports the electrical conductivity through its polymeric network.
- ✓ The prepared nano gel polymer electrolyte is very flexible, having good mechanical stability.
- ✓ The a.c impedance analysis of optimized nano gel polymer electrolyte has been done at different temperature. The conductivity plot shows the Arrhenius behaviour. The activation energy was calculated as – 0.047eV.
- ✓ The potential window of the system was found to be ~3.0V, which is compatible working temperature region for most of the electrochemical devices.
- ✓ The dielectric behaviour against changing frequency at different temperature confirms the electrode polarization phenomenon.
- ✓ The analysis of dielectric behaviour by modulus plot determines the bulk properties of the electrolytic system. The modification in σ with frequency at different temperature was due to increase in concentration of ion transporter which obeys the Jonscher's power law.
- ✓ The ionic transport number for the nano composite polymer gel electrolyte having alumina as filler, detected as 0.96, which proves that the principal charge transport mechanism is ionic in nature.
- ✓ Thermal consistency of the NCPGE system were performed by capitalizing differential scanning calorimetry techniques, which shows that they are quite stable in a wider temperature range varying from – 60 ºC to 70 ºC, that gives the idea about suitability in wide range of working temperature devices.

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Application Of Matrix To Cryptography

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ABSTRACT

A novel approach which incorporates the salient features of message sharing (Called coding theory) is presented and also extended to the messages of higher length. The proposed method is very simple in its principle and has great potential to be applied to other situations where the exchange of messages is done confidentially.

Keywords— *Plain text, Cipher text, encoding, decoding, key matrix, Inverse etc.*

1. INTRODUCTION

Coding theory, which had its inception in the late 1940's, is now generally regarded as a mature science. Cryptography on the other hand, at least in the public sector, is a science in the phase of early and rapid development. The thesis of this paper is that there are many problems in cryptography to which the well-developed techniques and extensive results of coding theory can be fruitfully applied. Our approach to demonstrating this thesis is anecdotal–we simply recount instances in our own research in cryptography where we have found coding theory to be an exceedingly useful tool.

Coding theory is concerned with successfully transmitting data through a noisy channel and correcting errors in corrupted messages. The exchange of message is administered in a confidential & more secured way having a wide application in military operations, banking transactions etc. The study of encoding & decoding secret messages is called cryptography. In cryptography codes are called ciphers and messages are called plaintext where as the message after coding is called cipher text.

In the present paper we will study that using the matrix how we can convert a simple message into complex message after composition & Similarly on the other hand an complex message can be converted using Inverse matrix into simple message by decomposing it. Higher level of Security can be enhanced by using structured system of codes.

2. OBJECTIVES OF RESEARCH

To study the Inverse in a Modular Group.
To study the process of encoding the message.
To study the algorithm for decoding the message.
To examine the higher level of security in coding theory.

3. RESEARCH METHODOLOGY

This present paper is primarily based on secondary source of data which is collected from various Books, Newspaper, Journals, and Research articles.

4 Modular Group

If n is a positive Integer and a & b are any integers, then we say that a is equivalent to b modulo n, written as $a \equiv b \pmod n$ if (a-b) is an integer multiple of n.

for e.g. $25 \equiv 1 \pmod 6$, $11 \equiv 2 \pmod 3$, $-1 \equiv 7 \pmod 4$.

The set $Z_n = \{0, 1, 2 \ldots n-1\}$ is called the set of residues under modulo n. Thus if a is a non-negative integer greater than n, then its residue modulo n is simply the remainder that results when a is divided by n.

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Theorem 4.1: for any integer a and modulus n, let R = remainder of $\frac{|a|}{n}$ then the residue r of a modulo n is given by $a \equiv r \pmod{n}$

Where r = R If $a \geq 0$

= n-R If $a < 0$ & $R \neq 0$

= 0 If $a < 0$ & R = 0

For e.g. $60 \equiv 6 \pmod{27}$, $-35 \equiv 19 \pmod{27}$

5 Multiplicative Inverse in a modular group

If a is number in Z_n, then a^{-1} is called reciprocal or multiplicative inverse of a modulo n if

$a\,a^{-1} \equiv a^{-1}a \equiv 1 \pmod{n}$

for e.g. $2x \equiv 1 \pmod{27}$

Now we know that $2.14 \equiv 28 \equiv 1 \pmod{27}$

Thus $2^{-1} \equiv 14 \pmod{27}$

5.3 Table of Inverse under modulo 27

a	1	2	4	5	7	8	10	11	13
a^{-1}	1	14	7	11	4	17	19	5	25
a	14	16	17	19	20	22	23	25	26
a^{-1}	2	22	8	10	23	16	20	13	26

In ordinary arithmetic a square matrix A is Invertible if & only if $|A| \neq 0$ where as in modular arithmetic we have the following theorem.

A square matrix A with entries in Z_n is Invertible modulo n if & only if the residue of $|A|$ modulo n has a reciprocal (Inverse) modulo n & that is possible if there is no common factor between $|A|$ & n.

Hence a square matrix A with entries in Z_{27} is invertible modulo 27 if & only if the residue of $|A|$ modular 27 is not divisible by 3.

6. Process of coding messages

A text message of some length t from the sender is converted into a stream of numerals with the help of Hill cipher modulo 27 where we assigned space or blank as one character and the number 0 is assigned to it after which we use standard codes like A-1, B-2, ... , Z-26.

6.1 Hill cipher modulo 27 Table

_	A	B	C	D	E	F	G	H
0	1	2	3	4	5	6	7	8
I	J	K	L	M	N	O	P	Q
9	10	11	12	13	14	15	16	17
R	S	T	U	V	W	X	Y	Z
18	19	20	21	22	23	24	25	26

Then the above numeral is again converted into matrix B of order n × k (plain message matrix) depending upon the length t of the message.

7. Working Algorithm for encoding the messages

Enciphering is the process of converting the message from plain text to cipher text

Step-1 Separate the plain text from left to right into some k number of groups (polygroup) of n letter each. If you run out of letter while forming the final groups, take space as many time needed to fill out that final group of n letters.

Step-2 Replace each letter by the corresponding number of its position by using Hill cipher modular 27 Table to get k groups of n Integers each.

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Step-3 Reshape each of the k groups of integers into n rows & hence forming plain message matrix B of order n × k. now introduced square matrix A of order n known as encoding matrix (security key) such that $|A|$ modular 27 is not divisible by 3.

Step-4 Now the (coded message) matrix C can be obtained by matrix multiplication of A (key matrix) with B (plain message) such that C = A.B

Step-5 After arranging all k. n of the resulting product n-row column vectors in order into a single (k. n) vector (with entries in Z_{27}) replace each of these (k. n) entries with the corresponding letter of the alphabet using Hill-cipher modular 27 Table.
The resultant is the cipher text corresponding to the original plain text

For. e.g 7.1 Consider the key matrix of size 2, Here n=2 and the key matrix is

Key matrix A = $\begin{pmatrix} 1 & 1 \\ 2 & 6 \end{pmatrix}$

Suppose we have to encode the message 'SECRET_CODE'

Step- I SE CR ET _C OD E_

Step-II 19, 5, 3, 18, 5, 20, 0, 3, 15, 4, 5, 0

Step-III $B = \begin{pmatrix} 19 & 3 & 5 & 0 & 15 & 5 \\ 5 & 18 & 20 & 3 & 4 & 0 \end{pmatrix}$

Step-IV C = A.B

$$C = \begin{pmatrix} 1 & 1 & 19 \\ 2 & 6 & 5 \end{pmatrix} \begin{pmatrix} 3 & 5 & 0 & 15 & 5 \\ 18 & 20 & 3 & 4 & 0 \end{pmatrix}$$

$$C = \begin{pmatrix} 24 & 21 & 25 & 3 & 19 & 5 \\ 68 & 114 & 130 & 18 & 98 & 10 \end{pmatrix}$$

$$C = \begin{pmatrix} 24 & 21 & 25 & 3 & 19 & 5 \\ 14 & 6 & 22 & 18 & 17 & 10 \end{pmatrix} \pmod{27}$$

Step-V 24 14 21 6 25 22 3 18 19 17 5 10
Cipher Text XNUFYVCRDQEJ

E.g.7.2 considers the key matrix of size 3. Here n=3 &

Key matrix A = $\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 4 \end{pmatrix}$

Suppose we have to encode the message 'BEST OF LUCK'
Step-I BEST_OF_LUCK
Step-II 2, 5, 19, 20, 0, 15, 6, 0, 12, 21, 3, 11
Step-III

$$B = \begin{pmatrix} 2 & 20 & 6 & 21 \\ 5 & 0 & 0 & 3 \\ 19 & 15 & 12 & 11 \end{pmatrix}$$

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Step-IV C = A.B

$$C = \begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 4 \end{pmatrix} \begin{pmatrix} 2 & 20 & 6 & 21 \\ 5 & 0 & 0 & 3 \\ 19 & 15 & 12 & 11 \end{pmatrix}$$

$$C = \begin{pmatrix} -2 & -20 & -6 & -21 \\ 5 & 0 & 0 & 3 \\ 76 & 60 & 48 & 44 \end{pmatrix}$$

$$C = \begin{pmatrix} 25 & 7 & 21 & 6 \\ 5 & 0 & 0 & 3 \\ 22 & 6 & 21 & 17 \end{pmatrix} \pmod{27}$$

Step-V 25, 5, 22, 7, 0, 6, 21, 0, 21, 6, 3, 17
Cipher Text YEVG_FU_UFCQ

8. Algorithm for decoding the messages

Deciphering is the process of converting the message from cipher text to plain text
Step-1 First of all obtains the inverse of the key matrix A of order n using Invertible & modulo group 27.

Step-2 considers the corresponding number of the encoded message using Hill-cipher modular 27 Table.

Step-3 now transforms the above integers into the matrix form of order n × k Known as matrix C (coded matrix)

Step-4 now the decoding of the matrix C can be obtained by the relation $B = A^{-1}C$ where B is the plain message matrix under modulo 27.

Step-5 after getting the matrix B we can arranged the entire element into a single (k. n) vectors & then can be decoded messages by replacing the numeric to corresponding letters using Hill-cipher modulo 27 Table. The resultant is the original plain text corresponding to the cipher text.

e.g 8.1 Decode the message '2, 5, 76, 20, 0, 92, 9, 19, 32, 5, 19, 0' coded with 3-cipher Key matrix

$$A = \begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 4 \end{pmatrix}$$

Step-I $|A| = -4$ whose inverse in Z_{27}

$$A^{-1} = \begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1/4 \end{pmatrix}$$

Step-II

$$B = A^{-1}C = \begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & ¼ \end{pmatrix} \begin{pmatrix} 2 & 20 & 9 & 5 \\ 5 & 0 & 19 & 19 \\ 76 & 92 & 32 & 0 \end{pmatrix}$$

Step - III

$$B = \begin{pmatrix} -2 & -20 & -9 & -5 \\ 5 & 0 & 19 & 19 \\ 19 & 23 & 8 & 0 \end{pmatrix}$$

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Step - IV Hence the decoded message is 2, 5, 19, 20, 0 , 23, 9, 19, 8, 5, 19, 0
BEST WISHES

9. Higher level of Security

In case of using the Standard codes one could recognize intuitively or by any way the codes of use from the codes allotted for the alphabets. So the use of codes in a random or chaotic way or by using some process increases the security level.

For example Instead of using the standard codes A-1, B-2, C-3… Z-26 and 0 for space if we use the codes assigned as

_	**A**	**B**	**C**	**D**	**E**	**F**	**G**	H
0	**7**	**6**	**5**	**4**	**3**	**2**	**1**	8
I	J	K	L	M	N	O	P	Q
9	10	11	12	13	14	15	16	17
R	S	T	**U**	**V**	**W**	**X**	**Y**	**Z**
18	19	20	**26**	**25**	**24**	**23**	**22**	**21**

Then the message 'BEST WISHES' is given by the matrix

$$B = \begin{pmatrix} 6 & 20 & 1 & 3 \\ 3 & 0 & 19 & 19 \\ 19 & 24 & 8 & 0 \end{pmatrix} \quad \text{instead of } B = \begin{pmatrix} 2 & 20 & 9 & 5 \\ 5 & 0 & 19 & 19 \\ 19 & 23 & 8 & 0 \end{pmatrix}$$

Anyone who intervene the communication uses the standard codes for this message matrix will get a confusing message like 'FCST_XASHCS_'.So the messengers are advised to make use of their convenient system of codes in order to have higher security level.

10. CONCLUSION

That we have not given more examples of the application of coding theory to cryptography is due more to the need to hold this paper to a reasonable length than to the paucity of such examples, even when we restrict ourselves to those that have arisen in our own research. The sciences of coding and cryptography appear to us to be intrinsically intertwined. As the former science is in a higher stage of development, i. e., the theory is more extensive and cohesive; its study is a natural springboard for those who want to dive into the much-less-well-charted waters of cryptography. We would be pleased if this paper encourages a few to take this plunge.

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An Application Of Ruscheweyh Derivatives Operator On Univalent Analytic Functions

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ABSTRACT

Let C ***denote the class of functions f(z) analytic and univalent in the unit disc D*=*** $\{z/|z|<1\}$ ***and normalised by f(0) = 0 and f"(0) = 1.The objective of this paper is to introduce a new subclass of C based on Ruscheweyh derivative operator and to determine coefficient estimate, extreme points, distortion theorem , radius of starlikeness and convexity of this class.***

Keywords- *Analytic function, Univalent function, Starlike function, Close to convex function.*

1. INTRODUCTION

p(z) = z+$\sum_{k=2}^{\infty} a_k z^k$ which are analytic and univalent in the unit disc $S^* = \{z/|z|<1\}$

For q(z) = z+$\sum_{k=2}^{\infty} b_k z^k$, the convolution product of p(z) and q(z) is defined by

$$(p * q) = z + \sum_{k=2}^{\infty} a_k b_k z^k, \quad z \in U$$

Let D^n f(z) denote the n[th] order derivative

The Ruschweyh derivative is defined as follows D^n:S→S such that

$$D^n p(z) = \frac{z}{(1-z)^{n+1}} * f(z), \qquad n > -1$$

$$= \frac{z(z^{n-1}f(z))^n}{n!} \qquad n \in N_0 = 0,1,2$$

$$= z+\sum_{n=2}^{\infty} a_k B(n,k) z^k \quad \text{where } B(n,k) = \binom{n+k-1}{n} \tag{1.1}$$

Note that $\frac{z}{(1-z)^{n+1}} = z+\sum_{n=2}^{\infty} a_k B(n,k) z^k$ where $n > -1$

And $D^0 p(z) = p(z), \qquad D^{'} p(z) = z p^{'}(z)$

The aim of this paper to study the class $E(\alpha,\beta,\mu,\lambda)$ which consist of the functions $p \in S$ and satisfies

$$\left| \frac{z\frac{D^{n+1}f(z)}{D^n f(z)} - 1}{(1-\alpha)\mu + \alpha\lambda - \lambda z\frac{D^{n+1}f(z)}{D^n f(z)}} \right| < \beta$$

For $0 \le \alpha < 1, \quad 0 < \beta \le 1, \quad 0 \le \lambda < \mu \le 1$

The investigation here is motivated by S.M.Khairnar and M.More [ ]

2. Coefficient Inequality

Theorem 2.1: Let $p \in S$, Then $p \in E(\alpha,\beta,\mu,\lambda)$ if and only if

$$\sum_{n=2}^{\infty} [(k-1) + \beta((k-\alpha)\lambda - (1-\alpha)\mu)] B(n,k) a_k \le \beta(1-\alpha)(\mu-\lambda) \tag{2.1}$$

Proof: Suppose p(z) $\in E(\alpha,\beta,\mu,\lambda)$ by (1.1)

$$\left| \frac{z\frac{D^{n+1}f(z)}{D^n f(z)} - 1}{(1-\alpha)\mu + \alpha\lambda - \lambda z\frac{D^{n+1}f(z)}{D^n f(z)}} \right| < \beta$$

$$D^n p(z) = z + \sum_{n=2}^{\infty} a_k B(n,k) z^k$$

$$D^{n+1} p(z) = 1 + \sum_{n=2}^{\infty} k a_k B(n,k) z^{k-1}$$

$$zD^{n+1} p(z) - D^n p(z) = z + \sum_{n=2}^{\infty} k a_k B(n,k) z^k - z - \sum_{n=2}^{\infty} a_k B(n,k) z^k$$

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$$= \sum_{n=2}^{\infty}(k-1)a_k B(n,k)z^k$$

Now

$$(1-\alpha)\mu + \alpha\lambda - \lambda z\frac{D^{n+1}(z)}{D^n(z)} = [(1-\alpha)\mu + \alpha\lambda]D^n(z) - \lambda z D^{n+1}(z)$$

$$= [(1-\alpha)\mu + \alpha\lambda]\left[z + \sum_{n=2}^{\infty}a_k B(n,k)z^k\right] - \lambda z\left[1 + \sum_{n=2}^{\infty}k a_k B(n,k)z^{k-1}\right]$$

$$= [(1-\alpha)\mu + \alpha\lambda - \lambda]z + \sum_{n=2}^{\infty}[(1-\alpha)\mu + \alpha\lambda - \lambda k]a_k B(n,k)z^k$$

$$= [(1-\alpha)\mu - (1-\alpha)\lambda]z + \sum_{n=2}^{\infty}[(1-\alpha)\mu - (k-\alpha)\lambda]a_k B(n,k)z^k$$

$$= [(1-\alpha)(\mu-\lambda)]z + \sum_{n=2}^{\infty}[(1-\alpha)\mu - (k-\alpha)\lambda]a_k B(n,k)z^k$$

$$\left|\frac{\sum_{n=2}^{\infty}(k-1)a_k B(n,k)z^k}{[(1-\alpha)(\mu-\lambda)]z + \sum_{n=2}^{\infty}[(1-\alpha)\mu - (k-\alpha)\lambda]a_k B(n,k)z^k}\right| < \beta \qquad (2.2)$$

We know that $|Re(z)| < |z|$

$$\mathrm{Re}\left|\frac{\sum_{n=2}^{\infty}(k-1)a_k B(n,k)z^k}{[(1-\alpha)(\mu-\lambda)]z + \sum_{n=2}^{\infty}[(1-\alpha)\mu - (k-\alpha)\lambda]a_k B(n,k)z^k}\right| < \beta$$

We choose values of above expression and allowing $z \to 1$ through the real value we obtain

$$\sum_{n=2}^{\infty}(k-1)a_k B(n,k) \le \beta\left[(1-\alpha)(\mu-\lambda) + \sum_{n=2}^{\infty}[(1-\alpha)\mu - (k-\alpha)\lambda]a_k B(n,k)\right]$$

$$\sum_{n=2}^{\infty}[(k-1) + \beta[(k-\alpha)\lambda - (1-\alpha)\mu]a_k B(n,k) \le \beta(1-\alpha)(\mu-\lambda)$$

Converse

Suppose that

$$\sum_{n=2}^{\infty}[(k-1) + \beta[(k-\alpha)\lambda - (1-\alpha)\mu]a_k B(n,k) \le \beta(1-\alpha)(\mu-\lambda)$$

We have

$$\left|zD^{n+1}p(z) - D^n f(z)\right| - \beta\left|(1-\alpha)\mu + \alpha\lambda - \lambda z D^{n+1}p(z)\right| < 0$$

With the position

$$\left|\sum_{n=2}^{\infty}(k-1)a_k B(n,k)z^k\right| - \beta\left|(1-\alpha)(\mu-\lambda)z + \sum_{m=2}^{\infty}(1-\alpha)\mu(k-\lambda)a_k B(n,k)z^k\right|$$

For $|z| < r < 1$ the condition is bounded above

$$\sum_{n=2}^{\infty}(k-1)a_k B(n,k)r^k - \beta\left[(1-\alpha)(\mu-\lambda)z + \sum_{n=2}^{\infty}(1-\alpha)\mu(k-\lambda)a_k B(n,k)z^k\right] < 0$$

$$\sum_{n=2}^{\infty}(k-1) + \beta[(k-\alpha) - (1-\alpha)\mu]a_k B(n,k) - \beta(1-\alpha)(\mu-\lambda) < 0$$

$\therefore$ p(z) $\in (\alpha,\beta,\mu,\lambda)$

Corollary 2.1.1: If P(z) $\in E(\alpha,\beta,\mu,\lambda)$ then

$$a_k \le \frac{\delta(1-\alpha)(\mu-\lambda)}{[(k-1) + \beta((k-\alpha)\lambda - (1-\alpha)\mu)]B(n,k)} \qquad (2.3)$$

and equality holds for

$$p(z) = z + \frac{\delta(1-\alpha)(\mu-\lambda)}{[(k-1) + \beta((k-\alpha)\lambda - (1-\alpha)\mu)]B(n,k)}z^k$$

3. Growth And Distortion Theorem

Theorem 3.1: If the function p(z) $\in E(\alpha,\beta,\mu,\lambda)$ then

$$|z| - \frac{\beta(1-\alpha)(\mu-\lambda)}{[1+\beta((2-\alpha)\lambda - (1-\alpha)\mu)]B(n,2)}|z|^2 \le |p(z)| \le |z| + \frac{\beta(1-\alpha)(\mu-\lambda)}{[1+\beta((2-\alpha)\lambda - (1-\alpha)\mu)]B(n,2)}|z|^2 \qquad (3.1)$$

With the equality for

$$p(z) = z + \frac{\beta(1-\alpha)(\mu-\lambda)}{[1+\beta((2-\alpha)\lambda - (1-\alpha)\mu)]B(n,2)}z^2 \qquad (3.2)$$

Proof: fro theorem (1) p(z) $\in E(\alpha,\beta,\mu,\lambda)$ if and only if

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$$\sum_{n=2}^{\infty}[(k-1)+\beta((k-\alpha)\lambda-(1-\alpha)\mu)]B(n,k)a_k \le \beta(1-\alpha)(\mu-\lambda)$$

Now

$$|p(z)| \le |z| + \sum_{k=2}^{\infty}a_k|z|^k$$

$$|p(z)| \le |z| + |z|^2\sum_{k=2}^{\infty}|a_k|$$

$$|p(z)| \le |z| + |z|^2\frac{\beta(1-\alpha)(\mu-\lambda)}{[1\beta\delta((2-\alpha)\lambda-(1-\alpha)\mu)]B(n,2)}$$

$$|p(z)| \le |z| + \frac{\beta(1-\alpha)(\mu-\lambda)}{[1+\beta((2-\alpha)\lambda-(1-\alpha)\mu)]B(n,2)}|z|^2 \quad (3.3)$$

Simillary

$$|p(z)| \ge |z| - \sum_{k=2}^{\infty}a_k|z|^k$$

$$|p(z)| \ge |z| - |z|^2\sum_{k=2}^{\infty}|a_k|$$

$$|p(z)| \ge |z| - |z|^2\frac{\beta(1-\alpha)(\mu-\lambda)}{[1+\beta((2-\alpha)\lambda-(1-\alpha)\mu)]B(n,2)}$$

$$|p(z)| \ge |z| - \frac{\beta(1-\alpha)(\mu-\lambda)}{[1+\beta((2-\alpha)\lambda-(1-\alpha)\mu)]B(n,2)}|z|^2 \quad (3.4)$$

By (3.3) and (3.4) we get

$$|z| - \frac{\beta(1-\alpha)(\mu-\lambda)}{[1+\beta((2-\alpha)\lambda-(1-\alpha)\mu)]B(n,2)}|z|^2 \le |p(z)| \le |z| + \frac{\beta(1-\alpha)(\mu-\lambda)}{[1+\beta((2-\alpha)\lambda-(1-\alpha)\mu)]B(n,2)}|z|^2$$

Thus the equality hold for

$$p(z) = z + \frac{\beta(1-\alpha)(\mu-\lambda)}{[1+\beta((2-\alpha)\lambda-(1-\alpha)\mu)]B(n,2)}z^2$$

Which complete the proof.

Theorem 3.2: If the function $p(z) \in E(\alpha,\beta,\mu,\lambda)$ then

$$1-\frac{2\beta(1-\alpha)(\mu-\lambda)}{[1+\beta((2-\alpha)\lambda-(1-\alpha)\mu)]B(n,2)}|z| \le |p'(z)| \le 1+\frac{2\beta(1-\alpha)(\mu-\lambda)}{[1+\beta((2-\alpha)\lambda-(1-\alpha)\mu)]B(n,2)}|z| \quad (3.5)$$

The equality hold for

$$p(z) = z + \frac{2\beta(1-\alpha)(\mu-\lambda)}{[1+\beta((2-\alpha)\lambda-(1-\alpha)\mu)]B(n,2)}z^2 \quad (3.6)$$

Proof: From theorem (1) $p(z) \in E(\alpha,\beta,\mu,\lambda)$ if and only if

$$\sum_{n=2}^{\infty}[(k-1)+\beta((k-\alpha)\lambda-(1-\alpha)\mu)]B(n,k)a_k \le \beta(1-\alpha)(\mu-\lambda)$$

Now

$$p(z) = z+\sum_{k=2}^{\infty}a_kz^k$$

$$p'(z) = 1+\sum_{k=2}^{\infty}ka_kz^{k-1}$$

$$|p'(z)| \le 1+\frac{2\beta(1-\alpha)(\mu-\lambda)}{[1+\beta((2-\alpha)\lambda-(1-\alpha)\mu)]B(n,2)}|z|$$

Simillarly $|p'(z)| \ge 1-\frac{2\beta(1-\alpha)(\mu-\lambda)}{[1+\beta((2-\alpha)\lambda-(1-\alpha)\mu)]B(n,2)}|z|$

$$\therefore 1-\frac{2\beta(1-\alpha)(\mu-\lambda)}{[1+\beta((2-\alpha)\lambda-(1-\alpha)\mu)]B(n,2)}|z| \le |p'(z)| \le 1+\frac{2\beta(1-\alpha)(\mu-\lambda)}{[1+\beta((2-\alpha)\lambda-(1-\alpha)\mu)]B(n,2)}|z|$$

Thus the equality hold for

$$p(z) = z + \frac{2\beta(1-\alpha)(\mu-\lambda)}{[1+\beta((2-\alpha)\lambda-(1-\alpha)\mu)]B(n,2)}z^2$$

which complete the proof.

4. Radius Of Starlikeness And Convexity:

Theorem 4.1: If $p \in E(\alpha,\beta,\mu,\lambda)$ then p(z) is starlikess in $|z| < R_1$ where

$$|z| \le R_1 = \inf_k\left\{\frac{(1-m)[(k-1)+\beta((k-\alpha)\lambda-(1-\alpha)\mu]B(n,k)}{(k+m-2)\beta(1-\alpha)(\mu-\lambda)}\right\}^{\frac{1}{k-1}} \quad \text{where } k = 2,3,4,\ldots\ldots \quad (4.1)$$

Proof: p is said to be starlike of order m, $0 \le m < 1$ if $\mathrm{Re}\left(\frac{zp'(z)}{p(z)}\right) > m$ (4.2)

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That is $\left|\frac{zp'(z)}{p(z)} - 1\right| \leq 1 - m$

Now, $zp'(z) - p(z) = z\left[1 + \sum_{k=2}^{\infty} k a_k z^{k-1}\right] - \left[z + \sum_{k=2}^{\infty} a_k z^k\right]$

$= \sum_{k=2}^{\infty} (k-1) a_k z^k$

$\therefore \left|\frac{zp'(z) - p(z)}{p(z)}\right| = \left|\frac{\sum_{k=2}^{\infty} (k-1) a_k z^k}{z + \sum_{k=2}^{\infty} a_k z^k}\right|$

$$\frac{\sum_{k=2}^{\infty} (k-1)|a_k||z|^{k-1}}{1 + \sum_{k=2}^{\infty} |a_k||z|^{k-1}} \leq 1 - m$$

$$\sum_{k=2}^{\infty} (k-1)|a_k||z|^{k-1} \leq (1-m)\left(1 + \sum_{k=2}^{\infty} |a_k||z|^{k-1}\right)$$

$$\sum_{k=2}^{\infty} \frac{(k+m-2)}{(1-m)} |a_k||z|^{k-1} \leq 1 \qquad (4.3)$$

From theorem (1)

$$\frac{\sum_{n=2}^{\infty} [(k-1) + \beta((k-\alpha)\lambda - (1-\alpha)\mu)] B(n,k) a_k}{\beta(1-\alpha)(\mu-\lambda)} \leq 1 \qquad (4.4)$$

By using (4.3) and (4.4) we get

$$\frac{(k+m-2)}{(1-m)} |z|^{k-1} \leq \frac{[(k-1) + \delta((k-\alpha)\lambda - (1-\alpha)\mu)] B(n,k) a_k}{\delta(1-\alpha)(\mu-\lambda)}$$

$$|z|^{k-1} \leq \frac{(1-m)[(k-1) + \beta((k-\alpha)\lambda - (1-\alpha)\mu)] B(n,k)}{(k+m-2)\beta(1-\alpha)(\mu-\lambda)}$$

$$\therefore \quad |z| \leq R_1 = \inf_k \left\{\frac{(1-m)[(k-1) + \beta((k-\alpha)\lambda - (1-\alpha)\mu] B(n,k)}{(k+m-2)\beta(1-\alpha)(\mu-\lambda)}\right\}^{\frac{1}{k-1}}$$

Which complete the proof.

Theorem 4.2 : If f $\in H(\alpha,\beta,\mu,\lambda)$ then f(z) is convex in $|z| < R_2$ where

$$|z| \leq R_2 = \inf_k \left\{\frac{(1-n)[(k-1) + \beta((k-\alpha)\lambda - (1-\alpha)\mu] B(n,k)}{k\beta(k+n-2)(1-\alpha)(\mu-\lambda)}\right\}^{\frac{1}{k-1}} \text{ where k = 2,3,4,.} \qquad (4.5)$$

Proof: p $\in E(\alpha,\beta,\mu,\lambda)$ then p(z) is convex order n , $0 \leq n < 1$ if $\text{Re}\left(1 + \frac{zp''(z)}{p(z)}\right) > n$ (4.6)

that is $\left|\frac{zf''(z)}{f'(z)}\right| < 1 - n$

f(z) = z+$\sum_{k=2}^{\infty} a_k z^k$

$f'(z) = 1 + \sum_{k=2}^{\infty} k a_k z^{k-1}$

z $f''(z) = \sum_{k=2}^{\infty} k(k-1) a_k z^{k-1}$

$$\left|\frac{\sum_{k=2}^{\infty} k(k-1) a_k z^{k-1}}{1 + \sum_{k=2}^{\infty} k a_k z^{k-1}}\right| < 1 - n$$

$$\sum_{k=2}^{\infty} k(k-1)|a_k||z|^{k-1} \leq (1-n)\left[1 + \sum_{k=2}^{\infty} k|a_k||z|^{k-1}\right]$$

$$\sum_{k=2}^{\infty} \frac{k(k+n-2)}{(1-n)} |a_k||z|^{k-1} \leq 1$$

(4.7)

From theorem (1)

$$\frac{\sum_{n=2}^{\infty} [(k-1) + \beta((k-\alpha)\lambda - (1-\alpha)\mu)] B(n,k) a_k}{\beta(1-\alpha)(\mu-\lambda)} \leq 1$$

Using (4.7) and (4.4) we get

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$$\frac{k(k+n-2)}{(1-n)}|z|^{k-1} \leq \frac{[(k-1)+\beta((k-\alpha)\lambda-(1-\alpha)\mu)]B(n,k)}{\beta(1-\alpha)(\mu-\lambda)}$$

$$|z| \leq R_2 = \inf_k \left\{\frac{(1-n)[(k-1)+\beta((k-\alpha)\lambda-(1-\alpha)\mu)]B(n,k)}{\beta k(k+n-2)(1-\alpha)(\mu-\lambda)}\right\}^{\frac{1}{k-1}}$$

5. Extreme Points

Theorem 5.1: Let $p_1(z) = z$, $p_k(z) = z + \frac{[(k-1)+\beta((k-\alpha)\lambda-(1-\alpha)\mu)]B(n,k)}{\beta(1-\alpha)(\mu-\lambda)}z^k$, where k = 2,3,…

Then $p \in E(\alpha,\beta,\mu,\lambda)$ iff it can be expressed in the form

$p(z) = \sum_{k=1}^{\infty}\lambda_k f_k(z)$ where $\lambda_k \geq 0$ and $\sum_{k=1}^{\infty}\lambda_k = 1$

Proof: Suppose that $p(z) = \sum_{k=1}^{\infty}\lambda_k f_k(z)$

$$p(z) = z + \sum_{k=1}^{\infty}\lambda_k \frac{[(k-1)+\beta((k-\alpha)\lambda-(1-\alpha)\mu)]B(n,k)}{\beta(1-\alpha)(\mu-\lambda)}z^k \quad (5.1)$$

Now $p(z) \in E(\alpha,\beta,\mu,\lambda)$ since

$$\sum_{k=1}^{\infty}\frac{[(k-1)+\beta((k-\alpha)\lambda-(1-\alpha)\mu)]B(n,k)}{\beta(1-\alpha)(\mu-\lambda)}\cdot\frac{\beta(1-\alpha)(\mu-\lambda)}{[(k-1)+\beta((k-\alpha)\lambda-(1-\alpha)\mu)]B(n,k)}\lambda_k = \sum_{k=1}^{\infty}\lambda_k = 1-\lambda_1 \leq 1 \quad (5.2)$$

Conversely ,suppose that $p \in E(\alpha,\beta,\mu,\lambda)$ then by theorem (1)

$a_k \leq \frac{\beta(1-\alpha)(\mu-\lambda)}{[(k-1)+\beta((k-\alpha)\lambda-(1-\alpha)\mu)]B(n,k)}$

setting

$$\lambda_k = \frac{[(k-1)+\beta((k-\alpha)\lambda-(1-\alpha)\mu)]B(n,k)}{\beta(1-\alpha)(\mu-\lambda)}, \quad k = 2,3,\ldots\ldots \quad (5.3)$$

And $\lambda_1 = 1 - \sum_{k=2}^{\infty}\lambda_k$

We notice that $p(z) = \sum_{k=1}^{\infty}\lambda_k f_k(z)$. Hence the proof.

6. CONCLUSION

This paper is to introduced a new subclass $H(\alpha,\beta,\mu,\lambda)$ of C based on Ruscheweyh derivative operator and determined coefficient estimate, extreme points, distortion theorem , radius of starlikeness and convexity of the $H(\alpha,\beta,\mu,\lambda)$ class.

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Reactivity of molecular carbon monoxide with $Al_{13-n}Rh_n$ (n=1,2) cluster: A Computational Study

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ABSTRACT

In recent years bimetallic nanocluster is most important category for material scientist in studying various important properties. one of the most important metal is used Aluminium.small aluminium cluster doped with different transition metal properties has been studied by different scientist.In this research paper we investigate possible changes in structural property of Al13-n-Rhn clusterafter adsorbing CO gas molecule.CO molecule is attached at different sites and on $Al_{13-n}Rh_n$ Nanocluster and we investigate the suitable site for attaching CO molecule and possible structural changes in nanocluster after adsorbing carbon monoxide molecule usinf Density functional theory.

Keywords— *Nanocluster, CO molecule ,FOP, DFT ,Binding energy*

1. INTRODUCTION

The property of material drastically changes when material is reduced to nano-dimension range therefore studying the properties of material in relation to cluster size is required for understanding their physical and chemical properties. Some specific properties of nanocluster can be basic building blocks for developing novel materials. More attention is given on metal cluster because of their possible application in catalyst,superconductivity,optics, Nano-electronics .Aluminium is one the most important metal for various application ,various group of scientist around the globe studying several application of aluminium cluster. Here in our study we doped different number of Rh atom in Aluminium thirteen cluster and investigate it is adsorption ability to adsorb carbon monoxide gas using density functional theory. We choose CO gas CO is most hazardous gas in the atmosphere causing several health problems to human being therefore CO should be sense and must be converted into some useful gas. As due to industrialization everywhere around the world peoples are affected by air pollution. Gas sensing material is highly need of time in industry and in academics. Effective and accurate gas sensor has become very important because of its application in environment studies, automotive industry. Different cluster of Rhodium has various important catalytical application. Rhodium is one of the precious element and use of Rhodium should be limited.

Therefore in our research we doped the Al_{13} nanocluster with one and two atoms of Rhodium and try to investigate the adsorbing ability and structural changes in Aluminium doped Rhodium cluster after adsorbing Carbon monoxide gas molecule.

In this research paper we attached the CO gas at various sites on $Al_{13-n}Rh_n$ nanocluster and investigate the suitable site for adsorbing CO gas and structural changes in nanocluster after adsorbing the CO gas molecule. We explained the adsorption of CO molecule on $Al_{13-n}Rh_n$ nanocluster by using frontier orbital picture.

2. COMPUTATIONAL DETAILS

All the calculations are performed by the density functional theory (DFT) method provided in the GAUSSIAN 03 programme. The geometry optimization of $Al_{13-n}Rh_n$ and Al_{13-n}Rh-CO clusters are carried out with exchange correlation function combining Becke's exchange with Pardew-Wang correlation functions referred to as BPW91 and the LANL2DZ basis set.

Various possible structures of and Al13 clusters are optimized with various spin multiplicity. The HOMO-LUMO gap is computed as the energy difference between the highest occupied molecular orbit and lowest unoccupied molecular orbit. This HOMO-LUMO gap is very important in knowing the stability and ability of molecule in participating in bond formation.

In this calculation we calculated Binding energy of adsorbed CO molecule on $Al_{13-n}Rh_n$ cluster using the formula

$B.E.=E(Al_{13-n}Rh_n\text{-}CO) - E(Al_{13-n}Rh_n) - mE(CO)/m$

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3. Results and discussion

We begin our discussion by noting some of the features of Al13 cluster as well as with singly and doubly doped Rh atom. In figure 3.1 and 3.2. we show the ground state structures of these three clusters. Al_{13} is known to be a distorted icosahedron [2] with average Al-Al bondlength of 2.86A . When a single Al is replaced by Rh atom, a significant change in geometry and electronic structure is seen. Single Doped Rh atom takes the
position of inner Aluminium atom and icosahedron structure of Al13 cluster got distorted and the average distance between doped Rh atom and sorrounding Aluminium atom is 2.59A.When two Rh atoms are doped in Aluminium cluster Rh takes the position of iner Aluminium atom and distance between two Rh atom is 3.2496A and average distance of Aluminium atoms from Rh atom is 2.71A . Interesting fact is that the two Rh atoms try to form octahedral structure – both forming the interior part of the octahedra. Discuss the effect of this doping on the energies (binding energies of Al_{13}, $Al_{12}Rh$, $Al_{11}Rh_2$) gives rise to a completely different electronic structure of the doped systems. Binding energy of $Al_{11}Rh_2$ is maximum will be the most stable structure. BE of Al13, Al12Rh, Al11Rh2 is given by

BE(Al13) = (E(Al13) – 13*E(Al)) / 13=46.9365eV

BE(Al12-Rh) = (E(Al12-Rh) – 12*E(Al) – E(Rh)) / 13=7274.065eV

BEAl11-Rh2) = (E(Al11-Rh2) – 11*E(Al) – 2*E(Rh)) / 13=13171.161eV

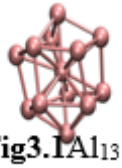

Fig3.1Al_{13} cluster

A. Adsorption of CO on Al12Rh cluster

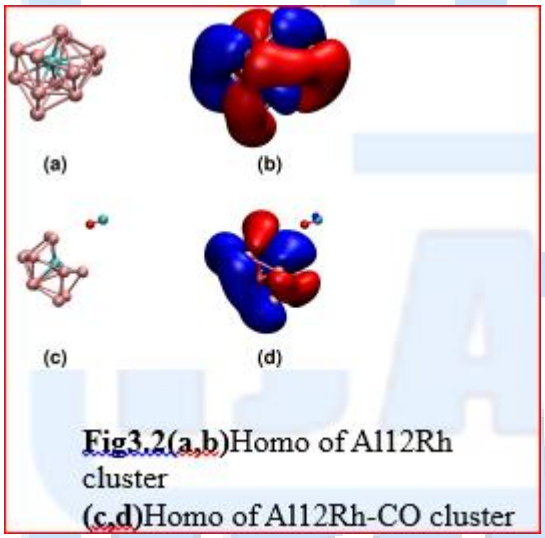

Fig3.2(a,b) Homo of Al12Rh cluster
(c,d) Homo of Al12Rh-CO cluster

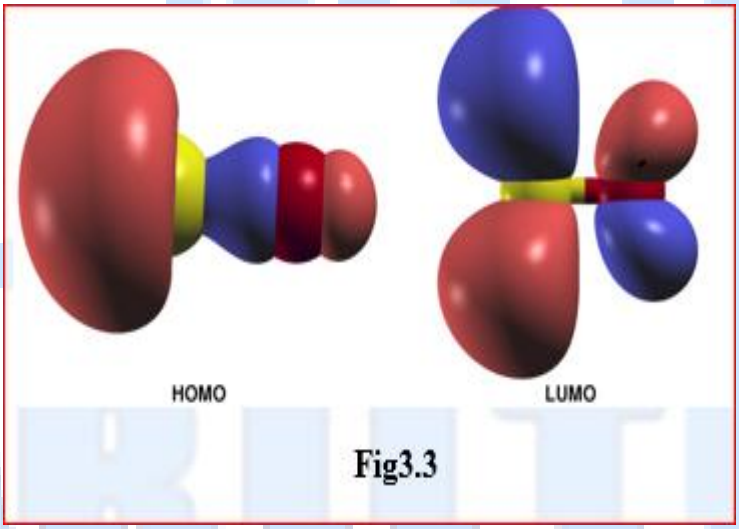

Fig3.3

The adsorption of CO on to Al-Rh cluster can be explained using the frontier orbital picture (FOP). In figure 3.2(a) we show the HOMO orbital of Al12Rh cluster and the HOMO and LUMO of CO is plotted in figure 3.2(c). Metiu et al. [4] described the orbital roughness where the strongest binding of the electron donor occurs to be at the site where the lowest unoccupied molecular orbital (LUMO) protrudes farthest; similarly, the strongest binding site of the electron acceptor is where the highest occupied molecular orbital (HOMO) protrudes farthest. Further, the binding orientation of adsorbed CO can be explained based on the matching of the orbital symmetries [5] in the FOP. It may be noted that a good binding can be obtained if there is a favourable overlap between the HOMO of Al12Rh and the LUMO of CO. Based on this we first describe the FOP for Al12Rh. From figure 3.2(a,b) it may be noted that the HOMO orbital of Al12Rh is composed primarily of the $3p_z$ orbital of Al atoms and spread all over the surface. On the other hand, the LUMO of CO (figure3) protrudes farthest and is formed out of $2p_y$ orbitals. Due to this the and as per Metiu's description, the CO molecule is unlikely to bind on to the Al12Rh cluster. This is clearly seen in figure fig2(c,d) where the distance between the CO molecule and the Al12Rh cluster is at least 3.39 A . which is an indication that CO molecule does not bind to the Al12Rh cluster. This weak interaction can also be seen from the binding energies of CO molecule 2.68 eV. In order to have a

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favourable overlap between the HOMO of Al12Rh and the LUMO of CO, we can add an electron to Al12Rh making it negatively charged since the HOMO of Al12Rh has the needed protruding molecular orbital which can overlap with the LUMO of CO from fig 3.3 it is clearly seen that HOMO of Al11Rh2 spread all over the surface and LUMO of CO overlap with Aluminium 3pz orbital. Due to this CO binds on this site with the distance between Al11Rh2 and CO molecule is of the order of 2.1249A. Binding energy of CO molecule on $Al_{11}Rh_2$ is of the order of 16.04 eV.

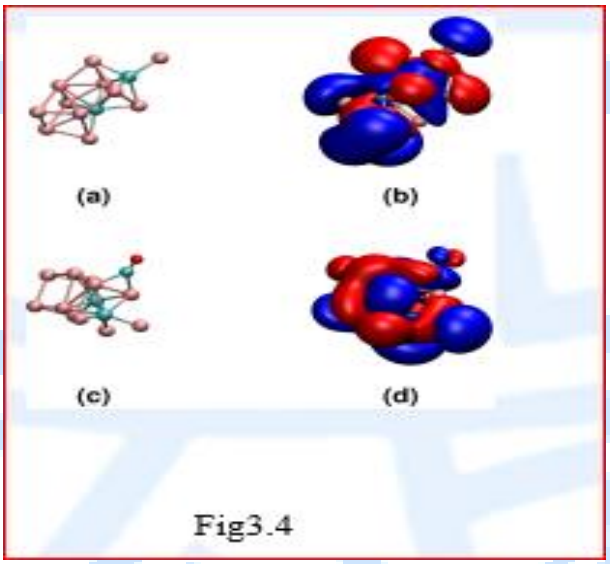

Fig3.4

CO adsorption on $Al_{13-n}Rh_n$ cluster

In table we have calculated the HOMO and LUMO energy of $Al_{13-n}Rh_n$ cluster from the data obtained it is very clear that after adsorption of CO $Al_{11}Rh_2$ cluster there is change in the HOMO and LUMO energy of $Al_{11}Rh_2$ but the energy gap remains nearly same before and after adsorption of CO gas molecule .so it is clear that $Al_{13-n}Rh_n$ cluster can not be used as gas sensor but can be used to adsorbe CO gas molecule for further it's application in catalyst or oxidation process.

3.5 TABLE

System	E_{HOMO}	E_{LUMO}	E_G
$Al_{12}Rh$	-4.91	-3.69	1.22
$Al_{12}Rh$-CO	-4.87	-3.64	1.23
$Al_{11}Rh_2$	-4.79	-3.38	1.41
$Al_{11}Rh_2$-CO	-4.94	-3.51	1.43

4. CONCLUSIONS

In this research we investigated the reactivity of CO molecule by Al_{13}cluster doped with different Rh atom based on DFT calculation. When Al13 Nanocluster doped with single Rh atom CO does not get adsorbed on Al13 cluster but when Al13 cluster doped with two Rh atoms CO get adsorbed on the Al11Rh2 cluster. It shows that Al11Rh2 can be use as good absorber for adsorbing CO gas molecule from envirnoment.Result of our research will provide further information for using Al11Rh2 cluster for catalytical activity and oxidation reaction for further converting CO gas molecule into useful end product.

5. ACKNOWLEDGMENT

The computational work described here is performed at the university of Mumbai, Physics Department,Santacruze(East),Mumbai, India. We would like to express our gratitude to them.

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APPLICATION OF GESTURE CONTROL ROBOT USING MEMS

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ABSTRACT

The aim of the project is to provide a simple human-computer interface. This project is designed to provide simplicity as well as precision over the acquired product. We use accelerometer as a motion sensor input to guide robot to its destination. Project also try to implement crane and its controlling factors as well as obstacle detection. By implementation of gesture control, high degree of precision can be obtained. Its application is very vast, and project has high versatility.

Keywords— *human-computer interface, accelerometer, motion sensor, precision, simplicity*

1.INTRODUCTION

PEOPLE NATURALLY USE GESTURES FOR COMMUNICATION. THIS PROJECT USE GESTURES TO OBTAIN A MORE NATURAL WAY TO COMMUNICATE TO THE OBJECTS. *GESTURE* CAN BE DEFINED AS THE MOVEMENT OF HEAD, BODY, HAND, ARMS, OR FACE THAT IS EXPRESSIVE OF AN EMOTION, IDEA, OPINIONS, ETC. WHEN TALK ABOUT *HUMAN-COMPUTER* INTERFACE, PEN AND MOUSE ARE THE FIRST THING THAT COMES IN MIND (GENERALLY CALLED AS *SINGLE-PATH GESTURE*).

THE HUMAN-COMPUTER INTERACTION IS EXTENDED TO REFER TO HAND MOTION THAN AS GESTURES ARE CALLED AS *MULTI-PATH GESTURES* [1] & [2]. CONTROL OF THE ROBOTS USING TRADITIONAL KEYBOARD OR MOUSE MAY PROVE INCONVENIENT.

THE BASIC REMOTE CONTROL FOR ROBOTS HAVE BEEN AN ACTIVE AREA OF RESEARCH AND TECHNOLOGY, ESPECIALLY OVER THE PAST FEW DECADES. REMOTE CONTROLLED ROBOTS HAVE BEEN USED IN HAZARDOUS CONDITIONS WHERE WORK FOR HUMANS IS DANGEROUS.

THE GESTURES OF THE USER ARE SENT TO MICRO-CONTROLLER (ATMEGA 8) [3] FOR PROCESSING. MEMS STAND FOR MICRO ELECTRO MECHANICAL SENSOR. THE MEMS USED IS AN ACCELEROMETER MMA7631L [4] TO MEASURE THE MOVEMENTS OF THE USER, WORN ON THE USER'S FOREARM. AN RF TRANSCEIVER [5], ALSO MOUNTED ON THE USER, TRANSMITS THE ENCODED SIGNAL TO THE ROBOT VIA RF LINK. THE MICRO-CONTROLLER AFTER RECEIVING DATA ACTS ACCORDINGLY AND CHECKS OTHER SENSORS SUCH AS SONAR [6]. L293D [7] IS USED FOR MOTOR CONTROL. FOR ENCODING AND DECODING HT12D AND HT12E [8] IS USED.

THE REMOTE CONTROL CONSIST OF ACCELEROMETER AND COMPARATOR [9]. LM1117[10] IS USED AS VOLTAGE REGULATOR.

THE PRODUCT AVAILABLE IN MARKET ARE FAR MORE EXPENSIVE AND COMPLICATED FOR THE NORMAL USER. THE PROJECT AIMS TO NOT ONLY COVER MILITARY USAGE BUT ALSO USAGE OF THE COMMON PEOPLE AS WELL AS THE COMMERCIAL MARKET SUCH AS MINING, RESCUE OPERATION, ETC.

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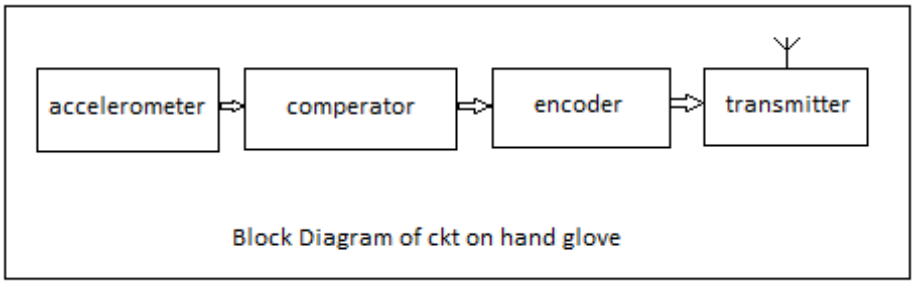
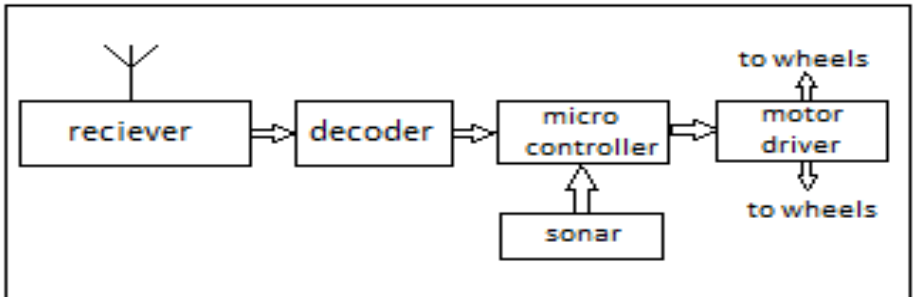
I. BLOCK DIAGRAM AND WORKING



Block Diagram of ckt on hand glove



Block diagram of ckt on chassis/robot

2.COMPONENTS:

ATMEGA 8(AVR FAMILY) MICROCONTROLLER, ACCELEROMETER MODULE *(MMA 7361L)*, HT12D DECODER AND HT12E ENCODER, 433 MHZ RF TRANSMITTER/RECEIVER MODULE, IC-LM324 COMPARATOR IC, SONAR MODULE (*SL-HC-SR04*), L293D MOTOR DRIVER IC, LED, BUZZER, PRE-SETS (10Ω), BATTERY (9V AND 12V), 12V DC MOTOR, CAR CHASSIS.

3.WORKING

THE MAIN OF THIS PROJECT IS TO CONTROL THE ROBOT BY USING MEMS ACCELEROMETER. *MEMS* IS *MICRO ELECTRO MECHANICAL SENSOR* WHICH IS HIGHLY SENSITIVE ACCELERATION SENSOR AND CAPABLE OF DETECTING THE TILT. THE *ACCELEROMETER* TILTS ARE PROCESSED BY MICROCONTROLLER AND IT CONTROLS THE MOTOR IN ACCORDANCE. THE PROJECT CONSISTS OF ONE MICROCONTROLLER ON THE MAIN CASSIS BOARD WHICH RECEIVES SIGNAL WIRELESSLY (RADIO TRANSMITTER AND RECEIVERS) AND LED INDICATORS. THE PROJECT ALSO CONTAINS AN ANTI-COLLISION MECHANISM (*SONAR*). MICROCONTROLLER IS PROGRAMMED IN EMBEDDED C LANGUAGE.

PROJECT FINDS ITS MAJOR APPLICATION FOR MONITORING LARGE AREAS LIKE POLITICAL CANVASSING, CRICKET STADIUM, INTERNATIONAL CONFERENCES, WORSHIP PLACES, BANKING, ETC. THIS PROJECT ASSURES US WITH MORE RELIABILITY AND HIGHLY SECURED SYSTEM.

GESTURE-BASED SYSTEMS REQUIRE CONTROLLER TO DISTINGUISH BETWEEN THE DIFFERENT GESTURES AVAILABLE. IN THE PREVIOUS ATTEMPTS CONTROLLER HAVE OFTEN BEEN HAND CODED FOR EACH NEW APPLICATION, MAKING THEM DIFFICULT TO BUILD, CHANGE, MAINTAIN. A WIRELESS GLOVE IS DEVELOPED TO CONTROL ROBOT. SENSOR(S) MOUNTED ON THE GLOVE SEND SIGNAL TO PROCESSING UNIT, WORN ON USER'S FOREARM THAT TRANSLATES HAND POSTURE INTO DATA. AN RF TRANSCEIVER, ALSO MOUNTED ON THE USER, TRANSMITS THE ENCODE SIGNALS REPRESENTING THE HAND POSTURE.

3.result and discussion

MAIN FEATURE OF THE PROJECT IS TO PROVIDE A NEW AND SIMPLE INTERFACE FOR THE CONTROL OF THE ELECTRONICS VIA GESTURE. THE PROJECT IS SMART ENOUGH AND HAVE A VAST ROOM FOR UPGRADABILITY AS WELL AS

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MODULARITY. THE IMPLEMENTATION OF THE CRANE AS WELL AS SONAR (OBSTACLE DETECTION) CANNOT BE FOUND ON OTHER PRODUCTS IN THE MARKET.

PROJECT FEATURES PROPER INTEGRATION OF MEMS SENSOR WITH THE ELECTRONIC COMPONENT AND CAN BE USED FOR VERY FINE CONTROL OVER THE NO. OF APPLICATIONS. THE RF-TRANSMITTER USED HAVE A RANGE OF ABOUT 15 METERS IN OPEN ENVIRONMENT (REDUCED TO 5 TO 10 METERS FOR ENVIRONMENT CONTAINING WALLS AND VERY LARGE OBSTACLES). ROBOT CAN CARRY WEIGHT OF UP TO 2.5 KG THOUGH CARRYING AS WELL AS TRANSMISSION CAPABILITIES CAN BE UPGRADED VIA HARDWARE TWEAKS SUCH AS 20V DC MOTOR AND HIGH-POWER RF MODULE RESPECTIVELY. RANGE OF SONAR MODULE USED IS 2CM TO 400CM WITH ACCURACY UP TO 3MM IS TWEAKED TO RESPOND WHEN IN PROXIMITY OF OBSTACLE OF 10 CM WHICH CAN BE ADJUSTED AS NEEDED VIA SOFTWARE. BUZZER USED FOR NOTIFICATION OF THE OBSTACLE CAN ALSO BE REPLACED BY CAMERA MODULE FOR PHOTO OR VIDEO CAPTURE.

THE RANGE OF APPLICATION INCLUDE SPYING, MINING, RESCUE OPERATION, SECURITY AND MONITORING USE FOR PHYSICALLY IMPAIRED, ETC.

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A Study Of Convex And Concave Function And Its Applications

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ABSTRACT

In this report, we study a convexity and concavity of the function which are being used in various branch of mathematics. In mathematics, convex geometry is the branch of geometry studying convex sets, mainly in Euclidean space. Convex sets occur in many areas such as computational geometry, discrete geometry, geometry of numbers, integral geometry, convex analysis, functional analysis, probability theory and linear programming etc

In financial mathematics, convexity refers to non-linearity's in a financial model. In other words, if the price of an underlying variable changes, the price of an output does not change linearly, but depends on the second derivative (or higher-order terms) of the modeling function. Geometrically, the model is no longer flat but curved, and the degree of curvature is called the convexity.

Keywords *:-Line Segment, Convexity, concavity and Euclidian space.*

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1. INTRODUCTION

Convexity is a measure of the curvature or second derivative of how the price of a bond varies with interest rate, i.e. how the duration of a bond changes as the interest rate changes. Specifically, one assumes that the interest rate is constant across the life of the bond and that changes in interest rates occur evenly. Using these assumptions, duration can be formulated as the first derivative of the price function of the bond with respect to the interest rate in question. Then the convexity would be the second derivative of the price function with respect to the interest rate.

In actual markets the assumption of constant interest rates and even changes is not correct, and more complex models are needed to actually price bonds. However, these simplifying assumptions allow one to quickly and easily calculate factors which describe the sensitivity of the bond prices to interest rate changes. Convexity refers to the second derivative of output price with respect to an input price. In derivative pricing, this is referred to as Gamma (Γ), one of the Greeks. In practice the most significant of these is bond convexity, the second derivative of bond price with respect to interest rates.

As the second derivative is the first non-linear term, and thus often the most significant, "convexity" is also used loosely to refer to non-linearities generally, including higher-order terms. Refining a model to account for nonlinearities is referred to as a convexity correction.

Formally, the convexity adjustment arises from the Jensen inequality in probability theory, the expected value of a convex function is greater than or equal to the function of the expected value.

An n-dimensional real number is called an Euclidian space. It is denoted by the symbol R^n or E^n . A point t defined by $(t_1, t_2, \ldots t_n)$ in R^n is called an element of Euclidian space IR^n ,symbolically $\{ (t_1, t_2, \ldots t_n) \in R^n : t_i \in R \}$.

Suppose s and t be any two points in Euclidian space R^n . The line segment between these two points defined by the set $S = \{ (1- \lambda) s + \lambda t : o \leq \lambda \leq 1 \}$.

2.CONVEX SET

A set S is said to be convex if the line segment joining by any two points s and t entirely lying within the set S.For examples

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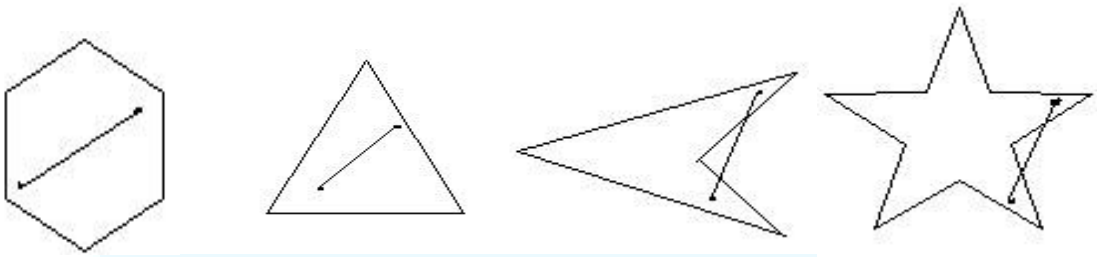

Fig 2.a fig. 2.b fig. 2.c fig.2.d

Figures 2.a and 2.b are convex set but fugures 2.c and 2.d are not a convex set since the linesegments are not lying entirely within the shape.

Consider the set $S=\{t \in E^n : a^T t > b , 0 \neq a \in E^n , b \in E\}$

Let s,t are in the set S and

Suppose $w=(1-\lambda)s+\lambda t$ for some $\lambda \in [0,1]$

Then $a^T w=a^T[(1-\lambda)s+\lambda t]$

$=(1-\lambda)a^T s+\lambda a^T t$

$>(1-\lambda)b+\lambda b$

$=b$

Thus $a^T w \geq b$ for all $w \in E^n$, so S is a convex set. Is intersection of two convex sets is convex?

If the intersection consists of a single point or it is empty then it is obviously true by the definition. Otherwise we have to consider any two points say P and Q in the intersection the line PQ joining by these two points must also lie entirely within their intersection, Hence intersection of two convex set is convex. That is in general, finite intersection of convex sets is convex. But union of two convex sets is not a convex set.

2.1.Monotonic function

Let the function f(t) be define on [a,b]. of for any pair of points s, t ∈[a,b],

s < t =>f(s) < f(t),then f is increasing on [a,b].

s< t => f(s) < f(t),then f is decreasing on [a,b].

If we remove the equality sign we have strictly increasing and strictly decreasing function respectively on[a,b].A function t which is either increasing or decreasing on [a,b] is called a monotonic function on [a,b] and If f is stictly increasing or strictly decreasing on[a,b],then f is called strictly monotonic

2.1.1 Theorem:-Let f be continuous on closed interval [a,b] and let f(t) is diffnentiable on (a,b)

(1) If $f'(t) \geq 0 \ \forall \ t \in (a,b)$, then f is increasing on [a,b].

(2) If $f'(t) \leq 0 \ \forall \ t \in (a,b)$, then f is decreasing on [a,b].

Now, if the equality is strict,we have strictly increasing and strictly decreasing function respectively.

3. CONVEX FUNCTION

A function f: I→ R is said to be convex if

$f((1-\lambda)s + \lambda t) \leq (\lambda - 1)f(s) + \lambda f(t)$, ……..(1) for points s, t in and

$0 \leq \lambda \leq 1$.

It is called strictly convex if inequality (1) holds strictly whenever s and t are distict points and $0 < \lambda < 1$.If –f is convex (strictly convex),then we can say that f is concave (strictly concave) and if f is both convex and concave, then f is said to be affine.The affine function on intervals are precisely the functions of the form cs + d where c and d are some suitable constants one can easily prove that the $f(t)= |t|$ is convex.

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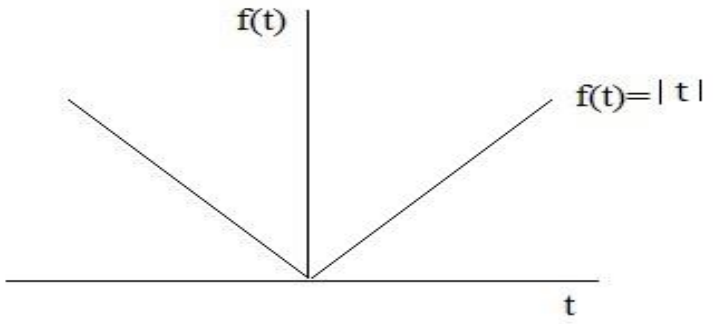

Fig.3.a

Consider the function of $f(t)=t^2$

Let [s, t] contained in I, and $0 \leq \lambda \leq 1$.

$f((1-\lambda)s+\lambda t) = (1-\lambda)^2 s^2+2\lambda(1-\lambda)\, st+\lambda^2t^2$

$= (1-\lambda)\, s^2-\lambda(1-\lambda)\, s^2+2\lambda(1-\lambda)\, st+\lambda^2t^2$

$= (1-\lambda)\, s^2+\lambda(1-\lambda)\, s(2t- s) +\lambda^2t^2-\lambda t^2+\lambda t^2$

$= (1-\lambda)\, s^2-\lambda(1-\lambda)\, (s^2-2\, st+t^2) + \lambda t^2$

$= (1-\lambda)\, s^2-\lambda(1-\lambda)\, (s-t)^2+\lambda t^2$

$\leq (1-\lambda)\, s^2+\lambda t^2$

Thus, the function $f(t)=t^2$ is convex.

Lemma 3.1: If f is defined on (a, b) such that $f\left(\frac{s+t}{2}\right) \leq \frac{1}{2} f(s) + \frac{1}{2}$ f(t) for all s, t in (a, b),then for positive integer m the function f has the property

$f\left(\frac{1}{m}\sum_{i=1}^{m} t_i\right) \leq \frac{1}{m}\sum_{i=1}^{m} f(t_i)$.

3.2Thereom: If f is continuous on (a,b) and $f\left(\frac{s+t}{2}\right) \leq \frac{1}{2} f(s) + \frac{1}{2}$ f(t) for all s, t in (a, b),then f is convex on (a,b).

Proof : We first prove the case where $\lambda = \frac{m}{n}$ for m,n in Z+

$\therefore$ By the above lemma, we have

$f((1-\lambda)s + \lambda t) = f\left((1-\frac{m}{n})s + \frac{m}{n}t\right)$

$= \frac{f((n-m)\, s\, +\, mt))}{n}$

$\leq \frac{1}{n}\left(\sum_{i=1}^{n-m} f(s) + \sum_{i=1}^{m} f(t)\right)$

$=\left(\frac{n-m}{n}\right) f(s) + \frac{m}{n} f(t)$

$= (1-\lambda) f(s) + f(t)$

Now, consider the general case where $\lambda \in [0,1]$. Let $\lambda \in [0,1]$, and let $\{\lambda_n\}$ be a sequence of rational number that converger λ. By our earlier result, we find that

$f((1-\lambda_n)s + \lambda_n t) \leq (1-\lambda_n) f(s) +\lambda_n f(t)$ for every positive integer n, since f is continuous, we have

$\lim_{n\to\infty} f((1-\lambda_n)\, s + \lambda_n t) = f((1-\lambda)\, s +\lambda t)$

And $\lim_{n\to\infty} f((1-\lambda_n)\, s + \lambda_n t) = (1-\lambda_n) f(s) +\lambda_n f(t)$

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Therefore f($(1-\lambda_n)s + \lambda_n t$) $\leq$ $(1-\lambda_n)$ f(s) $+\lambda_n$ f(t) .
So it follows that f is convex.

4. CONCAVE FUNCTION

Let I be a convex set. The function f: I R is called a concave function if for any two points s,t in I f (($1-\lambda$) s + λt) $\geq$ $(1-\lambda)$ f(s) + λ f(t), $\lambda \in [0,1]$……..(2)
It is called strictly concave if the inequality (2) holds strictly whenever s,t are distinct points and $\lambda \in (0,1)$.

5. CONCAVITY AND POINT OF INFLECTION

If f be a differentiable function defined on an interval I

(i) The function f is said to be concave up on I if f ” > 0 on I. ie f’ is increasing on I
(ii) The function f is said to be concave down on I if f ” < 0 on I. ie f ’ is decreasing on

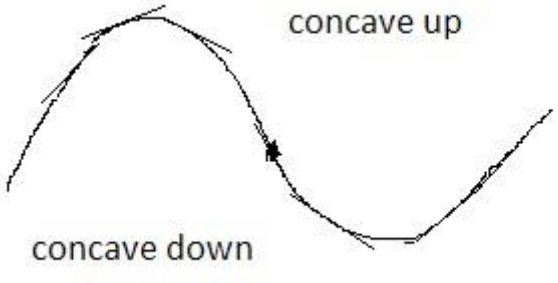

Fig.5.a

(iii) A point where the concavity changes (from up to down or down to up) is called a point of inflection; note that the tangent line to a graph at a point of inflection must cross the graph at that point. If the graph of f has point of inflection then f’’= 0.

If the function is f(t)= $t^3 - 6t^2 – 2t + 1$,then f’(t) = $3t^2 – 12t -2$ and f’’(t) = 6t – 12.For point of inflection f’’(t) = 0.This is true when 6t – 12 =0 implies that t = 2.So,
f(1) = $(2)^3 - 6(2)^2 -2(2) + 1 = -19$
For t = 0, the value of the second derivative, 6t -36, will be negative so the curve is concave down. For higher values of *t*, the value of the second derivative, 6t -12 , will be positive so the curve is concave up. So, we can conclude that the point (2,-19) is a point of inflection of the given function.

5.1 Theorem:- Let f be a differentiable function defined on a interval I. The function f is concave up on I iff the graph of f lies below its secant lines on I.
Prof:- Suppose that the function f is concave up on I, and let [a,b] contained in I. We define the secant line between the points (a,f(a)) and (b,f(b)) by

ψ_{ab}(t) = $\frac{f(b) - f(a)}{b - a}$ (t - b) + f(a)

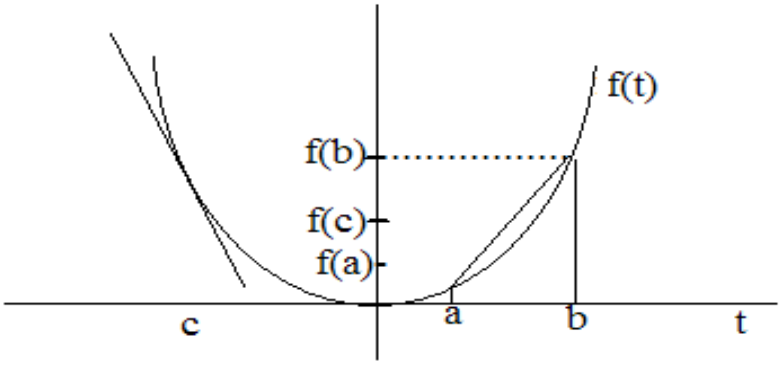

Fig.5.1(a)

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ϕ: [a,b]→R be defined by

$$\phi(t) = \begin{cases} \frac{f(b)-f(a)}{b-a} \; for \; a < t < c \\ f'(a) \; for \; t = a \end{cases}$$

since f is continuous on I and differentiable at t= a, it follows that $\phi(t)$ is continuous on [a,b].Further,using the fact that f is concave up,and thus

f'(t) –f'(a) ≥0 for t $\in$ (a,b), we have that ϕ'(t) ≥ 0 for all t $\in$ (a,b).By monotonicity theorem and definition of ϕ, we find that

$$\frac{f(t)-f(a)}{t-a} \leq \frac{f(b)-f(a)}{b-a}$$

$$\therefore f(t) - f(a) \leq \frac{f(b)-f(a)}{b-a} \text{ (t - a)}$$

$$\therefore f(t) \leq \frac{f(b)-f(a)}{b-a} \text{ (t - a) + f(a)}$$

Thus, the graph of f lies below its secant lines on I.

Now instead of supposing that the graph of f lies below its scant line on I.

Let a,b $\in$ I such that a < b. by mean value theorem, there exists a point c $\in$ (a,b) such that

$$f'(c) = \frac{f(b)-f(a)}{b-a}$$

Since the graph of f lies below its secant linear on I we have for x $\in$ [ab] that

f(t) $\leq \psi_{ab}$ = f '(c) (t - a) + f(a) and therefore,

$$f'(a) = \lim_{t \to a+} \frac{f(t)-f(a)}{t-a} \leq f'(c)$$

It can be shown that f '(c) $\leq$ f '(b) ; it follows that f '(a) $\leq$ f '(b) and hence f is concave up on [a,b].

6. CONCLUSION

In our report study one can conclude that convexity and concavity of a function is a very essential and important phenomenon of a study and an useful tool of mathematics and statistics. In mathematical finance, convexity refers to non-linearities in a financial model. Convexity is an important topic in economics. The profit function is the convex conjugate of the cost function. Convex analysis is the standard tool for analyzing textbook economics. Non-convex phenomena in economics have been studied with non-smooth analysis, which generalizes analysis.It has huge application in the area of computational geometry, discrete geometry, geometry of numbers, integral geometry, convex analysis, functional analysis, probability theory and linear programming etc .

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