



# National Conference on Innovative Solutions for Rural Development of Chhattisgarh NCISRDC-2018



February  
23<sup>rd</sup> -24<sup>th</sup>  
2018



**KITE**  
Make. Things. Happen

**KRUTI INSTITUTE OF  
TECHNOLOGY & ENGINEERING**

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INNOVATIONS IN TECHNOLOGY**  
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**Chhattisgarh Council of  
Science & Technology**

# NATIONAL CONFERENCE

On

# INNOVATIVE SOLUTIONS FOR RURAL DEVELOPMENT OF CHHATTISGARH



**NCISRDC – 2018**

**23<sup>rd</sup> & 24<sup>th</sup> February, 2018**

**Proceedings of**

**National Conference on Innovative Solutions for Rural Development of Chhattisgarh  
(NCISRDC) 2018**

**Editors**

*Mr. Abhishek Kumar Jain, Mr. Harishankar Singh Yadav, Ms. Parul Choudhary, Mr. Abhinav Singh  
Gautam, Mr. Amol Dewangan*

**Organized by**



**International Journal of Advance  
Research, Ideas and Innovations in  
Technology**



**Kruti Institute of Technology &  
Engineering, Raipur**



**Chhattisgarh Council of Sciences  
& Technology, Raipur**

## **ABOUT KRUTI GROUP OF INSTITUTIONS**

SBA Education Society, a synonym for higher education and professional training, came into existence in the year 2007. A group of enthusiastic and dedicated educationists, industrialists and professionals associated together, to work towards a common goal of providing avenues of professional education and training, matching international standards, to the people of the State of Chhattisgarh.

Kruti Group of Institutions has been striding in its journey towards academic achievements in a steady manner since 2008. Kruti Institute of Technology and Engineering (KITE) started with four AICTE approved branches of Under Graduate level Engineering programme: Computer Science, Electrical and Electronics, Electronics and Telecommunication and Information Technology. In 2009, KITE added Mechanical Engineering, and in the year 2010, KITE obtained approval for Civil Engineering and MBA programme. In the year 2012, Kruti School of Business Management (KSBM) was added to provide a balanced comprehensive education in the Management, Science and Commerce Stream (BCA, BBA, B.Com, B.Com with Computer and PGDCA are currently offered). In the year 2013, Bachelor of Education (B.Ed.) was added along with Kruti Institute of Fashion & Interior Designing (KIFID, affiliated to JD Institute of Fashion Technology, Mumbai). Latest additions in the year 2017 are Diploma in Education (D.El.Ed. running in both KITE and KSBM), Diploma in Fashion Photography in KIFID.

'Kruti' is about "*Make Things Happen*", Creating, Dreaming and Designing the future and making human life happy, creating a successful career path for students & staff as Industry Professionals.

College campus is spread over 20 acres in the vicinity of Chhattisgarh Vidhan Sabha. KITE building is a visual delight and an architectural pride. It is designed around our central theme of the three forces- "*Jan Sakti, Karma Sakti & Sankalpa Sakti*".

"Kruti Campus" offers stimulating learning and self development opportunities to students and aims at helping them develop into capable professionals, who will contribute in building a glorious future. Workshops, Industrial Visits and Guest Lectures are designed to provide rich industrial environment. High speed internet and Wi-Fi connectivity is provided for easy access to student portal and digital library. Campus also includes Central Library, Laboratory Workshop, Boys and Girls Hostels, Canteen and Sports facilities.

## **ABOUT THE CONFERENCE – NCISRDC 2018**

Rural development is a key element in developing strategies to facilitate employment and create income, resulting in wider distribution of economic and industrial activities, thereby reducing rural exodus. The overall development of rural areas is of paramount importance, for any state and this can be achieved only by improving the quality and standard of life of people in rural area. The theme of the conference is a comprehensive and multidimensional concept, encompassing the development with interactions between social, cultural, environmental, technological, economical and institutional factors. The aim of the conference is to bring together Academicians, Researchers, Professionals, Executives and Practicing Engineers, from various Industries, Research Institutes and Educational bodies to share and exchange ideas and information on the theme of the conference. This conference will provide a forum to discuss various issues, new research areas, technological development and problems pertaining to various fields (social, cultural, environmental, technological, economical and institutional) for sustainable development of society. Mission of this conference is to generate implementable practical Idea, Solutions, Observation and Analysis of providing “Innovative Solutions for Rural Development of Chhattisgarh” for better future

### **CONFERENCE THEMES**

#### **1. CIVIL ENGINEERING**

- ◆ Transportation around and beneath existing cities.
- ◆ Environment infrastructure for population in rural areas.
- ◆ Water and energy infrastructure for population in rural areas.
- ◆ Materials and tools for rural development.
- ◆ Resilient building in rural areas.
- ◆ Emerging paradigms for rural communities.

#### **2. COMPUTER SCIENCE AND ENGINEERING**

- ◆ Design Foundations.
- ◆ Mobile Communication and Services.
- ◆ Realistic Aspects.
- ◆ Networking and Grid Approaches.
- ◆ Big Data, Internet of Things.
- ◆ Machine Learning.

### **3. ELECTRICAL AND ELECTRONICS ENGINEERING**

- ◆ Green Technology for Power Generation.
- ◆ Power Quality and Soft Computing Applications.
- ◆ Power System Modeling, Simulations & Analysis.
- ◆ Power Electronics and Drives.
- ◆ Flexible AC Transmission System.
- ◆ High Voltage Engineering.
- ◆ Renewable Energy Management.

### **4. ELECTRONICS & TELECOMMUNICATION ENGINEERING**

- ◆ E-Agriculture
- ◆ Agriculture Robotics
- ◆ Remote Sensing
- ◆ Image Processing
- ◆ Renewable Energy
- ◆ Wireless Communication
- ◆ Microelectronics
- ◆ Automation in Agriculture

### **5. MECHANICAL ENGINEERING**

- ◆ Heat transfer, thermal engineering.
- ◆ Fluid dynamics, biotechnology.
- ◆ Energy conservation system.
- ◆ Design and analysis CAD/CAM/CAE.
- ◆ Conditional Monitoring.
- ◆ Fracture Mechanics, Cryogenics, Mechatronics.
- ◆ Production and Industrial Engineering.
- ◆ Advanced Manufacturing Process.

### **6. MASTER OF BUSINESS ADMINISTRATION (MBA)**

- ◆ Policies for Rural Development
- ◆ Rural Products Marketing
- ◆ Socio Economic Aspects of Rural Development
- ◆ Financial Schemes for Rural Development
- ◆ Community Based Rural Development

All the selected papers for the conference have been published in  
“*International Journal of Advance Research, Ideas and Innovations in Technology*  
(IJARIIT) with ISSN 2454-132X in the website <https://www.ijariit.com/conferences/ncisrdc-2018/>

These papers are achieved and indexed in more than 15 esteemed online directories followed by **Google Scholars, Cosmos, DOAJ, DJIR and many more.**

Apart from paper presentation, we organized “Key Note Address, and Invited Talk” to enlighten the participants with the recent trends in innovation solution in technology and engineering. The participants had opportunity to interact with the distinguished guest during talk.

**Dr. R. L. Shrivastava**, Professor, Department of Mechanical Engineering, YCCE Nagpur, delivered a key note address on innovation solution of Rural Development.

**Mr. Suresh Tripathi**, Joint Mission Director Chhattisgarh State Rural Livelihoods Mission, Department of Panchayat & Rural Development, Govt. of Chhattisgarh presented invited talk on Rural Development.

The research scholars, faculty members and students from institution across India contributed their research articles to the conference. The prominent institution/universities like MANIT Bhopal, NIT Raipur, Priyadarshini Engineering College Nagpur, AMITY University Gwalior, AMITY University Raipur and many more.....

Around 75 plus papers were presented during the conference in a different session which has been chaired by academicians.

Dr. A. M. Vaidya

Dr. Divya Singh

Dr. S. A. H. Zaidi

Dr. Pranjali Gani

Dr. Vivek Kumar Baghel

Dr. Mithilesh Singh



## Prem Prakash Pandey

Minister  
Revenue & Disaster Management, Rehabilitation,  
Higher Education, Skill Development, Technical Education,  
Employment, Science & Technology Department  
Govt. of Chhattisgarh

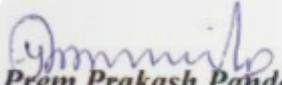
### MESSAGE

It is a matter of great pleasure to know that Kruti Institute of Technology & Engineering (KITE), Raipur is organizing a **“National Conference on Innovative Solutions for Rural Development of Chhattisgarh (NCISRDC-2018)”** on 23<sup>rd</sup> and 24<sup>th</sup> February, 2018.

Rural development aims at improving rural people's livelihoods in an equitable and sustainable manner, both socially and environmentally, through better access to assets (natural, physical, human, technological and social capital) and services and control over productive capital that enable them to improve their livelihoods on a sustainable and equitable basis. This national conference would bring together academicians, researchers and practitioners working on different fields of rural development over the country and provide a forum for exchange of information between scholars and practitioners on various issues in contemporary rural development practices and bring new contribution to the rural development discipline.

I hope that NCISRDC-2018 will provide a platform for meticulous exchange of thoughts and ideas that can be purified and applied to boost the rural development in the related fields.

Wishing you all a very fruitful and rewarding conference.

  
(Prem Prakash Pandey)





# बृजमोहन अग्रवाल

मंत्री, जलसंसाधन, आयकर, कृषि, पशु पालन  
मछली पालन, धार्मिक न्याय एवं धर्मस्व विभाग,  
छत्तीसगढ़ शासन

## MESSAGE

प्रसन्नता का विषय है कि कृति इंस्टीट्यूट ऑफ टेक्नोलॉजी एण्ड इंजीनियरिंग रायपुर (छत्तीसगढ़) **“National Conference Innovative Solutions for Rural Development of Chhattisgarh” (NCISRDC-2018)** का आयोजन 23 February 2018 को कार्ट परिसर, रायपुर में आयोजित हुआ। इस कॉन्फ्रेंस में प्रस्तुत किए गए शोध, टेक्नोलॉजी एवं इंजीनियरिंग क्षेत्र से जुड़े विशेषज्ञों के व्याख्यान अत्यन्त प्रभावशाली सिद्ध होंगे।

आपकी कॉन्फ्रेंस से प्राप्त निश्कर्ष छत्तीसगढ़ शासन की कार्ययोजना का स्वर्णिम पृष्ठ होगा व टेक्नोलॉजी एवं इंजीनियरिंग क्षेत्र में अच्छा सुधार आयेगा।

कॉन्फ्रेंस के सफल आयोजन पर मेरी हार्दिक बधाई।

बृजमोहन अग्रवाल





**Dr. M. K. Verma**

Vice Chancellor  
CSVTU Bhilai, C.G.

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## MESSAGE

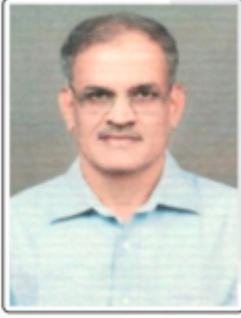
It gives me immense pleasure to know that Kruti Institute of Technology & Engineering, Raipur is organizing **"National Conference on Innovative Solutions for Rural Development of Chhattisgarh" (NCISRDC-2018)**

It is the scale of opportunities that is drawing scores of entrepreneurs to Rural India. I hope that this conference would offer a platform for Rural Development of Chhattisgarh.

I extend my best wishes to the organizers and the participants of the Conference.

(Dr. M. K. Verma)





**Dr. K. Subramaniam I.F.S.**

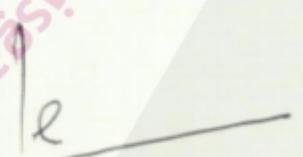
Director General, CGCOST, Raipur  
& PCCF

## MESSAGE

I am delighted to note that Kruti Institute of Technology & Engineering, Raipur is organizing **“National Conference on Innovative Solutions for Rural Development of Chhattisgarh” (NCISRDC-2018)**

I am sure that this conference would achieve its objective and bring academically inclined bright students of the institute to emerge as innovators in finding appropriate solutions for challenges present in rural areas and help the rural population to benefit from it. Conference of the this nature is really useful to ignite young minds towards innovation and inform them about its significance in bringing overall change in the life of people who are residing in villages

I wish all success for this conference.



(Dr. K. Subramaniam I.F.S.)





**Shanti Lal Baradia**

Patron  
SBA Education Society, Raipur

## MESSAGE

यह प्रसन्नता का विशय है कि कृति इंस्टीट्यूट ऑफ टेक्नोलॉजी एण्ड इंजीनियरिंग रायपुर के द्वारा **“National Conference Innovative Solutions for Rural Development of Chhattisgarh” (NCISRDC-2018)** का आयोजन किया गया।

इस आयोजन में देश के कोने-कोने से अपने-अपने विशय में पारंगत विद्वानगण जिनको देश-विदेश में कहॉ, क्या-क्या विकास हुआ है, इस पर आप सभी के बीच इस कॉन्फ्रेंस के माध्यम से अपने विचार बॉटने का प्रयास किया गया। जिससे यहां के विद्यार्थियों एवं उभरते हुए शिक्षकगण के लिए यह कॉन्फ्रेंस मील का पत्थर साबित होगा। नये-नये अविश्कार टेक्नोलॉजी की जानकारी प्राप्त होने से आपसी विचारधारा में परिवर्तन होगा, जिससे प्रदेश की शिक्षा में कुछ बदलाव किया जा सकता है।

नेशनल कॉन्फ्रेंस के आयोजन पर कृति इंस्टीट्यूट ऑफ टेक्नोलॉजी एण्ड इंजीनियरिंग रायपुर एवं छत्तीसगढ़ स्वामी विवेकानंद टेक्नीकल विष्वविद्यालय भिलाई को हार्दिक शुभकामनाएँ।

**शांतिलाल बरडिया**





# Rajesh Kumar Agrawal

Chariman  
SBA Education Society, Raipur

## MESSAGE

I am glad to know that Kruti Institute of Technology and Engineering is organizing a **“National conference on Innovative Solutions for Rural Development of Chhattisgarh” (NCISRDC-2018)** on 23rd February 2018.

The conference is aimed to collaborate academicians, students, industrialists and research scholars on ongoing research activities in the field of engineering for the rural development of Chhattisgarh. This conference provides a unique platform to understand the constantly evolving trends, technologies and innovative solutions to meet the challenges faced in various fields of rural development. NCISRDC-2018 will bring together experts from all across country to share their practical experiences, innovative ideas and knowledge. It will also enable the attendees to meet, transfer knowledge and network with each other for the development of rural part of Chhattisgarh.

I would like to invite all the participants for contributing towards a highly informative event NCISRDC-2018 and wish the conference a grand success

(Rajesh Kumar Agrawal)





**Dr. B. C. Jain**

Principal  
KITE College, Raipur

## MESSAGE

It is indeed a matter of privilege and honor for me to host the “**National conference on Innovative Solutions for Rural Development of Chhattisgarh**”(NCISRDC-2018) on 23rd February 2018 at Kruti Institute of Technology and Engineering, Raipur. Innovative solutions are imperative for meeting the needs and challenges of the rural areas. This conference will bring academicians, researchers and practitioners together to exchange and share their knowledge and experience. I am sure that the exchange of thought and discussions during conference help will boost the rural development of Chhattisgarh.

I take this opportunity to express my gratitude towards Dr. Subramaniam, Director General, CGCOST, Raipur for his keen interest and financial support to this conference. I am also very grateful to all the participants for their contribution to enrich the knowledge in the conference. Looking forward for successful completion of the conference and joining hands together to develop rural areas of Chhattisgarh.

(Dr. B. C. Jain)



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# MECHANICAL PROPERTIES OF RECYCLED AGGREGATES

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## ABSTRACT

*This paper discusses the suitability of producing concrete with 100 % recycled aggregate to meet durability and strength requirements for different applications. Aggregate strength, gradation, absorption, specific gravity, shape and texture are some of the physical and mechanical characteristics that contribute to the strength and durability of concrete. In general, the quality of recycled aggregate depends on the loading and exposure conditions of the demolished structures. One of the major problems with the use of recycled aggregates in structural concrete is their high water absorption capacity which leads to difficulties in controlling the properties of fresh concrete and consequently influences the strength and durability of hardened concrete. This paper presents an experimental study on the properties of fresh concrete prepared with recycled aggregates. Concrete mixes with a target compressive strength of 35 MPa are prepared with the use of recycled aggregates at the levels from 0 to 100% of the total coarse aggregate.*

**Keywords:** *Recycled aggregate. Fresh Properties. Bleeding concrete properties, physical properties, mechanical properties.*

## 1.Introduction

Utilizing recycled aggregate is certainly an important step towards sustainable development in the concrete industry and management of construction waste. Recycled aggregate (RA) is a viable alternative to natural aggregate, which helps in the preservation of the environment. One of the critical parameters that affect the use of recycled aggregate is variability of the aggregate properties. Quality of the recycled aggregate is influenced by the quality of materials being collected and delivered to the recycling plants. Therefore, production of recycled aggregate at an acceptable price rate and quality is difficult to achieve due the current limitations on the recycling plants. These issues concern the clients about the stability of production and variability in aggregate properties. The main goal of the current research project is to investigate variability of aggregate properties and their impact on concrete production. Aggregate strength, gradation, absorption, moisture content, specific gravity, shape, and texture are some of the physical and mechanical characteristics that contribute to the strength and durability of concrete. They also reported that in the case of using recycled aggregates in the saturated surface-dried (SSD) state, the high water content inside the aggregate particles may result in bleeding during casting. The Concrete Technology Unit of University of Dundee showed that the use of recycled aggregate as a partial replacement of natural aggregate leads to slight increases in slump and compacting factor, and a high degree of bleeding. Bleeding has negative effects on the properties of concrete, which is referred to the movement of water to the surface of fresh concrete a result of the settlement of solid particles. A high degree of bleeding can significantly increase the near-surface water-to-cement (W/C) ratio, leading to a lower concrete strength at the cover zone. The formation of a network of capillary pores due to the movement of bleeding water also reduces the durability of concrete in this zone. In

addition, bleeding water trapped along the underside of reinforcing steel can reduce the bond strength and increase the risk of corrosion. The degree of bleeding in fresh concrete is dependent on a number of factor.

## 2.Experimental Work

TEST RESULTS				
S.No.	Name of Test	Test Method	Result	Unit
<b>A)</b>	<b>Recycled Aggregate Sample</b>			
1	Crushing Value	As per IS : 2386 Part-4-1963	34.67	%
2	Impact Value	As per IS : 2386 Part-4-1963	27.79	%
3	Water Absorption	As per IS : 2386 Part-3-1963	5.60	%
4	Loss Angeles Abrasion Value	As per IS : 2386 Part-4-1963	35.74	%
5	Bulk Density & Voids	As per IS : 2386 Part-3-1963	1.440	
6	Specific Gravity	As per IS : 2386 Part-3-1963	2.31	
7	Flakiness Index		5.40	%
8	Elongation Index	As per IS : 2386 Part-1-1963	16.61	%
9	Gradation of Aggregate	As per IS : 2386 Part-1-1963	Seives Nos.	% Passing
			40 mm	100.00
			20mm	63.16
			10mm	10.88
			4.75 mm	0.51

## 3.Conclusion

Natural Aggregate	Recycled Aggregate
Aggregates are derived from a variety of source rocks and mined primarily by surface methods.	Aggregates are derived from debris of road and building construction projects.
Quality depends primarily upon the physical and chemical properties of the source deposit.	Quality varies significantly due to large variation in type and impurities of debris sources.
Must conform to Federal, State, or local technical specifications for each product application.	Must conform to Federal, State, or local technical specifications for each product application.
Processing generally occurs at mine site, often outside city limits. Resource suitable for multiple products.	Processing often at centrally located site in area using mobile urban equipment. Product mix often limited
Mine and plant layout in part determines the efficiency of an operation.	Recycler must be able to adjust material feed and output to meet changing product requirements.

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# COMPARISON OF VARIOUS PROPERTIES OF VIRGIN & RECYCLED AGGREGATES

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## ABSTRACT

*This paper presents an experimental study on the properties of fresh concrete prepared with recycled aggregates. Concrete mixes with a target compressive strength of 35 MPa are prepared with the use of recycled aggregates at the levels from 0 to 100% of the total coarse aggregate. The influence of recycled aggregate on the slump and bleeding are investigated. The effect of delaying the starting time of bleeding tests and the effect of using fly ash on the bleeding of concrete are explored. One of the major problems with the use of recycled aggregates in structural concrete is their high water absorption capacity which leads to difficulties in controlling the properties of fresh concrete and consequently influences the strength and durability of hardened concrete. Several concrete mixes were prepared with 100 % recycled aggregates and the results were compared to that of a control mix. SEM was conducted to examine the microstructure of selected mixes. The results showed that concrete with acceptable strength and durability could be produced if high packing density is achieved.*

**Keywords:** *Recycled aggregates, virgin aggregates, concrete properties, construction and demolition.*

## 1.Introduction

The main goal of the current research project is to investigate variability of aggregate properties and their impact on concrete production. Aggregate strength, gradation, absorption, moisture content, specific gravity, shape, and texture are some of the physical and mechanical characteristics that contribute to the strength and durability of concrete. Therefore, it is necessary to evaluate these properties before utilizing the aggregate. In this paper, properties of recycled aggregate from an unknown source collected over a period of 6 months from a recycling plant were evaluated. In addition, properties of concrete produced with 100 % recycled aggregates were investigated. One of the major problems with the use of recycled aggregates in structural concrete is their high water absorption capacity which leads to difficulties in controlling the properties of fresh concrete and consequently influences the strength and durability of hardened concrete. Hanson and Sagoe-Crentsiet al. suggested that recycled aggregates should be pre-wetted or saturated with water to prevent a rapid decrease in concrete workability. Poon et al. demonstrated that the initial slump of a concrete mixture depended on the initial free water content, while the slump loss of the mixture with time was related to the initial moisture state of the aggregates.

## 1. Experimental Work

S.No.	Name of Test	Test Method	Result	Unit
1	Crushing Value	As per IS : 2386 Part-4-1963	34.47	%
2	Bulk Density & Voids	As per IS : 2386 Part-3-1963	1.384	%
3	Water Absorption	As per IS : 2386 Part-3-1963	4.30	%
4	Loss Angeles Abrasion Value	As per IS : 2386 Part-4-1963	39.32	%
5	Specific Gravity	As per IS : 2386 Part-3-1963	2.36	%
6	Flakiness Index		5.58	%
7	Elongation Index	As per IS : 2386 Part-1-1963	10.65	%
8	Gradation of Aggregate	As per IS : 2386 Part-1-1963	Sieves nos.	% passing
40mm			100.00	
20mm			54.74	
10mm			6.95	
4.75mm			0.82	
2.36mm			0.49	

## 2. Conclusion

We should prefer to use virgin aggregate because they believe it has a higher performance rating than recycled; however, from a product performance perspective, recycled aggregates are just as durable and strong as virgin. The biggest difference between virgin and recycled aggregate is the impact on the environment. Virgin material needs to be mined, and this requires digging up land, using a variety of tools and equipment, and then processing the material for use. All of this can use valuable natural resources, cause pollution, and consume energy. Since recycled aggregates are already coming from a previously existing product, they do not need to be mined for use. This allows companies to conserve the natural resources while also eliminating the need for products to take up space in a landfill. There are many factors that determine the cost of aggregate, and when comparing recycled vs. virgin aggregate, recycled is generally the more cost-effective option. Since companies don't have to mine or produce new material, they can price the recycled material lower than the virgin material. Since recycled producers already have the raw material at their facility, costs are generally lower, and savings are passed on to the consumer. In some instances, you may actually get more recycled material than virgin material for the same or a lower price. For example, recycled CA6 is 15% lighter than virgin CA6, so you receive 15% more volume per ton. All of this adds up to a significant cost savings.

## 3. References

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# STUDY OF CONSTRUCTION & DEMOLITION WASTE

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## ABSTRACT

*This research aims to study feasibility of incorporation of fine fraction of recycled aggregates coming from construction and demolition waste in cement-based masonry mortar fabrication. The recent trend in construction industry is to use the alternative source of construction materials which can substitute the use of virgin materials in order to reduce environmental impact in terms of energy consumption, pollution, waste disposal and global warming. On the other hand, the waste generated from the demolition of old structure and construction activity is a matter of concern all over the world. Thus, recycling and reuse of these wastes may reduce the usage of natural resources and it can also serve towards the demand of environment. It also attempts to elucidate the approaches for the better performances, identifies the gaps in the existing knowledge and underlines the reasons why this promising technology has not become widely accepted by the construction industry. The practical problems with application of recycled aggregate in concrete are also discussed.*

**Keywords:** Institutional framework , sustainable , amplitude , construction and demolition.

## 1.Introduction

Concrete is a composite material, basically consisting of different constituents such as binding materials, water, aggregates and admixtures. Among these ingredients, aggregate plays a very crucial role in concrete which occupy the largest volume of about 60–75% of total concrete volume [1]. It is indispensable for any construction work. The versatility of concrete as a construction material for large construction work lies in its high strength, low maintenance cost, resistant to weathering effect, economical over other construction materials and its excellent structural performance. From the forecast of the research group of Fredonia, it was mentioned that the global consumption of aggregate used in construction may exceed 26 billion tons by 2012 [3]. With this increase in rate of consumption, it is expected that the demand of aggregates will be doubled in the next two to three decades [4]. Amongst different countries, India has occupied a place in the top ten users of the leading countries to use natural resources. The composition of construction and demolition waste (CDW) is dictated by different construction types and their components; in general, CDW is composed of concrete, asphalt, brick and ceramic materials [1]. The problems related to waste dumping have dramatically increased with the growth and development of large cities. In the UK, for example, over 50% of landfill waste comes from construction use [2] and the US alone produces around 200– 300 million tons of CDW annually [3]. The exhaustion of natural sand deposits close to large urban centers necessitates the initiative to use CDW as a potential raw material.

## 2.Experimental Work

Specific gravity	
Common symbols	SG
SI unit	Unit less
Derivations from other quantities	

**Specific gravity** is the ratio of the density of a substance to the density of a reference substance; equivalently, it is the ratio of the mass of a substance to the mass of a reference substance for the same given volume. Apparent specific gravity is the ratio of the weight of a volume of the substance to the weight of an equal volume of the reference substance. The reference substance is nearly always water at its densest (4°C) for liquids; for gases it is air at room temperature (25°C). Nonetheless, the temperature and pressure must be specified for both the sample and the reference. Pressure is nearly always 1 atm (101.325 kPa).

### Crushing Value Test

This test helps to determine the aggregate crushing value of coarse aggregates as per IS: 2386 (Part IV) – 1963. The apparatus used is cylindrical measure and plunger, Compression testing machine, IS Sieves of sizes – 12.5mm, 10mm and 2.36mm

Sample: - Recycled Aggregate Sample.

### Test Result

S. No.	Name of Test	Test Method	Result	Unit
1)	Crushing Value	As per IS : 2386 Part-4-1963	36.88	%
2)	Impact Value	As per IS : 2386 Part-4-1963	27.89	%
3)	Water Absorption	As per IS : 2386 Part-3-1963	4.90	%
4)	Loss Angeles Abrasion Value	As per IS : 2386 Part-4-1963	35.04	%
5)	Specific Gravity	As per IS : 2386 Part-3-1963	2.53	%
6)	Flakiness Index		6.39	%

7)	Elongation Index	As per IS : 2386 Part-1-1963	6.29	%
8)	Gradation of Aggregate	As per IS : 2386 Part-1-1963	Sieves nos.	% passing
			40mm	100.00
			20mm	28.42
			10mm	0.68
			4.75mm	0.11
			2.36mm	0.00

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# QUANTITATIVE APPROACH FOR ESTIMATION OF RESIDENTIAL BUILDING

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## ABSTRACT

*Cost estimation is the most important preliminary process in any construction project. Therefore, construction cost estimation has the lion's share of the research effort in construction management. In this paper, we have analyzed and studied proposals for construction cost estimation for the last 10 years. To implement this survey, we have proposed and applied a methodology that consists of two parts. The first part concerns data collection, for which we have chosen special journals as sources for the surveyed proposals. The second part concerns the analysis of the proposals. To analyze each proposal, the following four questions have been set. Which intelligent technique is used? How have data been collected? How are the results validated? And which construction cost estimation factors have been used? From the results of this survey, two main contributions have been produced. The first contribution is the defining of the research gap in this area, which has not been fully covered by previous proposals of construction cost estimation. The second contribution of this survey is the proposal and highlighting of future directions for forthcoming proposals, aimed ultimately at finding the optimal construction cost estimation. Moreover, we consider the second part of our methodology as one of our contributions in this paper. This methodology has been proposed as a standard benchmark for construction cost estimation proposals.*

**Keywords:** *Building cost estimation, cost models, building functional elements, cost database, computer-aided cost estimation.*

## 1.Introduction

As the industrial development directly affects the construction sector, the projects are getting more complicated and their scales are getting larger. Hence it is getting more difficult to complete the projects within quality standards, budgeted cost limits and on time. The risk and uncertainties met by managers during the construction process result in some difficulties, thus the decisions to be taken may be delayed. One of these difficulties is caused by the lack of cost data whenever needed and in demanded quality. Therefore, the budgeted cost limits are often exceeded. In building construction projects, the direct cost is often emphasized and it is underlined in the cost estimation and cost control studies as the direct cost generally is very high compared with indirect cost within the building cost. Besides, decisions on investment of building projects, owner's evaluation of bids prepared by contractors, calculation of the tender price of the contractors, cost control during the decisions on design are all bound to the correct or almost correct cost estimation.

C O N C R E T E	R A T I O	T O T A L	C E M E N T	SA ND	AGGRE GATE	V O L U M E	DRY VOLUME ( IN 54%)	C E M E N T	S A N D	A G G R E G A T E
M20 CONCRETE	(1:1.5:3)	5.5.	1	1.5	3	1339.16	2062.30024	374.96 4	562. 4	112 5

<b>CONCRETING CEMENT</b>
1 BAG OF CEMENT= 0.035 CUM
NO. OF CEMENT BAGS REQUIRED = 10714 BAGS
SAND VOLUME REQUIRED= 562.4 CUM
AGGREGATE VOLUME REQUIRED= 1125 cum

<b>BRICK WORK MORTAR</b>
VOLUME OF CEMENT= 133 CUM
1 BAG OF CEMENT= 0.035 CUM
NO.OF CEMENT BAGS REQUIRED= 3800 BAGS
SAND VOLUME REQUIRED= 532 CUM

<b>PLASTERING MORTAR (1:6)</b>
TOTAL VOLUME= 158.61 CUM
VOLUME OF CEMENT= $158 \times \frac{1}{7} =$ 22.6585714 CUM
VOLUME OF SAND= 135.951429 CUM
1 BAG OF CEMENT= 0.035 CUM
NO.OF CEMENT BAGS REQUIRED= 648 BAGS

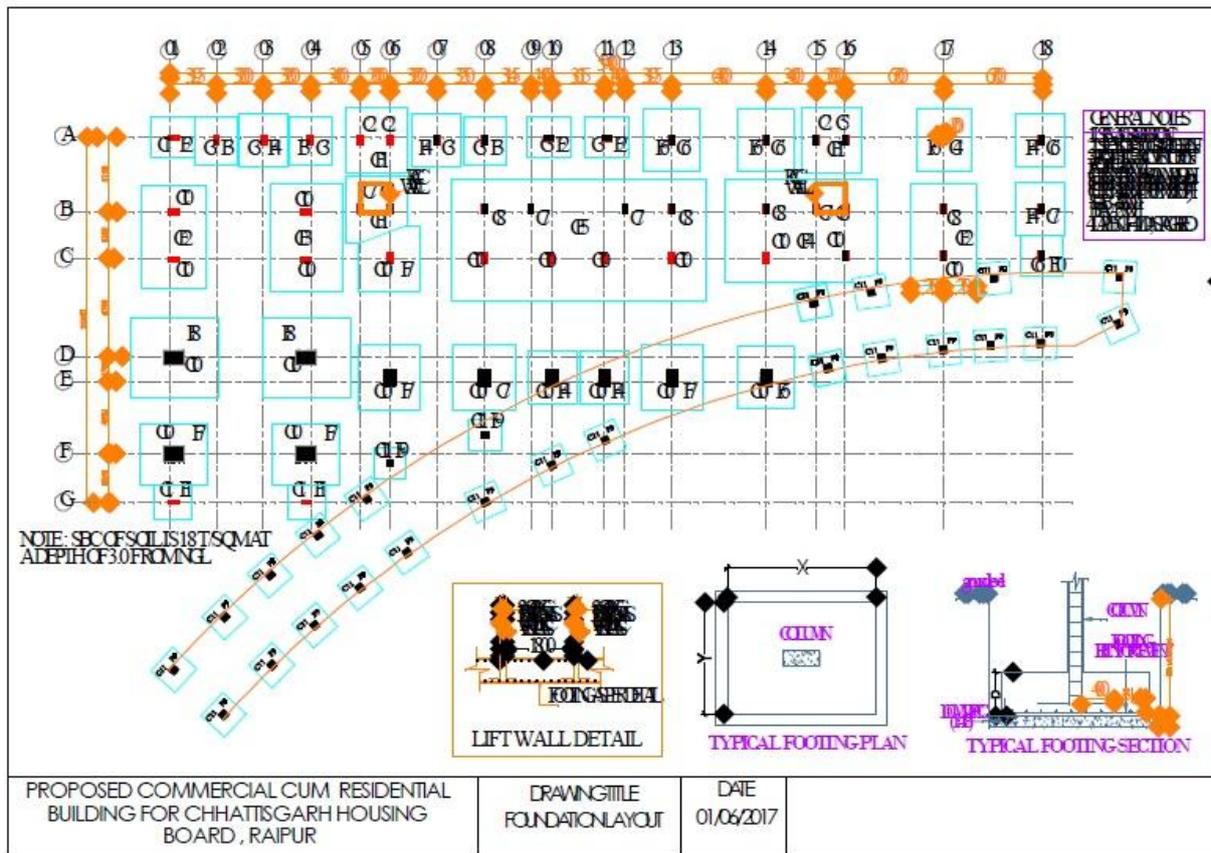
<b>BRICK</b>
NO. OF BRICKS REQUIRED= 643758 NOS

<b>STEEL</b>
TOTAL VOLUME OF STEEL= 37.819 CUM
DENSITY OF STEEL= 7850 KG/CUM
WEIGHT OF STEEL= 296881.7562 KG

<b>TILES</b>
VOLUME OF TILES = 52.23 CUM
VOLUME OF TILE ADHESIVE = 12.21 CUM
VOLUME OF DRY ADHESIVE INCREASE 50%=18.32
DENSITY OF ADHESIVE= 1700 KG/CUM
MASS OF ADHESIVE = 31135.5 KG

<b>RATES</b>
RATE OF BRICK = 3.5 RS/BRICK
RATE OF CEMENT= 250 RS./BAG
RATE OF SAND= 16 (coarse) 20(fine) rs./kg
RATE OF AGGREGATE= 30 Rs./kg (20mm)
RATE OF TILE = 80rs/pc (250*250 mm)
RATE OF TILE ADHESIVE= 10 RS./KG
RATE OF STEEL= 40 RS/KG

2. Experimental Work



3. Conclusion

It is a well-known fact that up-to-date and reliable databases and information systems that support estimators are needed to make accurate cost estimation for different phases of the building construction process. Recent developments in information and communication technology enable to the development of such kinds of tools. However, the most important matter in cost estimation is the simplicity and applicability of the system to the factual cases. Cost estimation systems must be simple, reliable, flexible and convenient to the nature of the application area. The building cost estimation model based on functional elements helps the user to estimate the total building cost using historical data of the similar projects. Total building cost can be estimated in feasibility or in the schematic design phase depending on the detail level of project data available. Even in the case of knowing only the total construction area and number of storey of the project the user can estimate approximate total building cost. Even if the user has not sufficient project data, the model allows the user to make a project budget. The average quantities of the functional element. As the building materials to be used in the project can be modified, the user can see the total building cost difference between the first trial and the latter one accordingly. The model also allows estimating the most suitable total building cost even in the phase of the schematic design phase, as there is a chance of using more than one composite element alternative for each functional element group.

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# CHANGING PRACTICES IN HIGHWAY ENGINEERING: INDIA AND AWAY

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## ABSTRACT

*Main topics include transportation engineering practice, airport and highway pavements and materials, design and safety, planning and operations, pipelines, technology, and education. In conclusion, future directions in transportation engineering as a result of advances in technology and the attendant changing need of the transportation engineering profession in the 21st century are addressed. The paper introduced the research and application of the highway construction management information integrated system. The purpose of this paper is to review the areas where advanced technologies can significantly affect the way transportation engineering is practiced. Strategies for implementation of the necessary changes in practice are also discussed, along with the expected impact on civil engineering curriculum.*

**Keywords:** Highway, GIS, Traffic, Transportation system

## 1.Introduction

Explained the development and application of highway survey applet run on mobile telephone supporting Java and the technique of transmitting engineering data by GPRS wireless network technology. And expounded the development and application of highway engineering construction field data collecting software run on Pocket-PC. Especially expatiated on the research on the platform of highway construction management information integrated system adopting geography information system (GIS) technique, database technique and network technique. And said all to subsystem about bid manage, contract management, engineering design drawing, engineering survey calculation, measure and pay, data processing on engineering experiment, quantity assessing, project plan and progress, engineering document management etc. This paper proposes a design load concept that treats capacity and traffic flow as random variables. This contrasts with the nth-hourly-volume concept (e. g. 30th hourly volume), which neglects the highest traffic volumes, which produce a disproportionate share of the social or generalised costs of any facility. It involves planning, design, construction, maintenance, and operation of transportation facilities. Advanced technologies in the area of information systems, automation, and telecommunications have the potential of achieving cost savings and productivity improvements as well as enabling new developments in transportation.

With the infrastructure construction investment enlarging in China for the traffic increasing continuously, the highway traffic construction, especially highway construction, came into vigorous developing period. Beside for new theory, technology, material and technique, the more important thing is requirement in the aspect of management for high grade.

## 1.1 The GIS and network technique

**The GIS technique:** GIS ( Geographic Information System) is a kind of information handling and management system, can combination of graph management system with data management system organically, collect and stock for various spatial information, analysis and visual expression.

**Network technique:** 21 century is the times of information, the times of network. Along with the unceasing development of computer technology and network technology, interconnection network abruptly rise in the sphere of whole world develop quickly.

### Overview Of Some Advanced Technologies And Transportation Applications

#### Knowledge-Based Expert Systems

Knowledge-based expert systems (KBES) evolved from research in artificial intelligence with the overall objective of producing intelligent behavior with computers (Harmon 1985). Numerous artificial intelligence research areas exist, including theorem proving, automatic programming, vision, learning, natural language processing, and others. Transcontinental railroads, national highways, canals, petroleum and natural gas pipelines, as well as major urban transit systems, are testimonials to the achievement of civil engineers.

#### Computer-Aided Planning and Design

Computer-aided planning and design system are evolving to incorporate a constellation of analysis, evaluation, and synthesis application programs with shared data and interprocess communication (Rehak 1985). Graphic displays, knowledge-based expert systems, and databases, as well as conventional analysis programs, are all important components.

#### Strategies For Implementation

##### Organizational Strategies

Transportation-related organizations face both challenges and opportunities in responding to the role of advanced technologies in transportation engineering. The challenges concern adjusting organizational frameworks to best choose and implement new tools, and the opportunities relate to tremendous increases in productivity.

#### About HSIS

HSIS is a safety database that contains crash, roadway inventory and traffic volume data for a select group of agencies. The participating states of California, Illinois, Maine, Minnesota, North Carolina, Ohio and Washington and the city of Charlotte were selected based on the quality of their data, the range of data available and their ability to merge the data from various files. The HSIS database also contains historic data from Michigan and Utah. The HSIS is used by FHWA staff, contractors, university researchers and others to study current highway safety issues, direct research efforts and evaluate the effectiveness of crash countermeasures.

The concepts and methods of traffic engineering are similar to those used for typical traffic engineering or operation analysis studies. The primary differences being the degree of effort, the level of detail, and the use of the results. In the case of operational studies, just enough data is gathered to permit a decision-maker to answer a question by making assumptions and supplying judgment. This information is compared to known principles and standards and applied to real-time problems. The researcher, on the other hand, must gather sufficient data to satisfy statistical tests to prove that his conclusions are correct.

## 2. Conclusion

Highway construction visible management system, which is visual engineering management software platform, is based on the actual needs of the Guangqing freeway project, by use of modern popular GIS technical, network technology and database technical development. It has offered effective evidence and means for the macroscopic management of the project, has raised the level of project management. Highway construction management system and project OA integration based on GIS graph platform will be a new direction of the engineering project management system research. This growing dichotomy between the generalist and specialist has been aided by contemporary transportation education. Although universities have often broadened their curriculum programs, they are increasingly theoretical, stems from a growing emphasis on training for research rather than practice.

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# TRENDING PRACTICES IN CONSTRUCTION SECTOR FOR EARTHQUAKE RESISTING STRUCTURES

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## ABSTRACT

*The field of Earthquake Engineering has existed in our country for over 35 years now. Indian earthquake engineers have made significant contributions to the seismic safety of several important structures in the country. However, as the recent earthquakes have shown, the performance of normal structures during past Indian earthquakes has been less satisfactory. This is mainly due to the lack of awareness amongst most practicing engineers of the special provisions that need to be followed in earthquake resistant design and thereafter in construction. A workshop was conducted at IIT Kanpur to discuss the role of earthquake-resistant construction in Civil Engineering curriculum. The workshop also discussed the avenues for dissemination of this knowledge to the students, practicing engineers and other people. In this paper, the main recommendations of the workshop and an action plan that can be implemented in the next few years have been described.*

**Keywords:** *Earthquake, Building Structures, Infrastructure, Building Code, Seismic design, India*

## 1.Introduction

Formal activities in the field of Earthquake Engineering in the country were started in the late fifties at the University of Roorkee (UOR). The first Indian code was published by the Bureau of Indian Standards in 1962. Since then, Indian earthquake engineers have handled numerous prestigious and challenging projects in high seismic regions of the country. However, it has often been felt that an average civil engineer in the country even today looks at earthquake engineering as an area of super-speciality to be handled only by researchers and professors. The cause of earthquake-disaster mitigation through constructions that can appropriately withstand earth-quakes, can be achieved only when the professional civil engineers in India take it upon themselves to ensure earthquake-resistant constructions [1]. A typical undergraduate civil engineering curriculum in the county does not include any coverage of earthquake engineering; the situation is no different in most other countries of the world. Even at the post-graduate level, only a small fraction of structural engineering students gets a chance to study earthquake engineering and design. This results in most civil engineers not receiving any formal training in earthquake engineering during the undergraduate or postgraduate studies [2]. This needs to be corrected for a country like ours with an enormous earthquake problem. A three-day workshop was held at the Indian Institute of Technology Kanpur during 10-12 October 1996 to discuss all aspects related to earthquake resistant construction in civil engineering curriculum [3]. The questions that prompted this workshop include: 1. Should we continue to let earthquake-resistant constructions to be handled by specialists only, or should an average civil engineer responsible for construction be expected to know about appropriate earthquake technology for day-to-day

constructions?. Should earthquake-resistant construction be taught as a separate subject in the engineering curriculum, or should the topics related to earthquake engineering be merged with the existing courses? For instance, it may be more effective to teach students about ductile detailing of reinforced concrete structures in the regular design course on reinforced concrete, than covering all aspects of earthquake engineering in one single course.<sup>3</sup> Should earthquake engineering maintain an identity outside the normal civil engineering industry or become a part of civil engineering industry itself. How best to achieve the following goal: professional civil engineers should be able to ensure earthquake-resistant constructions without seeking help from "earthquake engineering experts," particularly for the run-of-the-mill constructions. As a preparation towards this workshop, two questionnaires were sent to all engineering colleges in the country. These questionnaires solicited information from the colleges, regarding: (a) state of teaching curriculum at undergraduate as well as at graduate levels *vis-à-vis* earthquake-resistant constructions, and (b) profile of faculty members, having expertise in earthquake-resistant constructions or interested in developing expertise in earthquake-resistant constructions. Responses received during this survey were made available to the workshop participants in the form of a directory [4]. To ensure a holistic approach to addressing the above questions, a very broad agenda was prepared for the workshop. Most of the time during the workshop was spent in across-the-table discussions [5]. Participation was by invitation. This paper gives a summary of the discussions and recommendations.

## 2. Discussions and Recommendations

### Theme 1 :: Earthquake-Resistant Constructions in India

**1.1 Engineered and Non-Engineered Constructions**• Most building constructions are non-engineered. However, formal education is imparted only on engineered constructions. Focus of discussions should also be placed on non-engineered constructions.

**1.2 Building Material Technology and Know-How**• There is a need for greater discussion on the different building materials and their utility for earthquake-resistant constructions in technical curriculum.

**1.3 Division of Responsibilities between Consultants, Contractors and Owners**• The consultant plays the most important role in realising earthquake resistant constructions. The consultant has to educate the owner regarding the consequences of not providing earthquake-resistant features; this may motivate the owner to incur the extra costs for safety. The responsibility of adhering to the minimum requirements specified by the design codes shall remain with the consultant. The consultant also needs to ensure that the detailing provided is fully implemented by the contractor [6].

**1.4 Earthquake-Resistant Design Practice versus Traditional Design Practice**• Earthquake-resistant design and detailing should be considered under normal design situations. These should be an integral part of design process, even though these may not govern the final design in all cases. This situation would then be similar to the current treatment of design for wind loads. This will demystify the myth of earthquake-resistant design and construction being a special requirement [7].

**1.5 Code Provisions And Issues**• Design codes are the minimum specifications of the society's expectations of the structures. There is a need to ensure that the codal provisions are faithfully complied with [8]. Since the building codes also fulfill a social obligation, the costs incurred by individuals involved in the code development should be provided. The code revisions sometime require technological upgradation or other major changes in the prevailing practices. Appropriate technological innovations and developments must take place in order to help the implementation of the

difficult provisions. • The code compliance in the country is currently very poor. This can be improved through necessary regulations and legal provisions. Introduction of tender specifications and changes in the city bylaws are some strategies for this. Also, there is a need for speedy action against defaulters to encourage compliance. The professional societies should take the initiative to develop model codes or to discuss specific issues. These may be used as a basis for arriving at the practical codes. These model codes should be regularly revised based on continuous technological developments. This will greatly benefit through increased involvement of professional engineers in code development.

### 3. Conclusion

The workshop held intensive discussions on several important topics related to the status of earthquake engineering in India. The major conclusions that were arrived at during the discussions have been discussed in this paper. Some of the recommendations of this workshop are implementable in the short term, while the others require long-term efforts for their implementation. The authors believe that the following steps should be initiated urgently: 1. Working notes and teaching aids should be developed and widely disseminated for model UG and PG curricula in Earthquake Engineering and Structural Dynamics. 2. Model experiments should be developed to illustrate the concepts in earthquake engineering, using low-cost and easily available instruments. These experiments should be integrated with the theory courses to illustrate different concepts of earthquake engineering and structural dynamics. 3. There is also an urgent need to develop short-term training programs in the area of earthquake-resistant constructions for structural engineering faculty of different engineering colleges. 4. There is a very urgent need to demystify the earthquake-related design codes by developing detailed commentaries on the code provisions [9]. 5. A dedicated national-level facility needs to be established for the collection and dissemination of earthquake engineering publications and literature. 6. The architecture curriculum in the country should be suitably modified to impart the basic concepts of earthquake-resistant design to architecture students. 7. The diploma programs related to building constructions should be modified to include the essential earthquake-resistant features in buildings. Since the conduct of this workshop, based on the above recommendations several initiatives have already been taken at some of institutions. For instance, some faculty members at IIT Delhi and IIT Bombay have already incorporated earthquake-resistant construction in the regular undergraduate courses. An arrangement has been finalised and implemented between the Central Building Research Institute Roorkee (CBRI) and IIT Kanpur regarding the M. Tech. Programme, where; CBRI financially supports a few students at IIT Kanpur and the students carry out their M. Tech. Thesis in joint supervision of one CBRI scientist and one faculty member of IIT Kanpur. Also, many participants felt that such workshops should be conducted at regular intervals at different locations in the country, as these improve collaborations between participants from the different sectors and different organizations in India

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# FUTURE POTENTIALS OF SMART MATERIALS IN CONSTRUCTION INDUSTRY

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## ABSTRACT

*Smart materials are materials that "remember" configurations and can conform to them when given a specific stimulus. These materials can respond to changes in electricity, heat, or magnetic waves. They are able to perceive and feel the stimuli from the environment as well as from their inner, to react on stimuli and adapt to them by integration of functionalities in their structures. In construction, smart materials and systems could be used in „smart“ buildings, for environmental control, security and structural health monitoring e.g. strain measurement in bridges using embedded fiber optic sensors. Magneto rheological fluids have been used to damp cable-stayed bridges and reduce the effects of earthquakes With the advent of advanced technology, smart materials are used in various civil engineering applications and across a wide range of other sectors including agriculture, aerospace, marine, food and packaging, healthcare, sport and leisure, energy and environment, space and defense using embedded fiber optic sensors.*

**Keywords:** Actuators, intelligence, sensors, smart materials, specific stimulus.

## 1.Introduction

Historical ages are often referred to in terms of material age such as, Stone-age, Bronze-age, Iron-age etc. The present age is considered to be the age of flexibility of choice of materials. Scientific and technological developments have given us numerous advanced and novel materials and their applications, and any one single material, therefore, can not characterize the present age. Today, due to the scarcity of suitable construction materials, the primary concern of engineers is to explore the new advanced materials which find their bulk utilization in various engineering applications. For the development of such innovative materials and their use, the engineer has to select the most appropriate technology, he must know what properties should be considered, how these are determined, what are their limitations, and should intelligently select the right material for appropriate use. These predictions are not the result of gazing into a crystal ball, but are based on an appraisal of current research in leading materials laboratories around the world.

The "smart" or "intelligent" materials respond with a change in shape upon application of externally applied driving forces. Typically this shape change is reflected in an elongation of the sample, thus allowing their use e.g. as a small linear motor. The term "smart materials" describes a group of material systems with unique properties. Some materials systems do not exhibit a shape change, but rather have other significant properties are also called smart materials. Examples of "other" smart materials include electro- and magneto rheological fluids. These fluids can change viscosity over many orders of magnitude upon application of an external magnetic or electric field.

**Types of Smart Materials:** Smart/Intelligent structure applications are wide ranging from active shape control, vibration and noise control, improved damping and aero elastic stability to change stress distribution. The various types of smart materials used in smart structures are as listed below.

- Piezoelectric Materials (PEM)
- Fiber optics
- Shape Memory Alloys (SMA)
- Electro-Rheological Fluids (ERF)
- Magnetostrictive Materials
- Electrostrictive Materials

## 2. Smart Structure

Adaptive Materials and to some extent actuators and sensors are almost always used interchangeably. This can sometimes lead to confusion as different terms can really describe the same effect or property of a material. To add to the confusion the terms smart devices, smart systems or smart structure are often carelessly used. Here one should note that in general the system complexity increases from the unit material to device to systems to structures. Any permutation of the adjective (smart, active) with the subject (material, device) is more or less meaningful and seems to have been used already in one way or the other in published reports and papers. Much more important than the actual word definition is the general understanding of the field.

## 3. Application of Smart Materials in Engineering & Allied Sectors

Smart materials find a wide range of applications due to their varied response to external stimuli. The different areas of application can be in our day to day life, aerospace, civil engineering applications and mechatronics to name a few. The scope of application of smart material includes solving engineering problems with unfeasible efficiency and provides an opportunity for creation of new products that generate revenue. Important feature related to smart materials and structures is that they encompass all fields of science and engineering.

**3.1 Structural Health Monitoring:** Embedding sensors within structures to monitor stress and damage can reduce maintenance costs and increase lifespan. This is already used in over forty bridges worldwide.

**3.2 Self-Repair:** One method in development involves embedding thin tubes containing uncured resin into materials. When damage occurs, these tubes break, exposing the resin which fills any damage and sets. Self-repair could be important in inaccessible environments such as underwater or in space.

**3.3 In Structural Engineering:** These materials also find application in the field of structural engineering. They are used to monitor the civil engineering structures to evaluate their durability. Not only the smart materials or structures are restricted to sensing but also they adapt to their surrounding environment such as the ability to move, vibrate and demonstrate various other responses. The applications of such adaptive materials involve the capability to control the aero elastic form of the aircraft wing to reduce the pull and improve operational efficiency, to control the vibration of satellites' lightweight structures, Smart structures are also being developed to monitor structural integrity in aircraft and space structures. Effort has been made to investigate certain piezoelectric materials to reduce noise in air conditioners.

Besides, in civil engineering, these materials are used to monitor the integrity of bridges, dams, offshore oil-drilling towers where fiber-optic sensors embedded in the structures are utilized to identify the trouble areas.

#### 4. Conclusion

The technologies using smart materials are useful for both new and existing constructions. The many emerging technologies available, the few described here and need further research to evolve the design guidelines of smart structures. Codes, standards and practices should give crucial importance for the further development of smart structures using smart materials.

1. Smart materials are not only useful but also cost effective as compared to conventional materials for both new and existing constructions.
2. The potential future benefits of smart materials, structures and systems would prove amazing in their scope.
3. Smart technology and smart materials gives promise of optimum responses to highly complex problems.

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# SCOPE OF UTILIZATION OF CONSTRUCTION AND DEMOLITION WASTE

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## ABSTRACT

*With anytime accumulation burden on our adored resources, the building and construction industry has a analytical role to play in Environmental Stewardship .The construction industry is one of the major waste producer in all countries . Recycling and reuse of aggregates arising from construction and demolition waste may reduce the demand supply gap in construction sector. Landfill has been the acceptable auctioning apparatus for construction and demolition waste. But in accordance with waste management ,construction and demolition waste is burdening on landfill amplitude . Research plan is focussed on waste arising out of construction and demolition waste which includes concrete aggregates. There is no articular framework for appliance of these wastes which are disposed both accurately and illegally. This will be a actual laborius plan as it will appraise the impacts of two alternatives for the management of construction and dmolition wastes, recycling and disposing. It is accepted that concrete aggregates acquired from construction and demolition wastes can be used for structural concrete safely. Review of literatures gives an idea regarding interventions for suistanable solid waste management in Chhattisgarh along with the Local Muncipal Cooperorations and Institutional framework. Raipur city, the basic of Chhattisgarh has been adversity for abnormal auctioning of waste acquired by unorganised management of waste from construction and as well from the demolition. Research paper proposes based on bounded inspections in the ambience of solid waste management, and references of research publications. Research paper highlights keeping in view that the Raipur city-limits doesnot accept construction and demolition waste management plan which is creating ecology and socio economic problems.*

**Keywords:** *Institutional framework , suistanable , amplitude , construction and dmolition.*

## 1.Introduction

Proper machanism of waste from demolished construction can be implemented in structural applications and manufacturing of blocks, bricks, concrete tiles etc; No legislation exists and there is absolute abortion in accomplishing of utilization of construction and demolition waste. Legislation regarding construction waste is unclear and acceptance based on various interpretations does not specify concrete aggregates from demolished structures as waste. National waste management plan does not cover items of construction and demolition waste . A specific plan for construction and demolition waste is needed. Recycling and reusing of construction and demolition waste may accommodate ample amount of jobs. New business and opportunities assosciated with recycled aggregates may add to construction industry which will eventaually boost economy. Encouraging the use of construction and demolition waste will advance drastic change in economic accord of society. Research plan will absolve that construction and demolition waste concrete is recyclable and it's use in government projects should be made mandatory like fly-ash bricks. In so far as use in concrete is concerned, IS:456 or IRC:112 donot allow use of aggregates acquired from demolished sites. Aggregates conforming to IS:383 are permitted only in structural concrete constructions as per codal provisions. It is time that recycled aggregates should be acceptable for use in concrete constructions. Suitable blueprint should be done by Bureau of Indian

Standards(BIS) to utilize recycling and reclaim of aggregates derived from construction and demolished waste materials. Management of construction and demolition wastes is almost new and accountable in India. In spite of haphazard use for filling and some non structural components, there is no analytical approach. The only active construction and demolition waste processing plant in India was commissioned in December 2009 in North Delhi which is operating successfully. Although it is predominantly a major waste, there is no abstracted set of rules for construction and demolition waste. The municipal solid waste management and administration rules 2000 has abrupt mentions about construction and demolition wastes. Due to lack of guidelines regarding use of recycled construction and demolition waste no development has been carried out in India so far. The state government should authorize and should make accountable to institutions through government adjourned projects. Wastes per year in assorted countries in Million Tons are - Germany:223,Australia:19, China:200, Japan:85, SouthKorea:61.7, Ireland:11, India:10.7. Unavailability of concrete aggregates is due to lack of authoritative compulsions. Stated amount for India is in the ambience of Delhi which would be accurate for the blow of the country. Government bodies have manuals of permissions issued for new constructions but has no base of monitoring renovations and repairs. Developed countries are already going through development action of recycling and use of construction and demolition waste. In view of all-embracing developments and adventures in various locations of the country it's time that recycled aggregates should be used in structural concrete apart from non-structural concrete, road constructions and backfilling. Lastly, on the area of accommodation building, achievability of its applications, research plan should be agitated out on priority basis.

## **2.Building on research and connecting to the market :**

The Organisation for Economic Co-operation and Development begin that globally buildings are amenable for about 30 per cent of raw materials used, 42 per cent of activity used, 25 per cent of baptize used, 12 per cent of acreage use, 40 per cent of atmospheric emissions, 20 percent of baptize effluents, 25 per cent of solid decay and 13 per cent of added releases (Centre for Design RMIT, 2003). 2006–07 abstracts from the National Decay Report 2010 showed that 22 707 000 tonnes or 52 per cent of Australia's decay was recycled. Of this, 42 per cent was from the C&D decay stream. In 2004–05 C&D decay bearing in Australia (The Blue Book—Australian Decay Industry, 2008, p. 8) was 15.1 actor tonnes, of which 7.6 actor tonnes was recycled abstracts (timber, steel, concrete, bits and soil) and 7.5 actor tonnes was balance decay to landfill. In 2006–07, 43 777 000 tonnes of decay was generated, 38 per cent of which was from the C&D stream. Buildings and their users are amenable for about a division of Australia's greenhouse emissions. The activity embodied in absolute architecture banal in Australia is agnate to ten years of the nation's activity consumption. Choice of abstracts and architecture attempt has a significant, but ahead unrecognised, appulse on the activity appropriate to assemble a building. Embodied energy is one admeasurement of the ecology appulse of architecture and of the capability of recycling, decidedly for CO<sub>2</sub> emissions. The embodied activity of a architecture is over 30 times the anniversary operating activity of appointment buildings. Making barrier added activity able usually requires added embodied energy, appropriately accretion the arrangement even added (CSIRO Material Science and Engineering, 2009). The addition that the re-use and recycling industry can accomplish to lower the embodied impacts of barrier is significant. Communicating the allowances of re-use and recycling and highlighting how barriers accept been affected will advice to abode the misperception that re-use of C&D waste in basement is novel, difficult and risky. This will activate greater re-use and recycling of C&D decay beyond the accumulation chain.

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# THE LEARNING OF ARTIFICIAL INTELLIGENCE

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## ABSTRACT

*Design of intelligence in a device is known as “Artificial Intelligence.” We can use AI instead of Artificial Intelligence. It is a branch of science & engineering for making intelligent machine; especially intelligent computer program. This topic is based on the study of how to make computer to do things superior than people. AI focused on sorting of problem solving, nature of problem and so on which we do every day. It includes reasoning, communication, and calculation also.*

**Keywords:** Turing test, different jobs in AI, Blind and Heuristics techniques, etc.

### 1. Introduction

Intelligence is the computational part of the ability to achieve goals in the world. A degree of intelligence may vary in some machines, many animals and other people. Intelligence is ability to acquire, understand and apply knowledge. Pattern recognition, solving problems, creativity, learning, language processing are the task involving high level of mental process. Also Perceiving, thinking, curiosity, communicating, and activity in complex environment, understanding and learning from experience, knowledge applying at new situation is the behavior of intelligence. Intelligence requires knowledge like it is voluminous, it is hard to characterize, constantly changing, differs from data organizes in a way that correspond to way it will used.

#### A. Features of Intelligence

- 1 It will perform complex task
- 2 Recognize complex pattern
- 3 Learn from experience and instructions
- 4 It helps to solve unseen problem.

Intelligence are divided into three categories- Excellent, Good and Worst. By taking example of student, we can explain it deeply.

- 1 If student know concept individually then student called as “Excellent”.
- 2 If student know concept with the help of teacher then student called as “Good”.
- 3 If student neither understood by themselves nor with teacher then student called as “Worst”.

#### B. Applications

- 1 Natural language processing and understanding
- 2 Recognition of speech
- 3 Playing game
- 5 Computer vision and classification of various searching techniques in heuristic way

#### C. Advantages:

AI can able to do complex task then human being do with struggle or sometimes he may not. AI has the ability to take things fast.

- 1 Need of creativity in responses
- 2 Behind a certain decision, incapability to explain the logic and reasoning
- 3 Its decisions are based on facts rather than emotions.
- 4 Overcoming the natural disadvantage of tiredness in humans machines with artificial intelligence do not need any sleep?
- 5 Infinite function.
- 6 Defects and error are less

## D. Limitations

In every field, with the development of AI is that it will soon start substituting humans. Crime and poverty, depression suffers due to high rate of unemployment. Next is the best example of caring behavior is Nurses in hospital, machines will not be able to do with humanity.

- 1 AI is very much cost effective. Due to their complex nature, Creation of smart technologies always is an expensive also ongoing maintenance and repairing needs occurs.
- 2 To adapt to the changing business environment, Software programs need regular upgrading.
- 3 With other systems and platforms interoperability and usability.
- 4 If we decided to bring AI technology then we should take a risk for technological complexity.

## 3.Description

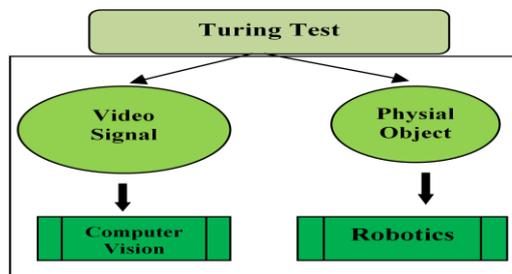
### A. Turing Test

For passing Turing test following steps are to be followed:

If we decided to bring AI technology then we should take a risk for technological complexity.

- 1 **Natural Language Processing (NLP):** NLP is used to make machine which enable for communication.
- 2 **Representation of Knowledge:** During interrogation knowledge is stored.
- 3 **Automated reasoning:** To draw new conclusion and to use store knowledge for answering questions.
- 4 **Machine learning:** For adapting new circumstances and for detecting and expressing extrapolate patterns this type of learning is required.

Below figure elaborate Turing test with its two sub categories; Here video signal gives vision of computer and physical objects related to robotics.



### B. Production systems

To structure AI programs this system is useful; such a way that it describes and performs searching process. Mainly production system consists of two parts-

- 1 "If Statement" called a sensory precondition;
- 2 "then statement" called an action.

If  $A \rightarrow B$  where LHS is known for condition and RHS is known for action. This rule are inferred like A take action B. Action part can be any step in the problem solving process. On other side condition is like a pattern which determines whether this rule applied or not.

### Characteristics of Production system-

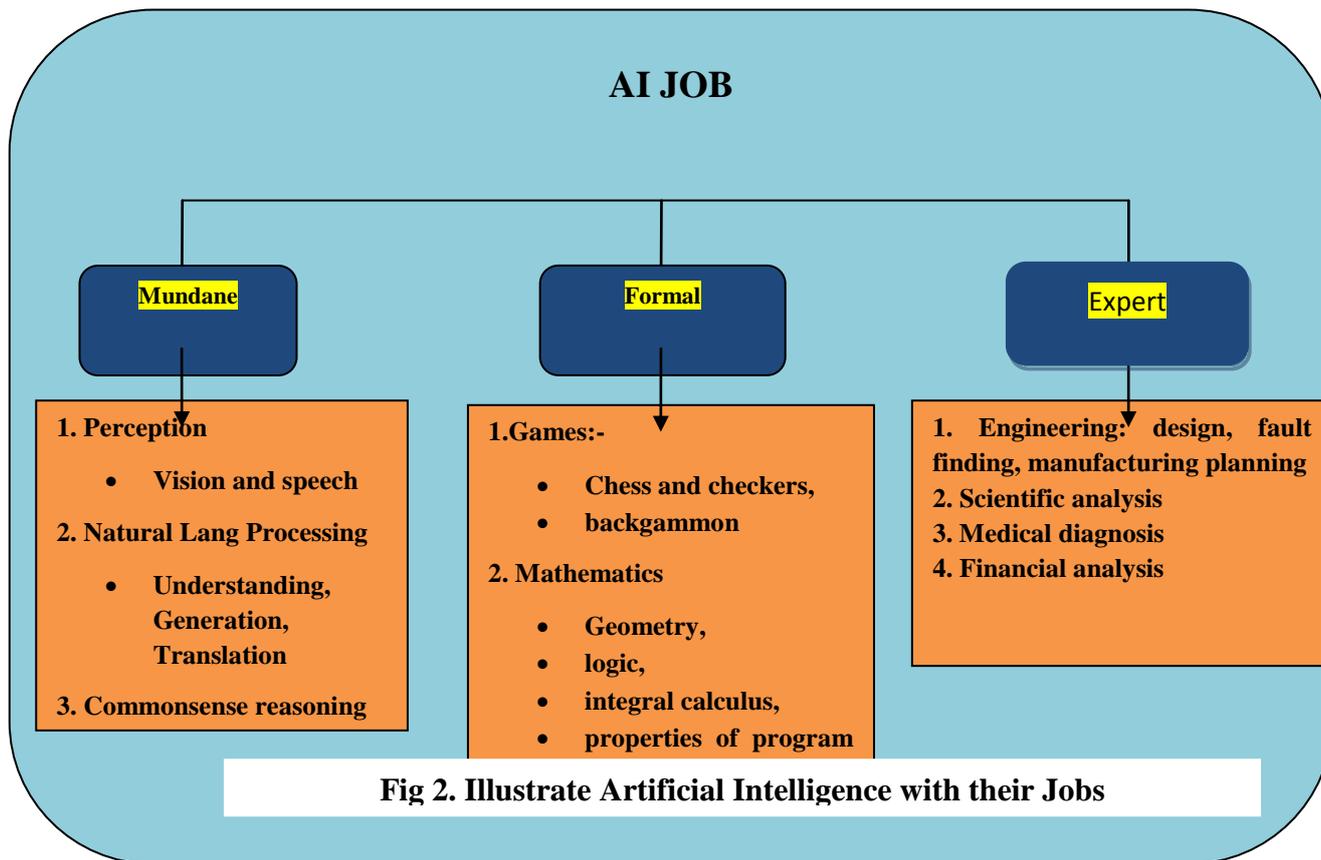
- 1 Knowledge separation
- 2 Production rules modularity
- 3 More flexible than algorithmic control i.e. Pattern Directed Control
- 4 Mapping Natural onto State space search
- 5 Opportunities for heuristics control can be built into rules
- 6 Simply control informative rules.
- 7 Independence in Language
- 8 Model for human problem solving

### C. Artificial Intelligence

Special type of job requiring special level of intelligence. Below following figure shows various special type of jobs with their sub types.

AI focused to take charge of solving problems which we always do every day. Like wake up early in the morning i.e. planning. It called as "Commonsense Reasoning."It describes about physical object with their action, connection, and

consequences to each other. For communication, it has the ability to use proper language with different ideas. Mundane type is also called as for Routine type. Second is Formal type which have two categories, one is games like checkers and chess. This helps people to play games with machine and other is mathematics like logic, geometry, integral calculus, theorem proving, etc helps to calculate various functions mathematically. Last is Expert type, categories into engineering which has manufacturing, designing, finding faults then medical diagnosis, analysis scientifically and finance.



**A. Blind Search:** It is also called as “Uninformed Search.” These types of search have no additional information for states. It is task of distinguishing a goal state from a non-goal state; all can do is generate successors. Example are Breadth First Search, Depth First Search and Bi-directional Search. We may get result of solving problem of above three techniques in either good solution or failure. So we evaluate this technique in four ways.

**Completeness:** It describes either the technique gives guarantee to get solution? Also complexity represents in terms of three quantities. First is  $b$  it is called branching factor. Second is  $d$  called as depth of shallowest goal node. Last is  $m$  called as maximum length of  $m$  state space in any path. Note that this  $b, d$  and  $m$  not be in capital and should be read as small  $b$ , small  $d$ , small  $m$ . BFS is complete after finding it expanding all shallowest node but DFS is not complete

**Optimality:** It helps to get optimal solution. Technically BFS is optimal but only if its path cost is non decreasing order function. DFS is not optimal.

**Time Complexity:** How much time does it take to get result. BFS is  $O(b^{d+1})$  and DFS is  $O(b^m)$

**Space Complexity:** To perform searching it tells how much memory/space is needed. BFS is  $O(|V|)$  where  $V$  is cardinality of all vertices and DFS is  $O(bm)$ .

BFS, DFS and Bi-directional searching may able to get shortest path so it has to generate, expand and dropped nodes. With the help of below table we can see results.

Techniques	Time	Memory	Optimal	Complete	Node Generated	Node Expanded	Node Dropped
BFS	$O(b^d)$	$O(b^d)$	Yes	Yes	NA	23	NA

<b>DFS</b>	$O(b^d)$	$O(b)$	No	Yes	NA	4743	NA
<b>Bi-Directional</b>	$O(b^{\frac{d}{2}})$	$O(b^{\frac{d}{2}})$	Yes	Yes	Yes	4832	NA

**Table 1. Comparative Analysis of BFS, DFS & Bidirectional**

**B. Heuristics Search:** It is also called as “Informed Search.” It is technique of finding whether one non goal state is more likely to be promising than other state. By order in which nodes should be expanded, all search strategies are distinguished.

Techniques of heuristics searching are Best First Search, Generate and Test, Hill Climbing, Constraint Satisfaction, Reduction of Problem and Means-Ends Analysis.

#### 4. Conclusion

Hence in this paper we study artificial intelligence deeply. It specially elaborates intelligence with their features, applications, advantages and limitations. Further it categories AI Job into three sub job with examples. Also boardly explains uninformed and informed searching techniques. It also gives quick glance to their sub techniques with example. Thus with the help of this paper one can easily know the concept of intelligence that are feeded artificially in a device.

#### 5. Acknowledgement

I am very much thankful to our principal sir Dr B. C. Jain who gave me opportunity to share my ideas about AI in this paper. AI is the most entertaining topic in today’s world. Most of the people are like to take this topic for their research. So with the help of my paper they will definitely get information about AI.

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# ANALYSIS OF BUBBLE, INSERTION, SELECTION AND MERGE SORT

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## ABSTRACT

*Arranging elements in a specific order is called sorting. There are mainly two orders are generally in used like lexicographical and numerical order. For optimizing use of other algorithms efficient sorting is important such as insertion, selection, merge and bubble sorting algorithms. In this paper we analyze this different type of sorting with the help of algorithms and examples. One always requires data input which have to be sorted in specific order and produces output in human readable form. But it has to satisfy two conditions – first it should be in non-decreasing order and second it is in re-ordering order but with original elements of all inputs.*

**Keywords:** - Bubble, Insertion, Selection, Merge sorting, Pseudo codes.

## 1. Introduction

Sorting is the technique to arrange the array elements into ascending or descending order. We can also stores the elements into the array. By using sorting we can sort the numbers, alphabets and records. Sorting can be done by any method which is suitable for it. There are many different types of sorting techniques in Computer Science to sort or stores the values into the array, they techniques are Bubble sort, Insertion sort, Selection sort and merge sort . Sorting arranges data in a sequence which makes searching easier. The sorting by shifting one by one element into the array is known as Insertion sort. By selecting a key and compares it the elements which is ahead of this element is known as Selection sort. The list given for sorting can divide into various sub strings and after sorting we merge it this type of sorting is known as Merge sort. Bubble sort is the technique of sorting in which we compares the elements into pairs and then swap it. By using sorting we can find our data stored into the array is easier way.

### A. Application:

- 1 Now a day's people usually prefer sorted data to read.
- 2 A sorted array is much easier to search the data stored in array.
- 3 Sorting makes it much easier to discover patterns or statistics of data items, such as the median or other moments.
- 4 Sorting often helps in comparing lists (or sets), and performing operations like intersection of sets, finding out if two lists contain the same elements, finding if there are duplicates in a list, etc.

**B. Limitations:**

- 1 The maximum length of a sort key in a GROUP BY clause, ORDER BY clause, SELECT DISTINCT statement, or outer join is 255 bytes; the maximum length of all sort keys in a sort row is 65,500 bytes.
- 2 The loop continues to run even if the array is sorted if the code is not optimized.

**2.Description**

Let us discuss all four sorting i.e. bubble, insertion, selection and merge sorting one by one.

**A. Bubble Sort:** The idea of repeatedly comparing pairs of adjacent elements and if they arrange in wrong order then swap their place is known for bubble sort.

Suppose we have B[ ] is unsorted array of m number of elements. Now we want all ements to be sorted in ascending order.

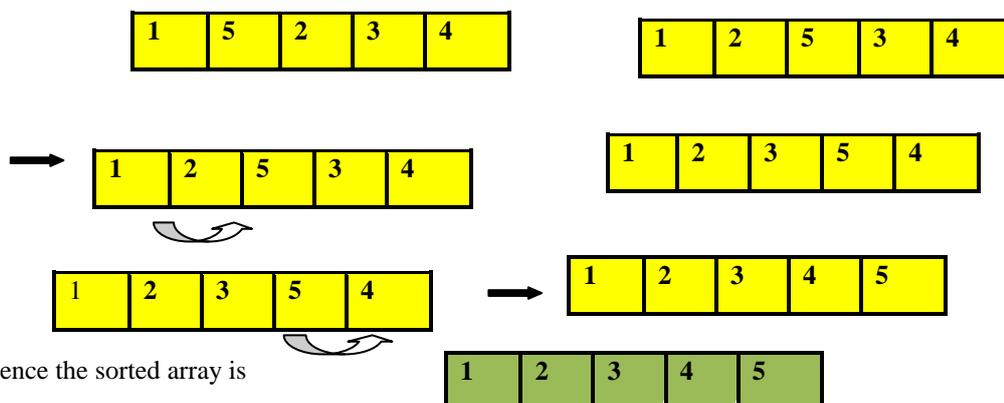
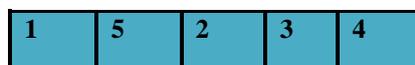
**Implementation --**

```
void Sort_Bubble ( int B[ ], int m)
```

```
{
int asc;
for (int i=0;i<m-1;i++)
{
for(j=0;j<m-i-1;j++)
{
if (B[j] > B[j+1])
{
asc= B[j];
B[j]= B[j+1];
B[j+1] = asc;
} } } }
```

**Example --**

Let an array:



Hence the sorted array is



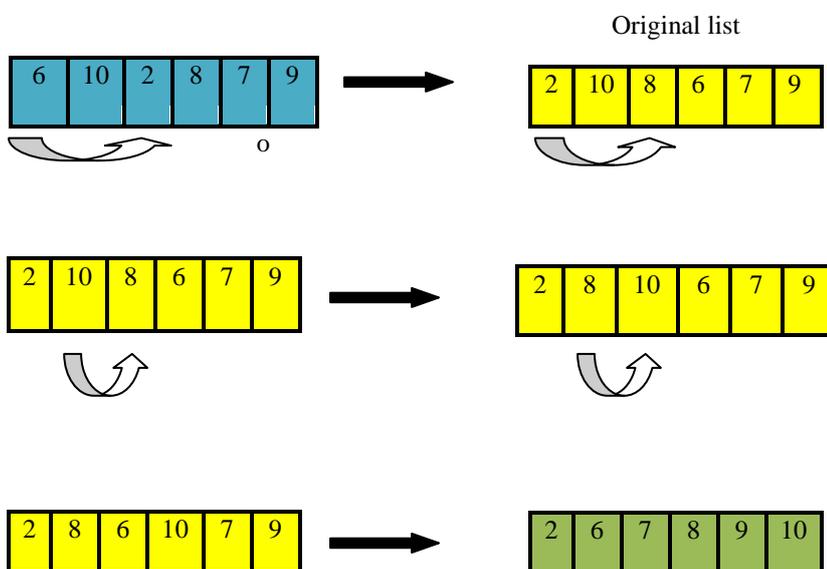
**Fig 1. Example for Bubble Sort**

**B. Selection Sort:** In an unsorted array, the idea of finding the minimum or maximum element then arrange its in proper position is known for Selection sort. Implementation is like.

### Implementation

```
void Sort_Selection (int B[ ], int m)
{
    int min;
    for (int k = 0; k < m-1 ; k++)
    {
        max = k ;
        for (int j = k+1; j < m; j++) {
            if (A[ j ] < A[ min]) {
                min = j ;
            } }
        swap ( A[ min ], A[ k] );
    } }
}
```

### Example --



Hence the sorted array found

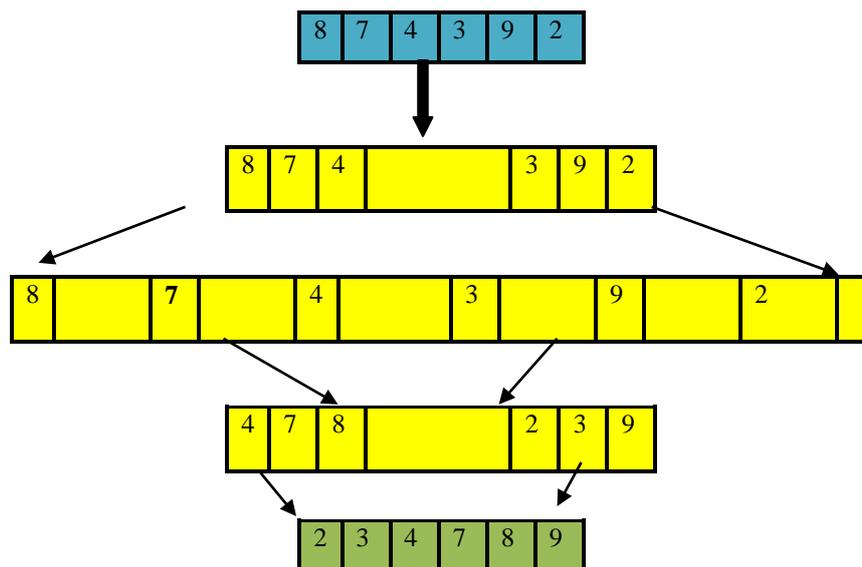
**Figure 2: Example for Selection Sort**

**C. Merge Sort:** It is based on the idea of breaking down a list into several sub-lists until each sub list consists of a single element then merge these into a sorted list. It is also known for divide-and-conquer algorithms.

### Implementation ---

```
void Sort_Merge ( int B [ ] , int BEG, int MID, int END){
    int a = BEG ,b = MID+1;
    int Array [END-BEG+1] , k=0;
    for ( int i = BEG; i <= END; i++)
    {
        if (a > MID)
            Array [ k++ ] = B [ b++ ] ;
        else if ( b > END)
            Array [ k++ ] = B[ a++ ] ;
        else if( B[ p ] < B[ b ] )
            Array [ k++ ] = B[ a++ ] ;
        else
            Array [ k++ ] = B[ b++];
    }
    for (int a=0 ; a<k ;a ++ ) {
        B [ BEG++ ] = Arr[ a ] ;
    }
}
```

### Example ---



**Figure 3: Example for Merge Sort**

**D. Insertion Sort:** The idea is based on for finding element's correct position; one element from the input elements is consumed in each iteration to find its correct position is known for Insertion sort.

#### Implementation –

```
void Insertion_Sort ( int D [ ], int m) {
    for ( int k = 0 ;k < m ; k ++ )
    {
        int temp = D [ i ];
        int i = k;
        while ( i > 0 && temp < D [ i-1]) {
            D [ i ] = D [ i-1];
            i = i - 1;
        }
        D [ i ] = temp;
    } }
}
```

#### Example ---

Let consider an array:

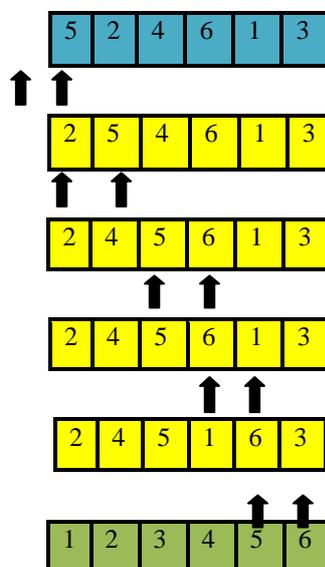


Figure 4: Example for Insertion Sort

### 3.Comparative Analysis

We can analyze all sorting and elaborate it with the help of table given below.

**Complexity:** In terms of computer science complexity is used to measure the required recourses for the execution of an algorithm. Complexity of an algorithm is a calculation of the amount according to their time and/or space required by an algorithm for an input of a given size (n).

**Space Complexity:** Required memory space for working of an algorithm is the Space complexity. A sorting algorithm has  $O(1)$  by allocating the working storage , such as a few variables for iteration and that is not proportional to the size of the input.

**Time Complexity:** Time complexity of an algorithm defines the total time required by the algorithm to perform its task till its completion. The time complexity of algorithms expressed by using big O notation. The time complexity is estimated by counting the number of elementary functions performed by the algorithm.

**Worst case complexity:** Analyzing the efficiency of an algorithm in the worst case tell us about how fast the maximum run time grow when we increase the input size of an array.

**Best case complexity:** In best case input supplied to the algorithm is much similar to the output format which is expected. In best case we can computed by performing dry run on an algorithm.

**Average case complexity:** Efficiency of an algorithm tell us about probabilistic analysis by which we find expected runtime for an algorithm. The time complexity that we get certain set of inputs is as a average same.

Complexity/Sorting	Insertion Sort	Merge Sort	Selection Sort	Bubble Sort
Worst –case	$O(n^2)$	$O(n \log n)$	$O(n^2)$	$O(n^2)$
Best case	$O(n)$	$O(n \log n)$	$O(n^2)$	$O(n)$
Average case	$O(n^2)$	$O(n \log n)$	$O(n^2)$	$O(n^2)$
Space Complexity	$O(1)$	$O(n)$	$O(1)$	$O(1)$

**Table 1: Comparative analysis of all sorting in terms of worst case time, best case, average, space and complexities**

#### 4. Conclusion

Different sorting techniques have different uses according to their behavior for different inputs, every sorting technique has its own best case, average case and worst case according to inputs. Selection sort is useful where swapping is complex. Normally, Insertion sort is used for small data sets. For large data sets, Merge sort and Bubble sort are useful. Merge sort is practically useful for humans and as similar Bubble and Selection sort is used. For restricted data (data in a fixed interval) radix sort is useful. Bubble sort is rarely used, but found in teaching and theoretical expressions. We can use these all types of sorting to sort or arrange the array. These sorting techniques do not contain stack so it is quite easy to perform on array.

#### 5. Acknowledge

I am very much thankful to my guide who gave me opportunity to share my ideas about Sorting in this paper. Sorting is the most important term used in computer science for sorting or storing the data into array. Most of the people is not sure about the sorting concept. So with the help of my paper they will definitely understand Sorting easily.

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# EVALUATION OF STANDARD PROGRAMMING LANGUAGES

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## ABSTRACT

*“The purpose of learning a programming language is to become a better programmer i.e. to become more effective on designing and implementing new systems and on maintaining old ones.” C, C++ and Java are the most popular standard programming languages used today at a broad level. They have a pretty similar syntax for basic concepts. Most of the basic control statements like if statements, loops, function syntax, switch case statements and concepts like recursion are still valid. Many other concepts like the syntax for comments, and the idea of static class variables, also hold in both Java and C++. Java uses the syntax of C and structure of C++ language. So lets study and evaluate all basic languages in this paper.*

**Keywords:** C, C++, Java, Programming codes and structure.

## 1.Introduction

**A. C Language:** It is a general-purpose high level language that was originally developed by Dennis Ritchie in 1972 for the UNIX operating system. C is a successor of B language which was introduced around 1970. C is a structured language which is easy to learn and produces efficient programs. it's a top-down approach. It can handle low-level activities and can be compiled on a variety of computers. Today C is the most widely used System Programming Language.

### Limitations:-

- 1 There is no run time checking and no strict type checking in C language
- 2 C doesn't have the concept of namespace, constructors and destructors, polymorphism, data hiding and the others
- 3 It does not provide data security and no help for solving real world problems
- 4 There is no enough library function for handling today's programming environment

### Applications:-

- 1 C programming language can be used to design the system software like operating system and Compiler
- 2 It is used to develop application software like database and spread sheets.
- 3 For Develop Graphical related application like computer and mobile games.
- 4 To evaluate any kind of mathematical equation use c language.
- 5 UNIX Kernal is completely developed in C Language.
- 6 For creating compiler of different Languages which can take input from other language and convert it into

lower level machine dependent language.

- 7 C programming language can be used to design Operating System.
- 8 C programming language can be used to design Network Devices.

**B. C++ Language:** It is a general purpose programming language developed by Bjarne Stroustrup starting in 1979 at Bell Labs, designed to make programming more enjoyable for the serious programmers. C++ is a superset of the C programming language. In addition to the facilities provided by C, C++ provides flexible and efficient facilities for defining new types. The key concept in C++ is class. A class is a user defined type. C++ supports structures, unions, templates, operator overloading, pointers and pointer arithmetic operations.

#### **Limitations:**

- 1 Gets complex when u want to develop a graphics rich application in c++.
- 2 Does not provide efficient means for garbage collection
- 3 C++ code is easily prone to errors related to data types, their conversions, for example, while passing arguments to functions.  
Portability of code on various platforms, etc

#### **Applications:-**

- 1 For Develop Graphical related application like computer and mobile games.
- 2 To evaluate any kind of mathematical equation use C++ language.
- 3 C++ Language are also used for design OS. Like window xp
- 4 Google also use C++ for Indexing
- 5 Few parts of apple OS X are written in C++ programming language
- 6 Internet browser Firefox are written in C++ programming language
- 7 All major applications of adobe systems are developed in C++ programming language. Like Photoshop, ImageReady, Illustrator and Adobe Premier
- 8 Some of the Google applications are also written in C++, including Google file system and Google Chromium.
- 9 C++ is used for design database like MySQL.

**C. Java Language:** - Java is a programming language created by James Gosling from Sun Microsystems in 1991. The first publicly available version of Java (Java 1.0) was released in 1995. The Old name of Java was Oak. Java is now taken by Oracle Corporation. The acquisition of Sun Microsystems by Oracle Corporation was completed by Oracle in January 2010. The current version of Java is Java 1.7 (Java 7). Java is a Programming language as well as a Platform itself. Java is an Interpreted language while C, C++ are compiled languages.

#### **Limitations:-**

- 1 No preconditions and postconditions
- 2 No separation of specification from implementation
- 3 No support for genericity
- 4 No enumeration types and No local constants
- 5 Exceptions not caught within a method must be declared as thrown by that method.

#### **Applications:-**

- 1 Mobile Applications and Scientific Applications
- 2 Embedded Systems:
- 3 Enterprise Applications:
- 4 for Desktop GUI

## 2.Description

### A. Structure in C:

“C is a structural or procedural type of programming language. It’s a top-down approach it means data should be executed from top to down sequence.” C lays emphasis on the steps or procedures that are followed to solve a problem. C does not support function overloading. C does not provide String or Boolean data types. It supports primitive & built-in data types. C does not support functions with default arrangements. C does not have inline function. In C programming language, the data is unsecured.

**C program basically consist of the following parts:-**

Header file /preprocessor directives, Functions, Variables, Statements and expressions, Comments

#### Structure --

```
#include<stdio.h>          //header file or preprocessor directives
#include<conio.h>
void main()                // main function
{
    //variable or data type declaration
    //Statements or expressions
}
```

### B. Structure in C++

C++ is object oriented programming language. It is bottom-up approach; it means that data should be executed from down to top sequence. C++ consists of various classes and a single main class that should be executes the data. Data is hidden in C++ and is not accessible to external functions. Hence, is more secure. C++ supports Exception handling exception handling can be done through try & catch block. C++ supports functions with default arrangements.

#### Structure --

```
#include<iostream.h>      //header file
int main()                //main function
{
    //variables or data type declaration
    //statements and expressions
}
```

### C. Structure in Java

Java is also a object oriented programming language. It doesn’t contain any header file. All java programs create in classes. Java support automatic garbage collection. It does not support destructors as C++ does. Java does not support conditional compilation and inclusion.

**Structure --**

```

class Demo //main class name//
{
    public static void main(String args[]) //main function or method//
    {
        //variables and data type declaration
        //statements and expressions
    }
}

```

**3. Comparative Analysis**

Let us see features of C, C++ and Java with the help of table

No	Features	C	C++	Java
1	Year which Developed	1972	1979	1991
2	Developed By	Dennis Ritchie	Bjarne Stroustrup	James Gosling
3	Successor of	BCPL	C	C(Syntax) & C++ (Structure)
4	Paradigms	Procedural	Object Oriented	
5	Reserve / Keywords	32	63	50 defined (goto, constunusable)
6	Dependency in Platform	Dependent	Dependent	Independent
7	union, structure Data types	Supported	Supported	Not Supported
8	Pre-processor directives	Supported (#include, #define)		
9	Header files	Supported		Use Packages (import)
10	Inheritance	Not use	Supported	Only Multiple Inheritance not Supported
11	Overloading	Not supported	Supported	Only Operator Overloading not
12	Pointers	Supported		No Pointers used
13	Translation in code	Compiled		Interpreted
14	Storage Allocation	malloc, calloc are uses	new, delete are uses	garbage collector uses
15	Multi-threading and Interfaces	Not Supported		Supported
16	Exception Handling	No Exception handling	Supported	
17	Templates	Not Supported	Supported	Not Supported
18	auto, extern Storage class	Supported	Supported	Not Supported
19	Destructors	No Constructor or Destructor	Supported	Not Supported
20	Connectivity in databases	Not Supported		Supported

**Table 1. Various features of languages**

#### **4. Conclusion**

After study and compare of standard programming languages we have gained the basic information of languages. Where the procedural language can be used to design operating system and compiler designing as well as the object-oriented programming languages can be used for web designing, software designing and so . Also we learn about its applications and limitations of object oriented programming language which has reduced the complexity of software design.

#### **5.Acknowledgement**

We would like to spread knowledge of Standard Programming Languages. I appreciate my friends who help to make beautiful programs in academic. I give special vote of thanks to my guide Ms Parul Choudhary who contributes her knowledge regarding research paper.

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# ASSOCIATION OF ARRAY, LINKED LIST, BINARY AND LINEAR SEARCH

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## ABSTRACT

*For storing large amount of data, computer system is generally used according to different searching techniques. Important issue is to make easy searching fast with efficient storage. In this paper, we study performance of array and linked list data structure and searching techniques like binary and linear search. Searching an element from the list is the elementary aspects in software world. There are various numbers of algorithms are developed for searching an element among which linear search and binary search are the most popular algorithms. We have made efforts to implement on various data structures and also to explain their algorithms. At last evaluate all algorithms with the help of bar graph*

**Keywords:** Array, linked list, binary and linked list.

## 1.Introduction

We mostly perform three steps to perform various operations on data take input, process it and get back output. For example if we want to search location of particular city on goggle map, we simply give initial and final point as input, also while logging in to your mail; we give your mail id and password. Likewise, in last step, application gives us output in terms of site open or mail is open.

Computers can store, retrieve and process large amount of data. Data Structure is an arrangement of data in computer's memory in such a way that it could make the data quickly available to the processor for calculations. Data Structure tells us how the data will be stored?? And what operations will be performed on it?? Data Structure can be classified in two categories – *linear structures and hierarchical structures*. Arrays and linked lists are linear structures while tree and graphs are hierarchical structures.

Arrays are statically implemented data structures. The size of array is fixed and cannot be altered at runtime. We can store similar types of data either be a integer, character or float data type. In array insertion and deletion of elements are situation dependent. Elements are stored in a consecutive memory location.

Linked lists are dynamically implemented data structures. Memory is allocated whenever required and can be de-allocated when it is no longer needed. It is a special list of some data elements linked to one another. They linked with each other through POINTER who points another element. In linked list insertion and deletion are easier and efficient.

In array and linked list if we want to check whether element is present or not then we use searching technique. The searching would be successful if and only if given element is found. Searching helps to get location of element in array. Other case if element would not found then we called that searching is unsuccessful. For searching the elements in array there are two most popular methods – Linear search and Binary search.

In Linear Search, we can access elements of an array one by one sequentially. It will start searching element from leftmost element and go till the end of the array and compare each element with the searched element and if element is matched with searched element it will return the position of the searched element and if element is not matched it will return element is not present in array.

In Binary Search, we compare the particular element by comparing it with the middle most element of the array. If a match occurs then the middle position of array is returned. If middle element is greater than then the element, then the element is searched in the sub-array to the left of the middle element. Otherwise, the element is searched in the sub-array to the right of the middle element. The process continues until the size of the sub-array reduced to zero.

## 2.Description

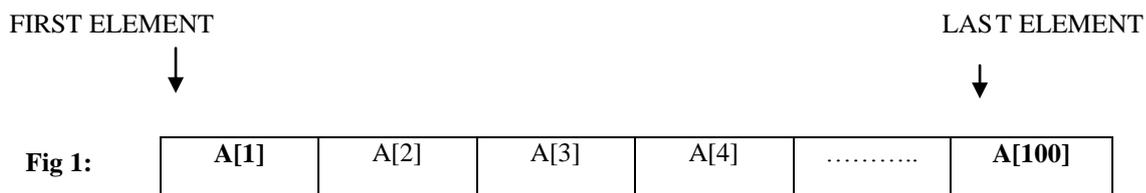
**A/ARRAY** : Array contains a group of elements. These elements are of the same data type like integer, float, character, or string. On Array we can perform various types of operations such as Insertion, Deletion, Updating, Traverse, Sorting, or Searching. Each element is identified by a unique index number. Instead of declaring individual variables such as A1, A2, A3, A4... A100. We can declare one array name as A and use A[1], A[2], A[3], A[4],...,A[100] to represent individual variables. All arrays consist of contiguous memory location. Lowest index number represent first element and highest index number represent last element of array.

**Syntax –**

*i] One Dimensional Array : data\_type variable\_name[ARRAY\_SIZE];*

This is the Syntax of One Dimension Array. The ARRAY\_SIZE must be a integer constant and greater than zero and data\_type must be valid.

**Example –** We have to store 10 values of integer type in array with variable\_name amount like- int amount[10];



**Fig 1:**

**Diagrammatical Representation of One-Dimension Array.**

**Algorithm :** PRINT(A)

Step 1: START

Step 2: [INITIALIZE ARRAY] A[j] WITH VALUES 1,2,3,4,5,6

Step 3: PRINT “DISPLAYING VALUE IN ARRAY”

Step 4: FOR j = 1 to 6

Step 5: PRINT A[j]

Step 6: END OF FOR LOOP

Step 7: PRINT “DONE”

Step 8: END

**Explanation :** In this Algorithm in Step 2 we initialize array of name A[j] with their values, and in Step5 we print all values of array using FOR loop

*ii] Two Dimensional Array: data\_type variable\_name[X][Y];*

This is the Syntax of Two Dimension Array. It can be considered as table where [X] represent the no. of row in table and [Y] represent the no. of column in table.

**Example** – We have to make a table of 3rows and 3columns : int table[3][3];

	Column 0	Column 1	Column 2
Row 0	table[0][0]	table[0][1]	table[0][2]
Row 1	table[1][0]	table[1][1]	table[1][2]
Row 2	table[2][0]	table[2][1]	table[2][2]

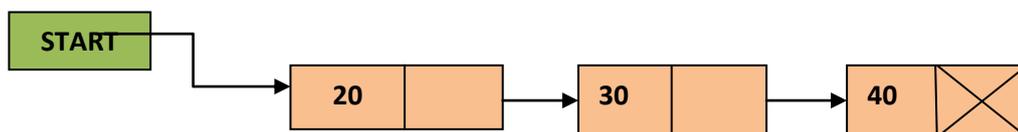
**Table 1: Diagrammatical Representation of Two-Dimension Array.**

**B] LINKED LISTS:** If the memory allocation is done before the execution of any program, then it is fixed and cannot be changed further. Therefore, We have to take an alternative way to allocate memory only when is needed. There is a Unique Data Structure known as Linked Lists, which provides more storage and flexible system. Linked lists are dynamically implemented data structures. Memory is allocated whenever required and can be de-allocated when it is no longer needed. The logical ordering represented by having each element pointing to the next element. Every element is called **NODE**, it has 2 parts, information which is stored in **INFO** and **POINTER** which points the next element.

**The basic operations operations of Linked List are** Creation, Insertion, Searching, Deletion, Traversing, Concatenation, Display.

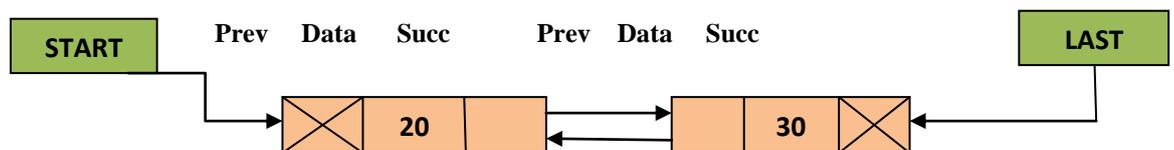
**Types of Linked Lists:** Basically, they are of 4 types –

**1] SINGLY LINKED LIST:**



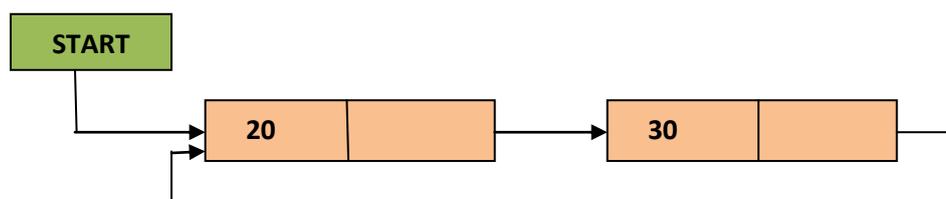
**Fig 2: Diametrical Representation of Single Linked List.**

**2] DOUBLY LINKED LIST:**



**Fig 3: Diametrical Representation of Doubly Linked List.**

**3] CIRCULAR LINKED LIST:**



**Fig 4: Diametrical Representation of Circular Linked List.**

## 4] CIRCULAR DOUBLY LINKED LIST:

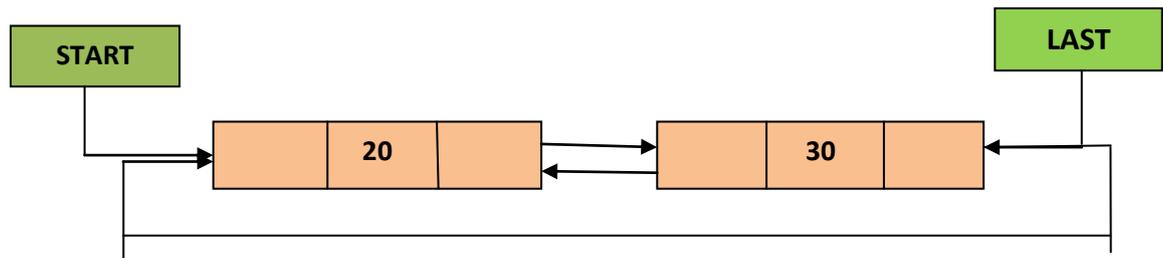


Fig 5: Diametrical Representation of Circular Doubly Linked List.

**Algorithm :** INSERT(PTR, ELEMENT)

Step 1: [Check Overflow]

if PTR = NULL, then Print Overflow EXIT

else PTR = (Node \*) malloc (size of (node)). [END if]

Step 2: Set PTR → INFO = ELEMENT

Step 3: Set PTR → NEXT

Step 4: END

**Explanation** — In Step1 we first of all check overflow and if **PTR** is NULL then we print Overflow and if **PTR** is not NULL then we create new node and enter **ELEMENT** to that node.

**C] LINEAR SEARCH:** Linear Search is a search in which we access each element one by one sequentially. This search is also known as **SEQUENTIAL SEARCH**. It uses LOOP to step through starting point of an array till the ending point of an array. It compares each element with the value which we are searching, and stop its searching when we found the element or we reached to the end point of an array. In Worst Case we may search or scan whole array and in the Average Case we may have to search or scan half of the array, So, for Worst and Average Case our complexity will be **O(n)** and **O(n/2)** respectively. If the desired element is present in the 1<sup>st</sup> position or we have to scan less than half of an array then that case considered as a Best Case.

**Advantages of Linear Search:**

- 1 It is a simple and easy to understand.
- 2 It is very easy to implement.
- 3 It is not necessary that data stored in any particular order in array.

**Disadvantages of Linear Search:**

- 1 In average case may be n/2 comparisons will be made.
- 2 In worst case n comparisons will be made.
- 3 Time Complexity → O(n)

**Algorithm:** LINEAR\_SEARCH(ARR, N, VALUE)

Step 1: [INITIALIZE] Set position : = -1

```

[Initialize] set J:= 1
Repeat step 4 while J<=N
If arr[J] = VALUE
Set position := J
Print position
Go to step6
[End If]
Set J := J+1
[End loop]
Step 2: if position = -1
Print value is not in array
[End if]
Step 3: exit

```

**Explanation:** In this algorithm first of all we initialize the **POSITION** with -1 and we take a variable **J** for running a loop. The loop will run till the value is not found or we reached to the end of the array.

**DJ BINARY SEARCH:** In Binary Search we use **Divide and Conquer technique**. For this search array must be arranged in a particular manner. In other words we can say that array must be sorted. In this search we divide array from middle to two parts and compare the desired element with the middle element. If the middle element of array is larger than the desired element then we search desired element in 1<sup>st</sup> half of the array or if the middle element is smaller than the desired /element then we search desired element in 2<sup>nd</sup> half of the array. This Search is also known as **HALF – INTERVAL SEARCH**. The Worst and Average Case Complexity is **O(logn)**, and the Best case Complexity will be **O(1)**. If we find our desired element in minimum iterations then that is considered as Best case and we found desired element in maximum iterations then that is considered as Worst case. Its Time Complexity is **O(log<sub>2</sub>n)**.

#### **Advantages of Binary Search:**

- 1 Binary Search is faster.
- 2 The average no. of comparison is less.
- 3 It is easy to implement.

#### **Disadvantages of Binary Search:**

- 1 Array must be sorted in a particular manner.
- 2 It works only in Array.

**Algorithm:** BINARY\_SEARCH(lb, ub, Value, A, LOC)

Step 1: [INITIALIZE SEGMENT VARIABLES]

Set F := lb, B := ub, C := int((F+B))/2

Step 2: Repeat Steps 3 and 4 while F <= B and A[C] != Value

Step 3: If Value < A[mid], then

Set B := C-1

Else

Set F := C+1

[End of If]

Step 4: Set C := int((F+B))/2

[End of Step2 loop]

Step 5: If A[C] = Value then

Set LOC := C

Else

Set LOC:= NULL

[End of If]

Step 6:END

**Explanation:** A is a sorted array with lower bound **lb** and upper bound **ub**, and **Value** is a given item which is to be searched. The variables **F**, **B** and **C** denote the beginning, end and middle location of a segment of element of **A**.

## 2.Comparative Analysis

### I] Array and Linked Lists -

S.No.	COMPONENTS	ARRAY	LINKED LISTS
1.	BASIC	It is a consistent set of a fixed number of data elements.	It is an ordered set of consisting a variable number of data elements.
2.	SIZE	Size is fixed and specified during declaration.	Size is not fixed and it can grow and shrink during execution.
3.	ALLOCATION	Location is assigned during Compile time.	Location is assigned during Run time.
4.	STORING ORDER OF ELEMENTS	Elements are Stored Consecutively.	Elements are Stored Randomly.
5.	ACCESS ELEMENTS	Directly or Randomly can access elements.	Sequentially can access elements.
6.	TYPES	One Dimension and Multi Dimension (2-D) arrays.	Singly linked list, Doubly linked list, Circular linked list, and Circular

			Doubly linked lists.
7.	SEARCH TECHNIQUE	Both Binary and Linear Search.	Linear Search only.
8.	INSERTION AND DELETION	Relatively slow because of shifting of elements is required.	Easy, Fast and Effective as compare to Array.
9.	UTILIZATION OF MEMORY	Utilization of memory is ineffective.	Utilization of memory is efficient.
10.	REQUIRED MEMORY	Requirement of memory is less.	Requirement of memory is more.

**Table 2: Comparison of Array and Linked Lists.**

### II] Linear Search And Binary Search –

S.No.	COMPONENTS	LINEAR SEARCH	BINARY SEARCH
1.	DEFINITION	In this search we search sequentially.	In this search we divide array into two sub array.
2.	BEST CASE COMPLEXITY	If the desired element is First element of the array then complexity will be $O(1)$ .	If desired element is in middle of the array then its complexity will be $O(1)$ .
3.	TIME COMPLEXITY	$O(N)$	$O(\log_2 N)$
4.	IMPLEMENTED	Both Array and Linked list.	Direct implementation on linked list is not possible.
5.	TYPE OF ALGORITHM	Iterative algorithm.	Divide and Conquer algorithm.
6.	PRE-	No such requirement	Array must be sorted in particular manner.

	REQUIREMENT OF ARRAY		
7.	LINE OF CODE	Less	More
8.	INSERTION	We can easily insert element at the end of list.	Require Processing to insert element into its place to maintain sorted list.
9.	USEFULLNESS	Easy to use because no need of ordered elements.	Tricky to use because elements must be arranged in an order.
10.	SPEED	Speed of linear search is slow as compared to binary search.	Speed of binary search is fast as compared to linear search.

**Table 3: Comparison of Linear Search and Binary Search.**

#### 4. Conclusion

In this paper we try to distinguish all standard algorithms of array, linked list, linear search and binary search. With the help of algorithms we see step by step instruction of searching and flow chart indicates diagrammatical representation of searching techniques. Array and linked lists are the type of data structures in their structure, accessing methods, memory requirement and utilization. And have particular advantage and disadvantage over its implementation. So through this paper one can be used it as per their requirement. Linear and Binary search is the searching techniques, which can be as per their requirement.

#### 5.Acknowledgement

The writing of this paper was a enormous task for which lot of help required. I had a fine support and I Want to THANK to very special person in my life My Family and My teachers who always appreciate me. My sincere thanks go to my guide Ms Parul Choudhary for his inspiration and guidance in writing this paper. We would like to spread knowledge of Array, Linked Lists, Linear Search and Binary Search.

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# IMPLEMENTATION OF DATA DEDUPLICATION USING CLOUD COMPUTING

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## ABSTRACT

Cloud computing has quickly become one of the most significant field due to its evolutionary services provided model of computing not only in the IT industry but also in the software and hardware industry. This mechanism came up with increasing flexibility, scalability and reliability; while decreasing the operational and support cost. Due to the cloud computing, it becomes easy for managing the stuffs related as well as provides many features which cannot be replaced by anyone. It is a way difficult as well as effective in its own. Providing security is a major concern as the cloud data are stored and accessed in a remote server with the help of by the cloud service provider. Translation of efficient storage and security for all data is very important for cloud computing. Securing and privacy preserving of data is of high priority when it comes to cloud storage. Therefore, to provide efficient storage for cloud data owners and provide high security for data this paper proposes Cloud Computing. Intrusion, detection and prevention are performed manually by network operators in the existing system. Data deduplication technique allows the cloud users to manage their cloud storage space effectively by avoiding storage of repeated data's and save bandwidth. The data are finally stored in cloud server. To ensure data confidentiality the data are stored using encryption.

**Keywords:** De-duplication, Cloud computing.

## 1.Introduction

**Cloud Computing:** Cloud computing is an information technology paradigm that enable ubiquitous access to share pool of configurable system resources and higher level services that can be rapidly provisioned with minimal management efforts, often over the internet.

Cloud computing is one of the emerging technology, which helped several organizations to save money and time adding convenience to the end users. Thus the scope of cloud storage is vast because the organizations can virtually store their data's without bothering the entire mechanism.



Fig.1.Cloud Computing

**Types of Cloud:** The cloud is categorized into four types:

- 1.Public
- 2.Private
- 3.Hybrid
- 4.Communit

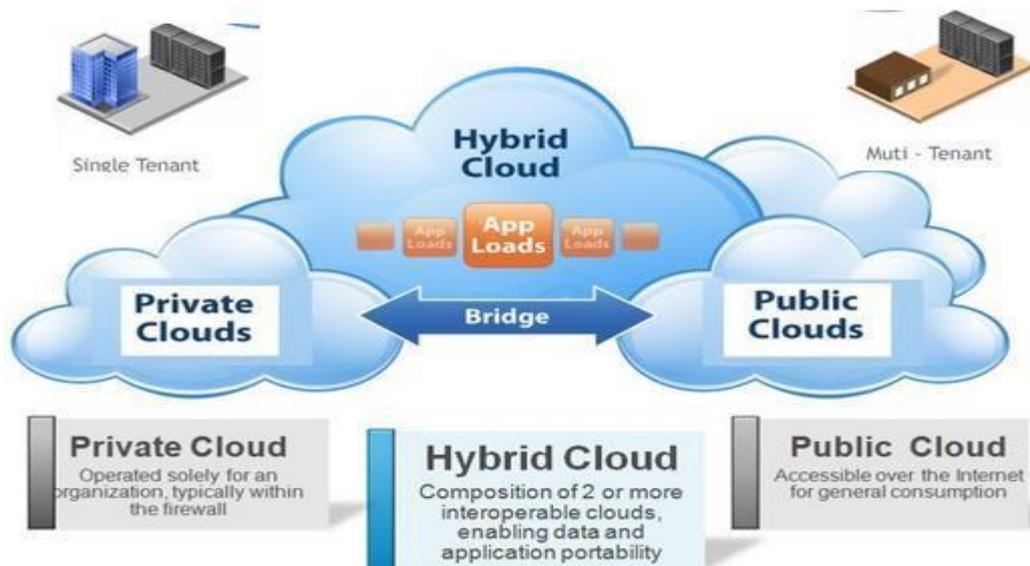


Fig.2.Types of Cloud

**1. Public Cloud:** Public cloud is a type of cloud hosting in which the cloud services are delivered over a network which is open for public usage. This model is a true representation of cloud hosting; in this the service provider renders services and infrastructure to various clients. The customers do not have any distinguishability and control over the location of the infrastructure. From the technical viewpoint, there may be slight or no difference between private and public clouds' structural design except in the level of security offered for various services given to the public cloud subscribers by the cloud hosting providers.

**2. Private Cloud:** Private cloud is also known as internal cloud; the platform for cloud computing is implemented on a cloud-based secure environment that is safeguarded by a firewall which is under the governance of the IT department that belongs to the particular corporate. Private cloud as it permits only the authorized users, gives the organisation greater and direct control over their data.

**3. Hybrid Cloud:** Hybrid cloud is a type of [cloud computing](#), which is integrated. It can be an arrangement of two or more cloud servers, i.e. private, public or community cloud that is bound together but remain individual entities. Benefits of the multiple deployment models are available in a hybrid cloud hosting. A hybrid cloud can cross isolation and overcome boundaries by the provider; hence, it cannot be simply categorized into public, private or community cloud.

**4. Community Cloud:** Community cloud is a type of cloud hosting in which the setup is mutually shared between many organisations that belong to a particular community, i.e. banks and trading firms. It is a multi-tenant setup that is shared among several organisations that belong to a specific group which has similar computing apprehensions. The community members generally share similar privacy, performance and security concerns.

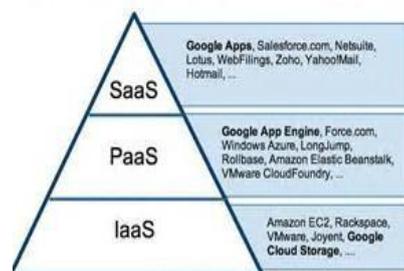


Fig.3. Services of cloud

### 1.3. Services of Cloud

**A. SaaS (Software as a Service):** SaaS model are provided with the access to the application software which are often referred as the “On-demand software”. SaaS uses the Web to deliver applications that are managed by a third-party vendor and whose interface is accessed on the clients’ side. Most SaaS applications can be run directly from a Web browser, without any downloads or installations required.

**B. PaaS (Platform as a Service):** It provides the platform which typically includes operating system, programming language execution environment, databases, web server, etc. PaaS is a framework they can build upon to develop or customize applications. PaaS makes the development, testing, and deployment of applications quick, simple, and cost- effective,

**C. IaaS (Infrastructure as a service):** This base layer provides the computing infrastructure, physical or virtual machines and other resources like virtual disk image library, block and file based storage, firewalls, load balances, IP addresses, virtual local area networks, etc. Instead of having to purchase software, servers, or network equipment, users can buy these as a fully outsourced service that is usually billed according to the amount of resources consumed.

**2. Data Deduplication:** Data deduplication or Single Instancing essentially refers to the elimination of redundant data. As the amount of digital information is increasing exponentially, there is a need to deploy storage systems that can handle and manage this information efficiently. Data deduplication is one of the emerging techniques that can be used to optimize the use of existing storage space to store a large amount of data. Basically, data deduplication is removal of redundant data [1]. Thus, reducing the amount of data reduces a lot of costs storage requirements costs, infrastructure management cost.

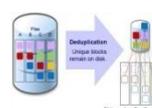


Fig.4. Data Deduplication

**Implementation:** For implementation we preferred ASP.NET C# language, Visual studio framework and Windows O.S. Platform as it provides inbuilt server called IIS. ASP.NET provides inbuilt MSDN managed code to support cryptographic hashing algorithm needed to perform encryption and decryption. IIS (Internet information services) server of Windows allows creating and deploying ASP.NET application, which helps in to host our prototype web application on local network as well as on public network. Data deduplication is referred to as a strategy offered to cloud storage providers (CSPs) to eliminate the duplicate data and keep only a single unique copy of it for storage space saving purpose.

Data deduplication is one of the techniques which used to solve the repetition of data. The deduplication techniques are generally used in the cloud server for reducing the space of the server. To prevent the unauthorized use of data accessing and create duplicate data on cloud the encryption technique to encrypt the data before stored on cloud server. Cloud Storage usually contains business-critical data and processes; hence high security is the only solution to retain strong trust relationship between the cloud users and cloud service providers

In this methodology we have to detect the duplicate copy of the file any type of file can be detect file .txt,.doc,.xls, ppt, .pdf. so we have to start with uploading the file when we upload the file we have to extract first 50 bytes from the file and last 50 bytes from the file. After extracting this 100 byte we have match this byte with existing byte. This comparing is done one by one byte i.e.one byte after another upon last byte. After completion of comparing this byte if this new file upload file is duplicate then we will discard the file. If this file is not duplicate, then we will upload this file. In this way the methodology is use.

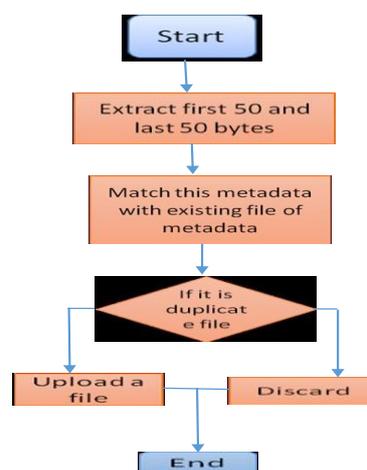


Fig.5. Flow chart

**i. Encryption:** Data encryption is one of the techniques where we can protect or secure our data from getting misused by the unauthorized user. Generally, there are three encryption algorithms which have been used for securing the data in cloud computing.

**i. AES Algorithm:**

The algorithm was developed by two Belgian cryptographer Joan Daemen and Vincent Rijmen. It was first published in 1998. The AES stands for Advanced Encryption Standard. It is also known as rijndael algorithm. It is symmetric key algorithm. It was first adopted by the U.S government and now is being used in the whole world.it

is having various ciphers with different keys and the block sizes [2]. In this the plain text is encrypted with the help of AES and then the cipher text which we have got will again encrypted likewise there will be various round like the AES algorithm includes 10, 12 and 14 round with the 128, 192 and 256 key bits.

**ii. Framework:** The term "framework" is used to loosely describe collections of anything from development tools to middleware to database services that ease the creation, deployment and management of cloud applications. Those that work at the level of servers, storage and networks are infrastructure-as-a-service (IaaS) frameworks. Those that operate at the higher level of applications are platform-as-a-service (PaaS) frameworks [7].

Client module consists of :-

1. User registration
2. Key generation
3. File-Upload: duplicate check for byte level and if file are not duplicate then encrypt and transfer it to public CSP
4. File-download: Download files uploaded by other users or admin using unique

key Admin module consists of:

1. Login operation
2. Monitoring all registered user's

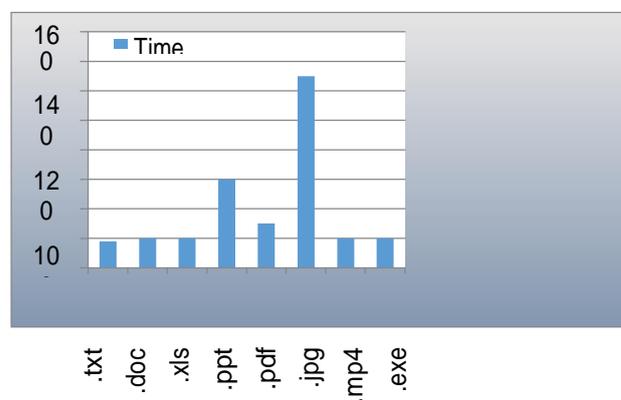


Fig.6. Deduplication time factor at Byte level

### 3. Literature Survey

In this paper they conclude that, Cloud Computing is an emerging paradigm which has become today's hottest research area due to its ability to reduce the costs associated with computing. In today's era, it is most interesting and enticing technology which is offering the services to its users on demand over the internet. Since Cloud Computing stores the data and disseminated resources in the open environment, security has become the main obstacle which is hampering the deployment of Cloud environments. Even though the Cloud Computing is promising and efficient, there are many vicinity of the data for the Cloud user. To ensure the security of data, we proposed a method by implementing RSA algorithm [8]. In cloud storage service, users upload their data together with authentication information to cloud storage server. To ensure the availability and integrity of users' data stored in the cloud storage, users need to verify the cloud storage remotely and periodically, with the help of the pre-stored authentication information and without storing a local copy of the data or retrieving back the data during variation. Public variation enables a third party auditor (TPA), on the behalf of the data owner, to verify the integrity of cloud storage with the data owner's public key. In this paper, we propose a method that allows the data owner to delegate the auditing task to a potentially untrusted third party auditor in a secure manner:

- (1) The data owner can verify whether the TPA has indeed performed the specified audit task; task at the right time specified by the data owner;
- (2) The confidentiality of the data is protected against the TPA. Our method also enables a TPA to re-outsource the audit task [3].

Cloud computing has formed the conceptual and infrastructural basis for tomorrow's computing. The global computing infrastructure is rapidly moving towards cloud based architecture. While it is important to take advantages of cloud based computing by means of deploying it in diversified sectors, the security aspects in a cloud based computing environment remains at the core of interest. Cloud based services and service providers are being evolved which has resulted in a new business trend based on cloud technology. With the introduction of numerous cloud based services and geographically dispersed cloud service providers, sensitive information of different entities are normally stored in remote servers and locations with the possibilities of being exposed to unwanted parties in situations where the cloud servers storing those information are compromised. If security is not robust and consistent, the flexibility and advantages that cloud computing has to offer will have little credibility. This paper presents a review on the cloud computing concepts as well as security issues inherent within the context of cloud computing and cloud infrastructure [11].

Cloud computing is known as one of the big next things in information technology world. Unlike other traditional computing system, cloud computing paradigm that provide unlimited infrastructure to store or execute client's data/program. Cloud computing is a long dreamed vision of computing as a utility, where data owners can remotely store their data in the cloud to enjoy on- demand highly-quality application and services from a shared pool of configurable computing resources. This paper gives a brief introduction of cloud computing its types and security issue and approaches to secure the data in the cloud environment [5].

#### 4. Conclusion

The notion of authorized data de-duplication technique is specialized data compression technique which eliminates redundant data as well as improves storage and bandwidth utilization. Convergent encryption technique is proposed to enforce confidentiality during de-duplication, which encrypt data before outsourcing. Security analysis demonstrates that the schemes are secure in terms of insider and outsider attacks. To better protect data security, we present Two Factor Authentication scheme (2FA) of user along with PoW of files, to address problem of authorized data de-duplication, in which the duplicate-check tokens of files are generated by the private cloud server with private keys.

#### 5. Future scope:

Various open issues are identified as future scope.

**1. Secure trust based Solution for cloud computing Service:** A secure environment for execution of the cloud computing services along with overall security considerations is a challenge. A secure and trusted solution is the requirement that needs to be focused and addressed by the cloud computing infrastructure [4].

**2. Optimization of resource Utilization:** Security considerations and provisions for virtualization along with the optimum use of the cloud infrastructure also needs to be focused and addressed.

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# CRYPTOGRAPHY AES ALGORITHM – A REVIEW

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## ABSTRACT

*The main aim of this paper is to provide a broad review of network security and cryptography, with particular regard to encryption and decryption algorithm. Network security and cryptography is a subject too wide ranging to cover about how to protect information in digital form and to provide security services. Once the data is out of hand, people with bad intention could modify or hack your data, either to collapse the data or for their own benefit. Cryptography can reformat and transform our data, making it safer on its trip between computer to another computer. If contrasted with the standard bottom-up approach to defining models of computation, algorithms, complexity, efficiency, and then security of cryptographic schemes, our approach is top-down and axiomatic, where lower abstraction levels inherit the definitions and theorems from the higher level, but the definition of low levels is not required for proving theorems at the higher levels. The goal is to strive for simpler definitions, higher generality of results, simpler proofs, diagrams and to derive new insights from the abstract viewpoint.*

## 1.Introduction

Cryptography is associated with the process of converting ordinary plain text into meaningless text and vice-versa. It is a method of storing and transmitting data in a particular form so that only those for whom it is intended can read and process it. Cryptography not only protects data from theft or hacker, but can also be used for user verification. Earlier cryptography was effectively synonymous with encryption but nowadays cryptography is mainly based on mathematical theory and computer science practice.

There are some primary functions of cryptography:

1. **Privacy/confidentiality:** Ensuring that no one can read the message except the exact receiver.
2. **Authentication:** The process of proving one's identity.
3. **Integrity:** Assuring the receiver that the received message has not been altered in any way from the original.
4. **Non-repudiation:** A mechanism to prove that the sender really sent this message.

In cryptography, the unencrypted data, is referred to as plaintext. Plaintext is encrypted into cipher text, which will usually be decrypted back into usable plaintext. The encryption and decryption is based upon the type of cryptography scheme being engaged and some differ in the form of the key. This process is sometimes written in formula like:

$$C = E_k(P)$$

$$P = D_k(C)$$

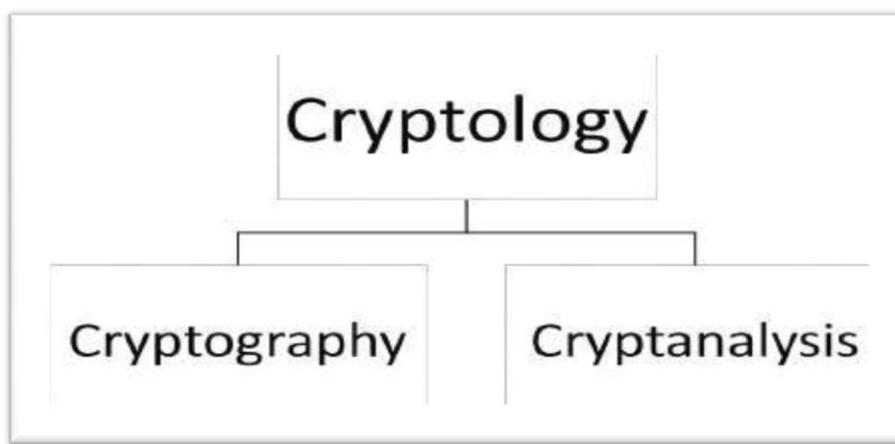
where  $P$  = plaintext,  $C$  = cipher text,  $E$  = the encryption method,  $D$  = the decryption method, and  $k$  = the key.

**Cryptography** is most closely associated with the development and creation of the mathematical algorithms used to encrypt and decrypt messages, whereas **cryptanalysis** is the science of analyzing and breaking encryption schemes. **Cryptology** is the term referring to the broad study of secret writing, and encompasses both cryptography and cryptanalysis.

#### Parts of Cryptography-

Cryptology, the study of cryptosystems, can be subdivided into two kind –

- Cryptography
- Cryptanalysis



#### Cryptography

Cryptography is the art and science of making a cryptosystem that is capable of providing information security. Cryptography deals with the actual securing of digital data. It refers to the design of mechanisms based on mathematical algorithms that provide fundamental information security services. We can think of cryptography as the establishment of a large tool kit containing different techniques in security applications.

#### Cryptanalysis

The art and science of breaking the cipher text is known as cryptanalysis. Cryptanalysis is the related branch of cryptography and they both co-exist in network security. The cryptographic process results in the cipher text for transmission or storage. It involves the study of cryptographic process with the intention to collapse them. Cryptanalysis is also used during the design of the new cryptographic techniques to test their security strengths.

Encryption is the process of transforming information so it is unclear to anyone but the intended recipient.

Decryption is the process of transforming encrypted information so that it is clear again. A cryptographic algorithm, also called a cipher, is a mathematical function used for encryption or decryption algorithm. In most cases, two related functions are engaged, one for encryption and the other for decryption. With most modern cryptography, the ability to keep encrypted information secret is based not on the cryptographic algorithm, which is widely known by all, but on a number called a key that must be used with the algorithm to produce an encrypted result or to decrypt previously

encrypted information. Decryption with the correct key is simple. Decryption without the correct key is very difficult, and in some cases impossible for all practical purposes.

The sections that follow introduce the use of keys for encryption and decryption :-

- Symmetric Key Functions.
- Asymmetric Functions.
- Hash Functions.

### Symmetric-key Algorithm

Symmetric algorithm's work is to encrypt and decrypt a message using the same key. If we use a key, we can exchange the messages with anybody else using the same key. It is a shared secret. If the key gets in the wrong hands, there is no getting it back. That person can read all of the past messages, and create new messages that are identical from valid data.

There are some types of algorithm which are used in previous years:-

- Blowfish
- DES
- 3DES (Triple DES)
- Two fish

But the another algorithm of the symmetric algorithm is the Advanced Encryption Standard(AES) algorithm which is now mostly used to encrypt the messages before passed to the receiver.

### 1. DESCRIPTION

The Advanced Encryption Standard (AES) algorithm is one of the block cipher encryption algorithm that was published by National Institute of Standards and technology (NIST) in 2000. The main aim of this algorithm was to replace DES algorithm after appearing some unprotected aspects of it.

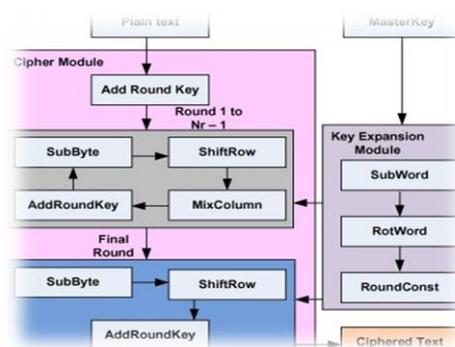


Fig 1. Process of AES algorithm

An implementation of the AES algorithm supports atleast one of the three key lengths: 128, 192, or 256 bits. Implementations may optional support two or three key lengths, which may promote the ability to exchange and use information of algorithm implementations. For the AES algorithm, the length of the Cipher Key,  $K$ , is 128, 192 or 256 bits. The key length is represented by  $nK = 4, 6, \text{ or } 8$  which reflects the number of 32-bit words (number of columns) in the Cipher Key. For the AES algorithm, the number of rounds to be performed during the execution of the algorithm is dependent on the key size. The number of rounds is represented by  $nR$ , where  $nR = 10$  when  $nK = 4$ ,  $nR = 12$  when  $nK =$

6, and  $nR = 14$  when  $nK = 8$ . The only Key-Block-Round combinations that conform to this standard are given in the below table.

Bit Pattern	Key Length (nK Words)	Block Size (nB Words)	No.of Rounds(nR Words)
AES-128	4	4	10
AES-192	6	4	12
AES-256	8	4	14

Table1- Key block Round Combination.

For both its *Cipher* and *Inverse Cipher*, the AES algorithm uses a round function that is composed of four different byte oriented transformations :-

1. Byte substitution using a substitution table ,
2. Shifting rows of the State array by different offsets,
3. Mixing the data within each column of the State array, and
4. Adding a Round Key to the State.

#### Steps of AES Algorithm

2. **Sub bytes**-It is non-linear substitution step where each byte is take place with another according to table.
3. **Shift Rows**-A transposition step where each row of the state is shifted cyclically a such type of number of steps.
4. **Mix Columns**-A mixing operation which operates on the columns of the state, combining the four bytes in each column
5. **Add Round Key**-Each byte of the state is together with the round key; each round key is define from the cipher key using a key process.

#### AES Applications-

It has many applications. It is used in cases where data is too sensitive and as usually important too that only the authorized person are supposed to know and not to the other person or client. The some of the following are the various applications secure communication :-

- Smart Cards which know mostly used for person identification.
- Using of ATM cards and their networks for using money process.
- Such type of Image encrypt secure storage .
- Confidential co-operate our such important files and documents and some legal Government Documents.
- Personal storage devices in our system or mobiles.
- It saves us person information to the hackers or third party at the time of sharing.

### **AES Advantages-**

Advantages of AES over tripleDES-

- AES is more secure (it is less susceptible to cryptanalysis than tripleDES).
- AES supports larger key sizes than tripleDES's 112 or 168 bits.
- AES is faster in both hardware and software.
- AES's 128-bit block size makes it less open to attacks via the problem than tripleDES with its 64-bit block size.
- AES is required by the latest U.S. and International standards.

### **Drawbacks of AES**

Some drawbacks of AES algorithm:- It uses too simple algebraic structure.

- Every block is always encrypted in the same way.
- Hard to implement with software.

AES in counter mode is complex to implement in software taking both performance and security into considerations.

## **2.Conclusion**

This paper describes the AES algorithm. The encrypted cipher text and the decrypted text are analyzed. The encryption efficiency of the AES algorithm was studied. The algorithm of AES with their advantages and disadvantages was also discussed. The following functions can be categorized for the future of this paper work :-

- An extra modification to be used for 192 bit and 256 bit key AES which is an extension of this paper.
- Power reduction and area minimization is the purpose of the AES algorithm is to be done by the device.

## **3.Acknowledgement**

I would like to thank my guide who gave me an opportunity to share my knowledge about the Cryptography.

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# COMPARISON BETWEEN LINEAR SEARCH AND BINARY SEARCH ALGORITHMS

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## ABSTRACT

*We are living in the age of technology. In this age of technology many engineers and researchers are comparing our existing technologies and working on new technologies. Software engineering is the most important branch of computer science. In computer science, a search algorithm is an algorithm used to solve the search problem and to retrieve information stored within some data structure. The main objective of this paper is to study linear search and binary search algorithm and to compare them on the basis of their time complexity.*

**Keywords:-** Searching, linear search, binary search, linked list, time complexity, static array, dynamic array, search algorithms.

## 1.Introduction

A search algorithm is the step by step procedure used to locate specific data among the collections of data. Searching is considered as the most fundamental procedure in computer science. When the data is to be searched, the difference between a fast application and a slower one lies in the use of proper search algorithms.

All search algorithms make use of a search key in order to proceed with the procedure. Search algorithms are expected to return a success or a failure status, usually denoted by the Boolean true or false. Different search algorithms are available and the performance and the efficiency of them depend on the data and on the manner on which they are used.

Search cases in search algorithm can be categorized as best case, average case, and worst case. In some algorithms all three cases can be same but in some algorithms their might be big difference between all of them. The average behavior of the search algorithm helps in determining the usefulness of the algorithm.

### Categories of searching

Searching algorithms are categorized into two way.

- a. **External searching:** External searching is the searching algorithm that can handle large amount of data. The requirement of external search comes when the data being searched do not fit into the main memory of a computing device (usually RAM) and instead they must reside in the slower external memory, usually a hard drive.
- b. **Internal searching:** The internal searching is any data searching process that takes place entirely within the main memory of the computer. This is possible whenever the data is to be searched is small enough to all be held in the main memory.

## 2.Description

There are two types of searching.

- a. Linear search
- b. Binary search

- a. Linear search:** Linear search is most simplest method of searching. It is also known as sequential search, it is named so because linear search searches element from array or linked list by testing each of the element one by one and comparing it with the search element starting from left to right. it means it is the method where search starts at the end of the list, scans the element of the list from left to right until the desired element is found. This searching is used for searching the records that are stored without considering the order.

### Algorithm for linear search:

Linear search (Array A, Value x)

Step 1: Set i to 1

Step 2: if  $i > n$  then go to step 7

Step 3: if  $A[i] = x$  then go to step 6

Step 4: Set i to  $i + 1$

Step 5: Go to step 2

Step 6: Print element x found at index i and go to step 8

Step 7: Print element not found

Step 8: Exit

### Pseudo code for linear search:

Procedure linear search (list, value)

for each item in the list

if match item == value

return the item's location

end if

end for

end procedure

- b. Binary search:** Binary search is also known as half interval search, logarithmic search, or binary chop. it is more efficient than linear search because it searches the element in minimum number of comparison. Binary search compares the target element from the middle of the element of array; if it is not found then half in which target cannot lie is eliminated and the search continues in the remaining half until the desired target is found. if the search ends with the remaining other half empty, it means the target element is not in the array.

**Algorithm for Binary search:**

Function Binary search(B, M, S):

Step 1: [Initialize]

Low=1

High=M

Step 2: [Perform search]

Repeat thru step 4 while LOW&lt;=HIGH

Step 3: [Obtain index of midpoint of interval]

MIDDLE=(LOW+HIGH)/2

Step 4: [Compare]

If S&lt;B [MIDDLE]

Then HIGH=MIDDLE-1

Else if S&gt;B [MIDDLE]

Then LOW=MIDDLE+1

Else Write('SUCCESSFULSEARCH')

Return (MIDDLE)

Step 5: [Unsuccessful search]

Write('UNSUCCESSFULSEARCH')

Return(0)

**Pseudo code for Binary search**

Procedure binary search

A=sorted array

n=size of array

x=value to be searched

Set lowerBound=1

Set upperBound=n

While x not found

If upperBound&lt;lowerBound

EXIT: x does not exists.

Set midpoint= lowerBound+(upperBound-lowerBound)/2

If A[midPoint]&lt;x

Set lowerBound=midpoint+1

If A[midPoint]&gt;x

Set upperBound=midpoint-1

If A[midPoint]=x

EXIT: x found at location midpoint

End while

End procedure

### 3.Comparison of linear search and binary search

S.no	Base of comparison	Linear search	Binary search
1	Time complexity	O(N)	$O(\log_2 N)$
2	Best case time	O(1)first element	O(1)center element
3	Prerequisite of an array	No prerequisite	Array must be sorted in order
4	Input data	No need to be sorted	Need to be sorted
5	Access	Sequential	random
6	Comparison	equality	ordering

### 4.Conclusion

From the above research it is concluded that the linear search is more simpler than binary search because linear search searches element from array or linked list by testing each of the element one by one and compare it with the search element starting from left to right but the binary search compares the target element from the middle of the element of array; if it is not found then half in which target cannot lie is eliminated and the search continues in the remaining half until the desired target is found. But the binary search is more efficient than the linear search because it takes less amount of comparisons to find target element as compare to linear search. But the insertion of elements in binary search is not more efficient because it requires arranged elements in specific order.

### 5.Acknowledgement

I would like to thank my guide who gave me an opportunity to share my views regarding searching. This paper will definitely give them a detail knowledge about the searching .

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# REVIEW ON WELL KNOWN SORTING ALGORITHMS

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## ABSTRACT

*There are many popular problems in different practical field of computer science. One of the primary issues is ordering a list of items i.e. sorting. Its goal is to make records easier to search, insert and delete. In most cases, the efficiency of an application itself depends on usage of a sorting algorithm. To increase the performance in terms of computational complexity many of the sorting algorithms have been developed. Some factors that affect the performance are - time complexity, stability, memory space. In this paper, we have done a comparative study of some popular sorting techniques based on their time complexity or running time.*

**Keywords:** Bubble sort, insertion sort, selection sort, merge sort, quick sort, heap sort, time complexity.

## 1.Introduction

Sorting is a technique of rearrangement of given list items either in increasing or decreasing order. In sorting, we have a number of items like  $a_1, a_2, a_3, \dots, a_n$  as input and we have to calculate the output as  $a_1 \leq a_2 \leq a_3 \leq \dots, a_n$  and vice versa. The data elements which are to be sorted, normally stored in an array data structure but it is not necessary we can use any other linear or non-linear data structure for storing purpose according to nature of data elements. Most software applications need to sort data in some order e.g. ascending or descending. When data will be sorted then there must be used some sorting algorithm. Efficient sorting is important to optimize the use of other algorithms which require input data to be in sorted lists to work correctly. Number of reasons can participate to select a sorting algorithm to solve a specific sorting problem. In this paper, we present a comparison based analysis of some well-known sorting algorithms and explain these algorithms in a simple manner. Also present some previous comparative study of sorting algorithms of some other people which have done nicely.

## 2. Sorting Algorithms

### A. Bubble Sort

Bubble sort is the simplest sorting algorithm that works by swapping the neighboring items again and again if they are in wrong order. The bubble sort makes multiple pass through a list until the list is arranged in either ascending or descending order. After every pass the next largest item is placed in its proper place. Primarily, each item “bubbles” up to the place where it belongs. It has  $O(n^2)$  Time complexity.

The steps in the bubble sort algorithm can be explained as follow-

- Exchange neighboring items until the largest item reaches the end of the array.
- Repeat the above step for the rest of the items.

In a list of  $n$  items,  $(n-1)$  pairs of items are compared in first pass,  $(n-2)$  in second pass,  $(n-3)$  in third and so on. Table 1 shows the number of comparisons for each pass.

Pass	Comparisons
1	$(n-1)$
2	$(n-2)$
3	$(n-3)$
...	...
$n-1$	1

Table no. 1- Number of comparisons performed in each pass

### B. Insertion sort

Insertion Sort is a simple sorting technique, it can be simply explained by an example of how we sort the playing cards in our hand. Insertion sort iterates, consuming one input element each repetition, and growing a sorted output list. After every iteration, one element is removed from the input data, and placed at the location it belongs within the sorted list. At each array-position, it checks the value in the sorted list. If the value is larger, it leaves the element in place and moves to the next and if the value is smaller, it finds the correct position within the sorted list and inserts into that correct position.

The main idea of insertion sort is

- Check the first two item items of the array data, if they are ordered, then swap them.
- Now, check the next element, place it to its proper position and continue until array is sorted.

It has an  $O(n^2)$  Time complexity.

### C. Selection sort

Selection sort is the simplest of sorting techniques. At every pass Selection sort places the largest item in the proper location. After the first pass, the largest item is in the correct place. After the second pass, the next largest is in place. This process continues and requires  $(n-1)$  passes to sort  $n$  items, since the final item must be in place after the  $(n-1)^{st}$  pass. It works very well for small files, also It has a quite important application because each item is actually moved at most once.

The main idea of selection sort algorithm is given by

- Find the largest element in the data list.
- Put this element at last position of list.
- Find the next largest element in the list.
- Place at the second last position of the list and continue until the whole data items are sorted.

It has  $O(n^2)$  time complexity, making it inefficient on large lists.

#### **D. Merge sort**

Merge sort is based on a popular problem solving technique i.e. divide and conquer technique. In this, we divide the given list into two approximately equal sub lists, then sort the sub lists recursively.

Suppose, we have a given set of data items of length  $n$  as an input, stored in an array  $A$ . The merge sort algorithm is work as-

- Split array  $A$  from middle into two parts of length  $n/2$ .
- Sorts each part calling Merge Sort algorithm recursively.
- Merge the two sorting parts into a single sorted list.

The running time of Merge sort is  $\Theta(n \log n)$ .

#### **E. Quick sort**

Quick sort is a divide and conquer algorithm which relies on a partition operation. To partition an array, we choose a pivot element. Although there are many different ways to choose the pivot value, we will simply use the first item in the list. Pivot element is fixed in its place by moving all the elements less than that to its left and all the elements greater than that to its right. The actual position where the pivot value belongs in the final sorted list, commonly called the split point. We then recursively sort the lesser and greater sub lists. It is one of the fastest sorting algorithms which is the part of many sorting libraries. It is an  $O(n \log n)$  Time complexity in average case. However worst case running time is  $\Theta(n^2)$  but it happens rarely.

#### **F. Heap sort**

Heap sort is based on Binary Heap data structure. A heap is a left complete binary tree which satisfies the heap order. There are two types of heap. The minimum heap contains the smallest value in the root node and the maximum heap contains the largest value in the root node. Same as the selection sort, we first find the item having maximum value and place it at the end. Repeating the same process for the remaining of items. Heap sort algorithm works as follows

- Build a max heap of a given array  $A [1 \dots n]$ .
- Extract the largest value from the heap repeatedly.
- When largest element is removed then a whole is left at the root node.
- Replace with the last leaf to fix this problem.

Heap sort is a comparison-based sorting algorithm. Although somewhat slower in practice on most machines than a well-implemented quick sort, it has the advantage of a more favorable worst case  $O(n \log n)$  runtime. Heap sort is an in-place algorithm, but it is not a stable sort.

The running time of heap sort is  $\Theta(n \log n)$

### 3. Comparison Table

This table gives the comparison of time complexity or running time of above sorting algorithms in a short and precise manner which is given as under.

Algorithm	Worst case running time	Average case running time
Bubble sort	$O(n^2)$	$O(n^2)$
Insertion sort	$O(n^2)$	$O(n^2)$
Selection sort	$O(n^2)$	$O(n^2)$
Merge sort	$O(n \log n)$	$O(n \log n)$
Quick sort	$O(n^2)$	$O(n \log n)$
Heap sort	$O(n \log n)$	$O(n \log n)$

Table no.2- Comparison of time complexity of different sorting algorithms

### 4. Conclusion

In this paper, we have discussed well known sorting algorithms and their running time. We have compared the running time of these algorithms purely as a mathematical entity and tried to analyze as a generic point of view. We have discussed six well known sorting algorithms and their running time which is given in the above table. From the table No.2, it is cleared that the running time of Merge Sort, Heap Sort and Quick Sort are  $O(n \log n)$  therefore these algorithms are also called  $O(n \log n)$  time algorithms. The Insertion Sort, Selection Sort and Bubble Sort take  $O(n^2)$  running time. These are called slow sorting algorithms and expensive in the sense of running time. Their use is not so much in these days. It is mathematically proved that any comparison based sorting algorithm take at least  $O(n \log n)$  running time. Therefore we should select a sorting algorithm among  $O(n \log n)$  running time algorithms when sorting is comparison based

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# A STUDY OF FAILURE NODE DETECTION TECHNIQUES FOR WIRELESS AD-HOC NETWORK

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## ABSTRACT

*Ad-hoc Networks are multi-hop network in which there is no need of central administration. Each node in Ad-hoc networks act as router to send and receive data. A failure detector is an important building block when using ad-hoc network. In ad-hoc network the failed nodes are often indistinguishable from slow processes. Different classes of failure node detectors have been proposed to solve different kinds of problems. Unfortunately, ad-hoc devices are vulnerable to failure because of various factors, including physical damage due to deployment in harsh environmental conditions, limited energy, and malicious attacks. This paper presents the techniques for failure node detection. Further, this paper also provides the pros and cons of techniques.*

**Keywords:** *Ad-hoc Network, Failure Node Detection, Heartbeat Techniques.*

## 1. Introduction

There are two types of wireless networks: first is the infrastructure wireless networks and second one is infrastructure-less wireless networks. This paper is concern about infrastructure-less wireless networks, also called Ad-hoc Networks. In Ad-hoc network environment, for establishing a communication between a sender and corresponding receiver, all the intermediate nodes provide equal contribution for finding the route paths and helps to start a communication. Nodes are self-healing and self-configurable because of the topology of Ad-hoc networks changes periodically and nodes in the Ad-Hoc Networks is free to go away anywhere in the network. Ad-Hoc Networks does not contain any infrastructure so there is a bigger challenge to keep up Quality of Service (QOS) in the wireless background. Ad-Hoc networks are vulnerable to many kinds of attacks because of its dynamic nature. Detecting node failure is an important problem that has been widely studied. Recent attention has focused on determining failure when nodes are mobile. Detection of node failure requires additional messages to be sent across the network, which is costly in terms of energy consumption. Node failure detection in ad-hoc networks is very challenging because the network topology can be highly dynamic due to node movements. Once a node fails, it can no longer communicate with other nodes. The first work to address these properties of failure detectors was by Chandra and Toueg [1]. The authors showed why it is impossible for a failure detector algorithm to deterministically achieve both completeness and accuracy over an asynchronous unreliable network. R. Jin et al. [2], the author take a probabilistic approach and propose two node failure detection schemes that systematically combine localized monitoring, location estimation and node collaboration. R. Badonnel et al. [3] proposes a fault monitoring approach for ad-hoc networks which considers this constraint. This approach is based on an information theory measure suitable to the intermittence of ad-hoc nodes and capable to detect network failures by inference. M. Elhadef et al. [4] introduce the concept of unreliable failure detectors and study how they can be used to solve Consensus in asynchronous systems with crash failures. Gupta et al. [5], the author assume a crash-recovery failure model, and a network model that is

probabilistically unreliable. N. Sridhar [6] present a local failure detector that can tolerate mobility and topology changes. This means that this failure detector can distinguish between a failed process and a process that has moved away from its original location. It also establishes an upper bound on the duration for which a process wrongly suspects a node that has moved away from its neighborhood. Liu and J. Payton [7] present two approaches to dynamically adapting a fault detection algorithm. The author compares their adaptive approaches to existing approaches and evaluate the tradeoffs between cost and accuracy. The following approaches are used for detecting failed nodes in ad-hoc networks like: heartbeating architectures, ping architectures, gossiping architectures, adaptive timeouts and leases.

## **1. Heartbeating architectures**

Heartbeat protocols are widely used for failure detection in ad-hoc network [8,9]. In these protocols, a node periodically sends a heartbeat message (“I am alive”) to a detector node. If the time between consecutive heartbeat messages exceeds a timeout value, then the node is considered failed. Heartbeat architectures are used in many areas: system diagnosis, network protocols, reaching agreement, and fault detection in computer networks. Many variants of heartbeating architectures are found in the literature, depending on the network topology: centralized, all-to-all, ring-based, and cluster-based heartbeating.

### **A. Centralized heartbeating:**

A centralized entity senses the arriving heartbeat messages. Each node periodically sends a heartbeat message to the centralized entity. A node is declared failed if the centralized entity does not hear from it for a defined timeout. This variant is simple to implement. It is often used in devices that control servers to ensure that they are running. When the devices miss a user-defined number of heartbeat intervals, they will reboot the servers. Unfortunately, the centralized entity presents a single point of failure and potential bottleneck when the network scales upwards. This architecture is not appropriate for MANETs since they are inherently fully decentralized.

### **B. All-to-all heartbeating:**

Every node in the network periodically sends heartbeat messages to every other node [9]. If a node does not receive a heartbeat message from a node after a certain period, it declares that node failed. This variant demands a high bandwidth and consequently it does not scale well.

### **C. Ring-based heartbeating:**

In this variant, the nodes are connected logically or physically in a ring. Each node sends a heartbeat message to its successor neighbor when it receives a heartbeat message from its previous neighbor. A node is determined failed if it does not receive a heartbeat message from its neighbor after a timeout. This variant was used in IBM SP-2 [10]. It presents a high detection delay and it is unpredictable for simultaneous multiple failures.

### **D. Cluster-based heartbeating:**

In this variant, the network is partitioned in clusters. Each cluster is maintained by a cluster-head. Different heartbeat styles can be applicable inside clusters and between cluster-heads. For example, it can be all-to-all heartbeating inside clusters and

ring-based between cluster-heads. Cluster-based heartbeating is a compromise between centralized heartbeating and all-to-all heartbeating. By nature, it is decentralized and can be easily made scalable. Moreover, it minimizes the system throughput. Studies of cluster-based failure detection issues for MANET applications are still largely lacking.

The work done in [11] presents a cluster-based failure detection service (FDS) for applications that are made up of large and dense populations of lightweight system resources. Applications are built over ad-hoc wireless networks. The FDS exploits the message broadcasting in wireless networks to build a heartbeat failure-detection service. A cluster-head and the nodes in its range constitute a cluster. Nodes in the range of two clusters may act as gateways for inter-cluster failure forwarding. The heartbeat style is composed of three phases: heartbeat exchange, digest exchange and health-status-update diffusion. In the first phase, every node in the cluster broadcasts a heartbeat message to its cluster-head while the cluster-head broadcasts a heartbeat message to its members.

In the second phase, every node in a cluster sends the cluster-head a digest message, which enumerates the nodes that it heard in the first phase. The cluster-head broadcasts its own digest messages to its members. Finally, in the third phase, the cluster-head analyzes the information collected in the two previous phases, identifies the failed nodes according to a set of failure detection rules and then diffuses an update message to all the nodes. A cluster-formation algorithm ensures the election of cluster-heads and connectivity between the clusters. It does not support routing stability when nodes move. In fact, the current cluster-based heartbeating solution is designed for stationary hosts and does not address node mobility at all, which is critical for MANETs. Consequently, the clusters will disappear once the nodes move. The FDS will then give unpredictable results since it relies on clusters that may no longer be there.

## 2. Pinging architectures

In this approach, a node sends a ping message (“Are you alive?”) to another node. The receiving node replies with an acknowledgement message (“I am alive”). Two strategies are used for detecting failed nodes. A node is considered failed if it does not send an acknowledgement within a timeout or fails to respond to a defined number of ping messages. Pinging architectures are more vulnerable to message loss than heartbeating architectures because of their acknowledgement feature, which increases message loss.

A variant of pinging architectures, randomized pinging, is described in [5]. Each node randomly picks another node to ping. If there is no response,  $k$  other nodes are randomly chosen to ping the suspected node. If an acknowledgement is received by one of the  $k$  nodes, the acknowledgement is forwarded to the original node. If no acknowledgement is received by the original node, the suspected node is considered failed. This variant considerably decreases the bandwidth, but it presents a high detection delay.

## 3. Gossiping architectures

Gossiping architecture was presented for the first time in [12]. Subsequently, some new versions of gossiping architecture have been proposed [13]. In this architecture, each node in the network maintains a list of  $\langle M_i, H_i, T_{last} \rangle$  such that  $M_i$  is the address of node  $i$ ,  $H_i$  is the heartbeat count and  $T_{last}$  is the last time of the heartbeat increase. Every  $T_{gossip}$  time, each node increments its heartbeat, selects a random target node (from its list) and sends to it a constant number of  $\langle M_i, H_i \rangle$  entries. A node, upon receiving a gossip message, merges its list with the list received (taking the maximum of heartbeats). If the sum of  $T_{last}$  of  $M_i$  and a predefined  $T_{fail}$  is less than that of the current system time, then node  $M_i$  is considered as failed. These architectures are resilient against message loss but they use a large bandwidth because of message length.

## 4. Adaptive Timeouts

Each node  $p$  maintains an adaptive timeout for each neighboring process  $q$  [14]. If  $p$  suspects  $q$  wrongly after, say, time  $T$  and later hears from  $q$  after delay  $q$ , then  $p$  updates the timeout period for  $q$  to be long enough so that this mistake is not repeated. The new  $T$  is now at least  $T + \text{delay } q$ . Each process thereby keeps extending timeouts until such a time when the timeouts are long enough to account for all forms of incidental delays.

## 5. Leases

In applications in which nodes sleep for most of the time (as with sensor nets) [15], none of the strategies listed above make sense. In this context, the roles could be reversed. Each process  $x$  sends to each neighbor  $y$  an “I am alive” message. In addition,  $x$  also sends to  $y$  a request for a lease for some duration  $T$ . Now,  $x$  can go to sleep, and all it must do is wake up some time before  $T$  expires and send a request for lease renewal to all its neighbors. This is the strategy we use in this paper to implement local failure detection.

## 6. Discussion

Pinging architectures are not appropriate for ad-hoc network because of their large bandwidth and high detection delay. Gossiping is interesting for ad-hoc network, but large messages are not suitable, especially in large-scale networks. Heartbeating can provide rapid failure detection, which is very important in ad-hoc network since messages pass through multi-hop nodes. Unfortunately, the existing cluster-based heartbeating solution for ad-hoc network applications is designed for stationary hosts. Heartbeating in general is more appropriate for ad-hoc network than the other approaches

## 7. Conclusion

Soon, ad-hoc network applications will be in demand. The need for failure detection architecture is crucial, especially for real-time applications. Failure detection technology is used to detect survival state of nodes in ad-hoc network to support services running uninterrupted. However, failure detection will consume computing and communications resources of system, reducing the system's ability to supply service. When number of nodes is small, the load brought by failure detection is not obvious. With the increasing scale, detection time of the system extends and amount of detection message increases. Therefore, it is necessary to reduce the load brought by failure detection. In future work we will investigate a real implementation of this failure detection architecture for real time applications.

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# A REVIEW ON COMMONLY USED OPERATING SYSTEMS

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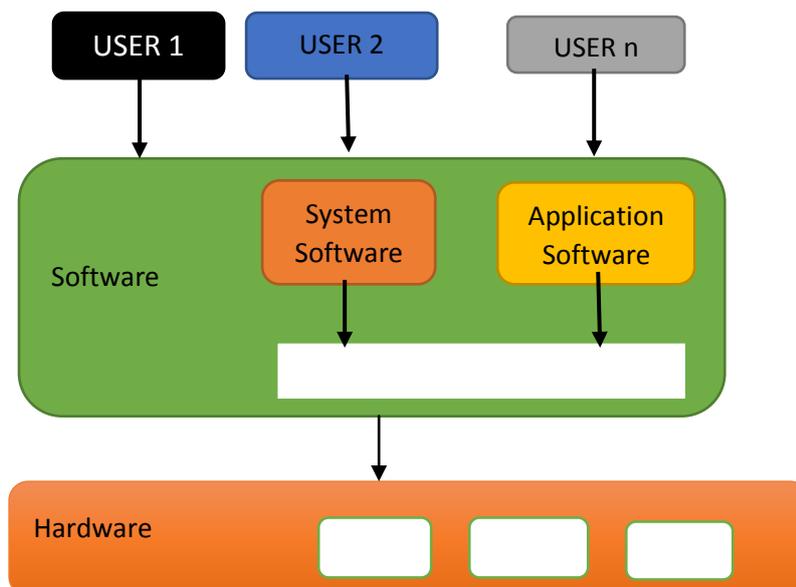
## ABSTRACT

*This paper provides information about the different types of operating systems available for user to use. Operating System is a software that works as an interface between the user and the computer hardware. Its primary object is to make computer system convenient to use and utilize hardware in an efficient manner. Different operating systems have different advantages as well as disadvantages. In this paper, we compare and review some operating systems. Here are few types of OS which are commonly used these days – Windows, Linux, Mac OS.*

**Keyword:-** OS, Windows, Mac OS X, Linux.

## 1.Introduction

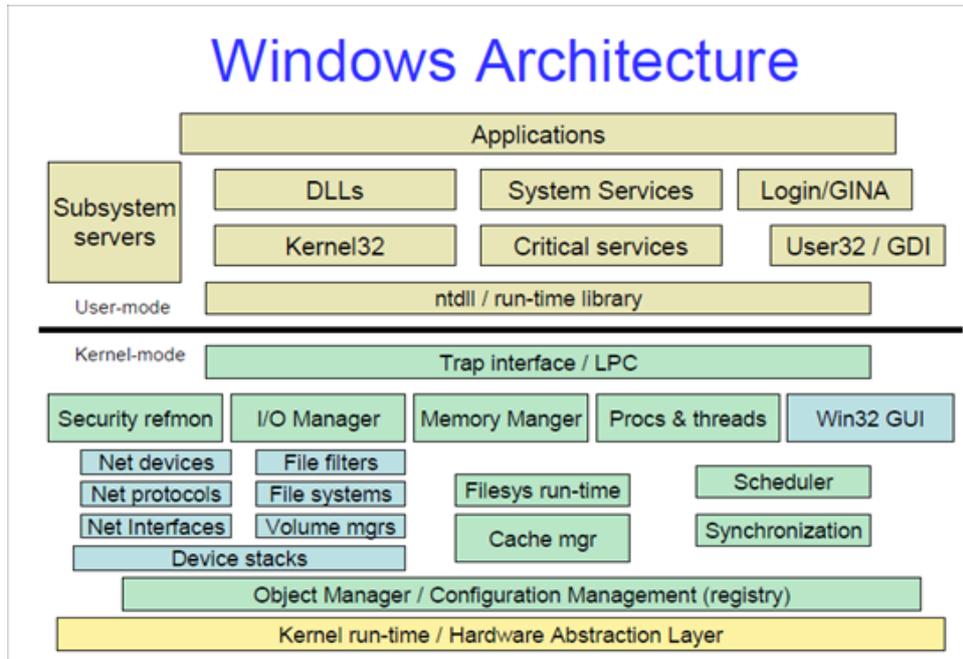
Operating System (OS) is a program that acts as an interface between the user and the computer hardware and controls the execution of the program. It is a system software, that manages computer hardware resources and provides services for computer programs. It is an important component of the system software. It performs all the basic tasks like memory management, file management, process management and controlling peripheral devices such as keyboard, disk drives, etc.



## Windows

It is generally used OS. It is easy to use. It is generally used for personal computing, small scale offices. It was introduced as a graphical operating system shell for MS-DOS in response to the growing interest in graphical user interfaces (GUIs). Its kernel type is hybrid.

### Windows architecture:-



## Linux

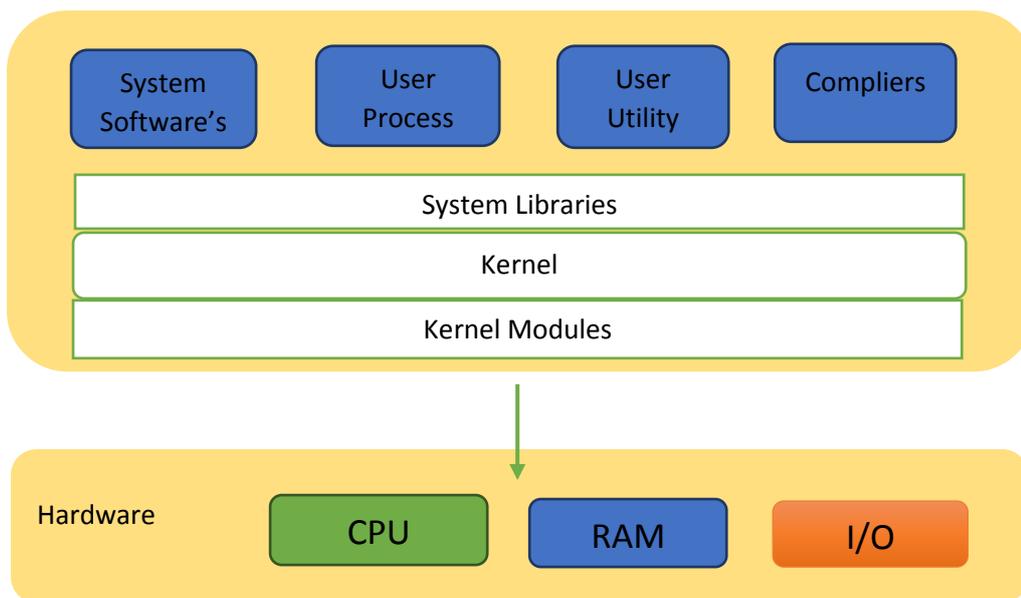
It is one of the popular version of UNIX Operating System. It is an open source as its source code are freely available. It is secured than windows. Linux was designed considering UNIX compatibility.

### Components of Linux System

Linux OS has three components:-

- ❖ Kernel - It is the core of Linux. It is responsible for all major activities of an operating system. It consists of different modules and it interacts directly with the underlying hardware.
- ❖ System Library – These are special functions or programs which accesses Kernel's feature. These libraries implement most of the functionalities of the OS and do not require kernel module's code access rights.
- ❖ System Utility - System Utility programs are responsible to do specialized, individual level task.

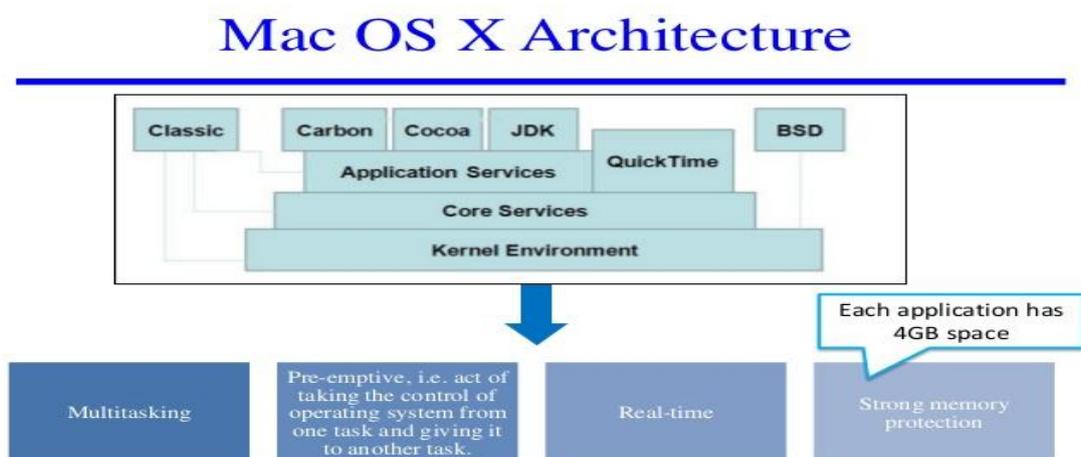
**Linux Architecture**



**Mac OS:-**

Mac OS is an open UNIX based foundation with the richness and usability of the Mac interface, bringing UNIX technology and 64-bit power to the mass market. MacOS makes use of BSD codebase and the XNU kernel, and its core set of components is based upon Apple’s open source Darwin operating system. It takes up a special role in the world of desktop systems. Mac OS was named by the company Apple as “ Mac System Software” in the beginning, a specially designed operating for 68k Motorola processors. The classic desktop is designed as a single user operating system and almost completely hides the full path to files and directories. The graphic representation is reduced to the essence. Overall the interface is very easy to use and does not need the right mouse button for user interface. Mac OS does not include a command line interface.

**Mac OS architecture:-**



## I. Comparison

Ubuntu is an open source and more secured compared to Windows and Mac OS. There are thousands of viruses, worms and trojans targeting windows users. Users who have poor knowledge of viruses become their victims and some have their information compromised as not all kinds of viruses can be detected by antivirus.

Ubuntu is the most popular Linux distro till today. It comes with pre-installed software that a user would use. This is one major advantage with all Linux distros unlike Windows which just comes with the recycle bin and other basics like calculator, word pad and Windows Player.

O.S	Variant	Advantages	Disadvantages
Windows	1.0 (DOS Based)	<ul style="list-style-type: none"> <li>• It offers limited multitasking of existing MS-DOS programs and concentrates on creating an interaction Paradigm.</li> <li>• It is often regarded as a Front end to the MS-DOS OS.</li> <li>• It can call functions of MS-DOS.</li> <li>• It have original device driver for video cards, mouse, keyboards, printers and serial communications, and applications were supposed to only invoke APIs built upon these drivers.</li> </ul>	<ul style="list-style-type: none"> <li>• It lacked storage.</li> <li>• Unable to run multiple operations at once.</li> <li>• Lack of memory management.</li> <li>• All windows are tiled.</li> </ul>
	XP	<ul style="list-style-type: none"> <li>• It provide better performance over its DOS-based predecessors.</li> <li>• Streamlined multimedia and networking features.</li> <li>• Fast user switching.</li> <li>• Native support for ZIP files.</li> <li>• DirectX 8.1 upgradeable to DirectX 9.0c.</li> <li>• Improved imaging features, improved image handling and thumbnail caching in Explorer.</li> <li>• A number of kernel enhancements and power management improvements.</li> </ul>	<ul style="list-style-type: none"> <li>• Less RAM.</li> <li>• Cannot solve problem automatically.</li> <li>• Absence of User Account Control.</li> <li>• It has compromised security.</li> <li>• Performance cannot be increased without increasing hardware requirements.</li> </ul>
	Vista	<ul style="list-style-type: none"> <li>• Compared to Windows XP, its highly secure.</li> <li>• Enhanced performance and reliability with graphical user interface.</li> <li>• Performance can be increased without increasing hardware requirement.</li> <li>• Each processor has one or more threads.</li> <li>• Enhanced memory management.</li> <li>• Direct X10 was launched for windows Vista</li> </ul>	<ul style="list-style-type: none"> <li>• It consumes a lot more resources than windows XP.</li> <li>• It require high memory.</li> <li>• It is not compatible with too many system.</li> <li>• It only supports DirectX 10 graphics card.</li> <li>• Due to reduced size of buttons like min, max and close, it cause difficulty for those with sight problems.</li> <li>•</li> </ul>

	7	<ul style="list-style-type: none"> <li>• It has lot of new features that are not in other versions.</li> <li>• It was introduced for touch screen interaction.</li> <li>• It is faster than its predecessors.</li> <li>• It supports Virtual Hard Disk with the support of enhanced performance of multi core processor.</li> <li>• It is much easier and safe from hackers than other versions.</li> <li>• It support advance touch and handwriting recognition.</li> <li>• It helps you make best use of graphic cards.</li> </ul>	<ul style="list-style-type: none"> <li>• It require at least 1 GB of RAM.</li> <li>• It is not easily not upgradable from XP.</li> <li>• It is expensive than the previous Microsoft OS.</li> <li>• Only high end computers can install Windows 7.</li> <li>• Can only be used in highly configures system.</li> </ul>
	8.8.1	<ul style="list-style-type: none"> <li>• It is optimized for touch devices as it uses the ‘Metro’ interface which is improved for touch screen devices.</li> <li>• It supports the low-power ARM architecture. It has advanced security features such as antivirus capabilities and supports secure boot.</li> <li>• It has short boot time. Windows 8 boot time takes less than 8 seconds which is much shorter than its earlier version.</li> <li>• It is upgradable from windows 7.</li> <li>• I was introduced with app platform called “Windows Store”.</li> <li>• Windows 8 also supports Near Field Communications (NFC) printing. A technology which can aid in financial transactions digitally.</li> </ul>	<ul style="list-style-type: none"> <li>• The most important issue is Privacy. If the users are not alert during installing Windows 8, they might end up granting location access to many of the Windows 8 apps.</li> <li>• The main disadvantage of Windows 8 is overlapping of Metro and Aero User Interface. Switching between Metro applications and desktop applications is not user-friendly and creates confusion for users and developers.</li> <li>• There is no way to turn the home screen tiles into icons.</li> <li>• Most of the applications, which were designed to work with Windows 7, are not working in Windows 8.</li> <li>• System tray is gone and determining where programs have gone when minimized is difficult.</li> </ul>

	10	<ul style="list-style-type: none"> <li>• It is free for Windows 7 and Windows 8 users.</li> <li>• It has simple setup and migration experience.</li> <li>• Familiar user experience</li> <li>• It is a perfect mixture of classic and modern.</li> <li>• Finally return of customizable Start menu.</li> <li>• It has improved setup and recovery tools (rollback), backup.</li> <li>• It has stable, robust modern entertainment and productivity apps.</li> <li>• Customizable Universal (modern) apps – ability float on desktop, resize, snap.</li> <li>• It has Cortana digital assistant .</li> <li>• Task View for managing applications</li> <li>• Snap Assist for managing on screen windows more effectively.</li> <li>• Action Centre for centralizing and managing app and system notifications</li> <li>• Clean, powerful modern web browser – Microsoft Edge.</li> <li>• Logicaluser interface with less distractions.</li> </ul>	<ul style="list-style-type: none"> <li>• Two step process for performing a clean install and activation compliance check and 32 to 64 bit migrations.</li> <li>• Action Centre limited options for notifications – can't respond a tweet on the fly.</li> <li>• Mandatory Automatic Updates gives users less control over managing updates they might not want or can potential cause damage.</li> <li>• Microsoft Edge lacking Thumbnail Previews when multiple tabs are open</li> <li>• No extension model in Edge, some sites will still need to depend on Internet Explorer.</li> <li>• Some functions have been moved around that will require familiarization.</li> <li>• Number of Control Panel items have not been modernized.</li> <li>• Network Flyout does not support setting connection as a Metered Connection.</li> </ul>
<b>Linux</b>	Debian	<ul style="list-style-type: none"> <li>• It a open source Operating System and a old one.</li> <li>• APT is good enough, and Debian has one of the biggest software repositories.</li> <li>• It is one of the easiest distros to update/upgrade.</li> <li>• It can be boot live.</li> </ul>	<ul style="list-style-type: none"> <li>• It's rather conservative and lags behind in features. New software update need to go a lengthy way to get to Stable repository.</li> <li>• It's not very user-friendly.</li> <li>• Ubuntu has PPA's, Debian doesn't.</li> </ul>
	Kali	<ul style="list-style-type: none"> <li>• It comes with many in-built applications.</li> <li>• It is used to analysis vulnerability.</li> <li>• It is less vulnerable to malware and a stable OS.</li> <li>• It give you the best security for data.</li> <li>• It helps in Sniffing, Cloning Web Pages, Penetration of Wifi and lots other thing related to hacking and cracking.</li> <li>• User can boot it live.</li> </ul>	<ul style="list-style-type: none"> <li>• Many users are not familiar with Kali Linux.</li> <li>• Does not support windows application.</li> <li>• The installation is not as easy as windows.</li> </ul>
	Slackware	<ul style="list-style-type: none"> <li>• It is most stable and fastest version of Linux.</li> <li>• Highly secure.</li> </ul>	<ul style="list-style-type: none"> <li>• It uses old versions of most packages.</li> </ul>

		<ul style="list-style-type: none"> <li>• It doesn't depend on a package manager, so it enjoys much more neutrality than any other distribution does.</li> <li>• It is probably the most GPL compliant.</li> <li>• It is a live OS</li> </ul>	
	Red Hat	<ul style="list-style-type: none"> <li>• It is the open source OS.</li> <li>• It is fast to boot, agile.</li> <li>• Several hardware vendors already support the OS.</li> <li>• It reduce support and maintenance efforts.</li> <li>• It inherit the stability.</li> <li>• It simplify management tasks.</li> <li>• It minimize points of failure and security vulnerabilities.</li> <li>• RedHat Enterprise Linux clone called Scientific Linux is being used to perform all the computing at CERN laboratories.</li> </ul>	<ul style="list-style-type: none"> <li>• Decreased productivity due to breaking habits.</li> </ul>
	Fedora	<ul style="list-style-type: none"> <li>• No bundleware, bloatware.</li> <li>• Drivers are usually cleaner than proprietary operating systems.</li> <li>• It provide ideal learning environment.</li> </ul>	<ul style="list-style-type: none"> <li>• Hardware manufactures don't see Linux as a market share worth considering and eventually some hardware doesn't run on Linux.</li> </ul>
	Mint	<ul style="list-style-type: none"> <li>• It provide a "complete out of box experience".</li> <li>• In Linux Mint users can customize and tweak the desktop they use.</li> <li>• It doesn't track users – no personal info. Is collected, shared or used to customize individual users search results.</li> <li>• It's appearance have original artwork and even more new themes.</li> <li>• It is a application power house.</li> <li>• It has a unique Update Manager.</li> <li>• It takes a number of additional steps towards safety and reliability.</li> <li>• it's a real eye-opener to be able to make your operating system your own.</li> </ul>	<ul style="list-style-type: none"> <li>• Commercial Software vendors do not generally write their software for Linux use.</li> <li>• New users have no idea how to install software.</li> <li>• Some configuration changes have to be done as the Root User and access to the Root account is done indirectly through the use of Sudo command.</li> </ul>
<b>Mac OS</b>	Cheetah	<ul style="list-style-type: none"> <li>• It was a next generation software.</li> <li>• It introduce a brand new code base completely separate from Mac OS 9.</li> <li>• It also introduce a completely new system of memory management.</li> <li>• "Dock" a new way of organizing applications.</li> <li>• The terminal was a feature that allow access to</li> </ul>	<ul style="list-style-type: none"> <li>• The system can only use TCP/IP, not apple talk to connect to servers sharing the Apple Filing Protocol.</li> <li>• It cannot use SMB to connect to Windows or Samba servers.</li> <li>• As a server, the system can share files using only the Apple Filing</li> </ul>

		<p>Mac OS underpinnings, namely the Unix core.</p> <ul style="list-style-type: none"> <li>• Memory protection so that if an application corrupts its memory, the memory of other application will not be corrupted.</li> <li>• New Darwin Unix like core was introduced.</li> </ul>	<p>Protocol.</p> <ul style="list-style-type: none"> <li>• It was riddled with fatal bugs that caused kernel panics, especially in complex hardware setups.</li> <li>• Missing features such as DVD playback, as well as CD burning.</li> </ul>
	Jaguar	<ul style="list-style-type: none"> <li>• Introduced with support in QuickTime, Address Book and Inkwell for handwriting recognition.</li> <li>• It include Apple Zeroconf implementation, which allows devices to discover each other and display available services to the user.</li> </ul>	<ul style="list-style-type: none"> <li>• No Google search in Sherlock.</li> <li>• Security issues.</li> </ul>
	Snow Leopard	<ul style="list-style-type: none"> <li>• It is very inexpensive compared to most operating system upgrades.</li> <li>• It modestly improved performance compared to "Leopard" on Intel-based Macs.</li> <li>• It saves an Apple-estimated 7 GB of hard drive (or SSD) space compared to "Leopard" OS.</li> <li>• It continues to support PowerPC applications via "Rosetta" framework.</li> <li>• It support Native Microsoft Exchange.</li> <li>• It has improved Voice Over for visually impaired.</li> </ul>	<ul style="list-style-type: none"> <li>• It does not support PowerPC Macs.</li> <li>• Intel based Macs capable of booting 64-bit apparently blocked in EFI.</li> <li>• There are some existing MacOS X software and peripherals that are not compatible.</li> <li>• It does not support MacOS 9/Classic software.</li> </ul>
	Mountain Lion	<ul style="list-style-type: none"> <li>• It was introduce with iCloud integration.</li> <li>• It contain syncing features that give same experience on all your devices.</li> <li>• Brought new features for sharing and social connectivity.</li> <li>• With new sharing system ,making it easier to share links, photos, videos and other files.</li> <li>• It allow you to dictate text.</li> <li>• A faster version of "Safari" with unified Smart Search Field.</li> <li>• It is a much more stable environment than windows.</li> <li>• It is a lot more convenience.</li> </ul>	<ul style="list-style-type: none"> <li>• Can't use dictation offline.</li> <li>• Gatekeeper (A mac program) doesn't allow you to download unsafe program.</li> <li>• Mac OS is twice expensive than Windows OS.</li> <li>• No customization option.</li> <li>• Mac comes with limited gaming option.</li> </ul>
	Sierra	<ul style="list-style-type: none"> <li>• It comes with fix over 60 securities issues.</li> <li>• Safari 10 IS released with 21 Patches for vulnerabilities.</li> <li>• It is more secure than others versions of Mac OS X.</li> </ul>	<ul style="list-style-type: none"> <li>• It come with view rough edges.</li> <li>• It was not as smooth as previous version of Mac OS.</li> <li>• Due to security it has blocked some application.</li> </ul>

		<ul style="list-style-type: none"> <li>Sierra was introduced with Siri which integrates many things.</li> <li>It unlocks automatically with Apple Watch.</li> <li>It allow interaction b/w Mac and iOS devices.</li> <li>It has optimized the storage.</li> </ul>	<ul style="list-style-type: none"> <li>Bad compatibility with a series of application.</li> </ul>
	High Sierra	<ul style="list-style-type: none"> <li>Its newly enforced security on EFI automatically.</li> <li>It uses 35% less disk space than Sierra.</li> <li>New file system introduced “Apple File System(APFS)”.</li> <li>APFS is a 64 – bit file system that supports native encryption and faster metadata operation.</li> <li>It finally support VR.</li> <li>It compress video files 40% more than the previous generation H.264 standard.</li> <li>Faster video Streaming.</li> </ul>	<ul style="list-style-type: none"> <li>It’s the latest Mac OS X.</li> </ul>
Ubuntu		<ul style="list-style-type: none"> <li>It is relatively secure compared to Windows and OS X.</li> <li>It is open source.</li> <li>It supports windows application.</li> <li>It is most popular Linux distro till today.</li> <li>It comes with all software pre-installed ever required.</li> </ul>	<ul style="list-style-type: none"> <li>It have compatibility issues with hardware.</li> <li>Poor choice for gaming.</li> <li>Does not support Mp3 files.</li> <li>Poor availability of software.</li> </ul>

### 3.Conclusion

Windows beats Linux and Ubuntu in market share because of its excellent hardware support, availability of software’s. Windows is generally used by personal desktop and laptops users. It’s best platform for gaming (PC level). Linux is mostly used for Web Serving, Networking, Database management, Scientific Computing and of course it can be used on a daily basis at home and in the office. Mac lets you get a lot more done in less time without any aggravation. A Mac is the right tool for photography just as a remote control does a better job of tuning your TV than a 10 foot wooden pole. When people speak of computer problems they are referring to Windows OS problems, not computer problems. Mac users hear about these things, but rarely if ever have to deal with them. Except gaming Mac is better than windows. Mac is complete virus free and apple comes with Mac OS only. Linux is an open source OS, there are lesser amount of virus in Linux compared to windows. Apple devices are too much expensive than windows. Many software are not compatible with Mac OS, user can feel limited as compare to Windows. On the other hand user can program software for Linux as they want. Mac is too much reliable and smooth, but windows get struck, Linux is not a complete OS user can modify it according to their usage. Mac is a complete GUI system. No Operating System is really better, the choice is up to user. If user is a gamer, then windows is good. Programmers might prefer Linux for programming and graphics producers will probably prefer Mac. The best thing to do is probably to try each OS.

#### 4.Acknowledgements

We would like to thank our guide and mentor Mrs. Palak Keshwani for supporting us and encouraging us for writing this paper.

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# A REVIEW ON VARIOUS GENERATIONS OF MOBILE TECHNOLOGY

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## ABSTRACT

*This paper deals with the relative study of wireless cellular technologies. First Generation, Second Generation, Third Generation, Fourth Generation and Fifth Generation under wireless cellular technologies. A cellular network or mobile network is a radio network diffuse over earth areas called cells. Each cell is served by at least 1 fixed-location handset and handset is known as a cell site or base station. In a mobile network, each cell uses a different set of frequencies from other neighbouring cells and avoids constrain. The First Generation was referred as cellular and which was later abbreviated to "cell". Cell phone signals were analog in nature. In this paper an attempt has been made to arrange an analysis of expansion of mobile generations by analyze the quality, data rates, capacity, primary utility, objection and displaying provided by each generation and describe how recovery have been made from earlier generation to the next one.*

**Keywords:** - FIRST Generation, SECOND Generation, THIRD Generation, FOURTH Generation and FIFTH Generation.

## 1.Introduction

The primordial stone-age sounding 1G, or analog cellular, then like 80's rock came 2G, or digital cellular; 3G wireless, 4G, 5G and so on. The last decade subscribers. With all the scientific advances, and the friendly incidence of the 2G, 2.5G, 3G and 4G networks, the bang of services on network efficiency have become even more reproach. And update addition to this group, is the 5G technology, which promises to revolutionaries Internet stood witness to wonderful increasing in the wireless industry, both in terms of mobile technology and its as we know it with make lighter fast speeds. The first generation (1G) mobile wireless statement network was analog used for voice calls only. The second generation (2G) is a digital technology and maintain text messaging. The third generation (3G) mobile expertise provided higher data transmission rate improved capacity and supply multimedia maintain. The fourth generation (4G) combine 3G with fixed internet to maintain wireless mobile internet, which is an increase to mobile technology and it overcome the limitations of 3G. It also increases the radio band and reduces the cost of property. 5G stands for 5<sup>th</sup> Generation Mobile technology and is going to be a new exchange in mobile market which has changed the means to use cell phones within very high radio band. User never competent ever before such high value technology which includes all type of advance features and 5G technology will be most important and in giant attention in near future.

**Evolution:-** Generation refers change in nature of service friendly transmission technology and new frequency bands. In 1980 the mobile cellularera had started, and since then mobile communications have substantial significant changes and experienced massive growth.

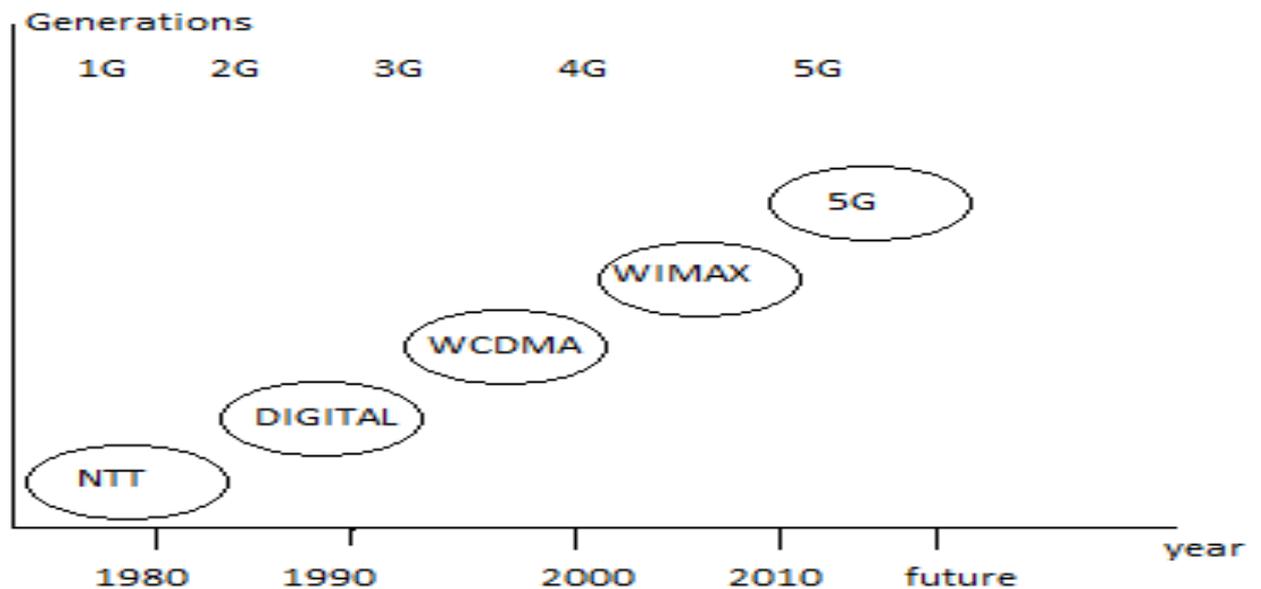


fig1- evolution of cellular network

## 2. Description

**1<sup>st</sup> Generation:-** 1G is the first generation wireless telephone technology, Cell phones. They were analog cell phones and were introduced in 1980. In 1979, the first cellular system in the world became functioning by Nippon Telephone and Telegraph (NTT) in Tokyo, Japan. In Europe two most established analog systems were Nordic Mobile Telephone (NMT) and (TACS) other analog systems were also introduced in 1980's across the Europe. All the systems obtainable handover and travelling potential but the cellular networks were unable to interoperate between countries. This was the main drawback of First Generation mobile networks.

- Speed-2.4 kbps
- Allows voice calls in 1 country
- Use analog signal.
- Poor voice quality
- Poor battery life
- Large phone size
- Limited capacity
- Poorhandoff reliability
- Poor security
- Offered very low level of spectrum efficiency

**2<sup>nd</sup> Generation:-** 2G cellular telecom networks were commercially launched on the GSM standard in Finland by Radiolinja in 1991. [1] 2G used digital signals for voice transmission and had a speed up to 64 kbps. It also provided the facility of Short Message Service (From now on, referenced as SMS) and used the bandwidth range of 30 - 200 KHz. 2G comprised of the following Mobile technologies: General Packet Radio Service (GPRS), Code Division Multiple Access (CDMA), Global System for Mobile Communication (GSM) and Enhanced Data Rates for GSM Evolution (EDGE).

- Data speed was up to 64kbps
- Use digital signals

- Enables services such as text messages, picture messages and MMS(Multimedia message)
- Provides better quality and capacity
- Unable to handle complex data such as videos.
- Required strong digital signals to help mobile phones work. If there is no network coverage in any specific area, digital signals would weak.

**3<sup>rd</sup> GENERATION:-** 3G is the third generation of mobile phone standards and technology, superseding 2G, and preceding 4G. It is based on the International Telecommunication Union (ITU) relatives of standards under the International Mobile Telecommunications programme, IMT-2000. 3G technologies enable network operators to offer users a wider range of more superior services while achieving larger network capability through better spectral efficiency. Services contain large area wireless voice telephony, video calls, and broadband wireless data, all in a mobile environment.

- Speed 2 Mbps
- Typically called smart phones
- Increased bandwidth and data transfer rates to accommodate web-based applications and audio and video files.
- Provides faster communication
- Send/receive large email messages
- High speed web/more security/video conferencing/3D gaming
- Large capacities and broadband capabilities
- TV streaming/mobile TV/Phone calls
- To download a 3 minute MP3 song only 11 sec-1.5 mins time required.
- Expensive fees for 3G licenses services
- It was challenge to build the infrastructure for 3G
- High bandwidth requirement
- Large cell phones
- Expensive 3G phones

**4<sup>th</sup> GENERATION:-** 4G Technology will have a data rate up to 20mbps. A successor of 2G and 3G is 4G which have 100mbps downloading speed. A 4G system must provide capabilities defined by ITU in IMT Advanced. 4G system does not support traditional circuit-switched telephony service, but all-Internet Protocol (IP) based communication such as IP telephony.

- Capable of provide 10Mbps-1Gbps speed
- High quality streaming video
- Combination of WiFi and Wi-Max
- High security
- Provide any kind of service at any time as per user requirements anywhere
- Expanded multimedia services
- Low cost per-bit
- Battery uses is more
- Hard to implement
- Need complicated hardware
- Expensive equipment required to implement next generation network.

**5<sup>th</sup> Generation:-** Fifth generation is a impending technology. Some sources suggest that 5G technology will come approximately in 2020. 5G has speeds beyond what the current 4G can offer. The main heart of 5G will be on world-Wireless World Wide Web (WWWW). It is a absolute wireless communication with no boundaries.

The main features of 5G are :

- It is highly supportable to WWW (wireless World Wide Web)
- High speed, high capacity
- Provides large broadcasting of data in Gbps.
- Multi-media newspapers, watch TV programs with the clarity (HD Clarity)
- Faster data transmission than that of the previous generation
- Large phone memory, dialling speed, clarity in audio/video

Technology	1G	2G	3G	4G	5G
Start/Development	1970/ 1984	1980/ 1999	1990/ 2002	2000/ 2010	2010/ 2015
Multiplexing	FDMA	TDMA, CDMA	CDMA	CDMA	CDMA
Switching	Circuit	Circuit, Packet	Packet	All Packet	All Packet
Data/ Bandwidth	2kbps	14.4- 64kbps	2mbps	2000mbps to 1Gbps for low Mobility	1Gbps and higher
Core Network	PSTN	PSTN	Packet N/W	Internet	Internet
Technology	Analog	Digital	CDMA 2000, UMTS,EDGE	Wi-Max, Wi-Fi, LTE	WWWW
Handoff	Horizontal	Horizontal	Horizontal	Horizontal and vertical	Horizontal and vertical
Key differentiator	Mobility	Secure, Mass adoption	Better Internet experience	Faster Broadband Internet, Lower Latency	Better coverage and no dropped calls, much lower latency, Better performance
Services	Mobile technology (voice)	2G: Digital voice,	Integrated Higher Quality	Dynamic Information Access,	Dynamic Information Access,

		Short Messaging 2.5G: Higher capacity Packetized data	audio, video and data	Wearable devices	Wearable devices with IA capabilities
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Table1. General Comparison between 1G to 5G technologies

### 3.Conclusion

Mobiles have become very necessary part of our daily life. Their current development is the result of different generations. In this paper, we have seen various generations of mobile wireless technology, their portals, performance, advantages and disadvantages of one generation over other. This field is still full of research opportunities. In conclusion, our analysis reveals that there are following major area of research:

- Real wireless world with no more limitation with access and zone issues.
- Wearable devices with AI capabilities.
- Internet protocol version 6 (IPv6), where a visiting care of mobile IP address is assigned according to location and connected network.

### 4.Acknowledgement

We would like to thank our guide and mentor Mrs. Palak Keshwani for supporting us and encouraging us for writing this paper.

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# A SURVEY AND ANALYSIS OF THE ARTIFICIAL NEURAL NETWORK AND THE BIOLOGICAL NEURAL NETWORK

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## ABSTRACT

*Artificial Neural Network (ANN) is modeled on the brain where neurons are connected in complex patterns to process data from the senses, establish memories and control the body. An Artificial Neural Network (ANN) is a system based on the operation of biological neural networks or it is also defined as an emulation of a biological neural system. An ANN is configured for a specific application, such as pattern recognition or data types, through a learning process. Artificial Neural Networks (ANN) is a part of Artificial Intelligence (AI) and this is the area of computer science which is related in making computers behave more intelligently. This paper gives overview of Artificial Neural Network, applications and advantages of ANN and the types of ANN. Artificial neural networks (ANNs) are computing systems inspired by the biological neural networks that constitute animal brains.*

**Keywords:** *Artificial Neural Network, Biological Neural Network.*

## 1. Introduction

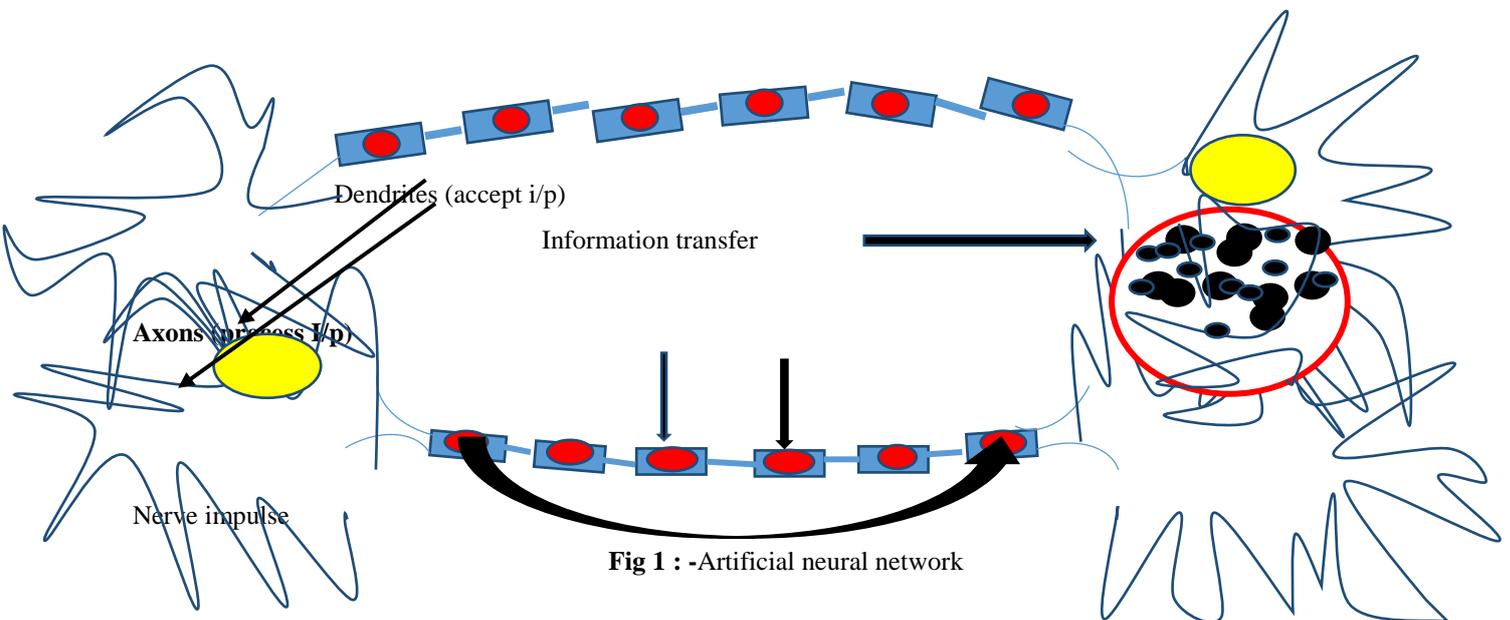
The main stage toward an artificial neural networks originated in 1943 after Warren McCulloch, a neurophysiologist, and a new mathematician, Walter Pitts, created a paper on in what way neurons might work. They modeled a modest neural network through electrical circuits. A computing system is created up to a number of simple, highly interconnected processing elements and they process information to external inputs with their dynamic state response. A neuron has the power to produce a linear or a non-linear response. A non-linear artificial network is made by the interconnection of non-linear neurons. Non-linear systems have inputs which will not be proportional to outputs. The biological brain memories are also represented by patterns of activation amongst populations of neurons.

### 1.1 Artificial Neural Network

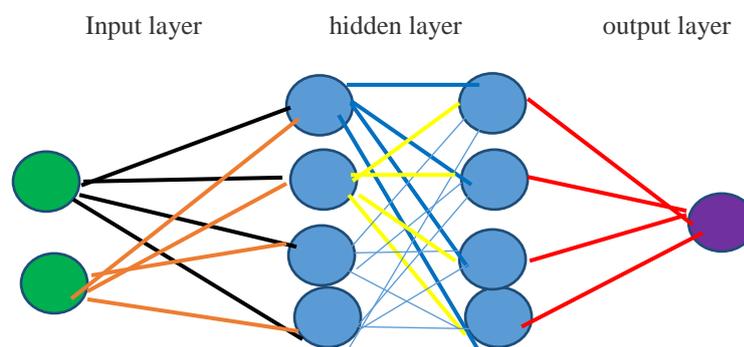
The location of the key neuro computer, Dr. Robert Hecht-Nielsen, defines a neural network as "...a calculating system extensive up of an amount of simple, very interconnected processing collection, which process report by their dynamic public answer to exterior inputs." An artificial neuron network (ANN) is a computational characteristic based agreed the building and role of biological neural networks. Information that activities done the network moves the structure of the ANN for a neural network changes - or learns, in a sense - based on that input and output.

## 1.2 Basic Structure of ANNs

The idea of ANNs is based on the belief that working of human brain by making the right connections, can be imitated using silicon and wires as living **neurons** and **dendrites**. The human brain is composed of 86 billion nerve cells called **neurons**. They are connected to other thousand cells by **Axons**. Stimuli from external environment or inputs from sensory organs are accepted by dendrites. These inputs create electric impulses, which quickly travel through the neural network. A neuron contains then send the message to other neuron to handle the issue or does not send it forward.



ANNs remain collected of many **nodes**, which emulate biological **neurons** of human brain. The neurons are connected by relatives and they interact with each other. The nodes can take input data and perform simple operations on the files. The result of these process is passed to other neurons. The production on all node is called its **activation** or **node value**. Each relatives is associated through **weight**. ANNs are capable of knowledge, which takes place through altering weight values. The following illustration shows a simple ANN



**Fig 2-Neural Networks**

## 1.3 Applications of Artificial Neural Networks

- Artificial neural network submissions have been used in the ground of solar energy for modeling and design of a solar steam generating plant.
- They are beneficial in system modeling, such as in applying multifaceted mapping and system identification.
- ANN are used for the estimation of heating-loads of buildings, parabolic-trough collector's intercept issue and native concentration ratio.

- ANN are used in diverse requests in control, robotics, pattern recognition, forecasting, medicine, power systems, manufacturing, optimization, signal processing, and social/psychological sciences.
- They have also been used for the prediction of air movements in a naturally ventilated test room and for the prediction of the energy consumption of solar buildings.
- They are able to handle noisy and incomplete data and also able to deal with non-linear problems
- The use of artificial neural-networks in ventilating and air-conditioning organizations, refrigeration, modeling, heating, load-forecasting, control of power-generation systems and solar radiation.

#### 1.4 Advantages

- A neural network container perform tasks in which a inlines program cannot perform.
- When a group of the neural network fails, it can remain without any problem by their parallel nature.
- A neural network does not need to be reprogrammed as it learns itself.
- It can be applied in an easy way without some problem.
- As adaptive, intelligent schemes, neural networks are healthy and excel at solving complex problems. Neural networks are effectual in their programming and the scientists decide that the advantages of using ANNs outweigh the risks.
- It can be implemented in some application.

#### 1.5 Disadvantages

- The neural network needs training to work.
- Needs high processing time for big neural networks.
- The construction of a neural network is different from the architecture and history of microprocessors so they consume to be emulated.

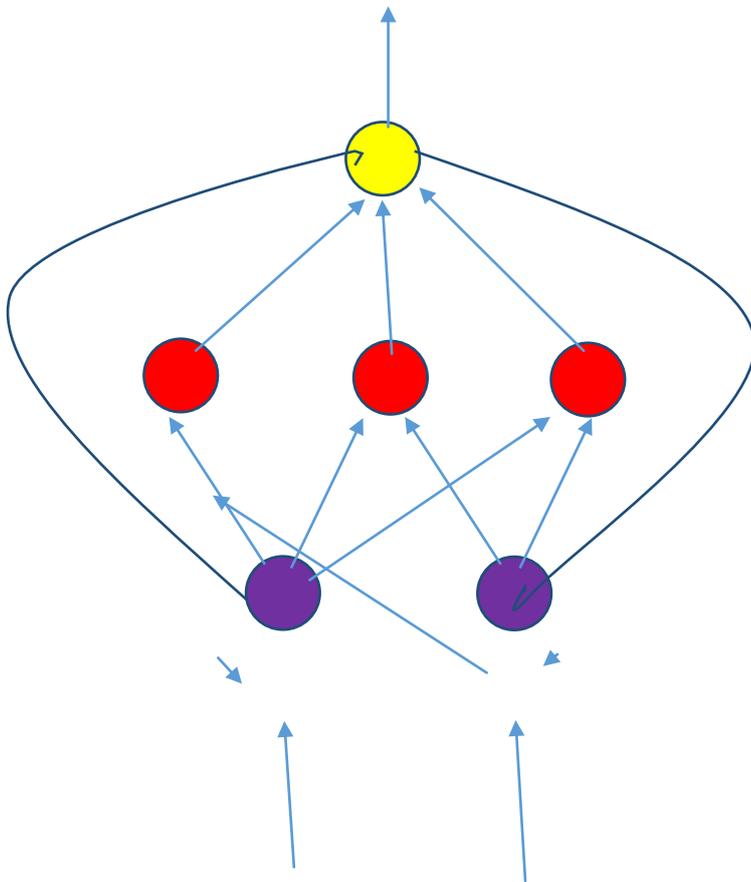
#### 1.6 Types of Artificial Neural Networks

There are different types of Artificial Neural Networks (ANN) – Depending upon the human brain neuron and network functions, an artificial neural network or ANN performs tasks in a similar manner. Most of the artificial neural networks will have some resemblance with more complex biological counterparts and are very effective at their intended tasks like for e.g. segmentation or classification. Types of Artificial Neural Networks

1. **Feedback ANN**
2. **Feed forward ANN**

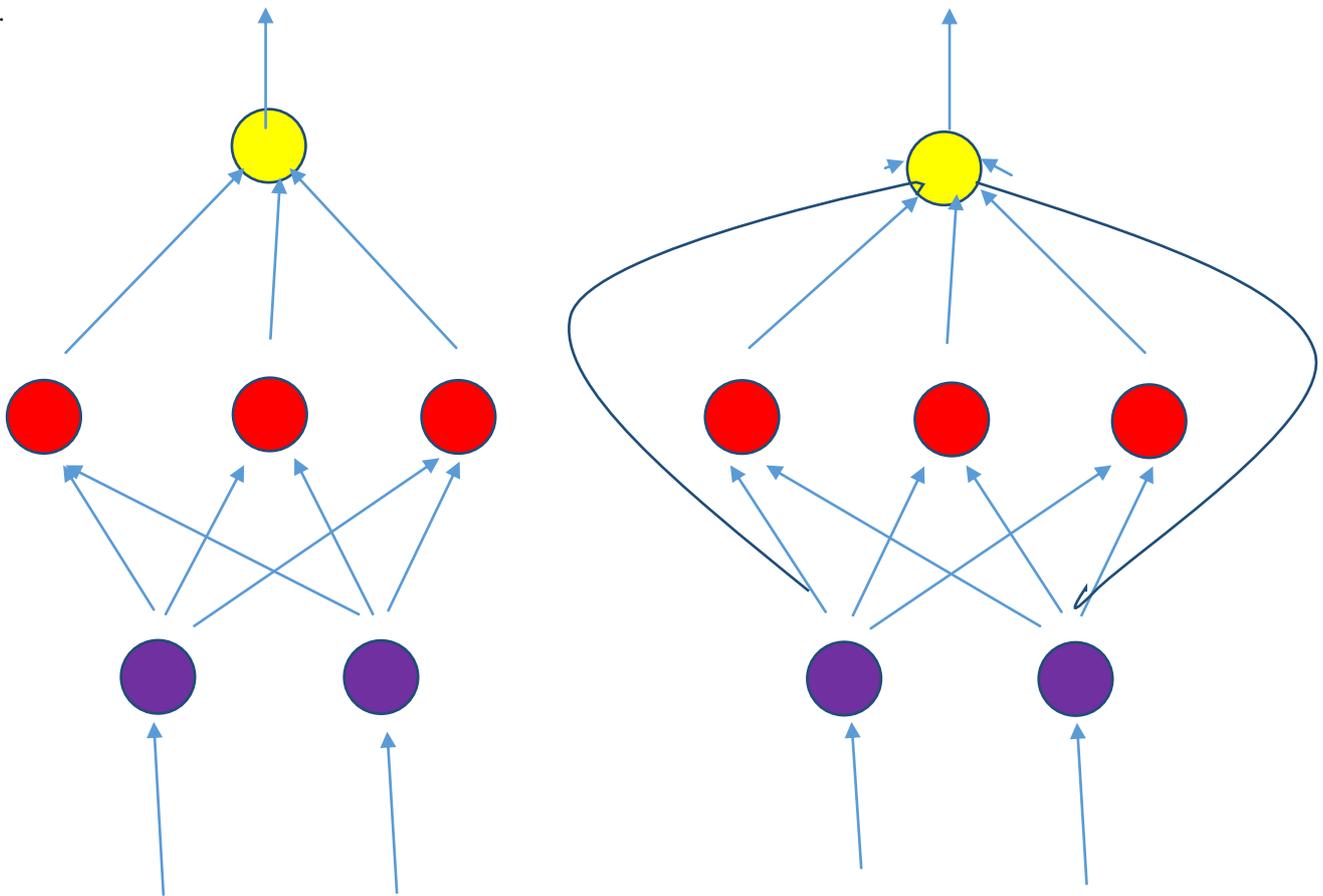
##### 1.6.1 Feedback ANN

In these type of ANN, the output goes back bone into the network to attain the best-evolved results internally. The feedback network feeds information back into itself and is well matched to solve optimization problems, according to the University of Massachusetts, Lowell Center for Atmospheric Research. Feedback ANNs are used by the inner system fault modifications.



### 1.6.2 Feed Forward ANN

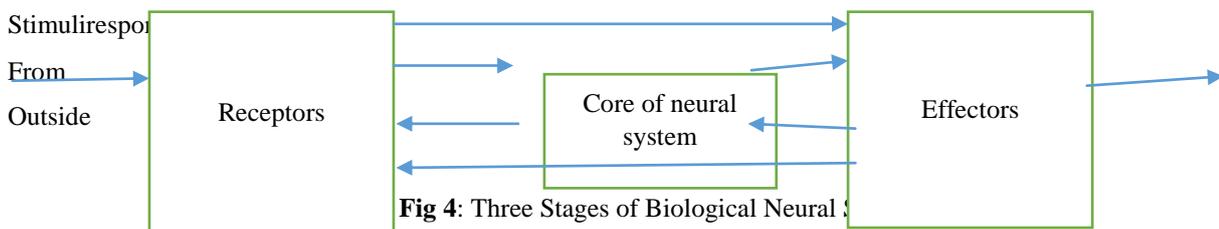
A feed-forward network is a simple neural network containing of an input layer, an output layer and one or additional layers of neurons. Through evaluation of its output by studying input, the command of the network can be noticed base on group performance of the connected neurons and the output is decided. The main benefit of this network is that it studies to evaluate and recognize input patterns. The material movement is unidirectional. A unit sends information to other unit from which it does not accept some information. There are no feedback loops. They are used in pattern generation/recognition/classification. They have fixed inputs and outputs.



**Fig 3: Feed Forward ANN**

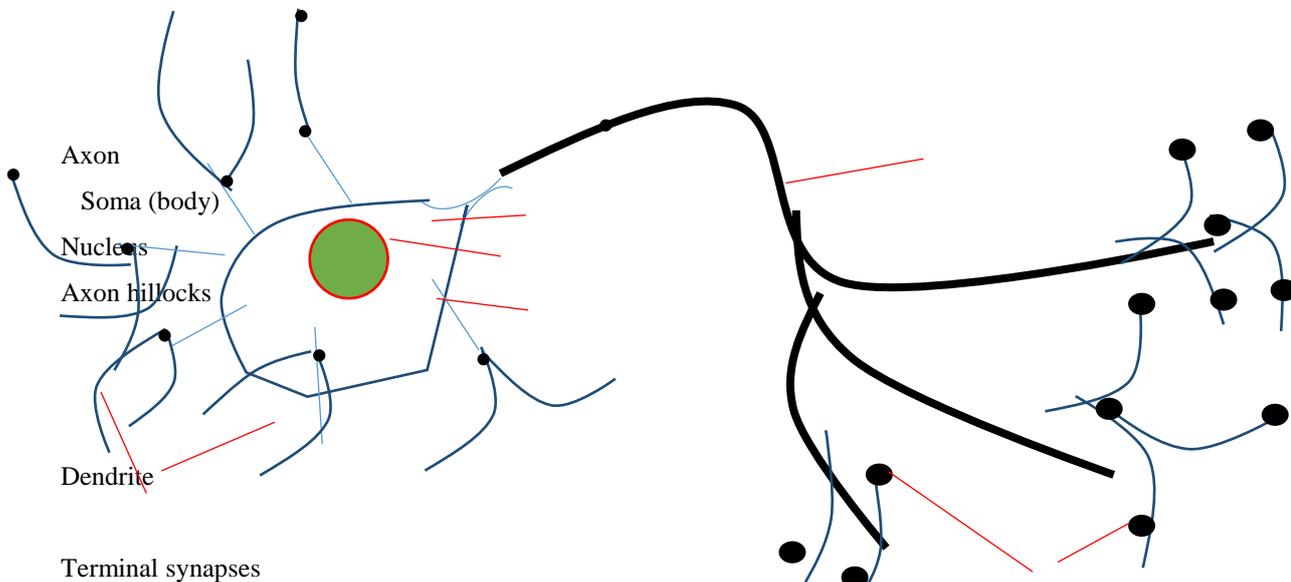
**1.7 Biological Neural Network**

Neural networks are moved by our mind. The human mind has about 1011 neurons and 1014 synapses. A neuron contains of a soma (cell body), axons (sends signals), and dendrites (receives signals).A synapse connects an axon to a dendrite. Assumed a signal, a synapse strength increase (excite) or decrease (inhibit) electrical potential. A neuron fires when it’s electrical potential extents a threshold. Learning might happen by changes to synapses. The neural system of the human frame consists of three stages: receptors, a neural network, and effectors. The receptors receive the stimuli either inside or from the outside world, then permit the info into the neurons in a form of electrical impulses. The neural network then procedures the inputs then kinds proper decision of outputs. Finally, the effectors translate electrical impulses from the neural network into responses to the outside environment. Figure - shows the bidirectional communication between stages for feedback



**Fig 4: Three Stages of Biological Neural S**

The fundamental part of the neural network is called a neuron. As shown in figure, a neuron mostly contains of three portions: dendrites, soma, and axon. Dendrites are the tree-like structure that accepts the signal from surrounding neurons, where a line is connected to one neuron. Axon is a tiny cylinder that transfers the signal from one neuron to all. At the end of axon, the connection to the dendrites is completed through a synapse. The inter-neuronal signal at the synapse is commonly chemical diffusion but occasionally electrical impulses. A neuron fires an electrical impulse only if confident condition is met.



**Fig 5:** A biological neuron

The received impulse signal from all synapse to the neuron is either excitatory or inhibitory, which means selection or obstructing firing. The condition of producing firing is that the excitatory signal must exceed the inhibitory signal by a certain quantity in a short period of time, called the period of latent summation. As we allocate a weight to each received impulse signal, the excitatory signal has positive weight and the inhibitory signal has negative weight. This technique, we can say, "A neuron fires first if the full weight of the synapses that accept impulses in the passé of covert summation exceeds the threshold."

### 1.7.1 Basic Components of Biological Neurons

1. The popular of neurons encode their activations or productions a series of brief electrical pulses.
2. The neuron's cell body (soma) develops the incoming activations and alters them into output activations.
3. The neuron's nucleus contains the genetic material in the form of DNA. This exists now greatest kinds of cells, not impartial neurons.
4. Dendrites are fibres which arise from the cell body and offer the receptive parts that receive activation from extra neurons.
5. Axons remain fibres temporary as transmission lines that show activation nearby extra neurons.
6. The links that certification pointer transmission among the axons and dendrites are called synapses. The procedure of transmission is by diffusion of chemicals called neurotransmitters diagonally the synaptic cleft.

## 2. Comparison between Biological Neural Network and Artificial Neural Network

**Table-1:** Artificial neural network and biological neural network

Biological Neural Network	Artificial Neural Network
Soma	Unit
Axon, dendrite	Connection
Synapse	Weight
Potential	weighted sum
Signal	activation
Threshold	Bias weight

### 3. Conclusion

In this paper, we have studied the artificial neural network and biological neural network. The thoughtful of biological nervous systems enthused the concept of Artificial Neural Networks, a structure of information processing. Just as a biological nervous system is a enormous interconnection of nodes called neurons, located within the brain, Artificial Neural Network consists of many interrelated processing elements which at the same time work to solve precise problems. Typically created for precise applications, neural networks are perfect for data classification and also for pattern recognition problems. Mankind, having learned the brain for many years, it was only normal that go forward in electronics would entice man to try and recognize and imitate its processes of problem solving, understanding, memorizing, and so on.

### 4.Acknowledgement

We would like to thank our guide Mrs. Palak Keshwani under whom we were able to complete this paper.

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# UNDERSTANDING EVENT BUS : EVENTS FOR ANDROID

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## ABSTRACT

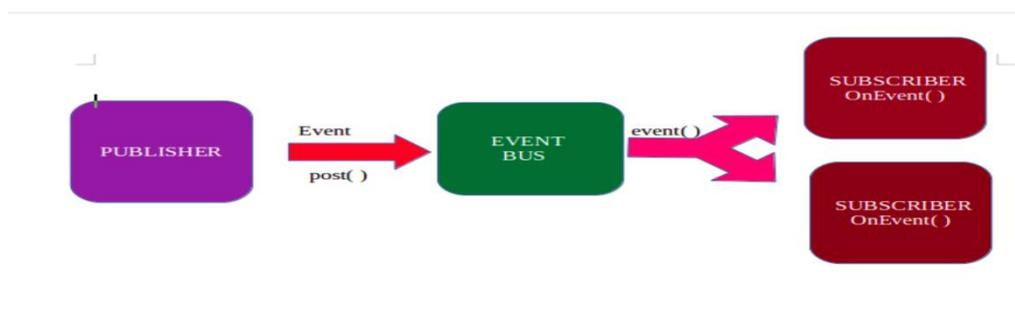
*In order to reduce dependencies, event based techniques have been used in software system since a long period of time. EventBus provides an open-source library for Android. EventBus enables low coupling and high cohesion, by providing a centralized communication between classes. By imparting EventBus to our code we can simplify the code, remove dependencies and speed up app development.*

**Keywords-** *Event, Activities, Classes, Objects*

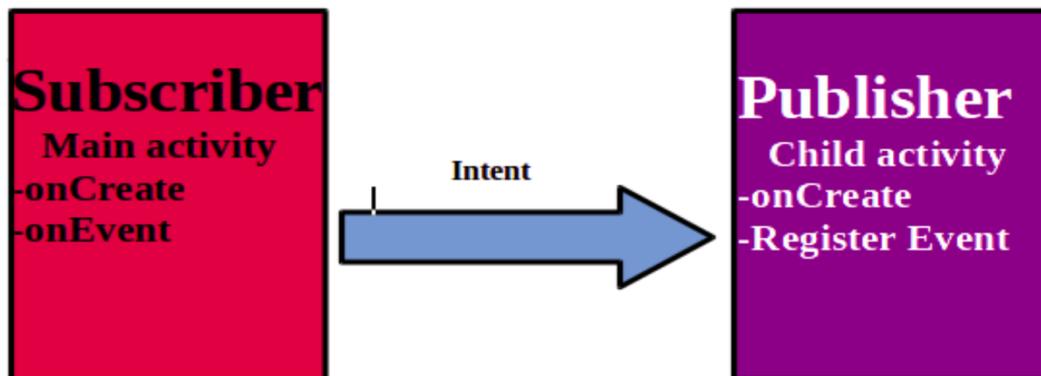
## 1. Introduction

Event based software is basically used to avoid any dependency between the software component that triggers an operation and the component that performs it. The observer pattern is a software design pattern. In this, the observer (also known as subject) maintains a list of dependents. This list of dependents is called observer. In case of any state changes the subject automatically notifies the observer. This is usually done by calling one of their methods. Observer pattern allows us to accomplish low coupling and high cohesion which is something extraordinary in software architecture. By using EventBus, we are able to maintain a system of objects that communicates through an Event Bus system, rather than connecting all of our class instances together through references. In simple words, instead of passing the reference of objects back and forth, which allows us to make a callback on the parent activity we can use the Event Bus. EventBus performs well with UI artifacts such as Activities and Fragments and background threads. It is optimized for higher performance and it also has advanced features like delivery threads, subscriber priorities. It needs zero configuration, one can instantly start using the default EventBus instance throughout the code. EventBus always runs on the Main UI thread.

## 2. Description



**EventBus-** In reference to the diagram above, the publisher posts the Event to the EventBus. The Event Bus then passes the event to the Subscriber. These events are just plain java objects. Consider two activities, one is the MainActivity and another is the ChildActivity. The ChildActivity will register the Event and the EventBus will send the event to the respective references.



EventBus offers low coupling refers to limiting the number of connections between classes and high cohesion refers to the degree to which functionality belongs to. EventBus works by registering as a subscriber to an event. The MainActivity will subscribe to the event posted by the Child Activity which would be the data that will generate in the Child Activity will create an event and pass that to the EventBus. Hence our Child Activity known as the publisher generates the event and if there exists any object that cares about that event it will get notified, the other events won't know about the event happening.

When there exists multiple objects that care about the Child Activity, with EventBus we can make all the related object subscribe to the an event when the data is created in Child Activity.

### Implementing Event Bus-

The process of implementing Event Bus can be broken into 5 steps:

- Add compile 'org.greenrobot:eventbus:3.0.0' to the gradle file of the project.
- A separate class needs to be created for handling information that is to be passed (say the name of class is CustomMessage can have just the basic getter and setter methods.
- Register the class to listen to the events (generally done in the MainActivity) This is done by passing the statement `EventBus.getDefault().register(this)`
- Next, Subscribe to those events

For this simply use the annotation `@Subscribe` and make an `onEvent` method which takes the object of CustomMessage as its parameters and performs what is to be don

- At last we need to post the event by creating an instance of the CustomMessage class (say event) and posting it through  
`EventBus.getDefault().post(event)`

### Features of EventBus-

- It simplifies the communication between the components.
- While interacting with the User Interface, EventBus delivers the event in the main thread, irrespective of how the event was posted.
- While the Subscriber is performing any long running task, EventBus can use the background thread to prevent UI blocking.
- In EventBus, the event and subscriber classes follow the object oriented programming pattern.
- It eradicates error-prone dependencies and life cycle issues

### 3. Conclusion

The basic goal of this paper this paper was to define event-based software system, which allows us to maintain a system of the object references that communicate through an EventBus system. It makes the overall application have higher reliability, robustness, reusability and understandability. EventBus helps us achieve this by making a class instance register with EventBus to start receiving in the app another object say Child Activity then creates an event and sends that to EventBus if it's the same object that the first object cares about it will get notified, never does the second object needs to know about the first object or its interface.

### 4. Acknowledgement

This is paper is a result of support of many people. I thank Mrs. Palak Keshwani, Assistant Professor, Kruti Institute of Technology and Engineering for comments that greatly improved the manuscript and for being a motivator. I would also like to show my gratitude to Mr. Meghal Agrawal, for sharing his knowledge during the course of making this paper. I am also thankful to Mrs. Geeta Chaturvedi for being a constant support and motivation, although any errors are my own and should not tarnish the reputation of these esteemed persons.

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# IMPLEMENTATION OF REGENERATING CODE BASED CLOUD COMPUTING FOR PRIVACY PRESERVING

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## ABSTRACT

*Outsourced knowledge in cloud storage is protected from corruption but it becomes crucial to add fault tolerance in cloud storage along with checking the reparation of knowledge integrity. Adventively make codes have quality because of their lower information measure providing fault tolerance. C remote checking ways for making coded knowledge exclusively offer non-public auditing requiring knowledge owner continuously keep on-line and handle auditing and repairing, that is impractical. A public auditing for the code based mostly cloud storage have been proposed. The regeneration inconvenient for unsuccessful authenticators is to be resolved within the absence of knowledge homeowners, a proxy that's privileged to regenerate the authenticators into the standard public auditing system model is introduced. Additionally style novel public verifiable authenticators that is generated by a handful of keys and may be regenerated exploitation partial keys. Hence this technique will totally unfairnessed knowledge homeowners from on-line burden. To preserve knowledge privacy the code coefficients are disarranged with a pseudorandom way.*

**Keywords:** *Cloud storage, regenerating codes, public audit, privacy preserving, authenticator regeneration, proxy, privileged, provable secure.*

## 1.Introduction

Verifying the credibility of information has emerged as a essential issue in storing knowledge on untreated servers. It arises in peer- to-peer storage systems[1], network file systems, long-run archives, web-service object stores, and information systems. Such systems storage servers from modifying knowledge by providing authenticity checks once accessing knowledge.

However, It's low to observe that information are modified or deleted once accessing the information, as a result of it's going to be too late to recover lost or broken information. Cloud storage servers retain tremendous amounts of knowledge, very little of that is accessed. They conjointly hold information for long periods of your time during that there could also be exposure to information loss from administration errors because the physical implementation of storage evolves, e.g., backup and restore, information migration to new systems, and dynamical memberships in peer-to-peer systems.

Previous solutions don't meet these needs for proving knowledge authority. Some schemes give a weaker guarantee by implementing storage complexity: The server should store associate degree quantity of knowledge a minimum of as giant as the client's knowledge, however not essentially constant precise knowledge. Moreover, all previous techniques need the server to access the whole file, that isn't possible once addressing large amounts of knowledge.

In this paper, a tendency to specialize in the integrity verification drawback in regenerating-code-based cloud storage, particularly with the purposeful repair strategy. Similar studies are performed by Bo Chen et al. and H. Chen et al. [2] separately and severally. Extended the single-server CPOR scheme [4] to the regenerating code- scenario; designed and enforced a knowledge integrity protection (DIP) theme for FMSR-based cloud storage [3] and the theme is customized to the thin-cloud setting. However, both of them square measure designed for personal audit, solely the information owner is allowed to verify the integrity and repair the faulty servers. Considering the massive size of the outsourced information and the users forced resource capability, the tasks of auditing and reparation within the cloud will be formidable and privacy for the users [5]. The overhead of mistreatment cloud storage ought to be decreased the maximum amount as attainable specified a user doesn't need to perform too several operations to their outsourced information [6] (in extra to retrieving it). Specifically, users might not want to travel through the complexness in valedictory and reparation. The auditing schemes imply the matter that users need to invariably keep on-line, which can impede its adoption unpracticed, particularly for long-run repository storage.

## 2.Related Work

Assymmetricryptography or public key cryptography is cryptography in which a pair of keys is used to encrypt and decrypt a message so that it arrives securely. With assymmetric cryptography, the sender encrypts data with one key, and the recipient uses a different key to decrypt ciphertext. The encryption key and its matching decryption key are often referred to as a public or private key pair. The public key of the recipient is used to encrypt data. It can be openly distributed to those who want to encrypt a message to the recipient. The private key of the recipient is used to decrypt messages, and only the recipient can be able to access it. Initially, a network user receives a public and private key pair from a certificate authority. Any other user who wants to send an encrypted message can get the intended recipient's public key from a private directory. Public Key Cryptosystems Secrecy and Authentication The key used in symmetric encryption is referred as a secret key. The two keys used for assymmetric encryption are referred to as the public key and the private key. The steps of public key cryptosystems - secrecy are as follows:-There is some source A that produces a message in plaintext,  $X=[X_1, X_2, \dots, X_M]$ . The M elements of X are letters in some finite alphabet. The message is intended for destination B. B generates a related pair of keys: a public key, PUB, and a private key, PRb. PRb is known only to B, whereas PUB is publicly available and therefore accessible by A. With the message X and the encryption key PUB as input, A forms the ciphertext,  $Y=[Y_1, Y_2, \dots, Y_N]$ ,  $Y=E(PUB, X)$ . The intended receiver, in possession of the matching private key, is able to invert the transformation :  $X=D(PRb, Y)$ .

Key distribution refers to the delivering of key to two parties who wish to exchange data without allowing other parties to see the key. For symmetric encryption to work , the two parties of an exchange must share the same key and that key must be protected from access by others. Furthermore, frequent key changes are desirable to limit the amount of data compromised if an attacker learns the key. Therefore, the strength of any cryptographic system rests with the key distribution technique. For two parties A and B key distribution can be achieved in a number of ways. A can select a key and physically deliver it to B or A third party can select the key and physically deliver it to A and B both are the types of manual delivery of key. If A and B have previously and recently used a key, one party can transmit the new key to the other , encrypted using tat old key. If A and B eachhas an encrypted connection to a third party C, C can send a key on the encrypted links to A and B In a distributed system, any given host or a terminal may need to engage in exchanges with many other hosts and terminals overtime. Thus, each device needs a number of keys supplied vigorously.

The most widely used encryption scheme is based on the Data Encryption Standard (DES). Data are encrypted in 64 bit blocks using a 56 bit key. DES is a block cipher that uses shared secret encryption. It expects two inputs, the plain text to be encrypted and the secret key. It uses the same key for both encryption and decryption and only operates on 64 bit blocks of data at a time. All blocks are numbered from left to right which makes the eighth bit of each type the parity bit. Once a plain text message is received to be encrypted, it is organized into 64 bit blocks required for input. If the number of bits in the message is not evenly divisible by 64 then the last block will be padded. It is based on two fundamental attributes of cryptography as substitution and transposition.

The key distribution scenario can be used in number of ways. The key distribution scenario presumes that each user distributes a distinct master key with the Key Distribution Center (KDC). Let us assume that user A wishes to establish a logical connection with B and requires a one-time session key to protect the data transmitted over the connection. A has a master key,  $K_A$ , known only to the KDC and itself; similarly, B distributes the master key with the KDC. The following steps occur. A issues a request to the KDC for a session key to protect a logical connection to B. The message contains the identity of A and B and a distinctive identifier,  $N_1$ , for this transaction, which we refer to as a nonce. The nonce may be a timestamp, a counter, or a random number; the minimum requirement is that it differs with each request. Also, to prevent masquerade, it should be difficult for a challenger to guess the nonce. Thus, a random number is a good choice for a nonce. The KDC responds with a message encrypted using  $K_A$ . Thus, A is the only one who can successfully read the message, and A knows that it originated at the KDC. The message contains two items intended for A: The one-time session key,  $K_s$  to be used for the session. The original request message, including the nonce, to enable A to match this response with the appropriate request. Thus, A can verify that its original request was not altered before reception by the KDC and, because of the nonce, that this is not a replay of some previous request. In addition, the message comprises of two elements designed for B: The one-time session key,  $K_s$ , to be used for the session. An identifier of A (eg., its network address),  $IDA$ . These last two items are encrypted with (the master key that the KDC shares with B). They are to be sent to B to establish the connection and prove A's identity. A stores the session key for use in the upcoming session and forwards to B the information that originated at the KDC for B, namely  $E(K_B, [K_s || IDA])$ . Because this information is encrypted with  $K_B$ , it is protected from eavesdropping. B now knows the session key ( $K_s$ ), knows that the other party is A (from  $IDA$ ), and knows that the information originated at the KDC (because it is encrypted using  $K_B$ ).

Message Digest algorithm is a widely used cryptographic hash function to produce a 128 bit hash value, ideally represented in text format as a 32 digit hexadecimal number. A cryptographic hash function is a type of security mechanism that produces a hash value, a message digest or a checksum value for a specific data object. Cryptographic hash functions are used to perform information security to calculate the incorruptibility of data, authentication control and other security mechanisms. A cryptographic hash function is a one-way computational mathematical operation that takes a stream of data and returns a fixed-sized bit string known as a cryptographic hash value. A hash value is also called a message digest, a digital fingerprint, digest or a checksum. This value is unique, any small modification to the file will change it. Cryptographic hash functions work by generating the checksum value of a data object. If the data is intentionally or unintentionally modified, the checksum value is changed. Thus a data object's integrity may be evaluated by comparing and verifying previous and current checksums. The hash code is a function of all bits of the message and provides an error detection capability. A change in any bit or bits results in a change of hash value. A hash value  $h$  is generated by a function  $H$  of the form  $h = H(M)$  where,  $M$  is a variable length message and  $H(M)$  is a fixed length hash value. The hash value is affixed to the message at the source at a time when the message is known to be actual. The receiver authenticates the messages by recomputing the hash value. The message plus the concatenated hash code is encrypted using symmetric encryption. Sender and receiver share the same secret key.

### 3. Conclusion

This paper we studied a public auditing for the create code primarily based cloud storage system, wherever because the information owner as delegate TPA for information validity checking. To secure original information privacy against the TPA, here disarrange the constant within the starting than applying the blind technique thanks to auditing method. The information owner cannot invariably keep on-line in apply, to stay the storage obtainable and once a malicious corruption, here introduce a semi trustworthy proxy to handle the coded blocks and authenticators. To raised performance for create code situation here style critic supported the BLS signature. These authenticators are often with efficiency generated by the info owner at the same time with the coding procedure. In depth analysis shows that the theme is obvious secure, and therefore the performance evaluation shows that the theme is very economical and might be feasibly integrated into a regenerating-code-based cloud storage system.

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# ARTIFICIAL INTELLIGENCE-A SURVEY

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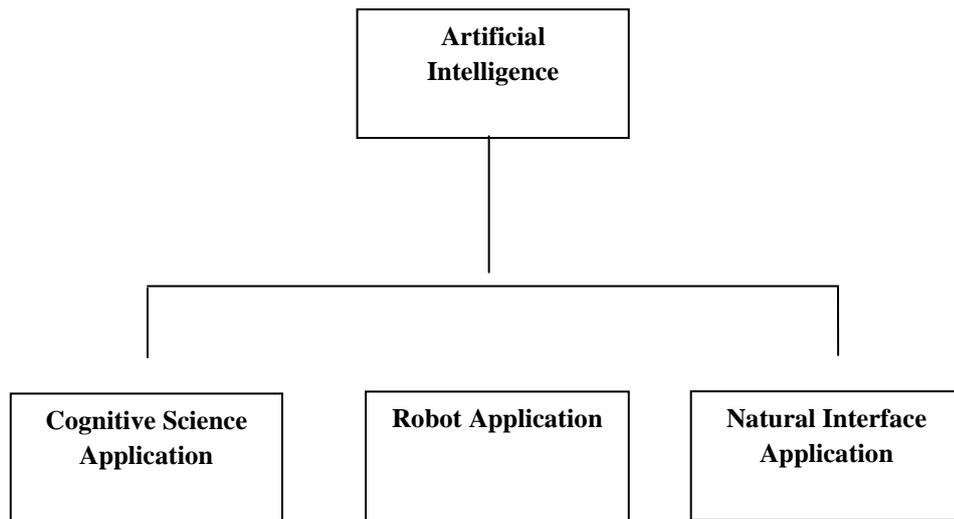
## ABSTRACT

*Artificial intelligence in the last two decades is very much improved in the performance of the manufacturing and service systems. Study in the area of artificial intelligence has given rise to the rapidly increasing technology known as expert system. Application areas of Artificial Intelligence is having a huge impact on various fields of life as expert system is widely used these days to solve the complex problems in various areas as science, engineering, business, medicine, weather forecasting. Research in AI has built upon the tools and techniques of many different disciplines, including formal logic, probability theory, decision theory, management science, linguistics and philosophy. However, the application of these disciplines in AI has necessitated the development of many enhancements and augmentation.*

**Keywords:** - *Turing Test, Gaming Industry, Weather Predictions, Expert System*

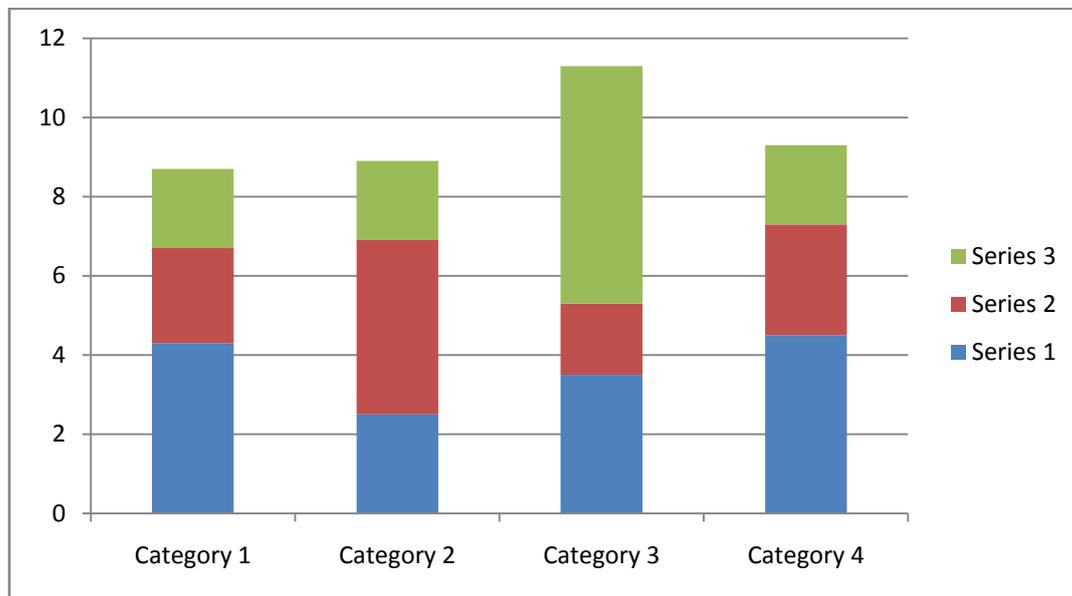
## 1. Introduction

The term Artificial Intelligence was given by John McCarthy in 1956. Numerous definitions for AI have been proposed by scientists and researchers, its volume is huge, next to unimaginable. It is not well-organized or well-formatted. It keeps changing constantly. Intelligence is commonly considered as the ability to collect knowledge and reason about knowledge to solve complex problems. In the near future, intelligent machines will replace human capabilities in many areas. Artificial intelligence is the study and developments of intelligent machines and software that can reason, learn, gather knowledge, communicate, manipulate and perceive the objects. John McCarthy coined the term in 1956 as branch of computer science concerned with making computers behave like humans. AI technologies have matured to the point in offering real practical betterment in many of their applications. Major Artificial Intelligence areas are Expert Systems, Natural Language Processing, Speech Understanding, Robotics and Sensory Systems, Computer Vision and Scene Recognition, Intelligent Computer Aided Instruction, Neural Computing. From these Expert System is a rapidly growing technology which is having a huge impact on various fields of life.



**Fig 1:-Overview of Artificial Intelligence**

- Expert System
- Visual Perception
- Natural Languages

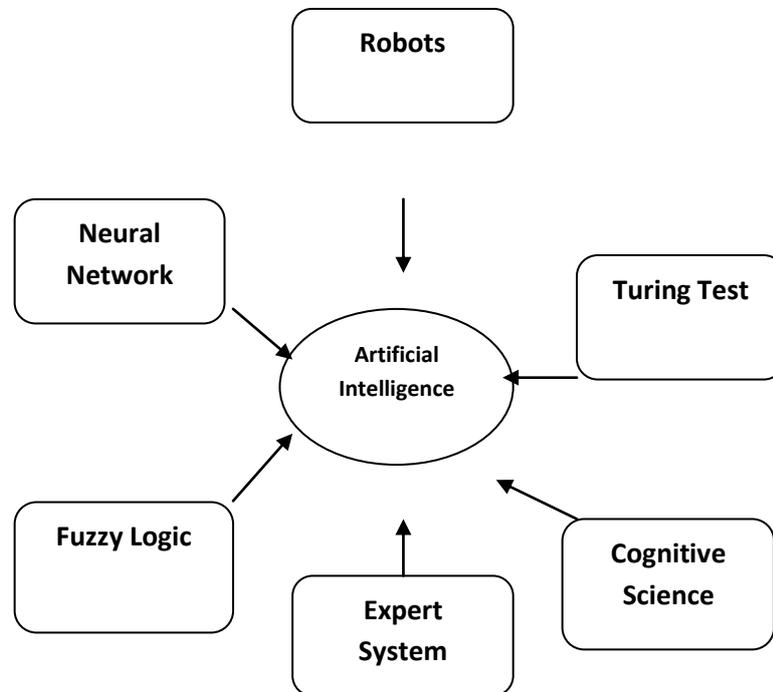


“Neural Network”    “Fuzzy Logic”    “Evolutionary Computing”    “Hybrid AI.”

**Fig 2:- Papers published on different Artificial Intelligence**

## 2. Description

Areas of artificial intelligence are as follows-



**Healthcare re-imagined:-**AI promises the capability to automate medical diagnostics by mining patient records and the scientific literature. This technology will allow doctors to focus primarily on dimensions of care while utilizing their experience to guide the process.

**Robots:-**Robotics are no where near achieving this level of artificial intelligence, but they have made a lot of progress with more limited AI. Today's AI machines can replicate some specific elements of intellectual ability. Industrial robots for moving, spraying, painting, precision checking, drilling, cleaning, coating, carving, etc.

**Entertainment:-** The entertainment industry is expected to transform in a bit different manner. The use of AI will make the industry more interactive, personalized, engaging in the future. Gaming ? AI plays crucial role in strategic games such as chess, poker, tic-tac-toe, etc., where machine can think of large number of possible positions based on heuristic knowledge. Natural Language Processing ? It is possible to interact with the computer that understands natural language spoken by humans.

### Applications of artificial intelligence

Artificial intelligence can play a key role in the sectors like healthcare, agriculture, personal care, home automation, banking and transportation. Currently, AI in its very basic form is influencing human life in the form of automated cars, virtual assistants, image recognition software, computer driven online conversations and so on. All these are instances of AI's role in the betterment of human life. We can also see a lot of global interest among the technological advancements

like Cognitive computing, Machine learning and Natural Language Processing. These are all small journeys to make machines smarter and self-adaptable compared to the old spoon fed, preprogrammed computing devices.

### Artificial Intelligence Categories

AI is a broad topic which can be broken down into subcategories. The three main categories of AI includes:

- **Artificial Narrow Intelligence (ANI)**:-ANI is the weakest form of Artificial Intelligence. The machines with ANI capabilities can do a single task only. For example if the machine is intended to do chess game, it won't be able to do anything else. ANI machines use a logic driven process to replicate human actions. It sifts through massive amounts of information and accurately extracts the relevant information. Many of the AI applications that we see currently are based on ANI.
- **Artificial General Intelligence (AGI)**:-AGI machines hold strong intelligence or match with human level intelligence. AGI machines can successfully perform any intelligent tasks that a human being can do. AGI can be applied contextually where it use cognitive capabilities to arrive at decisions like human beings. It can simulate human reasoning and can extend it capabilities to a broad range of circumstances. We are still in the early stages of implementing AGI for addressing many real world problems.
- **Artificial Super Intelligence (ASI)**:ASI machines are much smarter and faster than the best human brains in every field that human beings excel. It is considered to be the greatest opportunity for human beings at the same time industry experts are concerning that whether it can become the greatest threat as well.

### Roots of AI

Artificial Intelligence has identifiable roots in a number of disciplines, particularly

- Philosophy
- Logic/Mathematics
- Computation
- Psychology/Cognitive Science

### Future of Artificial Intelligence

Today the role of AI is confined to specific narrow tasks and they don't have adaptable intelligence that humans exhibit, the influence of AI is drastically growing. Research and Markets, a leading Market Research organization's Artificial Intelligence Market - Global Forecast to 2020" report states that "the artificial intelligence market is estimated to grow from USD 419.7 Million in 2014 to USD 5.05 Billion by 2020, at a CAGR of 53.65% from 2015 to 2020. AI holds the power to redefine the current work environment in IT enterprises especially the way Knowledge capital and people capital are deployed. As labor force adapts to the demands of a new technology revolution, it leads to economic prosperity as well. It brings in tremendous opportunities in enterprises to deploy knowledge and people towards value creation as opposed to process management. To tap this huge potential, technology(AIaaS).With companies in India and abroad have started offering Artificial Intelligence platform as a solution or as a service AI getting more mature, let us

expect humans will get more empowered with self-learning machines that can create a smarter competition with the human brains and that will probably redefine the whole business ecosystem.

### 3. Conclusion

We have sketched two ways in which the ALP agent model building upon many different developments in Artificial Intelligence, can be used by ordinary people to improve their own human intelligence. It can help them express their thoughts more clearly and coherently, and it can help them make better choices. We believe that the application of such techniques is a fruitful direction of research for the future and a promising area for collaboration between researchers in AI and researchers in more humanistic disciplines. Field of artificial intelligence gives the ability to the machines to think analytically, using concepts. Tremendous contribution to the various areas has been made by the Artificial Intelligence techniques from the last 2 decades. Artificial Intelligence will continue to play an increasingly important role in the various fields.

### 4. Acknowledgement

We would like to thank our guide who gave us an idea to write this paper and share our knowledge regarding Artificial Intelligence.

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# PLANT COLOUR DETECTION- AN APPLICATION FOR WIRELESS SENSOR NETWORK

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## ABSTRACT

*Intelligent Farming makes a marvelous impact on agriculture sustainability for 21st century. To design future agriculture, present agriculture should be improved established on the framework of intelligent agriculture that specifies the broad form of agriculture containing a social system. Wireless sensor network (WSN) and the various type of optical sensors are assumed to be a basic technology of smart agriculture which intends the harmony with the economic development and sustainable agro ecosystem. This research goal is to provide long term sustainable solution for automation of agriculture. Agriculture automation has several methods to getting data from paddy crop like sensor for environmental measurement. This research focuses on detection of color changing of plant by color sensor and send a message to controller. Further controller takes some decision for appropriate action and implement it. This paper encourages the researchers to improve the technique in this fields and enhance the productivity.*

**Keywords** - *Wireless Sensor Network, Color Detector, Zigbee, IntelligentFarm.*

## 1.Introduction

A wireless sensor network (WSN) is a wireless network comprises of spatially assigned self-determining devices that uses sensors to measure various physical and environmental related parameters. A WSN node assembles and processes the measured data, and transfers the same towards the gateway. A WSN contains many tiny nodes. A node consists of a sensor, a transceiver, a power source, a battery, an antenna, an Analog to digital convertor (ADC), small memory and a processor. WSN have three main constraints: the available bandwidth, limited energy in each node and the computational power of each node. Based on the role in the network, the nodes can be classified as cluster head, sink node and active node. Cluster head collects data from all of its cluster member's nodes, collect them and then pass the same towards the base station. The base station collects the data from each cluster and processes it as per the need. Since the nodes work in an ad-hoc manner, each node in the network should be synchronized with each other. The application of WSN in the field can abundantly contribute in increasing the productivity paddy crop.

Intelligent farming is the consistent betterment of care farming. The target of care farming was mainly on technological invention to allow for site-specific farming. Furthermore, intelligent farming is about permitting farmers with the decision tools and automation measurement technologies that smoothly reconcile products, knowledge and services for better productivity, quality and profit. The most important thing of intelligent farming is environmental measurements. The reason is that the environmental aspects affects the productivity. Along with these, environmental measurements using wireless sensor network and plant color detection technology are much simpler, cheaper and lower running costs.

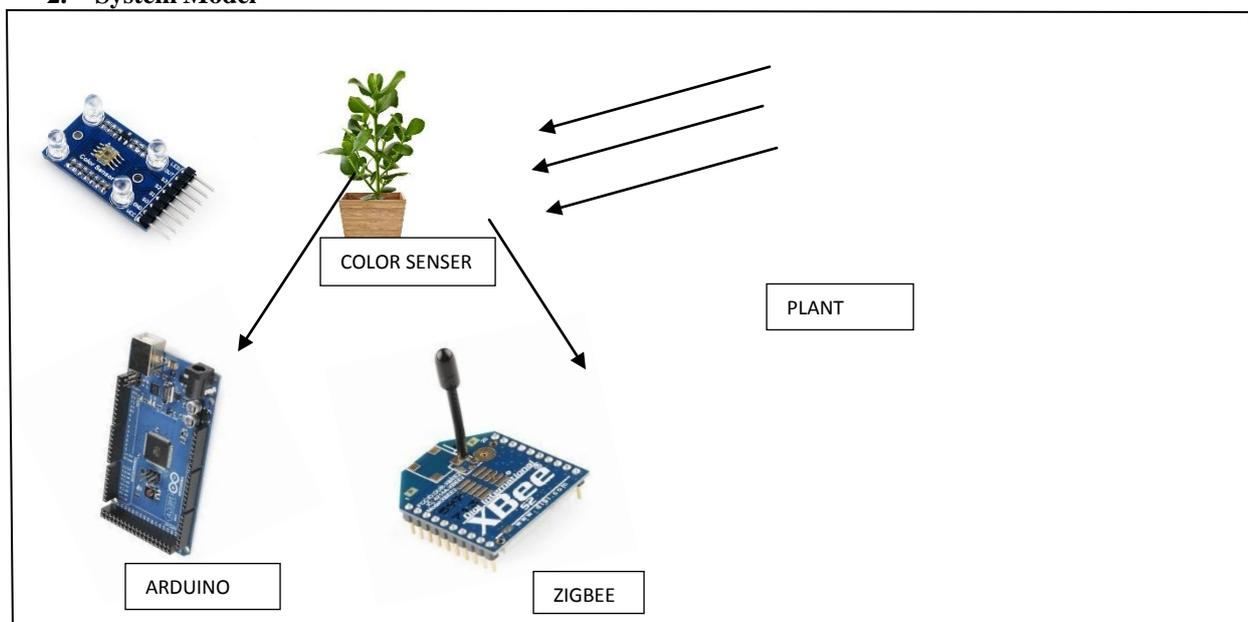
Agriculture is an art of development of land for growing corps. Agriculture is the major source of food, which is one of the important demands of the mankind. India comes at second position in terms of agricultural outputs. There are a number of environmental factors that affect the crop production like soil temperature, environment temperature, climatic

changes, rain, drought, soil composition, humidity, etc. Years ago, human observations were the only way to detect the needs of agriculture, however, with the betterments in the technology, the changes in environmental aspects can be predicted and be able to measure the composition of the soil, reduce the time and human effort required, improve the irrigation methodologies. Now, farmers uses a number of methods to improve the crop productivity.

### 1. Related Work

The most imperative stuffs of intelligent farming are environmental dimensions and water management. The reason is that the environmental and water management affects plant evolution. In addition, environmental dimensions using wireless sensor network and water management technology are much humbler, cheaper and minor running outlays. Researchers had developed and used numerous devices for spotting and collecting soil and environment situations [1]. Technological advances in these areas wrinkle increasing momentum, and this means that continuing an overview of latest developments suits more and more of an experiment [2]. They had connected the sensor devices and broadcast equipment's in apposite area [3]. These sensor devices have cast-off in wireless sensor network (WSN). A case in point is certain researcher had studied the reflected of ultrasonic wave signals display a soil moisture and groundwater levels [4] to forecast the incidence of landslides and gradient. The environments have numerous factor relate to plant development such as temperature, moisture in the air, soil moisture (the water leakage outflow swiftness of groundwater) [5] and soil PH. Automated Irrigation system has described factors to farmer through mobile SMS, website [6] The part of device to communicate data is often used as a TinyOS or microcontroller (MCU) and ZigBee (XBee) for radio transmission to send data signals from source to destination [7, 8]. The most of system are motorized by solar cells and batteries [9]. The study of the measurement and investigation environment in agriculture has performed extensive research and continuous with the technology to help for sensing the amount of light, humidity and temperature using wireless sensor networks to accumulate and process on a computer server and explosion to farmer through mobile device like PDA or cell phone [10, 11].

### 2. System Model

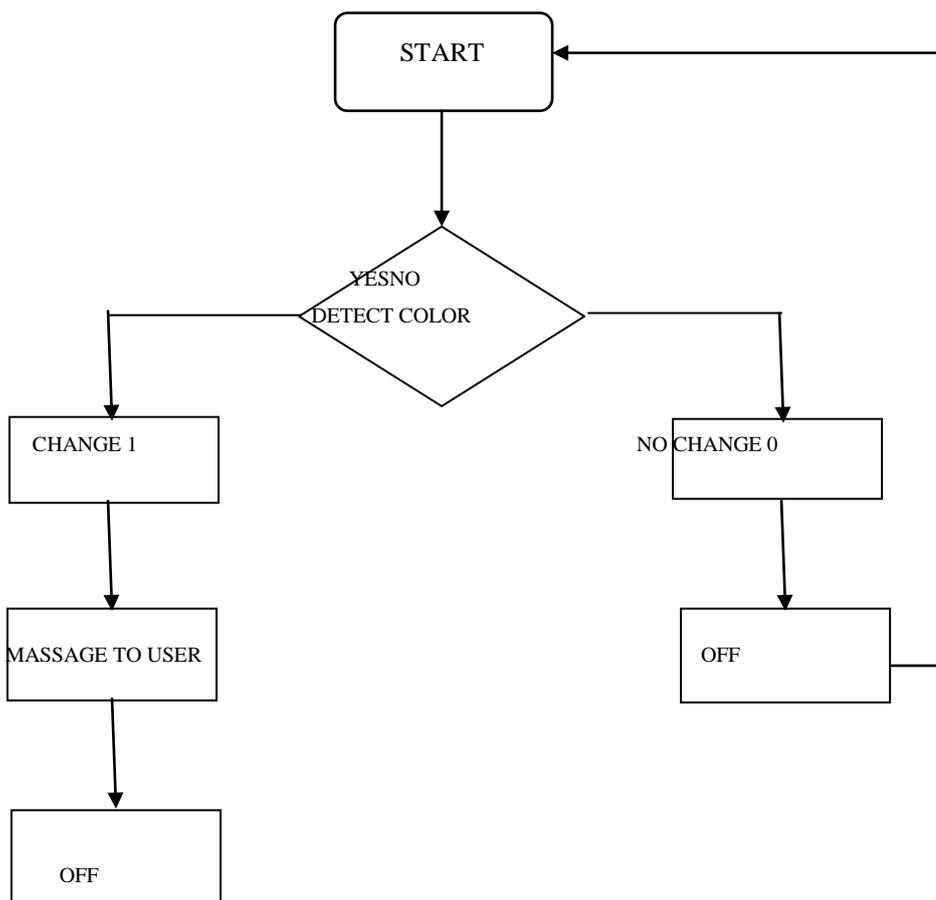


List of devices are: -

- a) Arduino MEGA 2560- Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs such as light on a sensor and turn it into an output such as activating a motor, turning on an LED.
- b) Zigbee- ZigBee is a low-power, low data rate, and close proximity wireless ad hoc network. Throughput of ZigBee is very low and the rate of data transfer is about 250 Kbps. Therefore ZigBee is useful for the applications which requires low data rate.
- c) Color sensor-The color sensor provides red, green, blue and clear (RGBC) light sensing for precise color measurement, determination, and discrimination.

### 3. Methodology

Our model will work on the following flow chart.



### Arduino

The Arduino Mega 2560 is a microcontroller board based on the ATmega2560 (datasheet). It has 54 digital input/output pins (of which 14 can be 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. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Mega is compatible with most shields designed for the Arduino Duemilanove or Diecimila. The board

can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

**ZigBee:** Zigbee is an IEEE 802.15.4-based specification for a suite of high-level communication protocols used to create personal area networks with small, low-power digital radios, such as for home automation, medical device data collection, and other low-power low-bandwidth needs, designed for small scale projects which need wireless connection. Zigbee is widely deployed for controlling and monitoring applications where it covers 10-100 meters within the range. Zigbee supports different network configurations for master to master or master to slave communications. And also, it can be operated in different modes as a result the battery power is conserved. Zigbee networks are extendable with the use of routers and allow many nodes to interconnect with each other for building a wider area network.

**Color sensor:** The color sensor detects the color of the surface, usually in the RGB scale. Color is the result of interaction between a light source, an object and an observer. In case of reflected light, light falling on an object will be reflected or absorbed depending on surface characteristics, such as reflectance and transmittance. Measuring colors of the ingredients are basically two ways. The easiest way is to use a color-changing light source and a sensor that measures the intensity of the light. Most industrial color sensors contain a white light emitter and three separate receivers. There are usually three sets of color source or color filter with peak sensitivities at wavelengths that we identify as red (580nm), green (540nm) and blue (450nm). All colors can be derived by their components

**Circuit Diagram:-**

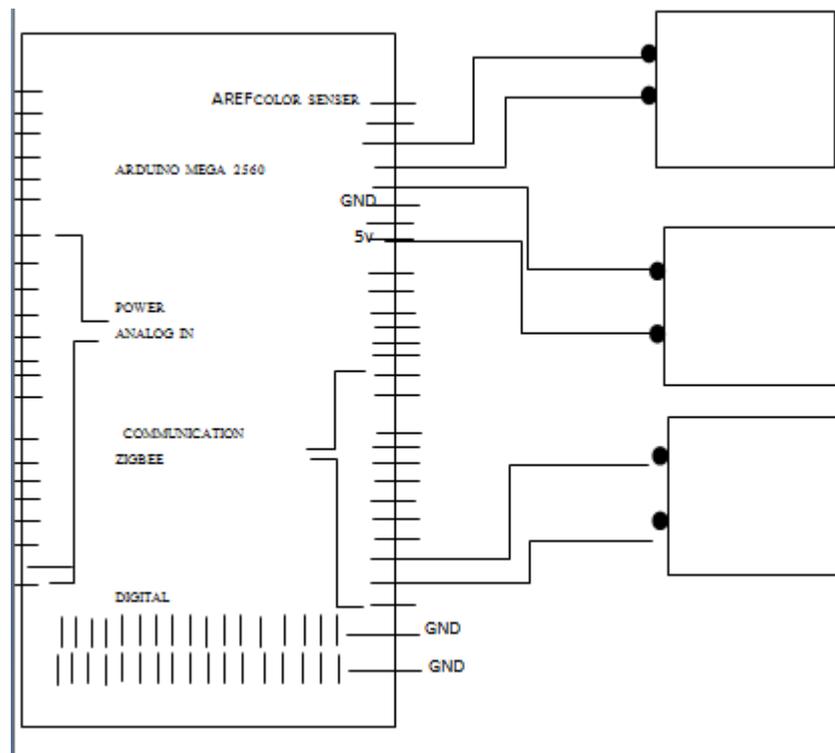


Fig. 2 circuit of arduino.

- a) **Network setup:** -It is a wireless monitoring system for agriculture and the environment. The set up consists of a node having four ports at the bottom to which sensors are attached. The node can be easily integrated with any low power sensor and can be deployed randomly in the field. The maximum allowable single hop distance between the nodes is 500 to 1500 ft with line of sight. To detect the sensor after connecting, the node should be reset once. The node can be easily integrated with a maximum of 4 different or of same sensors at a time. The nodes are connected through a wireless medium to the base station, which collects the data and sends the information to the gateway. A large area can be covered with the help of these nodes by arranging them in some topology. The information is hopped among the nodes and it finally reaches the destination.
- b) **ZigBee:** - To receive and send data for wireless sensor network. The data is transmitted via XBee (wireless module ZigBee XBee Series 2). This system can work either indoors, outdoors and various environments as well. The XBee transmits the signal as the characters through small Chip. It can transfer the data as point-to-multipoint or point-to- point until the destination node has received the data. The XBee transceiver utilizes the Carrier Sense Multiple Access with Collision Avoidance (CSMA-CA) which is the multiple input-output channels to prevent the collision of signals. The network topologies would be a Star, Mesh or Peer-to-Peer. Each device address should be long as 64bit or 16bit.

## 2. Results

In our model, the color changes were analyzed by transforming the RGB color system of the color sensor. We tried to develop a quantitative color sensing method of agricultural products using the simple illuminating information of the natural environment by developing the analysis on the relationship between the color appearance of the plant in ideal conditions and after any physical change. As the result, the color calibrations were very successful. After the detection of color changing of plant by color sensor, using a wireless sensor network ZigBee send a message to the user's mobile phone. Further controller takes some decision for appropriate action and implement it. These results could play a very important role in developing the surface color analysis of agricultural products for both the simple and rapid evaluation at the field.

## 3. Conclusion

In this paper we have proposed an application of WSN in the cultivation of paddy crop. These WSN methodologies give favorable contribution for betterment of farming industry that results to sustainability of quality crop. We have considered the fact that the cost of WSN sensors should be kept low and be affordable to the farmers. The network set up is simple and compatible to changes in terms of node addition, new sensor deployment etc. This model is beneficial for the farmers of Chhattisgarh as some of them are unaware of technologies, hence, this model can be easily implemented by anyone and alerts can be setup to receive updates by message in the mobile phone. In future work we extend our work and introduce new algorithms and concepts of Artificial neural network for analyzing the behavior of plant and take appropriate action. So that the plant gets healthy in all season and provide fruitful result to the farmers.

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# ARTIFICIAL INTELLIGENCE: A MARVELLOUS TECHNIQUE & ITS APPLICATIONS

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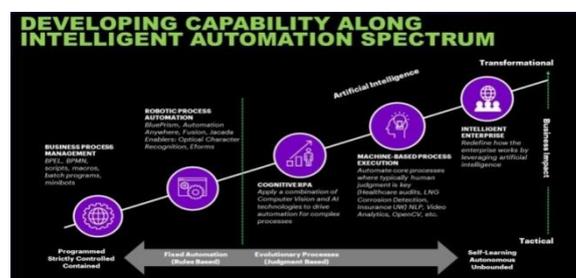
## ABSTRACT

*Artificial intelligence plays a very important role in the development process to make people advance. This paper tells about artificial intelligence and gives a brief description on implementation of artificial intelligence in various fields or era. It also describes the implementation of artificial intelligence from the past up to future. It discuss the implementation i.e. application of AI in various field like in medical, defense, transportation & communication, gaming, expert system, s/w engineering etc. It is a good platform to move ahead in the world of advance technology.*

**Keywords:-** Artificial Intelligence (AI), Machine Intelligence (MI), Natural Intelligence, Computer Science, Intelligent Agents, Humans, Operating System, Calculus Ratiocinator, Reasoning, Remote Sensing, Medical Diagnosis, Robes, Artificial neural network, Medical Diagnosis

## 1. Introduction

Artificial Intelligence is also called as Machine Intelligence. AI is developed to make equipment more and more accurate and efficient in daily life. In other words, AI is the field of computer science which tells about the usage of computer by the construction of computational mechanism for any type of activities in daily life. It is man made learning provided to a computer to solve the complex problems and to generate that type of system which runs itself by commanding once (for eg. Operating system). In simple word Artificial Intelligence is an intelligence shown by a computer or machine as compared to natural intelligence shown by human beings and animals. In the field of computer science, research on AI is the simple study of Intelligent Agent of any devices which show their environment and the action taken by the machine to achieve a goal.



## History of AI

In 1300 CE an idea came in the mind of **Ramon Llull** to build a machine which can solve complex reasoning by using the concept of Calculus ratiocinator (calculating machine) and then as per the idea that machine can think ,learn ,create as same as humans. The Field of AI research was born at a workshop at **Dartmouth College** in 1956. **Attendees Allen Newell (CMU), Hebert Simon (CMU)** and their student are the founder and leaders of Research.

## 2. Applications of AI

Now a days the implementation of AI in various field is increasing in huge amount (for eg. Development of new technology likes 3D Printers and Robes, etc.) And the programs developed to perform various tasks like medical diagnosis, electronic trading, robot control and remote sensing. AI is most helpful in the tremendous development of industries, transportation, public sectors, etc. Today the AI researcher have founded a many advanced tools for solving any type of difficult problem in computer science. Russell & Norvig (2003) describe the various application developed in AI laboratories.

Some of the important application that are implemented and some are on the way are as follow:-

### I. Robotics

The robotics is a branch which deals with making of machines which have an intelligent (i.e.AI) work as per programmed eg. *Robes, industries machines, planet rovers etc.*

Mainly robots are the artificial agent. It is a simple machine which is controlled by computer programs as directed by the user. Few applications of robotics can be seen as follows-

- In industries the robots are used to perform *heavy tasks* which cannot be done by a single person.
- Fixing machine parts like designing and modification in vehicles, etc.
- In the field of defense, robots can be used in diffusing bombs, etc.
- A robo named **SOFIA** is programmed which can talk, give answer and act like human beings.
- **Planet Rovers** are the robots used for **exploring distant planets** because they can do much of their work alone without any commands from earth as it takes a long time to send radio signal from earth to exploring planets .



## II. Medical Field

In today's generations, AI plays a very important role to save the lives of many creatures by using advanced techniques. One of the most effective techniques is Artificial Neural Network. It is used as **clinical decision support systems** for medical diagnosis like **Concept Processing technology in EMR software**.

There are many several tasks which can be performed in the medical field by using concept of AI. Some of those are:

- Computer-aided interpretation of medical images. This type of system is formed to scan the digital image of affected area e.g. **Computed tomography**. Basically this type of application is used in detection of tumor.
- Heart sound analysis.
- Drug creation.
- Robots for caring elderly.
- For training purpose **Avatars** are used instead of patients and design treatment plan.
- During surgery robots are used for small areas.
- In **JAPAN**, an operation was led to a big success where **artificial skull** was fitted to the patient's head by using AI.



## III. Gaming

In video gaming the artificial intelligence plays a very important role by making a game's feature a classic and advanced to the people. The reason behind using AI in video games is to provide a **non-player character** (i.e. responsive, adaptive and intelligent) or you can say providing a character which is similar to human intelligence. The technique of AI is used in video gaming by draw upon existing ideas or methods.

If the term AI is attached to any of the video game then the many set of algorithm are used to make that game (i.e. control theory, computer graphics and computer science). In some games automated computation are used to get predetermined and limited responses to predetermined and limited inputs. The first computerized game using AI is made in 1951 and publishes in 1952.

EXAMPLES:-

- Creatures(1996)

A creature is an artificial life program where the user "hatches" small furry animals and teaches them how to behave. These "Norns" can talk, feed themselves, and protect themselves against vicious creatures. It's the first popular application of machine learning into an interactive simulation. Neural networks are used by the creatures to learn what to

do. The game is regarded as a breakthrough in artificial life research, which aims to model the behavior of creatures interacting with their environment .

- Sid Meier's and Alpha Centauri (1999)
- Halo :Combat Evolved (2001)

A first person shooter where the player assumes the role of the Master Chief, battling various aliens on foot or in vehicles. Enemies use cover very wisely, and employ suppression fire and grenades. The squad situation affects the individuals, so certain enemies flee when their leader dies. A lot of attention is paid to the little details, with enemies notably throwing back grenades or team-members responding to you bothering them. The underlying "behavior tree" technology has become very popular in the games industry (especially since Halo 2).



#### IV. Manufacturing of Forest Product:-

- To get the good quality wood based product in the market as per demand of the customer's requirement.
- To overcome the costly test on the wood based product the AI is used in the form of **fuzzy logic** and **artificial neural network** are the two promising tools.
- By using this technique allows the manufacturing companies to reduce the manufacturing and testing time and cost without compromising the reliability results

#### V. Bank Cheque Signature and Thumb Verification system:-

To provide an authentication the signature and *thumb impressions* are used in banks, **UDAI** and at government sector. To be very perfect in verification in all these sectors the term AI and its techniques are used i.e. are artificial neural network. The main concept behind this verification is done by verifying the entered signature from the collection or set of signature which is saved already. For that the three processes are done i.e. *image pre-processing* (This technique is used for manipulation and modification and first step of verification), *feature extraction* (here we compare the other signature to signature which is going to verify), and at last the *artificial neural network*.

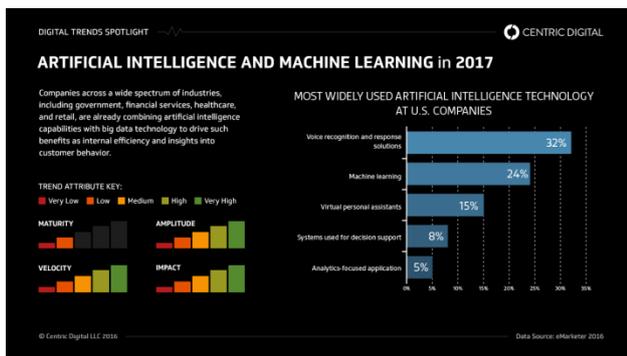
## VI. Weather forecasting:-

To predict the weather the artificial intelligence techniques are used by doing analysis of past weather in form of *patterns* and then future weather is predicted.

## VII. In Crime Investigation:-

In foreign countries, AI is used for identification of criminals or victims. Suppose, if an accident of murder case arrives then they can use the blood sample of the person to identify him. **DNA** of the individual can be saved and used as identification.

## 3. Modifications



- In future, we can design **robots** to perform as soldiers in armies, nurses in medical field, etc so that man force can be reduced. **Algorithm** can become a base in designing such advanced machines.
- In security, AI can be used to as **face detection machines** in **ATMs**, etc.
- It can be a big source of time saving as if everything is automatic then we don't need to waste our time in travelling for long distance.
- It can be implemented in medical field by using **artificial organ replacement** to save several lives.

## 4. Conclusion

This paper concludes that there are infinite applications of AI. It can be modified by using other techniques like application of algorithm, matrices as a fusion with AI.

## 5. Acknowledgement

We would like to thank our guide and mentor Mrs. Palak Keshwani for supporting us and encouraging us for writing this paper.

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# A SURVEY OF FALSE ALARM ALGORITHM IN PRESENCE OF MALICIOUS NODE FOR MOBILE AD-HOC NETWORKS

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## ABSTRACT

*As the network size and application level of mobile ad hoc networks increases, the numbers of security parameters needed by such algorithms become more and more efficient. Mobile ad hoc network has dynamic architecture which thus provides rights to malicious node to modify or delete data or reroute the data transmission path. If the centralized administration is not present then malicious node may also leave the network architecture. False alarm algorithm plays a vital role to detecting malicious nodes present in the mobile ad hoc network. False alarm algorithm produces an alarm when it detects the malicious node and notifies other neighbor nodes and network admin. In this paper we survey the past and present year on False alarm algorithm, which observe and analyze these algorithms.*

**Keywords:** Manet, Fpr, Aodv

## 1. Introduction

In current situation, mobile ad hoc networks have been get more concern due to their properties of highly dynamic, multi-hop, lack of central structure, and infrastructure-less. Especially, mobile ad hoc networks are widely used in specialized areas or relief environment such as emergency operations, battlefields, disaster recovery in such situations like flood or earthquake, and suitable for wired and wireless networks etc. Mobile ad hoc networks have wide applications; since it has the various numbers of services provided by mobile ad hoc networks are rapidly increasing. It is major task to identify malicious nodes becomes complex challenge of mobile ad hoc network. Since mobile ad hoc network has dynamic infrastructure, in which malicious node has malicious activities like modifying data, deletion of data, rerouting. Mobile ad hoc network is suffering from lacking of centralized administration which causes malicious nodes to creating loopholes thus reflecting innocent nodes to leaving network. False alarm algorithms plays vital role to detecting malicious node in the mobile ad hoc network. Most of the intrusion management uses False alarm algorithm for good utilization of packets in the MANET and usability of MANETs. There have been various intensive research efforts and extensive applications in the domain of False alarm algorithms of most Ad hoc networks.

### The Basic Idea of False Alarm Algorithm

A false alarm algorithm is an alert alarm. If the malicious node present in the network and causes unwanted variation where they are not needed in the MANET then false alarm algorithm generate erroneous report and notify to other neighbor nodes. False alarms may raise when the nodes in network plays as malicious or selfish.

**Various Classification of False Alarm Algorithm in Mobile Ad Hoc Networks:**

**1) Based on Infrastructure network:** Mobile ad hoc networks usually been based on the cellular methodology and depend on good infrastructure support, in which mobile nodes communicate with each access points such as base stations connected to the fixed network infrastructure where false alarm will be activated from base station if any falsify node detected.

**2) Based on Infrastructure less network:** In infrastructure less technique there is no central administration involvement is done for the entire network. The MANET is infrastructure less in a way that commonly known as a mobile ad hoc network (MANET). A mobile ad hoc network is a collection of wireless nodes that can dynamically changes their position to form a network to exchange information without using any fixed stationary network architecture. Here false alarm algorithm used to identify the malicious node occurs in the network.

**2. Related Work**

In this section we provide extensive description of the existing false alarm protocols, which are grouped according to the taxonomy, defines in the introduction of this paper.

**2.1 An Acknowledgment-based Approach for the Detection of Routing Misbehavior in MANETs**

The authors [1] suggest a routing protocol for mobile ad hoc network which is based on theory that the nodes in network are collaborative with neighbor nodes. Since mobile ad hoc network is lacking of central administration and has open structure node may misbehave in network. Such routing misbehavior causes malicious nodes that will involve in the route creating and maintenance activities but deprive to forward data packets. In this paper, they propose the 2\_ACK methodology that provides process as an add-on method for routing methodology which is used to identify routing misbehavior and to minimize their unfavorable effect. The motive of the 2\_ACK method is to transmit two-hop ack packets in the opposite side of the routing path. In 2\_ACK scheme acknowledged received data packets is used to minimize routing overhead.

**2.2 Technique to handle mischievness in MANETs**

In this paper [2], author said some nodes may selfishly behave only to coordinate randomly, or not at all, with other neighbor nodes in mobile ad hoc network. These malicious nodes could then minimize the overall network performance in the network which thus increase delay in data query. So many researchers have worked on this malicious node problem, and proposed various methodologies to identify these Mischiefs nodes. In this paper authors gives a survey on different techniques used to identify mischiefs nodes in Mobile ad hoc networks. It also gives information on data packet replication in a network, and certain techniques to handle malicious nodes. Authors suggest a collaborative watchdog along with method combined credit risk which thus increases network performance by identifying malicious nodes within short time period.

**2.3 Detecting Selfish Nodes in MANETs**

In this paper[3], every node plays two role first one is as a router and second one is as end-system and therefore each node in network is permitted to move freely in any direction which makes routing path very difficult in network. Most of the routing algorithms used in mobile ad hoc network such as AODV and DSR which assume that every node will send every data packet it receive. In this methodology Source node will forward data packets to the destination node with the help of the

intermediate neighbor's nodes. However, misbehavior of the selfish nodes is a common phenomenon in MANET. These nodes use the network and its services and do not provide any services to intermediate nodes in order to save energy such as battery, CPU Power and band-width for relaying data from other nodes and reserve for themselves. These selfish nodes will degrade the performances of wireless ad hoc networks. However, we can identify the selfish nodes by modifying the original AODV and DSR routing algorithms. In this thesis, we proposed a time based scheme for identifying selfish nodes.

#### **2.4 Derivative threshold actuation for single phase wormhole detection with reduction false alarm rate**

In this paper [4], Data transmission in mobile Ad hoc networks is truly via multi-hop techniques. Owing to the distributed characteristics and bounded resource of nodes, MANET is having high risk to wormhole attacks i.e. wormhole attacks create severe problem to every Ad hoc routing protocol. Thus, so as to discover wormholes, totally diverse methods are in use. Our aim in this paper is to deduce the traffic threshold level by derivational approach for identifying wormholes in a very single phase in relay network having dissimilar characteristics. In all those methods fixation of threshold is merely by trial & error methodology or by random manner. Conjointly wormhole detection is in twin part by putting the nodes that is higher than the edge in a suspicious set, however predicting the node as a wormhole by using some other algorithms.

#### **2.5 Identifying false alarm in MANET in presence of congestion control**

Since, the mobility is high, the nodes may move randomly and fast, which lead to network Partitioning. Most of the user sat different places assume that mobile nodes co-operate fully in terms of sharing their memory space. But the alarm will also be initiated because of network disconnections too but it seems and treated as overall selfishness alarm, it will affect the overall performance of the network. We have explored the impression of selfish nodes in a MANET from the perspective of replica allocation and developed selfish node detection algorithm that considers the partial selfish node and fully selfish node as selfish replica allocation. The behavior of these selfish nodes leads to decrease in over all data accessibility of the network. The replica will be allocated using specific SCF tree concept. To improve the data accessibility, we have proposed several data replication techniques. In this paper [5], the mobile nodes will have the characteristics of mobility and constraints in resources in mobile adhoc network. Detection of attacker node in the network and should be informed to all others in the network.

There is a source constraints lead to a big problem as decrease in performance and the network partitioning leads to poor data accessibility. But some nodes may decide as not to co-operate with others or partially co-operate with other nodes. An alarm will be raised based on the selfish behavior of overall nodes called overall selfishness alarm. The concept of this paper deals with detection of false alarm as differentiated from overall selfishness alarm and to inform the other nodes at route as exactly where the disconnections occur to select the next best alternative path and also to increase the performance with increased congestion control.

#### **2.6 Identification of False Alarm in Handling of malicious Nodes in Mobile Ad Hoc Networks**

Mobile ad networks do not have any existing infrastructure and they do not have any centralized administrator. In MANET each node acts as router. These nodes use the network and its services but they do not cooperate with other nodes. Several data replication techniques have been proposed to minimize performance degradation. These kind of selfish nodes do not consume any energy such as CPU power, battery and bandwidth for retransmitting the data of other nodes. They will

preserve the resources for their own use. So the MANET is self-creating, self-organizing and self-administrative wireless network. In this paper, [6] a mobile Ad Hoc network is a collection of mobile nodes. Most of them assume that all mobile nodes collaborate fully in terms of sharing their memory space. In practice some of the nodes may act as the selfish nodes. In reality, however, some nodes may selfishly decide only to cooperate partially, or not at all, with other nodes. These selfish nodes could then reduce the overall data accessibility in the network.

### **2.7 Selfish Node Detection Algorithm in Cluster Based MANET**

In our proposal the MANET area has been split into a number of size clusters having cluster head and storage capability according to connectivity degree, RSS (relative signal strength) as per the cluster formation algorithm given. The idea behind clustering is to group the network nodes into a number of overlapping clusters. In this paper[7], Mobile Ad hoc network are collection of mobile nodes that can dynamically form temporary networks, it is necessary to bring the smart technologies in the Ad hoc network environment. In this cluster architecture we try to find false node inside clusters of MANET using a modified algorithm and try to removethem.In the clusters of mobile ad hoc network The resource constraints creates to a big problem as decrease in performance and the network partitioning leads to poor data accessibility due to false and selfish node. Huge amount of time and resources are wasted while travelling due to traffic congestion.

### **2.8 A Collaborative Intrusion Detection methodologiesfor Ad Hoc Network**

In this paper[8], MANETs are highly vulnerable to attacks due to the open medium, dynamically changing network topology, cooperative algorithms, lack of centralized monitoring and management point, and lack of a clear line of defense So we report our progress in developing intrusion detection (ID) capabilities for MANET. Compared with the scheme where each node is its own ID agent, this scheme is much more efficient while maintaining the same level of effectiveness. For several well-known attacks, we can apply a simple rule to identify the attack type when an anomaly is reported. In some cases, these rules can also help identify the attackers. We address the run-time resource constraint problem using a cluster-based detection scheme where periodically a node is elected as the ID agent for a cluster. Building on our prior work on anomaly detection, we investigate how to improve the anomaly detection approach to provide more details on attack types and sources.

### **2.9 Dynamic Intrusion Detection System for MANET Using CPDOD Algorithm**

Many of the intrusion detection techniques created on wired networks cannot be directly applied to MANET due to special characteristics of the networks. A series of experimental results demonstrate that the proposed method can effectively detect anomalies with low false positive rate, high detection rate and achieve higher detection accuracy. In this paper[9], Mobile Ad hoc networks are susceptible to several types of attacks due to their open medium, lack of Centralized monitoring and management point, dynamic topology and other features. However, all such intrusion detection techniques suffer from performance penalties and high false alarm rates. In this paper, we propose novel intrusion detection techniques by combining two anomaly techniques Conformal Predictor k nearest neighbor and Distance based Outlier Detection (CPDOD) algorithm.

## 2.10 Discarding Selfishness to enhance Replica Allocation over MANET's

These nodes could be detected and excluded from the cooperative portion of the network, as they only consume resources but don't contribute to the infrastructure. Some mobile nodes decided not to cooperate with other mobile nodes and simply aim to save its resources to the maximum while using the network to forward its own packets, these types of mobile nodes are called "Selfish Nodes" this misleading is very common in ad hoc network because of its configuration setup. In this paper [10], Mobile ad hoc networks are formed dynamically due to autonomous system of mobile nodes that are connected through wireless links without using an existing infrastructure or centralized administration. We have explored the impression of selfish nodes in a MANET from the perspective of replica allocation and developed selfish node detection algorithm that considers the partial selfish node and fully selfish node as selfish replica allocation. In this paper, a new mechanism that minimizes the problem of selfish nodes with the help of Credit risk and Brain trapping function Model. In existing methods, there are no steps to handle false alarms and efficient detection of selfish nodes. Including Degree of selfishness in allocating replicas will considerably reduce communication cost and produce high data accessibility.

## 3. Conclusion

The result after analysis has concluded and suggestion of mine is analyzing selfish node by using FAREP protocol is best when compared to above studied performance metrics. In this research paper, an effort has been made to concentrate on the comparative study and performance analysis of various False alarm methods to find selfish node in MANET on the basis of above mentioned performance metrics.

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# MRI IMAGES RETRIEVAL WITH CBIR, K-NN ALGORITHM AND SFTA

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## ABSTRACT

*Content Based Image Retrieval or CBIR is an image processing technique which retrieves the desired images from a massive image collection which is stored in a database by availing the characteristics of the image such as pixel color, texture, appearance, surface, shape and other characteristics that can be effectively removed from the images themselves. The conventional techniques for image recovery and preparing are inadequate and inappropriate. K-Nearest Neighbor (K-NN) is a technique used for compelling and mainstream order calculation to group image information. The resultant calculation has certain limitations in specific circumstances. Segmentation-based Fractal Texture Analysis or SFTA is an algorithm that decomposes the input image to design a set of binary images. This binary image set is used in extracting the targeted regions dimensions in order to describe segmented texture patterns. In this paper, an improved calculation has been recommended that focuses on giving enhanced preparing set to K-NN which is compact in size and more correct joined together with an improved SFTA calculation to concentrate emphasizes that serves to concentrate preparing set which is better and diminishes the execution time of K-NN calculation.*

**Keywords:** MRI, Digital Image Processing; Content Based Image Retrieval (CBIR), Improved K-Nearest Neighbor (K-NN), SFTA.

## 1.Introduction

### Content Based Image Retrieval (CBIR)

Content Based Image Retrieval (CBIR) is a widely used method for recovering images on the certain determined image characteristics like texture, shape, color, surface and additionally structure. The name itself suggests the way of processing. "Content Based" refers to the process of analyzing the digital images on the basis of their contents. Contents (color, texture, shape, etc.) of the image assist in the analysis process. Traditional image recovery strategies usually employ associated metadata such as keywords, characterization codes or phrases for searching images. CBIR then again chips away at an alternate guideline from essential word looking. CBIR systems are capable enough to use query for the similarity comparison between the standard image stored in the database and the query image. CBIR systems review on the capacities that describe image composed substance, for example, color, texture, shape, appearance. These characteristics are processed for retrieval process. Some of the CBIR frameworks are: IBM's QBIC, Excalibur's Image Retrieval Ware, Virage's VIR Image Engine and so on.

Image recovery queries can be characterized into three levels [6]:

**Level One: –**

This is the initial level that comprises of image information gathering and analyzing by its own features like texture, surface, pixel coloration, shape, additionally structure, composition and also the spatial position of certain image. A sample issue may discover long thin dim articles structure images from the left-hand corner [10][11].

**Level Two:**

In this particular degree, the access connected with image illumination by utilizing inferred and/or other sensible characteristics that includes a point connected with sensible surmising as to the distinction of the physical items delineated inside picture [10][11]. The specific questions at this level get for out of store learning ordinarily.

**Level Three:**

The third level comprises of recovery of image illumination on its attributes, with respect to several other aspects of the objects or scenes illustrate. This level demands expert knowledge about the concept to defend the queries. Complex reasons along with subjective judgment are mandatory to make an association between image attributes and the subjective standards to demonstrate the image data.

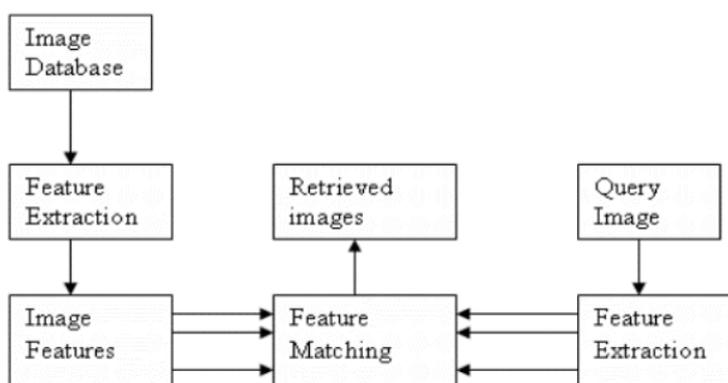


Fig. 1Architecture of CBIR system

**K - Nearest Neighbor (K-NN) Algorithm**

K-NN is an algorithm which stores all available cases and classifies new cases based on a similarity measure, for example, distance functions. This technique is used in pattern recognition and statistical estimation. It is also implemented as a non-parametric technique.

**Simple K - Nearest Neighbor Algorithm**

- For each training example  $\langle x, f(x) \rangle$ , add the example to the list of training examples.
- Given a query instance  $x_q$  to be classified,
- Let  $x_1, x_2, \dots, x_k$  denote the  $k$  instances from training examples that are nearest to  $x_q$ .
- Return the class that represents the maximum of the  $k$  instances.

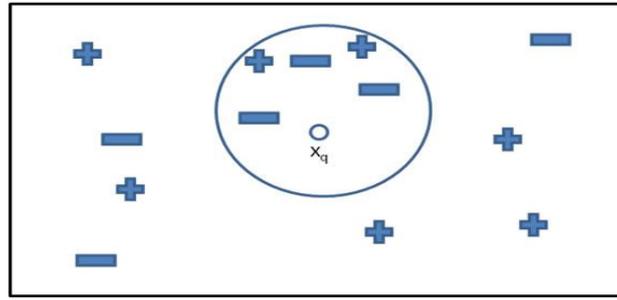


Fig 2. Simple K - Nearest Neighbor (K-NN) Algorithm

## 1. Work by Previous Authors

Previous authors stated in their work that feature extraction plays an essential role in CBIR techniques. K-NN technique mainly depends upon the training set for the classification of image data. To maximize the algorithm performance, the training set has to more accurate. Also it should be compact in size for the algorithm performance.

Various robust techniques have been proposed by the previous authors:

One of best considered technique is to extract the best features of the image and then training the K-NN classifier. The K-NN classifier is then classifies and retrieves the MRI Brain Image [1]. Other technique suggested that computational time can be increased by decreasing the quantity of the training samples [2].

The second technique consists to find the nearest neighbor by introducing the fast search algorithm or establishing efficient indexing [5].

In the third technique, the computation complexity is slashed by decreasing the dimension of the vector space [5].

## 2. Problem Identification

In the present techniques, with giant image databases, traditional systems for image indexing are inadequate. The capability of all current CBIR frameworks is restricted in the way that these frameworks can be employed only at the primitive characteristic level. No existing CBIR frameworks can be considered as remarkable. Some of the crucial factors could be taken care specially while fixing them as and regarding primitives. K-Nearest Neighbor (K-NN) is the technique which is considered as an influential and vastly used characterization calculation method to club the image information. This calculation has its own confinements in certain circumstances which are as takes after:

- 1) K-NN can have poor run-time execution. (If the preparation set or training set is profound, K-NN takes long run-time.
- 2) K-NN is exceptionally associated to unessential or repetitive characteristics of the image. (Since the analysis is done by the characteristics of the image itself, all the characteristics help the closeness and accordingly to the order).

## 3. Improved Methodology

The improved methodology, for quick and productive handling and recovery of MRI brain images by enhancing the execution time and correctness of K-NN calculation, by first diminishing the training set count and then, by coordinating a more enhanced algorithm for retrieval of image characteristic. The later algorithm is named as SFTA. Segmentation-based Fractal Texture Analysis (SFTA) is an algorithm that decomposes the input image to design a set of binary images. This binary image set is used in extracting the targeted regions dimensions in order to describe segmented texture patterns.

The significant steps included in procedure are:

### 1) Image Preprocessing:

The process done before transforming by revising picture from distinctive errors. This step likewise includes smoothing which suppresses noise or other small fluctuations in the image[10][11]. Smoothing is carried out by utilizing Median Smoothing[10] i.e. the median value is the central value of the ordered value set. Median Filtering diminishes obscuring of edges. The fundamental concept is to substitute the current point inside the image by the median of the pixel brightness of its neighborhood[10][11].

### 2) Extracting Texture Features using SFTA Technique:

Texture is that natural property of all surfaces that portrays visual patters and holds paramount data about the structural positioning of the surface and its relationship to the encompassing environment [8][9]. Texture extraction is an uncommon manifestation of dimensionality decrease, in both, image handling or image processing and pattern recognition. Feature extraction includes disentangling the measure of assets important to condense an expansive number of data accurately. In view of the orientation and separation between picture pixels, we extricate some real composition properties like Coarseness Contrast, Directionality and so forth.

Segmentation-based Fractal Texture Evaluation or SFTA is an evacuation convention and is created all around decaying the recommendations picture straight into several paired images from where the fractal extents with the ensuing spots are by and large registered to demonstrate sectioned feel conduct [7]. SFTA attained expanded point of interest and additionally correctness relating to CBIR and likewise picture qualification. Likewise, SFTA is, with respect to feature extraction time, faster than Gabor by 3.7 times and also faster than 1.6 times than Haralick [7]. They are changed over into a Co-event lattice that will introduce the feature extraction data.

### 3) Classification utilizing KNN:

This is the keep going step concentrating on grouping and recovery of relevant image information. In the wake of concentrating relevant training set on the premise of Co-event framework acquired from last step, the training set is given to the classifier alongside applicant set for classification or grouping.

## 4. Conclusion

The viability of conventional K-NN algorithm can be enhanced radically by simply lessening the count of training examples given to the classifier. Be that as it may diminishing the count of training examples ought not to influence the exactness of K-NN algorithm. The enhanced method means to keep account the above certainties. Additionally, it handles and retrieves the MRI images in more productive way. This method is recommended by us to be utilized as an assisting mode for the experts in the treatment process.

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# A COMPREHENSIVE STUDY OF VARIOUS TECHNIQUES OF STEGANOGRAPHY : A SURVEY

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## ABSTRACT

*Today, security is a very important concern in the data communication. Security of data is used in almost every field like education, e-commerce, industry and data warehouse. Firmly sending and receiving data in these areas is an important issue as the data is very crucial. Maintaining the security becomes tough as the data intrinsic features are also different. Hence, the main focal point of this paper is to study and discuss the trends which have already been proposed in the direction of steganography. The gap identification is provided by this study and based on the identification further suggestions are provided.*

**Keywords:-** *Steganography, Adaptive steganography, Non-adaptive steganography, LSB, DWT, PSNR.*

## 1. Introduction

With the rapid enhancement and the data swapping, a lot of apprehension have been brought up in the security of data transmitted over open channels, particularly at the level of text and picture information. There are 3 basic routines for secured communication, cryptography, steganography and watermarking. Cryptography , manages the improvement of procedures for changing over data in the middle of understandable and incomprehensible structures amid data trade. Steganography, then again, is a procedure for concealing and separating data to be passed on utilizing a transporter signal. Watermarking, is a method for creating legal strategies for concealing restrictive data in the perceptual information. The technique which I am analyzing is Steganography. The image into which a message is hidden is called a cover image and the result is stego-image. This is achieved by entrenching the secret data behind another media such as image, audio and video. In image steganography, the message is hidden behind an image. It can be used in military, commercial and anti-criminal applications, transmission of confidential documents between international governments, e-commerce, media, database systems, digital watermarking etc. Steganography is the method through which existence of the secret message can be kept secret. Steganography has various applications. The stegoimage must be undetectable and it should entrench more data. Two significant characteristics which should be considered while scheming a steganographic algorithm are undetectability and embedding capacity.

## 2. Literature Review

It inserts secret data by replacing  $x$  LSBs of a pixel by  $x$  secret data bits directly [1]. Zhang and Wang's method and Mielikainen's methods [3,4] had the limited capacity for embedding. In this scheme, only one pixel of  $n$  pixels into one group is increased or decreased by 1. A very well-known steganographic method is the Least Significant Bit (LSB) substitution method. In the past, several work has been done on steganography. In order to minimize the image distortion, Chan–Cheng gave a new LSB algorithm which based on optimal pixel adjustment [2] in 2004. Zhang and Wang gave an algorithm [3] which is represented in  $(2n + 1)$ -ary notation system. In 2006, Jarno Mielikainen [4] projected a new LSB matching algorithm for embedding secret message. The security in LSB-based techniques is not good because they only modify the LSB of the image pixels. Different steganalysis algorithms e.g. RS detector [5] can be applied to get the secret data easily. All the pixels in the cover image cannot bear equal amount of embedding without causing observable distortion. For this reason, it can be easily noticed by eavesdropper. To trounce these problems, adaptive techniques for embedding are proposed [6-12]. In these techniques, quantity of embedding data in pixels is uneven. These techniques give more unrevealed result than simple LSB and other non-adaptive methods. The adaptive techniques estimate the hiding capacity of the cover according to its local characteristics[13,14,15,16]. One of the adaptive technique proposed by Wu-Tsai utilizes the dissimilar values between two neighboring pixels to calculate the number of secret bits to be entrenched[17]. A steganographic technique given by Wu et al.[18] utilizes LSB and pixel values differencing(PVD) method. Within this algorithm, the pixels located in the edge areas hide the secret data using PVD algorithm and the pixels located in the smooth areas hide the secret data using 3-LSB algorithm[18]. In 2008, Yang et al. [19] gave a LSB matching adaptive steganography that utilizes the different values of 2 successive pixels based on  $n$  bit modified LSB method to distinguish between edge and smooth areas. Weiqi et al. in 2010 [20] and Sivaranjani et al. in 2011 [21] have given an adaptive image steganography using LSB matching revisited. In these algorithms, edge regions of cover image are changed and the smooth regions stayed remained stable. In 2013 [22], Yu and Wang gave an adaptive steganography technique in the sparse domain. In 2014 [23], Maleki et al. gave an adaptive and non-adaptive methods for grayscale images based on modulus function. Adaptive method utilizes average difference value of 4 neighbor pixels and modulus function. The average difference value of 4 neighbor pixels and a threshold secret key are utilized to find out the edge or smooth area. This adaptive technique can withstand the RS steganalysis attack. Non-adaptive method gives less distortion in the stego-image. The residual of the paper is organized as follows. First, I provide a small introduction to non-adaptive technique using LSB and integer wavelet transform. Then, I will discuss the adaptive technique using LSB and integer wavelet transform. Second, I will discuss the results; and then I will conclude the paper.

## 3. Methodology

There are 2 techniques for hiding the secret data inside the cover media. They are non-adaptive and adaptive techniques. Here I will analyze LSB using non-adaptive and adaptive steganography. Then I will review DWT using non-adaptive and adaptive steganography.

### LSB with non-adaptive steganography

LSB replacement hides a secret message into the cover image by replacing the  $x$  LSBs of the cover image with  $x$  message bits to get the stego image. In various existing techniques, the selection of hiding places within a

cover image depends on a pseudorandom number generator without taking into account the relationship between the image content itself and the size of the secret data. And, hence the smooth regions in the cover images will indubitably be contaminated after embedding data still at a less embedding rate, and this will give low visual quality and low security, especially for those images with lots of smooth areas. If we take a 24-bit color image, a bit of every of the three colors - red, green and blue can be used, so therefore a total of 3 bits can be stored in each pixel. For example, the given grid can be taken as 3 pixels of a 24-bit color image, using 9 bytes of memory:

```
(00101101 00011101 11011100)
(10100110 11000100 00001100)
(11010010 10101101 01100010)
```

If we take the number 204, which is represented in binary form as 11001100, is entrenched into the least significant bits of this part of the image, the resultant is as follows:

```
(00101101 00011101 11011100)
(10100110 11000101 00001101)
(11010010 10101100 01100010)
```

Even if the number was entrenched into the first 8 bytes of the grid, only the 3 underlined bits needs to be changed according to the embedded message. Therefore, on an average, only half of the bits in an image will need to be changed to entrench a secret message. Because, there are 256 possible intensities of each primary color, changing the LSB of a pixel results in small changes in the intensity of the colors. These changes cannot be apparent by the human eye and therefore the secret data is successfully hidden. Through a chosen image, one can even hide the message in the least as well as second least significant bit .

### LSB with adaptive steganography

The least-significant-bit (LSB)-based technique is a very familiar steganographic technique in the spatial domain but this scheme will give poor visual quality and low security based on various analysis and experiments predominantly for those images having many smooth regions. Here I briefly explain the LSB matching revisited based on adaptive steganography. In 2010 Weiqi Luo et al. [20] gave an edge adaptive scheme which find the places for entrenching according to the size of secret data and the difference between 2 successive pixels in the cover image. For smaller embedding rates, sharper edge places are used while keeping the smoother places as they are. As the entrenching rate increases, more edge places can be released adaptively for hiding the data by changing a few parameters. LSB matching revisited (LSBMR)[4] takes a pair of pixels as an entrenching component, in which the LSB of the 1st pixel entrench 1 bit of secret message, and the relationship (odd-even combination) of the 2 pixel values carries another bit of secret message. The changing rate of pixels can reduce from 0.5 to 0.375 bits/pixel (bpp) in the case of a highest embedding rate, meaning less alterations to the cover image at the same payload compared to LSB replacement and LSB matching. It has been made known that this scheme can avoid the LSB replacement style asymmetry, and hence it should make the detection slightly extra difficult than the LSB matching scheme. This approach has 2 parts-embedding and extraction. The embedding or entrenching part first initializes few parameters, that are used for successive data preprocessing and region selection, and then calculates the capacity of chosen places. If the places are large enough for entrenching the secret data, then data hiding is performed on the selected places. Then, it performs some postprocessing to arrive at the stego image. Or else, the scheme needs to revise the parameters, and then repeats place selection and capacity calculation until secret data can be entrenched

completely. The extraction section first extracts the side data from the stego image. Based on this side information, it then does some preprocessing and know the places that have been utilized for data hiding. Last of all, it finds the secret message according to the equivalent algorithm. In[20] such a place adaptive method is applied to the spatial LSB domain. The absolute difference between 2 contiguous pixels is used as the measure for place selection, and the LSBMR is used as the data hiding algorithm. The experimental results calculated on huge figure of images using different steganalytic algorithms reveal that both visual quality and security of stego images are enhanced hugely as compared to LSB-based approaches.

### **DWT using non-adaptive steganography**

We have 2 familiar domains for hiding the secret data. They are spatial domain and transform domain. The Least Significant Bit (LSB) replacement is an example of the spatial domain. Thus far, LSB is the favorite method which is used for embedding the data because it is very easy to apply, offers high embedding capacity, and gives an easy way to organize the stego-image quality. But, it has little robustness to adjustments which can be made to the stego-image, for example low pass filtering, compression and little imperceptibility. The other class of technique for entrenching the data is the transform domain that overcome the robustness and imperceptibility troubles found in the LSB substitution techniques. There are many different transforms existing for hiding the secret data. The normally used transforms are: the discrete cosine transform, DCT which is used in the image compression format MPEG and JPEG, the discrete wavelet transform, DWT and the discrete Fourier transform, DFT. Many current researches are proposed for the use of DWT as it is used in the new image compression format MPEG4 and JPEG2000, various examples of using DWT can be seen in [23]. In [23], the secret data is entrenched into the high frequency coefficients of the wavelet transform at the same time leaving the low frequency coefficients subband unaffected. A little mathematical operations are performed on the secret data before entrenching. These methods and a clever mapping table stay the messages away from destroying and stealing from intended users on the internet and therefore offer acceptable security. In [24], a novel distortionless image data hiding algorithm based on integer wavelet transform (IWT) that can turn around the stego-image into the original image without performing any distortion after extracting the hidden data is given. Integer Wavelet Transforms maps integer with integer. This technique embeds the data into one or more middle bitplane(s) of the integer wavelet transform coefficients in the middle and high frequency subbands. It can hide more data as compared to the existing distortionless data embedding techniques and it satisfy the imperceptibility criteria. The image histogram alteration is utilized to keep away from grayscales from probable overflowing. A secret key function is utilized that keeps the secret data secret still after the algorithm is revealed. And hence, the lossless recovery of original image is attained. Various benefits of transform domain methods are their large capacity to tolerate noises and some signal processing activities but they are computationally very complex and slower.

### **DWT using adaptive steganography**

B.Lai and L.Chang [16] gave an adaptive embedding capacity function to determine how many bits of the secret message is to be entrenched in each of the wavelet coefficients. The original image is separated into 8\*8 sub-blocks. The method that used was Haar Discrete Wavelet Transform(HDWT).Each block is divided to obtain LL1,HL1,LH1and HH1 bands. Because human eyes are not sensitive to the edge area ,more data is entrenched when the band LL1 is complex. A data embedding capacity function is employed to find out the

complexity of LH1,HL1and HH1 bands. If these 3 subbands are complex, the LL1 band is divided and additional data bits are entrenched in the further decomposed LH2,HL2 and HH2 bands. This method does better than other methods in data entrenching capacity and image quality. Wavelet domain allow us to embed data in those places that the human eyes is less perceptive to, for example, the high resolution detail bands (HL, LH and HH). Entrenching data in these areas let us to raise the robustness. It also keep good visual quality. Integer Wavelet Transform maps an integer data set into another integer data set. In the Discrete Wavelet Transform, wavelet filters have floating point coefficients so that when we entrench data in their coefficients any truncations of the floating point values of the pixels that should be integers may cause the loss of the entrenched data. This may direct to the breakdown of the data embedding system. In line to avoid the troubles of floating point precision of the wavelet filters when the input data is integer as in digital images, the output data will no longer be integer that doesn't allow perfect rebuilding of the input image. And in this case there will be no loss of data through forward and inverse transform. Because of this differentiation among Integer Wavelet Transform and Discrete Wavelet Transform, the LL sub band in the case of Integer Wavelet Transform appears to be a close copy with lesser level of the original image at the same time in the case of DWT the resulting LL subband is distorted. Lifting scheme is one of the technique which can be utilized to carry out integer wavelet transform. R.O.El Safy et al.[25] gave an adaptive data hiding method that is tied with the use of optimum pixel adjustment algorithm to entrench the data into the integer wavelet coefficients of the cover image so as to increase the data hiding capacity as much as possible. A particular pseudorandom generator function is utilized to pick the entrenching regions of the integer wavelet coefficients to increase the system security. The system entrench the secret data in a random order by utilizing a secret key that is only well-known to sender and receiver. This system entrenches different number of bits in every wavelet coefficient according to a entrenching capacity function so as to increase the entrenching capacity without giving up the visual quality of resultant stego image. The system also reduce the difference between the original coefficients values and modified values by using the optimum pixel adjustment algorithm. Experiments and the obtained results revealed that this system gives greater entrenching capacity up to 48% of the cover image size with sound image quality and high security because of using random insertion of the secret message except the system go through low robustness against different attacks like histogram equalization and JPEG compression.

### Analysis of adaptive and non-adaptive methods of steganography

Table 1: Adaptive and Non-adaptive methods

<i>Steganographic Techniques</i>	<i>Cover Media</i>	<i>Description</i>	<i>Advantages</i>
1) Non-adaptive LSB	Image	This technique embeds a secret message into the cover image by replacing the x LSBs of the cover image with x message bits to arrive at the stego image.	Easy and simple way of entrenching secret data.
2) Adaptive LSB	Image	In this method, the	Fine visual quality.

		entrenching of the secret data into the cover image is done by adapting any of the local characteristics of the image.	
3)Non-adaptive DWT	Image	In this method, the wavelets are used to entrench the secret data. The secret message is entrenched into the high frequency coefficients of the wavelet transform while leaving the low frequency coefficients subband unchanged.	It can entrench more data compared with the existing distortion less data hiding techniques and suit the imperceptibility condition.
4)Adaptive DWT	Image	A function is used to select the embedding regions of the integer wavelet coefficients. The integer wavelet coefficients are used to hide the secret data.	Entrenching capacity is maximized.

#### 4. Results

**Table 2: Study of Results**

Sr. No.	Steganographic Algorithms	Average PSNR
1	Non-adaptive LSB	62.2
2	Adaptive LSB	61.9
3	Non-adaptive DWT	33.13
4	Adaptive DWT	31.35

The average Peak Signal-to-Noise ratio, PSNR of non-adaptive steganographic method with Least Significant Bit is 62.2. The average Peak Signal-to-Noise ratio of adaptive steganographic algorithm using Least Significant Bit is 61.9. The average PSNR of non-adaptive steganographic algorithm utilizing Discrete Wavelet Transform is 33.13 and that of adaptive steganographic algorithm using Discrete Wavelet Transform is 31.35 but both of them have very high hiding capacity.

## 5. Conclusions and Future Scope

Steganography is used in different applications. In some applications, non-adaptive steganography is used whereas in some applications, steganography is modified by adapting some of the local characteristics of the image leading to adaptive steganography. This paper gives a laconic overview of adaptive and non-adaptive LSB methods as well as adaptive and non-adaptive DWT method.

In future, adaptive and non-adaptive steganographic techniques can be fused together. This fused approach will give us greater security as trespasser will not be capable to perceive that what technique exactly we have used non-adaptive or adaptive.

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# ACCOMPLISHMENT OF CRYPTOGRAPHY USING NEURAL NETWORK IN ARTIFICIAL INTELLIGENCE

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## ABSTRACT

*In the recent years there has been quite a development in the field of artificial intelligence one of which has been the introduction of the artificial neural networks (ANN). The ANN can be considered as an information processing unit which to a great extent resembles the working of the human brain. Its utilization has spread through various fields namely bioinformatics, stock market predictions, medical science, weather forecasting etc. One of these fields in which ANN has been indispensable is cryptography. Recently there has been quite a study going on various encryption methods based on neural nets comprising of single layer or multilayer perceptron models. This field of cryptography is more popularly known as Neural Cryptography. Cryptography is the one of the main categories of computer security that converts information from its normal form into an unreadable form. An Artificial Neural Network (ANN) is an information processing paradigm that is inspired by the way biological nervous systems, Neural Network (NN) has emerged over the years and has made remarkable contribution to the advancement of various fields of endeavor. The purpose of this paper is to using neural networks on Cryptography, In this paper also, I have examined and analysed the various architectures of NN.*

**Keywords:** *-Artificial neural network, Cryptography, Decryption, Encryption, multilayer perceptron, optimal neural network.*

## 1. Introduction

Cryptography refers to the tools and techniques used to make messages secure for communication between the participants and make messages immune to attacks by hackers. Cryptography uses mathematical techniques for information security. The cryptography deals with building such systems of security of news that secure any from reading of trespasser. Systems of data privacy are called the cipher systems. The file of rules are made for encryption of every news is called the cipher key. Encryption is a process, in which we transform the open text, e.g. message to cipher text according to rules. Cryptanalysis of the news is the inverse process, in which the receiver of the cipher transforms it to the original text. The cipher key must have several heavy attributes. The best one is the singularity of encryption and cryptanalysis. The open text is usually composed of international alphabet characters, digits and punctuation marks. The cipher text has the same composition as the open text. Very often we find only characters of international alphabet or only digits. The reason for it is the easier transport per media. The next cipher systems are the matter of the historical sequence: transposition ciphers, substitution ciphers, cipher tables and codes. Simultaneously with secrecy of information the tendency for reading the cipher news without knowing the cipher key was evolved. Cipher keys were watched very closely. The main goal of cryptology is to guess the cipher news and to reconstruct the used keys with the help of

goodanalysis of cipher news. It makes use of mathematical statistics, algebra, mathematical linguistics, etc., as well as known mistakes made by ciphers too. The legality of the open text and the applied cipher key are reflected in every cipher system. Improving the cipher key helps to decrease this legality. The safety of the cipher system lies in its immunity against the decipher. The goal of cryptanalysis is to make it possible to take a cipher text and reproduce the original plain text without the corresponding key. Two major techniques used in encryption are symmetric and asymmetric encryption. In symmetric encryption, two parties share a single encryption-decryption key. The sender encrypts the original message (P), which is referred to as plain text, using a key (K) to generate apparently random nonsense, referred to as cipher text

(C), i.e.:

$C = \text{Encrypt}(K, P)$

(1) Once the cipher text is produced, it may be transmitted. Upon receipt, the cipher text can be transformed back to the original plain text by using a decryption algorithm and the same key that was used for encryption, which can be expressed as follows:

$P = \text{Decrypt}(K, C)$

(2) In asymmetric encryption, two keys are used, one key for encryption and another key for decryption. The length of cryptographic key is almost always measured in bits. The more bits that a particular cryptographic algorithm allows in the key, the more keys are possible and the more secure the algorithm becomes. The following key size recommendations should be considered when reviewing protection:

Symmetric key: • Key sizes of 128 bits (standard for SSL) are sufficient for most applications.

• Consider 168 or 256 bits for secure systems such as large financial transactions Asymmetric key:

- Key sizes of 1280 bits are sufficient for most personal applications
- 1536 bits should be acceptable today for most secure applications
- 2048 bits should be considered for highly protected applications. Hashes:
- Hash sizes of 128 bits (standard for SSL) are sufficient for most applications
- Consider 168 or 256 bits for secure systems, as many hash functions are currently being revised (see above). NIST and other standards bodies will provide up to date guidance on suggested key sizes.

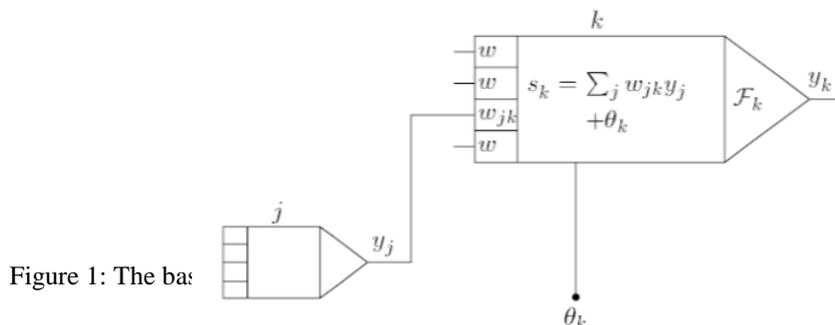
## 2.Artificial Neural Network (Ann)

Artificial Neural Network is an information processing and modelling system which mimics the learning ability of biological systems in understanding unknown process or its behaviour. ANN is configured for a specific application, such as pattern recognition or data classification, through a learning process. Learning in biological systems involves adjustments to the synaptic connections that exist between the neurons. This is true of ANNs as well. ANNS have developed as generalizations of mathematical models of human cognition or neural biology. Based on the assumptions that:

1. Information procures at many simple elements called neuron.
2. Signals are passed between neurons over connection links.
3. Each connection link has associated weight. Which in a typical neural net multiplies the signal transmitted?
4. Each neuron applies an activation function usually nonlinear to its net input (sum of weighted input signals) to determine its output signal.

An Artificial Neural Network is a network of many very simple processors (units), each possibly having a (small amount of) local memory. The units are connected by unidirectional communication channels which carry numeric data. The units operate only on their local data and on the inputs they receive via the connections. The design motivation is what

distinguishes neural networks from other mathematical techniques: A neural network is a processing device, either an algorithm, or actual hardware, whose design was motivated by the design and functioning of human brains and components.



There are many different types of Neural Networks, each of which has different strengths particular to their applications. The abilities of different networks can be related to their structure, dynamics and learning methods.

### 3. Cryptography Techniques

Cryptography is usually referred to as —the study of secretl. Encryption is the process of converting normal text to unreadable form; while decryption is the process of converting encrypted text to normal text in the readable form. Important aspects of encryption and decryption are privacy, authentication, identification, trust and verification. As the security demand increases the cost of cryptography algorithm increases [1]. There are two types of cryptosystems; symmetric cryptosystems and asymmetric cryptosystems. Symmetric cryptosystems use the same key for encryption and decryption. On the other hand, asymmetric cryptosystems use two different keys; a public key for encryption and a private key for decryption. Furthermore, symmetric encryption algorithms are very efficient at processing large amounts of information and computationally less intensive than asymmetric encryption algorithms. There are two types of symmetric encryption algorithms: stream ciphers and block ciphers which provide bit-by-bit and block encryption respectively.

### 4. Architecture Of Neural Networks

Neural networks are not only different in their learning processes but also different in their structures or topology, can be divided the network architectures into the following classes:

#### □ Basic Architecture of a Feed-forward Network

The feed-forward network topology illustrated in Fig.2 permits signals to travel one way only, from the input through the hidden layer to the output layer. These types of networks are somehow straight forward and associate inputs with outputs. This kind of organization is also referred to as bottom-up or top-down and commonly used in pattern recognition. Fig.2 also shows the commonest type of artificial neural network which consists of two layers. The hidden layer neurons are connected to the output layer neurons. The functions of each layer in the network are defined below:

- The input layer neurons represent the pre-processed data fed into the network.
- The input of each hidden layer neuron is defined by the sum of the input vector set and the connection weights between the input layer and hidden layer.
- The input of the output neuron is determined by the weighted sum of outputs of the hidden layer neurons.

d) The output of a neuron is defined by the type of the transfer function used in that specific layer. This type of network is attractive because the hidden neurons are free to develop their individual representations from the input set.

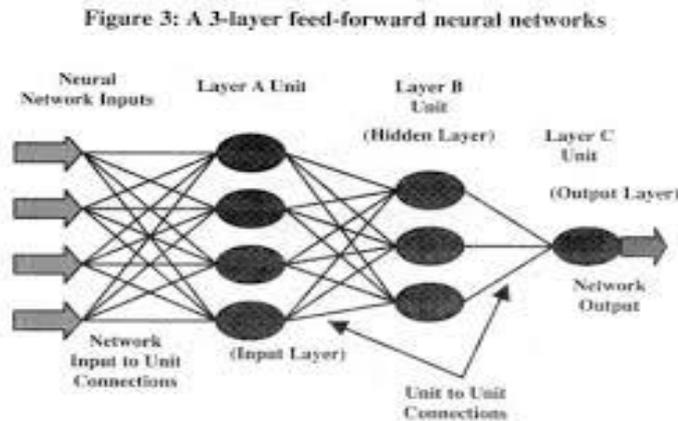


Fig. 2: Architecture of a feedforward neural network

### The Perceptron – A Network for Decision Making

The perceptron, a basic neuron, invented by Rosenblatt in 1957 at the Cornell Aeronautical Laboratory in an attempt to understand human memory, learning, and cognitive processes prior to his demonstration on the first machine that could "learn" to recognize and identify optical patterns in the early 1960. The mathematical model of the perceptron or artificial neuron is modelled in the similar manner of the biological architectural set-up. Again, the three major components are considered: Axons and synapses of the neuron are modelled as inputs and weights respectively.[6] The strength of the connection between an input and a neuron is denoted by the value of the weight. The mathematical model of this topology is illustrated in Fig.3.

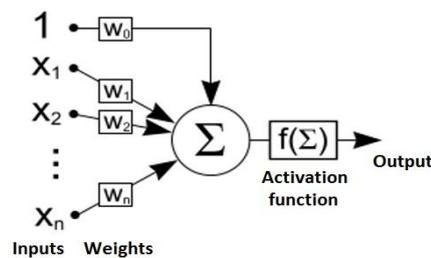


Fig.3: A perceptron model

## 5. Learning Of Artificial Neural Networks

By learning rule we mean a procedure for modifying the weights and biases of a network. The purpose of learning rule is to train the network to perform some task. They fall into three broad categories:

**1. Supervised learning** -The learning rule is provided with a set of training data of proper network behaviour. As the inputs are applied to the network, the network outputs are compared to the targets. The learning rule is then used to adjust the weights and biases of the network in order to move the network outputs closer to the targets.

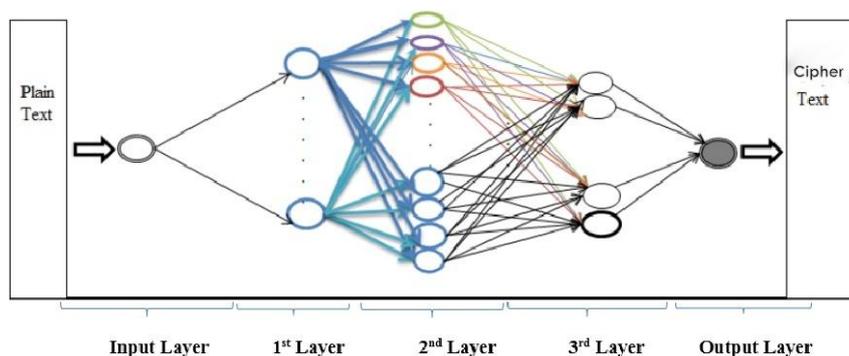
**2. Reinforcement learning**-it is similar to supervised learning, except that, instead of being provided with the correct output for each network input, the algorithm is only given a grade. The grade is a measure of the network performance over some sequence of inputs.

**3. Unsupervised learning**-The weights and biases are modified in response to network inputs only. There are no target outputs available. Most of these algorithms perform some kind of clustering operation. They learn to categorize the input patterns into a finite number of classes.

## 6. Design Of Cryptography Based On Neural Networks

Cryptography is the practice and study of hiding information through techniques based on randomness. So, in neural cryptology, the ANN has to be a form of random topology. The structure of networks changes randomly. The training and transfer functions of the network are also selected randomly. ANN with random topology in cryptography is depicted in Fig. 4, the input is plain text that is encrypted by NN- using encryption algorithm and output of NN is Cipher text. The transfer functions and training algorithms are also selected according to the NN-based pseudo-random number generator.

Fig. 4.1:General structure of a block cipher



### 7. Methodology

Multilayer Perceptron Neural Networks are used. MLP NN is as shown in Figure 1. These were adapted by using backpropagation. .

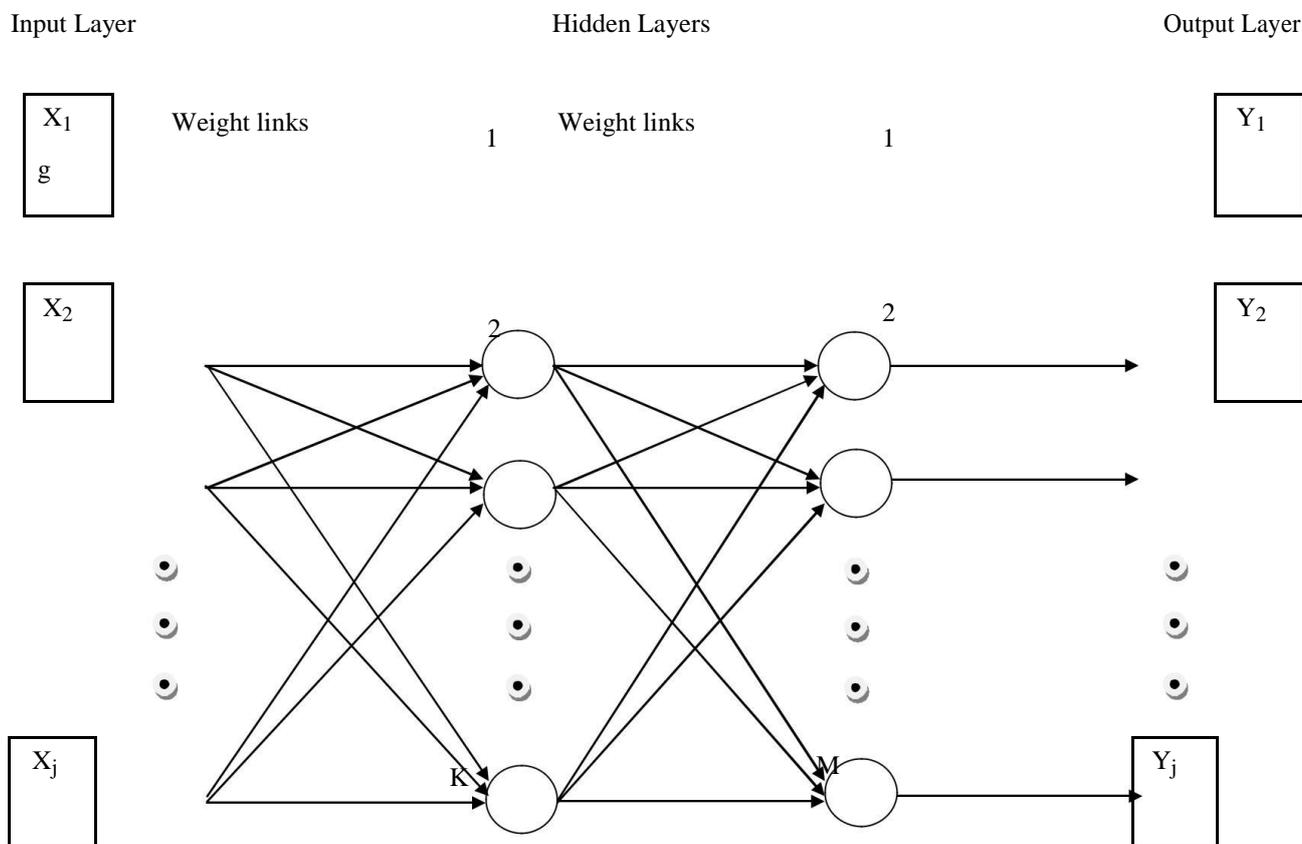


Figure 5 Multilayer Perceptron Neural Network

Usually a fully connected variant is used, so that each neuron from the  $n$ -th layer is connected to all neurons in the  $(n+1)$ -th layer, but there are no connections between neurons of the same layer. A subset of input units has no input connections from other input units; their states are fixed by the problem. Another subset of units is designated as output units; their states are considered the result of the computation. Units that are neither input nor output are called as hidden units [1]. A simple Artificial Neuron is as shown in Figure 2.

Basic computational unit is called as a neuron. It receives the inputs  $x_1, x_2, x_3, \dots, x_n$  which are associated with weights  $w_1, w_2, w_3, \dots, w_n$ . This unit computes:

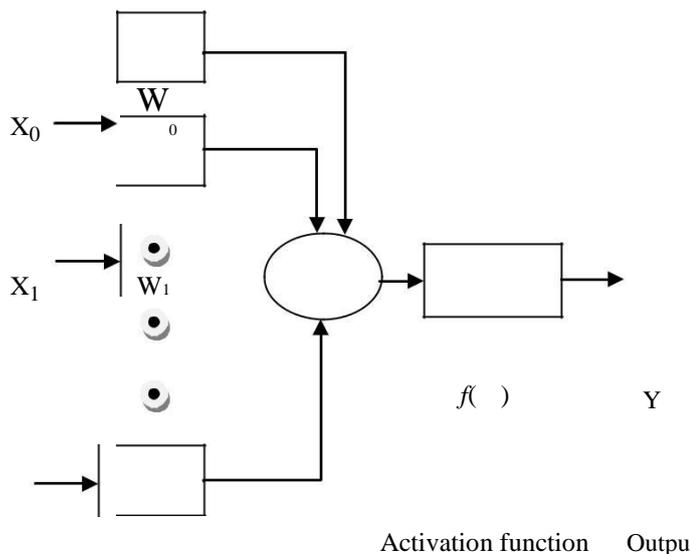
$$y_i = f( \sum_j (w_{ij}x_j) )$$

Where,  $w_{ij}$  refers to the weights from unit  $j$  to unit  $i$  and function  $f$  is unit's activation function

Backpropagation algorithm usually uses a logistic sigmoid activation function as follows:

$$f(t) = 1/(1+e^{-t})$$

Where,  $-\infty < t < \infty$



$X_n W_n$

Inputs Weights

**Figure 5** Simple Artificial Neuron

Backpropagation algorithm belongs to a group of “gradient descent methods”. Backpropagation algorithm searches for the global minimum of the weight landscape by descending downhill in the most precipitous direction. The initial position is set at random selecting the weights of the network from some range. Backpropagation using a fully connected neural network is not a deterministic algorithm. The basic backpropagation algorithm can be summed up in the following equation (the delta rule) for the change to the weight  $w_{ji}$  from node  $i$  to node  $j$ :

$$\Delta w_{ji} = \eta \times \delta_j \times y_i$$

That means weight change ( $\Delta w_{ji}$ ) is equal to the multiplication of learning rate ( $\eta$ ), local gradient ( $\delta_j$ ) and input signal to node  $j$  ( $y_i$ ).

Where, the local gradient  $\delta_j$  is defined as follows:

□ If node  $j$  is an output node, then

$$\delta_j = \varphi'(v_j) \times e_j$$

Where,  $e_j$  is error signal,  $\varphi'()$  is the logistic function,  $v_j$  is the total input to node  $j$  (i.e.  $\sum_i w_{ji} y_i$ ),  $e_j$  is the error signal for node  $j$  (i.e. difference between desired output, actual output)

□ If node  $j$  is a hidden node, then

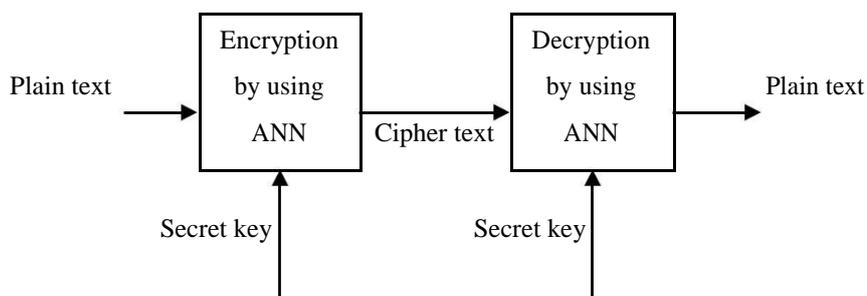
$$\delta_j = \varphi'(v_j) \times \sum_k \delta_k w_{kj}$$

Where,  $\sum_k \delta_k w_{kj}$  is the weighted sum of the  $\delta$ 's computed for the nodes in the next hidden or output layer that are connected to node  $j$  and  $k$  ranges over those nodes for which  $w_{kj}$  is non-zero (i.e. nodes  $k$  that actually have connections

from node  $j$ ). The  $\delta_k$  values have already been computed as they are in the output layer (or a layer closer to the output layer than node  $j$ ).

**Design of optimal mlpnn**

Neural networks are used as an encryption and decryption algorithm in cryptography. The block diagram is as shown in Figure 6. Parameters of both neural networks were then included into cryptography keys (i.e. Secret keys). Topology of each neural network is based on their training sets



**Figure 6.**Block of Cryptography by using ANN

As an example of the encryption process, the encryption is performed on input string of digits where each digit is developed using 6-bits and also 6-bit output has to be produced after the encryption process (refer to Table 1).

**Table 1:** Training sets with plain digits and corresponding cipher text

THE PLAIN TEXT			THE CIPHER TEXT
Character	ASCII code (DEC)	The chain of bits	The chain of bits
0	48	110000	111111
1	49	110001	110010
2	50	110010	101100
3	51	110011	111010
4	52	110100	101010

5	53	110101	100011
6	54	110110	111000
7	55	110111	000111
8	56	111000	010101
9	57	111001	110011

Thus, both encryption and decryption systems were designed using MLP NN as follows:

- 6 bit input to single hidden layer MLP NN.
- 6 bit output from the single hidden layer MLP NN.
- There is no predetermined number of units in the hidden layer.

Both networks were trained on binary representations of symbols (i.e. digits). In each training set, chains of numbers of the plain digits are equivalent to binary values of their ASCII code and the cipher text is a random chain of 6 bits

The security for all encryption and decryption systems is based on a secret key. Simple systems use a single key for both encryption and decryption (i.e. symmetric cryptography). The robust systems use two keys (one for encryption and another one for decryption i.e. asymmetric encryption). If we use the neural network as encryption and also decryption algorithm, their keys have adapted neural networks parameters; which are their topologies (architecture) and their configurations (weight values on connections in the given order)

Generally, for single hidden layer MLP NN each key is written as follow:

[Input, Hidden, Output, Weights coming from the input units, Weights coming from the hidden units] Where,

- Input is the number of binary inputs to MLP NN.
- Hidden is the number of neurons in the hidden layer.
- Output is the number of binary output from MLP NN.
- Weights coming from the input units are weight values coming from the input to hidden units in a predefined order.
- Weights coming from the hidden units are weight values coming from the hidden units to output units in a predefined order

Parameter values of encrypting MLP NN in our experimental study are the following:

- Input layer consists of 6 bit binary input.
- Output layer consists of 6 bit binary output, used to define the encrypted output message.
- Fully connected networks.
- A sigmoid activates function.

In this model, a 6-bit plain text is entered and a 6-bit cipher text is the output.

For example, if we want to send the following message of some digits:

"258025001253456"

Encryption process is as follows:

The plain text is coded into the chain:

(110010110101111000110000110010110101110000110000110001110010110101110011110100110101110110)

Now, break it down into blocks (N=6), thus:

110010 110101 111000 110000 110010 110101 110000 110000 110001 110010 110101 110011 110100 110101 110110

The corresponding cipher text is the following:

(1011001000110101011111111011001000111111111111111110010101100100011111010101010100011111000)

The encrypted data will then be transmitted to the recipient.

After training the MLP NN for maximum 100 epochs (three times each with number of hidden neurons from 2 to 20) for the given data sets using MATLAB the plot of average mean square error (mse) verses number of neurons and plot of average accuracy verses number of neurons are obtained as shown in Figure 7 and Figure 8 respectively.

It is required to get minimum mse and maximum accuracy. When number of hidden neurons is 5, then both minimum error and maximum accuracy are achieved as per Figure 7 and Figure 8. Therefore, optimal configuration for the encryption MLP NN is 5 sigmoidal neurons in the hidden layer with 6 bit inputs and 6 bit outputs. Similarly, MLP NN for the decryption process could be design.

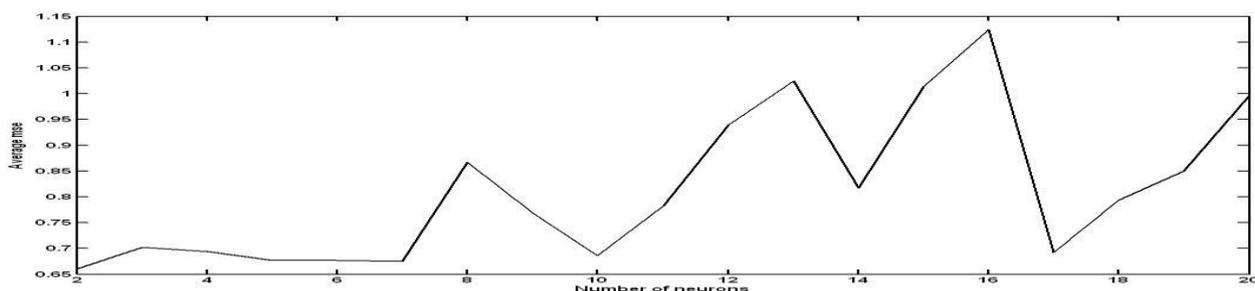


Figure 7 Plot of Average mse verses number of neurons

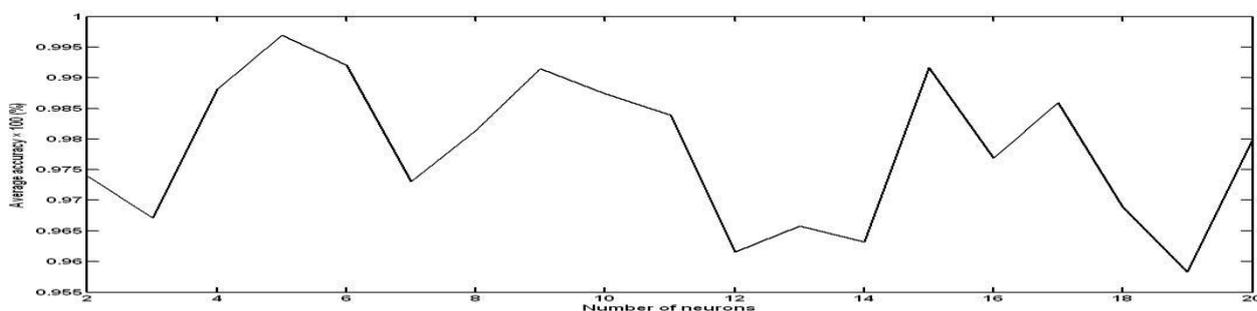


Figure 8 Plot of Average accuracy verses number of neurons

## 8. Conclusions

Next development in robust cryptography is represented by neural network application. Optimal neural network with minimum number of neurons is designed to get minimum error and maximum accuracy for cryptography application. The limitations of this type of system are few, but potentially significant. This is effectively a secret-key system, with the key being the weights and architecture of the network. With the weights and the architecture, breaking the encryption becomes trivial. However, both the weights and the architecture are needed for encryption and decryption. Knowing only one or the other is not enough to break it. The advantages to this system are that it appears to be exceedingly difficult to break without knowledge of the methodology behind it, as shown above. In addition, it is tolerant to noise. Most messages cannot be altered by even one bit in a standard encryption scheme.

- The computing world has a lot to gain from neural networks. Their ability to learn by example makes them very flexible and powerful.
- Neural network will never replace conventional methods, but for a growing list of applications, the neural network architecture will provide for a complement to these existing techniques.
- Artificial Neural Networks is a powerful technique that has the ability to emulate highly complex computational machines. We have used this technique to build cryptography systems.
- The use of ANN in the field of Cryptography is very good method because the NN can process information in parallel, at high speed, and in a distributed manner.

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# NEXT GENERATION, 5G TECHNOLOGY FOR MOBILE COMMUNICATION

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## ABSTRACT

*The major contribution of this paper is the key provisions of mobile communication through 5G (Fifth Generation) technology of which is seen as consumer oriented. In 5G technology and mobile consumer has given top priority over others. 5G technology is to make use of mobile phones within very high bandwidth. The consumer never experienced the utmost valued technology as 5G. The 5G technologies comprise all types of sophisticated features which make 5G technology most governing technology in the vicinity of future. 5G technologies will change the way most high-bandwidth users access their phones. With 5G people will experience a level of call volume and data transmission never experienced before. 5G technology is offering the services in different fields like Documentation, supporting electronic transactions (e-Payments, e-transactions) etc. As the customer becomes more and more aware of the mobile phone technology, he or she will look for a decent package all together, including all the advanced features a cellular phone can have. The 5G design is based on user-centric mobile environment with many wireless and mobile technologies on the ground. WWW that is World Wide Wireless Web allows complete wireless communication with almost no limitation, Multi-Media Newspapers, watch TV programs with the clarity as to that of an HD TV.*

**Keywords:** 5G Technology, WLAN, Evolution of wireless technologies, GSM, LTE.

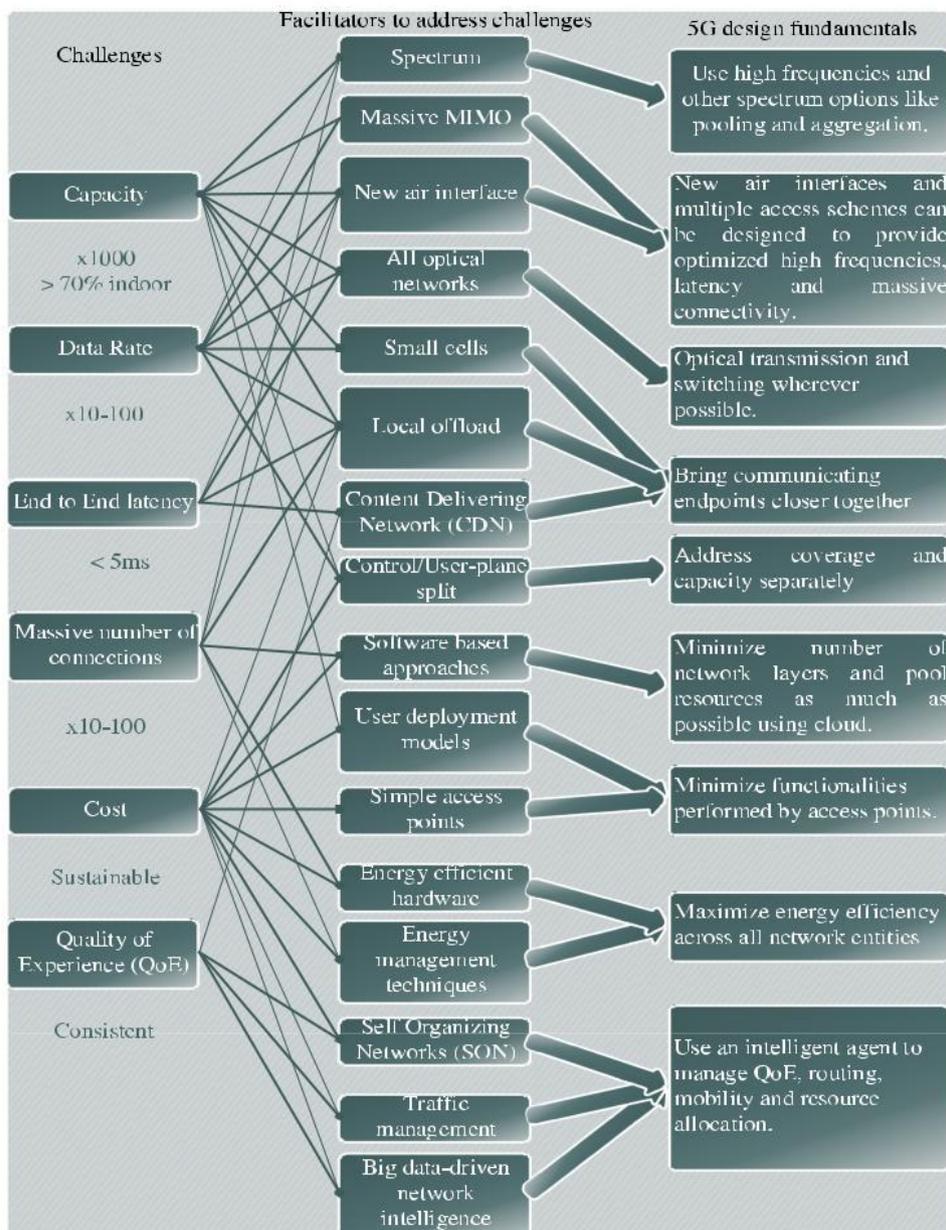
## 1. Introduction

Mobile and wireless networks have made significant improvement in the last few years. At the current time many mobile phones have also a WLAN adapter. One may expect that near soon many mobile phones will have Wax adapter too, besides their 3G, 2G, WLAN, Bluetooth etc. adapters. We are using IP for generations, 2.5G or 3G Public Land Mobile Networks (PLMN) on one side and

WLAN on the other, developed study on their incorporation. With reference to the 4G, its focal point is towards flawless integration of cellular networks such as GSM and 3G. The multiple consumers put plants as it should be for 4G, but private security mechanisms and private support for the operating system in the wireless test techniques remain. However, the application of a combination of different wireless networks (such as PLMN and WLAN) is in practice until the present time. Although, different wireless networks from only terminal are used absolutely, there is no combining of dissimilar wireless access technologies for an equal session (e.g., FTP download). The predictable Open Wireless Architecture (OWA) in is targeted to offer open baseband processing modules with open interface parameters. The OWA is related to MAC/PHY layers of future (4G) mobiles. New error-control schemes can be downloaded from the Internet and augmentation is seen towards the customer terminals as a focus on the 5G mobile networks. The 5G terminals will have software defined radios and modulation scheme and the 5G mobile terminals will have access to diverse wireless technologies at the same time. And also 5G mobile terminal should be proficient to merge special flows from different technologies. The 5G terminal will make the final selection among diverse mobile access network providers for a

particular service. The network will be reliable for managing user-mobility. The paper gives the concept of intelligent Internet phone where the mobile can prefer the finest connections.

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## 2.Challenges In Migration From 4g To 5g

Presently, 5G is not a term officially used for any particular specifications.3GPP standard release beyond 4G and LTE [4]. 5G Technology is a name used in a range of research papers and projects to point to the next most significant stage of mobile communication values beyond the 4G standards. The execution of standards under a 5G umbrella would likely be around the year of 2020. The following are the main constraints for migrating from 4G to 5G.

### 1. Multi-mode user terminals

This trouble caused by means of 4G can be solved by using software radio approach. There will be an essential to design a single user terminal that can operate in different wireless networks and overcome the design troubles such as boundaries on the size of the device, its cost and power utilization.

## **2. Choice among various wireless systems**

Every wireless system has its distinctive characteristics and roles. The choice of most suitable technology for a specific service at a specific place and at precise time will be applied by making the choice according to the best possible fit of consumer QoS (Quality of Service) requirements.

## **3. Security**

Mechanisms with adaptive, reconfigurable, and lightweight protection should be designed.

## **4. Network infrastructure and QoS support**

Integrating the current non-IP and IP-based systems and providing QoS assurance for end-to-end services that engage different systems is a challenge.

## **5. Charging and Billing**

It is hard to accumulate, handle and accumulate the Consumers' account information from many service providers. Consumers' billing is also a difficult task. Attacks on Application Level Software applications will offer new feature to the consumer, but will commence new bugs.

## **6. Jamming and spoofing**

Criminals can make use of such techniques. Jamming occurs when a transmitter sending out signals at the same frequency shifts a GPS signal. Spoofing is fake GPS signals being sent out, in which case the GPS receiver considers that the signals arrives from a satellite and computes the wrong coordinates Data Encryption. If a GPS receiver will communicate with the main transmitter then the communication link between these two is not tough to break and consumer must use encrypted data.

## **3.Features Of 5g Technology**

- [1]. In Capacity -1000x higher data volumes and 10-100x higher data rates to end user.
- [2]. Low Latency –Latency decrease by a factor of 5 in order to enable remote presence, tactile internet, etc.services.
- [3]. Increase in number of connected device- up to 300,000 will be served per access point.
- [4]. Increase in Efficiency- Energy, Spectrum like resource utilization higher.
- [5]. Increase in reliability- 5G will be deliver extremely reliable connections (Typically 99.999% Availability).
- [6]. 5G support to Internet of Thing, Smart Home Appliances, Autonomous Car and it also applicable in following
- [7]. Area- Health, Transport, Agriculture and Education.
- [8]. 5G provide uniform, uninterrupted, and consistent connectivity across the world.

## **4. Hardware Of 5g**

- [1]. UWB Networks: higher bandwidth at low energy levels. This short-range radio technology is ideal for wireless personal area networks (WPANs). UWB complements existing longer range radio technologies –such as Wi-Fi, WiMAX, and cellular wide area communications – that bring in data and communications from the outside

world. UWB provides the needed cost-effective, power-efficient, high bandwidth solution for relaying data from host devices to devices in the immediate area (up to 10 meters or 30 feet).

[2]. Bandwidth: 4000 megabits per second, which is 400 times faster than today's wireless networks.

[3]. Smart antennas.

- a. Switched Beam Antennas: Switched Beam Antennas support radio positioning via Angle of Arrival (AOA) information collected from nearby devices.
- b. Adaptive Array Antennas: The use of adaptive antenna arrays is one area that shows promise for improving capacity of wireless systems and providing improved safety through position location capabilities. These arrays can be used for interference rejection through spatial \_altering, position location through direction ending measurements, and developing improved channel models through angle of arrival channel sounding measurements.

[4]. Multiplexing: CDMA (Code Division Multiple Access) CDMA employs analog-to-digital conversion (ADC) in combination with spread spectrum technology. Audio input is first digitized into binary elements. The frequency of the transmitted signal is then made to vary according to a defined pattern (code), so it can be intercepted only by a receiver whose frequency response is programmed with the same code, so it follows exactly along with the transmitter frequency. There are trillions of possible frequency-sequencing codes, which enhance privacy and makes cloning difficult.

## 5. Software Of 5g

1) 5G will be single unified standard of different wireless networks, including LAN technologies, LAN/WAN, WWW - World Wide Wireless Web, unified IP & seamless combination of broadband.

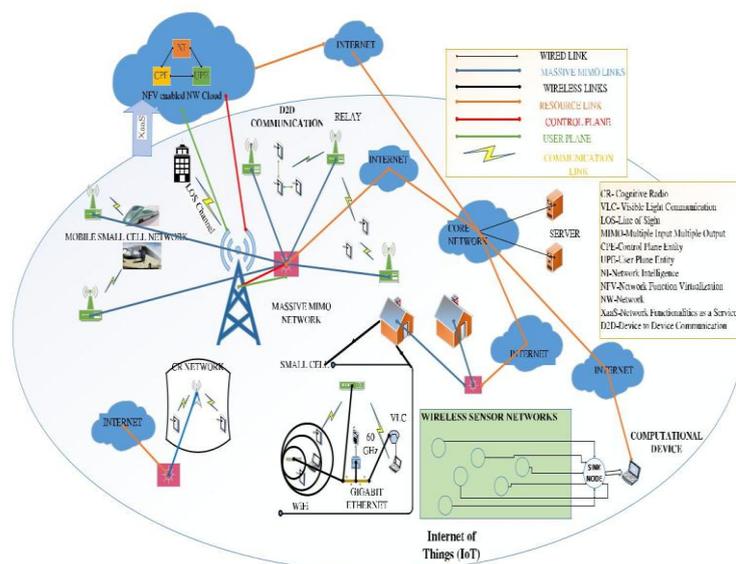
2) Software defined radio (SDR), Packet layer, Implementation of Packets, Encryption, Flexibility, Anti-Virus.

## 6. Architecture & Working Of 5g

It is necessary to look thoughtfully for 5G network in the market now, it is clear that the multiple access techniques in the network are still available and requires some improvement. The current technologies like OFDMA will be work at least for next 50 years. By taking this into consideration, it is not necessary to have a change in the wireless setup which had come about from 1G to 4G. Correspondingly, it only needs the improvement to be done at the fundamental network to fulfil user requirements. To fulfil user requirements and to reduce the challenges that has been introduced in the 5G system, an effective change in the technique of designing the 5G wireless cellular architecture is needed. According to observation of the researchers, most of the wireless users stay inside for up to 80% of time and outside for up to 20 % of the time. In these wireless cellular network architecture, for a mobile user wish to communicate either inside or outside, an outside base station located at the middle of a cell helps in communication. When the inside users wants to communicate with the outside base station, the signals has to travel through the walls of the indoors, and it will result in very high penetration loss, which alternatively reduced the spectral efficiency, data rate, and energy efficiency of wireless communications. To overcome these challenges, a new designing technique that has come in to market for implementing the 5G cellular architecture is to distinct outside and inside setups. With the help of this designing technique, the penetration loss through the walls of the building will be slightly reduced. This technique will be implemented with the help of some standard technologies like massive MIMO technology, which deployed geographically distributed array of antenna's which include tens or hundreds of antenna units. Not only MIMO systems are using either two or four antennas, but also the idea of massive MIMO systems has come up with utilization of the advantages of large array antenna

elements in terms of huge capacity gains. To implement a large massive MIMO network, basically it having two stages- First, the outside base stations will be attached with large antenna arrays and they are distributed around the some hexagonal cell and connected to the base station via optical fibre cables, which are aided with massive MIMO technologies. The mobile users present at outside are basically attached with few number of antenna units but a large virtual antenna array can be built with cooperation, which antenna arrays of base station will together form virtual massive MIMO links. Second, for every building their will be large antenna arrays from outside, to communicate with outdoor base stations using line of sight components. To communicate with indoor users the wireless access points being installed inside the building which will be connected with the large antenna arrays via cables. This will improve the energy efficiency, cell average throughput, data rate, and spectral efficiency of the cellular system but at the high rate of increased infrastructure cost. As larger antenna arrays remained installed outside the buildings, the inside users will only have to communicate with inside wireless access points. For small range communications (Indoor communication) having large data rates there are some of technologies like Wi-Fi, Small cell, ultra-wideband, millimetre wave communications, and visible light communications are very useful. But there are some of the technologies like millimetre wave and visible light communication they requires higher frequencies which are not useful for cellular communications. But these high frequency waves are not efficient for outside and long distance applications because these waves will not infiltrate from dense materials efficiently and can easily be dispersed by rain droplets, gases, and flora. As millimetre waves and visible light communication technologies come up with large bandwidth can improve the transmission data rate for indoor setups. As we seen with the introduction of new spectrum, which is not being efficiently used for wireless communication, there is one more method to solve the spectrum shortage problem by improving the spectrum utilization of current radio spectra through cognitive radio (CR) networks. The 5G cellular network architecture explained above, having equal importance in terms of front end and backhaul network. In this paper, we introduced general 5G cellular network architecture as shown in Fig. 1. It shows the interconnectivity between different emerging technologies will be like Massive MIMO network, Cognitive Radio network, and mobile and static small-cell networks. It also explains the role of network function virtualization (NFV) cloud in the 5G cellular network architecture. Similarly this 5G cellular network architecture has also included the concept of D2D communication, small cell access points and IoT. In short, this 5G cellular network architecture may provide a very good platform for future 5G standardization network

**FIGURE 1.** A general 5G cellular network architecture.



**COMPARATIVELY STUDY OF 4G AND 5G**  
**TABLE I.**  
**TECHNICAL COMPARISON BETWEEN 4G AND 5G.**

Sr. No.	Specification	4G (Fourth Generation)	5G (Fifth Generation)
1.	Data Bandwidth	Up to 100Mbps	Greater than 1Gbps
2.	Frequency Band	2GHz to 8GHz	3GHz to 300GHz
3.	Standards	OFDMA, MC-CDMA, N/W-LMPS	CDMA and BDMA
4.	Technologies	unified IP, seamless integration of broadband LAN/WAN/PAN and WLAN	4G and advanced technologies based on OFDM modulation used in 5G
5.	Service	Dynamic information access, wearable devices, HD streaming, global roaming	Dynamic information access, wearable devices, HD streaming, any demand of users with all Capabilities
16.	Multiple Access	CDMA	CDMA,BDMA
7.	Core Network	All IP network	Flatter IP network, 5G network Interfacing(5G-NI)
8.	Hand Off	Horizontal and vertical	Horizontal and vertical
9.	Initiation Form	year-2010	year-2015
10.	Multiplexing	CDMA	CDMA
11.	Switching	Packet	Packet
12.	Antenna Type	Sub wavelength antenna	Array antennas
13.	Radiation Pattern	Omnidirectional	Directional fan-beam
14.	Diversity and MIMO	Present	Present

15.	Deployment	2000-2010	By 2020
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## 8.Applications Of 5g Technology

The 5G technology applications are set to evolve in a multiplatform environment. 4G applications will be available across various wireless technologies like LTE, Wi-Fi, etc. and also in devices like cell phones, laptops-readers, digital cameras, printers and so on. 4G applications are very likely to be extended and improved versions of the existing 3G services, but it is still unclear what the capacity of 4G will hold for the mobile world. Some of the applications of 5G networks are;

- [1]. Education: For people who are interested in lifelong education, 4G provides a good opportunity. People anywhere in the world can continue their education through online in a cost effective manner.
- [2]. Crisis management: Natural disasters can cause breakdown in communication systems. In today's world it might take days or weeks to restore the system. But in 4G it is expected to restore such crisis issues in a few hours.
- [3]. Virtual Presence: This means that 5G provide user services at all times, even if the user is off-site. Virtual navigation: 4G provides users with virtual navigation through which a user can access a database of the streets, buildings etc. of large cities. This requires high speed data transmission.
- [4]. Security: This layer also branches across all the layers of the 5G network architecture which perform the function of authentication, authorization, encryption, establishment and implementation of service policy agreement between the various vendors.
- [5]. Tele-Medicine: 5G will support remote health monitoring of patients. A user need not go to the hospital instead a user can get videoconference assistance for a doctor at anytime and anywhere.
- [6]. Tele-geo processing applications: This is a combination of GIS (Geographical Information System) and GPS (Global Positioning System) in which a user can get the location by querying.
- [7]. Artificial Intelligence: More applications combined with artificial intelligent (AI) as human life will be surrounded by artificial sensors which could be communicating with mobile phones.
- [8]. Travelling: Introducing the launch of new mobile phone apps; the use of Bluetooth & NFC technology integrated smartphones in the passenger travel process. Technology is likely to play a role in re-ordering these phases over the next decade, allowing, for example, people to experience a destination virtually before transit, or to seek inspiration and share information live, while they are travelling and experiencing a place.

## 9.Threats Of 5g Implementation

The Following Threats Are Expected From The Application Implementation Of 5G Network As A Future System.

- I). Since All The Network Operators And Service Providers Would Share A Common Core Network Infrastructure, Compromise Of A Single Operator Will Lead To The Collapse Of The Entire Network Infrastructure, If Not Carefully Guide Against.
- Ii). Third-Parties Can Masquerade As Legitimate Users Resulting In Theft Of Service And Billing Frauds Can Easily Arise.
- Iii). Since 5G Is A Secure IP Based Solution It Will Be Vulnerable To All The Security Threats As The Current Internet World.

Application Layer	Application(Services)
Presentation Layer	
Session Layer	Open Transport Protocol
Transport Layer	
Network Layer	Upper Network Layer
	Lower Network Layer
Data link Layer	Open Wireless Architecture
Physical Layer	

Table 2: OSI Layers in 5G Terminal Design.

Iv).On The Lines Of Email-Spam, The Spam Over Internet Telephony (SPIT), The New Spam Over Voip May Become Serious And Become Serious Threats.

V). Spooling Attacks Can Lead To Misdirected Communication And Internet Banking Related Frauds.

Vi).Eavesdropping And Interception Of Private Communications.

Vii). Phishing Attacks, Stealing Bank Account Details And Other Secured Information, Are More Likely.

## 10.Layers Of 5g Networks

As stated earlier, 5G will be completely user centric i.e. nothing is hidden from user. It will have new error prevention schemes that can be installed through internet anytime and have modulation methods and software defined radios.[25]5G will be a collaboration of networks and individual network handle user mobility. This network will be based on Open Wireless Architectures as it has Physical Access Control Layer i.e. OSI Layer. OSI layer are shown in table 2.

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# SURVEY AND REVIEW ON SOFTWARE ENGINEERING MODELS

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## ABSTRACT

*Software engineering goal is to produce a quality software package which is delivered on time, within assigned budget, and by the demand & needs expected by customer but unluckily maximum times this aim is rarely achieved. Software engineering has a continuous growth in research in determining new methodology. The tools and methodologies that has a vast modernization in software maintenance and development to be much more dependable and effective. We will learn that the quality, cost, and schedule are primary forces that control the software project.*

**Keywords:** *Waterfall model, Spiral model, RAD model, Prototype model.*

## 1. Introduction

Here we see the basic terms software, software engineering, software engineering models, their requirements, their designing, their testing and maintenance.

### Software :

The term software in general is a set of instructions and programs instructing a computer for doing particular task or a project.

### Software Engineering :

Software Engineering is elaborated study for engineering to designing, development and maintaining the software. The concept Software Engineering was introduced for addressing the issue of low quality software programs or project. Problems arise when a particular software generally exceeds timelines, budgets, and reduced levels of quality. It assure that the application is built constantly, correctly, on time and on budget and within under requirements.

### Software Engineering Model :

The **software development or engineering models** are distinct processes or methodologies that are selected for the development of the project or application depending on the project's aims or goals. There are many development life cycle models that have always been developed in order to accomplish different needed objectives. The selection of model has very high impact on the testing that is carried out.

The phases of the software engineering models are the main criteria for developing any application project or program or model. They are as follows :

- Gathering the requirement for the particular type of model.
- Designing should be done in a type of blue print.
- Implementation process of design of the particular model.

- Testing process of that models are necessary.
- Maintenance is the main function after the testing of development model.

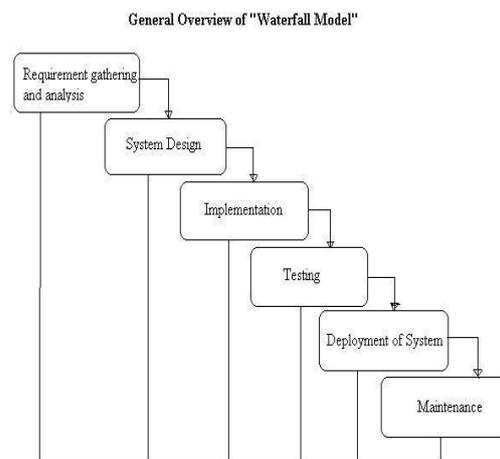
There are various Software development models or methodologies. They are as follows:

- ✓ Waterfall model
- ✓ RAD model
- ✓ Spiral model
- ✓ Prototype model

## 2.Description

### 2.1 Waterfall Model

The Waterfall Model was first Process Model. It reference as a **linear-sequential life cycle model**. It is very simple to understand and adopt. In waterfall model, each stage must be completed altogether before the next stage can begin. This type of software development model is generally used for the project which is small and there are no indistinct requirements. At the end of each stage, a review takes place to determine if the project or model is on the right path and whether or not to continue or discard the project. In this model software testing starts only after the development is complete or whole-hog. In **waterfall model stages** do not overlap or fold over.



#### Advantages of waterfall model:

- This model is simple and easy to adopt and use.
- It is easy to handle due to the rigidity of the model – each stage has specific deliverables and analysis process.
- In this model stages are processed and completed one at a time. Stages do not overlap or fold over.
- Waterfall model works well for smaller or minor projects or programs where fulfillments are very well understood.

**Disadvantages of waterfall model:**

If an application is in the testing stage, it is not possible to go back and change something that was not well-thought out in the concept stage.

- No working software is produced until late during the life cycle.
- There is high amounts of risk and uncertainty.
- Poor models for long and ongoing projects.
- Not suitable for the projects where fulfillments are at a considerate to high risk of changing

**When to use the waterfall model:**

- This model is utilized when the requirements are well known , fixed and clear.
- Product definitions are stable.
- Technology is understandable.
- There should be no ambiguous requirements.
- The projects are short.

Very less customer intercommunication is involved during the development of the product. Once the product is ready then after it can be demoed to the end users or customers. If the product is developed and if any failure arise then the cost of fixing such issues are high rated, since we need to update everywhere from document till the logics implemented.

**2.2 Spiral Model**

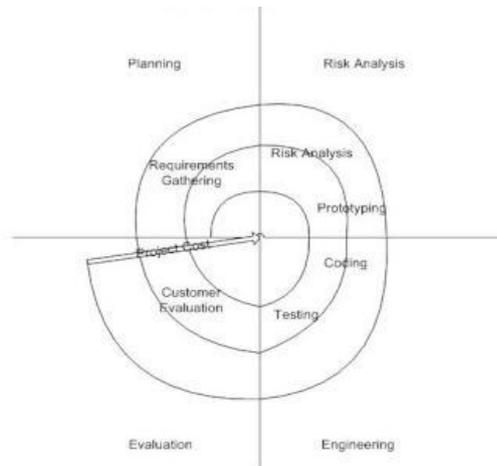
The spiral model is nearly similar to the incremental model, with more intensity placed on risk analysis. Spiral model has four phases or stages: Planning, Risk Analysis, Engineering and Evaluation. A software project again and again passes through these stages in iterations (called Spirals). The baseline spiral, starting or origin in the planning stage, fulfillments are gathered and risk is appraise. Every subsequent spirals builds on the baseline spiral. Its one of the software development models as Waterfall, V-Model.

**Planning Stage:** Requirements are accumulated during the planning stage. Requirements like ‘BRS’ i.e. ‘Business Requirement Specifications’ and ‘SRS’ i.e. ‘System Requirement specifications’.

**Risk Analysis:** In the **risk analysis stage**, a process is undertaken to identify risk and alternate the solutions. A prototype is produced at end of risk analysis stage. If any risk is found during the risk analysis then the alternate solutions are suggested and implemented.

**Engineering Stage:** In this stage software is **developed**, along with testing at the end of stage. Hence in this stage the testing and development is done.

**Evolution Stage:** This stage grant the customer to assess the output of project to date before the project continues to next spiral.



### Advantages of Spiral model:

- High amount of risk dissection hence, avoidance of the Risk is enhanced.
- Good for the large and mission-critical projects.
- Strong concurrence and documentation control.
- Additional Functionality can be added on a later date.
- Software's are produced early in the software life cycle.

### Disadvantages of Spiral model:

- It can be costly model to use.
- Risk analysis requires highly explicit expertise mastery.
- Project's success is highly dependent on the risk analysis stage.
- Doesn't work well for the smaller or minor projects.

### When to use Spiral model:

- When costs and risk evaluation is important it is useful
- For the medium to high-risk projects
- Long-term project commitment unwise because of potential changes to economic preferences
- Users are unsure of their needs and requirements
- Requirements or fulfillments are complex
- New product line are implied

## 2.3 RAD Model

RAD model is a Rapid Application Development model. It's a type of incremental model. In RAD model the functions are developed in parallel as if they were minor projects. The developments are time boxed, delivered and then massed into a working prototype. This can quickly give the customer something to use and to provide feedback in regard to the delivery and their requirements or fulfillments.

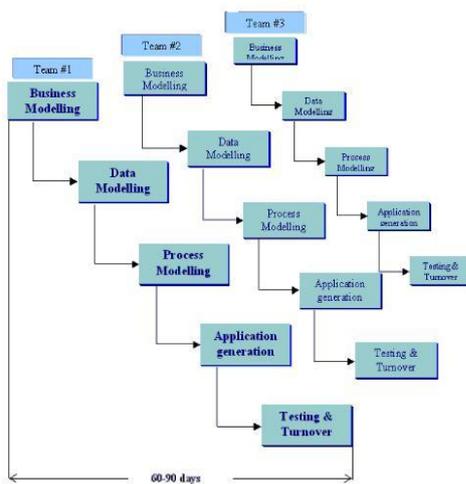


Figure 1.5 – RAD Model

The stages in rapid application development (RAD) model are:

**Business modeling:** The information flow is identified b/w many business functions.

**Data modeling:** Information massed from business modeling to define a data object that are needed for business.

**Process modeling:** Data object defining in data modeling are reformed for achieving the business information flow to achieve some specific business objective. Descriptions are identified and are created for CRUD of data objects.

**Application generation:** Automated tools are used for replacing process models into code and actual system.

**Testing and turnover:** Test the new components and all their interface.

**Advantages of the RAD model:**

- Reduce the development time.
- Increase the reusability of components
- Quick and initial reviews occur
- Encourages the customers feedback
- Integration from beginning solves a integration issues

**Disadvantages of RAD model:**

- Depend on strong team and an individual performances for identifying business requirements.
- Only system which can be modularized can be built using RAD
- Requires highly skilled developers and designers.
- High dependency on the modeling skills
- Inapplicable to the cheaper projects as the cost of modeling and automated code generation is high.

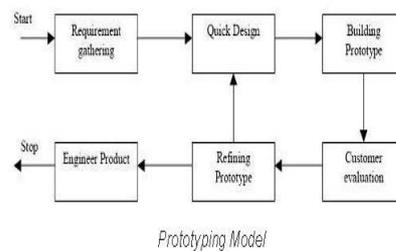
**When to use RAD model:**

- RAD should be used when there is a need to create a system that can be modularized in 2-3 months of time.
- It should be used if there’s high availability of developers for modeling and the budget is high enough to afford their cost.
- RAD SDLC model should be chosen only when the resources are with high business knowledge are available, there is a need to produce the system in a short span/term of time.

### 2.3 Prototype Model :

The basic information in **Prototype model** is that instead of freezing the requirements before coding and design can proceed, a throwaway prototype is built to understand the requirements. This prototype is developed based on the recently known requirements. Prototype model is a software development model. By using prototype, the client can get “actual feel” of system, since the interactions with prototype can enable the client to better understand the requirements of desired system. Prototyping is an attractive idea for complicated and large systems for which there is no manual process or existing system for determining the requirements.

The prototype are not usually complete systems and many of the details are not built in prototype. The aim is to provide a system with overall functionality.



#### Advantages of Prototype model:

- Users are actively involved throughout development
- Since in this methodology is a working model of the system which is provided, the users gets a better understanding of the system which is being developed.
- Errors can be detected previously.
- Quick user feedback is available leading to a better solutions.
- Missing functions can be identified easily
- Confusing functions can be identified, Requirements validation, Quick implementation.

#### Disadvantages of Prototype model:

- Leads to implementations and then repairing way of building the systems.
- This methodology can increase the complexity of system as scope of the system may expand beyond the original plans.
- Incomplete application can cause application not to use as full system was designed inadequate problem analysis.

#### When to use Prototype model:

- Prototype model should be used when the desired system wants to have a lot of interaction with the customer.
- Online systems, web interfaces have a high amount of interaction with customers, are best for Prototype model.
- Prototyping ensures that customer constantly work with system and provide a feedback which is incorporated in the prototype to result in useable system. They are excellent in designing good human computer interface systems.

### 3. Conclusion

In this paper, different methodologies are examined in the software development life cycle by categorizing them in traditional and modern methodologies. Advantages and shortcomings of all these models have been described. Traditional methods are used for extremely analytical projects where requirements do not change often, with limited requirements, limited features and large number of developers. Modern methodologies are used for somewhat low analytical projects where requirements changes often with flexibility of design ,improvement in quality, iterative and incremental delivery, increased performance, easy fault detection capabilities. Hence, it is important for a development team to select a software development model that best suits the project .

### 4. Acknowledgement

The success of our research is never limited to the individual undertaking the paper. It is the cooperative effort of the people around an individual that spell success. For all efforts, behind this successful research, we are highly intended to all those personalities without whom this research would ever be completed. We find no words to express our gratitude towards those who were constantly involved with us throughout our work.

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# SURVEY ON IOT(INTERNET OF THINGS) & ITS APPLICATION

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## ABSTRACT

*The terminology Internet of Things raises to a future where every day physical objects are connected via the Internet in one form or the other, but outside the outdated desktop dominion. The successful arrival of the IoT vision will require computing to outspread past traditional scenarios involving portables and smart-phones to the connection of everyday physical objects and the integration of intelligence with the environment. We're entering a new epoch of computing technology that may be called as the Internet of Things (IoT). System to system, machine to infrastructure, machine to environment, the Internet of Everything, the Internet of Intelligent Things, intelligent systems – call it what you want, but it's happening and its prospective is huge. The Internet of Things (IoT) is a system of unified computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers((UID)is a numeric or alphanumeric string that is associated with a single entity within a given system. With IoT user can control more than digital things easily through a comfortable GUI over the internet. It distribute current information collected from your different machines and exchange them in a way so that other machine can make decision on accessible data and do their work automatically.*

**Keywords :** IoT, Internet of intelligence, Digital Machines, GUI, Smart Systems, Security, Application, Physical attack, Threat.

## 1.Introduction

The Internet of Things (IoT) is the interconnection of billion of “smart” devices to the Internet, from smart-lights, smart-door locks, smart-air conditioners, smart-cameras, to brainy fridges and even vehicles. These objects are typically networked devices that bonds the somatic and virtual works. The growth of IoT in recent year is substantial as consumers, business and government distinguishes the benefit of interconnecting these devices together to provide additional features. IoT allows objects to be sensed and controlled remotely across existing network organization, creating opportunities for more direct integration of the physical world into computer based systems and resulting in improved competence, precision and economic benefit; when IoT is amplified with sensors and actuators, the technology becomes an instance of the more overall class of cyber-physical systems, which also comprehends technologies such as smart grids, smart homes, intelligent transportation and smart cities. Each thing is exceptionally identifiable through its entrenched computing system but is able to interoperate within Internet infrastructure. Experts evaluate that the IoT will consist of almost 50 billion objects by 2020.

**2.Application :** The application for internet connected devices are widespread. Multiple groupings have been suggested, most of which agree on a parting between consumer, enterprise(business), and infrastructure application. The ability to network embedded devices with limited CPU, memory and power resources means that IoT finds applications in nearly every field. Such systems could be in charge of amassing information in settings fluctuating from natural ecosystems to edifices and factories, thereby finding applications in fields of environmental sensing and metropolitan planning. Smart city is another powerful application of IoT generating curiosity among world's population. Smart surveillance, automated transportation, smarter energy management systems, water distribution, urban security and environment monitoring all are examples of internet of things applications for keen cities.

**A) Smart Home**

With IoT creating the buzz , ‘Smart Home’ is the most rifled IoT associated feature on Google. Smart Home has become the radical hierarchy of success in the domestic spaces and it is predicted Smart homes will become as common as smartphones. The cost wowing a house is the biggest expense in a landholder’s life. Smart Home products are assured to save time, energy and money. With Smart Home companies like Nest , Ecobee , Ring and August , Sono Wireless Speaker System , Philips Hue Smart Light Bulbs , to a name a rare , will become household brands and are preparing to deliver a never seen before experience.

**B) Connected Cars**

The self propelled digital technology has focused on enhancing vehicles internal functions. But now, this courtesy is growing towards enhancing the in-car experience. A connected car is a vehicle which is able to optimize it’s own operation, preservation as well as comfort of passengers using onboard sensors and internet connectivity.

**C) Iot In Agriculture**

With the continuous increase in world’s population, petition for food supply is particularly raised . Government are helping farmers to use innovative techniques and research to increase food production. Smart farming is one of the fastest mounting field in IoT.

**IoT as the Internet of Transformation :** The Internet of Things or IoT is one of the digital transformation technologies. In fact, it’s not just one technology as numerous saying but a sequence of technologies and other working gears that is really immense. With the addition of sensing and data conveying devices to network of connectivity and value comes an avalanche of data. While devices and connectivity are of course all significant , whether it’s in the Industrial Internet Of Things or the Consumer Internet of Things where the device apparently has an additional dimension, in the end the Internet of Things is an umbrella term. Businesses are investing comprehensively in the Internet Of Things (IoT) while remaining cautious about investments in artificial intelligence (AI) , discloses the Constellation Research Digital Transformation. Growing demand for the IoT and AI is probable to drive large investment in SaaS/cloud and big data technology. Seventy-five percent of respondents said their establishment was increasing investment in big data technologies. A full seventy seven percent of respondents said their establishment would increase investment in SaaS/cloud over the next 12 months , with 45 percent of that total saying the investment would be significantly greater.

**IoT Security (Internet of Things) :** IoT security is the area of exertion concerned with safeguarding linking devices and networks in the Internet of Things. The internet of Things comprises the increasing occurrence of objects and entities –know, in this context as things offered with exclusive identifiers and the ability to automatically transfer data over a network. Internet of Things Security is the province concerned with protecting interconnected devices and networks in the ecosystem. In an IoT ecosystem computing devices and entrenched systems , also called things are able to communicate data over network as they are provided with unique identifiers and ability to collect , send and receive data. IoT applications can be found in all sectors vacillating from home appliances to industrial machine to machine to smart energy grids. The simplicity of attacks in IoT ecosystems is in the ease a which an attacker can use the connected device as an entry point into the network. Whether it’s your new smart refrigerator or smart vehicle , without proper security it poses privacy risk and increased security theart. Most of the conventional cyber attacks are capable to exploit the security ambiguities in internet of things ecosystem.

**a) Data and Identity Theft :** More devices get connected to the internet and the more access they have of our personal data the higher are the risk of data and identity theft is. Smart devices like smart watch, health monitors and smart phones if got in hands of unscrupulous finders can provide access to valuable private data. With IoT devices interconnected by your fitness bans, smart fridge , smart meter and other devices.

**b) Network Security :** Protecting and securing the network connecting IoT devices to back end systems on the internet. IoT devices to back end systems on the internet . IoT network security is a bit more perplexing than traditional network security because there is a wider range of statement etiquettes , standards and device capabilities , all of which pose significant topics and increased convolution. Key capabilities include traditional endpoint security features such as antivirus and antimalware as well as other structures such as firewalls and incursion prevention and detection systems.

**Internet of Things Security Solutions :** There are a few internet of security solutions that authorities suggest. Foremost the IoT devices that need direct access to the internet should be segmented into their own networks that have limited access .It will then become easier to monitor a device's network segment for any erratic traffic. Providing the ability to validate and authorize data movement between IoT devices , back end systems and applications using documents based APIs. API security will be vital for protecting the integrity of data transiting between edge devices and back end systems to ensure that only authorized devices , developers and apps are collaborating with APIs as well as perceiving potential threats and attacks against specific APIs.

## 2.Conclusions

IoT is an developing technology that has attracted a significant number of researchers from all around the world. There have been major influence making this technology altered into our daily life. There are lot of key issues addressing security concerns of IoT and they need more research effort to be solved.

Connecting those smart devices (nodes) to the web has also started happening although at a slower rate. The percentages of the technology puzzles are coming together to accommodate the Internet of Things preferably than most people expect. On the IoT such as the ability if IoT to function gesture recognition reality in seeking to achieve safety.

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# A STUDY OF VARIOUS CRYPTOGRAPHIC ALGORITHMS

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## ABSTRACT

*The techniques ensuring secure transmission and storage of information has been ever increasing. Cryptography is evergreen and developing. Cryptography protects users by providing functionality for the encryption of data and authentication of other users. Compression is a method of reducing the number of bits or bytes needed to represent a given set of data. It decreases disk space. Cryptography is a ways of sending useful data in a secret way. There are many techniques available and among them AES is one of the most powerful techniques. Encryption algorithms transform messages by adding some cryptographic protection, such as confidentiality, authenticity or integrity to them. These algorithms employ one or more keys that are cryptographic variables used to control the algorithm and provide security against attackers. This paper deals with a comparative study of encryption algorithms along with their applications in real world scenario.*

**Keywords :** *Encryption, decryption, Compression, Cryptography, Security, Integrity.*

## 1. Introduction

In traditional telecommunication systems, securing the channel meant securing the messages. With the advent of internet and advancement in packet switching techniques, securing the channel is neither possible nor effective. This increases the importance of cryptography. Websites defines cryptography as “the enciphering and deciphering of messages in secret code or cipher; also the computerized encoding and decoding of information”. Cryptography aims at hiding information and making it secure. Where as , there is another field of study which is concerned with the techniques of defeating such attempts called cryptanalysis. Cryptology is a broad domain which includes both cryptography and cryptanalysis. The art of cryptography is considered to be born along with the art of writing. As civilizations evolved, human beings got organized in tribes, groups, and kingdoms. This led to the emergence of ideas such as power, battles, supremacy, and politics. These ideas further fuelled the natural need of people to communicate secretly with selective recipient which in turn ensured the continuous evolution of cryptography as well. The roots of cryptography are found in Roman and Egyptian civilizations .The importance of information and communication systems for society and the global economy is intensifying with the increasing value and quantity of data that is transmitted and stored on those systems. At the same time, the systems and data are also vulnerable to a array of threats, for example, unauthorized access and use, misuse, change, and demolition. The hiding of information is called encryption, and when the information is unhidden, it is called decryption. A cipher is used to accomplish the encryption and decryption. Merriam-Webster’s Collegiate Dictionary defines cipher as —a method of transforming a text in order to conceal its meaning. The information that is being hidden is called plaintext; once it has been encrypted, it is called ciphertext. To hide any data two techniques are mainly used one is Cryptography other is Steganography. In this paper ,we use Cryptography. Cryptography is the science of protecting data, which provides methods for converting data into unreadable form, so that valid user can

access information at the destination. Cryptography is the science of utilizing the mathematics to encrypt and decrypt data.

## 2. Description

Computers are used by large number of people for different purposes, such as banking, shopping, military, student records, etc.. Privacy is a critical issue in many of these applications. Cryptography is the transformation of readable and understandable data into a form which cannot be understood in order to secure data. Cryptography means the methodology of hiding the messages, cryptography comes from the Greek word "Kryptos", which means hidden, and "graphikos" which means writing.

The information that we need to hide, is called plaintext , It's the original text, It could be in a form of characters, numerical data, executable programs, pictures, or any other kind of information, The plaintext for example is the sending of a message from the sender before encryption, or it is the text at the receiver after decryption. The data that will be transmitted is called cipher text , it's a term refers to the string of "meaningless" data, or unclear text that nobody must understand, except the recipients, it is the data that will be transmitted exactly through network. Many algorithms are used to transform plaintext into cipher text. Encryption is a mechanism of converting readable and understandable data into "meaningless" data .The Key is an input to the encryption algorithm, and this value must be independent of the plaintext, This input is used to transform the plaintext into cipher text, so different keys will yield different cipher text, In the decipher side, the inverse of the key will be used inside the algorithm instead of the key. Computer security is a word for a collection of tools designed to protect any data from hackers, theft, corruption, or natural disaster while allowing these data to be available to the users at the same time. The example of these tools is the antivirus program. By using cryptography many goals can be achieved. These goals can be either all achieved at the same time in one application, or only one of them. These goals are:

1. Confidentiality: It is the most important goal, it ensures that nobody can understand the received message except the one who has the decipher key.
2. Authentication: It is the process that assures the communicating entity is the one that it claimed to be.
3. Data Integrity: It makes sure that the received message has not been modified.
4. Non-Repudiation: It is used to prove that sender has send the message and received by the specified party, so the recipient cannot claim that the message was not sent.
5. Access Control: It is the process of preventing an unauthorized use of resources. This goal controls who can have access to the resources, If one can access, under which restrictions and conditions the access can be occurred, and the permission access of a level.

## Cryptography Applications

Cryptography has found its application in more than what one can imagine. Major sectors which use cryptographic techniques include defense, government and law enforcement agencies, banking, insurance, business and industry. It has even found its way into sectors like healthcare, education, tourism and social welfare. Cryptography could be applied to text, image, audio and video based scenarios including both real time and non-real time systems. During the last years, the use of embedded cryptographic processors has spread from low-cost crypto-processors, such as smart cards used for holding decryption keys, to more modern applications, such as user authentication, identity management, e-mail, mobile communication, electronic payment schemes, digital right management and trusted computing Initiative (TCI).

## Types of Cryptography

Secret Key Cryptography: When the identical key is utilized for both encryption and decryption , the mechanism is known as secret key cryptography ,for example, DES, Triple DES, AES, RC5 etc.

Public Key Cryptography: When two dissimilar keys are utilized, one key for encryption and another key for decryption, mechanism is known as public key cryptography ,for example, RSA, Elliptic Curve and etc.

### 3. Related Work

#### 3.1 DES

DES is a block cipher that utilizes common secret key for the encryption and the decryption. DES algorithm gets a fixed length of string in plaintext bits and convert it through a sequence of process into cipher text bit sting of the same length and its each block is 64 bits.

There are 16 identical stages of processing, called as rounds. There is also an initial and final permutation named as IP and FP.

#### 3.2 3DES

3DES is an enrichment of DES and it is 64 bit block size with 192 bits key size. In this standard, the encryption of process is alike the one in the original DES and raise the encryption level and the average safe time.

3DES is slower than other block cipher methods. It uses either two or three 56 bit keys in the sequence order of encrypt-decrypt-encrypt.

TDES algorithm with 3 keys needs  $2^{168}$  chances of combinations and with 2 keys requires  $2^{112}$  combinations; and the limitation of this algorithm is too time consuming problem.

#### 3.3 AES

AES encrypts all 128 bits in one iteration. This is the reason that it has a comparably small number of rounds. AES encryption is fast and flexible. It can be implemented on a variety of platforms particularly in small devices.

#### 3.4 Blowfish

Blowfish is one of the most general and popular public domain encryption algorithm given by Bruce Schneier, one of the worlds leading cryptologists, and the president of Counterpane Systems and a consulting firm specializing in cryptography and computer security. It encrypts 64-bits block cipher with variety length key and its contains 2 parts.

Data Encryption: Its involves the iteration of a simple function of 16 times. Each round contains a key dependent permutation and data dependent substitution.

Subkey Generation: Its involves converting the key upto 448 bits long to 4168 bits

#### 3.5 RSA

RSA is a public key algorithm given by Rivest, Shamir, Adleman, it involves a public key and a private key. The public key can be identified to everyone and is used for encrypting messages. Messages encrypted with the public key can only be decrypted using the private key. These keys for the RSA algorithm are generated in many ways.

## 4. Comparison of Cryptography Algorithms

Varioous algorithms are compared in the following table no. 1.

Table 1: Comparision of various algorithms

Algorithm	Created By	Key size(bits)	Block size(bits)
DES	IBM in year 1975	56	64
3DES	IBM in year 1978	112 OR 168	64

AES	Joan Daemen and Vincent Rijmen in year 1998	256	128
BLOWFISH	Bruce Schneier in year 1993	32 OR 448	64

## 5. Conclusion

Security plays a very important role in conserving the integrity of data. And the ever persisting craving to develop a secure system has brought cryptography in the lime light. In this paper, a survey has been made on various cryptographic techniques like AES, DES, 3DES, Blowfish, RSA . This paper presents the performance evaluation of selected symmetric algorithms -AES, 3DES, Blowfish and DES. In future, we can use encryption techniques in such a way that it can consume less time and power of furthermore and high speed and minimum energy consumption.

## 6. Acknowledgement

I would like to thank my project guide Mrs. Palak Keshwani for providing guidance to carry out this work.

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# POWER FLOW WITH FLEXIBLE ALTERNATING CURRENT TRANSMISSION SYSTEMS (FACTS) CONTROLLER

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## ABSTRACT

**FACTS controllers are used to improve power system performance. These controllers be able to reduce electrical disturbances, modified the flow of power and absorb or provide reactive power support. It increases every types of stability of the system. FACTS controllers provide quick and consistent control over the three main transmission parameters, i.e. magnitude of voltage, angle of phase and impedance of line.**

**Keywords:** *Facts controller, power flow.*

## 1.Introduction

It gives nodal voltages phase angle that power injection at all buses and interconnected power lines. Power flow solution is essential for designing, planning and restructuring of a new power system according to the load demand. It requires calculation of load flow under normal, abnormal conditions and transient behavior of the system during operation.

The buses are classified as load bus, generator bus and slack or swing bus. At load bus real and reactive powers are specified where as voltage magnitude and phase angle through the load solution determined. At generator bus, voltage magnitude and real power of generations are specified where as reactive power generation and phase angle of bus voltage has to required. In slack bus voltage magnitude and phase angle are specified whereas real and reactive power are obtained through the power flow solutions. The power flow problem give relationship between voltages, powers and reactive volt amperes that will be mathematically formulated and flow of power will be found out at all lines of network. The power flow equations are nonlinear and solved by iterative methods. The Newton-Raphson power flow solution is favored compared to other as it has more efficient, solve the practical problem, less computation time and convergence characteristics are very fast.

FACTS controllers help to taper the gap between the no controlled and the controlled power system mode of operation, by providing voltages at best locations of the network and degrees of liberty to control flows of power (Hingorani and Gyugyi, 2000).

It is necessary to power engineers to promote majority of the analysis tools on rely to plan and to operate their systems (IEEE/CIGRE, 1995).

Solutions of power flow are most likely the large amount accepted type of computer-based calculations approved by planning and process engineers. The proficient and logical way to learn models and methods for the demonstration of FACTS controllers in power flow studies. The algorithm for power flow studies are as follows.

1. Initial values of bus voltage and phase angle.  $|V_x|$  and  $\delta_x$  for  $i=2,3,\dots,n$
2. Calculate active and reactive power at each load bus

$$P_x = \sum_{k=1}^n (V_x V_k Y_{xk} \cos(\delta_x - \delta_k - \theta_{xk}))$$

$$Q_y = \sum_{k=1}^n (V_x V_k Y_{xk} \sin(\delta_x - \delta_k - \theta_{xk}))$$

Calculate schedule errors

$$\Delta P_x^{(r)} = P_{xsp} - P_x^{(r)(cal)} \quad i = 2,3,\dots,n$$

$$\Delta Q_y^{(r)} = Q_{y sp} - Q_y^{(r)(cal)}$$

Obtain  $\delta$  and  $\Delta|V|$  by Jacobian matrix

$$\begin{bmatrix} \Delta P_x \\ \Delta Q \end{bmatrix} = \begin{bmatrix} H & N \\ M & L \end{bmatrix} \begin{bmatrix} \Delta \delta \\ \frac{\Delta V}{V} \end{bmatrix}$$

Modify  $\delta$  and  $\Delta|V_x|$

$$|V_x^{(r+1)}| = |V_x^{(r)}| + \Delta|V_x^{(r)}|$$

$$|\delta_x^{(r+1)}| = \delta_x^{(r)} + \Delta \delta_x^{(r)}$$

3. Continue until schedule errors for all load buses are within a tolerance  $\Delta P$  and  $\Delta Q < \epsilon$ .
4. Calculate the power flows.

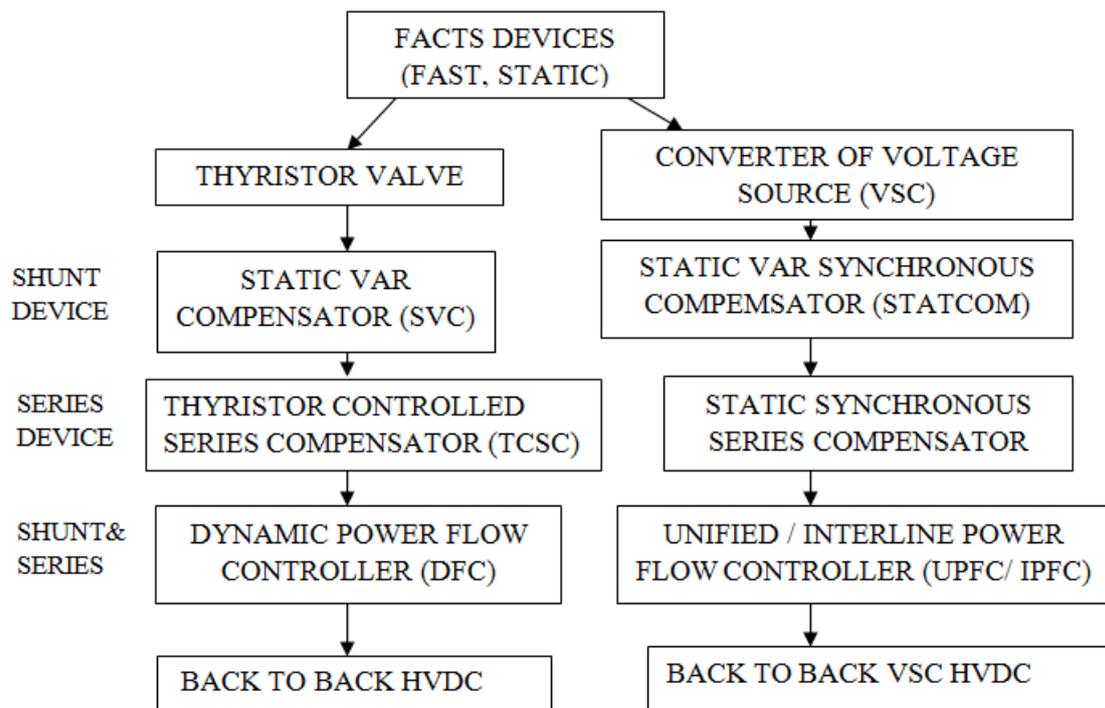


Figure 1: Overview of major FACTS devices

The overview of major FACTS devices are as shown in fig.1. The static var compensator (SVC) and static synchronous compensator (STATCOM) are shunt connected device while Thyristor Controlled Series Compensators (TCSC) is a series connected FACTS controller.

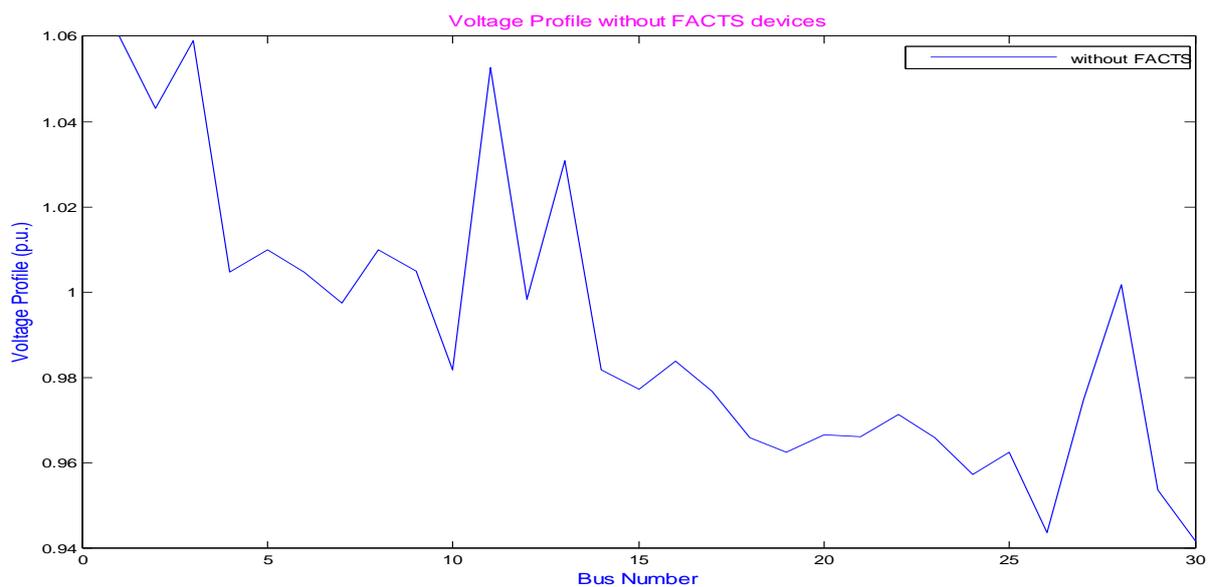
All FACTS controller are speed switching capability provides a mechanism for controlling line power flow, which permits better loading of existing transmission lines, and allows for rapid readjustment of line power flow in response to various contingencies.

In purpose of using FCATS controller in power flow studies is to minimize power losses, and to improve the voltage magnitude profile. The SVC is placed at various load buses at favorable location to satisfy the objective.

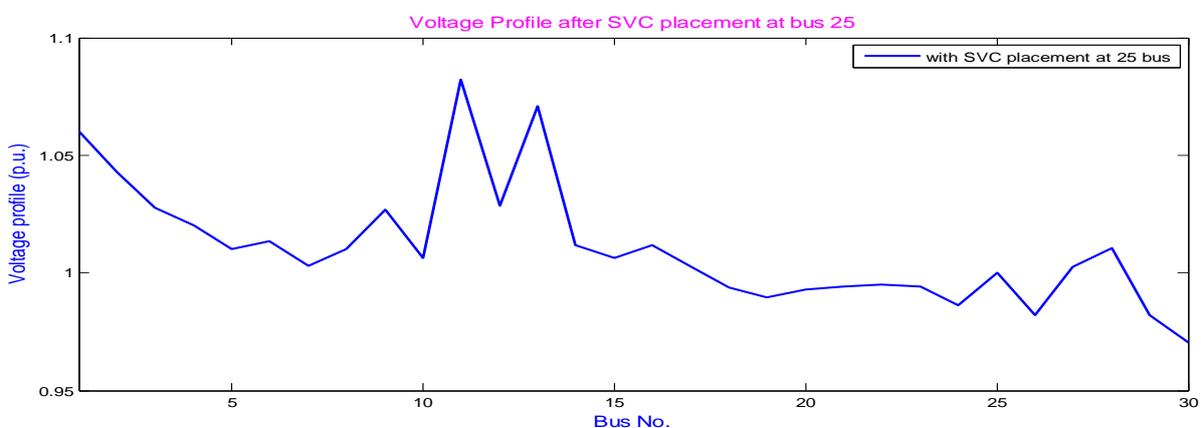
## 2.Simulation & Results

In this paper two cases are taken. In first case run power flow algorithm without FACTS devices and in second case run power flow data with FACTS devices. These two cases are considered for any IEEE bus system such as 14, 30 or 57 bus system.

The simulation results of voltage profile without FACTS devices is shown in figure 2.0 below.



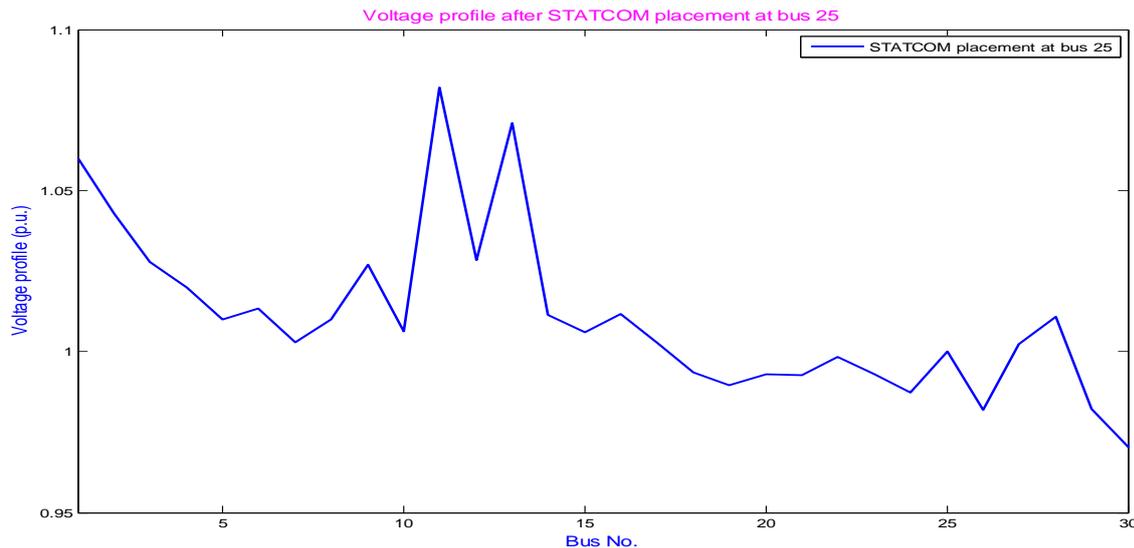
**Figure 2.0 Voltage profile without FACTS devices in power flow solutions**



**Figure 2.1: Voltage profile after SVC placement in IEEE bus system**

The Voltage profile after SVC placement in power flow with IEEE bus system is shown in Fig. 2.1 above.

The Voltage profile after STATCOM placement at IEEE bus system is shown in Fig.2.2 and the comparison of real power loss savings is shown in Fig.2.3.



**Figure 2.2: Voltage profile after STATCOM placement in IEEE bus system**

On comparison of result obtained in power flow between Fig.2 ( without FACTS controller) and then power flow with FACTS controller in Fig 2.2 and in Fig 2.3. It can be observed form Fig 2.2 and 2.3 that when FACTS controller are employ in power flow its performance are improved and it provides better voltage magnitude and hence we can say that losses are considerably reduced in transmission line with the help of FACTS controller.

### 3.Conclusion

Power flow solution with FACTS controller is important technique for designing, scheduling and reformation of a new power system according to the load demand. Its studies provide a reasonable mathematical move toward for the purpose of a variety of bus voltagesower flows through different branches under stable state condition. The usefulness of the FACTS devices for dropping the power losses in power system is invented. Iin the direction of the achievement of the proposed methods, standard test system IEEE bus system is used for simulation study work.

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# RISK PREDICTION IN MAGNETIC RESONANCE IMAGING BRAIN IMAGES USING MACHINE LEARNING TECHNIQUES

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## ABSTRACT

*Brain diseases is one of the major cause of cancer related death among children and adults in the world. Brain diseases like brain tumor is characterized as a gathering of abnormal cells that becomes inside the brain and around the brain. There are various imaging techniques which are used for brain tumor detection. Among all imaging technique, MRI (Magnetic Resonance maging) is widely used for the brain tumor detection. MRI is safe, fast and non-invasive imaging technique. The early detection of brain diseases is very important, for that CAD (Computer-aided-diagnosis) systems are used. The proposed scheme develops a new CAD system in which pulse-coupled neural network is used for the brain tumor segmentation from MRI images. After segmentation, for feature extraction the Discrete Wavelet Transform and Curvelet Transform are employed separately. Subsequently, both PCA (Principal Component Analysis) and LDA (Linear Discriminant Analysis) have been applied individually for feature reduction. A standard dataset of 101 brain MRI images (14 normal and 87 abnormal) is utilized to validate the proposed scheme. The experimental results show that the suggested scheme achieves better result than the state-of-the-art techniques with a very less number of features.*

**Keywords:** PCNN, DWT, Curvelet, PCA, LDA.

## 1.Introduction

The human body comprised of several types of cells with each cell has a precise function. The cells in the body grow and divide in an orderly manner which forms new cells to keep the human body in good physical condition. While few cells cease their capability to control their growth and they grow in an improper fashion which leads to extra cells formed form a mass of tissue which is called tumor. Brain tumors are a solid neoplasm inside the skull which usually they grow in the brain or grow in other places such as in lymphatic tissue, in blood vessels, in the cranial nerves, in the brain envelopes. Brain tumors may grow as a result of the spread of cancers primarily located in other parts of the body [1]. Brain tumors can be classified according to the tumor location or the type tissue which the tumor created or whether the tumor is malignant or benign, and other considerations [2]. The tumors may be either benign or malignant in which malignant tumors lead to cancer while benign tumors are not cancerous. In most cases, cancers that spread to the brain to cause secondary brain tumors arise in the kidney, lummy and breast or from melanomas in the skin [2]. Medical imaging techniques like X-ray, CT scan and MRI are the source of medical image data which is used in medical diagnosis. Magnetic field excitation and RF coil pulses produces MRI image [3]. On comparing with CT scan MRI seems to be powerful for diagnosis since it doesn't utilize radiation. MRI images present a unique perception that determines whether brain tumor is present or not [4]. Manual examination of MRI image is a time consuming job, prone to error while manipulating huge scale of data. Moreover MRI accommodates noise results in flawed classification. In order to analyze large volume of MRI, automation is inevitable which results in economic analyzer. High accuracy of tumor detection is required, because human being is involved. Two common techniques used to classify the MR Images, they are supervised techniques such support vector machine, k-nearest neighbors, artificial neural networks, and unsupervised techniques such fuzzy c-means

and self-organization map (SOM). Many research used both supervised and unsupervised techniques to classify MR Images either as normal or abnormal. [5].R. J. Ramteke, KhachaneMonali Y[6] proposed a method to detect the brain tumor automatically on the basis of image features and automatic abnormality detection. K-Nearest Neighbour (K-NN) classification technique is modest technique which produces reasonable classification accuracy. Khushboo Singh, SatyaVerma[7] proposed and incorporated Support Vector Machines (SVM classification techniques) to brain MRI image by employing the features vector.

## 2. Objective of Research

The main aim of this investigation is to develop a new machine learning framework/system for classification and risk assessment of brain MRI images.

Instead of so many advantages, diagnostic images obtained from MRI brain tumor rescreening methods as discussed in section 2 suffers from major shortcomings such as low resolution and low contrast, speckle noise, and blurry edges. So it is more difficult for a radiologist to read and interpret these images. Any decision is guided by radiologists own intuition. In addition, ultrasound diagnosis is heavily dependent on a doctor's personal experience. This reality is compounded by the fact that reading an ultrasound image is tedious, hard work, which can lead to fatigue and burn out, which, in turn, can ultimately lead to an increased rate of misdiagnosis and missed diagnosis. Further majority of non medical professionals tend to treat MRI brain tumor themselves, there are a lot of incorrect decisions and inadequate surgeries, and this directly affects the outcome and longevity of the patient [2]. Thus shortcomings of existing techniques as discussed above motivates for a very challenging problem of automatic classification of MRI brain images. The proposed research will investigate the problems in accurate diagnosis and classification of MRI brain abnormalities and addresses them using image processing and machine learning techniques. Image processing techniques can be employed to enhance the MRI Brain image and also to extract unique features/patterns representing each category of MRI brain image. In this research Image processing techniques will be investigated to filter/enhance the MRI brain images followed by feature extraction and appropriate feature selection. Then various machine learning techniques will be employed and evaluated to classify brain abnormalities.

## 3. Brief Review of Work Already Done in the Field

This section presents the relevant contributions of other researchers in the proposed research area.

In recent years, for the feature extraction and classification of the brain MR images various techniques have been suggested by different researchers. Extracting essential feature from brain MR image is very important for further analysis and classification.

**V.Vani , M. Kalaiselvi Geetha [2016]** observed that "Automatic Tumor Classification of Brain MRI Images using DWT Features " it has taken (200 images) 120 Images are used for training & 80 images for testing . it has used for preprocessing Median filter and Feature Extraction using Discrete Wavelet Transform (DWT) and Classification for used SVM, k-NN and Decision Tree. the Performance Accuracy of SVM= 78.61% ,k-NN = 88.89 % Decision Tree =81.48 % . This paper presents an efficient method of classifying MRI brain and Disadvantages of system could not distinguish Astrocytomas class of tumor.

**N. Subash and J. Rajeesh.[2015]** suggested that Brain Tumor Classification Using Machine Learning Here feature extraction from MRI Images has been done by gray scale and texture features From the simulation results it is observed that SVM based classification has been efficient for the classification of the human brain into normal and abnormal. It also achieves high degree of accurate classification (i.e. more than 95%). From the outcomes it has been concluded that this technique seems to be rapid, easy to operate, non-invasive and cost effective

**Nayak et al.[2015]** have proposed hybrid technique for brain MR image classification. For feature extraction through brain MR images they utilize the approximation coefficient of level-3 of discrete wavelet transform (DWT). To reduce the large set of extracted features from brain MR images they have employed kernel principal component analysis (KPCA). After getting the reduced set of features they have employed least square support vector machine (LS-SVM) as a classifier with different kernel function and they have reported that proposed scheme outperform with high accuracy.

**Yang et al.[2015]** suggested a wavelet-energy based approach for brain MR image classification. For feature extraction they have used 2D DWT. For brain image classification SVM classifier was employed and BBO method was utilized to optimize the weights of the SVM. They noticed that their scheme was superior than KSVM, PSO-KSVM and BPNN.

**N.V.S. Natteshan and J. Angel Arul Jothi [2015 ]** it investigated that Automatic Classification of Brain MRI Images Using SVM and Neural Network Classifiers This work has developed a CAD system for automatically classifying the given brain Magnetic Resonance Imaging (MRI) image into 'tumor affected' or 'tumor not affected'. The input image is preprocessed using Wiener filter and Contrast Limited Adaptive Histogram Equalization (CLAHE). The image is then quantized and aggregated to get a reduced image data. Neural network and Support Vector Machine (SVM) classifiers are trained using these features. Results indicate that Support vector machine classifier with quadratic kernel function performs better than Radial Basis Function (RBF) kernel function and neural network classifier with fifty hidden nodes performs better than twenty five hidden nodes. It is also evident from the result that average running time of FCM is less when used on reduced image data.

**El-Dahshan et al[2014.]** suggested a hybrid technique, in which feed forward pulse-coupled neural network is applied for the segmentation of the brain images. For feature extraction they consider approximation component of DWT. For feature reduction they used PCA and for the classification they used back propagation neural network and achieved 99% accuracy.

**ShwetaJain [2013]** stated that classifies the type of tumor using Artificial Neural Network (ANN) in MRI images of different patients with Astrocytoma type of brain tumor. The extraction of texture features in the detected tumor has been achieved by using Gray Level Co-occurrence Matrix (GLCM). An artificial neural network (ANN), generally called neural network (NN).

**Saritha et al.[ 2013].** Suggested a scheme, in which they have used entropy of wavelet approximation component at level-8 computed along with SWP for feature extraction. For the classification they used Probabilistic neural network (PNN) and their results indicate that they achieve high success rate.

#### **4. Noteworthy Contribution in the Field of Proposed Work**

**V.Vani , M. Kalaiselvi Geetha [2016]** observed that "Automatic Tumor Classification of Brain MRI Images using DWT Features " it has taken (200 images) 120 Images are used for training & 80 images for testing . it has used for preprocessing Median filter and Feature Extraction using Discrete Wavelet Transform (DWT) and

Classification for used SVM, k-NN and Decision Tree. the Performance Accuracy of SVM= 78.61% ,k-NN = 88.89 % Decision Tree =81.48 % . This paper presents an efficient method of classifying MRI brain and Disadvantages of system could not distinguish Astrocytomas class of tumor.

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**Kailash D.Kharat & Pradyumna P.Kulkarni & M.B.Nagori [2012 ] Brain Tumor Classification Using Neural Network Based Methods** This paper presents two Neural Network techniques for the classification of the magnetic resonance human brain images. The proposed Neural Network technique consists of three stages, namely, feature extraction, dimensionality reduction, and classification. In the first stage, we have obtained the features related with MRI images using discrete wavelet transformation (DWT). In the second stage, the features of magnetic resonance images (MRI) have been reduced using principles component analysis (PCA) to the more essential features. In the classification stage, two classifiers based on supervised machine learning have been developed. The first classifier based on feed forward artificial neural network (FF-ANN) and the second classifier based on Back-Propagation Neural Network. The classifiers have been used to classify subjects as normal or abnormal MRI brain images.

**Noramalina Abdullah, Umi Kalthum Ngah , Shalihatun Azlin Aziz [2011]** have showed that Image Classification of Brain MRI Using Support Vector Machine The main motivation of this work is to use wavelet approximate coefficient of a Brain MRI as the input for SVM. Through a machine learning method, we hope to achieve better precision and accuracy in interpreting a normal and abnormal brain image.

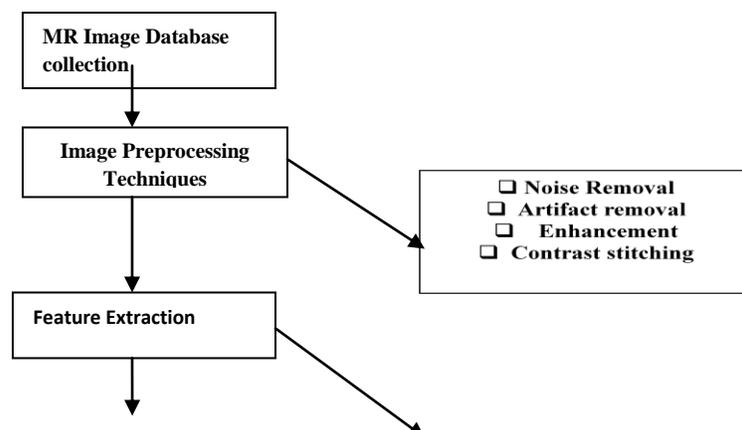
**Dipali M. Joshi, Dr.N. K. Rana , V. M. Misra. [2010 ]** It intended to "Classification of Brain Cancer Using Artificial Neural Network " for Texture Feature Extraction using Gray Level Co-occurrence Matrix (GLCM) and for Classification Neuro Fuzzy logic used Classifier it has advantages that the designed and implemented system provides precision detection and real time tracking by classifying the unknown sample Image into appropriate Astrocytoma type of Cancer, thus do not involve any pathological testing. Disadvantages is that More features that could be added to the system include metabolic and genetic data as well as anatomical attributes of the brain.

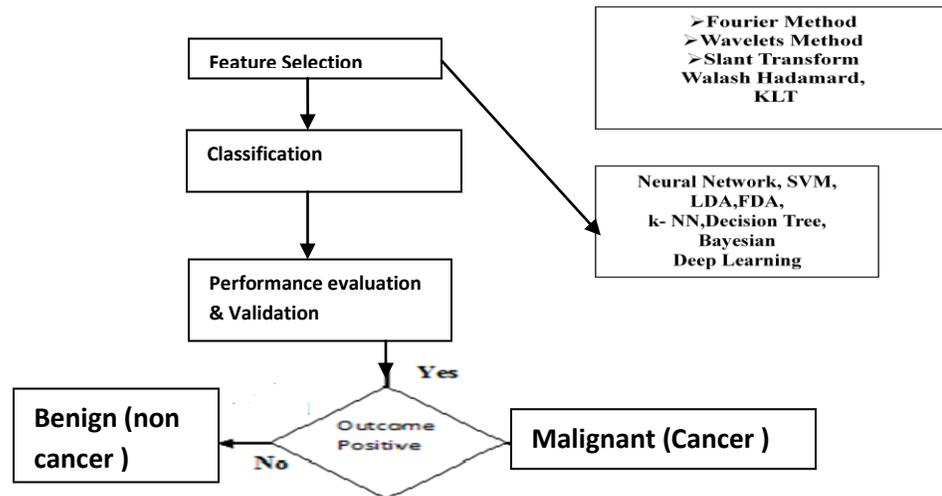
**Farias M. Santos V. Lopez [2008]** has reported that Brain Tumour Diagnosis with Wavelets and Support Vector Machine. A computation tool that merges Wavelets and SVM has been developed. The wavelet-SVM classifier

allows to observe the influence of the design parameters of each technique on the clustering, so to reduce the classification time and to improve the results.

## 5. Proposed Methodology During Tenure of the Research Work

- Literature survey and review: This involves collection of research papers from renowned technical journals such as relevant journals listed in IEEE, Springer, ACM, Elsevier, Science Direct etc.
- Preparation of Database: Collection of data from various hospitals and online open source (authenticated) for research purpose.
- Preprocessing The raw images always hold characters, non uniformity in size and orientation, noise etc. Thus before feature extraction preprocessing of raw image is required. It involves:
  - a) Enhancement
  - b) Noise Filtering
  - c) ROI extraction.
  - d) Comparison and evaluation of various filtering/denoising techniques will also be carried out to select the best filter.
- Feature Extraction: In most of the cases benign tumors often have round or ellipsoid shapes, smooth borders and homogenous internal echoes; whereas malignant tumors often have branch patterns, irregular/angular boundary and heterogeneous internal echoes . For classifying the mri brain tumor in to benign, malignant etc. features based on shape, texture etc will be extracted.
- Feature selection: High dimension data could contain a high degree of irrelevant and redundant information which may greatly degrade the performance of learning algorithms. A suitable/optimal set of features will be selected for classification while maintaining acceptable classification accuracy.
- Automatic Classification: Various machine learning techniques will be then used for classifying MRI Brain images in to benign, malignant etc.The input to the classifier will be features obtained in step 5.
- Evaluation and validation of classifiers: Evaluation of the performance of the developed system will be then carried out using evaluation parameters such as Accuracy, Sensitivity, and Specificity etc. Finally performance of various classifiers will be compared on the basis of evaluation parameters.
- Report writing/ Documentation: To write documentation/report/conference papers/Journal papers etc.





**Fig 1: Framework of the Proposed Methodology**

## 6. Conclusion

The proposed work is expected to improve the sensitivity, specificity, and efficiency of brain cancer diagnosis, and possibly reduce health care costs. Further it will increase detection and diagnosis accuracy and save labor. The proposed system will help/assist radiologists/Doctors to evaluate medical images and improve their diagnosis accuracy.

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# MODELLING SIMULATION AND ANALYSIS OF GRID CONNECTED WIND GENERATOR

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## ABSTRACT

*Wind generators can have a significant impact on the power flow, voltage profile and the power quality for customers and electricity suppliers. This requires a suitable tool to analyze the influence of wind generators on the distribution system. This paper presents a method to find the steady-state voltage stability region for each bus of a distribution power system, considering the presence of wind power generation. The maximum permissible load of each bus is calculated, so that it can operate with the voltage within the limits allowed by the power system utilities.*

**Keywords-** Wind generator; Voltage stability; power generation; steady-state.

## 1.Introduction

Recently wind power generation has been experiencing a rapid development in a global scale. The size of wind turbines and wind farms are increasing quickly; a large amount of wind power is integrated into the power system. As the wind power penetration into the grid increases quickly, the influence of wind turbines on the power quality and voltage stability is becoming more and more important. It is well known that a huge penetration of wind energy in a power system may cause important problems due to the random nature of the wind and the characteristics of the wind generators. In large wind farms connected to the transmission network (110 kV – 220 kV) the main technical constraint to take into account is the power system transient stability that could be lost when, for example, a voltage dip causes the switch off of a large number of wind generators. In the case of smaller installations connected to weak electric grids such as medium voltage distribution networks, power quality problems may become a serious concern because of the proximity of the generators to the loads. The existence of voltage dips is one of the main disturbances related to power quality in distribution networks. In developed countries, it is known that from 75% up to 95% of the industrial sector claims to the electric distribution companies are related to problems originated by this disturbance type. These problems arise from the fact that many electrical loads are not designed to maintain their normal use behavior during a voltage dip. The aim of this paper is to conduct a voltage stability analysis using an iterative power system simulation package, to evaluate the impact of strategically placed wind generators on distribution systems with respect to the critical voltage variations and collapse margins. This paper concludes with the discussion of wind generators excellent options for voltage stability.

## 2.Induction machines

Induction machines are used extensively in the power system as induction motors but are not widely used as generators. Despite their simplicity in construction, they are not preferred as much as synchronous generators. This is mainly due to the defined relationship between the export of P and absorption of Q. However, induction generators have the benefits of providing large damping torque in the prime mover, which makes it suitable for the application in fixed speed wind

turbines. The fixed speed wind turbine uses a squirrel cage induction generator that is coupled to the power system through a connecting transformer as shown in Figure 1. Due to different operating speeds of the wind turbine rotor and generator, a gearbox is used to match these speeds. The generator slip slightly varies with the amount of generated power and is therefore not entirely constant.

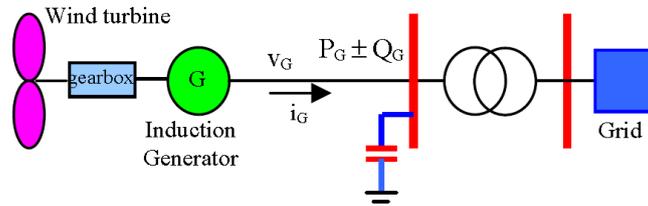


Figure 1. Modelling wind turbine connected grid.

However, because these speed variations are in the order of 1 per cent this wind turbine is normally referred to as constant speed. Nowadays, this type of wind turbine is nearly always combined with stall control of the aerodynamic power, although pitch-controlled constant speed wind turbine types have been built in the past. Induction machines consume reactive power and consequently, it is present practice to provide power factor correction capacitors at each wind turbine. These are typically rated at around 30 per cent of the wind farm capacity. As the stator voltage of most wind turbine electrical generators is 690V, the connecting transformer of the wind turbine is essential for connection to the distribution network and should be considered when modeling the electrical interaction with the power system [3].

### 3.Impacts of WGs.

Connecting a generation scheme to a distribution network will affect the operation and performance of the network depending on the scheme and rating of the generator itself. The impacts are (i) Power Flows, (ii) Voltage stability, (iii) Fault Analysis, and (iv) Impact of WTs on the Networks. Let us discuss each of them in detail.

#### A. Voltage Stability

A system experiences a state of voltage instability when there is a progressive or uncontrollable drop in voltage magnitude after a disturbance, increase in load demand or change in operating condition. The main factor, which causes these unacceptable voltage profiles, is the inability of the distribution system to meet the demand for reactive power. Under normal operating conditions, the bus voltage magnitude (V) increases as Q injected at the same bus is increased. However, when V of any one of the system's buses decreases with the increase in Q for that same bus, the system is said to be unstable. Although the voltage instability is a localized problem, its impact on the system can be wide spread as it depends on the relationship between transmitted P, injected Q and receiving end V. These relationships play an important role in the stability analysis and can be displayed graphically [1].

**B. PV Curves**

When considering voltage stability, the relationship between transmitted P and receiving end V is of interest. The voltage stability analysis process involves the transfer of P from one region of a system to another, and monitoring the effects to the system voltages. This type of analysis is commonly referred to as a PV study.

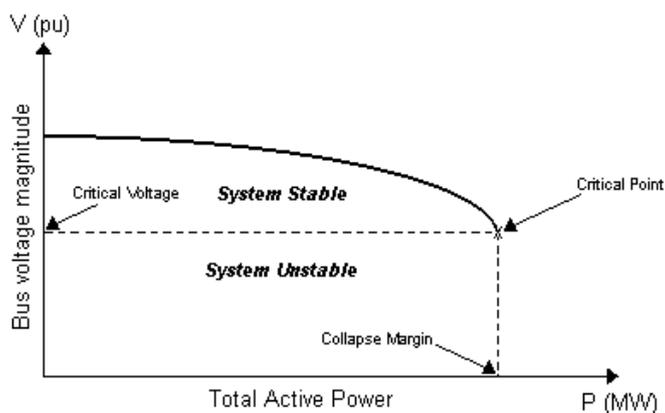


Figure 2. P-V Characteristics.

The Figure 2 shows a typical PV curve. It represents the variation in voltage at a particular bus as a function of the total active power supplied to loads or sinking areas. It can be seen that at the “knee” of the PV curve, the voltage drops rapidly when there is an increase in the load demand. Load flow solutions do not converge beyond this point, which indicates that the system has become unstable. This point is called the Critical point. Hence, the curve can be used to determine the system’s critical operating voltage and collapse margin. Generally, operating points above the critical point signifies a stable system. If the operating points are below the critical point, the system is diagnosed to be in an unstable condition [5].

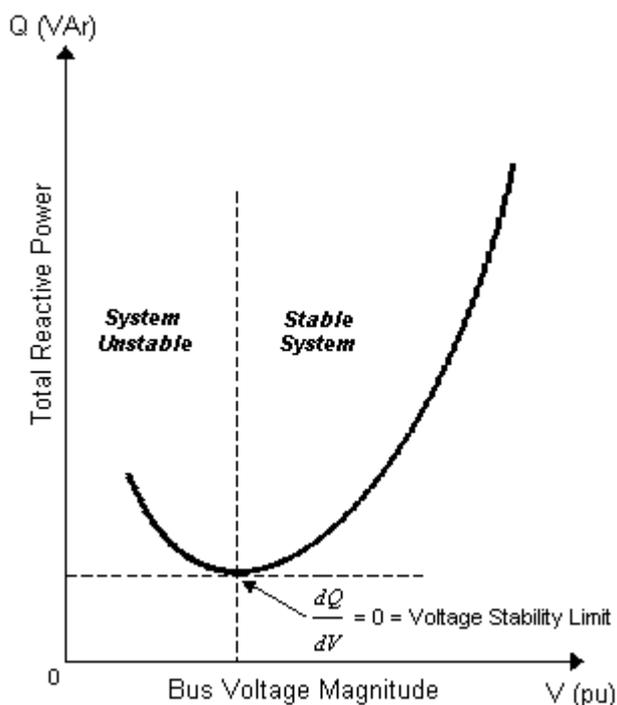


Figure 3. Q-V Characteristics.

### C. QV Curves

Voltage stability depends on how the variations in Q and P affect the voltages at the load buses. The influence of reactive power characteristics of devices at the receiving end is more apparent in a QV relationship. It shows the sensitivity and variation of bus voltages with respect to reactive power injections or absorptions. Figure 3 shows a typical QV curve, which is usually generated by a series of load-flow solutions. Figure 3 shows a voltage stability limit at the point where the derivative  $dQ/dV$  is zero. This point also defines the minimum reactive power requirement for a stable operation. An increase in Q will result an increase in voltage during normal operating conditions. Hence, if the operating point is on the right side of the curve, the system is said to be stable. Conversely, operating points in the left side of the graph are deemed to be unstable [4,5].

### D. PQ curves.

The maximum permissible loading of a system, within the voltage stability limit, is usually determined from the well-known P-V curve or Q-V curve. The P-V curve is plotted for a constant power factor and the Q-V curve is plotted for a constant power. A series of computer simulations is required to generate a family of these curves [6]. There are other methods to find the voltage stability limit of a system, such as multiple load flow solutions, singularity criterion of the Jacobian matrix [7]. It is an established fact that the voltage collapse occurs when the system load increases beyond a certain limit. If the limiting values of P and Q are known, the voltage stability margin for a given operating point can directly be determined. This requires the plotting of voltage stability boundary of the system in P-Q plane, however, using the limiting values of P and Q. To the best knowledge of the author, no such work has been reported so far that can determine the voltage stability margin using the P-Q curve.

The limiting or critical values of P and Q at the voltage collapse point are first determined and then used to plot the voltage stability boundary in P-Q plane. Unlike the conventional P-V or Q-V curves, no fixed value of power or power factor is used in generating the stability boundary [8]. Using the above curve, the voltage stability margin in terms of P, Q, or S (for a given power factor) can easily be determined when the initial operating point is known. Consider the equivalent  $\pi$  model of a distribution line connected between buses i and j as shown in Fig.4.

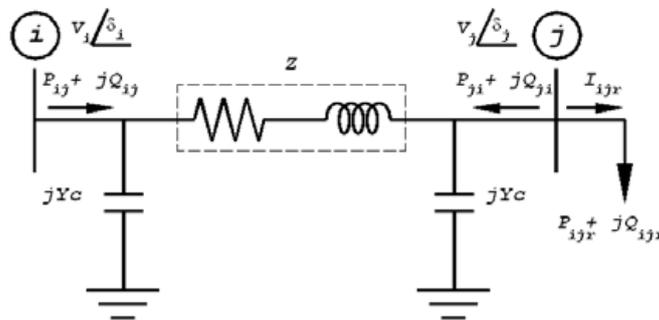


Figure 4. The  $\pi$  model distribution line connected between bus i and bus j.

We can formulate the relationship between injected current and voltage at any buses based on generalized ABCD parameters as follows:

$$V_i \angle \delta_i = AV_i \angle \delta_i + BI_j \quad (1)$$

where  $A = 1 + ZYc$  and  $B = Z$ . The complex form of A and B can be expressed as shown in eq. (2).

$$A = a_1 + ja_2 \text{ and } B = b_1 + jb_2 \quad (2)$$

The receiving end current,  $I_{ijr}$ , can be expressed:

$$I_{ijr} = \frac{(P_{ijr} - jQ_{ijr})}{V_i \angle -\delta_i} \quad (3)$$

Substitute A and B from (2) and  $I_{ijr}$  from (3) into (1) resulting in (4).

$$V_i \angle \delta_i = (a_1 + ja_2)V_j \angle \delta_i + \frac{(b_1 + jb_2)(P_{ijr} + jQ_{ijr})}{V_j \angle \delta_j} \quad (4)$$

Or

$$aV_j^4 + aV_j^2 + c = 0 \quad (5)$$

Where

$$\begin{aligned} a &= a_1^2 + a_2^2; \\ b &= c_2 P_{ijr} + c_3 Q_{ijr} - V_i^2; \\ c &= c_4 (P_{ijr}^2 + Q_{ijr}^2) \\ c_1 &= a_1^2 + a_2^2; \\ c_2 &= 2(a_1 b_1 + a_2 b_2); \\ c_3 &= 2(a_1 b_2 + a_2 b_1); \\ c_4 &= b_1^2 + b_2^2; \end{aligned}$$

The solution of eq. (5) is the square of the receiving end voltage. Thus the receiving end voltage can be calculated from eq. (6).

$$V_j = \sqrt{\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}} \quad (6)$$

There are two solutions for eq. (6), the lower solution lies on the lower part of the P-V curve and is unstable [4]. Thus, the available solution is a stable one on the upper half, which can be expressed as in eq. (7).

$$V_j = \sqrt{\frac{-b - \sqrt{b^2 - 4ac}}{2a}} \quad (7)$$

The point where the two trajectories, i.e. stable and unstable lines, are joined is the nose or bifurcation point. In addition, this is the point where the maximum power can be transferred, which is the condition  $b^2 - 4ac$ . Substitute coefficients of the quadratic equation from eq. (4) into eq. (7) and rearrange, we obtain (8).

$$\begin{aligned} &(c_2^2 - 4c_1c_4)P_{ijr}^2 + (c_3^2 - 4c_1c_4)Q_{ijr}^2 \\ &- 2c_2V_i^2P_{ijr} + 2c_3V_i^2Q_{ijr} + 2c_2c_3Q_{ijr} + V_i^4 \end{aligned} \quad (8)$$

The relationship between  $P_{ijr}$  and  $Q_{ijr}$  of eq. (8) is a locus of the collapsing point on the P-Q plane which separates the operating points into feasible and infeasible regions. The calculation method to obtain the predicted collapsing point can be illustrated in Fig.5.

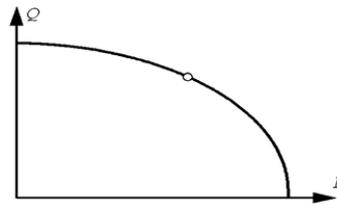


Figure 5. The predicted collapsing point calculation.

### E. Test System

Fig. 6 shows the simplified diagram of test system. It has 20 buses operating at the voltage of 12.47 kV, 19 circuits/transformers, and the hypothetical wind power is connected at bus 20 at 0.69 kV. The detailed of the system is not showed but it has only one circuit of 138 kV [4]. The power wind farm is a variable speed direct drive synchronous generator connected to the Point of Common Coupling, (PCC) by a full-load converter. It can be represented by a P-Q bus or a P-V bus, since it has the capacity to control the reactive power. The loads are distributed considering the thermal limits of the conductors. The line parameters, loads and Generator data are shown in Tables I. The load is increased with steps of 0.5% in all loads, starting from a normal operating point. The limits of the safe voltage in distribution buses are 0.95 to 1.05 per unit. The system was simulated considering two different scenarios.

TABLE I . LINE PARAMETERS OF DISTRIBUTION SYSTEM IN PER UNIT ON 40 MVA BASE.

	From	To	Resistance	Reactance
1	1	2	0.1196	0.1263
2	2	3	0.125	0.1505
3	2	9	0.0713	0.0185
4	2	10	0.0664	0.0702
5	3	4	0.0936	0.1129
6	3	5	0.6294	0.7586
7	5	6	0.3123	0.3766
8	5	7	0.624	0.4947
9	5	8	0.6559	0.5201
10	10	11	0.0561	0.0592
11	10	16	0.0859	0.0908
12	11	12	0.0471	0.0496
13	11	15	0.037	0.0095
14	12	13	0.08	0.0844
15	12	14	0.0257	0.0067
16	16	17	0.0229	0.0059
17	16	18	0.0286	0.0075

18	19	1	0	0.28
19	20	12	0	0.28

First: the wind power generation is connected and operates as a P-Q bus with unit power factor. His particular operating point for actual operation state is  $P_G = 7.5$  MW and  $Q_G = 0.0$  MVAR. The Wind Power can also be represented by a P-V bus with the reactive power limits, so that when the limits are reached, it becomes a P-Q bus. In modern wind turbine system it is possible to control the power factor, provides in this way, an additional source of reactive to help the power systems to control de voltage.

Second: without Wind Power Generation.

Fig. 7, 8 show the first scenario and the second for the load buses 13 of the system.

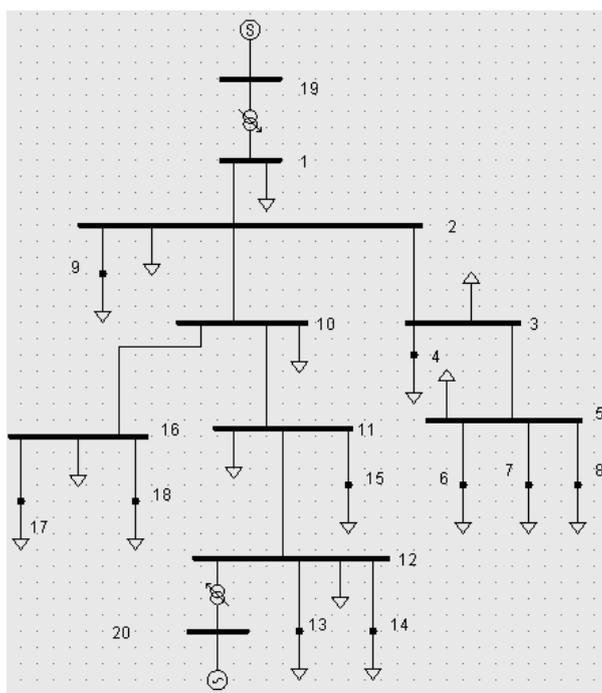


Figure 6. Distribution Power System Test.

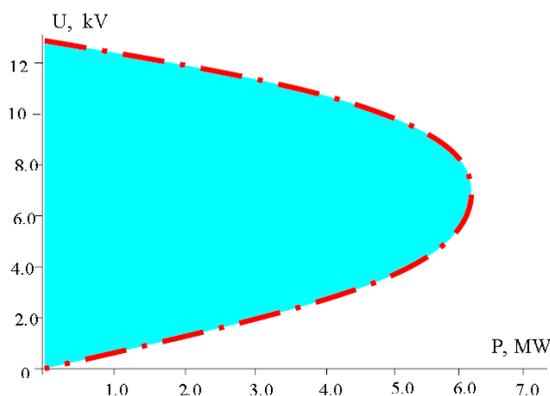


Figure 7. Loading in bus 13 - Voltage stability region with the contribution of wind power.

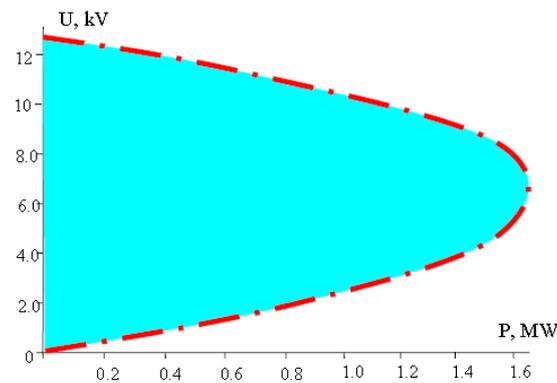


Figure 8. Loading in bus 13 - Voltage stability region without wind power.

Figure 9.

#### 4. Conclusion

A very efficient method is presented to determine the maximum permissible load that can be allowed in each bus of a distribution power system. To ensure the reliability of the results, a comparison between the proposed and a previous analytical method is carried out in a simple two bus system connected by a single transmission line. The results are very close and the proposed method was applied on a distribution power system. The presence of wind power is considered in order to analyze the effect of this generation on voltage operation and at the voltage stability limits. The voltage stability limit region and a sub-region in which the voltages at the bus are in acceptable ranges are defined for different power factors. For practical purposes, the PQ curves can be useful to determine the capacity of certain buses of the system to support an increasing in the load demand. Of course, to meet de new demand, the limits of secure voltages must be determined. P-Q curves can help the utilities in the choice the best point to connect the wind farms.

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# A REVIWE ARTICLE OF PV CELL BOOST CONVERTER EFFICIENCY ENHANCEMENT BY USING MULTILEVEL INVERTER

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## ABSTRACT

*The recent upsurge in the demand of PV systems is due to the fact that they produce electric power without hampering the environment by directly converting the solar radiation into electric power. However the solar radiation never remains constant. It keeps on varying throughout the day. The need of the hour is to deliver a constant voltage to the grid irrespective of the variation in multilevel inverter. We have designed a circuit such that it delivers constant and stepped up dc voltage to the load. We have studied the open loop characteristics of the PV array with variation in multilevel inverter levels. Then we coupled the PV array with the boost converter in such a way that with variation in load, the varying input current and voltage to the converter follows the open circuit characteristic of the PV array closely. At various isolation levels, the load is varied and the corresponding variation in the input voltage and current to the boost converter is noted. It is noted that the changing input voltage and current follows the open circuit characteristics of the PV array closely.*

**Keywords:** Maximum power point tracking, Photovoltaic system, Buck boost converter, Perturb and Observe method, Direct current, Photovoltaic Panel

## 1.Introduction

The rapid increase in the demand for electricity and the recent change in the environmental conditions such as global warming led to a need for a new source of energy that is cheaper and sustainable with less carbon emissions. Solar energy has offered promising results in the quest of finding the solution to the problem. The harnessing of solar energy using PV modules comes with its own problems that arise from the change in insulation conditions. These changes in insulation conditions severely affect the efficiency and output power of the PV modules [1-2]. A great deal of research has been done to improve the efficiency of the PV modules. A number of methods of how to track the maximum power point of a PV module have been proposed to solve the problem of efficiency and products using these methods have been manufactured and are now commercially available for consumers [1-3]. Today electrical power demand is very much increasing. So to generate the required power, resources used for this purpose are also increase. Hence proper utilization of power is required whenever surplus power is available. This can be achieved by storing the surplus power through batteries in the form of DC and this stored energy can be re- utilized by the conversion device called it as “INVERTER” by converting DC power into AC power. The renewable energy sources have been tremendously increasing its production, out of all those renewable energy sources solar is popular and it needs an inverter for the conversion. The multilevel inverters are the advancement in power electronics. Now-a-days multilevel inverters in literature are updating according to the high power capability. Hence,

multilevel inverters are capable of having good voltage spectrum and low voltage stress devices. Power electronic inverters are becoming popular for various industrial drives applications. In recent years, inverters have even become a necessity for many implementations such as motor controlling and power systems [1]. A multilevel inverter not only achieves high power ratings, but also enables the use of renewable energy sources. Renewable energy sources such as photo voltaic, wind, and fuel cells can be easily interfaced to a multilevel inverter system for a high power and Medium power application. Multilevel inverters have been mainly used in medium or high power system applications, such as static reactive power compensation and adjustable-speed drives.

## 2. Concept Of Multilevel Inverter

Basic concept of multilevel inverter is differentiated from other regular inverter in a way that in multilevel inverter more than two steps are generated [4-5]. As the number of steps increases an almost sinusoidal waveform is obtained. The multilevel inverter operates at the fundamental switching frequency, which makes the multilevel inverter suitable for high power applications. Multilevel converters (MLC) commonly operate as inverters [6]. The term 'level' refers to the number of voltage steps (L) produced by an MLI in one-quarter of a cycle (between zero and ninety degrees of an electric cycle). Typically the number of levels in a cascaded MLI is computed by  $L = (2n+1)$ , where 'n' is the number of DC sources. An MLI produces a staircase waveform from a single or multiple DC sources based on its topology. The switching frequency in a multilevel inverter is equal to the fundamental frequency (50 or 60 Hz). Hence, the loss due to frequency of switching is less. The switching losses in a solid-state device are proportional to the switching frequency and the number of switches in the system. The multilevel inverters have some disadvantages. One particular disadvantage is the great number of power switches needed. Although low voltage rating power switches can be utilized in a multilevel inverter, each switch requires a related gate driver circuits [6-7].

## 3. Literature Review And Issues Of Old Articles

**D. S. CHAUDHARI [1]:** The solar photovoltaic is considered to be the one of the most promising energy source in many applications, due to its safety and high reliability. Residential that uses solar power as their alternative power supply will bring benefits to them. In order to increase the efficiency of system during rapid changing environmental conditions; system will adapt some Maximum Power Point Tracking (MPPT) methods. This paper presents a review on various MPPT methods for variable environmental conditions (i.e. variable temperature and irradiation level), their difficulty while tracking and how those difficulties can be overcome efficiently by the other techniques. Apart from all the methods, an open circuit and slope detection tracking technique is found to be an efficient technique with respect to tracking speed and accuracy.

**PAWAN D. KALE [2]:** These modern days that consume a lot of energy e.g. fuel-oil, gas, coal etc. that will deplete its source one day so, much of the focus has been given on the topic of renewable energy. Renewable energies are energy that can be renewed or have no worries of depletion. For instance wind, thermal, bio-mass and solar energy are some of the examples for renewable energy [1]. Solar energy is one of the main renewable energy sources that are widely used in power generating application. Solar energy is an unlimited resource available in nature and set to become important in longer terms for providing heat energy and electricity to the user. This kind of energy resources does not create much pollution as the conventional power sources moreover it has the potential to be the major energy supply in future [1], [8].

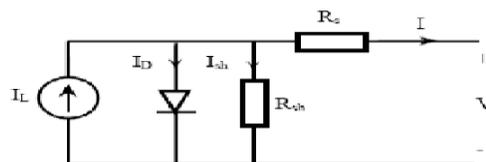
**GHISLAIN REMY [3]:** This paper presents a review of maximum power point tracking (MPPT) techniques for photovoltaic systems (PV). After a brief introduction of the key factors for the power extraction of photovoltaic panel, a review of the commonly used MPPT techniques is presented and detailed with an overall approach. Then, a comparison of the main industrialized ones is discussed for a photovoltaic system. In the last part, the pros and cons of each of the considered MPPT techniques are presented.

**MOHAMED AZAB [4]:** In this paper a new maximum power point tracking algorithm for photovoltaic arrays is proposed. The algorithm detects the maximum power point of the PV. The computed maximum power is used as a reference value (set point) of the control system. ON/OFF power controller with hysteresis band is used to control the operation of a Buck chopper such that the PV module always operates at its maximum power computed from the MPPT algorithm. The major difference between the proposed algorithm and other techniques is that the proposed algorithm is used to control directly the power drawn from the PV. The proposed MPPT has several advantages: simplicity, high convergence speed, and independent on PV array characteristics.

**M.S.SIVAGAMASUNDARI [5]:** Energy especially alternative source of energy is vital for the development of a country. In future, the world anticipates developing more of its solar resource potential as an alternative energy source to overcome the persistent shortages and unreliability of power supply. In order to maximize the power output the system components of the photovoltaic system should be optimized.

#### 4.Structutre Of Photovoltaic Cell

The principle of the photovoltaic effect is simple: The ray of light, assimilated to photons, passes through the top layer (N doped) of the photovoltaic cell. Then, electrons capture the photons' energy and help them to cross the potential barrier of the PN junction, which generates current. So there is a strong relation between the solar irradiance and the amplitude of the generated current, as in (1). As the solar cells characteristic is close to a semiconductor diode, a classical model can be found in literature [5].



**Fig.(1.1) Diode principle circuit.**

This model is based on classical assumptions:

- All the photovoltaic cells have the same  $v(i)$  characteristics;
- There is no partial shadow on the PV panels;
- Temperature is homogeneous on panels.

Hence, performances of PV technologies are really dependent on the sunshine, the cloudiness, the solar incidence and the temperature.

## 5. V-I Characteristic Of Pv Cell Model

The Current – Voltage characteristic curve of a PV cell for certain irradiance at a fixed cell temperature is shown in fig.2. The current from a PV cell depends on the external voltage applied and the amount of sunlight on the cell. When the PV cell circuit is short, the current is at maximum and the voltage across the cell is zero. When the PV cell circuit is open, the voltage is at maximum and the current is zero. 2.3. Power – Voltage curve for PV cell The Power – Voltage curve for PV cell is shown in fig.3. Here P is the power extracted from the PV array and V is the voltage across the terminals of the PV array. This curve varies due to the current isolation and temperature. When isolation increases, the power available from PV array increases whereas when temperature increases the power Available from PV array decreases.

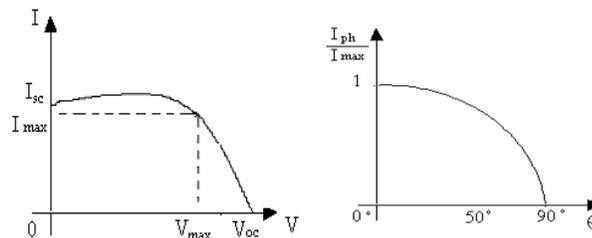


Fig.(2.a) VI Characteristics in PV Cell.

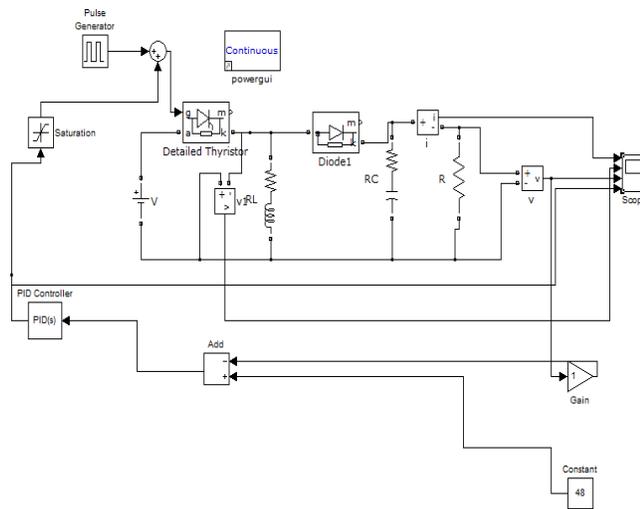
Fig.(2.b) Current variation.

## 6. Different Type Method Of Boost Converting System

**1. MPPT Techniques:** The motivation behind developing the various maximum power point tracking techniques was to increase the efficiency of the PV system at power stage i.e. an improvement in power efficiency. By considering this factor, different MPPT methods were proposed by the researchers. Each method is having their own features but some of them faces difficulties while tracking during rapidly change in the environmental condition. Maximum power point plays an important role in photovoltaic system because they maximize the power output from a PV system for a given set of conditions, and therefore maximize the array efficiency. There are different methods used to track the maximum power point are

1. Perturb and Observe method
2. Incremental Conductance method
3. Parasitic Capacitance method
4. Constant Voltage method

Among the different methods used to track the maximum power point, Perturb and Observe method is the most widely used method in PV MPPTs and is highly competitive against other MPPT methods.



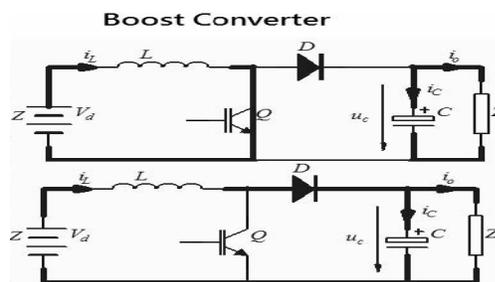
**Fig.(4.1) MPPT technique.**

P&O method [3], [4], [9] is the most frequently used algorithm to track the maximum power due to its simple structure and fewer required parameters. This method finds the maximum power point of PV modules by means of iteratively perturbing, observing and comparing the power generated by the PV modules. It is widely applied to the maximum powerpoint tracker of the photovoltaic system for its features of simplicity and convenience.

According to the structure of MPPTsystem shown in Fig. 1, the required parameters of the power-feedback typeMPPT algorithms are only the voltage and current of PV modules. Shown in Fig. 2 is the relationship between the terminal voltage and output powergenerated by aPV module. It can be observed that regardless of the magnitude of sun irradiance and terminal voltage of PVmodules, the maximum power point is obtained while the condition  $dP/dV= 0$  is accomplished. The slope ( $dP/dV$ ) of the power can be calculated by the consecutive output voltages and output currents, andcan be expressed as follows,

**2. Boosting Power Of Boost Converter:**

As photovoltaic cells are only able to produce more than 2V a cell, series and parallels are used in PV Array. But in order to reduce the losses in the energy transfer, it is better to boost the PV voltage using a DC-DC converter. Figure 1 shows a schematic of a classical Boost Converter, using the PowerSystems Toolbox from the MATLAB software:



**Fig (4.2) Power converter circuit.**

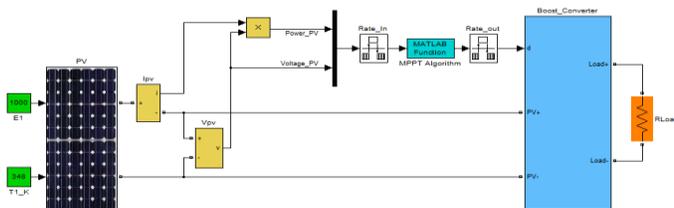
The principle of the Constant Voltage (CV) Method is simple: the PV is supplied using a constant voltage. Temperature and Solar Irradiance impacts are neglected. The reference voltage is obtained from the MPP of the P(i) characteristic directly. Here, the MPP voltage is about 16.3V for the studied PV. **Fig (4.2)** shows the CV algorithm and the code of the Matlab

embedded function. The CV method requires the PV voltage measurement only. The Matlab embedded function is evaluated with a 1 kHz frequency. This Constant Voltage Method cannot be very effective regarding Solar Irradiance impact and certainly not regarding the temperature's influence. Thus, some enhancements of the CV methods exist. The Open Voltage (OV) Method is based on the CV method, but it makes the assumption that the MPP voltage is always around 75% of the open-circuit voltage  $v_{OC}$ . So mainly, this technique takes into account the temperature. But it requests a special procedure to regularly disconnect the PV and to measure the open-circuit voltage. Besides, this technique can partially take into account the cell's aging.

The Temperatures Method is also an improvement of the OV Method: the open-circuit voltage is now considered to be related to the temperature by a linear function. Then, with a temperature sensor, the open-voltage measurement is no more necessary, because its value can be identified from the temperature value directly.

### Short-Current Pulse (SC) Method:

The principle of the Short-Current Pulse (SC) Method is based on a simple relation: the MPP current is proportional to the Short-circuit current  $i_{SC}$ , with some temperature and solar irradiance conditions. To simplify the  $i_{SC}$  estimation, it is often considered as constant, even if the temperature varies between 0 and 60°C. The determination of the Short-circuit current  $i_{SC}$  is in fact, done just before connecting the PV systems to the grid.

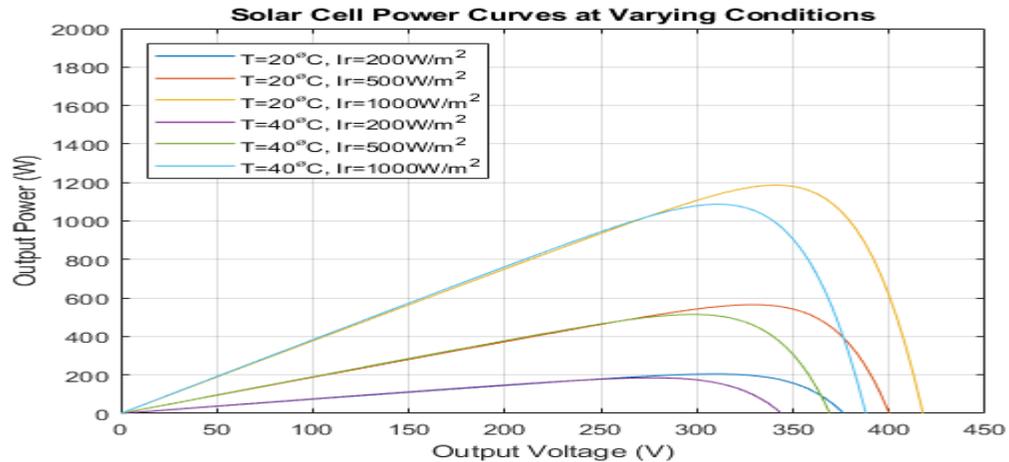


**Fig (4.2) Simulink basic modeling.**

In this paper, the simulation model is developed with MATLAB/SIMULINK. The simulation model of the proposed method and the waveforms are shown in **Fig (4.2)**. The proposed circuit needs independent dc source which is supplied from photovoltaic cell. The inputs are fed by voltage and current of the PV terminals, while the output provides duty cycle for the buck boost converter. The input voltage is 24V and the output voltage after being buck boosted up is 48.2V and shown in fig.6. Buck Boost converter controls the output voltage by varying the duty cycle  $k$ , of the switch and the value of  $k$  is 0.67 which is calculated using the formulae  $V_o = V_s * k / 1 - k$ . If we vary the pulse width of the pulse generator various voltage ranges at the output can be obtained. Once the buckboost converter injected the power from the pv panel and the PID controller starts function, it varies the value of duty cycle which will change the input value that is sensed by the PID controller. By using the PID controller the error has been minimized in the system and the efficiency is improved. Below shows the output values for PV panel.

## 5.Previous Result And Simulation

The PV cell temperature is maintained constant at 25 degree Celsius and the solar intensity is varied in steps up to the rated value of 1200W/meter square in **Fig (5.1)**. That the current slightly increase with increasing intensity thereby increasing the power output of the solar cell.



**Fig (5.1) Output result Solar cell Power Curves.**

## 6.Conclusion

In the Present Work, the maximum power point tracking is successfully carried out by this research using perturb and observe method. The PV module working on photovoltaic effect actually improves the system efficiency. Compared to other methods of maximum power point tracking, the perturb and observe method seems to be easy for the optimization of the photovoltaic system using buck boost converter. By varying the duty cycle of the buck boostconverter, the source impedance can be matched to adjust the load impedance which improves the efficiency of the system. The Performance has been studied by the **MATLAB/Simulink**. In future, the maximum power point tracking could be carried out without the use of controllers in order to reduce the cost and complications of hardware can be removed.

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# HOME AUTOMATION USING ATmega328 MICROCONTROLLER AND ANDROID APPLICATION

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## ABSTRACT

*Automation is the use of control systems and information technologies to reduce the need for human work in the production of goods and services. In the scope of industrialization, automation is a step beyond mechanization. Whereas mechanization provided human operators with machinery to assist them with the muscular requirements of work, automation greatly decreases the need for human sensory and mental requirements as well. Automation plays an in-creasing important role in the world economy and in daily experience. In this paper, we describe the design and development of a remote household appliance control system using ATmega328 microcontroller and android mobile through GSM technology.*

**Keywords:** Home Automation, GSM, ATmega 328Microcontroller, Short Message Service (SMS), Android.

## 1.Introduction

The rapid growth of wireless communication motivated us to use mobile phones to remotely control a household appliance. In this paper we describe a remote appliance control system which can control different household appliances by sending an SMS message from a mobile phone. This controller is extremely handy at places where we have to control the ON and OFF switching of the devices but no wired connection to that place is available. The microcontroller would then control and device based on the information given to it. The proposed solution will need to be easy to use, simple, secure, and robust and be useful on most mobile phones. A remote household appliance control has been described in [1]-[4] using internet. A Bluetooth based home automation control is described in [5]. In [6] a GSM based system for home automation is described which uses voice commands for control. In [7] voice commands for home automation is being described. In this paper we describe a simple remote home appliance control using ATmega328 microcontroller and GSM SMS (Short Messaging Service) via android application.

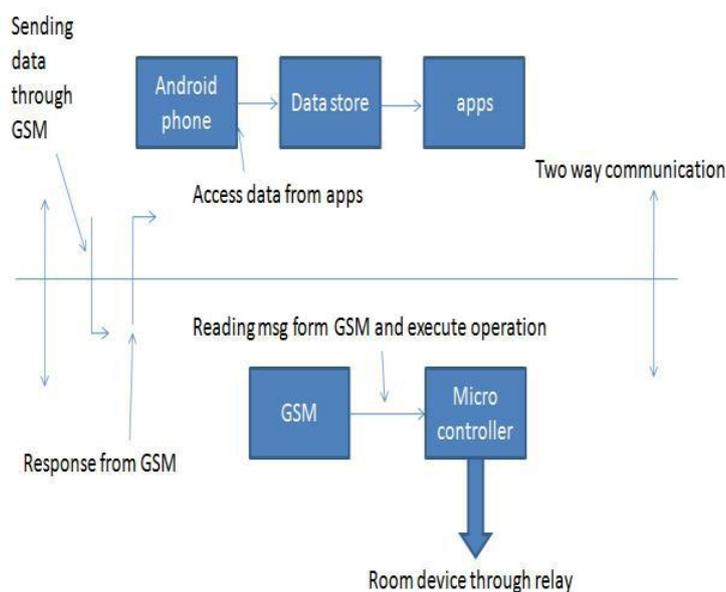
### 1.1 Need Of Automation

An Automated Device Can Replace Good Amount Of Human Working Force, Moreover Humans Are More Prone To Errors And In Intensive Conditions The Probability Of Error Increases Whereas, An Automated Device Can Work With Diligence, Versatility And With Almost Zero Error. Replacing Human Operators In Tasks That Involve Hard Physical Or Monotonous Work. Replacing Humans In Tasks Done In Dangerous Environments (I.E. Fire, Space, Volcanoes, Nuclear Facilities, Underwater, Etc. Performing Tasks That Are Beyond Human Capabilities Of Size, Weight, Speed, Endurance, Economy Improvement Etc. Automation May Improve In Economy Of Enterprises, Society Or Most Of Humankind. For Example, When An Enterprise That Has Invested In Automation Technology Recovers Its Investment, Or When A State Or Country Increases Its Income Due To Automation Like Germany Or Japan In The 20th Century. That's Why It Looks

Into Construction And Implementation Of A Sys-Tem Involving Hardware To Control A Variety Of Electrical And Electronics System.

## 1. System Description

The system has two parts, namely; hardware and software. The hardware architecture consists of a stand-alone embedded system that is based on 8-bit microcontroller (ATmega328), a GSM handset with GSM Modem and an android phone. The GSM modem provides the communication media between the homeowner and the system by means of SMS messages via android phone. The SMS message consists of commands to be executed. The format of the message is predefined. The SMS message is sent to the GSM modem via the GSM public networks as a text message with a definite predefined format. Once the GSM modem receives the message, the commands sent will be extracted and executed by the microcontroller. The system will interpret the commands and turn the appliances ON/OFF accordingly via android application. The detail description of individual modules in the system is as shown in Fig 1



### 1.1 User GSM mobile Handset

Cellular phone containing SIM (Subscriber's Identifying Module) card has a specific number through which communication takes place. The mode of communication is wireless and mechanism works on the GSM (Global System for Mobile communication) technology. Here, the user transmits instructions to the system to control the appliance in the form of SMS.

### 2.2 Receiver Gsm Handset

This receiver GSM handset is used to receive the SMS sent by the user and then to transmit an acknowledgement or status to the user's mobile. The receiver handset has to be equipped with an android operating system and a valid SIM card. In our design we have used an android platform GSM handset model. The handset has a built in AT modem with UART interface and supports most of the AT command instructions. This handset is attached with the microcontroller used to control the appliance through UART. AT Modem is a Modem which supports AT commands, also known as Hayes command. The Hayes command set is a specific command language originally developed for the Hayes Smart modem. The command set consists of a series of short text strings which combine together to produce complete commands for operations such as dialing, hanging up, and changing the parameters of the connection. Most modems

follow the specifications of the Hayes command set. AT commands are instructions used to control a modem. AT is the abbreviation of Attention. Every command line starts with "AT" or "at".

### 2.3. Microcontroller Board

This contains the micro-controller (ATmega328) and a timeout generator circuit. This is the main module of the system. On receipt of the SMS message, text words are checked with predetermined format which includes desired device ON/OFF commands. To read a message the microcontroller sends the appropriate AT command to the Receiver GSM Modem through UART. The Modem then responds with the message and the microcontroller stores the message in the RAM. When the message ends there is no way to know by the microcontroller. The time-out generator circuit performs the vital function of providing the microcontroller board with the ability to detect the end of a message from the receiver GSM mobile. The output of the time-out generator circuit (connected to port1\_3 of the microcontroller) is low until the message is being received and becomes high at the end of the message. The microcontroller then processes the command and sends the appropriate controlling signal to the switching module.

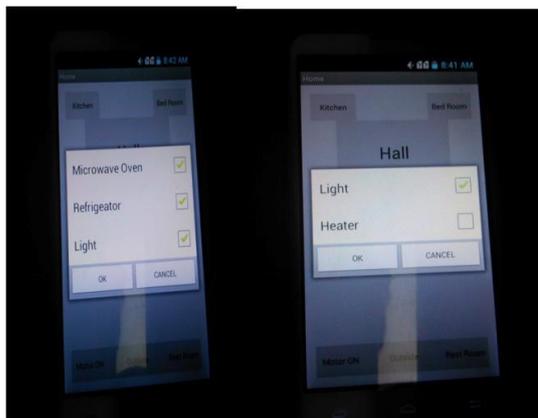
### 2.4. Android

Android is a mobile operating system that is based on a modified version of Linux. It was originally developed by a start-up of the same name, Android, Inc. In 2005, as part of its strategy to enter the mobile space, Google purchased Android and took over its development work as well as its development team).Google wanted Android to be open and free; hence, most of the Android code was released under the open source Apache License, which means that anyone who wants to use Android can do so by downloading the full Android source code.

### 2.5. Android Application

Android is a software stack for mobile devices that include an operating system, middleware and key applications. The Android SDK provides the tools and APIs necessary to begin developing applications on the Android platform using the Java programming language. By providing an open development framework, Android offers developers the ability to build extremely rich and innovative applications. Developers have full access to the same framework APIs used by the core applications. Android includes a set of C/C++ libraries used by various components of the Android system. They include System C library, Media library, Surface Manager, Lib Web Core, SGL, SQLite, Free Type and 3D libraries. Android applications are written in Java programming language. The Android SDK compiles the code along with any data and resource files into an Android package, an archive file with an .apk file extension. All the code in a single .apk file is considered to be one application and is the file that Android powered devices use to install the application. Once installed on a device, each Android application lives in its own security sandbox. Some important application fundamentals are: The Android operating system is a multi-user Linux system where each application is a different user. By default, the system assigns each application a unique user ID. The system sets permission for all the files in an application so that only the user ID assigned to that application can access them. Each process has its own virtual machine, so an application's code runs in isolation from other application. Every application runs its own Linux process

Fig 2 shows android application created in mobile.



**Figure: android application**

### 3. Algorithm

The system operates upon power up the microcontroller initializes the AT Modem. During initialization the microcontroller configures the Modems UART speed, message format etc. to be used. After the initialization is complete the microcontroller continuously checks the Modem for any new message. Upon receipt of a message the microcontroller reads the message and extracts the command and authentication information. The authentication information may be the remote user's mobile phone number or a text string sent along with the message for command. After the authentication is verified the microcontroller then sends the appropriate control signal to the switching module to control the appliance. The command is executed and the devices are switched ON or OFF according to the command by android application. The microcontroller then sends an SMS to the user through the AT modem stating the Status of the appliance as an acknowledgement. Fig 4 shows complete setup of the system.

### 4. Conclusion

In the paper low cost, secure, and ubiquitously accessible, auto configurable, and remotely controlled solution for automation of homes has been introduced. The approach discussed in the paper has achieved the target to control home appliances remotely using the SMS-based system satisfying user needs and requirements. The extensive capabilities of this system are what make it so interesting. From the convenience of a simple android mobile, a user is able to control and monitor virtually any electrical device in a household. By connecting all the appliances with the system through power line communication or wireless to the system, all electrical household appliances can be controlled by sending a message from an android mobile.

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# ROLE OF PSO OPTIMIZED SINGULAR VALUE DETECTION TECHNIQUE IN RURAL DEVELOPMENT

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## ABSTRACT

*With the rapid development in wireless communications, the demand for the high data transmission require increases in spectrum resources because of fixed spectrum assignment policy is characterized in wireless network these lead to low spectrum utilization in many frequency bands but the availability of the spectrum resources is limited. Cognitive radio is key enabling technology for improving the utilization of electromagnetic spectrum. It senses the spectral environment over wide range of frequency band and exploits the unoccupied band. In this sense cognitive radio can play important role in the rural development by using the unused spectrum. So many T.V bands are not used in rural area these bands can be used there for broadband transmission by cognitive Radio. These frequency bands can also be used for giving online training, guidance and help in agriculture like modern techniques, organic farming, inspection of crops, identification of diseases in crops & their remedies etc.*

*One of the most challenging issues in cognitive radio system is to sense the spectrum environment accurately and determine whether the primary user is active, or not over a specific band reliably. So, there is need of good sensing algorithm have the property have low sensing time, ability to detect primary signal at low SNR Therefore, in this paper a PSO optimized singular value based detection methods is proposed to obtain improved result. Performance analysis and comparison of techniques are carried out and developed on MATLAB 2014 R.*

## 1.Introduction

Currently, radio rapidly developing wireless communication systems, and increasing the intensity of their use, which leads to an increase in demand for radio spectrum. However, the radio-frequency spectrum (RFS) is a limited natural resource. Under these conditions it began to show a number of contradictions, the most urgent of which are:

- Contradiction between the increasing demand for services provided by wireless communication systems and the limited radio frequency spectrum.
- Contradiction between the Power Spectral Density (PSD) expansions represented in wireless communication systems and the ability to use the spectrum of each individual radio device 100%.

Virtually the entire frequency band allocated to the present time and is licensed, but the spectrum is a precious natural resource that is not used sufficiently effectively. Implementation and use of new services, for which the necessary availability of frequency bands, it becomes difficult, and in some cases even impossible. One of the possible solutions to this problem is to move to a new technology called cognitive radio.

An important way to increase spectrum efficiency allows dynamic spectrum management mechanism, according to which the secondary user (not assigned to the data of the frequency range) and the possibility to use the primary users ranges (assigned to this range) at a time, as long as this range is not used by the primary user.

The technology of cognitive radio (CR) intended for re-use of radio frequency spectrum, when the device on the network is automatically reconfigured for free frequencies. CR devices change their settings based on the information on the electromagnetic and the geographical environment, recognize the signals of all the images of the primary radio-electronic means (RES) and the frequency of use, when the primary distribution zone does not work. They are automatically reconfigured to free ranges while maintaining a stable connection. Dynamic spectrum management algorithms are technically very complex, and can only be used in so-called smart radio systems. A distinctive feature of such systems, sets them in a separate group, is the ability to retrieve and analyze information from the surrounding radio space, to predict changes in the communication channel and optimally adjust their internal state parameters, adapting to changes in the radio environment.

In this work, we are interested in the problem of spectrum sensing, which is the detection of the presence of PU in a licensed spectrum in the context of intelligent radio. We are not interested in a particular band (GSM or TV, for example) or a particular system. The objective of this paper is to propose efficient detection methods with low complexity and / or low observation time using the minimum information a priori on the signal to detect.

### **Detection Techniques**

The different methods that have been developed to achieve this objective can be categorized as

Matched Filter Detection, Energy Detection & Cyclostationary Feature Detection

The Energy detection method has shown its limits in the presence of a high level of interference. Indeed, the emitted signal preserves its spectral correlation but can no longer be detected with the Energy detection method because there is interference. So it is better to use the The Cyclostationary feature detection method has important advantages over other detection methods. Cyclostationary feature detection method when we have no information about the primary users. With these detection methods, a user of the cognitive radio network (which is also called a secondary user) will not be able to avoid interference due to lack of information on the licensed user. Indeed, the secondary user may not detect the presence of the primary user because of an obstacle between the two (the case of the hidden station) and thus generate interference at the receiver. Moreover, a single machine cannot constantly analyze the whole spectrum of frequencies in order to detect the unused portions of spectrum since this operation is very long.

To compensate for the lack of frequencies, researchers have designed cognitive radio technology. It involves exploiting the under-used frequency spectrum without interfering with licensed users. The first task of cognitive radio networks is to detect the presence of licensed users in the frequency spectrum to identify portions of unused frequency spectrum and to allow users of cognitive radio networks (also called secondary users) to Release frequencies used by primary users.

In the presence of several distinct cognitive radio networks, the detection of primary users is more difficult because it will be more difficult to distinguish the signals emitted by secondary users from those emitted by primary users. In protocol 802.22 a period of silence has been set up during which secondary users are not allowed to transmit a signal in order to better detect the presence of primary users. It will be necessary to synchronize the beginning of this period of silence between the different cognitive radio networks in order to increase the efficiency in the detection of a primary user.

### Proposed Pso Optimized Singular Value Based Detection

The proposed method can be used for various signal detection and applications without knowledge of the signal, channel, and noise power. The received signal samples under the two hypotheses are therefore respectively as follows:

$$H_0: x(n) = \eta(n)$$

$$H_1: x(n) = s(n) + \eta(n)$$

Let  $f(k), k = 0, 1, \dots, K$  be normalized band pass filter applied to the signal.

Let

$$x'(n) = x(n) * f(n)$$

$$s'(n) = s(n) * f(n)$$

$$\eta'(n) = \eta(n) * f(n)$$

Then,

$$H_0 : x'(n) = \eta'(n)$$

$$H_1 : x'(n) = s'(n) + \eta'(n)$$

Consider L samples and let

$$X(n) = [x'(n), x'(n-1), \dots, x'(n-L+1)]^T$$

$$S(n) = [s'(n), s'(n-1), \dots, s'(n-L+1)]^T$$

$$\eta(n) = [\eta'(n), \eta'(n-1), \dots, \eta'(n-L+1)]^T$$

Define a L x (L+K) matrix

$$H = \begin{bmatrix} f(0) & f(1) & \dots & f(k) & 0 & \dots & 0 \\ 0 & f(0) & \dots & f(k-1) & f(k) & \dots & 0 \\ \vdots & \vdots & \vdots & \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \dots & f(0) & f(1) & \dots & 0 \end{bmatrix}$$

If  $G = H(H^*)^H = Q^2$  then define  $R'_x = Q^{-1}R_xQ^{-1}$ . ( $R_x$  is the correlation matrix of  $x(n)$ ). If there is no signal, then  $R'_x = 0$ .

Hence the off diagonal elements of  $R'_x$  are all zeros. If there is signal and the signal samples are correlated,  $R'_x$  is not a diagonal matrix.

Let  $r_{nm}$  be the elements of  $R'_x$ . Let:

$$K_1 = \frac{1}{L} \sum_{n=1}^L \sum_{m=1}^L |r_{nm}|$$

$$K_2 = \frac{1}{L} \sum_{n=1}^L |r_{nn}|$$

$$K_3 = \frac{1}{L} \sum_{n=1}^L \sum_{m=1}^L |r_{nm}|^2$$

$$K_4 = \frac{1}{L} \sum_{n=1}^L |r_{nn}|^2$$

The primary signal is considered to be present if  $K_1 > \gamma K_2$ . Covariance absolute value (CAV) detection or if  $K_3 > \gamma K_4$ . Covariance Frobenius Norm (CFN) detection where  $\gamma$  is an appropriate value based on  $P_f$ .

### Particle Swarm Optimization

This approach is a heuristic method. The evaluation of candidate solution of current search space is done on the basis of iteration process.

The minima and maxima of objective function is determined by the candidate's solution as it fits the task's requirements.

Since PSO algorithm do not accept the objective function data as its inputs hence

The fitness function is:

$$(\text{minimize } f(L) = 1 - P_D)$$

Where,  $P_D = \text{prob. of detection}$  &  $L = \text{size of matrix}$

The best value of fitness is recorded by PSO for an individual record. The other individuals reaching this value are taken as the individual best position and solution for given problem. The individuals reaching this value are known as global best candidate solution with global best position. The up-gradation of global and individual best fitness value is carried out and if there is a requirement then global and local best fitness values for every individual  $f(L)$  are replaced. For PSO's optimization capability, the updation of speed and position is necessary. Each particle's velocity is updated with the help of subsequent formula:

$$v_i(t+1) = Wv_i(t) + c_1r_1[\hat{x}_i(t) - x_i(t)] + c_2r_2[g(t) - x_i(t)]$$

Where,  $v_i(t+1)$ =velocity of  $i^{th}$  particle at  $t+1$  iteration,  $c_1$  and  $c_2$  are acceleration coefficients &  $r_1$  and  $r_2$  are random and uniform elements of a sequence in the range of (0, 1)

The position of particle is calculated as :  $p_i(g+1) = p_i(g) + v_i(g+1)$

Here the singular value decomposition (SVD) is applied for the acknowledgement of received signal whether it is correlated to primary user or not. Here the received signal is changed into matrix form then its SVD is calculated. PSO optimizes the matrix prior to the SVD. Finally SVD is applied on the optimized value of  $L$  i. e. size of matrix.

### Singular Value based Detection (SVD)

In linear algebra, the singular value decomposition (SVD) is a factorization of a real or complex matrix, with many useful applications in signal processing and statistics. Formally, the singular value decomposition of a  $M \times L$  real or complex matrix  $R$  is a factorization of the form:

$$R = U \Sigma V^*$$

Where  $U$  is a  $M \times M$  real or complex unitary matrix,  $\Sigma$  is a  $M \times L$  rectangular diagonal matrix with nonnegative real numbers on the diagonal, and  $V^*$  (the conjugate transpose of  $V$ ) is a  $L \times L$  real or complex unitary matrix. The diagonal entries  $\Sigma_{i,i}$  of  $\Sigma$  are known as the singular values of  $R$ . The  $M$  columns of  $U$  and the  $L$  columns of  $V$  are called the left-singular vectors and right-singular vectors of  $R$ , respectively.

### Algorithm for Singular Value based Detection

Step 1: Select number of columns of a covariance matrix,  $L$  such that  $k < L < N - k$ , where  $N$  is the number of sampling points and  $k$  is the number of dominant singular values. here,  $k = 2$  and  $L = 14$ .

Step 2: Factorized the covariance matrix.

Step 3: Obtain the maximum and minimum eigenvalue of the covariance matrix which are  $\lambda_{\max}$  and  $\lambda_{\min}$ .

Step 4: Compute threshold value  $\gamma$ .

Step 5: Compare the ratio with the threshold. If  $\lambda_{\max} / \lambda_{\min} > \gamma$ , the signal is present, otherwise, the signal is not present.

### Experimental Setup & Results

Simulations are carried out in MATLAB environment

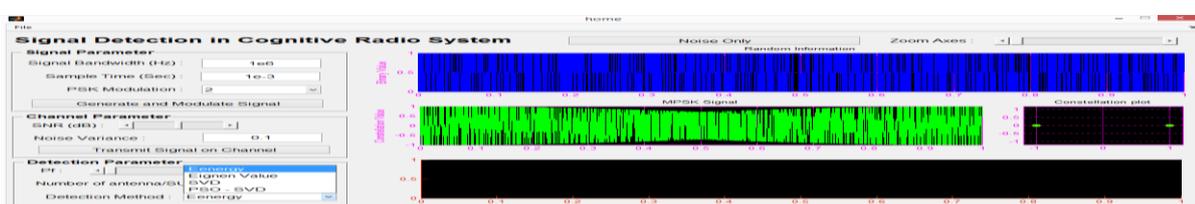


Figure 1. GUI of proposed research work

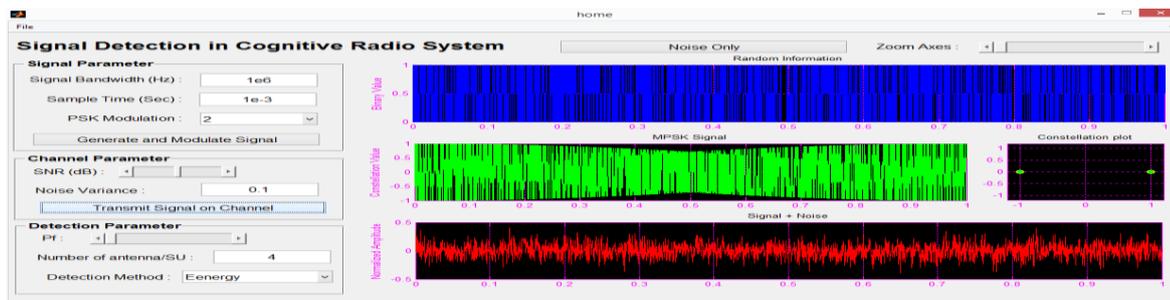


Figure 2. Selection of signal detection method

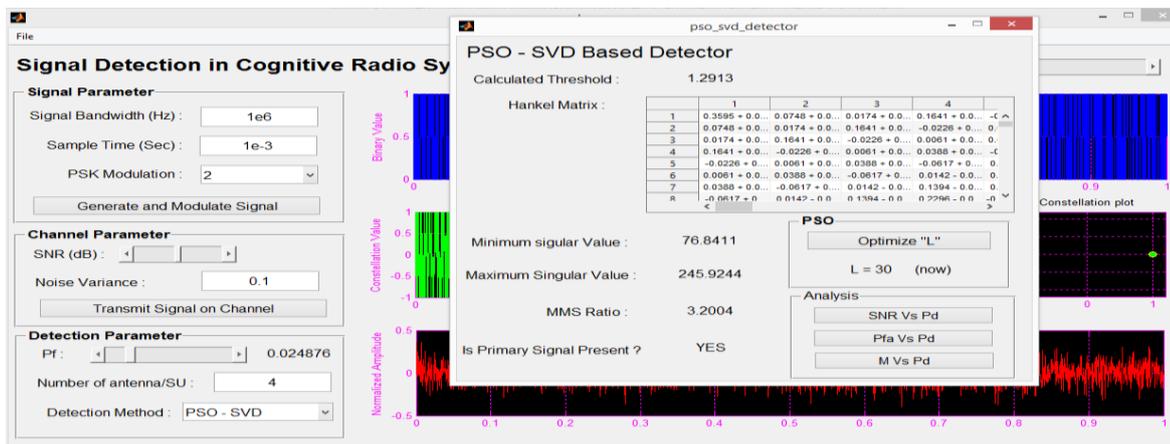


Figure 3. Performance analysis of PSO-SVD method

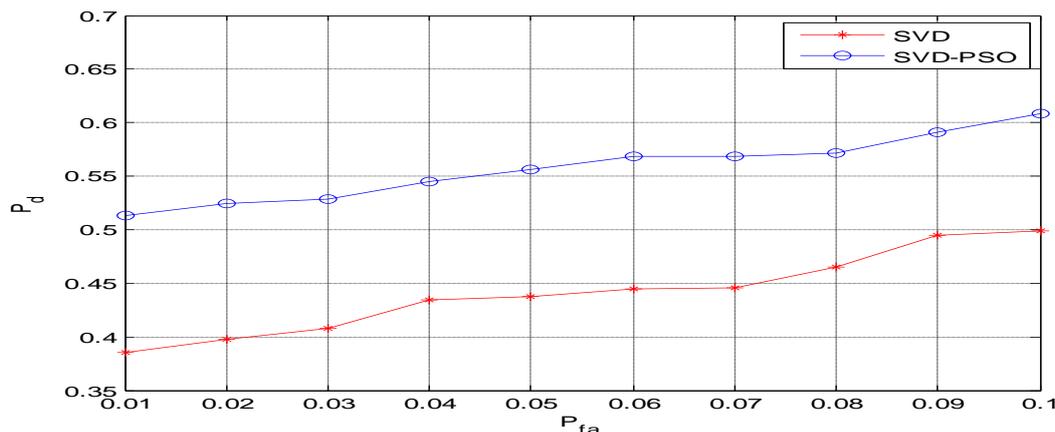


Figure 4. Comparative graph for probability of detection vs. probability of false alarm for SVD and SVD-PSO based detection algorithms

## 2.Conclusion

Signal detection in cognitive radio has been performed in this research with various detection methods and its enhancement with particle swarm optimization. A brief simulation shows that detection probability increases with PSO in noisy environment. PSO actually modified the size of Hankel matrix with respect to fitness function which evaluates probability of detection. Simulation also shows that results significantly improve when evaluating effect of false alarm probability. This paper adds consistency to the cognitive radio framework therefore it is improving the performance. Proposed method is suitable for all common digital signals but it is an iterative process thus needs proper knowledge of

system, any change in system will need re-optimization in order work efficiently. This efficient detection of idle spectrum made it possible to use this spectrum for rural development related services.

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# A SURVEY ON CROP DISEASE DETECTION USING IMAGE PROCESSING TECHNIQUE FOR ECONOMIC GROWTH OF RURAL AREA

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## ABSTRACT

*Development of an automated system for identifying and classifying different diseases of the contaminated plants is an emerging research area in precision agriculture. This paper provides survey on crop disease detection using image processing techniques. Disease in crops causes significant reduction in quantity and quality of the agricultural product. Manual detection of the diseases is very difficult and not accurate for farmer. This creates a need for Image processing techniques which will help in accurate and timely detection of the diseases and overcome the limitations of the human vision. The production rate can be improved by disease detection in well-time. Crop protection especially in large farms is done by using computerized image processing technique that can detect diseased leaf using color information of leaves.*

**Key words:** *leaf disease, image processing techniques, agriculture.*

## 1.Introduction

India is a predominantly agriculture based economy country. Ancient time former are used climate based irrigation system where there is productivity is very low, i.e. depend on the climate, now improving the productivity of crops increasing the irrigation area, irrigation system. But, it is not true in Eastern India as a whole and Chhattisgarh in particular due to diverse crop growing environment, land situations, physiographic and socio-economic conditions of the farmers. Crop production occurs in a dynamic environment. It has been experienced that cropping system of a region is the mirror of socio-economic condition of farmers, irrigation network, marketing and processing infrastructure of the area and ultimately agricultural scenario of the state. Farmers with their vast experience and practicability have established the best suited cropping systems in different region that are economically viable and environmentally sustainable. The information on crop cover in growing period with the use of internal and external resources can be used to intensify the cropping system or to adjust additional crop to make cropping system more profitable

The spine of economy is agriculture in most of the developing countries, especially in India. The crop production quantity and quality depends on the crop growth. Therefore, crop disease detection is very essential in earlier stage and take necessary steps prevent it from spreading to others parts of the field. Normally, the farmer identifies the disease by observe the colour and shape of the leaves. This method needs long time experience and lots of regular efforts. This is practically not possible for the large fields.

Chhattisgarh is one out of twenty-nine state in India. Chhattisgarh is located northern part of India, this area is fully fertile land and total economy is based on crops i.e. rice, wheat, Maize, Gram, Tur, Soybean, Rape and Mustard. Production of rice in Chhattisgarh is large as compare to other crops. All this crops are suffering various diseases, nursery

to reproductive stage. Technology involving in agriculture is an improving productivity, tracking climate changes, protecting the environment and also increasing the food securities. Agriculture and engineering involve for forming new branches agriculture engineering. Automation, machinery, disease analysis involve in agriculture to improve rural area that why we called rural development (RD). In the context of rural development (RD) electronics based agriculture involve wireless, Image processing, automation, e-mobile are playing a role. In this survey paper we include the Image processing part for rural development for crops diseases detection. Various diseases occur in different parts of the plant can be identified by observing the change in symptoms, spots, colour etc. The less time consuming and automatic diagnosis technique is the major requirement in agriculture to improve the crop production rate. Recently, image processing approaches have been used to solve the different problems based on agriculture applications like to detect disease leaf, stem, and fruit [1-2]. Leaf disease severity measurement and detection using image processing had reported by different researchers [3-5].

Depending on the applications, many image processing techniques has been introduced to solve the problems by pattern recognition and some automatic classification tools. In the next section this papers present a survey of those proposed systems in meaningful way.

## 2.Literature Review

The various approaches for detecting the disease in crops using image processing technique is described in this section:

**Pawanp. Warne & et.al., [6]** describes the approach to prevent the crops from heavy loss by careful detection of disease. In cotton, diseases in leaf are critical issue because it reduces the production of cotton. The region of interest is leaf because most of diseases occur in leaf only. The diseases that occur in cotton leaf are Alternaria, Cercospora and Red Leaf Spot. Histogram equalization is used to pre-process the input image to increase the contrast in low contrast image, K-means clustering algorithm which classifies objects. Segmentation is based on a set of features that partition the pre-processed image into number of classes and finally classification is performed using Neural-network. Diseases in cotton leaf are detected accurately using image processing technique. It is used to analyze the cotton diseases which will be useful to farmers.

**Daisy shergill & et.al.,[7]** describes a approach is useful in crop protection especially in large area farms, which is based on automated techniques that can detect diseased leaves using color information of leaves. The disease can be detected by capturing an image of a certain plantleaf followed by extracting feature from the captured image. First the captured RGB image is converted to gray image &then gray image is resized and perform canny edge detection, apply various comparison techniques, which detect the presence of disease and also the type of diseases . it enables early control and protection measures for specific diseases.

**Malvika Ranjan & et.al.,[8]** describes a diagnosis process that is mostly visual and requires precise judgment and also scientific methods. Image of diseased leaf is captured .As the result of segmentation Colour HSV features are extracted. Artificial neural network (ANN) is then trained to distinguish the healthy and diseased samples. ANN classification performance is 80% better in accuracy.

**Renuka Rajendra Kajale [9]** describes the approach for detection and computation of texture information for plant leaf diseases. The processing system consists of four main steps, color image is converted to HSI, then the green pixels are masked and removed using specific threshold value, then the pre-processed image is segmented and the useful segments are extracted, finally the texture information is obtained. The diseases present on the plant leaf are evaluated based on the texture information.

**Prakash M. Mainkar& et.al.,[10]** provides a software solution to automatically detect and classify plant leaf disease. This approach will increase productivity of crops. It includes several steps that are image acquisition, image pre-processing, segmentation, feature extraction and classification.

**Mr. Sachin B. Jagtap& et.al. [11]** Describes a system consists of four stages; the first stage is the image enhancement, which includes, histogram analysis, HSI enhancement and intensity adjustment. Fuzzy c-means algorithm is used for segmentation of captured image. Color, shape of spot, size is three features used to extract features from leaf. Then classification is based on back propagation based neural networks.

**Niket Amoda& et.al., [12]** provide image processing based solutions that are automatic, cheap, and accurate. Solution is composed of four main steps; in the first step the RGB leaf image is transformed to other colour model. Next, in the second step, the transformed images are segmented to obtain better information .the K-means clustering techniques used for segmenting the input image. In the third step, the features based on texture of leaf for the segmented infected objects are calculated. Finally, in the fourth step the classification is done by using pre-trained neural network based on the result of feature extraction.

**Smita Naikwadi & et.al.,[13]**describes the approach that has different steps. In first step, mostly green coloured pixels are identified. Next, based on specific threshold values green pixels are masked. Otsu's method computes threshold value to mask the green pixels. The other additional step is that the pixels in the image which has zero RGB values and infected cluster (object) pixels at boundary were completely removed. This is the robust technique for the detection of plant leaves diseases. The precision of this technique for classifying diseases is between 83% and 94%.

**Anand H. Kulkarni et.al., [14]** describes the approach begins with capture of leaf the images from agricultural field. Gabor filter is used segment the input image before feature extraction. Then segmentation of input image is done to extract the texture information and colour features .proper selection of the feature values to train artificial neural network to exactly distinguish the healthy and diseased samples leaf correctly. ANN based classifier has accuracy of 91%.

### 3.Comparison Of Different Crop Disease Detection Methods

The different advance image processing based leaf disease detection methods are reported in literature. The merits and demerits with potential application of each method are given in Table 1.

TABLE I. COMPARISON OF DIFFERENT LEAF DISEASE DETECTION METHODS

S. No.	Technique	Merits	Demerits	Potential application
1	Hybrid method of Noise reduction	Multiple Gaussian and speckle noise can be removed.	Choice appropriate threshold value in wavelet analysis	Leaf image becomes noise free and produces clear vein.
2	Genetic algorithm For segmentation	Very less computational efforts and the optimum results.	Efficiency and time of the process depends upon the initial generated population of chromosomes.	Genetic algorithm optimizes continuous or discrete variable efficiently. Large searches area and

				large number of variables can be processed at the same time.
3	K-means clustering techniques	Guaranteed to converge, to reduce the number of false edges.	Guaranteed to converge, to reduce the number of false edges.	K mean clustering method is used in image segmentation. It can be hybrid with other optimization method easily.
4	KNearest Neighbor (KNN) for classification	The cost of the learning process is zero No assumptions About the characteristics.	The model cannot be interpreted (there is no description of the learned concepts) It is computationally expensive to find the k Nearest neighbours when the dataset is very large.	Higher resolution remote sensing image classification and computer vision.
5	Naïve Bayes Classifier	Simple classifier, high accuracy, and Good classification speed with large database.	Very strong assumption on the shape of data distribution, data scarcity.	Image classification, reduce the possibility of tasks underestimation in future work.
6	Support Vector Machine (SVM)	robust, even when the training sample has some bias, gives unique solution.	Lack of transparency in result for high dimension data.	face and speech recognition, face detection and leaf image recognition, text categorization etc.
7	Decision Tree Classifier (DTC)	Decision trees indirectly perform variable screening or Feature selection, Require relatively	Instability, over fitting, unstable in small variations, cannot guarantee to achieve	Classification and prediction, risk analysis.

		little effort from users for data preparation, easy to interpret and explain to executives.	the globally optimal decision tree.	
8	Recurrent Neural Networks	Less computation time, used for difficult and complex problems.	the training outcome can be nondeterministic and depend crucially on the choice of initial parameters.	Leaf disease detection, Standard speech recognition.

#### 4.Key Issues And Challenges

Different image processing techniques are reported in literature to detection of leaf disease. However, some key issues and challenges of these techniques are as follows:

1. The background data affect the resulting image.
2. In the real world field conditions, optimization technique used for a particular crop diseases and continuous computerized intensive care of plant can be done by automation technique.
3. Leaf colour, size and texture are changes with climate and environment conditions. The field expert and regular observations are required well in time.
4. The review suggests that disease detection techniques show good potential with an ability to find crop diseases and some limitations. Therefore, there is scope of improvement in the existing research.

#### 5.Conclusion

This paper presents a survey on different method for crop disease detection using image processing technique. There are many methods in automated or computer vision for disease detection and classification but still there is lack in this research topic. All the disease cannot be identified using single method .The future work is to develop a method for processing an image that acquired with different background. Since this review, we can conclude that there are number of ways by which we can detect diseases in crop. Each technique has some pros as well as limitation. This paper evaluates the techniques in data mining and image processing in use by researchers designed for detection, diagnosis and recognition of plant diseases.

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# GLIMPSE OF FUTURE ARTIFICIAL INTELLIGENCE AND ITS IMPACT ON HUMAN LIFESTYLE

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## ABSTRACT

*This paper is compilation of our survey work, analysis and understanding of transformation happening around the world and how human lifestyle is reforming with it. Modern AI is reinforcing several other technologies as underlying architecture to enhance their performance level. It also cover how AI is satisfying human expectations in web search, designing, music composition, complex brain cancer operation, self-driving car, personal assistant and playing against human. With modern AI computing becomes much better as compared with past computing and operation. It also includes factors that are empowering and nurturing the roots of artificial intelligence to develop and grow faster. Along with it draws light on some challenges still AI is facing to overcome and some futuristic threat that might be happen.*

*In a nut shell this paper covers modern AI, future AI and its impact on human lifestyle. As now artificial intelligence is flourishing in every technical field and shaping human lifestyle.*

**Keywords :-***Artificial Intelligence, Machine learning, Future lifestyle, Cognitive computing, Big data.*

## 1.Introduction

Our objective behind this survey is to gather information about current ongoing researches and opportunities in this vibrant field of Artificial intelligence. John McCarthy[1] coined the term “Artificial intelligence” in way back 1956 then and now AI has made significant improvements and also developed as a prominent area of future technology. At that time he defined it as ‘the science and engineering of making intelligent machines’. Our study includes Artificial intelligence in current world and its influence on people, community, and society. How AI enabled computing systems are changing our lifestyle now and how they will change in future. In it we are summarizing most of undergoing and upcoming transformation in Business (Marketing, Customer Assistance, and Advertisement), Healthcare, Search Engine Optimization[4], Transportation, Jobs[2], and Education system by Artificial Intelligence. In fact we can't see presence of AI in various fields around us without proper knowledge of it. Everything seems changing and behaving more like human, machines started suggesting text patterns, products and music, recognizing voice, translating videos into text without any human intervention. It is just like a fastest vehicle for us to move towards future where unimaginable opportunities are awaiting for us.

## Why Ai Is Growing Now?

As every plant grows only when it gets required conditions and favorable environment to nurture it properly. And what we have in last few years are best suitable environment for AI, rapid growth in mobile technology, computing systems, availability of internet and availability of huge data sets as big data. Now we have IoT devices with powerful sensors,

high quality data capturing capability and data display systems. Large cloud storage for harvested data from thousands of IoT devices, powerful CPUs (Central Processing Unit), and GPUs (Graphics Processing Unit) to process them online. Also availability of AI compatible mobile devices and network connection to connect them with best data transfer rate. Big data a huge source of data to train current machines and most important curiosity of 21<sup>st</sup> century human, all these factors are responsible for AI explosion.

### **Machine Learning**

The shiniest gem that AI has now is machine learning, capability of learning things from experience just like humans. Every discipline in Science, Mathematics, Business, Media, Medical, And Security and many more are working together to integrate it. Modern virtual keyboard on android device and PCs are powered by machine learning algorithms to predict possible next words and auto text completion. Machine learning also enables a machine to draw some useful conclusion from given data on basis of their pre defined labels, category, property and classify them according to it. It also works with contents where labels are not available and machine has to decide how to classify them. It is now composing music for songs, stylish futuristic dress for designers, painting patterns and models for future equipments. CEO's, Business leaders and business executives are now turning their interest towards it. Machine Learning is again subdivided into supervised, unsupervised and reinforcement learning.

On 11th of June, 1997, IBM's computer 'Deep Blue', defeated Garry Kasparov, the world's greatest Chess Player And on May of 2017, Google, Deep Mind's, Alpha Go "Master" took on Ke Jie, the world's highest ranked Go player. Gaming experience[13] is also enhance and one of the imaginative area that exploiting the ability of Artificial intelligence with maximum. It makes games attractive, addictive, and realistic. Today we can play multiplayer games with computers and computers are getting so smart that they are able to beat real human champions.

### **Improved Cyber Security**

Artificial intelligence will also control hacking, resource overloading or DOS attack, identify terrorism and racism supporting contents and websites. Social sites like YouTube, twitter, and Facebook are using powerful intelligence systems to engage and amuse users with best possible contents and features. Network analyst and researchers are using it for developing better security protocols and intrusion detection/prevention systems. Next generation smart home[15] will have Artificial intelligence enabled devices, music systems, and fully automatic security camera with image detection.

### **Self-Driving Car**

Top automobile companies like Tesla, BMW, Audi, are investing huge amount of their business funds in machine learning, for development of driver less vehicles. Very soon it will be possible to have own car that doesn't need driver, drives with human accuracy and even better with traffic rules. So future is free from rush driving and accidents cause due to traffic rule violation. According to Google, Waymo safety report 2017 [10], 94% of U.S. car crash involve human error, it will reduce drunk and drive case, and also stop senior citizens from taking risk of driving. Save productive time wasted in traffic, an average 42 hours per person each year. Also you don't need to worry about who will drive your car when you are not under age of driving license or don't want to drive or not in condition to drive home your car will itself take care of it. Indeed this will reduce driver job opportunities for humans and also problematic in some emergency or urgency because they have limitation on violation of traffic rules. And they can't override it on just passenger's request. But they may have some special protocols for emergency situation where we need to drive little outside from normal driving pattern. BMW's futuristic motorcycle Vision Next 100[6] equipped with powerful AI with self-balancing

mechanism for balancing during riding and standing. Smart “Digital Companion” to assist rider during ride with best possible suggestion to make journey experience smooth and safe. “The Visor” specially designed glasses with state-of-art technology and controlled by eye movements provides continuous feedback about road condition during ride.

**Augmented Reality (Ar)**

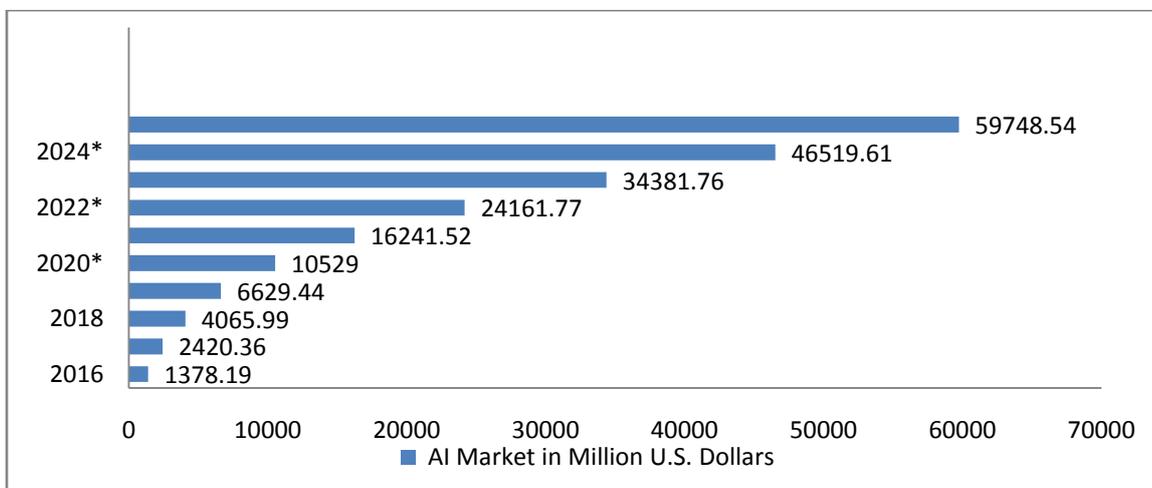
Augmented reality[5] allows user to integrate 3D virtual objects into a real 3D world environment in real time. AI combines with AR to provide much rich platform for virtual reality and real time information processing on objects around us. This pair has power to make non-living things alive and more informative. Specifically both are suitable to each other one can project things in real time and another can capture, analyze, process data in real time.

**Robots And Humanoids**

Sophia[11], a human like social humanoid robot developed by Hanson Robotics, Hong Kong. Sophia can communicate as like human and response to general questions. In October 2017 Sophia becomes the first robot to receive citizenship of Saudi Arabia or any country And in November 2017, Sophia becomes first non-human to have United Nations title as the United Nations Development Programme's first ever innovation Champion. Pepper[12] is a humanoid robot manufactured by Softbank Robotics, specialty about pepper is it can read human emotions [3] and response according to it.

**Business And Ai Market**

Even non-tech business companies have realized the strength and capability of modern AI. They are incorporating it for better performance and future business. Marketers are using it to connect with more customers and engaging them with their services for better and high rated customer satisfaction. The revolution that AI brings in business is affecting every kind of business model and size of business. Modern AI tools like chat bots, Virtual customer assistant[2], and personal assistants are rebinding the relationship between company and customer. In future AI will nurture business roots with his amazing data collecting, data processing, data understanding, and predicting capabilities. Visionary people are adopting it because they know that this is not just today’s technology it is technology that powers future[7]. Here we have future AI market predicting graph from statista.com which shows how fast AI market is growing.



**Figure 1. AI market growth forecast in future.**

Artificial Intelligence systems are also reforming retail store[7]. shopping better and simpler. As retail stores are essential part of our daily life it can be found in every city, village and shopping malls. Intelligence systems are automating billing,

item information, stock management, Supply chain, generating seals report and even rewiring vending machines for better retail store management.

### **Artificial Intelligence In Education (Aied)**

With AIED [14] Traditional classroom will become more interactive and it will also reform learning models for students. It can assist each student in one-to-one session and also keep track of students learning. Thanks to IBM AI team for achieving 5.5% error rate in speech recognition which is another millstone, that will enable future personal assistants like Siri, Alexa, Google assistant, and cortana to hear you more clearly.

### **Artificial Intelligence In Medical**

Artificial Neural Network the brain of AI getting complex and complicated day by day to solve multi disciplinary problems like pattern recognition and image processing. This is now effectively implemented in different kinds of cancer diagnosis and several other major health issues. Medical Science, Biotechnology, Genetic Engineering, and Nanotechnology such fields are also implementing machine learning for effective simulation and better experimental environment.

### **Artificial Intelligence In Behavioral Biometrics**

Artificial Intelligence has the capability to monitor and understand the pattern of mouse movement, keyboard operation, browsing pattern to verify the user authenticity. It can also learn driving pattern applying break, speed, and turning indications to identify the driver by creating a pattern of his regular behavior. It will reduce car and vehicle theft and robbery.

### **Doubts Regarding Artificial Intelligence**

Most common threat that people have in their mind is AI will take over humans[9]. Job opportunities will reduce with increase in use of intelligent bots, robots and assistants. As it's a technology and what if it is used against us as a weapon, automatic identity theft, automatic Dos attacker, security breakdown and it will be more dangerous when combine with psychological social engineering. Fear from AI technology is obvious and absolutely it's normal, we are ruling this planet is just because no other living creature or non-living thing has intelligence level like us so far. And now they are rising from ground level of intelligence. We are now creating our own competitor or even better intelligent thing is surely alarming if we only see dark side of it. But if we look at bright side it is full of unimaginable possibilities, solutions for yet unanswered questions, and key to expend mankind in outer space. Recent doubt is about Gmail ready to go automatic email reply templates, which is good for quick reply but also raise a question about privacy that does Google reading our private mails?.

## **2.Conclusion**

Indeed we are moving towards smart future vary fast and Artificial Intelligence has a big chunk of share in it. Scientist and researchers are working hard to make it even more significant but still we are far away from true intelligence and actual potential of AI. Super computers like IBM Watson were a baby steps towards building actual futuristic intelligence systems with powerful cognitive computing, machine learning, processing power, and Reasoning ability. AI is changing business rules and cutting unnecessary cost to maximize business profits. It also started managing customer driven economy well by satisfying customer with his intellectual answering capability and problem resolution ability. It is assisting in improving business quality, reducing human burden, providing better platforms for testing new products,

helping marketing executives to take better decision and also suggesting doctors with best results. In upcoming future AI will support almost every kind of technology as a core system from a morning coffee making machine to night lamp, health diagnosis systems to life support systems, pet robots and old age assistant for elders. Future is “AI era” where tools around us have ability to explain itself. It’s nearly impossible to predict exact future as it is uncertain, we can only make possible predictions on basis of current evidence we have today. It is now part of our culture, our daily life style and it will be in future too with many more options.

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# MACHINING OF METAL MATRIX COMPOSITE: A REVIEW

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## ABSTRACT

*This paper gives an overview of the present knowledge about the machining of metal matrix composite which is major concern. There is an increase demand of the development of advanced material for many industrial applications, to meet such demands composites are the right solution. Metal Matrix Composites (MMCs) have higher strength to weight ratio and their properties can be tailored as per the industrial requirements, MMC's are highly abrasive and tools can wear rapidly, machining of these materials attracted researchers and industrial community a lot. The main purpose of machining is to produce a product of desired shape and size with specific quality and surface finish by removing a material in the form of chips and it is effected by cutting parameters like cutting speed, feed, depth of cut and also the selection of cutting tool plays a major role.*

**Keywords:** Machining; MMC; Reinforcement; cutting tools; cutting speed

## 1. Introduction

For any engineering applications the right selection of high performance materials is very important for its success and almost eighty percent manufactured parts need machining before they are ready to use. [1] Aluminium alloys are widely used in manufacturing aerospace and automobile structures is well recognized today. This is due to some superior properties of these materials such as high strength- to- weight ratio, superior low temperature performance, corrosion resistance, high machinability index and comparatively low cost. But aluminium alloys cannot meet all engineering requirements. Their main weaknesses are poor high-temperature performance and low wear resistance. To overcome these problems new engineering materials have been developed by reinforcing aluminium alloys with ceramic particles/ whiskers these are known as metal matrix composites (MMCs). [2, 3] Metal Matrix Composites (MMC's) are the major innovation in the development of advanced materials but hard and abrasive nature of the reinforcement particles in MMC's causes rapidly tool wear and deteriorate surface roughness during machining. [4] The metal matrix materials of MMCs are aluminium alloys, titanium alloys, copper alloys and magnesium alloys while the reinforcement materials are silicon carbide, aluminium oxide, boron carbide, graphite etc. in the form of fibres, whiskers and particles. [5] According to Broutman and Krock "A composite material is formed by a close combination of at least two chemically and physically distinct materials which should remain separate and distinct while a good and continuous interface between them is maintained: the reinforcing components in the whole volume of the matrix should be as uniform as possible". [6] The research on the machining of MMCs was first reported in 1985 and there is the investigation regarding performance of various tool materials during machining of an aluminium alloy reinforced with 40 vol % SiC particles (Al/40% SiC MMC) and concluded that edge cracking due to mechanical chipping was the main cause of tool wear and that poly crystalline diamond (PCD) was superior to any other tool material for machining MMCs. Also in the same year the research committee of japan society for precision engineering (JSPE) started a cooperative research program on cutting and grinding of MMCs and published a summarized report in 1989, comprehensive research on

machining of aluminium-alloy- based MMCs started from the 1990s. The presence of reinforcement makes metal matrix composites different from monolithic materials and leads to superior physical properties of MMC, these reinforcement particles are responsible for complex deformation behaviour, high tool wear and inferior surface finish when machining MMCs hence the applications of these materials has been limited in many fields.

## 2.Literature Survey

As MMCs contain certain amount of hard abrasive and ceramic reinforcements hence they are considered as most difficult materials for machining. The study done by Kathirvel M. and Purushothaman [7] on machining of hybrid Al-SiC metal matrix composite using polycrystalline diamond (PCD) tool on a CNC lathe they concluded that % volume fraction of SiC shows more effect on forces, whereas spindle speed and feed rate are highly affected parameters for flank wear and surface roughness. Gurpreet Singh et al [8] perform experimental investigation of turning of Al/SiC/Gr MMC component and concluded that surface roughness increases with the increase in feed rate and depth of cut. N Muthu Krishnan et al. [9] perform investigation on the machining behaviour of metal matrix composite using PCD inserts and concluded that PCD 1600 grade is subjected to less force due to the fine grains and its stability at high cutting speeds, the machining with low feed has resulted in decreased cutting force in all grades of PCD. [10] Machining of MMCs can be classified in two major groups: (a) particulate reinforced and (b) fibre reinforced. Depending on the type of reinforcement the cutting mechanics differ considerably, hence the tool – reinforcement- matrix interaction play a major role in the machinability of MMC's and affect the surface roughness, cutting forces, tool wear and the subsurface damage. The most commonly used tool material is polycrystalline diamond (PCD) also cubic boron nitride (CBN), alumina, silicon nitride and tungsten carbide (WC) tooling are used as cutting materials. Cutting speed, feed and depth of cut in machining of particulate MMC's have a similar effect on tool life and surface finish to that of machining metals but some differences are noticeable due to the ceramic particles. The ceramic- reinforced particles tend to dislodge from the matrix and roll in front of the cutting tool hence plowing through the machined surface and generating grooves on it. In many cases cutting speed doesn't significantly affect the cutting forces there are some differences in reports on the effect of cutting speed on the cutting forces. During machining of MMC's built - up edge (BUE) has been seen by many researchers while machining these composites at low cutting speeds, due to the built – up edge the cutting force at low cutting speeds is lower than the cutting force observed at higher cutting speeds. The presence of BUE increases the actual rake angle of the tool resulting in a lower cutting force, there are some reports which have shown a decrease in the cutting forces with an increase in the cutting speed. [11] For broad machining applications there is wide range of cutting tool materials of different properties and performance capabilities are available today. These include High speed steels, Satellite, cemented carbides (coated & uncoated), Ceramics, Cubic Boron Nitride (CBN) and Diamond (synthetic & natural) as MMC's have high hardness, CBN and diamond are also referred as super or ultra-hard materials.

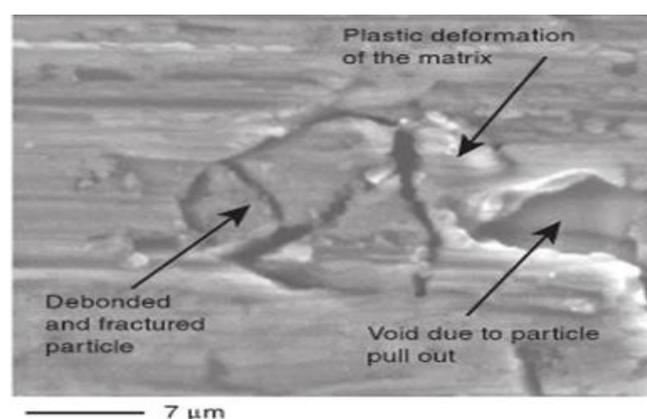


Figure 1: Scanning electron microscopy (SEM) image showing different deformation mechanism in a MMC[12]

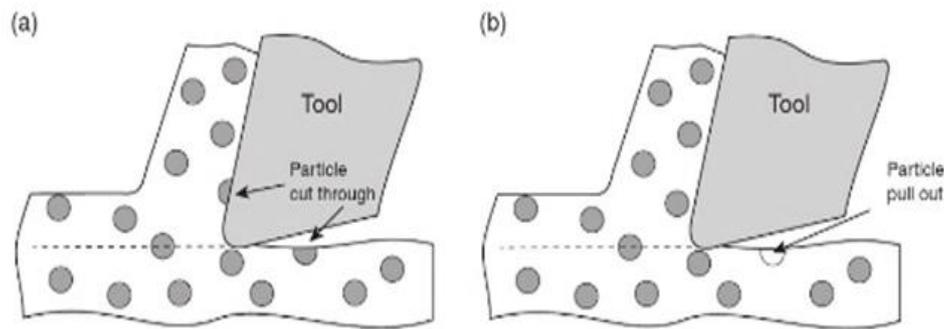


Figure 2.1 Schematic diagrams for cutting MMC's (a) particle cut through (b) particle pull out[12]

Fig 2.1 shows simplified illustration conditions encountered by the particles in front of the tool tip during machining MMC when the particle is sheared a better surface finish is obtained, whereas poor surface finish is usually observed when particles are pulled out due to the formation of cracks and pits on the machined surface. The published research on the machining of particulate MMC's indicates that only cutting tools harder than the reinforcements have acceptable performance. The poly-crystalline diamond (PCD) tools given their high hardness compared with most of the common reinforcements provide longer tool life but due to high cost of PCD tools other tools such as cemented carbides and ceramics are also been used to machine particulate MMC's.[12]. According to Tomac N. et al [13] ceramics tools were perform unsatisfactory while the carbides were preferred over other types when machining at low cutting speeds and high feed rates[13]. Some researchers observed the effect of different coatings on the performance of carbide cutting tools during machining MMC's and suggested that coatings with less hardness than those of the reinforcement do not improve tool performance [14, 15]. Many researchers have observed that the change in average particulate size and volume fraction of reinforcement greatly affects the machining characteristics of MMC's [16, 17]. The available coated tools having coating such as titanium nitride and titanium carbide perform well while cutting steel but show very poor performance in cutting MMC's. Also TiAlN coated tools show mediocre results in machining of Al + 20% SiC[18]. According to Li and Seah the tool wear increases rapidly when the percentages of reinforcement particles in the MMC exceed a critical value. This critical value is determined by the size and density of the reinforcement particles [19]. By the use of conventional single-point cutting tool during machining, a small part of the cutting edge is continuously subjected to extremely high temperatures and cutting forces due to this there is excessive wear along the area of contact[20]. Shaw et al in their study of a lathe type cutting tool in the form of disc that rotates around its centre, due to continuous spinning of the tool around its centre allows for the use of the whole circumference of the insert, due to this a fresh portion of the cutting edge is provided and therefore a better distribution of tool flank wear over the entire cutting edge is generated. The spinning action of the tool also provides a way for carrying the cutting fluid to the tool point [21]. While machining the composite materials researchers accepted the surface integrity as a term to describe the nature and condition of the machined surface to assess the quality of machined surface, optical and scanning electron microscopy are commonly used to find the presence of surface damage in the form of cavities, macro cracks, scratch marks etc. [22].

### 3. Conclusion

- From literature survey it is concluded that the metal matrix composite has unique properties due to which they are replacing traditional metals and alloys in several applications, there widespread applications is limited due to the difficulty in machining because of the presence of reinforcement particles which are hard, stiff and abrasive in nature.
- Many researchers indicated that poly- crystalline diamond (PCD) is the only tool material which gives useful tool life while machining SiC/Al particulate metal matrix composite, also the selection of appropriate grade poly- crystalline diamond (PCD) tool is a right decision while considering tool life and quality of machined surface required.
- Several researchers used self- propelled rotating tools while machining MMC's and compared with conventional cutting tools and observed that rotating cutting tools shows excellent performance in terms of progression of tool wear and tool life and at high feed and cutting speeds rotary tools shows super wear resistance.
- For the improvement of production rate rotary tools are the best suitable candidate, as poly- crystalline diamond (PCD) most commonly used tool material although cubic boron nitride (CBN), alumina, silicon nitride and tungsten carbide (WC) tooling are also used as cutting materials.

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# EFFECTS OF GASOLINE ETHANOL BLENDS ON PERFORMANCE OF SI ENGINE: A TECHNICAL REVIEW

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## ABSTRACT

*A review on effect of ethanol blend on performance of SI engine emphasis on correct blending percentage with gasoline for maximizing engine performance and minimizing emission from engine. In present scenario the dependency on fossil fuel is increasing day by day for different operations like transpiration, electricity production and transportation etc. but limited quantity of fossil fuel may be problem in future energy needs which may be compensate with renewable energy source for transpiration. Alcohol may be used as gasoline fuel for clean emission with good combustion properties with some limitation. In present review author focused on effect of ethanol blend on SI engine in place of neat gasoline fuel.*

## 1.Introduction

Day to day fuel economy of engines is getting improved and it will continue to improve. Increments in number of transportation vehicles have started dictating the demand for fuel which will increase the price of gasoline in near future. The huge problem with gasoline fuel is the engine emission like CO, CO<sub>2</sub> and hydro carbons (HC) which increase day by day due to increasing of transportation vehicles [1]. With increasing demand and depletion in fossil fuels reserves, alternative fuel will become more common in coming decades. The alternative fuel like alcohol, hydrogen, etc. has physicochemical properties similar to gasoline but has clean emission as compared to gasoline for same engine output power. Most of the researchers found that use of alternative fuel separately in SI engines is less effective in terms of engine emission and engine performance both. But blending with gasoline enhances the effect on performance of engine and reduced level of emission. Only one drawback in most of alternative fuels is emission of nitrogen oxide through engine is increasing as compared to gasoline engine. The reason is face of high combustion temperature ached during combustion process. It will reduce by blending with gasoline engine. This is the lead found by author by reviewing the number of literature on renewable energy source and fuels. Some researchers found that use of alcohol blend for light duty SI engine without any modification. But heavy duty SI engine needs a lot of change in injection system of fuel and design of combustion chamber. Ethanol is oxygenated fuel which reduces emission of CO and CO<sub>2</sub> complete combustion but the high latent heat of vaporization reduces the emission temperature which is the cause of emission of hydrocarbon which is not favorable case for SI engine. As per different country emission standards the limited emission HC, CO and CO<sub>2</sub> allowed for any type of engine which draw attention of researchers that alternative fuel blending with optimum range comes within the permissible range of emission through SI engine or not. After reviewing various papers on effect of alcohol blends with gasoline for SI engine we found that the limiting or optimum blending of ethanol with gasoline is scope of research for direct fuel injection or port fuel

injection system for SI engine. Ethanol blend has high flame speed as compared to gasoline so that no longer delay period for spark ignition is required and due to this the chance of incomplete combustion at higher speed of engine is reduced. The purpose of direct injection for ethanol and port injection of gasoline is that high vapor pressure of alcohol as compared to gasoline which means direct injected ethanol converted into vapor by compression pressure in combustion chamber which does not properly happen in port fuel injection system which opens a topic of research area on design of injection system in spark ignition engine for better performance. By energy consumption comparison it was found that ethanol was more efficient than gasoline [14] combustion efficiency, is also better than gasoline [6-16] but the neat ethanol produces high combustion pressure and temperature due to which there is greater chance of damage in piston head and combustion chamber wall and high percentage of ethanol also reduces the vaporization rate and due to this cooling effect observed [13] over the exhaust port which reduced the mean effective pressure and reduces engine power, so that ethanol should blend with correct percentage with gasoline for better engine performance. By reviewing it was observed that 25% to 50% by volume of gasoline which is denoted like (E25 to E50) produced desired output in terms of emission and engine performance.[6,7,9,15,16].

## 2.Ethanol Fundamental

Ethanol has high octane number, high latent heat of vaporization, high flame speed, low sulphur content, has less calorific value which means high fuel air ratio required for complete combustion. Ethanol is most promising fuel for SI engine.[25-28] Ethanol is renewable source because it is derived from fermentation of food stock and also derived from fermentation of cellulose stock like rice straw, corn stalks and sugar cane which are examples of sugar containing feed stock.[24]

**Table 1: Ethanol physicochemical properties**

Parameter	Ethanol	Gasoline
Chemical formula	$C_2H_5OH$	$C_2-C_{14}$
H/C ratio	3	1.795
O/C ratio	0.5	0
Molecular weight	46.07	110
LHV (MJ/l)	21.3	31.9
Research Octane Number	106	91
Density @ 20°C	790.9	744.6
Gravimetric Oxygen Content %	34.78	0
Stoichiometric A/F ratio	9:1	14.71:1
Enthalpy of vaporization (KJ/ kg)	840	373

Boiling Point (°C)	78.4	32.8
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**2.1 Knock Tendency:** Knocking is an important parameter in any SI engine because higher tendency of knock reduces the engine performance and also damages the piston head and cylinder wall [45]. Knocking happens in SI engine due to improper combustion and uncertain combustion rate. In past 10 years researchers found that alcohol has lots of similarity with gasoline and it is more effective as compared to gasoline [16,15,5]. M. Bahattin Celik found that for small compression ratio gasoline has less tendency for knock but for high compression ration like 10:1 gasoline has high tendency of knock but ethanol blending has less tendency.[16] In this series Yuan Zhuang et. al. also examined and found that direct injection of ethanol in SI engine promotes fast laminar flame speed, wide flammability and low emission temperature which improve anti knocking.[17]. Hui Liu et.al. examined and found that alcohol blend with gasoline suppress the knock and ethanol has highest anti-knock tendency for direct injection system among all alcohols.[21]

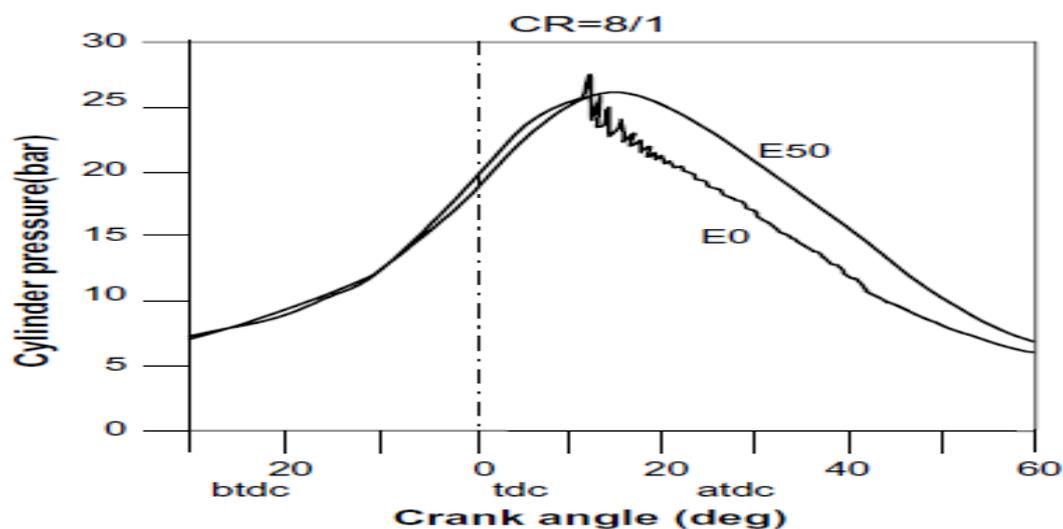


Figure 1: knocking tendency of gasoline and blended fuel (E0, E50) at 2000 rpm and 8:1 CR [16]

## 2.2 Flame speed:

Flame speed of ethanol is highest among all alcohols[14]. Because the ethanol is oxygenated fuel with O/C ratio 0.5 and zero for gasoline fuel which means less air is required for burning. (TABLE 1) and high vapor pressure enhances turbulence in combustion chamber so that flame speed is high.[15] Yuan Zhuang et. al. found that direct injection of ethanol in SI engine promotes fast laminar flame speed, wide flammability[17] P.G. Aleiferis et.al. stated that ethanol blend had faster flame growth in compression of butanol, iso-octane, methane and gasoline fuel by direct injection through center located injector [18] Gasoline Marshall et. el found that on decreasing equivalence ratio from 1 to 0.8 the laminar flame speed decreases 28 to 16 cm/s at 1 bar and at 5 bar 41 to 26 cm/s.[29] flame speed of ethanol increases by increasing the temperature of engine body which is because more evaporation of ethanol creates more thermal energy and increases the speed of combustion.[30].

**2.3 Exhaust temperature:** Ethanol blend reduces the emission temperature because of high heat of evaporation most of heat absorbed by thanol droplet at exhaust port and reducing emission temperature but increasing NOX and this trend is parallel to increased percentage of ethanol.[23, 10,12]. And also investigating that there is some

optimal limit of ethanol by which cooling effect increased is E0 to E58.[12] the decrement in exhaust temperature promotes the decrement in HC, CO.

**3. Engine Emission:** With the use of ethanol in gasoline clean emission observed by author after reviewing the papers. Refer table 1, it is clear that O/C percentage is more than gasoline which means the proper combustion takes place and reduces the CO but at the same time NOX emission increases due to fact that at higher combustion temperature nitrogen present in air gets converted into oxides but reducing the emission temperature which is reducing effect in global warming[1,6] Emission of particulate matter is calculated by number called PN and measured by optical spectroscopy with infra red light.[5,7,8] formaldehyde is also a emission product of SI engine but the main constituent of emission through SI engine are.

**3.1 Effect on NO<sub>x</sub> emission:** Due to high oxygen content in ethanol fuel and low exhaust temperature increase the NO<sub>x</sub> emission. M.A. Costaglio et.al. found that E85 blend reduce NOX emission by 15% but at same time 3.5 times higher carbonylic emission which is unhealthy for human and environment.[6] Simeon Ilive found by simulation technique on 1-D SI engine that on increasing percentage of ethanol E0 to E50 the nitrogen oxides emission decreasing when using blend percentage more than 30% .[9] Mustafa Kemal Balki et.el found that SI engine with compression ratio 9, 2400 rpm and fuel injection timing 20 ° CA optimum condition achieved by Tuguchi method has less break specific NOX.[13] M. Bahattin Celik investigated by experiment on SI engine for effect of suitable blends of ethanol with gasoline fuel at high compression ratio and full load condition. For this investigation a SI engine was selected with compression ratio 6:1 with 2000 rpm engine speed for constant load with E0, E25, E75 and E100 blend of ethanol. An interesting result was found by experiment which were: E50 blend produced less NOX emission, decrease by 19% [16] Yuhan Huang et. al. investigated the effect of injection timing on mixture formation and combustion for EDI plus GDI engine and found that mixture near spark plug leaner and distribution of equivalence ratio was uneven when reducing the direct injection timing of ethanol and due to late direct ethanol injection local over cooling and over rich mixture was observed. The combustion speed and temperature was reduced by reducing direct injection timing and reducing [23].

**3.2 Effect on CO emission:** Carbon emission through SI engine is due to incomplete combustion and less air volume [1a]. Ethanol is a oxygenated fuel which means due to availability of oxygen less air is required for combustion and complete combustion reduces the chance of CO emission [32,33]. Maria Antonietta Costagliola et. al. investigating the performance and emission through four stroke motorcycle of euro 3 emission standard fuelled with bioethanol blend (5% to 30% by volume) with gasoline found that particulate number and CO emission reduced [22] By energy consumption compression it was found that ethanol had more efficient combustion than gasoline due to high oxygen content and low boiling point which enhance the vaporization rate but the lower energy consumption enhanced the air fuel mixing for proper combustion and in was noted that ethanol has less emission of CO[14] Jaeho Cho et. al. investigated the effect of ethanol blend on PM emission from 2359 cc, 11:1 compression ratio, emission through catalytic convertor 2.4 L inline four cylinder , wall guided spark ignition direct injection (SIDI) engine. The observation for blend of E0 to E20 was that PN concentration decreased by 96% which analyzed by differential mobility spectrometer. E10 blend had

undesirable property investigated through this experiment that for fuel pressure varied from 45 bar to 75 bar the PN concentration decreases due to fact that at cold start condition ethanol blend needs more temperature for vaporization and required more fuel so that at starting PN concentration increases but for more percentage of blend of ethanol problem resolved[11] Yung-Chen Yao et.al. investigated the effect of emission from smaller SI engine like motorcycle. Here consider two motorcycles- one equipped with carburetor and other equipped with fuel injector and rest of design of engine is same as ordinary small engine of 50 to 125 cc capacity. For investigation select two fuels E15 and other convention gasoline. After experiment it was observed that motorcycle with carbonator emitted 32% less CO and for second motorcycle with fuel injector emitted 10% less CO as compared to gasoline [8]

**3.3 Effect on CO<sub>2</sub> emission:** Pioter Bielaczyc et al. tested and examined the physicochemical properties of ethanol-gasoline blend from E5 to E50 over the old unmodified European car and New European driving cycle with unregulated exhaust compound in laboratory and found that with the change in percentage of ethanol in gasoline blend the partial number change linearly because of improved combustion [3] Carbon dioxide is greenhouse gas and it increases by using unleaded gasoline and ethanol blend with four stroke and SI engine [35] Ceviz and Yüksel et.al. investigating the effect of ethanol blend on SI engine emission and cycle variability found increment in CO<sub>2</sub> concentration while CO concentration decreased when using E10.[36] The European Union is trying to enhance the percentage of ethanol blend in gasoline by 10% by 2020 and to reduce the fuel life cycle greenhouse emission [37,38,39].Al- Hasan examined the effect of ethanol blend on SI engine emission with three fourth throttle opening with variable engine speed and found that 7.5% CO<sub>2</sub> emission increased and Hsieh et.al. also found that with use of ethanol blend in SI engine CO<sub>2</sub> emission increased by 5-25% more.[41,41]

**3.4 Effect on HC emission:** Hydrocarbon are also reduced by ethanol blend, similarly CO because of oxygen content in ethanol enhances combustion and reduces improper combustion. Pioter Bielaczyc et el reported that in urban driving condition with E50 blend reduce HC.[3] I. Gravalos et al found that lower molecule alcohol gasoline blend reduces 20.4% more HC as compared to gasoline and also observed that at high engine speed engine hydrocarbon decreases[4]. The emission through SI engine is dependent on engine speed, design of combustion chamber, air fuel ratio and ignition system design. M. Clairotte et al examined that high ethanol fuel contains less HC but -7°C (low temperature the HC increases due to insufficient combustion.[5] M.A. Costaglio et al found that ethanol with 85% by volume of gasoline reduces polycyclic aromatic hydrocarbon which is the main cause of carcinogenic to human being.[6] Yung-Chen Yao et.al. investigated effect of ethanol bled in SI engine with carburetor with E15 blend and found that THC concentration is same as gasoline but with direct injection THC reduced by 10%.[8] M. Bahattin Celik investigating the effect of E50 on SI engine HC emission found 12% reduction.[16]

**4. Engine Performance:** Ethanol increases the engine performance by increasing volumetric efficiency, thermal efficiency but specific fuel consumption increases because ethanol has less calorific value as compared to gasoline (ref Table1) so that more ethanol is required for burning which enhances density of ethanol in combustion chamber, volumetric efficiency increase and due to oxygenated fuel high flame speed produces

rapid combustion without knock even in higher compression ratio enhance the thermal efficiency but air-fuel ratio decreases so more fuel is required.[1, 2,4,5,6,10].

**4.1 Break specific fuel consumption (bsfc):** Break specific fuel consumption means quantity of fuel required to produce 1 KWh power. Ethanol is low calorific value fuel even half of gasoline so that more fuel is required for producing power as compared to gasoline. Mustafa Canakci et al investigated the engine performance characteristics of 4 cylinder, 4 stroke multi point fuel injector SI engine with ethanol (E5, E10) and methanol blend (M5, M10) for 80km/hr and 100 km/hr vehicle speed and investigated the break specific fuel consumption and found that on increasing ethanol blend BSFC increase for ethanol this increment is 2.8% and 3.6% of E5 and E10 as compared to gasoline.[7]. M. Bahattin Celik investigated suitable ethanol blend for high compression ratio SI engine and found that with E50 blend SFC was reduced by 3% as compare to gasoline.[16]

**4.2 Volumetric Efficiency:** Many researchers found that with ethanol blend in SI engine volumetric efficiency increases.[10,11,12] Ethanol is high latent heat of vaporization due to which cooler intake in combustion chamber increases density of charge and improves volumetric efficiency for more power production. Yuhan Huang investigated the effect of ethanol blend in DISI engine and found that evaporation rate was reduced by addition of ethanol in gasoline from 94.3% to 92% for E0 to E80 fuel.[12] Ashrof Elfasakhany investigated the effect of ethanol blend in volumetric efficiency and found that on increasing the ethanol blend percentage the volumetric efficiency increases from 0.275 to 0.411 for 3400 rpm with E0 to E10 blend [10]

**4.3 Mean Effective Pressure:** Ethanol improves combustion efficiency by increasing percentage of ethanol and high mean effective pressure achieve which is parallel with engine power.[12] but S. Ilive investigated over 1D engine model for ethanol blend for engine performance and found that on increasing percentage of ethanol blend reduced engine break power due to low heating value of ethanol[42,43].

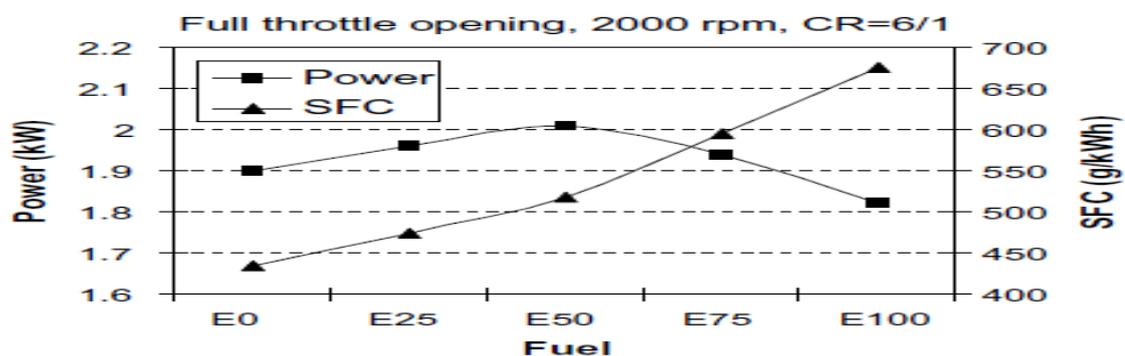


Figure 2: Effect of Ethanol blend over power and SFC [16]

Researchers also found that the combustion and thermal efficiency improved after blending with ethanol because of high octane number and high flame speed.

### 3. Conclusion

To meet the future requirement of gasoline fuel for transportation is going to create a big problem in front of us and will create a need to find out the alternative fuel for better emission, reducing PN number with good thermal efficiency and alcohol has a great opportunity to researchers for selecting as alternative fuel but both methanol

and ethanol have lots of good properties like high octane number , low emission of carbon dioxide gas and reduced harmful emission of gases but at the same time it is a difficult to be as a alternative fuel. Alcohol has a high latent heat of vaporization and corrosive effect over metal and plastic etc. so that only alcohol is not suitable fuel for SI engines and we need to blend this with gasoline and also bi and tri blending i.e methanol-gasoline (MG), ethanol –gasoline(EG) and ethanol-methanol-gasoline (GEM) and use of these fuel as alternative problem the difficulties of selection of alternative fuel alone is almost removed and thermal efficiency, higher compression ratio and low emission achieved. After reviewing the literature gaps were found which are:-

- There is little attention of researchers over effect on ethanol over material inside combustion chamber after long period of use.
- The effect of atmospheric condition directly affected the ethanol blend fuel which was reported but there is less research over optimum percentage of alcohol at the very cold conditions and very warm condition

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# A REVIEW OF STRUCTURAL AND VIBRATIONAL ANALYSIS OF NATURAL AND ARTIFICIAL COMPOSITES

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## ABSTRACT

*The first part of the study focuses on the fabrication of the Natural fiber plates and synthetic fiber plates of glass and carbon. These plates are made with the different orientation and different curing temperature. Natural fiber has drawn attention of researchers as an environmentally-friendly alternative to synthetic fiber. Developing natural fiber reinforced bio-composites are a viable alternative to the problems of non-degrading and energy consuming synthetic composites. This study will focus on (i) the application of fiber as a potential reinforcement and, (ii) determining the structural and thermal properties of the randomly oriented short natural fiber composite both experimentally and numerically, also the nature of natural fiber plates is to be studied under various curing temperature rates. The fiber materials under consideration are Coconut fiber, Banana Fiber, Jute, Kenef Fiber. Fabrication is done on hand lay-up technique and vacuum bagging technique. Composite Natural fiber plates are compared with the synthetic plates of Glass Fiber, carbon fiber and mixed composition of glass and carbon fiber. The plates under consideration are having 00, 450, 900 orientation. The second part of the study consists of comparison of the natural fiber plate to the synthetic fiber plate. The comparison study includes the Tensile, impact and buckling of the composite plates. The third part of the study consist of Vibration testing of these plates experimentally with the help of FFT Analyser and the Numerically with the help of ANSYS ACP tool.*

*And attempt has been made to give best combination of fiber plates by making it laminated, while making it laminated plates these plates are made with the different layer combinations. These laminated plates are compared with the fiber reinforced plates. Also in case of Vibration occurring on the plates, these vibrations are reduced by providing the piezoelectric patch to the lowest vibrating and structurally sound plate. In this way the overall study of composite plates are to be done and a solution is provided to reduce the vibrations in real life applications such as automobile panels and aircraft wings etc*

## 1.Heading

Composite structures, beam, plates, and shells are commonplace in many sectors of the automotive and aircraft industries. Use of such structures is now being considered for naval applications because of the potential for improved strength to weight ratio and resistance to harsh environments.

A composite is a structural material that consists of two or more combined constituents that are combined at a macroscopic level and are not soluble in each other. One constituent is called reinforcing phase and one in which it is embedded is called the matrix. The reinforcing phase material may be in the form of fibers, particles or flake. The matrix phase materials are generally continuous. The roles of matrix in composite materials are to give shape to the composite

part, protect the reinforcements to the environment, transfer loads to reinforcements and toughness of material, together with reinforcements. Composite materials are used for Automobile, Ships, Aircraft, sports goods and so on.

Composite materials are hybrids consisting of two constituents at the nanometer or molecular level. Commonly one of these compounds is inorganic and the other one is organic in nature. Thus, they differ from traditional composites where the constituents are at the macroscopic (micrometer to millimeter level). Mixing at the microscopic scale leads to a more homogeneous material that either shows characteristics in between the two original phases or even new properties. Purpose of hybridization is to increase a resistance against the inter-laminar toughness that cannot be obtained with only conventional material. The use of composite materials in composite structural is becoming more nowadays, and the fibers can be arranged in various orientations during preparation of composite. However, there are other factors such as cost, weight, post-failure behavior leading the designer to use hybridization in order to tailor the material to exact needs under design. Epoxy resin is used in composite because it provides a unique balance of chemical and mechanical properties combined with extreme processing versatility. In all cases, thermo set resins may be tailored to some degree to satisfy particular requirements.

Composite laminates are prepared by stacking sheets of Glass/Carbon fibers to required orientation to form angle ply laminates, and fiber reinforced composite materials are prepared by hand lay up technique, the fibers are made up of banana, coconut, kenef, glass, carbon the angle of orientation of these fibers are dispersed i.e. not fixed in case of natural fibers plates and in case of synthetic fiber plates it is 0, 90 & 45 degree.

The composite material is processed from a mixture of two or more different materials in certain proportions. Generally speaking, composite comprises a fiber reinforcement embedded in a polymeric matrix. The motivation behind the invention of a composite material comes from the demand of low weight and high strength material for the aerospace industry. The major work in this area was carried out during 1960's and to date there are several types of composites being developed for various applications. Examples of some synthetic fibers are glass, carbon, boron, aramid and Kevlar. Commercially available polymer matrices include epoxy, polypropylene and polyethylene. Metals and ceramics are also used as matrix materials in composite processing. A wide range of these composite materials have been successfully used for structural applications in the aircraft, space, automotive, marine and infrastructure industries.

Generally, for structural applications, composite laminates are processed by stacking lamina with varying fiber orientations to achieve the desired structural behavior. Structural functionality includes high tensile load carrying members; low thermal expansion, thermal barriers etc; and sometimes discontinuous fiber composite as shown in Fig 1. The mechanical behavior of such laminates is anisotropic in nature, meaning it depends on the fiber and matrix properties, fiber orientation and volume fraction, the interface bond between fiber and matrix, and processing techniques. The choice of a particular composite processing technique depends on the type of matrix to be used for composite, either thermo set or thermoplastic. Techniques used for thermo set kind matrix include resin transfer molding, vacuum assisted resin transfer molding, compression resin transfer molding, and pultrusion process. Thermoplastic kind matrix includes compression molding, filament winding and injection molding. Application of these techniques depends on the type of structure (at or complex), rate of production and type of application.

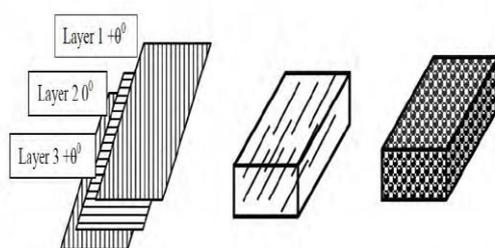


Fig:1. Various Types of Composites

Most of the existing composite materials (both fibers and polymers) are processed from petroleum based products and the previously mentioned processing techniques are power

consuming. Consequently, some concerns associated with the commercially available composites are high energy consumption, non-recyclability, non-renewability and cost. There is a need for developing an alternate composite material or processing technique that is economical, low energy consuming and environmental friendly. In recent years, researchers explored the potential natural fibers (derived from plants and animals) as a replacement for synthetic fibers. An experimental investigation of some natural fibers conducted by S.V. Joshi et al. proved to be capable of replacing E-glass fibers. At this point, before proceeding into details, the following questions must be answered:

- What is the morphology of natural fibers?
- Do these fibers have enough benefits to replace existing commercial fibers?
- How does one process a natural fiber reinforced composite?
- What are the major advantages and applications of natural fiber composites?

Natural fibers in this context imply those derived or obtained from plants. These fiber can be obtained from different parts of a plant, including the stem, leaf, root, core and fruit. The fibers obtained from the stem are called bast fibers and those obtained from the leaf, root and fruit are called leaf fibers, root fibers and fruit fibers respectively. Examples of bast fibers are hemp, ax, and jute, leaf fibers are abaca, sisal and pineapple, and fruit fibers are cotton, coir and kapok. A summary of worldwide production of various natural fibers was given in. It was observed that the bast fibers are most commonly used, followed by leaf and fruit fibers, proving their abundance in nature. This is why past few years of research have focused on using bastfibers as a replacement for synthetic fibers. The potential of various bast fibers as a composite reinforcement is discussed in the subsequent sections. Once the source for fibers has been chosen, the next step is extracting fibers from the stem (known as retting). Various retting processes currently used in industry include dew-retting, water retting, chemical retting and physical methods. The effect of retting methods on the bast fiber properties was collectively discussed in a review article. Water retting results in good quality fiber but takes 2-3 weeks, whereas chemical retting is done quickly and results in decreased strength of the fibers. The process of retting is followed by decortication, carding and spinning into yarn. The full process of various fiber extractions is shown in Fig 1.2.

Table 1: Comparison of Natural and E-glass Fiber Properties

Properties	E-glass	Hemp	Jute	Ramie	Coir	Sisal	Flax	Cotton
Density (g/cm <sup>3</sup> )	2.55	1.48	1.46	1.5	1.25	1.33	1.4	1.51
E-modulus (GPa)	73	70	10-30	44	6	38	60-80	12
Specific modulus	29	47	7-21	29	5	29	26-46	8

Table 1: Comparison of Natural and E-glass Fiber Properties

The potential (specific modulus) of the natural fibers as a reinforcement was studied by Wambua et al. and shown in Table 1. Five different fibers; sisal, hemp, jute and coir were selected in and a polypropylene matrix based composite was processed. The mechanical properties of these composites were compared to that of E-glass fiber reinforced composites. Specific modulus of natural fiber reinforced and E-glass fiber reinforced composites were reported to be comparable except in the case of coir. Earlier research focused on ax, hemp, bamboo and jute fibers due to their abundant availability and extensive use in the textile industry. This study will focus on a similar common fiber source, the plant. Fiber secures third place in terms of worldwide production (870.103 ton per year) after jute. In addition to its availability, belongs to the same family as the jute plant and is likely to share jute's desirable properties. There is a need for research about fiber properties and its surface characteristics if it is to become a successful reinforcement for composite production.

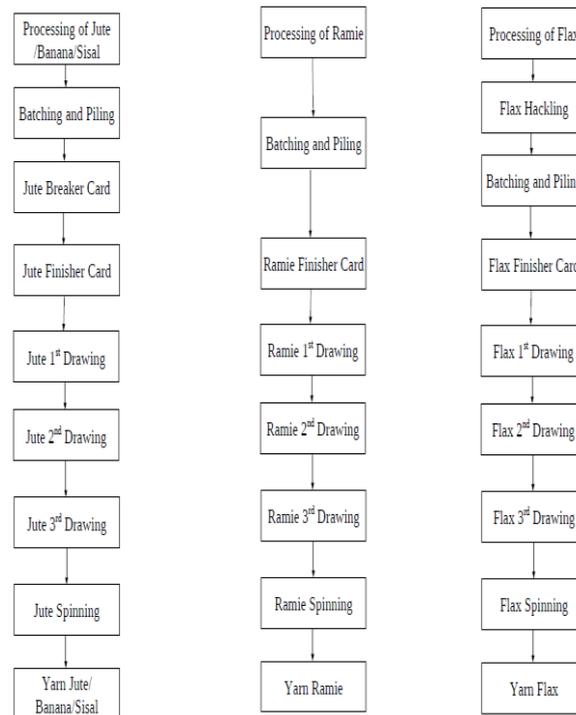


Fig.2. Processing Steps of Natural Fiber

Unlike artificial fibers, natural fibers show great variation in their mechanical properties due to: growth conditions, age of the plant, which part of the stem they are extracted from, varying constituent's fraction at the microscopic level, etc. Shinji Ochi [8] reported the variation of fiber modulus as a function of fiber location on the stem, where fibers obtained from the bottom part of a plant exhibited more tensile strength (about 20% more). The tensile strength of a fiber determined experimentally at the macroscopic scale is governed by the structure and the chemical composition present at the microscopic scale. Most of the materials available in nature are composite in nature (i.e. the material is a mixture of different chemical constituents). Similarly, bast fibers also consist of constituents namely: cellulose, hemicellulose, lignin, pectin and waxes at the microscopic scale. Fibers obtained from different plants have variation of these constituents and consequently exhibit different properties. The volume fraction of each constituent in different fibers was reported in and is presented here in Table 1.

The major advantages of developing natural fiber based composites include low cost, low density, recyclability, low pollution, no health hazards and effective utilization of resources. To this point, natural fiber composites can be used for secondary structural application due to their lower tensile strength and mechanical properties compared to that of primary structural applications. Some applications were listed in that includes seat backs, dashboards, door panels, and sports goods. In order to expand the use of natural fiber based composites, further detailed investigations are required with a focus on strength improvement.

In this study the prediction of transient response and natural frequencies is to be done on the laminated composite materials. As composite materials are widely used in many fields, there is a need for accurate prediction of dynamic characteristics so that they can be designed against the failure due to various types of dynamic loads. In the past few years the problem of health monitoring and fault detection of structures has received considerable deliberation. The changes can be considered as an indication of the health of the structure. Subsequently, these methods of fault detection are based on the comparison of the vibrant response of the healthy structure with the active response of the deserted

structure. The evaluation is carried out through some algorithm, which employs the modal data of the healthy and deserted structure. Therefore, the fault detection problem is in need of the modal data for the healthy structure, the modal data for the deserted structure and the algorithm that uses these data and provides information about the state of the structure. Each of these items has its own aspects and associated problems that affect the results of the fault detection. Due to the drawbacks of vibrations, it is important to eliminate or reduce the vibration i.e. provide damping, for this purpose the vibration analysis is to be done. In analysis of vibration we can derive the equations of motion of a vibratory system and find out the response of vibration in the forms of natural frequencies and displacements.

In our work in the area of vibration analysis we wish to develop an efficient model correction approach for resonant systems that are obtained from model analysis and approximate methods. Model correction for point-wise and spatial models of resonant systems would be considered. Also we have included the effect of damping in the resonant system which is assumed to be negligible in other approaches.

### 1.1 Objectives

- To develop the Natural Fiber Composite plate for various applications by using coconut, banana, and jute fiber at various curing temperature.
- To develop the synthetic fiber composite plate in comparison with the natural fiber plate at various fiber angle and various curing temperature.
- To determine the Young's modulus of natural fiber composite plate through tensile test by considering the appropriate fiber cross-sectional area after failure.
- To determine Young's modulus and Poisson's ratio of a short natural fiber reinforced composite plate.
- To determine Young's modulus and Poisson's ratio of a short synthetic fiber reinforced composite plate.
- To predict the structural behavior of carbon fiber composite when fiber angle is  $0^{\circ}$ ,  $45^{\circ}$ ,  $90^{\circ}$  respectively
- To predict the structural behavior of glass fiber composite when fiber angle is  $0^{\circ}$ ,  $45^{\circ}$ ,  $90^{\circ}$  respectively
- To study the Vibration characteristics of glass/carbon fiber composite when fiber angle is  $0^{\circ}$ ,  $45^{\circ}$ ,  $90^{\circ}$  respectively
- To structurally compare the results of natural fiber composite plate with the synthetic fiber composite plate.
- All the above process to be done numerically on ANSYS Software and Experimentally with the help of UTM and FFT analyser.
- To provide the best material to the automobile and aerospace industry which is lighter, stronger and less vibrating.

### I. Measurement

The Natural Fiber reinforced composites plates are to be made up of hand lay up technique. Coconut, banana and jute fiber will be used. The dimensions of the plate will be 150x250x6 mm. Curing is different for every composite. In case of the synthetic fiber the Glass and carbon fibers will be used, these plates are also to be manufactured by hand lay up technique. The epoxy resin used in this study was, with its hardener (Epoxy 10) in ratio (3:1), and left at room temperature ( $23^{\circ}\text{C}$ ) to solidified after (24) hours, at ( $30^{\circ}\text{C}$ ) & ( $40^{\circ}\text{C}$ ) for 24 hours. Hand lay – up molding technique used to prepare: -a- epoxy composite reinforced with [chopped strand mat fibers with surface density 0.277 Kg/m<sup>2</sup>] from 12C Composites Pune.

Epoxy composite reinforced with [woven roven ( $0^{\circ}$ – $90^{\circ}$ ) with surface density 0.5 Kg/m<sup>2</sup>] from 12C Composites Pune and chopped strand mat together as a sandwich composite.

### Tensile Testing

Tensile testing is a fundamental mechanical testing method in which a sample is subjected to uniaxial tension until failure. The results from the test are commonly used to select a material for an application, for quality control, and to predict how a material will react under other types of forces. Properties such as ultimate tensile strength, maximum elongation and reduction in area can be determined. In this test specimen is loaded in a very controlled manner while measuring the applied load and the elongation of the specimen over some distance.

Specimens are prepared as per ASTM D3039 standard, which consist tabs at either ends. The universal testing machine (UTM) is used for testing with higher accuracy, the maximum capacity of machine 100 KN is used for testing, which operated on electronic control servo mechanism. Speed rate is 2 mm/min; the specimen is fixed between lower crosshead & intermediate cross head.

In the second phase, the composite structures consisting of aluminum, mild steel and FRP materials are to be constructed and compared with the reinforced composites, the stacking sequence is going to change.



Figure 3: Composite Structures

The natural frequencies for these composite materials are found out. In this stage, the Damping effect produced by these sandwich structures is measured.

### Plan of Instrumentation

The complete experimental setup for vibration analysis is shown in following figure, In order to obtain natural frequencies of plates. The values of natural frequencies obtained by exciting the handle bar using Impact Hammer shown in following figure and measuring the response by an Accelerometer which was connected to FFT Analyzer.

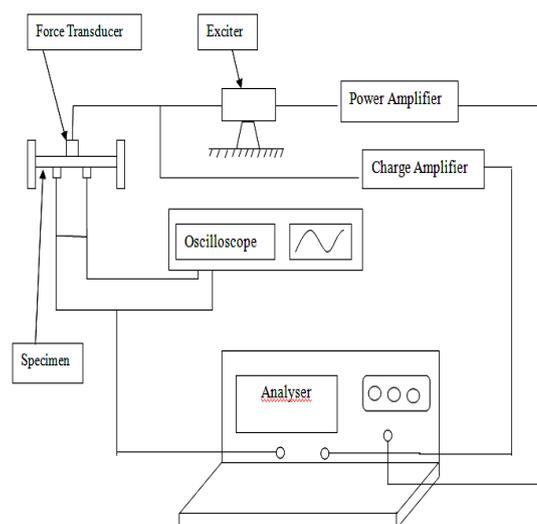


Figure 4 : Schematic Diagram of Experimental Setup

## I. FUTURE SCOPE

Experiments were conducted on Glass fiber/Carbon fiber/Epoxy resin hybrid angle ply laminates with different fiber orientation to characterize the tensile properties. The following conclusions were drawn and recorded:

During specimen preparation angle ply hybrid composite for  $0^\circ/90^\circ$  orientation, glass fiber is placed in  $90^\circ$  and carbon fiber placed in  $0^\circ$ , because the glass fiber is more ductile than carbon fiber.

During specimen preparation angle ply hybrid composite for  $0^\circ/90^\circ$  orientation, glass fiber is placed in  $90^\circ$  and carbon fiber placed in  $0^\circ$ , because the glass fiber is more ductile than carbon fiber.

In tensile test load is acting in axial direction, since glass fiber is in the direction of load which carries maximum load and also could be transferred to the carbon fiber. Carbon fiber is brittle in nature which fails first then glass fiber will fail.

In other types of specimen i.e. for  $60^\circ/30^\circ$  and  $\pm 45^\circ$  orientation of hybrid composite degree of orientation for glass fiber is less, because the less the degree of orientation is, the less the strength and stiffness of materials will be.

From above we concluded that if we calculate mechanical properties for other orientations, the maximum properties can be obtained only in  $0^\circ/90^\circ$  angle ply orientation.

Further research work needs to be carried out in the development of hybrid fiber-reinforced composites by the inclusion of filler material and fiber treatment for getting improved mechanical properties.

Comparatively the glass fiber materials provides more damping than that of other structures these plates can be used in the roofing of automobiles as well as the packaging purposes.

Natural fibers are a good alternatives for the Automobile interior roof and other interior panels of the automobile, these materials can act as a good shield to absorb the shock for the various machine parts.

In case of synthetic materials these materials can be used for the outer surfaces of automobile panels, aircraft panels to reduce the vibration in service on these panels we can provide the automatic actuator arrangement on these panels, so as the drag will be reduced and we get a good aerodynamic structure.

## 2. Conclusion

After performing the experiment for the validation of geometrical nonlinearity it is observed that, after 60 mm deflection actual effect of the nonlinearity is observed as it differs the linear and nonlinear results above 1 mm and the experimental results are matching with the software results.

So this concludes that Geometrical nonlinearity must have to take under consideration during whole analysis process. Research is in progress considering nonlinearity

Parameters of glass plate.

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# SYSTEMATIC STUDY OF SYNTHESIS OF POLY(O-ANISIDINE-CO-O-TOLUIDINE) COATINGS AND ITS PERFORMANCE AGAINST CORROSION OF COPPER

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## ABSTRACT

*The synthesis of poly(o-anisidine-co-o-toluidine) coatings on copper was carried out by copolymerization of o-anisidine with o-toluidine. For deposition of these coatings sodium salicylate was used as supporting electrolyte. The systematic study of synthesis of poly(o-anisidine-co-o-toluidine) coatings was done by cyclic voltammetry. The resulting coatings was characterised by UV-visible absorption spectroscopy, nuclear magnetic resonance spectroscopy (NMR). The copolymer formation with the mixture of o-anisidine and o-toluidine monomers was confirmed by a comparison of the results obtained with the cyclic voltammetry of the individual monomers, o-anisidine and o-toluidine, respectively. In cyclic voltammetry especially the peak A<sub>1</sub> corresponding to the oxidation of deposited monomer shows systematic and sequential variation in intensity with the change of monomer concentration in the copolymer solution. So variation in peak A<sub>1</sub> represents successful synthesis of copolymer. The corrosion protection performance of offered by poly(o-anisidine-co-o-toluidine) coatings to copper was studied in sea water (3% NaCl) solution by potentiodynamic polarization technique. The results of the potentiodynamic polarization measurements that the poly(o-anisidine-co-o-toluidine) coatings provide the better corrosion protection to copper than that of respective homopolymers. The corrosion rate is observed to depend on the feed ratio of o-toluidine used for the synthesis of the copolymer coatings.*

## 1.Introduction

From last two decades considerable attention has been paid to exploit the conducting polymers in various technological application such as rechargeable batteries [1,2], sensors [3,4], electromagnetic interference (EMI) shielding [5,6], electrochromic display devices [7,8], smart windows [9], molecular devices [10], energy storage systems [11], membrane gas separation [12] etc. due to their remarkable physical attributes. The use of conducting polymers as advanced coating materials for corrosion protection of oxidizable metals has become one of the most exciting new research fields in most recent times [13-19]. Mengoli et al. [20] was the first to examine the protective behavior of polyaniline on stainless steel and then in 1985, DeBerry [21] showed that the electrochemically synthesized polyaniline acts as corrosion protective layer on stainless steel in 1 M H<sub>2</sub>SO<sub>4</sub>. Since then, several research groups [22-26] have systematically investigated the electrochemical synthesis of various conducting polymers on oxidizable metals for corrosion protection purposes. Among the conducting polymers, polyaniline and polypyrrole are the most promising conducting polymers for corrosion protection of metals. The extent of using these of conducting polymers is limited due to the exclusivity of the monomers that are essential for their synthesis [27,28]. To overcome this limitation, different synthesis approaches have been attempted. The first approach involves the synthesis of substituted conducting polymer coatings on oxidizable metals,

with a view to explore the possibility of utilizing them as an alternative to parent polymers for corrosion protection. We have developed the appropriate electrochemical polymerization procedures to synthesize strongly adherent poly(*o*-anisidine) [29,30,32], poly(*o*-toluidine) [31], poly(2,5-dimethoxyaniline) [33] and the poly (aniline-co-*o*-anisidine) (PAOA) coatings were carried out on mild steel [34], The corrosion protective poly(aniline-co-*o*-toluidine) (PAOT) [35] coatings were synthesized on copper. The results of the potentiodynamic polarization measurements showed that the copolymer coatings provided more effective corrosion protection to mild steel and copper than the respective homopolymers.

## 2. Experimental

### a) Materials

The monomers, *o*-anisidine and *o*-toluidine were double distilled prior to being used for the synthesis of homopolymer and copolymer coatings. In the present study the aqueous sodium salicylate solution was used as supporting electrolyte.

The Cu substrates (size ~ 10 x 15 mm and 0.5 mm thick) were polished with a series of emery papers, followed by thorough rinsing in acetone and double distilled water and dried in air. Prior to any experiment, the substrates were treated as described and freshly used with no further storage.

### b) Synthesis of poly(*o*-anisidine), poly(*o*-toluidine) and poly(*o*-anisidine-co-*o*-toluidine) coatings on copper

The poly(*o*-anisidine), poly(*o*-toluidine) and poly(*o*-anisidine-co-*o*-toluidine) coatings synthesized on copper substrates by using cyclic voltammetry, the concentration of respective monomer and sodium salicylate were kept constant at 0.1 M each. For the electrochemical copolymerization, a mixture of *o*-anisidine and *o*-toluidine with total concentration of 0.1 M. The copolymer synthesis experiments were carried out by using feed ratio of *o*-toluidine as 10:90, 30:70, 50:50, 70:30 and 90:10, respectively.

The electrochemical polymerization was carried out in a single compartment three electrode cell with Cu as working electrode (1.5 cm<sup>2</sup>), platinum as counter electrode and saturated calomel electrode (SCE) as reference electrode. The cyclic voltammetric conditions were maintained using a PARSTAT 2363-1, EG and G, Princeton Applied Research (U.S.A.) controlled by PowerSuite software (Perkin Elmer Instruments, 2000 supplied by EG and G, Princeton Applied Research, U.S.A.). The synthesis was carried out by cycling continuously the electrode potential between -1000 mV and 1800 mV at a potential scan rate of 20 mV/sec. After 10 cycles, the working electrode was removed from the electrolyte and rinsed with double distilled water and dried in air.

### c) Characterization of coatings

The poly-*o*-anisidine, POT and OAOT coatings were characterized by cyclic voltammetry, UV-visible absorption spectroscopy, The optical absorption studies of these coatings were carried out *ex situ* in the wavelength range 300-1100 nm using microprocessor controlled double beam UV-visible spectrophotometer (Model U 2000, Hitachi, Japan). SEM was employed to characterize the surface morphology with a Leica Cambridge 440 Microscope (U.K.). The <sup>1</sup>H NMR spectra were obtained on a Bruker DSX-300 solid state NMR spectrometer, operating at 300 MHz. The measurements were carried out in DMSO-d<sub>6</sub> solution at ambient temperature.

### d) Study of corrosion performance of the coatings

The corrosion protection performance studies were performed at room temperature in aqueous solution of 3% NaCl by using potentiodynamic polarization technique. The polarization resistance measurements were performed by sweeping the potential between -250 mV and 250 mV from open circuit potential at the scan rate of 2 mV/sec. The

corrosion current density ( $I_{corr}$ ) in  $A/cm^2$  was calculated by using Stern-Geary equation [36] and it is converted into the corrosion rate (CR) in mm per year by using the expression [37]

where  $I_{corr}$  is corrosion current density ( $A/cm^2$ ), EW is equivalent weight of Cu (g) and  $\rho$  is the density of Cu ( $g/cm^3$ ). All the measurements were repeated at least four times and good reproducibility of the results was observed.

### 3.Result and Discussion

#### a)Electrochemical synthesis of homopolymers, Polyo-anisidine and Polyo-toluidine and poly(o-anisidine-co-o-toluidine) copolymer coatings on cu

The cyclic voltammogram of the first scans recorded during the electrochemical synthesis of homopolymers i.e. Polyo-anisidine and Polyo-toluidine and the copolymer poly(o-anisidine-co-o-toluidine) 50:50 coatings on cu substrate from an aqueous solution of sodium salicylate are shown in fig1. The first positive cycle of cyclic voltammogram is characterize by onset of oxidation wave followed by oxidation peak (B). During the reverse cycle , the anodic current density decreases rapidly and negligibly small current is seen . The negative cycle terminates with a reduction peak (C).

The oxidation wave attributed to oxidation of monomer since a black, uniform film is generated on copper substrate. The reduction peak during negative cycle is attributed to the partial reduction of of deposited polymer film.

The careful examination of these cyclic voltammograms indicates that potential corresponding to the onset of oxidation wave shifts significantly depending on monomer(s) present in electrolyte and it follows the order – o-anisidine < (o-anisidine + o-toluidine) < o-toluidine (386mV < 443mV < 672mV resp.) . The o-anisidine is derivative of aniline (-OCH3) group substituted at ortho-position and o-toluidine is derivative of aniline (-CH3) group substituted at ortho-position The, o-anisidine is more reactive than the o-toluidine in electrophilic substitution reaction as –OCH3 is more electron donating group than –CH3 group. Therefore, the result of cyclic attributed to earlier (lower) oxidation potential of o-anisidine i.e. higher reactivity of o-anisidine than the that of o-toluidine.

$$CR(mm / yr) = 3.268 \times 10^3 \frac{I_{corr}}{\rho} \frac{M W}{z}$$

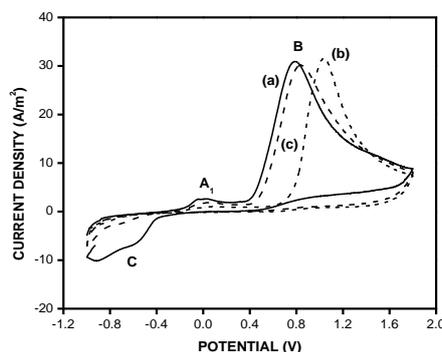


Fig.1 : Cyclic voltammograms of the first scan recorded during the synthesis of (a) Polyo-anisidine, (b) Polyo-toluidine and (c) poly(o-anisidine-co-o-toluidine) 50:50 copolymer coatings on Cu substrates.

During the next scan fig.2 a broad anodic peak  $A_1$  (between -255mV to -438mV) is observed and the rest of features are similar to that of the first scan .The anodic peak  $A_1$  assigned to oxidation of deposited polymer film at copper substrate corresponding to conversion of amine units in to radical cation. However, again the careful examination of this anodic

peak A<sub>1</sub> indicates that the current density corresponding to this peak varies significantly with monomer present in the electrolyte in the following sequence –

Polyo-anisidine > copolymer poly(o-anisidine-co-o-toluidine) 50:50 > Polyo-toluidine

Supports the higher reactivity of o-anisidine and the reactivity of copolymer poly(o-anisidine-co-o-toluidine) 50:50 lies in between the Polyo-anisidine and Polyo-toluidine. This is just about the individual polymers i.e. Polyo-anisidine and Polyo-toluidine and the poly(o-anisidine-co-o-toluidine) 50:50 copolymer. Now the question arises, what is the scenario of this peak A<sub>1</sub> for

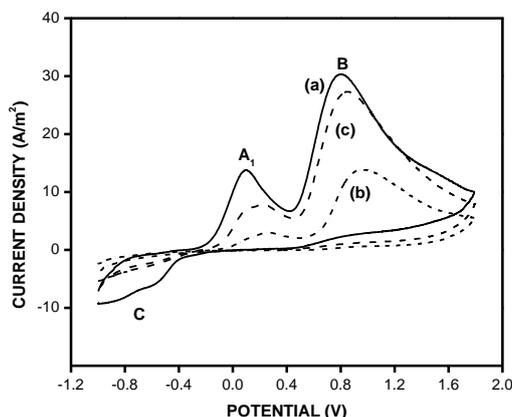


Fig.2 : Cyclic voltammograms of the second scan recorded during the synthesis of (a) Polyo-anisidine, (b) Polyo-toluidine and (c) poly(o-anisidine-co-o-toluidine) 50:50 copolymer coatings on Cu substrates

the other copolymers (i.e. poly(o-anisidine-co-o-toluidine) 10:90, poly(o-anisidine-co-o-toluidine) 30:70, poly(o-anisidine-co-o-toluidine), 70:30, poly(o-anisidine-co-o-toluidine) 10:90) See the fig3 which will give answer to this question i.e. the variation of the peak A<sub>1</sub> for individual polymer along with all copolymers with the different molar feed ratios.

Detailed study of fig 3 indicated that the current density corresponding to A<sub>1</sub> shows systematic variation with the feed concentration of of o-toluidine in the comonomer in the following sequence – Polyo-anisidine > poly(o-anisidine-co-o-toluidine) 90:10 > poly(o-anisidine-co-o-toluidine) 70:30 > poly(o-anisidine-co-o-toluidine) 50:50 > poly(o-anisidine-co-o-toluidine) 30:70 > poly(o-anisidine-co-o-toluidine) 10:90 ) > Polyo-toluidine

It is very interesting to note that peak A1 in it shows the presence of duplex for all the feed ratios of comonomers

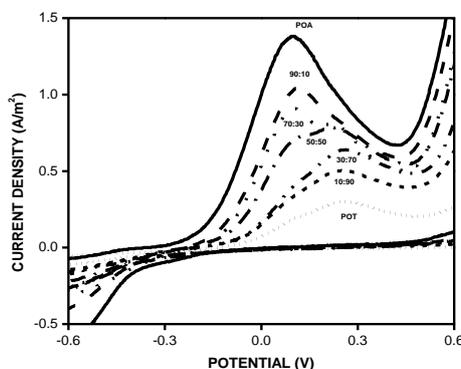


Fig.3 : Variation of the peak A1 as a function of feed ratio of o-toluidine

which supports the formation of copolymer. However the further detailed study of this duplex A1 peak for copolymers indicates that sharpness of duplex peak of poly(o-anisidine-co-o-toluidine) 90:10 is toward lower potential which is quite similar to poly(o-anisidine). While the sharpness of this duplex peak for poly(o-anisidine-co-o-toluidine) 10:90 is toward higher potential which is quite similar to poly(o-toluidine) and for poly(o-anisidine-co-o-toluidine) 50:50 the sharpness of duplex was equal and similar for both monomers it shows sequential variation.

On repetitive cycling, the voltammograms identical to that of the second scan. However the current density corresponding to anodic peaks decreases gradually with the number of scans. Thus the electrochemical polymerization of monomer(s) on copper substrate occurs in single step from aqueous salicylate solution. The visual inspection of copper electrode after 10<sup>th</sup> scan reveals the formation of black coloured polymer coating.

In order to establish that the poly(o-anisidine-co-o-toluidine) 50:50 is a copolymer rather than a mixture of homopolymers Poly(o-anisidine) and Poly(o-toluidine), these polymers were characterized by <sup>1</sup>H NMR spectroscopy. The <sup>1</sup>H NMR spectra of Poly(o-anisidine), Poly(o-toluidine) and poly(o-anisidine-co-o-toluidine) 50:50 copolymer recorded in DMSO-d<sub>6</sub> are shown in Fig.4.

The <sup>1</sup>H NMR spectrum of Poly(o-anisidine) [Fig.4(a)] is characterized by the presence of three main signals. The signals in the region of 6.3-7.9 ppm are due to the protons of the aromatic rings. The resonances in the region of 4.1-2.75 ppm are attributed to the methoxy protons. The two strongest peaks at 2.3 and 2.6 ppm are due to protons of DMSO and water in DMSO.

The <sup>1</sup>H NMR spectrum of Poly(o-toluidine) [Fig.4(b)] is characterized by the presence of three main signals. The signals in the region of 6.3-8.0 ppm are due to the protons of the aromatic rings. The resonances in the region of 1.97-2.3 ppm are attributed to the methyl

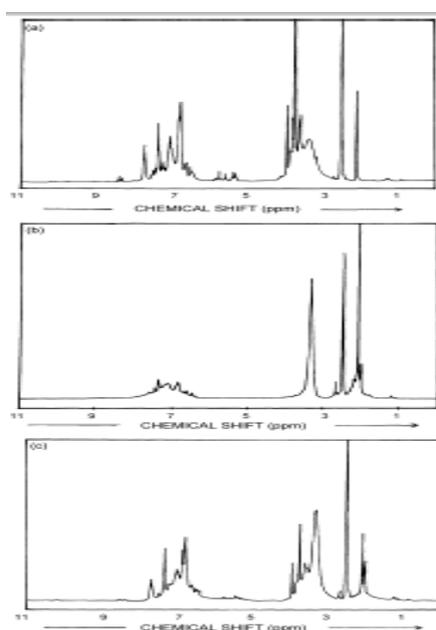


Fig.4 :<sup>1</sup>H NMR spectra of a) Poly(o-anisidine), (b) Poly(o-toluidine) and (c) poly(o-anisidine-co-o-toluidine) 50:50 copolymer recorded in DMSO-d<sub>6</sub> at 300 MHz.

protons. The two strongest peaks at 2.3 and 2.6 ppm are due to protons of DMSO and water in DMSO.

The <sup>1</sup>H NMR spectrum of poly(o-anisidine-co-o-toluidine) 50:50 copolymer has essentially the characteristics as that of the Poly(o-anisidine) and poly(o-toluidine). This spectrum is characterized by four main signals which exactly correspond to the four types of protons on the copolymer chains. As can be seen from Fig. 4(c), this spectrum exhibits the signals in a wide range from 6.3 to 7.9 ppm, which are attributed to the aromatic protons on the o-anisidine and o-toluidine units. The resonance peaks from 1.87 and 2.3 ppm are assigned to the protons of the methyl groups. The two strongest peaks at

2.3 and 2.6 ppm are due to protons of DMSO and water in DMSO. Again the resonance peaks from 2.8 and 4.07 ppm are assigned to the protons of the methoxy groups. Additionally, two negligibly small signals at 5.1 and 5.95 ppm are assigned to the –NH- linkages. This indicates the formation of high molecular weight poly(o-anisidine-co-o-toluidine) 50:50 copolymer. Thus,  $^1\text{H}$  NMR spectroscopic study confirms that o-anisidine and o-toluidine are indeed able to copolymerize on Cu in aqueous salicylate medium and in the resulting copolymer [38].

The optical absorption spectra of the homopolymers Polyo-anisidine, Polyo-toluidine and copolymer poly(o-anisidine-co-o-toluidine) 50:50 coatings are shown in Fig. 5. As can be seen from Fig. 6, the spectral characteristics of the poly(o-anisidine-co-o-toluidine) 50:50 copolymer are observed to be remarkably different from the individual homopolymers.

The optical absorption spectrum of Polyo-anisidine coating synthesized on Cu [Fig.5(a)] shows a high value of the absorbance between 600-800 nm with a weak shoulder at ~ 744 nm. This shoulder peak at 744 nm is

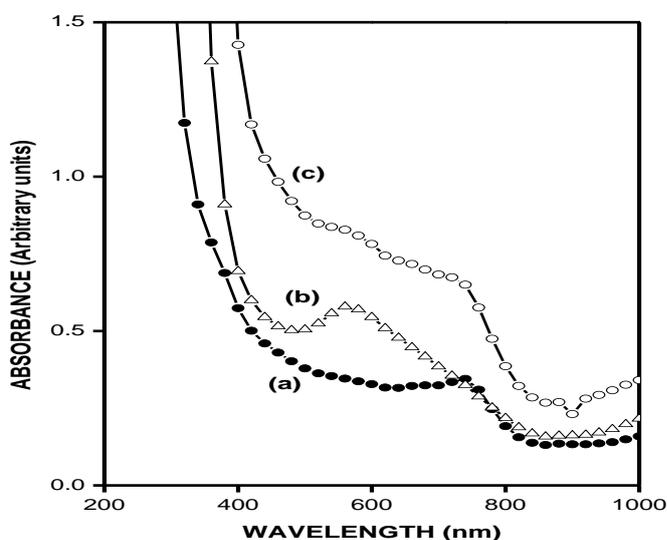


Fig.5 : Optical absorption spectra of (a) Polyo-anisidine, (b) Polyo-toluidine and (c) poly(o-anisidine-co-o-toluidine) 50:50

attributed to the formation of emeraldine salt (ES) form of Polyo-anisidine in the coating [39]. The higher value of the absorbance between 600-740 nm may be due to the formation of some species with other oxidation states. Thus, the optical absorption spectroscopy reveals the formation of ES form along with the some other oxidation state species. The optical absorption spectrum of Polyo-toluidine coating [Fig.5(b)] shows a broad well defined peak at about 562 is attributed to the presence of pernigraniline base (PB) form of Polyo-toluidine. The PB is the fully oxidized form of Polyo-toluidine and is insulating in nature [39].

The optical absorption spectrum of the poly(o-anisidine-co-o-toluidine) 50:50 copolymer coating [Fig.5(c)] shows a broad peaks at about 562 and 720 nm. The simultaneous appearance of 562 and 720 nm reveals the formation of mixed phase of PB and ES.

#### (b) Corrosion protection performance of the poly (o-anisidine-co-o-toluidine) copolymer and polymer coating

The potentiodynamic polarization curve uncoated Cu recorded and the curves for Polyo-anisidine, Polyo-toluidine and poly(o-anisidine-co-o-toluidine) 50:50 coated Cu in aqueous 3 % NaCl is shown in Fig.6. The values of the corrosion potential ( $E_{\text{corr}}$ ), corrosion current density ( $I_{\text{corr}}$ ), tafel constants ( $\beta_a$  and  $\beta_c$ ), polarization resistance ( $R_p$ ) and corrosion rate obtained from these curves are given in Table 1. The porosity in coating was calculated using the relation

$$P = (R_{ps}/R_p) 10^{(-|\Delta E_{\text{corr}}/\beta_a)}$$

where P is the total porosity,  $R_{ps}$  is the polarization resistance of the bare Cu,  $R_p$  the measured polarization resistance of coated Cu,  $\Delta E_{corr}$  is the difference between corrosion potentials and  $\beta_a$  the anodic Tafel slope for bare Cu substrate. The porosity in Poly(o-anisidine), Poly(o-toluidine) and poly(o-anisidine-co-o-toluidine)

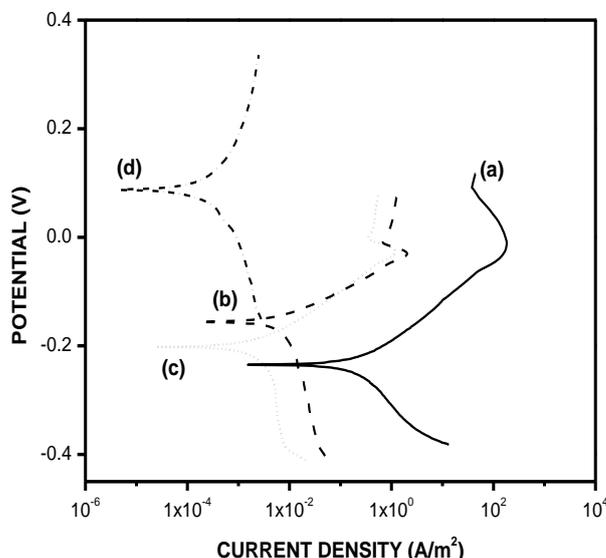


Fig.7 : Potentiodynamic polarization curves for (a) Bare Cu (b) Poly(o-anisidine), (c) Poly(o-toluidine) and (d) poly(o-anisidine-co-o-toluidine) 50:50 coated Cu recorded in aqueous 3% NaCl solution.

50:50 copolymer coating was found to be  $\sim 2.4 \times 10^{-1}$ ,  $2.7 \times 10^{-1}$  and  $1.42 \times 10^{-6}$  %, respectively.

The analysis of these potentiodynamic polarization curves shows the positive shift in the  $E_{corr}$  and substantial reduction in the  $I_{corr}$  of the Cu due to the Poly(o-anisidine), Poly(o-toluidine) and poly(o-anisidine-co-o-toluidine) 50:50 coatings, which indicates the corrosion resistant characteristics of the Poly(o-anisidine), Poly(o-toluidine) and poly(o-anisidine-co-o-toluidine) 50:50. It is found that the shift in the  $E_{corr}$  depends on the coating and decreases in the order poly(o-anisidine-co-o-toluidine) 50:50 > Poly(o-anisidine) > Poly(o-toluidine) .

Table 1 : Results of the potentiodynamic polarization measurements

Sample	$E_{corr}$ (mV)	$I_{corr}$ ( $\mu A/cm^2$ )	$\beta_a$ mV/dec	$\beta_c$ mV/dec	$R_p$ $\Omega cm^2$	CR (mm/y)	% P
Bare Cu	-234	24.06	72.0	110.0	784.05	0.28	----
Poly(o-anisidine)	-149	0.811	45.0	322.0	21139.15	0.009	0.249
Poly(o-toluidine)	-189	0.364	61.3	603.0	66377.1	0.004	0.277
Copolymer 90:10	-70	0.398	43.7	942.9	45562.82	0.004	0.009
Copolymer 70:30	-59	0.159	40.8	716.0	105414.66	0.002	0.0027
Copolymer 50:50	94	0.0265	171.0	202.0	1517395.7	0.0003	0.0000014
Copolymer 30:70	76	0.044	305.0	282.0	1445986.5	0.0005	0.0000026
Copolymer 10:90	-96	0.115	41.6	615.0	147121.38	0.007	0.0005

This implies that the copolymer poly(o-anisidine-co-o-toluidine) 50:50 coating provides effective protection to Cu against corrosion in aqueous 3% NaCl as compared to that of the corresponding homopolymers.

It is observed that the  $I_{corr}$  decreases from 24.3  $\mu A/cm^2$  for uncoated Cu to 0.811, 0.364 and 0.0265  $\mu A/cm^2$  for Poly(o-anisidine), Poly(o-toluidine) and poly(o-anisidine-co-o-toluidine) 50:50 coated Cu, respectively. The corrosion

rates of Poly(o-anisidine), Poly(o-toluidine) and poly(o-anisidine-co-o-toluidine) 50:50 coated Cu are found to be  $\sim 0.0095$ , 0.0042 and 0.0003 mm/year which are  $\sim 31$ , 70 and 940 times lower than that observed for uncoated Cu.

#### 4. Conclusion

Strongly adherent poly(*o*-anisidine-co-*o*-toluidine) coatings were successfully synthesized on Cu substrates from aqueous salicylate solution by using cyclic voltammetry.

The results of present study clearly show that aqueous sodium salicylate solution is a suitable medium for the electrochemical co-polymerization of *o*-anisidine with *o*-toluidine on the Cu.

The <sup>1</sup>H NMR spectroscopic studies reveal that the co-polymerization of *o*-anisidine and *o*-toluidine takes place on Cu in aqueous salicylate solution. The performance of the poly(*o*-anisidine-co-*o*-toluidine) coatings as protective coatings against corrosion of Cu in aqueous 3% NaCl solution was investigated by potentiodynamic polarization technique. – reveal that the poly(*o*-anisidine-co-*o*-toluidine) coatings effectively protect the Cu. The protection of Cu against corrosion in 3% NaCl by the copolymer coatings can be achieved more effectively when the synthesis was carried out with a feed ratio of *o*-toluidine as 50.

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# ANALYSIS OF HEAT TRANSFER FROM FINS USING FINITE DIFFERENCE METHOD

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## ABSTRACT

*In this paper we present Multi-dimensional heat transfer problems can be approached in a number of ways. Analytical approach using the Laplace equation involves according the solutions of differential equations. The analysis we can get complex fin analysis depending on boundary conditions, often involving advanced mathematics using Fourier series and other special functions. A more practical approach is the use of numerical methods. The finite difference method seems to provide a good approach as using these complex problems with a variety of boundary conditions MATLAB programming. With the help of FDM method one triangular problem and a circular profile were examine.*

**Keywords:** *Heat Transfer, Rectangular fin, Circular fin, Finite difference method.*

## 1. Introduction

Heat and mass transfer is one of the important fields of study for students of thermal engineering as it deals with diverse range of applications. Applications of heat and mass transfer include biological systems, common household appliances, industrial processes, electronic devices, food processing, and medicine preservation. For a thermal engineering student understanding the mechanism of heat transfer is becoming increasingly important since heat transfer plays a crucial role in the design of many appliances. Many ordinary household appliances are designed, whole or in part, by using the principles of heat transfer. The heat transfer problem can be grouped in two parts as

1. Rating Problems
2. Sizing Problems

Determination of heat transfer rate for a given temperature difference is part of problems related to rating of systems. Sizing problem deals with the determination of the size of a system in order to transfer heat at a specified rate for a specified temperature difference. there are two approaches to deal with a problem of heat transfer analysis. In the first approach one can analysis a problem experimentally by carrying out testing and taking measurements. Another approach can be analytical in which a problem or a physical situation is modeled and calculations or simulations is carried out to find the solutions. Experimental approach is close to actual physical system and can provide accurate result. However, the approach can be expensive, time consuming and some- times impracticable. With the advancement of high speed and low cost computing systems analytical approach seems to be more practical and inexpensive. High speed computing has resulted in various numerical approaches like Finite Difference Method (FDM) which can model a physical system more closely than idealistic mathematical model based on assumptions and approximations. Application of FDM in design of devices incorporating thermodynamics principles is increasingly becoming popular and present work is an attempt in that direction.

## 2. Objectives

Application of software in thermal analysis is not new. However, the cost of computation is very high in sophisticated software and their understanding demands greater skill for a proper solution. In view of the above and for deeper understanding of the software study of a numerical method and its application in heat transfer from fins is carried out in the project. The objectives of the project are

1. To understand Finite Difference Method and its application in heat transfer from fins.
2. To develop algorithms for heat transfer analysis of fins with different geometries.

## 3. Extended Surfaces for Heat Transfer Fin equations

The rate of heat transfer from a surface at a temperature  $T_s$  to the surrounding medium at  $T_\infty$  is given by Newton's law of cooling as

$$Q_{conv} = hA_{conv}(T_s - T_\infty) \quad (1)$$

Where,  $A_{conv}$  is the heat transfer surface area and  $h$  is the convection heat transfer coefficient. When the temperatures  $T_s$  and  $T_\infty$  are fixed by design considerations, as is often the case, there are two ways to increase the convection heat transfer coefficient  $h$  or to increase the surface area  $A_{conv}$ . Increasing  $h$  may require the installation of a pump or fan, or replacing the existing one with a larger one, but this approach may or may not be practical. Besides, it may not be adequate. The alternative is to increase the surface area by attaching to the surface extended surfaces called fins.

Consider a volume element of a fin at location  $x$  having a length of  $\Delta x$  cross sectional area of  $A_c$  and a perimeter of  $p$ .

Under steady conditions, the energy balance on this volume element can be expressed

$$Q_{cond,x} = Q_{cond,x+\Delta x} + Q_{conv} \quad (2)$$

Where,

$$Q_{cond,x} = Q_{cond,x+\Delta x} + Q_{conv}$$

$Q_{cond,x}$  = Rate of heat conduction into the element  $x$ ,  $Q_{cond,x+\Delta x}$  = Rate of heat conduction from the element at  $x+\Delta x$  and

$$Q_{conv} = hA_{conv}(T_s - T_\infty)$$

## 4. Finite difference modeling of Fins

Availability of high speed computers makes it possible for today's engineer to find answers for highly complicated problems of thermodynamics and heat transfer. Though a large number of software are available for thermal analysis, it is required to understand the calculations that is carried out by the software in the background to avoid any possible pitfall. Finite difference method is one of the methods that is used as numerical method of finding answers to some of the classical problems of heat transfer. Present section deals with the fundamental aspects of Finite Difference Method and its application in study of fins.

## 5. Finite Difference Method (FDM)

The numerical methods for solving differential equations are based on replacing the differential equations by algebraic equations. In case of finite difference method, this is achieved by replacing the derivatives by differences. A complete Description of the method is available in

### Case 1: Heat Transfer from Triangular Fins

Heat transfer from a fin of triangular cross section with length  $L$ , base thickness  $b$  and very large width  $w$  as shown in Fig.1 is considered and finite difference model of the fin is presented. The energy balance equation considering the conduction and convection can be expressed as

$$kA_{Left} \frac{T_{m-1} - T_m}{\Delta x} + kA_{Right} \frac{T_{m+1} - T_m}{\Delta x} + hA_{conv}(T_{\infty} - T_m) = 0 \quad (3)$$

In case of triangular cross section the heat transfer areas are different for each node and using geometrical relations, as follows:

$$A_{Left} = (\text{Height} \times \text{Width})_{m-\frac{1}{2}} = 2w \left[ L - \left( m - \frac{1}{2} \right) \Delta x \right] \tan \theta \quad (4)$$

$$A_{Right} = (\text{Height} \times \text{Width})_{m+\frac{1}{2}} = 2w \left[ L - \left( m + \frac{1}{2} \right) \Delta x \right] \tan \theta \quad (5)$$

$$A_{conv} = (2 \times \text{Length} \times \text{Width}) = 2w \left( \frac{\Delta x}{\cos \theta} \right) \quad (6)$$

$$\left[ 1 - \left( m - \frac{1}{2} \right) \frac{\Delta x}{L} \right] (T_{m-1} - T_m) + \left[ 1 - \left( m + \frac{1}{2} \right) \frac{\Delta x}{L} \right] (T_{m+1} - T_m) + \frac{h(\Delta x)^2}{kL \sin \theta} (T_{\infty} - T_m) = 0 \quad (7)$$

$$kL_{Left} \frac{T_{m-1} - T_m}{\Delta x} + hA_{conv} (T_{\infty} - T_m) = 0 \quad (8)$$

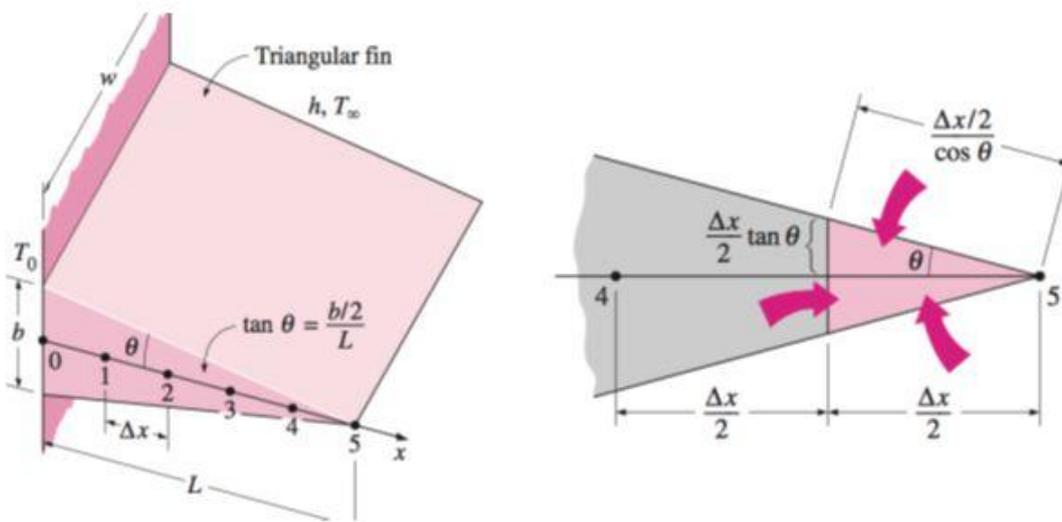


Figure [1] Triangular Fin Model

### Case 2: Heat Transfer from Pin Fin

The energy balance equation considering the conduction and convection can be expressed in usual manner as

$$kL_{Left} \frac{T_{m-1} - T_m}{\Delta x} + hA_{conv} (T_{\infty} - T_m) = 0 \quad (9)$$

In case of circular cross section the heat transfer areas are same for right and left side of the node and is equal to

$$A_{Left} = A_{Right} = A = \pi D^2/4$$

Where, D is the diameter of the pins.

Convective area is given by the

$$A_{conv} = p\Delta x$$

Where, perimeter p is  $p = \pi D$

Therefore, heat transfer equation for pin fin becomes

$$kA \frac{T_{m-1} - T_m}{\Delta x} + kA \frac{T_{m+1} - T_m}{\Delta x} + h(p\Delta x)(T_{\infty} - T_m) = 0 \tag{10}$$

$$kA \frac{T_{m-1} - T_m}{\Delta x} + kA \frac{T_{m+1} - T_m}{\Delta x} + h(p\Delta x)(T_{\infty} - T_m) = 0 \tag{11}$$

$$kA \frac{T_{m-1} - T_m}{\Delta x} + h\left(\frac{p\Delta x}{2} + A\right)(T_{\infty} - T_m) = 0 \tag{12}$$

Model of a surface with pin fins is shown in Fig.2

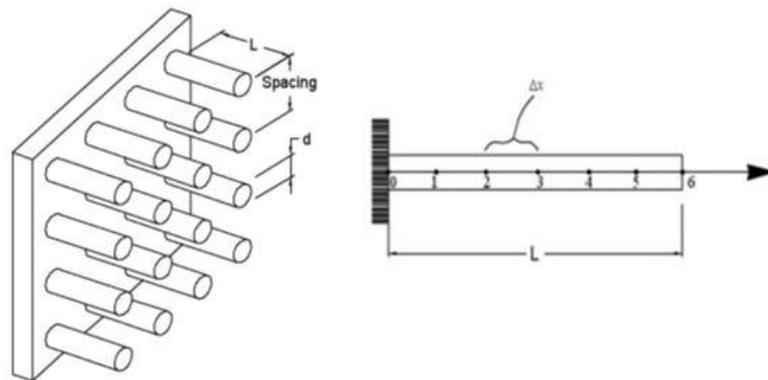


Figure [2] Triangular Fin Model

## 6. Analysis of Extended Surfaces for Heat Transfer in MATLAB

Based on the finite difference equations derived in previous chapter a pro- gram is developed in MATLAB ? to analyse the heat transfer from fins of various geometries. The algorithm developed for analysis is explained and several example Calculations from reference sources are taken to validate the program. The program reduces the effort required for calculation and can be used for analysis of fins with Rectangular, triangular and circular cross sections.

### 6.1 Development of MATLAB Code for Heat Transfer Analysis

MATLAB is a powerful computing system for handling the calculations involved in scientific and engineering problems. The name MATLAB stands for Matrix Laboratory, because the system was designed to make matrix computations particularly easy.

### 6.2 Algorithm for Heat Transfer Analysis of Fins

In Section xx some simple examples are presented on how to use MATLAB by entering single commands or statements at the MATLAB prompt. However, to solve problems which MATLAB can't do in one line, like calculation of a heat transfer equation (and taking all the special cases into account) a group of statements is required. A collection of statements to solve such a problem is called a program. In this section the mechanics of writing and running program is presented as an example and algorithm for heat transfer analysis of fins is presented.

#### Step I: Input Parameters

The heat transfer from fins depends upon the thermal property of the material, geometry of the fins surface, environment conditions which include temperature of the surrounding and temperature at the base. These are generally known in advance and are required to be entered as input to the program. Therefore, the first step of the algorithm involves input of the following parameters.

1. Thermal Properties - Thermal Conductivity (k), Convective Heat Transfer Coefficient (h)
2. Fin Geometry - Length (L), Thickness (t), Width (w)
3. Environment Conditions - Ambient Temperature ( $T_{\infty}$ )
4. Fin Base Temperature ( $T_0$ )

#### Step II: Node Specification and Nodal Spacing

Having provided the input parameters for the fin it is required to specify the number of nodes for calculation and the nodal spacing. It can also be possible to define the nodal spacing first and based on that the number of nodes can be calculated. If the number of nodes in the fin is specified to be M then the nodal spacing  $x$  becomes

$$\Delta x = \frac{L}{M - 1} \quad (13)$$

The temperature of node zero is normally given and the temperatures at the remaining nodes are to be determined. To determine them uniquely M-1 equations are needed. In order to formulate the equations the various areas are required to be calculated first

**Step III: Calculation of Heat Transfer Areas**

The heat transfer areas can be different for each node and using geometrical relations can be expressed in terms of fin geometry. Following set of areas are required for calculation of the equations.

1. Conductive area to the left of the node ( $A_{Left}$ )
2. Conductive area to the right of the node ( $A_{Right}$ )
3. Convective area ( $A_{conv}$ )

**Step IV: Formation of Set of Algebraic Equations**

Having found the areas of heat transfer the coefficients of governing equations can be calculated. The governing equations are formulated in three parts. In part one the governing equation of base node is specified. In part two governing equations of interior nodes are calculated and finally the governing equation for boundary node based on the specified boundary condition is formulated

**Step V: Solution of Algebraic Equations**

Previous step produces a set of linear algebraic equations. Solving them simultaneously using the linear solve method of MATLAB gives the nodal temperature distribution.

**Step VI: Rate of Heat Transfer from Fin**

The total rate of heat transfer from the fin is simply the sum of the heat transfer from each volume element to the ambient, and for a given geometry can be determined using the relation given below.

$$Q_{fin} = \sum_{m=0}^{M-1} Q_{element,m} = \sum_{m=0}^{M-1} hA_{conv,m}(T_m - T_{\infty}) \quad (14)$$

**Step VII: Fin efficiency**

The fin efficiency is determined from the following relation.

$$\eta_{fin} = \frac{Q_{fin}}{Q_{max}} \quad (15)$$

$$Q_{max} = hA_{fin,total}(T_0 - T_{\infty}) \quad (16)$$

Applying the above algorithm a program was developed in MATLAB and validated using several examples cited from reference sources. A complete solution as presented by the program is demonstrated with the help of a triangular problem fin. Analysis of Heat Transfer from Fins Finite difference modelling of various fin geometries was presented in previous Chapter. Based on the models developed examples are presented in this Chapter to demonstrate the effectiveness of finite difference method in the analysis of heat transfer from fins.

**Examples: Triangular Fin**

**Problem:** An aluminium alloy fin ( $k=180$  W/mK) of triangular cross section with length  $L = 5$  cm, base thickness  $b = 1$  cm, and very large width  $w$  is to be considered. The base of the fin is maintained at a temperature of  $T_0 = 200^\circ\text{C}$ . The fin is losing heat to the surrounding medium at  $T_{\infty} = 25^\circ\text{C}$  with a heat transfer coefficient of  $h = 15$  W/m<sup>2</sup>K. Using the

finite difference method with six equally spaced nodes along the fin in the x-direction, determine the temperature at the nodes.

**Solution:**

**Input Parameters**

Thermal Properties

Thermal Conductivity,  $k = 180 \text{ W/mK}$

Convective Heat Transfer Coefficient,  $h = 15 \text{ W/m}^2\text{K}$

Fin Geometry

Length,  $L = 5 \text{ cm}$ , Thickness,  $b = 1 \text{ cm}$ , Width,  $w = 1 \text{ m}$  14

Environment Conditions

Ambient Temperature,  $T_\infty = 25^\circ\text{C}$ , Fin Base Temperature,  $T_0 = 200^\circ\text{C}$

The result given by the MATLAB Program

-0.0004

<b>Finite Difference Equations:</b>					<b>Temperature at Nodes:</b>
-144.1507	63.0000	0	0	0	198.4198
63.0000	-108.1507	45.0000	0	0	196.8031
0	45.0000	-72.1507	27.0000	0	195.1152
0	0	27.0000	-36.1507	9.0000	193.2519
0	0	0	9.0000	-9.1500	190.4802
1.0e+04 *					
-1.6204					
-0.0004					
-0.0004					
-0.0004					

**Examples: Pin Fin**

A cylindrical aluminium fin with adiabatic tip is attached to a wall with surface temperature of  $300^\circ\text{C}$ , and is exposed to ambient air condition of  $15^\circ\text{C}$  with convection heat transfer coefficient of  $150 \text{ W/m}^2\text{K}$ . The fin has a uniform cross section with diameter of  $1 \text{ cm}$ , length of  $5 \text{ cm}$  and thermal conductivity of  $237 \text{ W/mK}$ . Assume steady one-dimensional heat transfer along the fin and the nodal spacing to be uniformly  $10 \text{ mm}$ . Determine the nodal temperatures.

**Solution by MATLAB Program:**

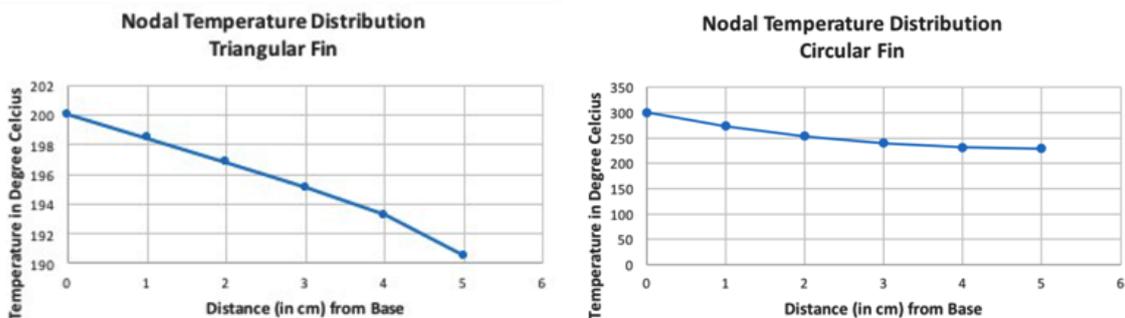
**Finite Difference Equations:**

**Temperature at Nodes:**

-2.0253	1.0000	0	0	0	273.5353
1.0000	-2.0253	1.0000	0	0	253.6157
0	1.0000	-2.0253	1.0000	0	239.7371
0	0	1.0000	-2.0253	1.0000	231.5480
0	0	0	1.8614	-1.8850	228.8412

**7. Results and Discussion**

Multi-dimensional heat transfer problems can be approached in a number of ways. Analytical approach using the Laplace equation involves finding the solutions of differential equations. The analysis can get quite complex depending on boundary conditions, often involving advanced mathematics using Bessel functions, Fourier series and other special functions. A more practical approach is the use of numerical methods. The finite difference method seems to provide a good approach as using this method a student can model fairly complex problems with a variety of boundary conditions using any software for programming. With the help of FDM method one triangular problem fin and a circular problem fin were examine and result is presented. The results are in complete agreement with the analytical solution. Nodal temperature distribution of Triangular Fin is shown in Fig. Nodal temperature distribution of Circular Fin is shown in Figure 5: Nodal Temperature Distribution Fig. 3



**Figure [3]** Nodal Temperature Distribution Triangular and Circular Fin

**8. Conclusion**

With the help of the FDM concept any thermal system can be modelled by applying the energy balance equation on volume element of the specified node. The FDM method was used to model three different geometries viz. rectangular, triangular and circular. A program was written in MATLAB based on the mathematical models. F: Nodal Temperature Distribution developed in Chapter 3. The program can be used to analyse heat transfer performance of \_ns having circular, triangular or rectangular cross sections. Several examples cited from reference sources are presented for validation of the program. With the help of the program heat transfer analysis of fins can be carried out with greater degree of confidence.

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# HYDRODYNAMIC AND HEAT TRANSFER STUDY IN A CHANNEL WITH BAFFLE

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## ABSTRACT

*The research work has been conducted numerically to assess heat transfer and friction loss behaviors of steady incompressible turbulent flow of air through in a three-dimensional rectangular-channel in which baffles are arranged in staggered way on two opposite channel walls. The governing equations, namely, continuity, Navier–Stokes and energy, based on  $k$ – $\epsilon$  turbulence model to describe the turbulence phenomenon are solved using the finite volume method and the SIMPLE algorithm have been conducted for the fluid flow in terms of Reynolds numbers ranging from 20000 to 60000. Effects of different baffle heights and number of baffles on heat transfer and flow behaviors in the channel are examined Parameters varied are no of baffles and Reynolds number ( $Re$ ). The axial velocity profiles, the velocity fields, the average coefficient of friction and the Nusselt number distribution were obtained for all the geometry considered. The results shows that the baffle provides the drastic increase in Nusselt number, friction factor values over the smooth wall channel due to better flow mixing from the formation of vortex flows generated by the baffle. In addition, substantial increases in Nusselt number and friction factor values are found for the rise in blockage ratio and/or for the increase in number of baffles.*

**Keywords:** Rectangular channel, hydrodynamic effect, friction factor, enhanced the heat transfer, turbulent flow.

## 1. Introduction

Nowadays very limited amount of non conventional energy sources are available, hence the cost of the energy sources are very high. So we require using energy source efficiently. For decades, many engineering techniques have been developed for increasing the rate of convective heat transfer from the channel surface. Baffle plates play an important role in the dynamics of the flow through shell-and-tube heat exchangers air-cooled solar collectors, and internally cooled turbine blades. The reason of this may be that the use of rib/baffles completely makes the change of the flow field and thus the distribution of the local heat transfer coefficient. The rib/ baffles increase the degree of heat transfer coefficients and restart the boundary layer after flow reattachment between rib/baffles. Although heat transfer is increased through the rib/baffle arrangement, the pressure drop of the channel flow is also increase due to the decrease flow area effects. Therefore, the channel aspect ratio (AR), blockage ratio (b/B), Number of baffles and baffle arrangement are all parameters are important for both the heat transfer coefficient and the overall thermal performance. Techniques used for present work is passive techniques, because in active technique blower and vibration consume extra energy.

Recently, many investigations have been focused on the heat transfer in a channel with baffles.

Maximum number of research work has been done on the baffles arranged either parallel with the flow passage or perpendicular to it. The first work was conducted by Patankar et al.(1) investigated numerically of flow and heat transfer characteristics in a duct with the concept of periodically fully developed flow conditions. Tsay et al. (2) numerically investigated the heat transfer enhancement on a vertical baffle in backward facing step flow channel. the effect of the baffle height, thickness and the distance between the baffle and the backward facing step on the flow was

studied. They found that an insertion of a baffle into the flow could increase the average Nusselt number by 190%. They also observed that the flow conditions and heat transfer characteristics are strong function of the baffle position. Bazdid-Tehrani and Naderi-Abadi (3) have been presented a numerical solution for the fluid flow and heat transfer in a duct with in line baffles and reported that the heat transfer behavior of this type of baffles is somewhat inefficient for large values of the blockage ratio. Mousavi and Hooman (4) investigated numerically of Laminar fluid flow and heat transfer in the entrance region of a two dimensional horizontal channel with isothermal walls and with staggered baffles. Data for heat and fluid flow as well as pressure drop are presented for Reynolds numbers ranging from 50 to 500 and baffle heights between 0 and 0.75. It has been observed that increasing the two parameters (blockage ratio and Reynolds number) will increase the Nusselt number, as expected. The results are reported for the thermal entrance region with 16 baffles. Prandtl number may vary from 0.35 to 10. Saim and Benzenine (5) investigated numerically of momentum and heat transfer characteristics with steady incompressible turbulent flow of air through channel. Reynolds number ranging between 12,000 and 38,000, the local and average coefficient of friction and the Nusselt number distribution were obtained for all the geometry considered and between the two inclined baffles and Suggest that the use of the inclined baffles induced with an improvement on the friction factor and the heat transfer intensity. Habib et al. (6) reported the characteristics of turbulent flow and heat transfer inside the periodic cell formed between segmented baffles staggered in a rectangular duct and pointed out that the pressure drop increases with the baffle height.

The present work is to study numerically of hydrodynamic as well as heat transfer study in a rectangular channel with baffles at turbulent fluid flow condition. Reynolds number vary from 20000-60000. Numerical study on blockage ratio and variation in number of baffles ( $n=3, 4$ ) at same aspect ratio ( $B/L=0.5$ ). Air is used as a working medium. Numerical result of friction factor and Nusselt number has been validated with Blasius and Dittus-Boelter correlations respectively.

## 2. Mathematical description

### 2.1 Numerical method

Three-dimensional turbulent force convection flow in a rectangular channel with baffles which is heated continuously at side wall is numerically simulated. The numerical simulations have been carried out using ANSYS-14.0 CFD Software package Fluent-6.3 version that uses the finite-volume method to solve the governing equations. Geometry has been created for air flowing in a one sided wall heated aluminum channel. Meshing has been created in ANSYS model with rectangular shapes. In this study Reynolds number varies between 20000 - 60000.

In this numerical simulation following boundary conditions are used as:

- The flow is three-dimensional and incompressible fluid flow.
- It is assumed that all external and baffle boundaries are stationary.
- The working medium is Air.
- The flow is assumed to be steady and turbulent.
- At the outlet, outlet pressure is equivalent to the atmospheric pressure.
- Body forces and viscous dissipation are ignored.

Based on the above assumptions, the following governing equations used to solve the incompressible, steady and turbulent fluid flow and heat transfer in the three dimensional computational channel are given as:

Continuity

$$\frac{\partial(\rho \cdot u_i)}{\partial x_i} = 0 \quad (1)$$

Momentum

$$\frac{\partial(\rho u_i u_j)}{\partial x_i} = -\frac{\partial p}{\partial x_i} + \frac{\partial}{\partial x_j} \left[ \mu \left( \frac{\partial u_i}{\partial x_j} + \frac{\partial u_j}{\partial x_i} \right) \right] \quad (2)$$

Energy equation

$$\frac{\partial}{\partial x_i} (\rho u_i T) = \frac{\partial}{\partial x_j} \left( \alpha \frac{\partial T}{\partial x_j} \right) \quad (3)$$

Where  $\alpha$  is thermal diffusivity and is given by

$$\alpha = \frac{\nu}{Pr} \quad (4)$$

$\nu$  = kinematic viscosity

Inlet temperature of air is 300K and Prandtl number (Pr) is 0.75 for present numerical investigation. The physical properties of the air have been assumed to remain constant at mean temperature. The physical properties of the air have been assumed to remain constant at mean temperature. One side of channel wall is heated at 330K. Velocity inlet has been given for five different Reynolds number.

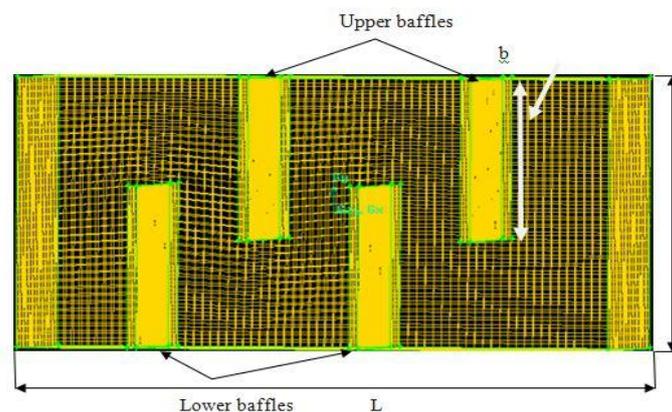


Fig -1 Channel geometry for computational study

The solutions were considered to be converged when the normalized residual values were less than  $10^{-5}$  for all variables but less than  $10^{-6}$  only for the energy equation. The first baffle is attached to the upper wall of the channel at distance of 6cm and the second inserted to the lower wall at 12.5cm from the entrance.

## 2.2 Non-dimensional parameter

Three parameters of interest in the present work are the Reynolds number, friction factor and Nusselt number. The Reynolds number is defined as

$$Re = \frac{\rho v D_f}{\mu} \quad (5)$$

The friction factor,  $f$  is computed by

$$f = \frac{2\tau_w}{\rho v^2} \quad (6)$$

$\tau_w$  = wall shear stress and value of  $\tau_w$  has been given by fluent.

The heat transfer is measured by local Nusselt number which can be written as

$$Nu_x = \frac{h_x L}{k} \quad (7)$$

The average Nusselt number can be calculated by

$$Nu = \frac{1}{L} \int Nu_x \partial x \quad (8)$$

### 3. Grid Independency Test and Validation

#### 3.1 Grid independence test

While changing the number grids a stage may come when the results are independent of the number of grids. These minimum number of grids after which there is no change in results were observed was known as optimum grid size and the results were independent of grids.

In the study, three different mesh sizes (80000, 125000 and 175000) are adopted in order to check the mesh independence. A detailed grid independence study has been performed, and results are obtained for the friction factor, wall shear stress, Nusselt number and pressure drop, but any considerable changes

was not obtained. Considerable percentage difference between the values of friction factor is less than  $\pm 5\%$  for same Reynold number. In the test, the variation in friction factor for the 4 baffles at Re 15000 is marginal when increasing the number of cells beyond 175000, hence there is no such advantage in increasing the number of cells beyond this value. The results are shown in Table 1

The grid size of 175000 was chosen to model accurately the fluid flow in this problem and for further study.

Table 1:- Grid independency test for Reynolds Number 15000 and velocity = 1.095 m/s.

Parameter	Grid Size		
	80000	125000	175000
Friction Factor	0.02814	0.02848	0.02927
Wall shear stress	0.02066	0.02091	0.0215

#### 3.2 Validation of smooth channel

Verification of the heat transfer and friction factor of the smooth channel with no baffle is performed by comparing with the exact solutions as shown in Fig (2). The present numerical smooth Rectangular channel result is found to be in excellent agreement with exact solution values obtained from the open literature for both the Nusselt number and the friction factor, less than  $\pm 5\%$  deviation. This provides a strong confidence in further investigation of the channel flow over the baffle.

The present numerical results on heat transfer and friction characteristics in a smooth wall channel are first validated in terms of Nusselt number and friction factor. The Nusselt number and friction factor obtained from the present smooth channel are, respectively, compared with the correlations of Dittus-Boelter and Blasius found in the open literature for turbulent flow in ducts.

Correlation of Dittus-Boelter,

$$Nu = 0.023 Re^0.8 Pr^0.4 \text{ for } Re \geq 10,000, \text{ heating} \quad (9)$$

Correlation of Blasius,

$$f = 0.316 Re^{-0.25} \text{ for } 3000 \leq Re < 20000 \quad (10)$$

Fig.(2) and (3) shows a comparison of friction factor and Nusselt number obtained from the present work with those from correlations. In the figures, the present results reasonably agree well within  $\pm 5\%$  for both friction factor correlation of Blasius and Nusselt number correlation of Dittus-Boelter, respectively. The present Nusselt number and friction factor for the smooth channel are correlated as follows:

$$Nu = 0.049 Re^{0.715} Pr^{0.4} \quad (11)$$

$$f = 0.344 Re^{-0.259} \quad (12)$$

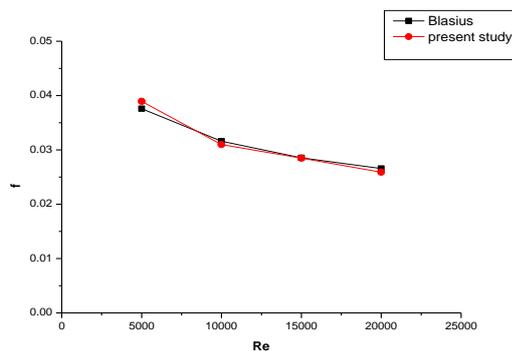


Fig. 2: Verification of friction factor for smooth channel.

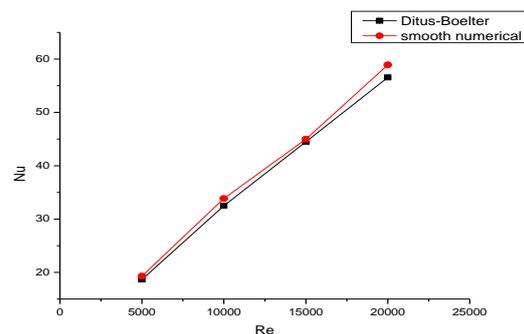


Fig. 3: Verification of Nusselt number for smooth channel.

## 4. Results and Discussion

The study is focused on influence of vertical baffles on the dynamic and thermal behavior of the system for higher Reynolds number. Velocity profiles, friction factors, Nusselt numbers and isotherms are presented in two parts as hydrodynamics and heat transfer.

### 4.1 Hydrodynamics

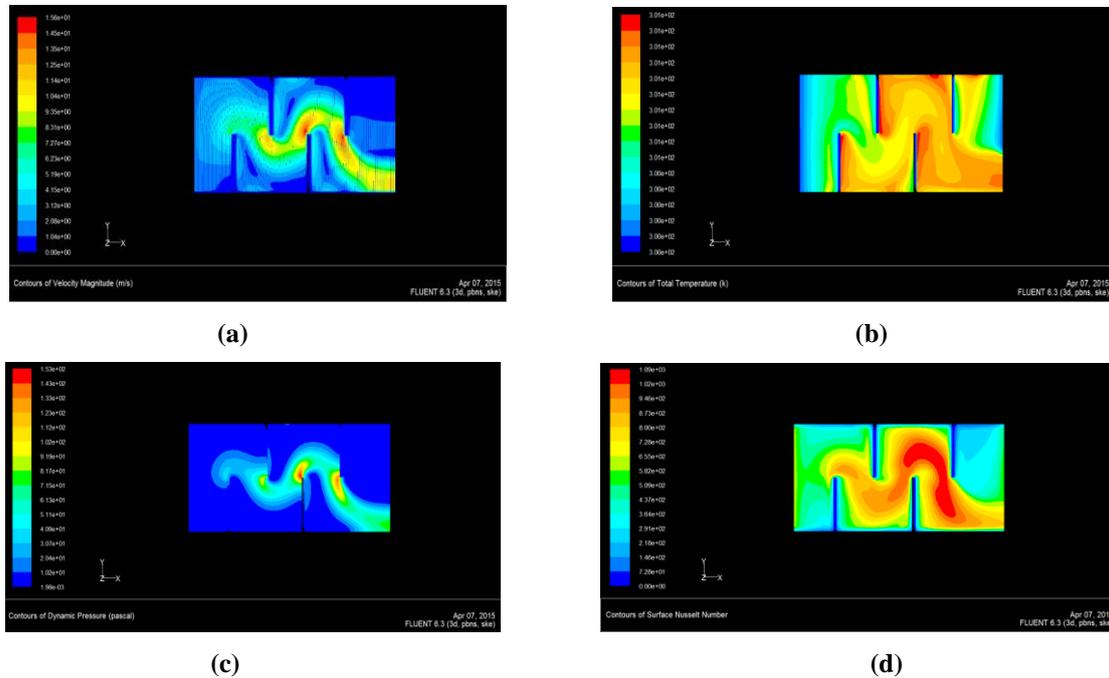
In this part we focus on pressure and velocity variation and effect on friction factor at same blockage ratio and variation in number of baffles.

The impact of the baffles on the flow structure of the near wall is presented in Fig.4(a-c) for 3 different parameters velocity variation Temperature variation and Dynamic pressure variation. As seen from the figure, a clockwise vortex is generated at the upstream region of the baffle. The dimensions of this vortexes are decreasing with increasing of

Reynolds number from  $Re = 20,000$  to  $60,000$ . Fluctuations between baffles and heated boundaries are increased with increasing of inlet fluid velocity.

In the upper part of the channel, velocities indicate the presence of the recirculation behind the first baffle. Its velocity is reduced in the upper part of the channel, while in the lower part is increased.

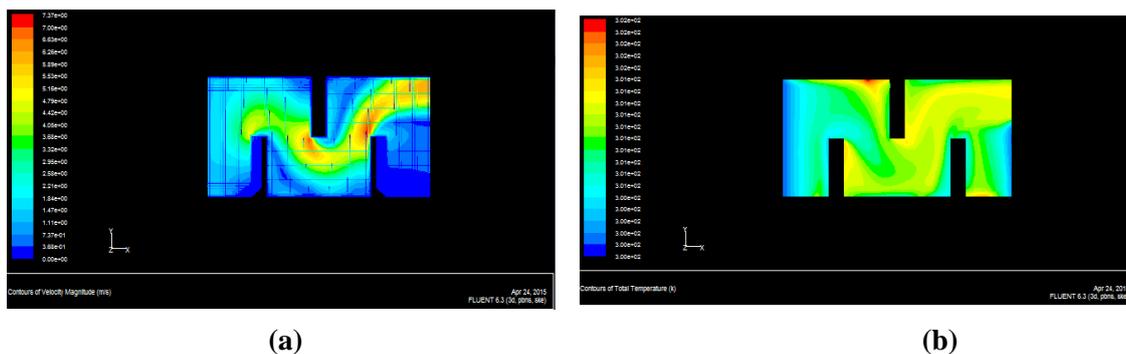
The effect of using the baffle on the isothermal pressure drop across the tested channel is presented in 4(c). The variation of the pressure drop is shown in terms of friction factor with Reynolds number. In the Fig5a, it is apparent that the use of baffle tabulators leads to a substantial increase in friction factor over the smooth channel.



**Fig 4 (a) Velocity, (b) Total Temperature, (c) Pressure,(d)Nusselt number profile for 4 baffles fitted in a channel with blockage ratio (b/B) =0.5 at velocity 1.37 m/s**

#### 4.2 Effect of Number of Baffles

The presence of the baffle in a channel affected the velocity field and also the pressure distribution in the whole domain, which is showing in the Fig. 4 (a-d). By placing of baffles is an important parameter to control heat transfer but the latter is concerned with the penalty in terms of friction coefficient, which leads to an increase in pressure drop. Effect of number of baffles has been shown in Fig 4 (a-d) and 5 (a-d) in which channel with 4 baffles generate more vortex comparison to channel with 3 baffles and causes more pressure drop and hence friction factor has been increases which has been show in Fig 6 (a). In channel with 4 baffles heat transfer has been increase compare to the channel with 3 baffles because of higher turbulent will be generated which has been shown in Fig 6 (b).



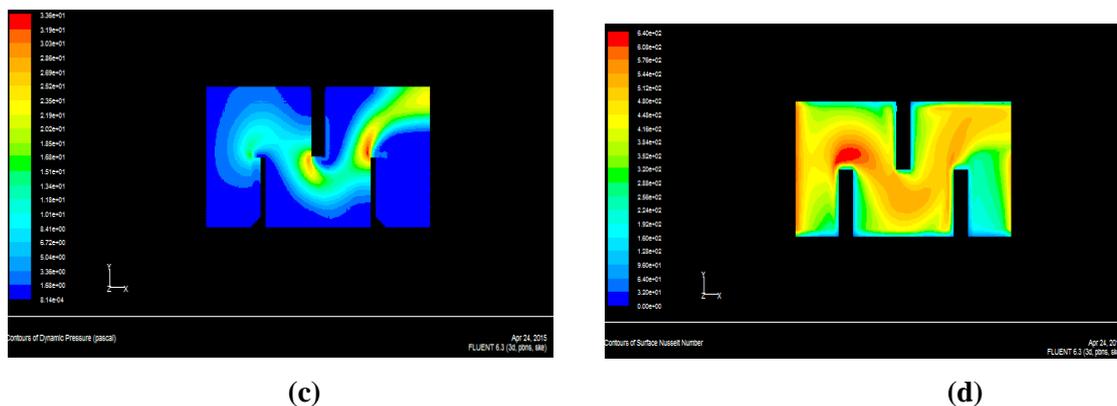


Fig 5 (a) Velocity, (b) Total Temperature, (c) Pressure,(d)Nusselt number profile for 3 baffles fitted in a channel with blockage ratio (b/B) =0.5 at velocity 1.37 m/s

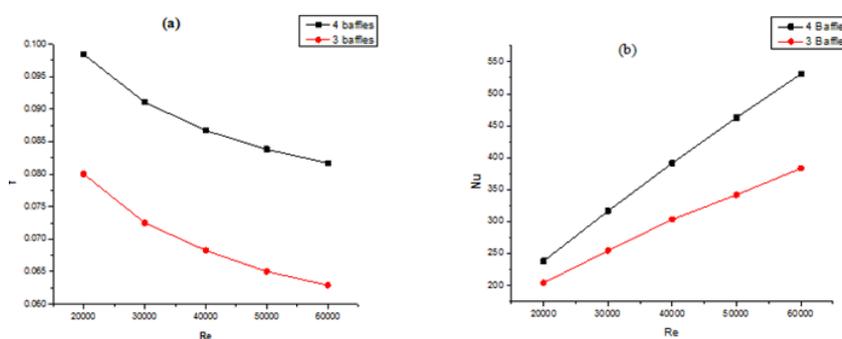


Fig.6. Variation between (a) Re and f and (b) Re and Nu with number of baffles for BR=0.5.

### 5. Conclusions

In general, Nusselt number increases whereas the friction factor decreases with an increase of Reynolds number. The values of Nusselt number and friction factor are substantially higher as compared to those obtained for smooth channel. This is due to distinct change in the fluid flow characteristics as a result of different baffle height that causes flow separations, and the generation of vortex flows. The major limitations of the present numerical study are that it is restricted to single value of Prandtl number such as Pr = 0.75. Numerical study has been carried out to investigate airflow friction and heat transfer characteristics in a low aspect ratio channel (AR=0.5) fitted with baffles in staggered way for the turbulent flow regime, Reynolds number of 20000 to 60,000. The Nusselt number augmentation tends to increase with the rise of Reynolds number in numerical result. The use of the more no of baffles causes a very high heat transfer and pressure drop increase as compared with less no of baffles used.

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# DESIGN AND OPTIMIZATION OF ROLLING MILL CHOCK

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## ABSTRACT

*Chocks for rolling mill application are small in capacity so the overall size of chock is very small and components are critical from manufacturing point of view. As these chocks are fitted in a rolling mill it should have minimum noise and vibration. It has been observed that more failure of rolling mill of this type is related to chock which make an entire failure of rolling mill assembly. There is a scope to improve a chock design both theoretically as well as using finite element analysis which will help manufacturer to minimize a failure rate of rolling mill and also maintain a function of minimum vibration level. Here the scope of work is to design, analysis and optimization of chocks whichever sustain maximum loading during operating condition and it will have a minimum stiffness. Modeling using solid works and analysis using ANSYS is done in order to generate a required data for calculation and to validate theoretical result.*

**Keywords:** *Rolling mill, roll chock, modeling, design, analysis and optimization.*

## 1. Introduction

Roll chocks which accommodate the roll neck bearing for the mill rolls are usually steel casting designed to fit into the window of the housing such they are intended to maintain accurate positioning of the rolls and in the case of backup roll chocks to transmit the rolling force from the housing to the rolls. Because of the larger size bearing they must accommodate, backup roll chocks are considerably larger than the work roll chocks, so much so that the latter are usually designed to fit inside the “wings” or projections of the former. To prevent appreciable moments of the chocks in the housing in a direction parallel to the roll axes, guides or adjusting plates, which are securely attached to the housing on the operator’s side only, are used. In this instance the guides are fitted with adjusting bolts which should be secured by nutshell bolts are not in direct contact with the chock with an abrasion rail placed in a groove of the chock block rail abuts against the guide with its ends lapped above and below so that it is not moved by any displacement of the chock. Henceforth chock does not slide on the adjusting bolts but on the abrasion rail, the guide abuts directly onto a chipping strip on the chock and is fastened to the housing by means of bolts. Fine adjustment can be achieved by adjusting screws. How the guides may be fitted to the housing.

## 2. Rolling Mill classification

Rolling mill is used to reduce successively the thickness of the metal strip as per the requirement. Hot rolling mills are used for mass thickness reduction at high temperatures, whereas the cold rolling mills are used as secondary rolling operations to attain more precise dimensional and mechanical properties. Rolling mills having single-stand type are generally operated as “reversing” mills, by which the strip is successively wound and unwound in coil form as it is

repeatedly passed back and forth through the mill. Reversing mills are usually used for smaller scale production of the specialty cold-rolled products. For high mass production we use tandem-type rolling mills, whereby the strip undergoes a single pass through a train of rolling stands before being wound into coil form. Among those rolling stand configurations, the 4-high variety is the most widely used – both in single-stand and multi-stand tandem mills. The 2-high mill consists of two working rolls only and no other supporting rolls are mainly used for “skin-pass” or temper rolling. Rolling mill configuration and four high stand of reversing cold mill are shown in figure 1 and 2 respectively.

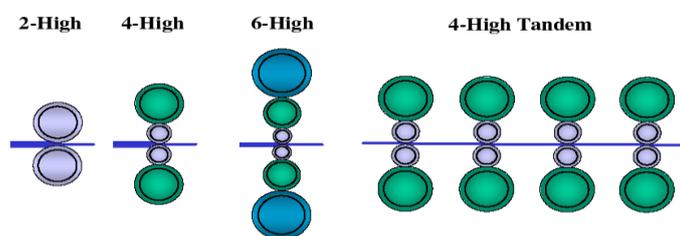


Figure [1] Rolling mill configuration

### 3. Types of Roll Chocks

The roll chocks are broadly categorized into 4 types which is shown in fig 3

1. Top Work Roll Chock
2. Bottom Work Roll Chock
3. Bottom Back Up Roll Chock

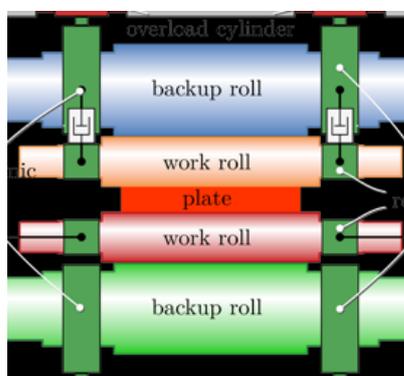


Figure [3] Roll chocks

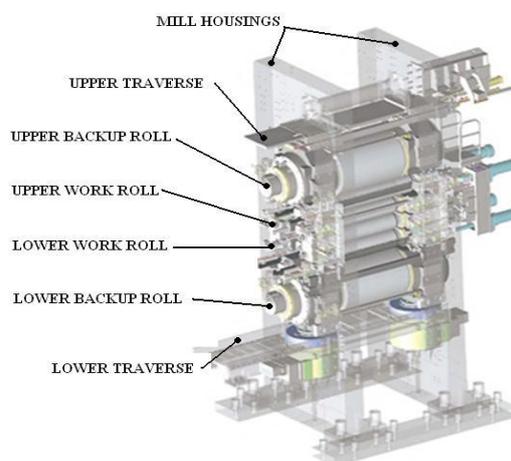


Figure [2] Four high stand of reversing cold mill

### 4. Design of chocks

The housing of a work roll or backup roll bearing is known as chock. Chock is mounted on the window of the housing between the posts with a small clearness in open bearing. The chock is usually a U-shaped frame of cast steel. In small mills when rolling is carried out with fixed pass setting the linings are usually mounted directly in the chock. In large mills where the roll is adjusted after each pass (blooming, primary, and plate mills), lining in boxes is mounted in the chocks. The lower roll chock is covered to prevent scale getting into the neck bearing, and to the lower part of the upper roll chock is fastened a support with an additional lining for holding up the top roll when the mill is idling. Housings are elements in a rolling mill that enclose and support the chock assemblies, the adjusting mechanism etc., and retain them in their proper positions. They set the rolls in correct vertical and horizontal position. Their construction and dimensions

have to take into account the sizes of various other elements. The forces, which act on the rolls during rolling, are completely transferred on to the housing. So, the housing of rolling stand requires high rigidity, sufficient strength for taking the loads, simplicity of design and minimum cost of production.

**4.1. Manufacturing Process and material used for roll chocks**

The original Roll Chocks are manufactured by fabricating from cast steel or gray cast iron. The cast iron from which such Roll Chocks are manufactured should contain carbon from 0.2% to 0.3%. In cast Iron Roll Chocks, minor welding repair is possible but major welding repair is not possible to these cast iron Roll Chocks because the major welding repair, large amount of welding material is required. Roll Chocks can also be made of steel casting but in this manufacturing process a great diligence and utmost care are required.

**4.2. Calculation of roll load and pressure acting on chocks**

The force on the frame is the force applied by the rolls. It can be calculated by the most commonly used T-selikov theory. The forces on the roll neck and in the housing posts are identical. The strength of the neck (with a constant relation between its diameter and length) is approximately proportional to  $d^2$ , Where  $d$  = diameter of roll neck bearing. For various mills, roll load depends on the roll material. The characteristics of various materials for rolls and roll load have been shown in Table 1 and 2.

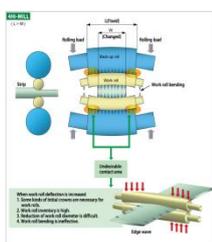
**Table [1] The structural properties of mild steel material**

Properties	Values
Young's modulus	2 e11 N/m <sup>2</sup>
Poisson ratio	0.266
Density	7860 kg/m <sup>3</sup>
Yield strength	2.5e8 N/m <sup>2</sup>

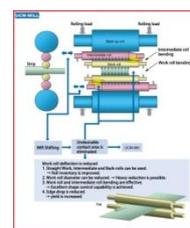
**Table [2] Roll load with material**

Material	Roll Load, N
Iron rolls	(0.6-0.8) d <sup>2</sup>
Carbon steel rolls	(0.8 to 1.0) d <sup>2</sup>
Chromium steel rolls	(1.0 to 1.2) d <sup>2</sup>

Forces acting 4 High Mill and forces acting on 4 High Mill with intermediate roll is shown in figure 4 and 5 respectively.



**Figure [4] Forces acting 4 High Mill**



**Figure [5] Forces acting on 4 High Mill with intermediate roll**

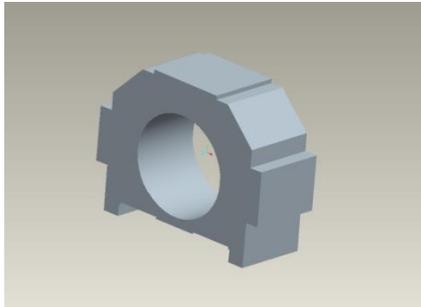
Let Working Pressure = 210 bar, Bore Dia = 400mm, Rod Dia = 350mm, Testing Pressure = 315 bar

Cylinder Force = P x A = 2637.6KN

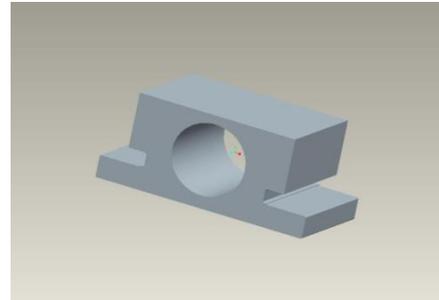
Pressure Acting on top backup chock, Bottom backup chock, Top Work roll Chock and Bottom Work roll Chock = Cylinder Force/( top backup chock, Bottom backup chock, Top Work roll Chock and Bottom Work roll Chock) Area = 19.53N/mm<sup>2</sup>, 8.04N/mm<sup>2</sup>, 13.7N/mm<sup>2</sup>, 10.4N/mm<sup>2</sup> respectively

### 5. Modal Analysis of Roll Chock

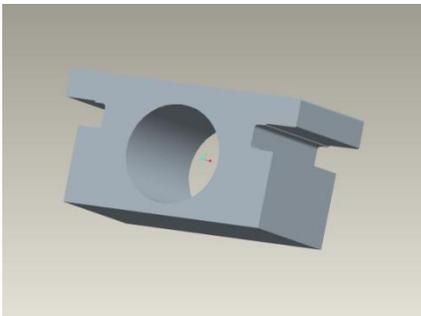
The Roll Chocks have been modeled in 3D Modeling Software “Solid Works” for better visualization and interference checking. 3D Models are also required for Structural Analysis and Optimization; therefore accurate modeling of Roll Chokes is required. 3D model of choks are shown in figure 6, 7, 8 and 9 respectively.



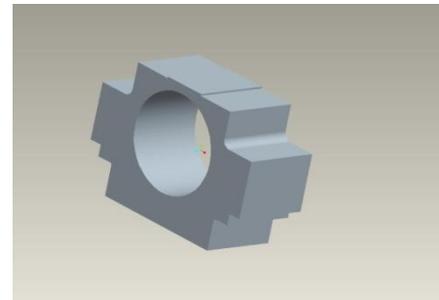
**Figure [6]** Top Back up Roll Chock



**Figure [7]** Bottom Work Roll Chock



**Figure [8]** Top Work Roll Chock



**Figure [9]** Bottom Back Up Roll Chock

#### 5.1 Material, Element and Constraints

Material Used – Fe 410

(a) Young’s Modulus – 200GPa (b) Poisson’s Ratio – 0.3

(a) Element Used – Solid 10 Node Tetrahedral (Solid 187) (b)Element Size – 30

The bottom surfaces of the Top Roll Choke were constrained as shown in figure 6.

The Von Misses Contour Plot for Top Roll Chock is shown in table 3 which gives the information about the Natural Frequency of the Top Roll Choke and to check if the natural frequency of the machine does not match the natural frequency of the Top Roll Choke to avoid resonance.

**Table [3] Von Misses Contour Plot for Top Roll Chock**

Mode	1	2	3	4	5	6	7	8	9	10
Frequency (Hz.)	7.0637	8.2337	13.896	24.336	27.757	28.28	29.517	30.709	40.672	43.793

## 6. Structural Analysis of Top Back up Roll Chock

### 6.1 Material

Material Used – Fe 410

- (a) Young's Modulus – 200GPa (b) Poisson's Ratio – 0.3

### 6.2 Element

- (a) Element Used – Solid 10 Node Tetrahedral (Solid 187)  
 (b) Element Size – The appropriate Element Size was found out by using an Initial Element Edge Length to be 50 and then gradually reducing Element Size until the Stress remained constant even if the Element Size reduced. Element Size vs. Deformation information is given in table 4

**Table [4] Element Size vs. Deformation**

Sr. No.	Element Size (mm)	Deformation (mm)
1	50	0.197729
2	35	0.198522
3	30	0.198749

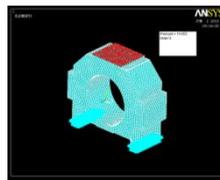
Therefore, Element Size 30 can be considered to be the ideal Element Size for the Following Analysis. Also, the Computer Available would require additional hardware to solve the number of equations for Element Size less than 30 is a constraint.

### 6.3 Forces

Forces acting on the top roll choke are the force of the hydraulic cylinder transferred through the bottom rolls through the material to be rolled and through the top work roll. Top Roll Choke is constrained at the top of the Rolling Mills by an adjustable Power Screw Mechanism. Reaction force is considered as the actual force acting on the choke and the bottom surfaces are considered to be constrained. Therefore, the cylinder pressure is converted to force and applied on the particular area.

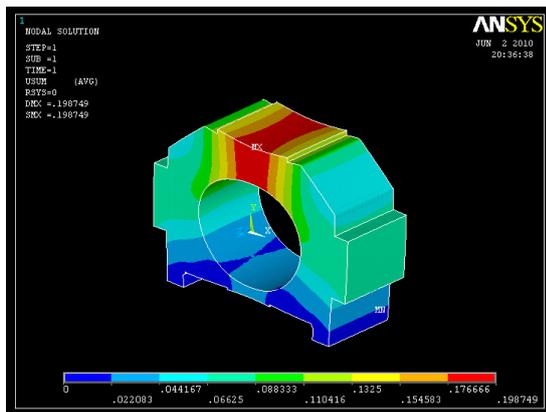
### 6.4 Constraint

The bottom surfaces of the Top Roll Choke were constrained as shown in figure 10

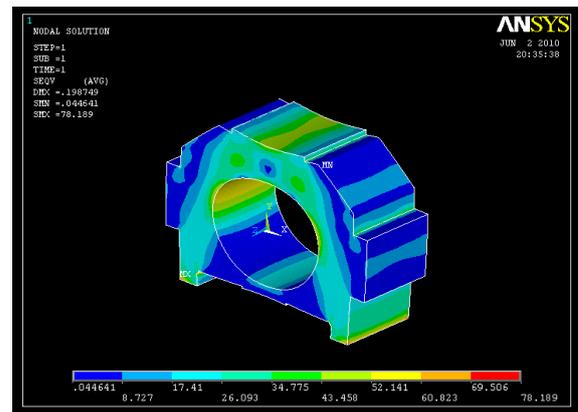


**Figure [10]** Meshing Diagram for Top Roll Chock

Total Deformation Contour Plot and Von Misses Contour Plot for Top Roll Chock are shown in figure 11 and 12.



**Figure [11]** Total Deformation Contour Plot for Top Roll Chock

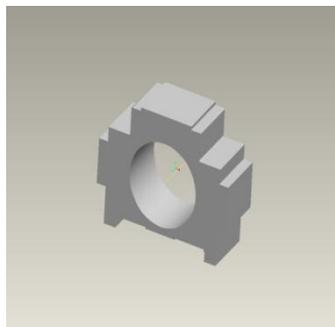


**Figure [12]** Von Misses Contour Plot for Top Roll Chock

## 7. Optimization of Top Back up Roll Chock

The primary Stress Contour Plots Obtained was observed and studied. The subsequent Iterations were carried out on the Roll Chock and a substantial weight reduction and thus cost savings was obtained by optimized to a smallest size with Stress Constraints, Bearing Size Constraints.

**7.1 Iteration 1:-** 3D Model of 1st Iteration, Deformation Contour of Ist Iteration and Von Misses Stress Contour of optimization of Top Back up Roll Chock are shown in figure 13, 14 and 15. Comparison of 1<sup>st</sup> Iteration and Existing Roll Chock is shown in table 5.



**Figure [13]** 3D Model of 1st Iteration of Optimization of Top Back up Roll Chock

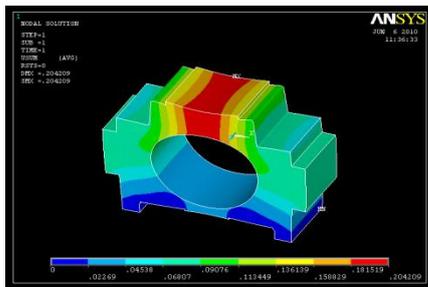


Figure [14] Deformation Contour of Ist Iteration of Optimization of Top Back up Roll Chock

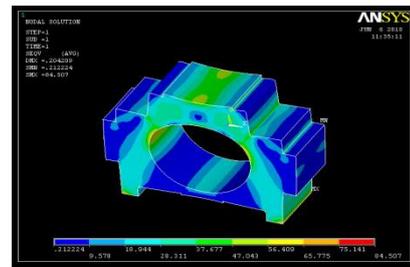


Figure [15] Von Misses Stress Contour of 1<sup>st</sup> Iteration of Optimization of Top Back up Roll Chock

Table [5] Comparison of 1<sup>st</sup> Iteration and Existing Roll Chock

Sr. No.	Item	Old	New
1	Weight	1816.49	<b>1693.79</b>
2	Deformation	0.198596	0.204209
3	Von Misses Stress	78.444	84.507

7.2 2<sup>nd</sup> Iteration

3D Model of 2<sup>nd</sup> Iteration, Deformation Contour of 2<sup>nd</sup> Iteration and Von Misses Stress Contour of optimization of Top Back up Roll Chock are shown in figure 16, 17 and 18. Comparison of 1<sup>st</sup> and 2<sup>nd</sup> Iteration and Existing Roll Chock is shown in table 6. Modes and their corresponding frequencies is shown in table 7.

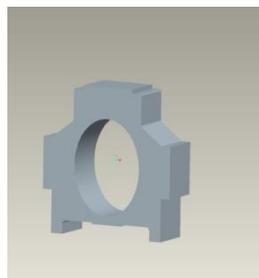


Figure [16] 3D Model of 2nd Iteration of Optimization of Top Back up Roll Chock

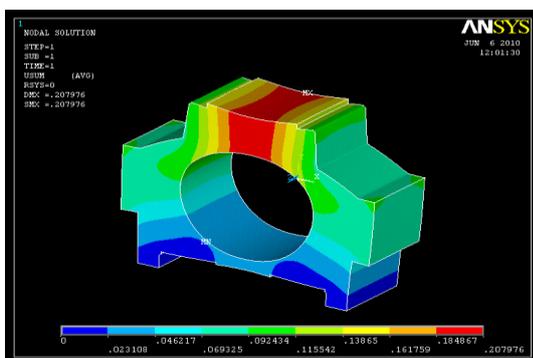


Figure [17] Deformation Contour of Ist Iteration of Optimization of Top Back up Roll Chock

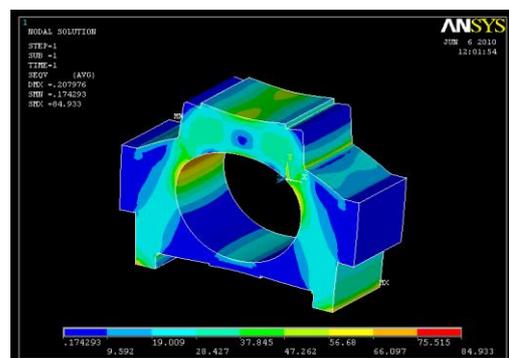


Figure [18] Von Misses Stress Contour of 2nd Iteration of Optimization of Top Back up Roll Chock

**Table [6] Comparison of 1st Iteration and 2<sup>nd</sup> Iteration Roll Chock**

Sr. No.	Item	1 <sup>st</sup> Iteration	2 <sup>nd</sup> Iteration
1	<b>Weight</b>	1693.79	<b>1633.4</b>
2	<b>Deformation</b>	0.204209	0.207976
3	<b>Von Misses Stress</b>	84.507	84.933

Thus a considerable weight saving is obtained as given below:-

Weight of Existing Roll Chock – 1816.49 kgs

Weight of Optimized Roll Chock - **1633.4 kgs**

Cost Savings – Wt. Reduced x Rs. 50 = 183.495 x 50 = **Rs. 9154.5**

**Table [7] Modes and their corresponding frequencies**

Mode	1	2	3	4	5	6	7	8	9	10
Frequency (Hz.)	7.5964	7.6924	15.71	22.976	24.667	29.02	29.047	32.248	37.795	43.152
Deformation (mm.)	0.0489 17	0.0357 99	0.0515 04	0.0506 9	0.0600 74	0.0434 98	0.0719 35	0.0383 19	0.0438 85	0.0770 78

As the deformation is very small compared to the size of the structure, static structural analysis is sufficient for the analysis of the Top Roll Chock

## 8. Conclusion

Finite element analysis of the actual chock model on the software shows that the chock of the machine experienced higher stresses at the place where the holding of work role and back role occur. In case if there is failure of chock occurs during the process of operation, we can design the new chock for rolling machine by improving the all over safety factor by using finite element methods. Optimization is technique to save the cost and time by giving more life to roll chock. The new chocks have good life compare to failure one and from that chock company daily saving.

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# EXPERIMENTAL INVESTIGATION OF EDM PROCESS PARAMETERS ON HIGH CARBON HIGH CHROMIUM STEEL WITH GRAPHITE

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## ABSTRACT

*Electrical spark machining is an advance machining process primarily used for hard metals which are not possible by conventional machine. In die Sinking EDM process, two metal parts are submerged in an insulating liquid and are connected to a source of current which is switched on and off automatically. The analysis of process parameters on responses has been done by conducting a set of experiments on high carbon-chromium steel with graphite as tool electrodes and high carbon oil as the dielectric medium. Central composite design was used for conducting the experiment and developing empirical models for MRR, surface roughness and EWR with the help of Minitab software. Pulse on time is most significant factor over other machining parameters for electrode wear rate with graphite tool.*

**Keywords:** *Electro Discharge Machining (EDM) process, Electrode Wear Rate (EWR), Material Removal Rate (MRR), Machining, Surface Roughness.*

## 1.Introduction

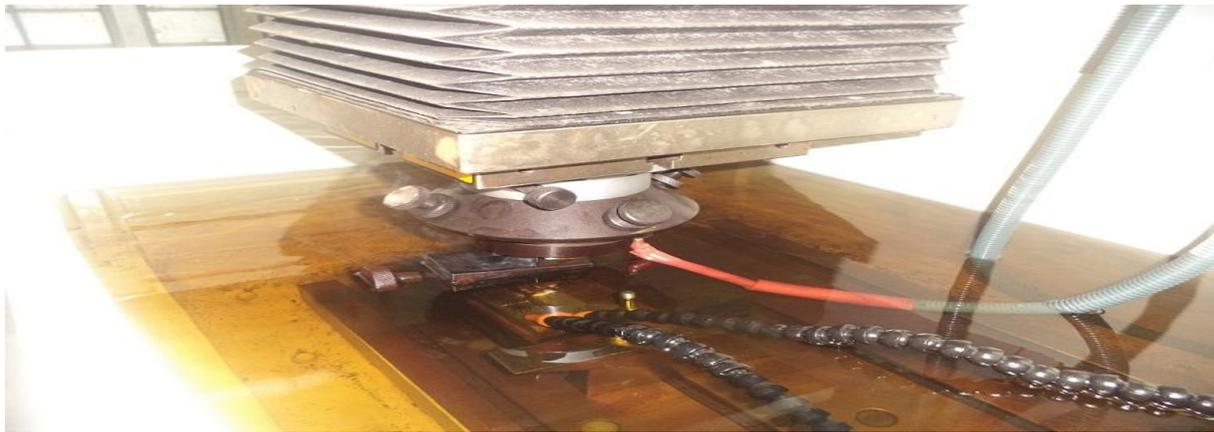
Electro-Discharge Machining (EDM) is an electro-thermal non-conventional machining Process, in which electrical energy is used to create electrical spark between two electrode and material removal mainly occurs by applied number series electrical discharge between work piece and tool [1,2].Sameh S. Habib is discussed comprehensive mathematical model for correlating the interactive and higher order influences of various electrical discharge machining parameters through response surface methodology (RSM), using relevant experimental data as obtained through experimentation. The proposed models have been tested for accuracy through the analysis of variance (ANOVA) [2].S. Assarzadeh, M. Ghoreishi developed a model and optimize process parameters in Electro-Discharge Machining (EDM) of tungsten carbide-cobalt composite (ISO grade: K10) using cylindrical copper tool electrodes in planning machining mode based on statistical techniques [3]. Neeraj Sharma, Rajesh Khanna, Rahuldev Gupta are study is to investigate the effect of parameters on metal removal rate for WEDM using HSLA as work-piece and brass wire as electrode for machining. HSLA used in cranes, trucks, bridges, roller coasters cars and other structures that are designed to handle large amounts of stress. In this work it is observed that metal removal rate and surface roughness increases with increase in pulse on time and peak current. Wire mechanical tension has no significant effect on surface roughness and metal removal rate [4].P. Kuppan & A. Rajadurai & S. Narayanan show the experimental investigation of small deep hole drilling of Inconel 718 using the EDM process. Some parameters such a pulse on-time, peak current, duty factor and electrode speed were chosen to study the characteristics of machining [5].Kuntal Maji and Dilip Kumar P ratihar was attempt made to model input-output relationships of an electrical discharge machining process based on the experimental data (collected according to a central composite design) using multiple regression analysis [6]. In this work, the study is focused on the studied of process parameters on responses of die-sinking EDM of high carbon high chromium steel by using Graphite

electrodes. This was done using the techniques of surface response methodology (CCD) for conducting series of experiment and analysis of variance (ANOVA) has been done for analysis the data with the help of Minitab.

## 2.Experimental detail

### 2.1 Experimental Set-Up

This experimental work was done on die-sinking Electric Discharge Machine at MANIT Bhopal, with constant servo-head and tool electrode used as a positive polarity and work piece used as a negative polarity during experimental time. High carbon EDM oil was used as dielectric medium. Discharge current was allowed in various steps in positive mode of terminal between two electrodes.



**Fig.2.1 Experimental setup**

### 2.2 Work Piece Selection

EDM are allow to machining of hard material component such as heat treated tool steels, composites, super alloys, ceramics, carbides and heat resistant steels. EDM are mostly used the higher carbon grades for such applications as stamping dies, metal cutting tools, etc. High carbon high chromium steel is taken as a work piece in this experiment. Steel material is a pre heated very slowly high tensile tool steel which offers ready machine ability in the hardened and tempered condition, therefore further heat treatment is not require. Fig 2.2 shows the work piece material in this work.



**Fig. 2.2 Work Piece**

**Table – 2.1 Chemical composition of high carbon high chromium steel (%) [7]**

C	Mn	Si	Co	Cr	Mo	V	P	Ni	Cu	S
1.4-1.6	0.60	0.60	1.0	11.00-13.00	7.00-1.20	1.10	0.03	0.30	0.25	0.03

**Table –2.2 Process Parameters and Theirs Levels**

Parameters (unit)	Notation	Levels /coded				
		-2	-1	0	1	2
Pulse on time (µs)	Ton	100	825	1550	2275	300
Duty cycle (%)	Dc	1	8.75	16.5	24.25	32
Current (amp.)	Ip	5	16.25	27.5	38.75	50
Voltage gap (volt)	Vg	10	37.5	65	92.5	120
Pressure (N)	F	0.1	0.2	0.3	0.4	0.5

### 3.Results And Discussion

In this study, model as well as experimental results of the responses have been analysed. Model analysis of the MRR, EWR and surface roughness was carried out in a line with the behaviour of the machining parameters on the responses. The analysis of variance is carried out on all the fitted models for a confidence level of 95%.

#### 3.1 Material Removal Rate (Mrr):

Model fitted for material removal rate is represented by this equation and its variance analysis is given in Table 3.1

$$\text{MRR} = 63.54 - 0.03*\text{Ton} - 4.79*\text{dc} + 1.76*\text{amp} + 1.93*\text{Vg} - 133.92*\text{press} + 0.95*\text{Ton}*\text{press} + 0.04*\text{dc}*\text{amp} - 7.1399*\text{dc}*\text{press} + 2.1922*\text{amp}*\text{Vg} + 0.97*\text{amp}*\text{press} - 4.30*\text{Vg}*\text{press}$$

Table – 3.1 ANOVA for MRR using graphite

Source	DF	Seq SS	Adj SS	Adj MS	F	P
Regression	15	8651.6	8652	576.8	0.69	0.059
Linear	5	982.6	4296	859.8	1.03	0.432
Interaction	10	7668.9	7669	766.9	0.92	0.039
Residual Error	16	13327.8	13328	833.0	2.37	0.175
Lack of fit	11	11186.0	11186	1016.9		
Pure Error	5	2141.8	2142	428.4		
Total	31	21979.3				

$$R\text{-sq} = 76.89\% , R\text{-sq (adj)} = 67.50$$

As per ANOVA results, Linear interaction fitted model is best fitted model for material removal rate using graphite tool because corresponding to that model P value is very low .The "Lack of Fit F-value" of 1016.9 implies that the lack of fit is significant relative to the pure error. It is not good for model because lack of fit is significant means there are such type of input process parameters which is much affected of model.

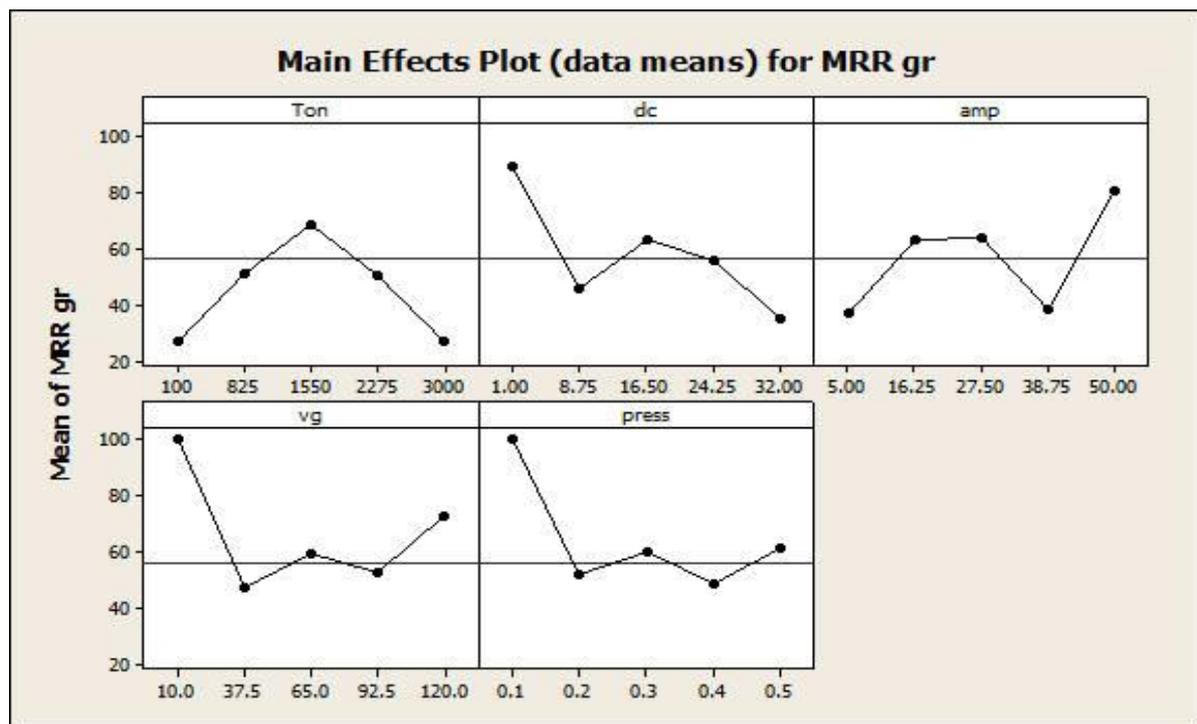


Fig.3.1 Main Effects Plot For MRR Gr

Figure 3.1 show the effect of pulse on time ( $T_{on}$ ), duty cycle (dc), discharge current ( $I_d$ ), voltage gap ( $V_g$ ) and pressure on material removal rate using graphite as a tool electrode. First graph in this figure show the effect of pulse on time on MRR, so from first graph I can say that first of all MRR increase with pulse on time up to 1550 after than decrease the MRR with increase the pulse on time to 3000. Second graph of this figure represent the effect of duty cycle on MRR and in this case material removal decrease up-to 1.0 to 8.75 after than it increase between 8.75 -16.50 and then finally decrease up to final point. Third graph is show discharge current on MRR, first of all increase the MRR with discharge current up to 16.25 after then approximately constant from 16.25 to 27.50 than decrease the MRR to 38.75 and finally

increase the material removal rate throughout. Graph fourth and fifth show the variation of voltage gap and pressure on material removal rate respectively and these two process parameters are affected in same nature on material removal rate (MRR).

**3.2 Surface Roughness:**

Model fitted for surface roughness is represented this equation and its variance analysis is given in Table 3.2

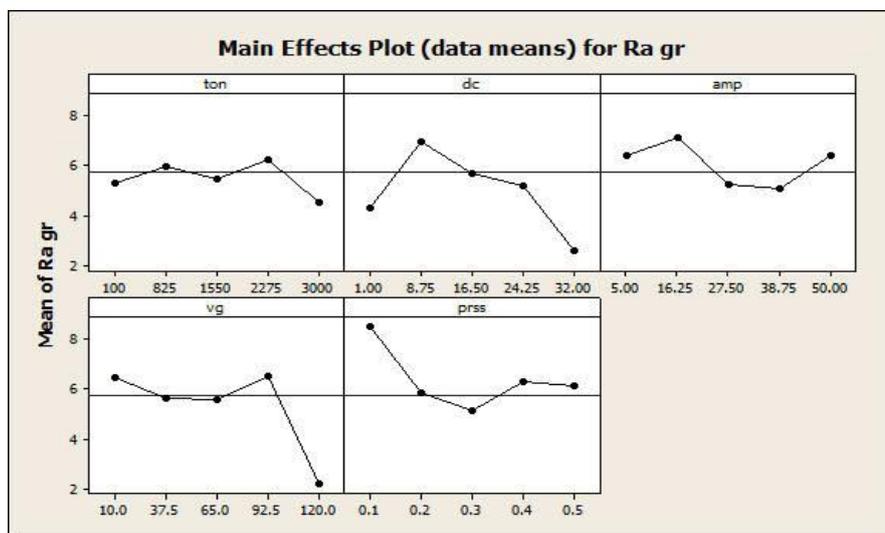
$$Ra = 5.26 + 0.5861*dc - 0.15*amp + 0.02*Vg - 3.86*press - 0.0012*ton*press + 0.02*dc*amp - 2.4452*dc*press - 0.7711*amp*press + 0.49*Vg*press$$

**Table – 3.2 ANOVA for Surface Roughness gr**

Source	DF	Seq SS	Adj SS	Adj MS	F	P
Regression	20	224.02	224.02	11.201	2.74	0.44
Linear	5	23.97	12.90	2.580	0.63	0.68
Square	5	20.09	20.09	4.018	0.98	0.47
Interaction	10	179.96	179.96	17.996	4.40	0.011
Residual Error	11	44.95	44.95	4.087		
Lack of fit	6	26.56	26.56	4.427	1.2	0.429
Pure Error	5	18.39	18.39	3.678		
Total	31	268.98				

R-Sq = 83.3% R-Sq(adj) = 52.9%

According to ANOVA results, Linear interaction fitted model is best fitted model for material removal rate using graphite tool because corresponding to that model P value is very low .The "Lack of Fit F-value" of 4.427 implies that the lack of fit is not significant relative to the pure error. It is good for model because lack of fit is not significant means there are no such type of input process parameters which is much affected of model.



**Fig.3.2 Main Effect Plot For Ra Gr**

Figure 3.2 represent the effects of various process parameters such as pulse on time, duty cycle, discharge current, voltage gap and pressure on surface roughness using graphite as a tool electrode. From the figure I can say that pulse on time is not much affected throughout. Second graph of this figure represent the effect duty cycle on surface roughness, third, fourth, fifth graph in this figure are represents the variation of discharge current, voltage gap and pressure on surface roughness using graphite as a tool electrode. From this figure it is clear that duty cycle and pressure are most influencing parameters for surface roughness.

### 3.3 ELECTRODE WEAR RATE (EWR)

Model fitted for surface roughness is represented this equation and its variance analysis is given in Table 3.3

$$\text{EWR} = 1.64 - 0.22 \cdot \text{dc} + 0.06 \cdot \text{amp} + 0.10 \cdot \text{Vg} - 7.81 \cdot \text{press} + 0.79 \cdot \text{dc} \cdot \text{press} + 0.02 \cdot \text{amp} \cdot \text{press} - 0.02 \cdot \text{Vg} \cdot \text{press}$$

ANOVA based sequential sum of squares test was carried out to select the most appropriate model to be fitted MRR. Experimental result is shown in Table 4.11. Linear, two factor interaction; quadratic and cubic models were compared to see if addition of extra terms improved the fitting as indicated by the F value in the Fischer's F test [17]. With the help The F probability distribution curve, I can convert F value into P value. Significance model can be tested either by comparing the F value to a threshold F value or by comparing the corresponding p value to the threshold p value respectively to corresponding terms. P value depends on the confident level which was set here to 95%. In table 4.1.1 P value of linear model is very low as comparison to other model such as square and interaction hence linear model is best fitted model for material removal rate using copper electrode. If P value is less than 0.01 then corresponding to these factor are much significant and if P value vary between 0.01to 0.05 then it is significant factor and above the 0.05 of P value no significant factor.

**Table – 3.3 ANOVA for EWR**

Source	DF	Seq SS	Adj SS	Adj MS	F	P
Regression	15	23.028	23.03	1.535	0.51	0.068
Linear	5	1.534	10.15	2.030	0.68	0.048
Interaction	10	21.494	21.49	2.149	0.72	0.099
Residual Error	16	48.034	48.04	3.002		
Lack of fit	11	36.456	36.64	3.134	1.43	0.364
Pure Error	5	11.579	11.58	2.316		
Total	31	71.063				

$$R\text{-Sq} = 83.3\% \quad R\text{-Sq}(\text{adj}) = 52.9\%$$

Linear fitted model is best fitted model for electrode wear rate using graphite tool because corresponding to that model P value is very low .The "Lack of Fit F-value" of 3.134 implies that the lack of fit is not significant relative to pure error. It is good for model as lack of fit is significant means there are type of input process parameters which is much affected of model.

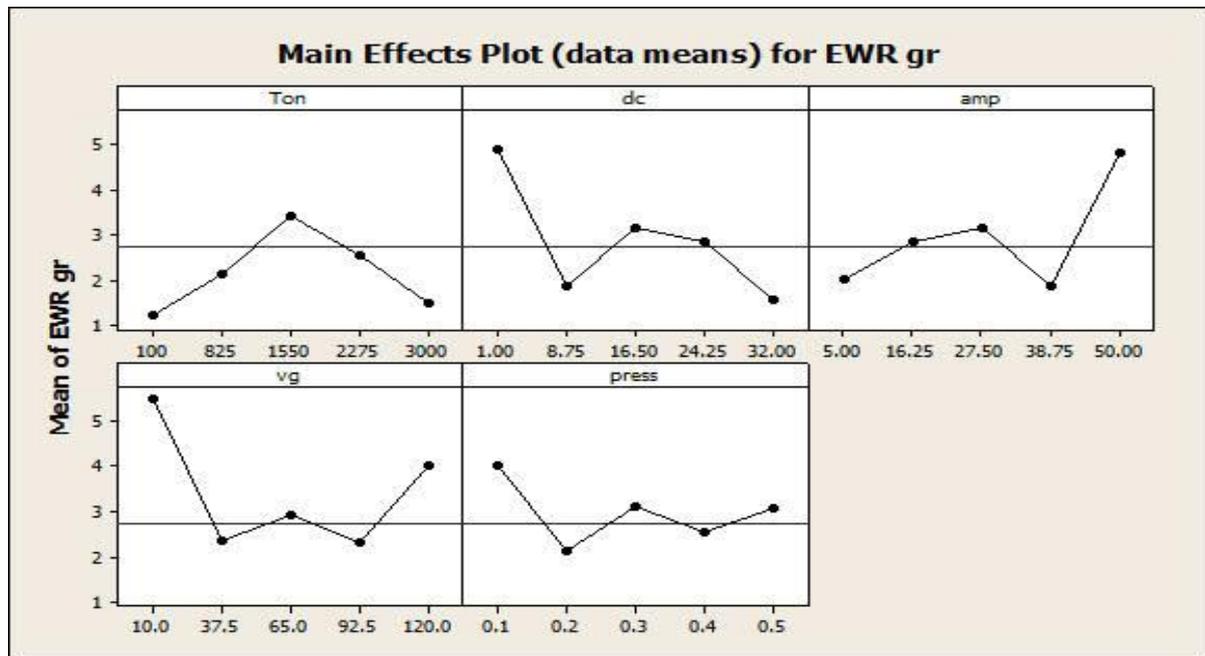


Fig 3.3 Main Effects Plot for EWR

Figure 3.3 represent the main effects of pulse on time, duty cycle, discharge current, voltage gap and pressure on electrode wear rate (EWR) using graphite as a tool electrode. First graph of this figure is show the variation of pulse on time on EWR, start with increase the electrode wear rate with pulse on time up to 1550 after than decrease from 1550 to 3000. Second graph is show the variation of duty cycle on EWR, in this case EWR decrease up to 8.75 then increase from 8.75 to 16.50 after then slightly decrease the electrode wear rate. In third graph electrode wear rate is increase up to 37.5 after then decrease from 27.50 to 38.50 and then finally increased. In fourth graph is show the variation of voltage gap on electrode wear rate first of all decrease the electrode wear rate up to 37.5 and after then increase and decrease and then finally increase the electrode wear rate. Last graph is show the variation of pressure on EWR. This graph follows the same path as to voltage gap.

#### 4. Conclusions

In the present work parametric analysis of die- sinking EDM process has been done based on experimental results.

1. It is clear from the result there are no such single factor which significant in case of material removal rate with graphite tool. Interaction of pulse on time and duty cycle is most significant factor for MRR over the machining parameters.
2. Interaction of duty cycle and pressure and interaction voltage gap and pressure are most significant factor over remaining parameters for surface roughness with graphite tool.
3. Pulse on time is most significant factor over other machining parameters for electrode wear rate with graphite tool.

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# ANALYSIS OF POWER GENERATION FROM THERMO ELECTRIC GENERATOR MODULE BASED ON DIESEL ENGINE COUPLED WITH EXHAUST GAS RECIRCULATION SYSTEM

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## ABSTRACT

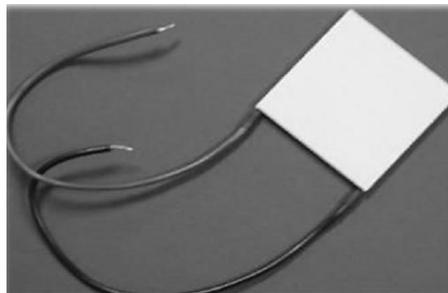
*In today's scenario; we have to reduce impact on the atmosphere. Internal combustion engines, being the major power source in the transportation sector as well as in individual transport. While the mobility in the world is growing, it is important to reduce the emissions that result from transportation. Also as it is well known that from our transport vehicles that is from internal combustion engine maximum of amount of exhaust gases exhausted directly to the atmosphere, which contain a lot of harmful gases and also contain lot of heat. Which are believed to be the main cause of global warming. Diesel exhaust contains toxic gases, mainly nitrogen oxides (NO<sub>x</sub>) and soot particles. These emissions are therefore limited by the authorities in most countries. The only way to utilize this huge amount of heat exhausted from exhaust gases is to adopt a system which will convert heat of exhaust gases into electricity. The name of device is known as TEG (Thermo electric generator) module and the device which tends to reduce the emission of harmful gases is known as EGR (Exhaust gas recirculation) system*

**Keywords:** Internal Combustion (IC) Engine, Thermo electric generator (TEG), Exhaust gas recirculation (EGR), Exhaust gas,

## 1. Introduction

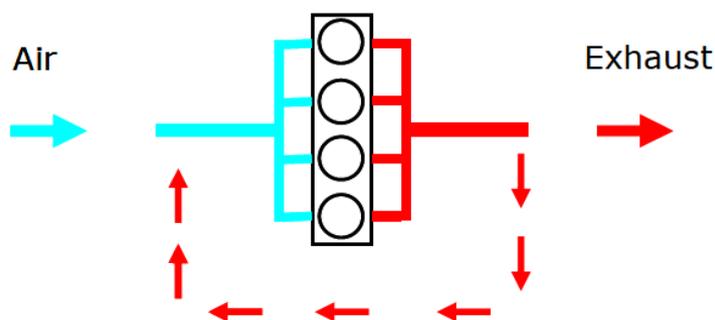
### 1.1 Thermoelectric generator and exhaust gas recirculation system

Thermoelectric generator modules are solid device which can convert heat or temperature difference into electrical energy. Thermoelectric elements are made of P type and N type semiconductor. Thermoelectric modules are based on Seebeck effect. When there is a temperature difference between two sides of semiconductor, a voltage is created. Current flows from N type element and passes into P type element. Thermoelectric modules are devices that either convert thermal energy from a temperature gradient into electric energy or vice versa, convert applied electric energy into a temperature gradient. [1]. The Seebeck coefficient (frequently measured in microvolts/K) is defined as the open circuit voltage produced between two points on a conductor when a uniform temperature difference of 1 K is applied between those points.



### Figure 1.1 TEG module

In internal combustion engines, *Exhaust Gas Recirculation* (EGR) is a nitrogen oxide ( $\text{NO}_x$ ) emissions reduction technique used in petrol/gasoline and diesel engines. EGR works by recirculating a portion of an engine's exhaust gas back to the engine cylinders. This dilutes the  $\text{O}_2$  in the incoming air stream and provides gases inert to combustion to act as absorbents of combustion heat to reduce peak in-cylinder temperatures.  $\text{NO}_x$  is produced in a narrow band of high cylinder temperatures and pressures. This can be achieved either internally with the proper valve timing, or externally with some kind of piping, Figure 1.2 shows this schematically. The exhaust gas acts as an inert gas in the combustion chamber, it does not participate in the combustion reaction. This leads to a reduction of the combustion temperature by different effects. The fuel molecules need more time to find a oxygen molecule to react with, as there are inert molecules around.



**Figure 1.2 Exhaust gas recirculation system**

### 1.2 Thermoelectric generator material

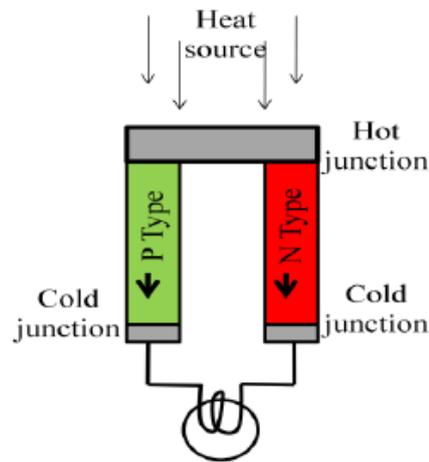
Among the vast number of materials known to date, only a relatively few are identified as thermoelectric materials. Thermoelectric materials can be categorized into established (conventional) and new (novel) materials. Today's most thermoelectric materials, such as Bismuth Telluride ( $\text{Bi}_2\text{Te}_3$ )-based alloys and Pb-Te-based alloys, Effective thermoelectric materials should have a low thermal conductivity but a high electrical conductivity. Material with range of temperature for which TEG is made is given in the table below.

**Table: 1.1 Thermoelectric generator material with range of temperature**

S.no.	TEG Material	Range of temperature
1	Alloys based on Bismuth (Bi) in combinations with Antimony (An), Tellurium (Te) or Selenium (Se)	Low temperature up to around 450K
2	Materials based on alloys of Lead (Pb)	Intermediate temperature up to around 850K
3	Material based on Si-Ge alloys	Higher temperature upto 1300K

### 1.3 Thermoelectric theory

The thermoelectric power generation is based on the Seebeck effect – If heat is applied to a circuit at the junction of two different conductors, a current will be generated. Thomas Johann Seebeck observed that the magnitude of the voltage generated was proportional to the temperature difference and depended on the type of conducting material, but was unaffected by the temperature distribution along the conductors. Seebeck tested a wide range of materials, including the naturally found semiconductors ZnSb and PbS. [2]



**Figure 1.3 Thermoelectric power generation**

### 1.4 Different EGR-Systems

#### 1.4.1 Short route system (SR)

In the short-route (SR) system, a pipe leads some of the exhaust gases from the exhaust manifold into the intake manifold where it is mixed with the fresh air. The pipe usually contains one or more coolers for the EGR and a valve to regulate the amount of EGR. The valve can be placed on either the hot or the cold side of the cooler. A placement on the hot side gives advantages in transient response [3], while a placement on the cold side makes the choice of valve easier, as it will be placed in a colder environment.

#### 1.4.2 Long-Route System (LR)

In the long-route system, the EGR is taken out of the exhaust system downstream of the turbocharger and driven into the intake upstream of the compressor. This leads to a higher power input into the turbocharger, as the whole exhaust stream passes the turbine.

## 2. Related work

### 2.1 Duct Specification

TEG module works between hot junction and cold junction. Rectangular duct shown act as hot junction for TEG module in which hot exhaust gases flows. For cold junction of TEG a similar duct is made in which cold fluid is made to flow.

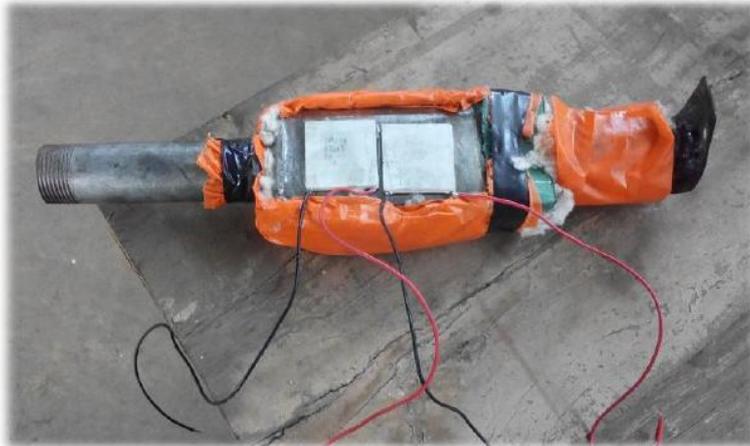
Figure below shows combination of both duct with TEG sandwiched in between.

The specification of duct is given below:

Shape of duct: Rectangular

Size of duct: 13 cm× 4 cm× 3 cm

Material of duct: Stainless steel



**Figure 1.4 Duct specification with TEG module**

## **2.2 Description of TEG module and EGR system coupled with engine**

TEG module coupled with EGR system is shown in figure below. TEG converts heat directly into electricity. Exhaust gas exhausted from the exhaust manifold first passes through the TEG modules which are connected in series and then passes through the different units of EGR system which is shown below. The exhaust gas acts as an inert gas in the combustion chamber, it does not participate in the combustion reaction. This leads to a reduction of the combustion temperature by different effects. The fuel molecules need more time to find oxygen molecule to react with, as there are inert molecules around. This slows down the combustion speed and thus reduces the peak combustion temperature, as the same amount of energy is released over a longer period of time. As the air is diluted with exhaust gas, the mass of a gas portion containing the needed amount of oxygen gets bigger.

The lower combustion temperature directly reduces the  $\text{NO}_x$  formation, as the  $\text{NO}_x$  formation rate is highly temperature dependent.

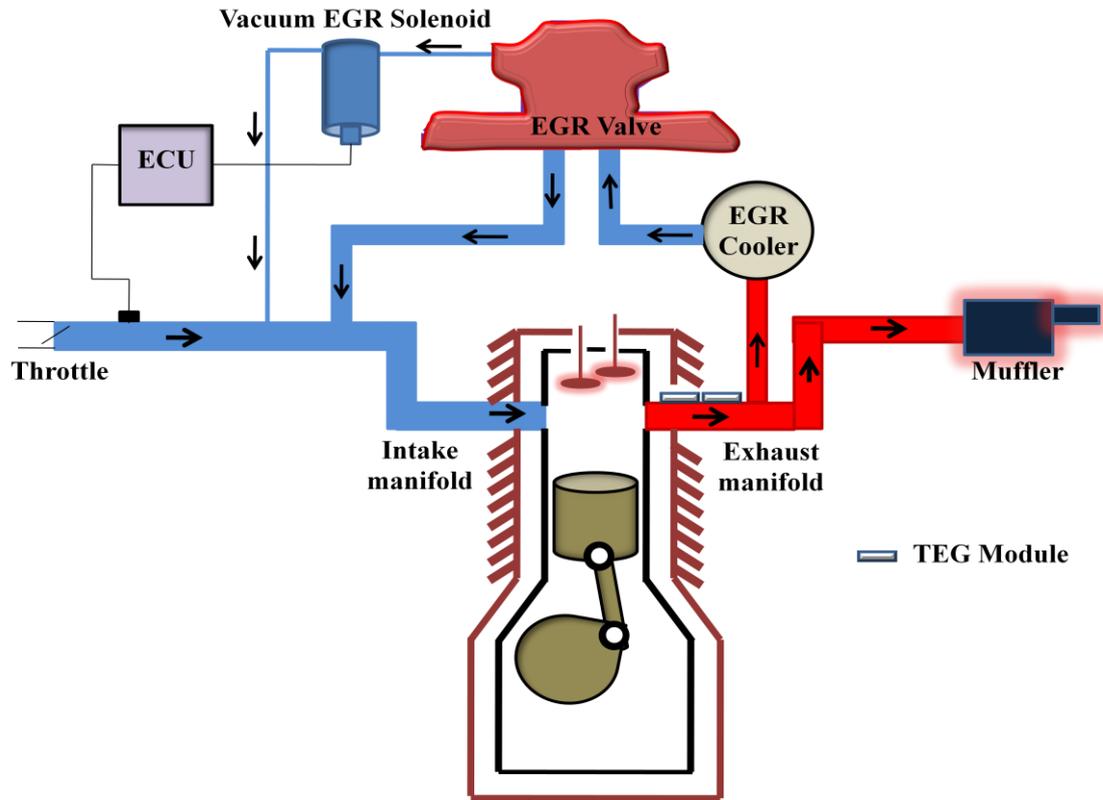


Figure 1.5 TEG and EGR system coupled with Engine

### 2.3 Calculation of brake power of engine

Brake power from the diesel engine is calculated by

$$BP = T \times \omega, \text{ where}$$

BP is brake power of engine

T Torque generated

$\omega$  is angular velocity (in rad/sec) of engine

### 2.4 Calculation of amount of heat contained in exhaust gases

Amount of heat contained in hot exhaust gases can be calculated by

$$Q_{eg} = m_{eg} \times C_{peg} \times (T_{gi} - T_{go})$$

Where

$m_{eg}$  = Mass flow of exhaust gases (kg/s)

$C_{peg}$  = Specific heat of exhaust gases (kJ/kg K)

$T_{gi}$  = Exhaust gas inlet temperature to calorimeter (in ° C)

$T_{go}$  = Exhaust gas outlet temperature to calorimeter (in ° C)

### 2.5 Calculation of electrical Power obtained from TEG

Power obtained from TEG module when connected between the hot source and cold sink is given by

$$W_{TEG} = \frac{V_{TEG}^2}{4r}$$

Where,

$W_{TEG}$  is power obtained from TEG

$V_{TEG}$  is voltage generated by TEG terminal, which can be obtained by using voltmeter

$r$  is load resistance of TEG module

## 2.6 Calculation of EGR rate

Another way to express the amount of EGR is the EGR-rate, which is defined as follows

$$EGR\% = \frac{\dot{m}_{exhaust, intake}}{\dot{m}_{exhaust, intake} + \dot{m}_{air, intake}}$$

## 3. Experimental result

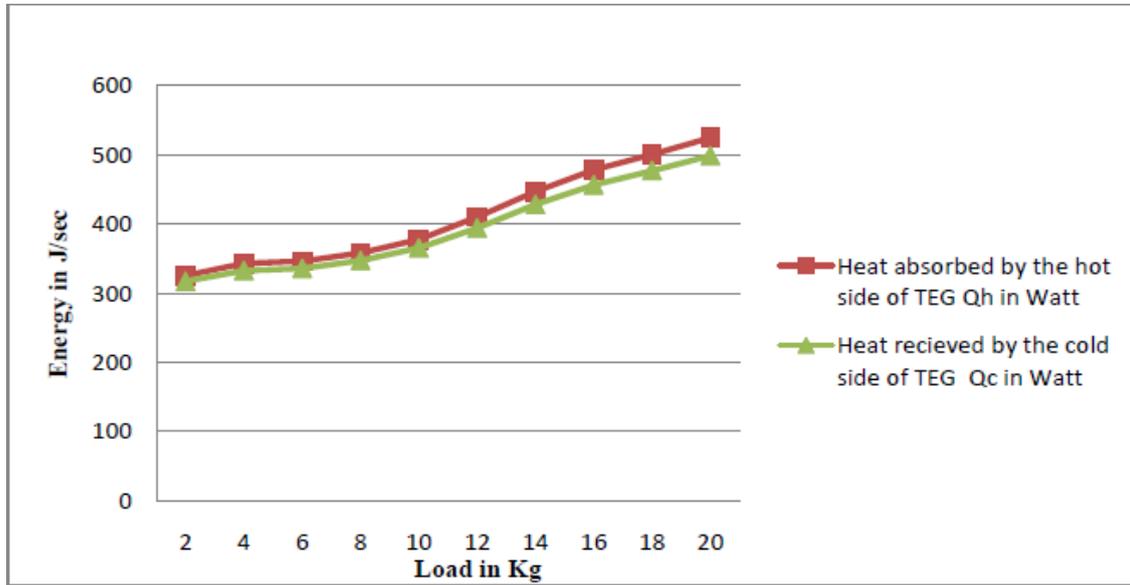
Experiment is done for calculation of temperature at cold side of duct, temperature at hot side of the duct, voltage generated, current, internal resistance, heat absorbed by hot side of TEG, Heat received by the cold side of TEG and Power obtained from TEG.

In this calculation load varies from 2 kg to 20 kg, speed of engine is kept constant equals to 1300 RPM

**Table: 1.2 Calculation of different parameters required to calculate power generated from TEG module**

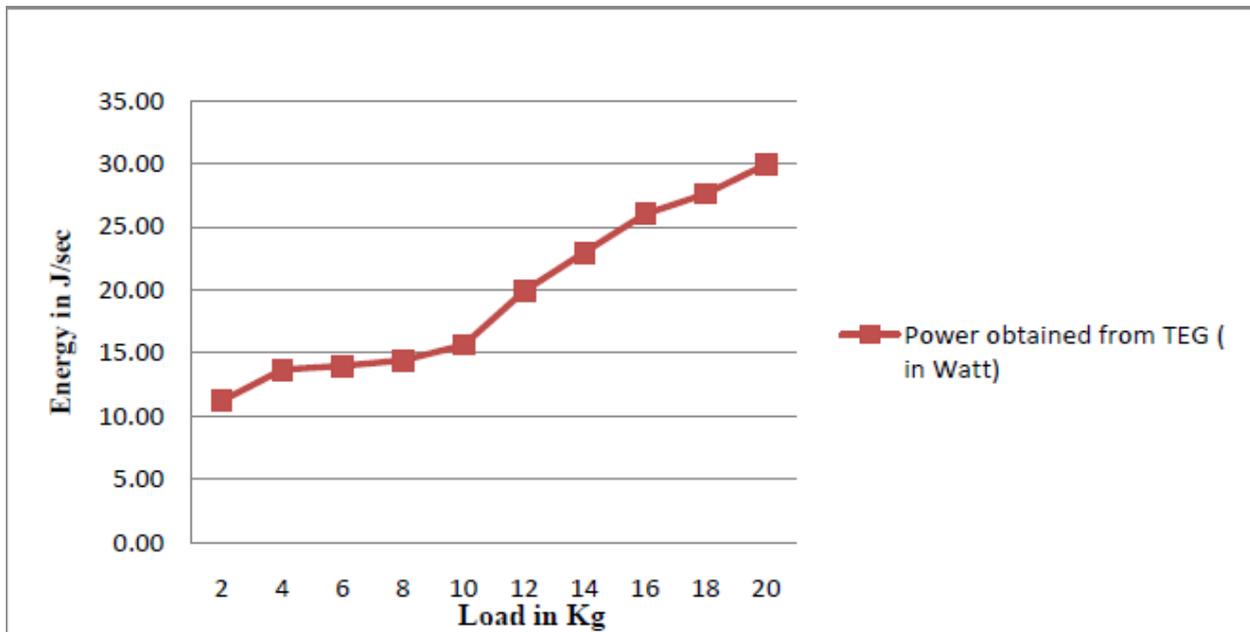
Sn.	Load (Kg)	Temp. at hot side of duct in degree Celsius	Temp. at cold side of duct in degree Celsius	Voltage generated (V) between terminals in volt	Current (I) in amp	Internal resistance r in ohm	Heat absorbed by the hot side of TEG Qh in Watt	Heat received by the cold side of TEG Qc in Watt	Power obtained from TEG in Watt
1	2	122	16	3.5	0.519	0.2731	325.5	317.31	11.21
2	4	126	16	4.2	0.523	0.3220	343.0	332.89	13.69
3	6	127	16	4.26	0.525	0.3245	346.5	336.09	13.98
4	8	131	16	4.32	0.529	0.3234	358.5	347.54	14.43
5	10	137	16	4.6	0.531	0.3380	377.8	365.70	15.65
6	12	145	16	5.2	0.586	0.3396	410.3	394.49	19.90
7	14	156	16	5.75	0.596	0.3598	447.3	428.51	22.97
8	16	165	16	6.28	0.605	0.3791	478.7	456.91	26.00
9	18	172	16	6.5	0.611	0.3825	501.1	477.60	27.61
10	20	179	16	6.86	0.618	0.3929	525.1	499.30	29.94

Figure below shows graphical representations of variation of heat absorbed by hot side of TEG and heat received by cold side of TEG with load variation of 2 kg to 20 kg at constant speed of 1300 RPM, when cold fluid at 16 degree Celsius is flowing through duct



**Figure 1.6** Graphical representations of variation of heat absorbed by hot side of TEG and heat received by cold side of TEG with load variation of 2 kg to 20 kg at constant speed of 1300 RPM,

Figure below shows graphical representations variation of power obtained from TEG with load variation of 2 kg to 20 kg at constant speed of 1300 RPM, when cold fluid at 16 degree Celsius is flowing through duct.



**Figure: 1.7** Graphical representations variation of power obtained from TEG with load variation of 2 kg to 20 kg at constant speed of 1300 RPM

#### 4. Results and Conclusion

Calculation is made for speed of the engine of 1300 RPM and load variation of 2 kg to 20 kg. At 1300 RPM and from 2kg to 20 kg different parameters like heat absorbed by the hot side of TEG in Watt, heat received by the cold side of TEG in Watt and power obtained from TEG in watt. It is observed that maximum power from TEG is obtained when experiment is done for load of 20 kg and speed of 1300 RPM which is 29.94 watt.

By applying EGR system at the exhaust manifold of the engine the concentration of harmful gases like  $\text{NO}_x$  can be minimize to certain level.

Hence by applying TEG module and EGR system on engine exhaust, performance of the engine can be increased by utilizing heat of exhaust gases and by reducing the concentration of the harmful gases by coupling EGR with engine exhaust manifold.

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# REDUCING SHIFTING COST OF MACHINE BY APPLICATION OF REPLACEMENT ANALYSIS IN FACILITY PLANNING

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## ABSTRACT

*This paper is a review and consolidation of the emerging literature on the Facilities planning and Plant Layout. A framework of analysis for developing the Plant layout is also suggested.*

*A facilities layout, also called plant layout, consists of the production areas, production related or support areas and personnel areas within the building. Plant layout design is one of the strategic fields that determine the long run efficiency of operation. Layout determines the way in which materials and other inputs (like people and information) flow through the operation. Relatively small changes in the position of a machine in a factory can affect the flow of materials considerably. This in turn can affect the costs and effectiveness of the overall manufacturing operation. Getting it wrong can lead to inefficiency, inflexibility, large volumes of inventory and work in progress, high costs and unhappy customers. Changing a layout can be expensive and difficult, so it is best to get it right first time.*

*Replacement problem fall into two categories depending upon the life pattern of the equipment involved that is whether the equipment wear out or become obsolete with time (because of constant use or new technological developments) or suddenly fails.*

*This dissertation proposes an efficient and flexible plant layout algorithm to minimize the transporting cost and deal with change in future. Replacement (replacement of machine) evaluation methods of layouts are also proposed by this dissertation. A computer-based system will be developed to integrate all of the functions.*

## 1.Introduction

### Concept of Facilities Planning and Plant Layout

A facility planning is a complex and broad subject that covers several disciplines. It involves civil, electrical, industrial and mechanical engineers, as well as architects, consultants, managers and urban planners.

According to Tompkins and White [Tompkins, 1996], facilities planning determines how an activity's tangible fixed assets best support achieving the activity's objective. Facilities planning can be divided into two components: facilities location and facilities design.

Facilities location is about placement of the facility on a specific plot of land with respect to customers, suppliers and other facilities. Facilities design consists of the facility systems design, the layout design and the handling systems design. The facility systems consist of the structural systems, the environmental systems, the lighting/electrical systems and safety systems. The layout consists of all equipment, machinery and furnishings within the building structure. The handling system consists of the mechanisms needed to satisfy the required facility interactions.

## Concept of Replacement Analysis

Replacement problem fall into two categories depending upon the life pattern of the equipment involved that is whether the equipment **wear out or become obsolete with time** (because of constant use or new technological developments) or **suddenly fails**.

For items that wear out, the problem is to balance the cost of new equipment against the cost of maintaining efficiency on the old and /or cost due to the loss of efficiency. Though no general solution is possible, models have been constructed and solutions have been derived using simplified assumption about the condition of the problem.

A separate but similar, problem involves the replacement of items such as electric bulb, radio tubes etc. of equipment which does not deteriorate with time but suddenly fails. The problem in this case, is of finding which items to replace and whether or not to repave them in a group and, if so, when. The objective is to minimize the sum of the cost of the item, cost of replacing the item and cost associated with failure of item.

*The most common question asked in industry is when should the existing be replaced?*

- When should a new machine replace the existing machine?
- When should a process be redesigned?
- When should a product be redesigned?

## 2.Replacement Model

Replacement problem fall into two categories depending upon the life pattern of the equipment involved that is whether the equipment wear out or become obsolete with time (because of constant use or new technological developments) or suddenly fails.

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There is still another situation in which replacement become necessary. This is obsolescence due to new discoveries and better design of equipment. The equipment needs replacement not because it no longer performs to the design standard, but because more modern equipment perform higher standard.

Quite often that repair and maintenance cost of items increase with time and a stage may come when these costs become so high that it is more economical to replace the item by a new one. Since both of these costs tend to increase with time, they are grouped while analyzing a problem.

*Replacement of Item that Deteriorate i.e., Whose Maintenance Cost Increase with Time*

*Case 1: When time 't' is a continuous variable*

Let C = Capital cost of item,

S = Scrap value of the item,

$T_{avg}$  = Average annual cost of the item,

n = Number of year the item is to be in use,

f(t) = Operating and maintenance cost of the item at time t.

It is desired to find the value of  $n$  that minimizes  $T(n)$ , the total cost incurred during  $n$  year.

Annual cost of the item at any time  $t =$  capita cost – scrap value + maintenance cost at time  $t = C - S + f(t)$ .

Now total maintenance cost incurred during  $n$  year  $= \int_0^n f(t).dt$ .

Total cost incurred during  $n$  year  $T(n) = C - S + \int_0^n f(t).dt$ .

Average annual cost incurred on the item  $T_{avg} = 1/n [C - S + \int_0^n f(t).dt.]$

Now we shall find that value of  $n$  for which  $T_{avg}$  is minimum. Differentiating previous equation w.r.t.  $n$ , we get

$$d/dn(T_{avg}) = -1/n^2 \cdot (C-S) - 1/n^2 \int_0^n f(t).dt + 1/n \cdot f(n).$$

$d/dn(T_{avg}) = 0$ , we have

$$f(n) = T_{avg} = 1/n [C - S + \int_0^n f(t).dt.]$$

Thus the item should be replaced when the average annual cost to date becomes equal to the current maintenance cost.

Using this result we can decide when to replace an item provided an explicit expression is given for the maintenance and repair costs.

*Case 2: when time 't' is a discrete variable*

In this case, the total cost incurred during  $n$  year,

$$T(n) = C - S + \sum_{t=0}^n f(t).dt.$$

Average annual cost incurred on the item,

$$f(n) = 1/n [C - S + \sum_{t=0}^n f(t).dt.]$$

' $n$ ' is optimal at the least average annual cost.

## Facility Problem Statement And Modeling

Here the problem is to arrange " $n$ " machine with different areas into a process plant to minimize the total expected transporting cost given several possible future material flows. The material flows can have the different cost per unit distance. The model is presented below:

$$\text{Minimum } T = \sum_{i=1}^n \sum_{j=1}^n f_{ij} d_{ij} c_{ij}$$

Where:

$f_{ij}$  = frequency/volume of movement

$c_{ij}$  = cost to move one unit load per one distance unit between two machines

$d_{ij}$  = distance between machine  $i$  and  $j$

Assuming the cost  $c_{ij}$  remain constant, the objective would be reduced to minimizing the total distance traveled for the parts.

**Example of three machine layout:**

There are six possibilities for three machine layout that is given below:

1	2	3	$f_{12} * d_{12} + f_{13} * d_{13} + f_{21} * d_{12} + f_{23} * d_{23} + f_{31} * d_{13} + f_{32} * d_{23}$
1	3	2	$f_{13} * d_{12} + f_{12} * d_{13} + f_{31} * d_{12} + f_{32} * d_{23} + f_{21} * d_{13} + f_{23} * d_{23}$
2	1	3	$f_{21} * d_{12} + f_{23} * d_{13} + f_{12} * d_{12} + f_{13} * d_{23} + f_{32} * d_{13} + f_{31} * d_{23}$
2	3	1	$f_{23} * d_{12} + f_{21} * d_{13} + f_{32} * d_{12} + f_{31} * d_{23} + f_{12} * d_{13} + f_{13} * d_{23}$
3	1	2	$f_{31} * d_{12} + f_{32} * d_{13} + f_{13} * d_{12} + f_{12} * d_{23} + f_{23} * d_{13} + f_{21} * d_{23}$
3	2	1	$f_{32} * d_{12} + f_{31} * d_{13} + f_{23} * d_{12} + f_{21} * d_{23} + f_{13} * d_{13} + f_{12} * d_{23}$

Table 1

$f_{ij}$	1	2	3	$d_{ij}$	1	2	3
1	-	2	4	1	-	1	3
2	6	-	3	2	1	-	2
3	5	1	-	3	3	2	-

Table 2

$$\text{Minimum } T = \sum_{i=1}^n \sum_{j=1}^n f_{ij} d_{ij} c_{ij}$$

			$T$
1	2	3	38
1	3	2	37
2	1	3	43
2	3	1	43
3	1	2	47

3	2	1	46
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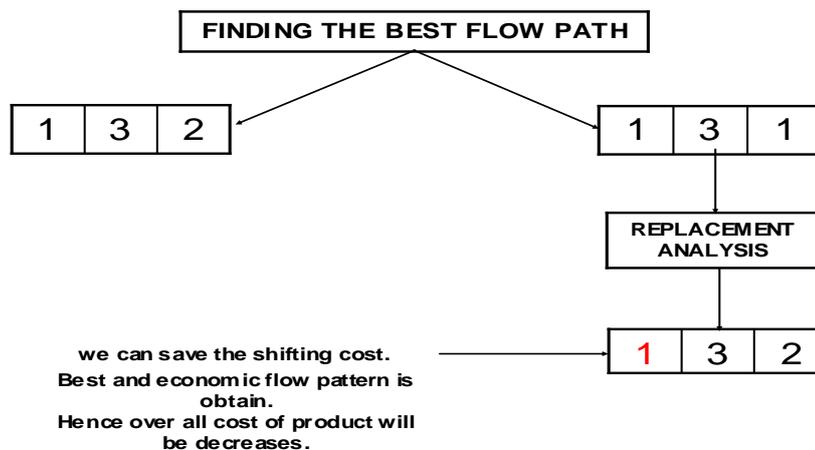
Table 3

*Here we can see that the layout 1-3-2 is most optimum layout.*

Here we can see that the layout 1-3-2 is most optimum layout. Now we can also calculate the overall shifting cost by using similar concept: First part is total transportation cost second part is total installation cost.

## 2.Summary And Conclusion

By the above analysis we can determine the optimum replacement time and hence we save the shifting cost



This paper has deal with some of the aspects of Facilities location and design procedures and has shown the reader that the flow of elements is greatly influenced by the layout of the plant.

The **combination of facility location decision and replacement analysis** will give the most optimum layout and hence production will be increase without failure of machine.

By applying replacement model we can easily calculate the replacement time of existing machine and can be make a new highly efficient layout these also **reduce the shifting cost** which further decreases the overall cost of product.

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# APPLICABILITY AND SYNTHESIS OF THERMAL RESISTIVE MATERIAL FOR RURAL DEVELOPMENT

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## ABSTRACT

*The utility of thermal resistive polymeric materials for rural development is of great importance in various constructional and tool development field. Therefore, the synthesis of such usable materials is of great interest. So the focus on facile free radical copolymerization of n-chloro-substituted of N-phenyl maleimide monomer with methyl methacrylate (MMA) were performed at 70°C in DMF using Benzoyl Peroxide (BPO) as a free radical initiator is emphasized so that a thermal resistive usable polymers material can be obtained. These copolymers are characterized by FT-IR, <sup>1</sup>H-NMR, GPC, TGA. The average molecular weight achieved by GPC viz. for copolymer, C-PCPMI has the highest molecular weight 9510 with PDI close to 1.6. Thermal analysis reveals copolymer show multistep degradation. The TGA and DTA curves explain its percentage weight loss with temperature at different heating rate 5°C, 10°C and 20°C. The Kissinger method is used for non-isothermal kinetic parameters value. The highest thermal stability is obtained for copolymer of 4-chloro-substituted poly phenyl maleimides polymer with MMA (C-PCPMI). On comparison of the behavior of para, meta and ortho chloro substituted copolymers, the faster weight loss on DTA curve was observed for ortho substituted chloro molecule at the same temperature and heating rate. The activation energy of para chloro substituted N-(phenyl) maleimides of polymer is highest among the all three polymers.*

**Keywords:** *Thermal resistive polymeric materials, TGA/DTA, Activation parameters.*

## 1.Introduction

The application of high thermal responsive polymeric materials for rural development is of great importance in various modernized constructional and smart tool development. Therefore, the synthesis of such usable materials is of great interest. So the attention on the aromatic polyimides as thermal stable high-performance polymers are considered as the most important class in development of smart cities construction and equipment development process[1-5]. The vast application of Poly methyl methacrylates as resin applications is modified by the introduction of functional maleimide moiety, may result in the better thermal stable polymers [6]. Free radical polymerization is used for the preparation of thermally stable polymers [7-17]. TGA and GPC techniques were carried out to study the thermal stability and molecular weight determination. The kinetic data processing was performed by applying Kissinger method and [18] gives activation energy for these antimicrobial copolymers. It is also possible to establish a rapid comparison of thermal stabilities and decomposition temperatures of different polymers [19-26]. Thus, thermal analysis could solve selection of thermally stable smart polymeric materials. Hence, in the present communication, we are discussing the kinetics of thermal degradation behaviour of copolymerization of chloro substituted N-phenyl maleimide with vinylic monomer, methyl methacrylate [27].

## Experiment

### Materials

*Ortho*-, *meta*- and *para*- chloro (phenyl) maleimide, were purchased from SRL, Pure. Maleic anhydride (SRL, Mumbai) recrystallized from chloroform. Methylmethacrylate (MMA) (SRL, Mumbai) distilled prior to use. Benzoyl peroxide (BPO) purchased from (Merck, Mumbai). Phosphorus pentoxide ( $P_2O_5$ ), sulphuric acid, methanol, acetone were purchased from Merck India.

### Synthesis of N-(chloro phenyl) maleimide monomer

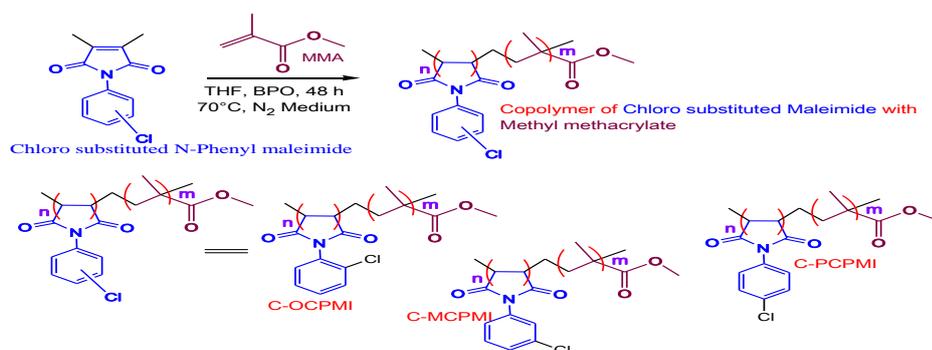
Substituted aniline in DMF and maleic anhydride (ME) mixed at room temperature to yield *Ortho/meta/para* chloro substituted N-phenyl maleimide monomers, under following scheme-1.



**Scheme 1:** The synthetic route of chloro-substituted N-phenyl maleimides

### Polymerization of N-(chlorophenyl) maleimide monomers with MMA

80 ml solution of Chloro substituted monomers in THF was mixed well with methyl methacrylate (MMA) (1.00 ml) into the flask at a low temperature followed by the addition of a free radical initiator (BPO, 0.003 g) in a nitrogen atmosphere, refluxed at 70°C for 48 hrs. (Scheme 2) to give copolymers as shown in the following scheme



**Scheme 2:** Co-polymerization of chloro-substituted N-phenyl maleimides with MMA

## Results and Discussion

### Spectral Characterization of monomers

In **N-OCPMI** monomer, peak at  $1634.9\text{ cm}^{-1}$  of hetero C=C stretching, at  $958.4\text{ cm}^{-1}$  of hetero Bending H-C=C-H suggest imide bond intact in monomer with  $1781.5$  and  $1710.2\text{ cm}^{-1}$  of symmetric and asymmetric stretch of C=O in a five member imide ring and  $1589.1$ ,  $1546.8$  and  $1482.4\text{ cm}^{-1}$  of C=C aromatic stretching of phenyl ring and  $1391.1$  aromatic C-N stretching,  $697.4\text{ cm}^{-1}$  aromatic C-Cl in 1, 2-disubstituted benzene,  $759.1\text{ cm}^{-1}$  ortho \aromatic C-Cl stretching).  $^1\text{H NMR}$  (300 MHz, TMS,  $\text{CDCl}_3$ ,  $\delta$  ppm) :  $\delta$  7.32-7.41 ppm (4H, phenyl),  $\delta$  6.57 ppm Singlet, CH=CH proton of imide. In **N-MCPMI** monomer, peak at  $1634.9\text{ cm}^{-1}$  of hetero C=C stretching, at  $969.5\text{ cm}^{-1}$  of hetero Bending H-C=C-H of imide suggest imide bond intact in monomer with  $1780.3$  and  $1716.0\text{ cm}^{-1}$  of symmetric and asymmetric stretch of C=O in a five member imide

ring and 1578.3, 1543.6 and 1435.6  $\text{cm}^{-1}$  of C=C aromatic stretching of phenyl ring and 1405.3 of aromatic C-N stretching, 669.9  $\text{cm}^{-1}$  of aromatic C-Cl in 1, 3- disubstituted benzene, 765.5  $\text{cm}^{-1}$  of meta aromatic C-Cl stretching.  $^1\text{H NMR}$  (300 MHz, TMS,  $\text{CDCl}_3$ ,  $\delta$  ppm)  $\delta$  7.28-7.50ppm (4H, phenyl),  $\delta$  6.76 ppm Singlet, CH=CH proton of imide. In N-PCPMI monomer, peak at 1630.0  $\text{cm}^{-1}$  of -CH=CH imide stretching are consisted with the structure of N-PCPMI and 953  $\text{cm}^{-1}$  of hetero bending H-C=C-H of imide and 1780, 1708.2  $\text{cm}^{-1}$  of symmetric and asymmetric C=O stretching in hetero ring and 1127.8 of C-N-C stretching and 1396  $\text{cm}^{-1}$  of aromatic -CN stretching. 1586.9, 1531.9, 1490.8  $\text{cm}^{-1}$  of aromatic HC=CH stretching of benzene, 1630  $\text{cm}^{-1}$  of hetero C=C stretching, 828.7, 695.0  $\text{cm}^{-1}$  of aromatic C-Cl in 1, 4 disubstituted benzene, 768.9  $\text{cm}^{-1}$  of para aromatic C-Cl stretching and  $^1\text{H NMR}$  (300 MHz, TMS,  $\text{CDCl}_3$ , ppm)  $\delta$  7.260-7.271 ppm doublet, two aromatic proton, ortho to phenyl ring and  $\delta$  7.44-7.50 ppm doublet, two aromatic proton in m-group in phenyl ring),  $\delta$  6.88 ppm Singlet, CH=CH proton of imide.

### Spectral Characterization of Copolymers

**FT-IR spectra of C-OCPMI, C-MCPMI and C-PCPMI IR spectra ( $\text{cm}^{-1}$ )** 3077.7 (aromatic C-H stretching), 3118.3 -CH stretching for hetero aromatic, 3121.1 (alkene C-H stretching), 1783.1 and 1720.4 (C=O stretching in a five membered imide ring), 1590.5, 1529.2 and 1486.7 for aromatic C=C stretching, 1442.5 (aromatic C-N stretching), 1194.4 (C-N-C). 2962.3 and 2954.3 (C-H stretching in  $\text{CH}_3$ ,  $\text{CH}_2$ ) and 1442.5(-CH deformation in  $\text{CH}_2$  of MMA ) **C-OCPMI** :759.1 (aromatic C-Cl stretching in di substituted benzene), 687.8 (aromatic CH-CH bending), 617.3 (heteroaromatic C-H deformation)**C-MCPMI**: 852.4 and 780.1 (aromatic C-Cl stretching in di substituted benzene), 698.4 (aromatic CH-CH bending), 607.0 (heteroaromatic C-H deformation) **C-PCPMI**: 852.6 $\text{cm}^{-1}$  and 766.5  $\text{cm}^{-1}$  (aromatic C-Cl stretching in di substituted benzene), and 677.0 (aromatic CH-CH bending) 604.2  $\text{cm}^{-1}$  (heteroaromatic C-H deformation)  **$^1\text{H NMR}$  of copolymers (300 MHz, TMS,  $\text{CDCl}_3$ , ppm)  $\delta$** :  $\delta$  7.21-8.03 ppm (2d, 4H phenyl).  $\delta$  3.70-3.89 ppm appeared for (S, 2H -CH-CH-),  $\delta$  0.85-1.12 ppm (T,3H  $\text{CH}_3$ ),  $\delta$  1.89-2.04 ppm (2H , $\text{CH}_2$ )

### Gel permeation chromatography (GPC)

Molecular weight usually decreases while the polydispersity index increases with increasing the maleimide content indicating higher rate of transfer to the maleimide monomer. GPC traces show that the synthesized copolymers contain no impurities. The PDI values indicate that the polymers show narrow molar mass distribution even synthesized by FRP.(Table 1)

**Table 1:** Molecular weight and PDI values for and Copolymers

COPOLYMERS	C-OCPMI	C-MCPMI	C-PCPMI
Mw	9217	9440	9510
PDI=Mw/Mn	1.21	1.56	1.59

### Thermal analysis and Evaluation of Activation Thermodynamic Parameters

The thermodynamic activation parameters of decomposition processes for polymers such as activation energy ( $E^*$ ), entropy of activation ( $\Delta S^*$ ), enthalpy of activation ( $\Delta H^*$ ) and Gibbs free energy ( $\Delta G^*$ ), are calculated with the help of DTA and TGA curves for copolymers and homo by using Kissinger method [33].The TG and DTA graph are shown in Figure 1and 2. The method proposed by Kissinger [34] is based on functional dependence of

the heating rate ( $\beta$ ) and variation of TG and DTA peak temperature ( $T_{\max}$ ) is in proportion to the maximum rate of reaction and equation:

$$\text{Log}(\beta/T_{\max}^2) = \text{log}(AR/E_a) - E_a/(2.303 \cdot RT_{\max})$$

Plotting the left side of this equation against  $1/T_{\max}$  should give a straight line of the slope  $-E_a/2.303R$  and intercept  $\text{log} AR/E_a$ . To apply this method several thermal analysis of the same substance at different heating rate is performed. Other non-isothermal parameters are calculated using following equation:

$$E^* = -\text{slope}(2.303 R), \Delta S^* = 2.303[\text{log}(Ah/kT)]R, \Delta H^* = E^* - RT, \Delta G^* = \Delta H^* - T\Delta S^*,$$

Where,  $T_{\max}$  is the peak temperature,  $h$ = plank constant= $6.6 \times 10^{-34}$ J.s,  $k$ = boltzman constant= $1.38 \times 10^{-23}$ J/K,  $R$ = gas constant= $8.314$  J/mol. K.  $A$ = Arrhenius factor

The data for copolymer degradation in different heating rate at various temperature stages. The high activation energy explains the thermal stability of the polymers. The entropy of activation has negative values indicates

The decomposition reactions proceed with a lower rate than normal ones. **Copolymer: C-PCPMI**

About 7.1 % mass loss for *C-PCPMI* was observed up to 190 °C at a heating rate of  $5^\circ\text{C}/\text{min}$ . and almost 50.2% copolymer (C-PCPMI) was degraded up to 340 °C, and up to 500 °C about 90 % mass loss was observed (figure 1). The thermo curve of copolymer (C-PCPMI) shows two-step degradation process with and gradual mass loss from copolymer. The first stage of degradation was between 256 to 318 °C with maximum mass loss at 287°C, and the second stage degradation was between 380 to 444 °C with maximum mass loss at 412°C. These two stages are visible from DTA curve. 0.2 % char yield was obtained at 640°C in case of copolymer (C-PCPMI). The activation energy value shows the decomposition proceeds with an exothermic process and activation energy at a heating rate of  $5^\circ\text{C}/\text{min}$  was  $-6171 \text{ Jmol}^{-1}$  at the range of 40-170 °C of decomposition temperature this value decreases as temperature increases gradually in every step to  $-13307 \text{ Jmol}^{-1}$  at the range of 460-590°C. The entropy was negative from range  $-1.4012$  to  $-1.34903 \text{ Jmol}^{-1}$ . Here negative value of entropy suggests the stability of the copolymer and enthalpy and gibbs free energy values were also negative in the range of  $-9854$  to  $-20482 \text{ Jmol}^{-1}$  and  $9233$  to  $-19318 \text{ Jmol}^{-1}$ . About 8.3 % mass loss for *C-PCPMI* was observed up to 180 °C at a heating rate of  $10^\circ\text{C}/\text{min}$ . and almost 50 % copolymer was degraded up to 335 °C, and up to 500 °C about 90 % mass loss was observed (figure 1). Thermo curve of copolymer (C-PCPMI) shows two-step degradation process with gradual mass loss. The first stage of degradation was between 257 to 325 °C with maximum mass loss at 303°C, and the second stage degradation was between 379 to 446 °C with maximum mass loss at 421°C. These two stages are visible from DTA curve. 2 % char yield was obtained at 587°C in case of copolymer (C-PCPMI). The activation energy value shows the decomposition proceeds with an exothermic process and activation energy at a heating rate of  $10^\circ\text{C}/\text{min}$  was  $-6102 \text{ Jmol}^{-1}$  at the range of 40-160 °C of decomposition temperature this value decreases as temperature increases gradually in every step to  $-13141 \text{ Jmol}^{-1}$  at the range of 450- 580°C. The entropy was negative from range  $-1.4026$  to  $-1.3422 \text{ Jmol}^{-1}$ . Here negative value of entropy suggests the stability of the copolymer and enthalpy and gibbs free energy values were also negative in the range of  $-9785$  to  $-20233 \text{ Jmol}^{-1}$  and  $-9164$  to  $-19087 \text{ Jmol}^{-1}$ .

About 5.6 % mass loss for *C-PCPMI* was observed up to 180 °C at a heating rate of  $20^\circ\text{C}/\text{min}$ . and almost 50 % copolymer was degraded up to 345 °C, and up to 490 °C about 90 % mass loss was observed. Thermo curve of copolymer (C-PCPMI) shows two-step degradation process with and gradual mass loss from copolymer. The first stage of degradation was between 273 to 350 °C with maximum mass loss at 320°C, and the second stage degradation was between 381 to 462 °C with maximum mass loss at 420°C. These two stages are visible from DTA curve. 1.1 % char yield was obtained at 585°C in case of copolymer (C-PCPMI). Copolymer loses completely before 587°C. The activation energy value shows the decomposition proceeds with an exothermic process and activation energy at a heating rate of  $20^\circ\text{C}/\text{min}$  was  $-6033 \text{ Jmol}^{-1}$  at the range of 40-150 °C of decomposition temperature this value decreases as temperature increases gradually in every step to  $-12773 \text{ Jmol}^{-1}$  at the range of 450- 580°C. The entropy was negative from range  $-1.40602$  to  $-1.3422 \text{ Jmol}^{-1}$ . Here negative value of entropy suggests the stability of the copolymer and enthalpy and gibbs free energy values were also negative in the range of  $-9500$  to  $-19889 \text{ Jmol}^{-1}$  and  $-8955$  to  $-18881.1 \text{ Jmol}^{-1}$ . So, by studying the degradation

pattern for copolymer (C-PCPMI) at different heating rate it is observed that degradation steps are almost same in this case but their range of degradation is changing and it is increasing slightly towards right side on increasing the heating rate. The activation energy at heating rate of  $20^{\circ}\text{C}/\text{min}$  of for copolymer C-PCPMI is the highest. Arrhenius factor, A for C-PCPMI also increases from 0.2007 to 0.2132 on increasing the heating rate at  $5^{\circ}\text{C}/\text{min}$  to  $20^{\circ}\text{C}/\text{min}$  while activation energy value decreases.

#### Copolymer : C-MCPMI

About 1.5 % mass loss for C-MCPMI was observed up to  $160^{\circ}\text{C}$  at a heating rate of  $5^{\circ}\text{C}/\text{min}$ . and almost 50.2% copolymer (C-MCPMI) was degraded up to  $330^{\circ}\text{C}$ , and up to  $520^{\circ}\text{C}$  about 90 % mass loss was observed (figure 1). The thermo curve of copolymer (C-MCPMI) shows two-step degradation process with and gradual mass loss from copolymer. The first stage of degradation was between  $256$  to  $318^{\circ}\text{C}$  with maximum mass loss at  $288^{\circ}\text{C}$ , and the second stage degradation was between  $339$  to  $423^{\circ}\text{C}$  with maximum mass loss at  $402^{\circ}\text{C}$ . These two stages are visible from DTA curve. 3 % char yield was obtained at  $500^{\circ}\text{C}$  in case of copolymer (C-MCPMI). The activation energy value shows the decomposition proceeds with an exothermic process and activation energy at a heating rate of  $5^{\circ}\text{C}/\text{min}$  was  $-6102\text{ Jmol}^{-1}$  at the range of  $40$ - $170^{\circ}\text{C}$  of decomposition temperature this value decreases as temperature increases gradually in every step to  $-12974\text{ Jmol}^{-1}$  at the range of  $470$ - $570^{\circ}\text{C}$ . The entropy was negative from range  $-1.4486$  to  $-1.3596\text{ Jmol}^{-1}$ . Here negative value of entropy suggests the stability of the copolymer and enthalpy and gibbs free energy values were also negative in the range of  $-9702$  to  $-19982\text{ Jmol}^{-1}$  and  $-9095$  to  $-18836\text{ Jmol}^{-1}$ .

About 1.6 % mass loss for C-MCPMI was observed up to  $160^{\circ}\text{C}$  at a heating rate of  $10^{\circ}\text{C}/\text{min}$ . and almost 50 % copolymer was degraded up to  $330^{\circ}\text{C}$ , and up to  $500^{\circ}\text{C}$  about 90 % mass loss was observed (figure 1). The thermo curve of copolymer (C-MCPMI) shows two-step degradation process. The first stage of degradation was between  $273$  to  $350^{\circ}\text{C}$  with maximum mass loss at  $316^{\circ}\text{C}$ , and the second stage degradation was between  $358$  to  $441^{\circ}\text{C}$  with maximum mass loss at  $405^{\circ}\text{C}$ . These two stages are visible from DTA curve. 3 % char yield was obtained at  $600^{\circ}\text{C}$  in case of copolymer (C-MCPMI). The activation energy value shows the decomposition proceeds with an exothermic process and activation energy at a heating rate of  $10^{\circ}\text{C}/\text{min}$  was  $-6094\text{ Jmol}^{-1}$  at the range of  $40$ - $150^{\circ}\text{C}$  of decomposition temperature this value decreases as temperature increases gradually in every step to  $-1293\text{ Jmol}^{-1}$  at the range of  $450$ - $580^{\circ}\text{C}$ . The entropy was negative from range of  $-1.4026$  to  $-1.1773\text{ Jmol}^{-1}$ . Here negative value of entropy suggests the stability of the copolymer and enthalpy and gibbs free energy values were also negative in the range of  $-9777$  to  $-20114\text{ Jmol}^{-1}$  and  $-9156$  to  $-19098\text{ Jmol}^{-1}$ . About 1.3 % mass loss for C-MCPMI was observed up to  $160^{\circ}\text{C}$  at a heating rate of  $20^{\circ}\text{C}/\text{min}$ . and almost 50 % copolymer was degraded up to  $300^{\circ}\text{C}$ , and up to  $490^{\circ}\text{C}$  about 90 % mass loss was observed (figure 2). The thermo curve of copolymer (C-MCPMI) shows two-step degradation process. The first stage of degradation was between  $248$  to  $356^{\circ}\text{C}$  with maximum mass loss at  $316^{\circ}\text{C}$ , and the second stage degradation was between  $378$  to  $459^{\circ}\text{C}$  with maximum mass loss at  $415^{\circ}\text{C}$ . These two stages are visible from DTA curve. 4.5 % char yield was obtained at  $568^{\circ}\text{C}$  in case of copolymer (C-MCPMI). The activation energy value shows the decomposition proceeds with an exothermic process and activation energy at a heating rate of  $15^{\circ}\text{C}/\text{min}$  was  $-6102\text{ Jmol}^{-1}$  at the range of  $40$ - $160^{\circ}\text{C}$  of decomposition temperature this value decreases as temperature increases gradually in every step to  $-12918\text{ Jmol}^{-1}$  at the range of  $410$ - $600^{\circ}\text{C}$ . The entropy was negative from range of  $-1.4043$  to  $-1.3425\text{ Jmol}^{-1}$ . Here negative value of entropy suggests the stability of the copolymer and enthalpy and gibbs free energy values were also negative in the range of  $-9702$  to  $-20177\text{ Jmol}^{-1}$  and  $-9094$  to  $-19005\text{ Jmol}^{-1}$ .

So, by studying the degradation pattern for copolymer (C-MCPMI) at different heating rate it was observed that degradation steps are almost same in this case but their range of degradation is changing. The Arrhenius factor, A for C-MCPMI is also increases from 0.2030 to 0.1459 on increasing the heating rate at  $5^{\circ}\text{C}/\text{min}$  to  $20^{\circ}\text{C}/\text{min}$  while activation energy value decreases. On observing the change in the activation energy and other non-isothermal parameters of C-MCPMI with increase in heating rate, it is concluded that increased heating rate does not affect the degradation of C-MCPMI to a large extent as the increase in activation energy is not much significant.

#### **Copolymer : C-OCPMI**

About 7.6 % mass loss for C-OCPMI was observed up to  $140^{\circ}\text{C}$  and 10 % mass loss for C-OCPMI was observed up to  $180^{\circ}\text{C}$  at a heating rate of  $5^{\circ}\text{C}/\text{min}$ . and almost 50 % copolymer (C-OCPMI) was degraded up to  $290^{\circ}\text{C}$ , and up to  $510^{\circ}\text{C}$  about 90 % mass loss was observed (figure 1). The thermo curve of copolymer (C-OCPMI) shows two-step degradation process. The first stage of degradation was between  $235$  to  $308^{\circ}\text{C}$  with maximum mass loss at  $297^{\circ}\text{C}$ , and the second stage degradation was between  $360$  to  $423^{\circ}\text{C}$  with maximum mass loss at  $381^{\circ}\text{C}$ . 4.9 % char yield was obtained at  $595^{\circ}\text{C}$  in case of copolymer (C-OCPMI). The activation energy value shows the decomposition proceeds with an exothermic process and activation energy at a heating rate of  $5^{\circ}\text{C}/\text{min}$  was  $-5843\text{ Jmol}^{-1}$  at the range of  $40$ - $140^{\circ}\text{C}$  of decomposition temperature this value decreases as temperature increases gradually in every step to  $-13051\text{ Jmol}^{-1}$  at the range of  $440$ -  $580^{\circ}\text{C}$ . The entropy was negative from range of  $-1.4061$  to  $-1.1768\text{ Jmol}^{-1}$ . Here negative value of entropy suggests the stability of the copolymer and enthalpy and gibbs free energy values were also negative in the range of  $-6974$  to  $-17873\text{ Jmol}^{-1}$  and  $-8817$  to  $-19138\text{ Jmol}^{-1}$ .

About 8.1 % mass loss for C-OCPMI was observed up to  $130^{\circ}\text{C}$  and 10 % mass loss for C-OCPMI was observed up to  $170^{\circ}\text{C}$  at a heating rate of  $10^{\circ}\text{C}/\text{min}$ . and almost 50 % copolymer (C-OCPMI) was degraded up to  $260^{\circ}\text{C}$ , and up to  $500^{\circ}\text{C}$  about 90 % mass loss was observed (figure 1). The thermo curve of copolymer (C-OCPMI) shows two-step degradation process. The first stage of degradation was between  $243$  to  $320^{\circ}\text{C}$  with maximum mass loss at  $299^{\circ}\text{C}$ , and the second stage degradation was between  $323$  to  $448^{\circ}\text{C}$  with maximum mass loss at  $397^{\circ}\text{C}$ . 4.9 % char yield was obtained at  $545^{\circ}\text{C}$  in case of copolymer (C-OCPMI). The activation energy value shows the decomposition proceeds with an exothermic process and activation energy at a heating rate of  $10^{\circ}\text{C}/\text{min}$  was  $-5893\text{ Jmol}^{-1}$  at the range of  $40$ - $130^{\circ}\text{C}$  of decomposition temperature this value decreases as temperature increases gradually in every step to  $-12845\text{ Jmol}^{-1}$  at the range of  $400$ -  $600^{\circ}\text{C}$ . The entropy was negative from range of  $-1.4085$  to  $-1.3425\text{ Jmol}^{-1}$ . Here negative value of entropy suggests the stability of the copolymer and enthalpy and gibbs free energy values were also negative in the range of  $-9244$  to  $-20021\text{ Jmol}^{-1}$  and  $-8676$  to  $-18862\text{ Jmol}^{-1}$ .

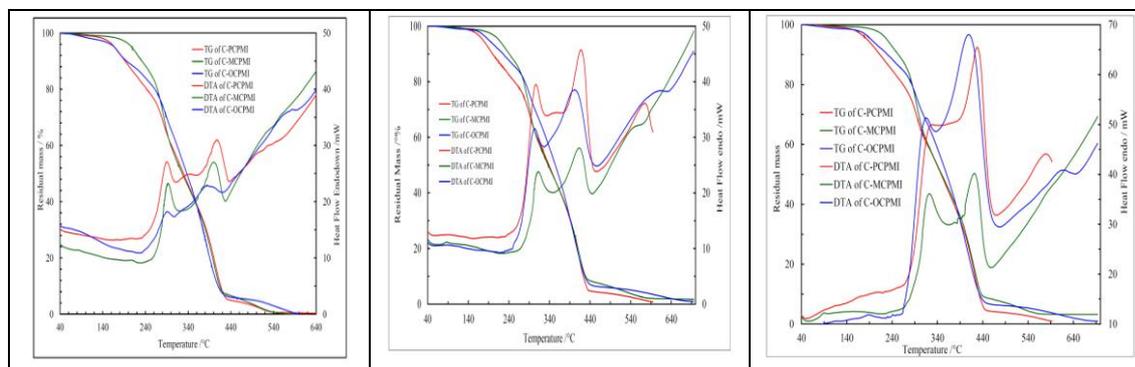
About 10.2 % mass loss for C-OCPMI was observed up to  $140^{\circ}\text{C}$  at a heating rate of  $20^{\circ}\text{C}/\text{min}$  and almost 50 % copolymer was degraded up to  $250^{\circ}\text{C}$ , and up to  $480^{\circ}\text{C}$  about 90 % mass loss was observed (figure 1) thermo curve of copolymer (C-OCPMI) shows two-step degradation process. The first stage of degradation was between  $248$  to  $334^{\circ}\text{C}$  with maximum mass loss at  $309^{\circ}\text{C}$ , and the second stage degradation was between  $334$  to  $471^{\circ}\text{C}$  with maximum mass loss at  $403^{\circ}\text{C}$ . These two stages are visible from DTA curve. 5.5 % char. The yield was obtained at  $530^{\circ}\text{C}$  in case of copolymer (C-OCPMI). The activation energy value shows the decomposition proceeds with an exothermic process and activation energy at a heating rate of  $20^{\circ}\text{C}/\text{min}$  was  $-5964\text{ Jmol}^{-1}$  at the range of  $40$ - $140^{\circ}\text{C}$  of decomposition temperature this value decreases as temperature increases gradually in every step to  $-12729\text{ Jmol}^{-1}$  at the range of  $440$ -  $580^{\circ}\text{C}$ . The entropy was negative from

range of  $-1.4581$  to  $-1.3432 \text{ Jmol}^{-1}$ . Here negative value of entropy suggests the stability of the copolymer and enthalpy and gibbs free energy values were also negative in the range of  $-9398$  to  $-19987 \text{ Jmol}^{-1}$  and  $-8816$  to  $-18815 \text{ Jmol}^{-1}$ .

So, by studying the degradation pattern for copolymer (C-OCPMI) at different heating rate it was observed that degradation steps are almost same in this case but their range of degradation is changing. It was observed that on increasing the heating rate from  $5^\circ \text{C/min}$  to  $20^\circ \text{C/min}$ , the copolymer C-OCPMI activation energy and other non-isothermal parameters are not almost same but at higher heating rate at  $20^\circ \text{C/min}$  the activation energy decreases for the degradation of copolymer, C-OCPMI. Arrhenius factor, A for C-OCPMI decreases from 0.2191 to 0.2161 for first stage and increases for last stage from 0.0956 to 0.1014 with increase in temperature and heating rate at  $5^\circ \text{C/min}$  to  $20^\circ \text{C/min}$  while activation energy value decreases. This is suggesting that first degradation was not faster later at higher temperature the degradation increases in C-OCPMI copolymer. Even the activation energy at  $5^\circ \text{C/min}$  and  $10^\circ \text{C/min}$  is almost same and higher than that of at  $20^\circ \text{C/min}$  suggesting faster degradation of C-OCPMI at higher heating rate and therefore, less activation energy is required for its degradation.

The degradation of copolymers is gradual. In general, the polymer chain of polyimide was begun to decompose gradually as the temperature increased continuously. From all the DTA curves, the decomposition rates of the copolymers showed two clear minimum values, indicating two distinguishing decomposition stages. On further increase in Ti value degradation process also increases in copolymers since two units are attached one is maleimide unit and other methylmetha acrylate so the polymeric chain fragmentation and degradation occur at multiple step degradation temperature range. Since it involves the breaking of carbon-carbon single bond between two polymerizing unit and thus require energy to degrade at higher temperature value at the second stage degradation in copolymers. On comparison of the behavior of para, meta and ortho chloro substituted copolymers, the greater or faster weight loss on DTA curve was observed for ortho substituted chloro molecule at the same temperature and heating rate. It is due to greater steric hindrance imposed by ortho position resulting in poor stacking of molecule.

**Figure 1 :** TG and DTA curve for copolymers at 5K/min, 10K/min and 20K/min



**Figure 1:** TGA and DTA curve for Homopolymers at 5K/min, 10K/min and 20K/min

**2. Conclusion** Free radical polymerization method is used for the synthesis of halogen substituted homopolymer and copolymers using BPO as free radical initiator and DMF as a solvent at  $70^\circ \text{C}$  for 48 hours. As such moieties are used in development and synthesis of novel highly efficient thermal responsive materials for a smart material production therefore the above work applicability increases and in high demand as it supports heat contact resistance, the heat losses from the free sample surfaces. The GPC results shows the copolymer, C-PCPMI has the highest molecular weight of 9510 among copolymers. The polymers synthesized using *para* substituted phenyl maleimide are comparatively more stable. Among copolymers *para* chloro substituted copolymer, C-PCPMI is more stable at higher temperature as the percentage weight loss is less at

higher temperatures and its activation energy is more negative than meta and ortho chloro substituted copolymers and is in the range of -6171 to -12773 Jmol<sup>-1</sup>. The activation energy required for degradation of C-PCPMI is the highest among all the synthesized copolymers. The GPC results show the homopolymer, C-PCPMI has the highest molecular weight (9510) among all. Among the three copolymers viz. H-PCPMI, H-MCPMI & H-OCPMI, para chloro substituted N-(phenyl) maleimide was found thermally more stable due to good stacking of molecules and less steric hindrance at para position assuring the more intermolecular hydrogen bonding in the H-PCPMI homopolymer chains. Furthermore, the activation energy of para chloro substituted N-(phenyl) maleimide polymer is highest among all three polymers, which clearly indicates that the stability of this polymer is more compared to ortho or meta substituted polymers. Thus due to its thermal resistive properties, it benefits modern tool development in larger aspects.

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# ARCHITECTURE AND SECURITY THREATS FOR HETEROGENEOUS NETWORK IN WIRELESS NETWORK

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## ABSTRACT

*The wireless communication networks combined with the wired networks have made tremendous progress with both the upgrade of cellular networks to support wide area data access and the widespread deployment. By the combination of these networks the information highway will be open to all and architecture fulfills the demands of the users in all scenarios. The various heterogeneous wireless networks architectures proposed are Unified Cellular Ad hoc Network (UCAN), Integrated Cellular Ad hoc Relay (iCAR) and Scalable Proxy Routing (SPR) and multiple hop cellular networks. Each has their exclusive design and protocol to discuss and also to point out their security weaknesses in any attack.*

**Key Terms** - Heterogeneous networks, UCAN, iCAR, SPR, security weaknesses.

## 1.Introduction

Diversity and Complexity are the titles of the coming communication technologies. This situation caused by the increased production of the communication devices and systems without depending on one standardized concepts or common language. Most of the systems and devices nowadays concern on heterogeneous networks. That raised the intensive need to find one station to control and manage these networks since controlling them separately brings a lot of difficulties and inconsistency. Heterogeneous networks will be enabling to support many services and applications in heterogeneous networks such as multimedia applications.

The capacity of a cellular data network can be improved by creating a larger number of smaller cells, each of which houses an expensive base-station (BS). The benefit of such an approach is the increased spatial reuse of the spectrum. Alternatively, in order to increase spatial reuse, cellular networks may be augmented with ad-hoc wireless connectivity; this is attractive as compared to the former approach in terms of the incurred cost [1], [2]. We call these latter types of networks hybrid cellular-ad hoc networks or simply heterogeneous networks. Such a network can be shown in Fig. 1.

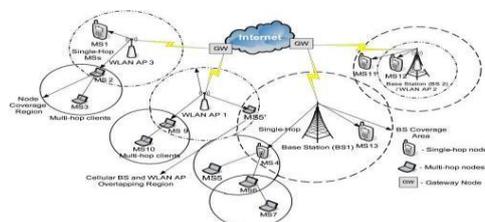


Figure 1. Futuristic heterogeneous multihop wireless architecture

The designs of the future wireless networks will have to put a huge effort on the security and trust management. The main reason for this is that future networks will be decentralized and ad hoc in nature and hence allowing various types of network mobile terminals to join and leave. All the nodes are free to move and dynamically connect in any arbitrary manner. The establishment, maintenance, and operation of this kind of networks rely on cooperation among nodes, which must handle the necessary networking tasks acting as routers and hosts. In particular far off nodes communicate using intermediate nodes as relays, through routes that nodes themselves discover and maintain [4].

In the wireless networking environment majority of the networking functions must be performed by the nodes themselves. Due to lack of routing infrastructure they have to cooperate to communicate. Nodes are rational their actions are strictly determined by self interest. Therefore misbehavior exists. Malicious nodes are the nodes that join the network with the intent of harming it by causing network partitions, denial of service, etc. while selfish nodes that utilize services provided by others but do not reciprocate to preserve resources. Thus in order to save battery and bandwidth nodes should not forward packets for others. [5].

Unlike nodes of conventional wire line networks nodes of wireless networks cannot be assumed to be secured in locked cabinets. Therefore they risk being captured and compromised. As all communications are performed over the air wireless networks are vulnerable to attacks ranging from denial of service to eavesdropping. This makes the entire network vulnerable and very sensitive to attacks. Because of the broadcast nature of the wireless transmission anyone within communication range can intercept the data that was not intended to them.

In such a complex environment the current cryptographic methods with high level security may not work. Ad hoc and cellular networks have received a great attention in recent years. To accommodate the large number of users and traffic over a large geographic area, cellular networks could take advantage of the infrastructure less ad hoc networks to provide extended service. One of the key issues in the integration of cellular and ad hoc networks is to find some mobile nodes who would act as proxies or relays. These proxies or relays will forward the information to the mobile nodes placed far away from the base station (BS). Much architecture has been proposed to understand and in future implement the design for successful data delivery. Although the architectures have focused on the increase of system capacity, coverage of cellular networks and improving the throughput of the whole network system. The terminals with dual access interfaces could act as relay nodes to route the data. Those nodes could have a wider bandwidth up to 11Mbps while 802.11a offers bandwidth up to 54Mbps [6]. None of the work to the author's knowledge has discussed the impact of security of these networks. Our work is an analysis of the existing architectures of the heterogeneous networks and how they would react to the attack scenario.

### **Wireless Security Measures:**

There are many issues in the Heterogeneous networks where only the most important issues discussed are Handoff issues and throughput and delay and how to maintain QoS when the networks are changed. Limited architecture considers the work of a security protocol in their mechanisms and considers all the nodes to be trustworthy and reliable. The main insecurity with wireless networks compared to wired networks is the easy of accessing the transmission medium used, i.e. with a wired network to sniff packets, there has to be a physical access to the network whilst with wireless networks, the transmission is easily available outside the physical building. Insecurities on wireless networks other than those caused by the ease of accessing the transmission media are the same as for a wired network, i.e. packets can be sniffed if sent in clear text across wires if someone has packet sniffing software on the same segment of the network as the packet is being transmitted across.

### Unified Cellular and Adhoc Routing :

The fundamental aspect of wireless communication is its broadcast nature i.e. transmission from a node can be overheard at several locations. This makes wireless communication inherently vulnerable to eavesdropping by an adversary. As the use of wireless networks grows the security aspects have yet to be controlled. These issues have been identified by recent discoveries that the wireless networks are vulnerable to eavesdropping. Thus a fundamental question is how to ensure secrecy in wireless networks. Although there has been extensive research in both Cellular layout and Mobile AdHoc Networks to date, on improving the performance of each of these two technologies in isolation, one question that remains is whether they can be synergistically combined to leverage the advantages of each other. UCAN is a new wireless networking paradigm that increases the throughput of wide-area wireless networks through opportunistic use of ad hoc local-area wireless networks. The architecture of UCAN can be shown in Fig.2

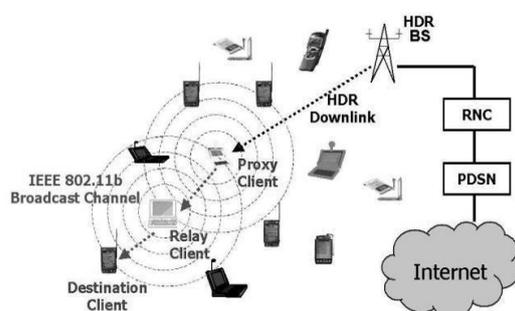


Figure 2: UCAN architecture

One prerequisite for the UCAN model is that each mobile device is equipped with two wireless interfaces. Fortunately, given the popularity of the IEEE 802.11b (Wi-Fi) interface, it is already being embedded in every mobile device and, thus, the device only needs a 3G interface card to operate in UCAN. The convergence of mobile phones and computers, such as walkie-talkie PC, also foresees the popularity of such wireless devices. More recently, several companies, such as GTRAN wireless, are offering integrated cards that implement both IEEE 802.11b and 3G wireless interfaces. Thus, if routing protocols can be made aware of both interfaces, they can improve performance significantly by selecting the best interface(s) to deliver packets to the mobile users. [7], In UCAN the AdHoc routing component is much more efficient and reliable because of its explicit use of the cellular infrastructure and the protocol complexity is also significantly lower. This method is broken down into two methods i.e. greedy proxy discovery and also on demand proxy discovery. Both of these methods are explained.

#### A. Greedy Proxy Discovery Method

In greedy proxy discovery, neighboring mobile clients within the one-hop IEEE 802.11b transmission range periodically exchange their average downlink channel rates by broadcasting a neighborhood advertisement message (NBADV). Thus, each mobile client proactively maintains a table of its neighbors' IDs (e.g., IP addresses) and their most recently advertised average high data rate (HDR) downlink channel rates. The destination client also sets its fields of its NBADV packet so that only those clients within a certain range from the destination client need to establish neighborhood information.

**B. On Demand Proxy Discovery**

In on-demand proxy discovery, mobile clients do not proactively maintain their neighborhood information. Instead, the destination client reactively floods a route request (RTREQ) message within a certain range. The RTREQ message carries the destination client’s average HDR downlink channel rate and a sequence number that is incremented every time the destination client initiates a new round of proxy discovery.

**Security Weaknesses**

The UCAN architecture although a pioneer work in the field of heterogeneous networks, still fails to address any attack mechanisms it might have against the malicious nodes. As there are two types of attacks malicious and selfish the methodology fails to pinpoint any one of them

The problem in UCAN is flooding messages and inefficient relay proxy. As there are more and more users joining and leaving the cell or network thus keeping records of each one is very difficult to maintain. If this protocol is implemented then the delay between nodes and delivery ratio is increased.

This also shows no strategy to provide as to how to defend from any such attack. This architecture is most prone to denial of service attack where a node can be attacked and it would be used to send more and more packets to other nodes and thus the whole network is failure prone. As any mobile node can exchange wrong information about its MAC address and thus cheat other nodes to send it data.

**Integrated Cellular Adhoc Routing (iCAR)**

The iCAR system is a representative heterogeneous wireless system, proposed to address the congestion problem in the wireless networks. iCAR system [8], [9], has been proposed to deploy the AdHoc networking technology in the cellular system to address the congestion problems due to limited wireless bandwidth and dynamically varying traffic load. By using the Ad hoc Relaying Stations (ARSs) along with the signaling and routing protocols presented by [10] it is possible to divert traffic from one (possibly congested) cell to another (non-congested) cell. iCAR, with its ability to leverage both the cellular and ad hoc relaying techniques to increase system’s capacity, is a promising evolution path to the next generation heterogeneous system. In [9], [11], the performance of iCAR in terms of the call blocking probability has been studied via analysis and simulations. It has been shown that iCAR can effectively balance traffic load among cells, and more importantly, overcome the barriers imposed by the cell boundaries and share channels between cells, which in turn leads to significantly lower call blocking probability than a corresponding cellular system can achieve. Recent studies on hand-off performance in iCAR [7], [11] has shown that with the same amount of resource as in conventional cellular systems and a limited number of ARS’s, the iCAR system can reduce hand-off call dropping probability significantly and achieve higher channel efficiency. The layout of iCAR is shown in Fig. 3

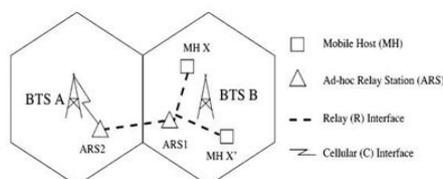


Fig. 3. A relaying example where MH X communicates with BTS through two ARSs [5]

### Security Shortcomings

However the authors primarily focus on improving the cell blocking probability for circuit like traffic by diverting traffic from congested cells to neighboring lightly loaded cells or cold cells. They use redeployed dedicated stationary relays for this purpose resulting in increased cost.

This methodology is using only the (ARS's) for more cellular coverage capacity but it does not show how the integration process will be carried out i.e. the process of building and involving more and more mobile ad hoc network users into the system. So thus its overall system is not that much secure. It tries to focus on more of the security policies that are placed in the cellular technology and have a link with the mobile station center where it can gather the required information for forwarding data packets. The method does not consider even one security risk and it is not the case in real world where other nodes may be malicious or selfish or misbehaving.

### Scalable Proxy Routing (SPR)

A Scalable Proxy Relay Routing Protocol (SRP) is used to increase the total throughput of the system. In this strategy, the base station always sends data to the destination node through the selected proxy nodes which has minimum transmission delay. The selection of the relay should be such that it has the minimum delay. This protocol is different from the other protocols in the sense that none of them have considered the transmission delay from a mobile node to the base station. Currently, most cellular network employs digital technology to improve the system quality and services. Typical present cellular networks include GSM, GPRS, CDMA, WCDMA, etc. Wireless Ad-hoc network is a temporary wireless mobile network which is organized by a collection of wireless mobile devices without the aid of any established infrastructure [6]. The layout of SPR is shown in Fig. 4

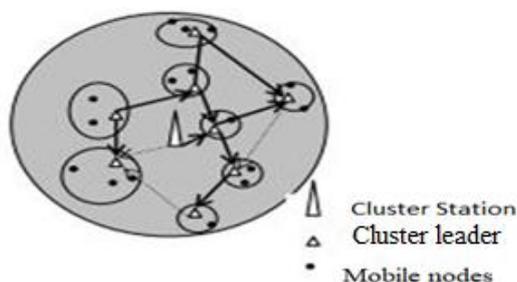


Fig. 4 Shortest path from base station to cluster leaders

### Security Flaws

As we know the more hops there are, the larger the delays and the more chances of corruption and attacks are increased. Thus both Quality of Service (QoS) and security of the whole system can be affected. This protocol not only increases the whole system throughput but also reduces the delay by selecting the shortest path from a base station to the selected cluster leader which further relays the message to the destination nodes. This method also keeps updated about the nodes as to who is having the best delay to the destination and path to the destination. As this is a scenario of mobile ad hoc networks so mobile nodes are joining and leaving all the time thus you have to maintain the tables and also update the table after so many transactions.

This method does not provide any incentive as to why the mobile nodes should forward data information or packets to any other node and waste its limited battery power while he himself has no concern for the data of other user.

A lot of processing is also done in selecting the cluster header the reason being that in mobile Ad Hoc networks nodes can leave and join anytime. So a lot of computation power will be wasted in sending updated information and receiving information thus a lot of messages are being sent and received and thus computation ability will also make the response slower.

A close analysis of the protocol shows that this is not an efficient secure protocol for the heterogeneous networks the reasons being that there is no security mechanism installed at all. It takes the scenario that two different networks are combined namely cellular and mobile ad hoc networks and the shortest delay path to the destination is chosen from a cluster head. What the authors have not mentioned is that suppose that a node gets malicious and shows that it is having the smallest delays to the destination thus it will be chosen as the cluster leader even though that the information shared is all false.

Thus it can attack  $k$  other nodes and thus valuable data will be lost and no method exists in this scheme to find out how to remove or fix the problem. Thus this protocol is very much prone to wormhole Sybil and black hole attacks. The Sybil attacks can also be used to get the other nodes trust. Thus it would be declared a cluster leader and if colludes with the other malicious nodes then serious damage can be done to the system. This method has no cure for removing the malicious nodes. Thus from a security point of view this is a very weak protocol and can be breached very easily from the mobile ad hoc networks side.

## 2. Conclusions

In this research a variety of new protocols are set up for the heterogeneous networks. The research approach is to handle more multimedia traffic without any delays or problem. Our intention is to increase the system capacity the whole time. While at the same time the security architecture of the protocol is being neglected and not given much attention. Our focus is on knowing about the effects which will happen when there is an attack on the system capacity or how it will respond to it. Our approaching work will focus on showing how an attack can damage the system capacity and show its effects and the delivery ratio.

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# A STRATEGY FOR POVERTY ALLEVIATION IN INDIA - AN APPROACH FOR RURAL DEVELOPMENT

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## ABSTRACT

*Rural development has assumed global attention especially in the developing nations. It has great significance for a country India where majority of the population, around 65% of the people standing in rural areas. The present strategy of rural development in India mainly focuses on poverty alleviation i.e., for better livelihood opportunities, provision of basic facilities like infrastructure through innovative programmes of self-employment and salary. I describe the role and function of the Government and its' programmes for rural development in India. The technology interventions in the field of rural development have been discussed briefly and efforts being made to give an innovative idea. The poverty alleviation programmes were not successful in most parts of India but still government putting efforts to make strategy successful. Especially to cover the lack of proper implementation and right targeting, overcome the overlapping of schemes, control population to renders the scheme ineffective, try to reach the deserving poor. Poverty alleviation is one of the guiding principles of the planning process. The role of economic growth in providing more employment opportunities to the population has been clearly recognized. Poverty rates in India have declined over the last decade, but the incidence of poverty remains high. So this paper is an attempt to study national schemes and programmes for poverty alleviation in India.*

**Keywords:** Poverty, Plans, Programmes, Poverty alleviation.

## 1.Introduction

For the growth of the Indian economy, rural development is the most important factors as India is an agriculture based country. Agriculture contributes nearly one-fifth of the gross domestic product in India so that there is increase in the growth of agriculture. Government proposed several programs and schemes pertaining to rural development in India. The Ministry of Rural Development in India is the apex body for formulating policies, regulations and acts pertaining to the development of the rural sector. Agriculture, handicrafts, fisheries, poultry, and diary are some contributors to the rural business and economy. Rural development in India has witnessed of several changes over the years in its approaches, strategies and programmes. It has assumed a new dimension and perspectives as a consequence. Rural development can be more meaningful only through the participation of clienteles of development. Just as implementation is the touchstone for planning, people's participation is the centre-piece in rural development. People's participation is one of the foremost pre-requisites of development process both from procedural and philosophical perspectives. By improving rural people's livelihoods in an equitable and sustainable manner, both socially and environmentally, better through access to assets (natural, physical, human, technological and social capital), and services, and control over productive capital (in its

financial or economic and political forms) that enable them to improve their livelihoods on a sustainable and equitable basis.

### **Role and function of the Government**

The various Government's policy and programmes have laid emphasis on poverty alleviation, generation of employment and income opportunities along with provision of infrastructure and basic facilities to meet the needs of rural poor. The Ministry of Rural Development in India is the apex body for formulating policies, regulations and acts pertaining to the development of the rural sector. Agriculture, handicrafts, fisheries, poultry, and dairy are the primary contributors to the rural business and economy. The introduction of Bharat Nirman, a project by the Government of India in collaboration with the State Governments and the Panchayati Raj Institutions is a major step to improve the rural sector. The National Rural Employment Guarantee Act 2005 was introduced by the Ministry of Rural Development, for improving the living conditions and its sustenance in the rural sector of India. The Ministry of Rural Development is engaged in legislations for the social and economic improvement of the rural people. The ministry can broadly be elaborated as to encourage, promote and assist voluntary action in the implementation of projects for the enhancement of rural prosperity, strengthen and promote voluntary efforts in rural development with emerging technologies which act as national nodal point for co-ordination of all efforts at generation and dissemination of technologies relevant to rural development in its wide sense to assist and promote programmes for conservation of the environment and natural resources. However, various ministries in the central government are engaged directly or indirectly for implementation of many programmes and schemes for the development of rural areas like Ministries of Agriculture, Health and Family Welfare, New and Renewable Energy, Science and Technology, Women and Child Development and Tribal affairs etc. In addition, to strengthen the grass root level democracy, the Government is constantly endeavoring to empower Panchayat Raj Institutions in terms of functions, powers and finance. Grama Sabha, NGOs, Self-Help Groups and PRIs have been accorded adequate roles to make participatory democracy meaningful and effective.

### **Strategies and programs for rural development**

The rural economy is an integral part of the overall Indian economy. As majority of the poor reside in the rural areas, the aim of rural development is to improve the quality of life of the rural people by alleviating poverty through the instrument of self-employment and wage employment programmes, by providing community infrastructure facilities such as drinking water, electricity, road connectivity, health facilities, rural housing and education and promoting decentralization of powers to strengthen the Panchayati raj institutions etc. The various strategies and programs of the Government for rural development are discussed below: Integrated Rural Development Program (IRDP): Introduced in 1978-79, IRDP has provided assistance to rural poor in the form of subsidy and bank credit for productive employment opportunities through successive plan periods. With, Training of Rural Youth for Self Employment (TRYSEM), Development of Women and Children in Rural Areas (DWCRA), Supply of Improved Tool Kits to Rural Artisans (SITRA) and Ganga Kalyan Yojana (GKY) all these introduced as sub-programs of IRDP to take care of the needs of the rural people. Wage Employment Programs: It is like anti-poverty strategies, for assistance of the rural poor families to bring them above the poverty line by ensuring appreciable sustained level of income through the process of social mobilization, training and capacity building. Wage Employment Programs have to achieve multiple objectives. They not only provide employment opportunities during lean agricultural seasons but also in times of floods, droughts and other natural calamities. They create rural infrastructure which supports further economic activity. It encompasses Swarnjayanti Gram Swarozgar Yojana (SGSY), Sampoorna Grameen Rozgar Yojana (SGRY) and National Rural

Employment Guarantee Act (NREGA) etc. NREGA is an act of parliament. It is not merely a scheme or policy. It aims at enhancing the livelihood security of the people in rural areas by guaranteeing hundred days of wage employment in a financial year, to a rural household whose members volunteer to do unskilled manual work. The objective of the Act is to create durable assets and strengthen the livelihood resource base of the rural poor. Employment Assurance Scheme (EAS): EAS was launched in October 1993 covering 1,778 drought-prone, desert, tribal and hill area blocks. Which was later extended to all the blocks in 1997-98. The EAS was designed to provide employment in the form of manual work in the lean agricultural season. Food for Work Program: This Work program was started in 2000-01 as a component of the EAS in eight notified drought-affected states of Chattisgarh, Gujarat, Himachal Pradesh, Madhya Pradesh, Orissa, Rajasthan, Maharastra and Uttaranchal. The program aims at food provision through wage employment. Food grains are supplied at free of cost. Rural Housing: Initiated in 1985-86, the IAY is the program for providing free housing to families of rural areas. It targets scheduled castes (SCs)/scheduled tribes (STs), households and freed bonded laborers. The rural housing program has certainly enabled many BPL families to give pucca houses. The coverage of the beneficiaries is limited given the resource constraints. The Samagra Awas Yojana (SAY) was taken up in 25 blocks to ensure convergence of housing, provision of safe drinking water, sanitation and drainage facilities. The Housing and Urban Development Corporation (HUDCO) has extended its activities to the rural areas, providing loans at a concessional rate of interest to economically weaker sections and low-income group households for construction of houses. Social Security Programs: Democratic decentralization and centrally supported Social Assistance Programs were two major initiatives of the government in the 1990s. The National Social Assistance Program (NSAP), launched in August 1995 marks a significant step towards fulfillment of the Directive Principles of State Policy. The NSAP has three components: a) National Old Age Pension Scheme (NOAPS); b) National Family Benefit Scheme (NFBS); c) National Maternity Benefit Scheme (NMBS). Land Reforms: In this agro-based economy, the structure of land ownership is central to the wellbeing of the people. The government has strived to change the ownership pattern of cultivable land, the abolition of intermediaries, the abolition of zamindari, ceiling laws, security of tenure to tenants, consolidation of land holdings and banning of tenancy are a few measures undertaken. Furthermore, a land record management system is a pre-condition for an effective land reform program.

### **Science and Technology for rural development**

Ministry of Science and Technology plays a pivotal role in promotion of science & technology in the country. The departments has many activities ranging from promoting high end basic research and development of cutting edge technologies on one hand to serving the technological requirements of the common man through development of appropriate skills and technologies on the other. Appropriate rural technology focuses mainly on those technologies which are simple and within the reach of the ordinary people for their own benefit and the benefit of their community and harness the local or regional capacity to meet local needs without increasing dependence on external factors. A large number of governments, public and private non-government organizations are involved in developing technologies for rural areas. However, these technologies have hardly touched the lives of the rural population. Apparently, the problem lies not only in the generation, diffusion and adoption of technologies but also in poor documentation. Recently, efforts have been made by several organizations like NRDC, CAPART, TRCS, NIRD, DST, DBT, CSIR, ICAR, KVKs and other voluntary organizations etc. to bring out a compendium of technologies for rural areas for wide information dissemination and public awareness. A brief account of technologies which are low cost, energy-efficient and environment-friendly as well as appropriate and sustainable for application in rural areas is presented in the Appendix I.

### **Government schemes focusing on Science and Technology are**

S&T Application for Rural Development (STARD): This application facilitating development of promising S&T based field groups and innovative technologies related to rural development. S&T for Women: To promote research, development and adaptation of emerging technology. In fact for empowering women it helps to improve the life style, working conditions and opportunities for profitable employment of women especially in rural areas. S&T Application for Weaker Sections (STAWS): This application aims at the development of economically weaker sections of the society. Tribal sub-plan: Aims application helps in improving living conditions of scheduled tribes based on sustainable science and technology activities. Special Component Plan (SCP): This let in improving the lot of the poor sections of SC community through intervention of Science & Technology.

### **Rural Development as Destination (A Significant achievements by CSIR)**

- Swaraj- India first indigenous tractor which facilitate mechanized agriculture.
- Value addition for rural population through post-harvest technologies like essential oil / menthol production.
- Cheapest water purification technology which includes terracotta purification disc, portable arsenic detection kit, ultrapore membrane-based purifiers for removing virus & bacteria.
- Over 365 technologies passed on to the rural masses through which publications, training sessions, etc.
- Construction of around 30,000 dwelling units using cost-effective construction technologies.
- Reverse Osmosis plant for desalination in Andaman & Nicobar Islands, Gujarat, Rajasthan and Tamil Nadu.

It needs to be mentioned here that in a project jointly initiated by the Andhra Pradesh Government and Council of Scientific and Industrial Research in Karim Nagar, Central Food and Technological Research Institute, where Mysore played a key role in establishing small-scale agro-based industries in district for better livelihoods of the rural communities and promote the setting up and modification of existing rice mills units at Mulkanoor for better yields. Rural Development is the main pillar of Nation's Development. In spite of rapid urbanization, a large section of Indian population still lives in the villages. Secondly, rural India has lagged behind in development because of many historical factors. There is still exists a big challenge to correct the developmental imbalances and priority to development in rural areas.

### **Implementation of programmes**

Ministry of Rural Development is implementing many programmes targeted at sustainable holistic development in rural areas. The thrust of these programmes is on all round economic and social transformation in rural areas. proposed target and strategy plan have been highlighted and presented below.

#### **- Review Five Year Plan**

- An expenditure incurred during the plan and for implementation of those various schemes/programmes government provide fund for expenditure. Target of constructing 2.83 lakhs houses was fixed. Against this target, 3.10 lakh houses were constructed under Indira Awas Yojana. Under which 2.11 lakh families have been benefited under Swarna Jayanti Gram Swarojgar Yojana. Out of this, 1.23 lakh beneficiaries i.e. about 58 % are from SC/ST category. Under Integrated Wasteland 89 Development programme, 82 projects were sanctioned for 3.93 lakh hectare of land. Out of this, 1.50 lakh hectares land was treated

- There is also 1466 Micro Water sheds were sanctioned and 4.28 lakh hectares land has been treated. In Sampoon Grameen Rojgar Yogn , the GOI has allocated 17.28 lakh MT of food grains out of which 15.04 lakh MT food grains have been utilized, also 176.23 lakh mandays were generated.
- Under PMGSY 13,500 Kms roads were completed. In Rastriya Sam Vikas Yojana, 12,504 works were sanctioned. Out of this, 11,496 works were completed. Under .
- The state has been a frontrunner in implementation of DDU-GKY, Gramin kaushal yojna for youth and target provide them employment

## 2. Conclusion and Suggestions

Although several concerned efforts have been initiated by the Government of India through implementing several plans and measures to alleviate poverty in rural India. But still remains much more to be done to spread prosperity in the lives of the people in rural areas. At present, technology dissemination is uneven and slow in the rural areas. Good efforts of government and developing technologies, devices and products for rural areas could not yield high success as population impact every time. Experiences of many countries suggest that technological development fuelled by demand has a higher rate of dissemination. However, in India, technology developers like internet of things, for rural areas have been catering to needs (with small improvement), rather than creating demand. Besides, there is also an imbalance between strategies and effective management programmes to improve the condition of rural people. Propagation of technology/schemes or programmes for rural development is slow and there is a lacking in wider participation of different stakeholders. An ideal approach may therefore, include the government, panchayats, village personals, researchers, industries, NGOs and private companies ie, CORPORATE SOCIAL RESPONSIBILITY to not only help in reducing this imbalance, but also to have a multiplier effect on the overall economy.

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# A STUDY ON PROMOTION/BRANDING OF MAHUA (MADHUKA LONGIFOLIA) IN CHHATTISGARH STATE

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## ABSTRACT

*Mahua is a tree which is found in dense forests of bastar region and is of great importance to tribal people because of its various useful outcomes. The tree is also of great commercial importance. The flower of the mahua tree is used by the people to make liquor. The liquor produced is famous for consumption among local people. It has been observed that various regions of the country has its own variety of liquor. for eg- goa is famous for its variety 'feni'. Similarly in order to market the rural product of Chhattisgarh i.e 'Mahua' the government needs to promote the product by creating a Brand. This will help in its commercialization and also will create employment for rural people. Although the government of India and various states have put a ban on liquor looking it as a social evil, which is deteriorating the culture of society. But as far as the economic view is concerned the liquor market contributes to a large share of the revenue though selling mahua is ban but it is sold through unorganized channel, So for development of rural economy the government should take some measures to promote this heritage liquor of the state.*

**Keywords-** *Mahua Plant, Promotion, Branding, Forest Product, Mahua flower uses*

## 1.Introduction

Whenever people talk about development of India we refer rural areas, we think about empowerment of rural population by providing livelihood to the people. Forest provides various resources to the people to run their livelihood. In tribal areas of Chhattisgarh such as Bastar there are ample resources like fruits, seeds, roots, leaves, flowers, grasses etc. There are hundreds of species of herbs & shrubs which are of medicinal importance. Timber is also very useful. These products are freely available and in abundance, which is a boon to the tribal people. Tendu, Lac, Mahua, Chirongi, Sal, Harra, Tamarind etc are also output of these forests and are of great commercial importance to the local people.

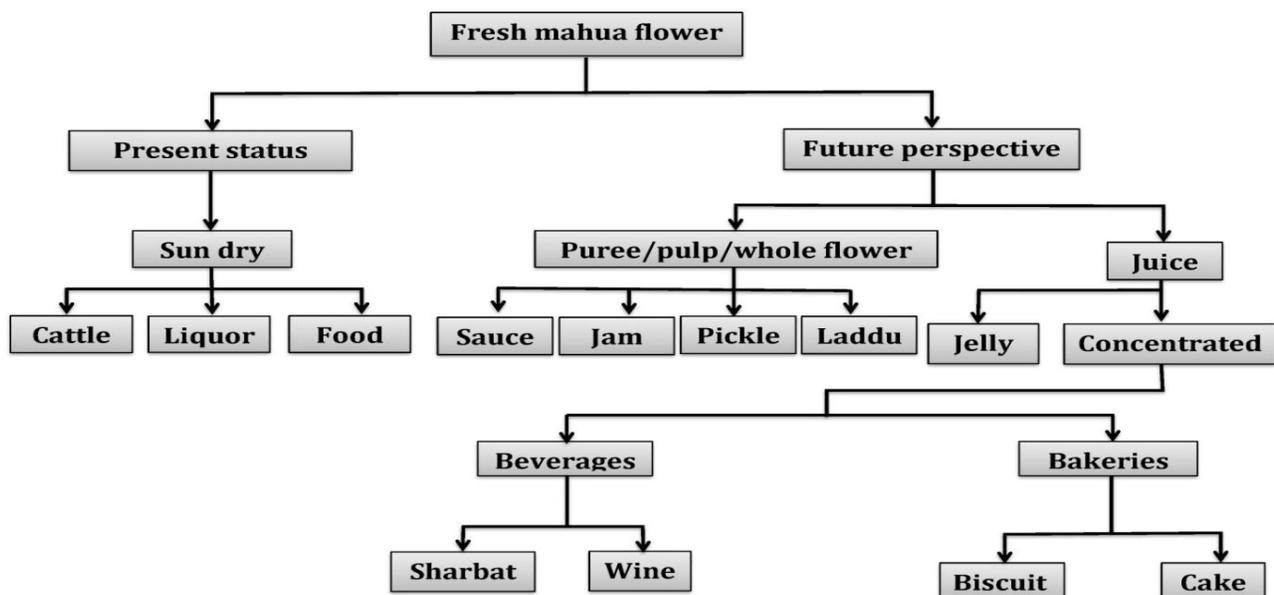
Madhuca longifolia, is its scientific name commonly known as mahua, is a tree found mainly in the central and north Indian forests. It is a fast growing tree that possesses evergreen quality. It is adapted to dry environments, being a prominent tree in tropical mixed deciduous forests in India it is found in the states of Chhattisgarh, Jharkhand, Uttar Pradesh, Bihar, Madhya Pradesh, Kerala, Gujarat and Orissa.

It is cultivated in warm and humid regions for its seeds, flowers and wood. The oil extracted from its seeds is used for the care of the skin, to manufacture soap or detergents, and as a vegetable butter. The seed cakes obtained after extraction of oil constitute very good fertilizer. The flowers are used to produce an alcoholic drink. Several parts of the tree, including the bark, are used for their medicinal properties. It is considered holy by many tribal communities because of its usefulness.

The mahua flower is edible and is a food item for tribals. They are used to make syrup for medicinal purposes. They are also fermented to produce the alcoholic drink mahua, a country \_liquor. Tribals of Bastar in Chhattisgarh and Orissa, Santhals of Jharkhand, Koya tribals of North-East Andhra Pradesh and tribals of North Maharashtra consider the tree and the mahua drink as part of their cultural heritage. Mahua is an essential drink for tribal men and women during celebrations. The main ingredients used for making it are gud (granular mollasses) and dried mahua flowers. Mahua flowers are also used to manufacture jam.

Mahua season lasts for 2-3 months when the tall trees shed them. The pale yellow flowers lie down on the ground making a yellow sheet on the ground. Men, women, and children come out of their homes and start filling their baskets with the flowers. You can see people walking on the road with baskets full of flowers, with small girls carrying small baskets.

At night they burn the dry leaves around Mahua trees so that next morning the flowers can be picked up easily over the dark ash. Mahua tree is considered sacred by the tribals, as almost all parts of it are useful for the humans. The bark has medicinal value, seeds make a good fertilizer and oil can be used as fuel oil. Mahua flower is also used in home recipes both as an ingredient and as a herb. As an ingredient, Mahua flower is added to the dishes for flavoring. So instead of boiled rice, you may get Mahua flavored boiled rice. It is used to make pickles. Mahua flower is fed to the cattle. As a herb, it is given to lactating mothers both human and cattle as it is said to help the body produce more milk.



### Processing of Mahua :

It has a great role in tribal economy and marketing.

There are three distinct and marked phases of flower dropping.

- **Shuru** – this lasts for 5-6 days. During this period, flowers that are collected possess a shrunken appearance. On drying, flowers collected during the phase yield 25% by weight of total collected produce.
- **Bharwari** – this stage follows shuru period, and lasts around a week. The qualities of flowers that drop during this period are highest, with yields going up to 50% post drying. They possess a bold and succulent appearance.

• **Kanwa** – last stage of flower dropping, they indicate end of collection period. The flowers of this stage bear resemblance to that of flowers at initial stage in appearance as well as in yield.

Business Includes collection that may be by hired tribes @ 10-20/- INR or voluntarily seeking extra income by selling it.

The collected mahua is then kept for sun drying for 3-4 days on the roof top, in the open area inside the house or in the front yard depending upon the sunlight. Sun drying may be followed by shade drying before it is finally stored or disposed off. Each day's collections are dried separately so that there is no moisture transfer from one lot to age in years productivity in kgs.

#### **Processing of Mahua occurs at three levels:**

- **Drying:** collectors dry the flowers before they sell
- **Stocking:** traders stock in cold storages
- **Brewing:** brewing of liquours household/bhatti/large brewer level

Drying is done immediately after collection. It is rarely observed that the flower is sold without drying. Hence this is generally put as part of production sub-system.

Stocking, technically, is not a processing activity. However, in the case of Mahua it has a special connotation. In order to retain its colour and quality Mahua is put in cold storage. Generally this is done by the large traders and wholesalers.

The most important processing done with mahua flower is brewing. For household use, the tribal brew it at home. However commercially it is undertaken by Bhattis or large scale brewers.

#### **Processing of Mahua flower into brew-**

Large scale brewing by licensed bhattis is not permitted in Chhattisgarh. Hence brewing is a household industry in the tribal belt of the state. However every household does not engage in brewing. In a village of 60-70 households, barely 5-7 households are engaged in this activity.

#### **The Process-**

Mahua flowers are put in earthen pots filled with water two days before it goes into brewing. After the bubbles are seen on the top of the pot, that pot of flowers is fit for further processing in the furnace and transferred to the brewing brass pot on the bottom.

The brewing room has a hearth/furnace with three pots put on one another. The bucket placed near the furnace is connected to the brew pot with a pipe. The process often takes five to six hours. The skills of brew making are primarily with the women. Often as a business woman, they protect the brew from the male members of their households so that they get the returns expected. They lock the brewing room if they go out for some other work.

Almost ninety per cent of the Mahua flower is used for making brews. Hence tribals who collect and produce are also the ultimate consumers. In the case of Chhattisgarh, tribals are the only legal processors. But what is important is that every other player in chain is expected to contribute to keeping the form intact including colour and texture. Change of form is not desired. Every tribal household sells the collection during the collection season and purchases it round the year. But they do

not have the capacity and wherewithal to store the annual requirements. Those having storage capacity or access to storage facility are the gainers in this game. In our context availability of modern storage facility or even a modest godown is limited to urban places. The state owned warehouses primarily caters to agricultural produces.

To quote a premier Mahua trader, production of Mahua flower may vary between two to four lakh tonnes. However comparing the national production data, it may be an over estimation. But it speaks of the variations. Similarly price varies between Rs 12 to 24 in the retail market. Production in neighbouring states especially Orissa also influences prices. But these swings are not always in favour of the primary producers. These fluctuations in production and prices make availability of storage facility/infrastructure in an accessible place and at affordable cost a critical constraint.!

Currently Chhattisgarh does not allow large scale mechanized brewing. This may be a constraint in tapping the external market, both national and international, where stringent standards in manufacturing processes are expected to be followed.

While many parts of India are considering Prohibition, Assam is nursing its drink. In August, the Assam government announced that country liquor produced in the state could be bottled, branded and sold in two flavours by private companies in Assam. In 2016 the state government had declared traditional brews made by various tribes as “heritage liquors” that could be bottled and retailed within the the state.

Ethnic people used to produce these liquors family wise, Now it can be produced on a commercial basis by any private enterprise. Only 25 per cent of the cakes (the discs of raw material that are fermented into wine or beer) must be bought from self-help groups within the community. The benefits have to go to the community.”

Another state that has successfully cashed in on traditional liquor is Goa. In April 2016, Goa gave its local feni drink the tag of a “heritage spirit”, which the state differentiates from country liquors. Unlike Assam’s new legislation, which allows its local country/heritage liquors to be branded and sold only within the state, feni’s heritage spirit tag has opened up markets for it across the country.

#### Mahua’s unorganized channels of Marketing –

Sub sector players	Role
Mahua producer/collector	Collection, drying
Kuchia	The first level of trader who visits villages for collection of Mahua flower with a bicycle
Haat trader	Storage and sale to haat retailer
Wholesaler	Purchases from both mandi and kuchia, stores in cold storages and sells back to the kuchias and also to bulk traders
Commission agents/brokers	Facilitates transactions without directly taking any responsibility of movement of produce
Retailers	Procure Mahua from whole sellers and sale in retail outlets
Cold storage owners	Storage
Mandis	Facilitate bulk trade, issue mandi tax receipts
Forest department officials	Supposed to play the role of facilitator
Transporters	Bulk transport of Mahua flower
Gunny bag suppliers	Providing packaging materials
NGOs	Advocates interests of primary collectors, facilitates collectivization at village/local level
Bhatti owners(other states)	Bulk consumers and play a role in determining prices

## 2. Conclusion

So if we see the commercial usage of mahua it is of great use to the rural people which can help develop rural economy. If we stop looking liquor as a social evil, it can help rural people earn their livelihood. Since many different states have their heritage liquor Chhattisgarh too can have one. If the government promotes this rural product by declaring 'heritage liquor' an organized way it can help the rural people alot. This can be a boon for rural economy. Branding will help it in getting more value. The mahua heritage liquor can be sold at souvenir shops.

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# FOREST PRODUCE OF CHHATTISGARH WITH SPECIAL REFERENCE OF TENDU LEAVES

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## ABSTRACT

*Forest produce is defined under section 2 (4) of the Indian Forest Act,1927. Its legal definition includes timber, charcoal,catechu,cdoutchouc,wood-oil,resin,natural varnish,bark,lac,myrobalans,mahua flowers,(whether found inside or brought from a forest or not ), trees and leaves,flowers and fruit,plants(including grass,creepers,reeds and moss),wild animals,skins,tusks,horns,bones,cocoons,slik,honey,wax,other parts or produce of animals and also includes peat,surface soil,rocks and minerals etc,when found inside or brought from a forest,among other things.*

*Chhattisgarh is a 29<sup>th</sup> state of India, located in central-east part of the country. It is a resource rich state.Geographical area under forest of Chhattisgarh is very rich.The recorded forest area in the state is 44.21% of its geographical area.Forest department of Chhattisgarh is the sole custodian of rich forest resource of the state.The purpose of this study is to explore the importance of “Tendu Leaves”used as a prospective forest produce trading in the national as well as international platform.This study will further throw light on various steps taken by Government of Chhattisgarh for encouragement of “Tendu Leaves” trading and marketing.”Tendu plants” also as a forest produce of Chhattisgarh has sound potentiality to flourish as a commercial purpose in current scenario.*

**Keywords:** *Forest Produce, Minor Forest Produce,Tendu Leaves,Tendu Plants.*

## 1.Introduction

Forest produce can be divided into several categories.From the point of view of usage forest produce can be categorised into the three types – Timber, Non-timber and Minor Minerals. Non-timber forest products (NTFPs) are also known as “Minor Forest Produce” (MFP) or “Non- wood forest produce”(NWFP). Chhattisgarh is one of the huge source of minor forest produce in India.The following are the important varieties under minor forest produce in the basis of(collection and trading) according to the Chhattisgarh State Minor Forest Produce Co-operative Federation Ltd.-

- a) Tendu Leaves (Diasporos Melonoxylon).
- b) Gums of Kullu.
- c) Dhawda.
- d) Khair.
- e) Babool.
- f) Sal seeds.
- g) Harra.
- h) Tamarind.
- i) Chironji.
- j) Lac.
- k) Karria lacca.

### Tendu Leaves

Chhattisgarh is a pioneer state of india, producing the best quality “Tendu Leaves” (Diasporas Melonoxylon). Nearly 70% production of the country’s tendu leaves is produced in Chhattisgarh State.Sarguja and Bastar are the main tendu producing area of Chhattisgarh.Good quality tendu leaves is found at Bilaspur,Raipur,Sarguja,Bastar,Kanker etc. In Chhattisgarh the collection season is from 3<sup>rd</sup> week of April to 2<sup>nd</sup> week of June.The collection season starts earlier in the southern part of the state in comparison to northern part of the state. The tendu leaves are used as Beedi(rural form of cigarette) wrappers. Tendu leaves are the most profitable minor wealths of the forest of Chhattisgarh in present scenario.The state forest produce earnings is very much depends on tendu leaves.The following are the year wise details of collection and sale of tendu leaves in the state are as follows :-

The demand of good quality tendu leaves is found not only inside the country but also outside of India –

Year	Collected Quantity (Lakh Standard Bags)	Collection Wages (Rs. Crores)	Sale Value (Rs. Crores)	Average Sale Rate (Rs. per Std. Bag)
2001	16.67	75.53	165.22	1000
2002	19.58	88.92	198.71	1015
2003	18.12	82.18	173.25	956
2004	18.86	84.92	148.50	787
2005	14.92	67.17	135.06	906
2006	14.72	66.31	140.02	951
2007	17.18	85.96	325.59	1895
2008	13.79	82.77	197.61	1434
2009	14.67	95.33	256.41	1748
2010	15.45	108.15	335.30	2170
2011	13.57	108.52	355.31	2619
2012	17.15	188.66	646.90	3772
2013	14.71	176.70	362.13	2461
2014	14.28	171.40	334.75	2345
2015	13.01	156.13	345.50	2656
2016	13.61	204.21	638.89	4693
2017	17.10	307.81	1368.03	8000

The demand of good quality tendu leaves is found not only inside the country but also outside of India –

Date	HS Code	Description	Destination	Port of Loading	Unit	Quantity	Value (INR)	Per Unit (INR)
Nov 22 2016	14049010	BIDI WRAPPER LEAVES (TENDU) BIRI LEAVESPKD IN JUTE BAGS (WE INTEND TO CLAIM REWARDS UNDER MERCHANDISE EXPORTS FROM INDI	Pakistan	Nhava Sheva Sea	KGS	6,000	1,664,080	277
Nov 22 2016	14049010	BEEDI WRAPPER LEAVES (TENDU)	Sri Lanka	Tuticorin Sea	KGS	6,000	2,071,468	345
Nov 19 2016	14049010	BEEDI WRAPPER LEAVES (WHOLE)(TENDU LEAVES) WE INTEND TO CLAIM REWARDS UNDER MERCHANDISE EXPORTS FROM INDIA SCHEME (MEIS)	Sri Lanka	Tuticorin ICD	KGS	3,000	887,186	296
Nov 18 2016	14049010	BEEDI WRAPPER LEAVES (TENDU)	Sri Lanka	Tuticorin Sea	KGS	6,000	1,954,729	326
Nov 18 2016	14049010	BEEDI WRAPPER LEAVES (WHOLE) (TENDU LEAVES) WE INTEND TO CLAIM REWARDS UNDER MEIS	Sri Lanka	Tuticorin Sea	KGS	6,000	1,968,433	328
Nov 17 2016	14049010	BEEDI WRAPPER WHOLE LEAVES (TENDU LEAVES) WE INTEND TO CLAIM REWARDS UNDER MEIS	Sri Lanka	Tuticorin Sea	KGS	2,090	739,069	354
Nov 05 2016	14049010	BEEDI WRAPPER LEAVES (WHOLE)(TENDU LEAVES) WE INTEND TO CLAIM REWARDS UNDER MERCHANDISE EXPORTS FROM INDIA SCHEME (MEIS)	Sri Lanka	Tuticorin ICD	KGS	1,500	385,759	257
Nov 03 2016	14049010	BIDI WRAPPER LEAVES (TENDU) BIRI LEAVESPKD IN JUTE BAGS (WE INTEND TO CLAIM REWARDS UNDER MERCHANDISE EXPORTS FROM INDI	Pakistan	Nhava Sheva Sea	KGS	6,000	1,634,320	272

### Policies of State Govt. Regarding Tendu Leaves Collection

In Chhattisgarh Govt. took a major policy decision in 2004 that instead of selling godowned leaves, sell the green leaves in advance to the purchaser. The collection of leaves and the payment of the collection wages to the pluckers will be done by the “Primary Co-operative Society” only. Green leaves will be handed over at the collection centre to the purchaser appointed in advance of collection. The purchaser will treat the leaves at collection centre, transport and store in his godowns or the godowns of Forest Department/Federation in double lock inside the state.

### Welfare Schemes taken by Chhattisgarh State Minor Forest Produce Co-operative Federation Ltd

Minor forest produce (MFP) means the produce forest species in the form of fruits, seeds, leaves, barks, roots, flowers and grasses etc. The State Minor Forest produce co-operative federation Ltd implemented of many socio-economic welfare schemes for the tendu leaves gatherer families like free footwear distribution, scholarship schemes for education of their children, insurance schemes for the members of Tendu Leaves gatherers, distribution of profit from the trade of tendu leaves in the form of differed wages etc.

### Tendupatta Bonus Programme

In Mahasamund district at Bagbahara mini stadium on 8<sup>th</sup> December 2017 celebrate a Tandupatta Bonus Programme. In this programme 7 thousand tendupatta collector given 21 crore 39 lack Rs. for bonus. The state govt. has launched the “Tendu leaves Bonus Tyohar” (festival), which took off from December 2 and is slated to end on December 11. Around 14 programmes will be held in different districts and developmental head-quarters within the state.

The Ramam Singh-led Chhattisgarh government would be doing out bonuses worth Rs.274 crore to tendu leave collectors, located in areas affected by left-to-wing (LWE) extremism in the state. “Green Gold” collection is slated to benefit around 1.4 million tendu leave collectors in Chhattisgarh – a majority of whom reside in areas considered to be a strong hold of Naxal Rebels.

### **Communally Benefits of Tendu and its Fruits**

There are various varieties of this fruit being cultivated, the popular one is the Chinese native, diospyros kaki, widely known as the Japanese Persimmon. Persimmon fruit is the brilliant orange coloured skinned fruit, that share close resemblance with Tomato in appearance, in fact is a berry. It is a low-calorie fruit rich with minerals such as Phosphorous, Calcium and Vitamins including Vitamin A and C.

Persimmon benefits for health :

- Anti Oxidants.
- Macular Degeneration.
- Weight Loss.
- Improves Digestion.
- Energy.
- Cardiovascular Health.
- Cancer.

Persimmon benefits for Skin & Hair:

- Brightness Skin Tone.
- Control Oil Secretion.
- Delays Signs of Ageing.
- Prevents fine lines and wrinkles.
- Promotes healthy hair.

### **2.Suggestions and Conclusion**

- 1) Uses of “Plastic” is banned in state as considered harmful element creating pollution and encourages more and more uses of “dona” and “pattals”(utensils made of leaves). Hence in place of such harmful products like “polithin” or “plastic” which is commercially consummated in a huge amount should be replaced by the most economical and easily available product like “dona” and “pattals”(made of tendu leaves).
- 2) Tendu fruits can also be used in making as a healthy drinks and low calorie food because it is rich with Vitamin A and C, Calcium and Phosphorous. This fruits is also beneficial for skin and hair so it can be used by dermatologists as a beauty products.
- 3) Proper spread of awareness about new developmental programmes/schemes in promoting tendu leave trading among tendu leave collectors/gatherers.
- 4) Encouragement should be given to unemployed women specially in rural areas and ensuring them timely and actual financial benefit is to be provided.

The state forest produce earnings is very much depends on tendu leaves. Trade of tendu leaves increases the chances of employment opportunities specially in the rural areas of the state by providing work when farm based employment is low. Policies and Welfare schemes taken by Chhattisgarh Govt. regarding tendu leave collection and trading have played a major role to reduce poverty, specially in the rural areas of the state.

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# A MOBILITY MODELS IN MOBILE ADHOC NETWORK

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## ABSTRACT

*Mobile Adhoc Network is a self configuring, agglomeration of wireless nodes. It can dynamically changing network topology that formed without using any pre installed infrastructure or any central administrator. Currently Adhoc technology is not deployed too much spacious hence research in this area is only simulation based. Many parameters are momentous for MANET performance like routing protocols, energy efficiency, security of network and mobility of nodes. This paper presents different mobility models that delineate the movement behaviors of different mobile nodes under different geographic conditions.*

**Keywords :-** Adhoc, MANET, MNs, Mobility Model

## 1.Introduction

Mobile Adhoc Network (MANET) is a agglomeration of wireless mobile nodes that exhibit the properties like self formed, self healing, self configuring and without under the control of any pre installed environment. Mobile nodes (MNs) in MANET move freely without any restriction. Direct link formed between MNs if they are within the radio range of other MNs. Otherwise the indirect link used i.e. in-between nodes used to send data from source to destination node.

Always same path are not followed to transfer information between sender and receiver because network topology in MANET are continuously due to the mobility of nodes. Some nodes leave and some entering in communication range of mobile network after duration of some time.

So every time it requires checking connectivity whether the path exist or need to be reconfigured. Two types of routing protocols are used to establish the path between different MNs Proactive and Reactive. In Proactive routing protocol information are continuously exchanging within the network topology to keep track different path whether they active or not. Whenever any MN wants to communicate with other nodes link will available immediately. On the other hand in Reactive protocol route formed only on demand. Whenever any MN wants to communicate with other MN link will be formed.

MANET will provide extensive applications in future like movable virtual classroom connectivity, battlefield communication management, disaster relief management, search and rescue management.

## 2.Mobility models

Mobility models represent the movement of mobile devices and also describe how the location, velocity and connectivity within the nodes are changing over the time. These mobility models are use for simulation intent whenever new changing techniques and environment are applied on mobile nodes to get commendable performance and obtrusive connectivity within the mobile Adhoc network. Different protocols are applied to test the behavior of mobile devices under different mobility models.

Two types of mobility models are available Traces and Synthetic. Traces are used to observe the mobility patterns in real life situations. Trace provides accurate information when there is large number of users present for long duration of time. But it is difficult to modeled in case of new environment like Adhoc network where traces have not yet been created. It is difficult to create trace of network because MANET not so physically deployed so synthetic models are used that is not trace driven. In synthetic models different mobility models are used that provide the behavior of MNs under different geographic and spatial conditions .

### **Random Based mobility Model**

In random mobility models the mobile nodes move freely and randomly irrespective of any restrictions. The parameter like destination, velocity and directions are randomly chosen and are independent of other mobile nodes. RBMM are more used for simulations purpose than other models .Random waypoint model, Random direction model, and Random walk model are the category of RBMM. Random waypoint model (RWPM) RWPM was first proposed by Johnson and Maltz. This model now became benchmark to provide comparability of different Mobility models because of its simplicity and widely used. The MNs used random speed between pre defined range [min-speed max-speed] and direction between  $[0, 2\pi]$ . The RWPM includes pauses between changes of speed and direction. The MNs are free to move in any direction and at any speed. After choosing random speed and direction MNs moves towards that particular point and after reaching that point all MNs take pause time and again take random speed and random direction and continue until MNs are not reaches to simulation area. Relative speed of two MNs determines whether the link between two nodes broken or formed instead of defined their individual speed.

### **Random Direction Model (RDM)**

RDM was created to overcome the problem of density waves produced in random way point model. Density wave problem is the clustering of nodes at one part of the simulation area. In RDM MNs choose random direction instead of random destination. Every time destination is border of simulation area. All the MNs are placed in the simulation area and assigned angular

direction in rang between  $[0, 2\pi]$  and velocity

$$[0, V_{max}]$$

between

When MN reaches border of simulation area it pauses for certain time period and again start moving with random direction until simulation not terminate. All MNs pauses at border of simulation area so that the average hop count for data packet at RDM are much higher than other mobility models and also network partition will be more likely with RDM as compared to other models.

### **Gauss-Markov Model**

Gauss-Markov model (GMM) was first proposed by Liang and Haas [C] .The main disadvantage of random mobility models is sudden and sharp turns and sudden stops. To overcome this problem GMM used previous velocity and direction of node to calculate current speed and direction. By using the current speed and velocity of node  $i$  the future location can be calculate.

### **Random Walk Model (RWM)**

RWM was mathematically described by Einstein in 1926 [3, 9]. RWM describes individuals of MNs w.r.t. cells. Many MNs spectacle unpredictable movement behaviors so RWM was developed to mimic the eccentric behavior of those MNs. RWM describes the memory less process i.e. does not keep track of previous speed and direction, after time  $t$  it again calculate speed and direction. Whenever all the MNs reaches to border of simulation area, the whole process terminate the further movement of MNs and angle calculated the incoming angle. The difference previous random model and RWM model is that previous models used some pause time but this model used zero pause time.

### **Reference point group model**

Reference point Group model (RPGM) describes the behavior of MNs group that are dependent to each others like in military number of solders moves in a groups and in disaster relief the number of person moves in groups.

### **Set of Correlated Models**

Column Mobility Model and Purse Mobility Models model are spatially correlated models that describe the strong spatial dependency between MNs. In Column Mobility Model (CMM) MNs moves in predefined fixed directions. When MNs reaches at the boundary of simulation area it rotated at 180 degree. CMM are used for searching and scanning purpose. In Purse Mobility Model (PMM) group of nodes moves behind single head node and mainly used in target tracking and law enforcement.

### **Pathway mobility model**

Pathway Mobility Model (PMM) is used to restrict the behavior of MNs according to obstacles in pathway. The map is predefined or can be generated randomly based on certain map of real life situation. A figure 9 show the PMM in which node describes the buildings and edge describes the path between those buildings. MNs are placed on edge and simulation starts and with randomly chosen destination node move towards destination and after reaching it take pause for certain amount of time .

### **Obstacle mobility model**

Obstacle Mobility Model (OMM) describes the behavior of MNs in different obstacles placed between simulation areas. As shown in figure 10 obstacles in the form of rectangular area placed within the simulation area. Voronoi path computation used to extract the pathway between buildings.

## **3. Conclusion**

In this paper we studied the different Mobility Models that are used to mimic the behavior of MNs. Each model have their own characteristics and limitations like random mobility models describes how the MNs are moving randomly choosing direction and speed without the effect of other MNs and group mobility models describing how the MNs behave in groups with dependent movement behavior. Models with temporal dependency describing how the MNs current velocity related with previous velocity, spatial dependency models describing how the behavior of group members have changed with group leader and geographic mobility models describing how MNs operate under predefined area or obstacles. These mobility models are not provide user dynamics behavior perfectly but it gives close scenario of real life movement of MNs so the major challenge in this area is to enhance the movement patterns of different mobility models and to overcome the different limitations of different mobility models will be the future work.

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# ROLE OF EDUCATION IN RURAL DEVELOPMENT

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## ABSTRACT

*Education is not the name of accumulation of facts and datas but its essence should appear in the mental concentration. Education makes the men, purifies and develops the character, makes a man cultured and civilized. Education has a desirable controlling influence over development of the rural individual, family, community, and society, leading to reduced poverty, income equity, and controlled, unemployment. The failure of trickle-down, development and recognition of the importance of rural areas and rural people to the economic emancipation of developing countries has given education a key role in rural systems of supply, production, marketing, personnel maintenance, education, health care, and governance. Functions of education include imparting social change, improving individual social position and standard of living, activating participation in rural and cultural development, increasing critical abilities of rural people to diagnose their needs, assert their rights and take greater control of decisions, Affecting their lives, providing trained manpower in rural areas, linking rural and urban sectors, providing employment and income opportunities, increasing labor force productivity, and developing leadership. Education oriented to urban rather than rural needs may do more harm than good by accelerating rural to urban migration, generating youth unemployment, and leaving students ill-equipped to succeed in a rural environment. Education contributing to rural development must be locally controlled, practical, applied, problem-posing, and focused on functional specialization. The functional components are supply, production, marketing, personnel maintenance, education, health care, and governance. A change in any of these components affects all the other components and all aspects of the rural system. Rural development requires educated manpower with a rural background. But, undoubtedly, almost all the rural areas or regions in developing countries are desperately short of highly trained manpower with - rural background. Education ties both rural and urban sectors through change in attitudes, behavior, and skills of rural people. Education prepares rural people to fate the transitional change from rural to urban areas.*

**Keywords:-** Education, rural development , trained manpower, Functional ability, development strategy.

## 1.Introduction

The greater proportion of people in the world live in rural environments The definition of rural development implies that rural development is not only concerned with increased income per capita of pimple living in those areas, but also includes the reduction or elimination of poverty, inequality, and unemployment among the rural folks. Therefore, rural developme nt must be considered as an overall economic development strategy, if a larger proportion of the rural people are to benefit from the development.

Rural areas experience with Universally, rural areas experience wide varieties of social, economic, political, and moral problems such as lower per capita income, lower educational level, fewer employment opportunities, limited educational and cultural facilities, confined social environments, migration, less developed health services .

Governments have made a number of effort to develop their nations' economies through urban-oriented development programs. However, those development effort were focused bated on consumer buying power in the big cities, thus depriving many economic opportunities for citizens of rural areas .

**Factors affecting rural development:**

Rural development is dependent to a large degree on the ability of entrepreneurs to bring together human creativity, capital, education, natural resources, and social and economic infrastructures in an economically rational manner. This implies that there are a wide range of variables playing major roles, independently as well as interdependently, in the process of rural development. There is no single factor which would alone be responsible for rural development. Each factor has its own contributions and limitations in its development function.

**Education as a component in rural development:**

A typical rural system is characterized as having seven functional components, related to each other through a linkage of infrastructures, and all set into a social, political, economic, religious, cultural, and physical environment. The functional components are supply, production, marketing, personnel maintenance, education, health care, and governance. A change in any of these components affects all the other components and all aspects of the rural system.

**Education means:**

Education is the expression of complete development of man. Through education, current of will power can be controlled positively education should be looked upon as a development of different powers, not in the memory of words collection. Education teaches a man to contemplate in the right direction. Education is not the name of accumulation of facts and datas but its essence should appear in the mental concentration. Education makes the men, purifies and developes the character, makes a man cultured and civilized.

**Role of education:**

Education has long been recognized as a potential means for rural development. In many developing countries, education has been seen as a panacea for national development. The education system is considered as a key factor in the rapid sectorial, regional, and national development in many developing countries. Education is both the product of society as well as an important tool for bringing about changes in the rural community. There is a dialectical relationship between education and society. Rural development and educational development are inseparable. Education encourages involvement of individuals from the cradle to the grave in imparting knowledge.

As mentioned earlier, education is a key factor for rural development. Education should be focused on long term goals as well as short term tactics in developing of an individual, a community and a nation as a whole. In every society, different forms of education produce different culture.

Woman are half of any society. Its education and development can only be civilized and prosperous. It is said that if a man is educated then only one person is educated, but if a woman is educated, the whole family becomes educated.

**Education as a principal development strategy:**

Many development economists apparently believe that education is a primary means of promoting economic development in rural areas. Many insist on a need to change the form of the educational system to make it more appropriate to their national priorities

**Education makes people conscious:**

Rural areas are today faced with a host of social, economic and political problems. These problems have significantly out paced the rate of growth in industry, trade, agriculture and education. Despite greater government efforts in the development of rural areas, the gap has widened between the urban and the rural areas. This imbalance is a factor in the political stability of many developing countries.

**Education helps increase functional ability of rural people:**

Over the years, education has come to be viewed not only in terms of filling basic intellectual gaps, but as a way of strengthening peoples' critical abilities which enhance their capacity to diagnose their own needs, assert their own right, and have greater control over the decisions that affect their lives. The ability to think and act arouse greater political consciousness in people and in turn, leads them to center their actions on behalf of their communities.

**Education provides trained manpower from rural areas:**

Rural development requires educated manpower with a rural background. But, undoubtedly, almost all the rural areas or regions in developing countries are desperately short of highly trained manpower with - rural background. It is also important to have enough manpower for specific occupations in rural development activities. Obviously, rural development is calling for advanced educational preparation at the rural cultural understanding level. The obvious reasons for limited supply of trained manpower is the shortage of quality schools in rural areas. If more schools are built, it is assured that they will contribute to greater cultural understanding and a larger supply of trained manpower for rural development from rural .

**Education Links rural and urban sectors:**

Education helps rural people to modify their physical and social environments and to make steady progress in meeting their needs. No rural community or rural development program based exclusively on self-help activities is isolated from urban sector or the nation. Education ties both rural and urban sectors through change in attitudes, behavior, and skills of rural people. Education prepares rural people to fate the transitional change from rural to urban areas.

**Education provides employment and income opportunities:**

Education must be a vital element in providing employment and income opportunities for rural residents. A rural development goal is to improve the well being or standard of living of rural people by increasing income earning opportunities in rural areas. The role of education in rural development is prominent by its impact on employment and income. Increasing the quantity and quality of education in rural areas can significantly attract private as well as public investors into those areas.

**Education increases productivity of rural labor force:**

Education has the ability to develop human resources in rural areas. In fact, rural development is dependent to a large degree on the ability of entrepreneurs to bring together human creativity, capital, natural resources, and social and economic infrastructures in a rural setting.

In accordance with technological and organizational progress, the quality of rural labor force must also be improved so that new skills can be combined profitably in production activities. Indeed, the greater skills knowledge has become an important factor in raising productivity per unit capital and labor input in both rural and urban areas. Educational facilities in rural areas increase the availability and use of human resources.

**Education develops leadership:**

Leadership is one of the essential elements of direction. Leaders make a country. Leader inspires his people to achieve the desired goal; a manager also leads his followers to achieve the desired results.

The rural world will need competent and dynamic leaders if it is to win the battle against hunger and poverty and succeed in rural development. Education helps to develop and identify leaders in a rural community.

**2. Conclusion:**

Education is a very important factor to bring about this change in rural environment. This paper describes the most important role of education in rural development. In fact, rural development, as a process, depends on a large number of variables of which education is one. Education should be placed first and foremost in the services of democracy, which demands not only that the citizen be protected against arbitrary decisions but also that he/she take part in decisions which affect the future of his/her society.

The useful role education played in the past in rural development clearly suggest that education should be incorporated as an important factor to bring about rural development in developing countries. Education controlled by the rural people will lead development.

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# POLICIES FOR RURAL DEVELOPMENT

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## ABSTRACT

*Rural development is a comprehensive term. It essentially focuses on action for the development of areas outside the mainstream urban economic system. we should think of what type of rural development is needed because modernization of village leads to urbanization and village environment disappears.*

*Rural development aims at finding ways to improve rural lives with participation of rural people themselves, so as to meet the required needs of rural communities The outsider may not understand the setting, culture, language and other things prevalent in the local area. As such, rural people themselves have to participate in their sustainable rural development. This study explores the role that education and training programs initiated and/supported by Haydom Lutheran Hospital play to the development of the rural community. The study have identified some education and training programs by Haydom Lutheran Hospital and explored the motives behind the establishment of those programs as well as the perceptions of the local community towards ducation in general and established programs in specific. The challenges associated with the establishment of education and training programs have also been explored. The experiences learned from the case study as a development project have been highlighted as lesson and example for the expected project at Kabanga Nickel in implementing the Corporate Social Responsibility mission. The findings indicate that various education programs, formal and non-formal have played a great role in the improvement of the living standard of the people around the hospital. On the other hand the contribution of education has been evidenced in the capacity building to the majority of the population that have been possible through education programs. This was highlighted by the number of people that have passed though Haydom Primary School, Dr. Olsen Secondary School, Nursing school, The vocational/trade School, Ngwandaq Primary School as well as by the working population .*

## 1.Introduction

**Rural development** is the process of improving the quality of life and economic well-being of people living in rural areas, often relatively isolated and sparsely populated areas.

Rural development has traditionally centered on the exploitation of land-intensive natural resources such as agriculture and forestry. However, changes in global production networks and increased urbanization have changed the character of rural areas. Increasingly tourism, niche manufacturers, and recreation have replaced resource extraction and agriculture as dominant economic drivers. The need for rural communities to approach development from a wider perspective has created more focus on a broad range of development goals rather than merely creating incentive for agricultural or resource based businesses. Education, entrepreneurship, physical infrastructure, and social infrastructure all play an important role in developing rural regions. Rural development is also characterized by its emphasis on locally produced economic development strategies. In contrast to urban regions, which have many similarities, rural areas are highly distinctive from one another. For this reason there are a large variety of rural development approaches used globally.

Rural development is a comprehensive term. It essentially focuses on action for the development of areas outside the mainstream urban economic system. we should think of what type of rural development is needed because modernization of village leads to urbanization and village environment disappears.

### **Rural development agencies**

- Technical Centre for Agricultural and Rural Cooperation ACP-EU (CTA) Agricultural and rural information provider
- USDA Rural Development, an agency of the United States Department of Agriculture
- European Network for Rural Development { Amaram M. C., FaithGem.
- England Rural Development Programme by DEFRA
- Agricultural Development & Training Society, India
- Azerbaijan Rural Investment Project in Azerbaijan
- Nimbkar Agricultural Research Institute, India
- Chhattisgarh Reportedly DRDA merged; practically only the ZP Chairman is made the Chairman of DRDA.

### **Major Programs are Being Run in India**

#### **(i) Mahatma Gandhi National Rural Employment Guarantee Act (MNREGA)**

The National Rural Development Guarantee 2005(NREGA) is a social security scheme that attempts to provide employment and livelihood to rural labourers in the country.the scheme was designed to provide any adult who registers for rural employment a minimum job guarantee of 100 days each financial year.



#### **(ii) National Rural Livelihoods Mission (NRLM) for self employment and skill development-**

India's National Rural Livelihoods Mission (NRLM) aims to benefit some 350million people in 12 states which account for almost 85% of the rural poor. The World Bank will support the NRLM with a credit of \$1 billion, in continuation of its decade-long engagement in the sector.

**July 05, 2011** - The Government of India's \$5.1 billion **National Rural Livelihoods Mission (NRLM)** is one of the world's largest initiatives to improve the livelihoods of poor rural people and boost the rural economy.

It aims to make a multidimensional impact on the lives of India's rural poor by mobilizing them, particularly the women, into robust grassroots institutions of their own where, with the strength of the group behind them, they will be able to exert voice and accountability over providers of educational, health, nutritional and financial services. This, based on past experience, is expected to have a transformational

social and economic impact, supporting India's efforts to achieve the Millennium Development Goals on Nutrition, Gender, and Poverty.

- (iii) **Indira Awas Yojana (IAY)- Indira Awaas Yojana (IAY)**, is a social welfare flagship programme, created by the Indian Government, to provide housing for the rural poor in India. A similar scheme for urban poor was launched in 2015 as Housing for All by 2022. Indira Awaas Yojana was launched in 1985 by Rajiv Gandhi, the then Prime Minister of India, as one of the major flagship programs of the Ministry of Rural Development to construct houses for BPL population in the villages.
- (iv) **Pradhan Mantri Gram Sadak Yojana (PMGSY)**- for making good roads- Rural Road Connectivity is not only a key component of Rural Development by promoting access to economic and social services and thereby generating increased agricultural incomes and productive employment opportunities in India, it is also as a result, a key ingredient in ensuring sustainable poverty reduction. Notwithstanding the efforts made, over the years, at the State and Central levels, through different Programmes, about 40% of the Habitations in the country are still not connected by All-weather roads. It is well known that even where connectivity has been provided, the roads constructed are of such quality (due to poor construction or maintenance) that they cannot always be categorised as All-weather roads.

With a view to redressing the situation, Government have launched the Pradhan Mantri Gram Sadak Yojana on 25th December, 2000 to provide all-weather access to unconnected habitations. The Pradhan Mantri Gram Sadak Yojana (PMGSY) is a 100% Centrally Sponsored Scheme. 50% of the Cess on High Speed Diesel (HSD) is earmarked for this Programme.

s.no.	Year	Length of road(km)	Amount(crore Rs.)
1.	31 march 2006(Achivement)	1500.00	386.00
2.	31 march 2007(Achivement)	4367.61	952.00
3.	31 march 2008(Achivement)	6450.64	1000.00
4.	31 dec. 2008(Achivement)	4850.00	1300.00
	Total	17168.25	3638.00

(v) **National Social Assistance Program for Social Pension (NSAP)-**

NSAP stands for National Social Assistance Programme. NSAP was launched on 15th August, 1995.

The National Social Assistance Programme (NSAP) represents a significant step towards the fulfillment of the Directive Principles in Article 41 and 42 of the Constitution recognizing the concurrent responsibility of the Central and the State Governments in the matter. In particular, Article 41 of the Constitution of India directs the State to provide public assistance to its citizens in case of unemployment, old age, sickness and disablement and in other cases of undeserved want within the limit of its economic capacity and development. National Social Assistance Programme is a social security and welfare programme to provide support to aged persons, widows, disabled persons and bereaved families on death of primary bread winner, belonging to below poverty line households.

**(vi) Prime Minister Ujjwala Yojna**

Prime Minister Shri Narendra Modi has launched the Prime Minister Ujjwala Yojna and has planned to provide free gas connections to 50,000,000 poor women in this scheme, according to the 2011 census in which the families were kept in poor category or in the BPL category. They were given the benefit of this scheme.

**Objectives-** ·Decrease in the rate of death due to cooking on impure fuel.

Reduce air pollution due to the burning of impure fuels.

**(vii) DDU-GKY-** The Ministry of Rural Development (MORD) announced the Deen Dayal Upadhyaya Grameen Kaushalya Yojna (DDU-GKY) Antyodaya Diwas , on 25<sup>th</sup> September 2014. DDU-GKY is a part of the National Rural Livelihood Mission (NRLM), task with the dual objectives of adding diversity to the incomes of rural poor families and center to the career aspiration of rural youth.

DDU-GKY is uniquely focused on rural youth between the ages of 15 and 35 years from poor families. DDU-GKY has so far committed an investment of more than 5,600 crores, impacting rural youth pan –India.

**(viii) Aajeevika Grameen Express Yojna -**

The Government of India has introduced a new sub-scheme under Deendayal Antyodaya Yojana - National Rural Livelihoods Mission (DAY - NRLM) entitled "Aajeevika Grameen Express Yojana ” (AGEY) from the financial year 2017-18.

- To provide an alternative source of livelihoods to members of SHGs under DAY - NRLM by facilitating them to operate public transport services in backward rural areas, as identified by the States
- To provide safe, affordable and community monitored rural transport services to connect remote villages with key services and amenities (including access to markets, education and health) for the overall economic development of the area by making use of the supports available within the framework of DAY - NRLM.

**(ix) Sukanya Samridhi yojna-**

- Sukanya Samridhi Account (literally *Girl Child Prosperity Account*) is a Government of India backed saving scheme targeted at the parents of girl children. The scheme encourages parents to build a fund for the future education and marriage expenses for their female child.
- The scheme was launched by Prime Minister Narendra modi on 22 January 2015 as a part of the Beti Bachao, Beti Padhao campaign. The scheme currently provides an interest rate of **8.1%** (for October 2017 to December 2017 ) and tax benefits. The account can be opened at any India Post office or branch of authorised commercial banks.

**(x) Sarva Shiksha Abhiyan(SSA)-** under the current scheme of Sarva Shiksha Abhiyan ,NPEGL provides additional resources for the backward classess which are not available to the primary level,these program is being run in those educationally backward block where female literary rates are lower then the national avarege and gender discrimination is higher than the national averge .

**➤ Proposed Plan for Rural Development-**

- Fruit plantation scheme
- Vegetable development program
- Medicine plant development
- Integrated masala development
- Poultry scheme

## 2. Conclusion

India is the country of village. There are millions of villages inside our India country and together with these villages, the entire country of India is formed and for the development of the villages, the entire village can be developed through the implementation of very important programs because only in the village India The heart of the country beats the development of villages will develop the whole nation. villages can be developed from the above modes of various schemes and it will be possible only when the people of the village will provide participation in all such schemes. In the world, India can roam the country.

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# ROLE OF COOPERATIVE SOCIETIES FOR WOMEN EMPOWERMENT IN RURAL AREAS

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## ABSTRACT

*Empowerment of women is a new ideology for carrying democratic values into the family and society. Empowerment of women means equal status to women. Women and children, equal ownership of productive resources, increase participation in economic and commercial sections, awareness of their rights and responsibilities.*

*Rural women suffer the curse of being both socially and economically 'invisible'. The civil society organizations work towards making them visible in these areas. Among these organizations, one with an open membership and democratic control, i.e., a cooperative organization will be more effective than other organizations working for the promotion of social and economic development. A dairy cooperative is one such civil society organization which aims at improving the rural people. Dairying has been an agriculture allied sector and indoor economic activity for women living in rural areas. It gives mass employment and thereby helps to promote economic development of the rural masses. Rural landless, small and marginal agricultural farmers and women are involved in the process of milk production. Dairy cooperatives, as workers level socio-economic organizations, have been working for the strengthening of the rural masses. In this context, the present study aims at examining the Social Change and Economic Development of Rural Women through Dairy Cooperatives. The purpose of the study specifies that the socio- and economic background, awareness of dairy cooperatives and participation of rural women members in dairy cooperatives have helped them achieve social change and economic development.*

**Keywords:** *Cooperative, Women empowerment, Economic, Rural areas, Dairy cooperatives, Mass employment*

## 1. Introduction

The strength of chain is the strength of its weakest link. In a society, women are the weakest links, so that they may be strengthened for strengthening the society as a whole and that is possible only by empowering them. It is said, "Women should be uplifted for the upliftment of the nation, if a woman is uplifted, society and nation is uplifted." Empowerment of women is essential to harness the women labor in the mainstream of economic development. Women either solely or largely support an increasing number of families. In Chhattisgarh the cooperative movement was sponsored by the Government of India. Initially it started as a credit movement of small size with a limited volume of operations. Consequently it spread to diverse spheres of economic activities and has grown into a massive complex organization. Cooperatives are socio-economic development organizations of the people. Cooperatives are founded on the principle of equality and equity. Their plan is to effect social advancement through economic improvement. The success or failure of a cooperative is judged by its economic performance and its social service to the community. An organization with an open invitation and democratic control has more impact than other types of civil society organizations working for upholding social change and economic development.

## Review of literature

**A.Paramasivam<sup>12</sup> (2005)** attempts to study the growth and development, quantity of milk procured and sold, and profitability position of selected Primary Milk Producers Cooperative Societies (PMPCSs) in Tirunelveli District Cooperative Milk Producers Union Limited, Tirunelveli, Tamil Nadu. The secondary data for the period of 1992-2002 was collected from the records of concerned societies. The study found out that the spread 15 of PMPCSs succeeded to make a laudable increase in not only the total membership but also the network of its activities, the quantity of milk supplied by the selected PMPCSs to the union registering a growth rate of more than 6 times and the number of societies making profit has gone up from 114 in 1992-1993 to 206 in 2001-2002. The researcher suggested and concluded that the membership coverage must be widened, new societies must be started in the areas uncovered by the existing societies, all dairy loans sanctioned by the commercial banks must be channelized through the dairy societies and payment for the milk supplied must be prompt and transparent

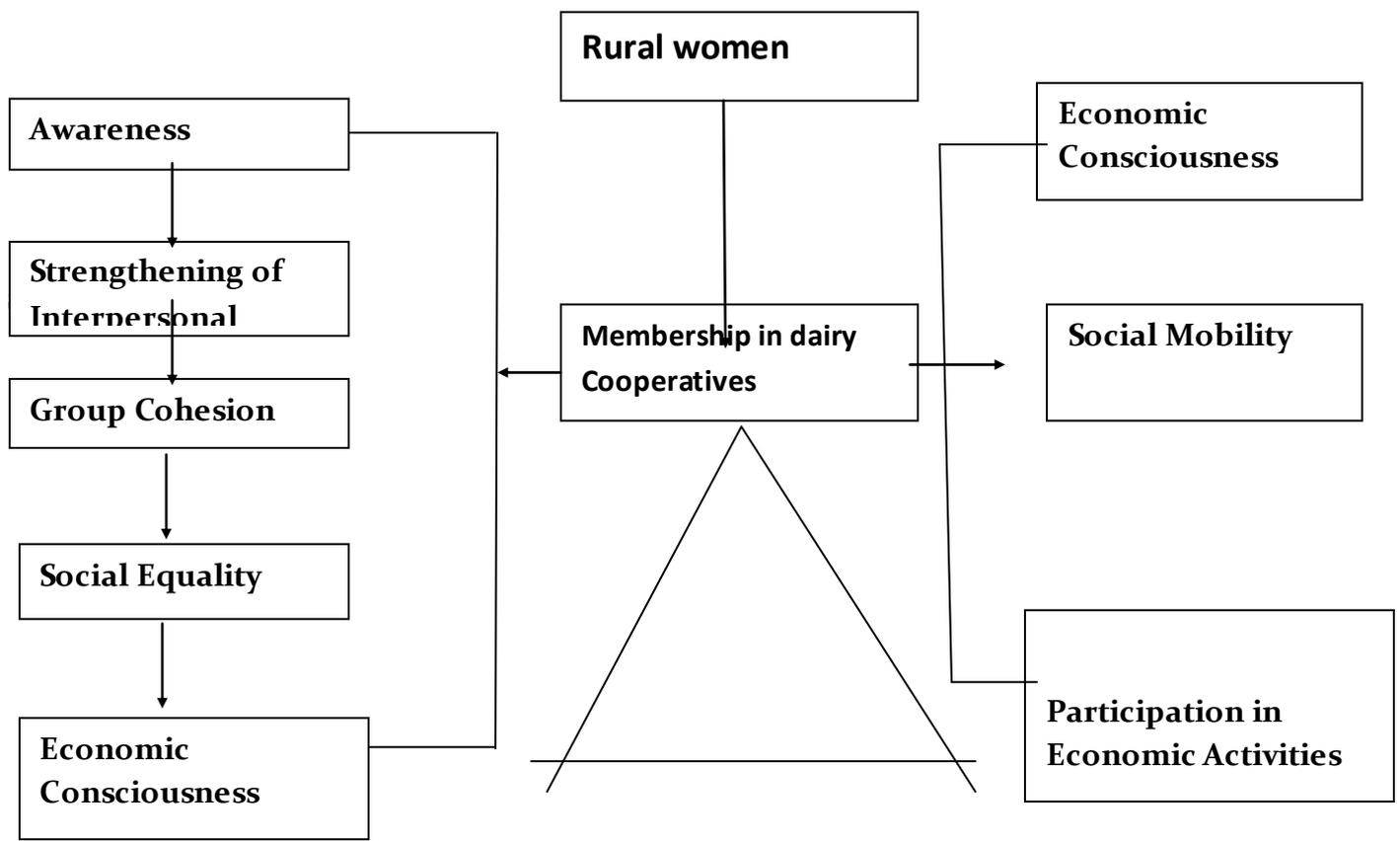
**P.Raji Reddy<sup>14</sup> et al. (2006)** analysed the factors for growth, efficiency, and thereby employment, income generation and women empowerment. They studied 200 sample farmers by adopting survey method. Respondents were selected at the rate of 50 each from four selected villages. The study revealed that four-fifths of members belong to farm size groups of less than 5 acres, dairy has provided monthly revenue in the range of less than Rs. 10,000 for about one-fourth of respondents and cent per cent respondents have perceived the income and employment benefit from dairy cooperatives. The study concluded that the overall effect of the union on 17 effective participation in the dairy operations and the positive impact on economic gains and qualitative aspects may reflect in the empowerment of women.

**K. Sivachithappa<sup>23</sup> (2002)**, analyzed millions of man-hours of work is generated right in the back-yard of several lakhs of farmers household spread over thousands of villages producing a flood of milk and resulting in perennial flow of cash into village economy. It revealed that although the income from dairying forms a small percentage of the gross village product, it has a myriad of multiplier effects having far reaching impact on socio-economic fabric of the village. It also revealed that the dairying as practiced sensitizes the village community to several changes such as discipline by way of waiting in queue, either to pour milk or to receive payment and improved the time sense to catch up the milk lorry twice a day. The researcher suggested that day-today management of the institution necessitate medium and long term planning to meet the needs of the dairy farmers, diversion of dairy cooperative profits for village improvement, gradually improves the management skills and promotes development of leadership traits. The researcher concluded that the dairy development activities are being extended further to touch every nook and corner of the country ushering in white revolution and making an impact on 24 the socio-economic front of the rural scene.

**K. N. Ramanujam<sup>24</sup> (2003)**, examined role of cooperatives in milk marketing venture, through his work "A study on the Distribution of Milk and Milk Products by Cooperatives". The study suggested that while fixing the price for milk and milk products both Governments and Federation have to consider the cost of unions, in order to reduce the cost the unions should pay to the vehicles route wise, instead of kilometer wise and milk products may be transported during the same time while milk is distributed, and enterprise resource planning may be strengthened by using computers. The researcher concluded that sound distribution system of milk and milk products is a must for an effective marketing. Then only our country will emerge as the world's leading dairy nation.

Social Change and Economic Development of Rural Women through

Dairy Cooperatives - A Conceptual Framework



**Factors for development**

**Awareness** Rural women are getting basic development information and **fruitful** knowledge on ways to achieve the production of high quality milk and milk products through PMPCSs. They become aware of the utility of milk production and its related business dealings. Awareness induces them to enlarge their knowledge of animal husbandry practices and milk marketing networks. Moreover, awareness programme of PMPCSs present them with the basic insight of cooperation and the way to live as a fine social being.

**Strengthening of Interpersonal Relations** While participating in the meetings of General Body and the Board of Directors and being the basic component of cooperatives, rural women build up strong interpersonal relations with employees and other members of their PMPCS, irrespective of their socio-economic status, caste, religion, etc. This enhances common kindness with neighborhood and other women in the village community. By having pleasant relations with other members in the neighborhood, and sharing growth information and production knowledge with others, rural women can improve their capacity and prospective to tap the hidden values and skills in individuals. In other words, 41 membership and participation in PMPCS can enhance leadership qualities of women.

**Group Cohesion** Through group solidarity, women in rural areas can develop their skills and potential to make better decisions not only on issues and concerns of health care and medical facilities, but also on their children’s education and in the well-being of the family members. PMPCSs provide chances for them to extend their problem solving capacity and abilities to manage gender issues. Collective decision making strengthen the socioeconomic base of rural women and their families.

**Social Equality** PMPCSs are legally created democratic bodies. So women in the villages can have equal opportunities to contribute in all the meetings, development planning and verdict making process in PMPCSs. They can freely complete their views and concerns in general body meetings and even directly to the employees. The equal opportunity for rural women in PMPCSs foster their managerial skills and democratic attitude, which in turn promotes the familial and national development. As a result, they get due respect by the family members, society and community in the development works and celebration of ceremonies.

**Social Mobility** While rural women have understanding on community, society and themselves, good interpersonal relations with employees and other members of PMPCSs and cohesion with neighborhood, it is possible for them to enhance their social mobility. By having active membership and involvement in the collective action of basic level organizations, women can afford to change and challenge the traditional principle. It will make them to move from lower to higher level in the community, village and society. As a result, they can get better positions in other socio-economic organizations and will gain desired goals and will increase larger acceptance.

**Economic Consciousness** Women in rural India are gaining avenues for developing their economic positions through dairy cooperatives. They get awareness and understanding on economic independence. Dairy cooperatives make rural women realize their full ability, capability and potential for the economic betterment. It makes them to be aware of their own duties, rights and tasks in the family, community, and society. The dairy cooperatives pave the way for improving their attitudes, values, insight and consciousness in relation to their economic position. The economic consciousness creates desire for rural women's self-development and induces them to engross in extra income producing activities.

**Participation in Economic Activities** Participation in productive activities is the important factor for an individual's economic improvement. To achieve long term economic improvement, constant participation is necessary. Enrollment as members of Primary Milk Producers Cooperative Society (PMPCS) is readily accessible for rural women. As members of PMPCS, they can take part not only in the day-today business transactions but also in the production and distribution of milk and milk products.

### **Status of Dairying in Chhattisgarh**

The dairy cooperative societies of the country are federated into 198 district milk producer unions, which in turn have 22 state cooperative dairy federations. There are 421 dairy cooperative societies are registered and having 18923 registered members. Chhattisgarh State Cooperative Dairy Federation (CGCDF) playing an important role in development of dairy industry of the state.

**Production and per capita availability of milk in Chhattisgarh**

Year	Production (000 tonnes)	Per Capita Availability (gms/day)
2000-01	777	100
2001-02	795	105
2002-03	804	103
2003-04	812	102
2004-05	831	103
2005-06	839	103
2006-07	849	102
2007-08	866	103
2008-09	908	106
2009-10	956	110
2010-11	1029	117
2011-12	1119	129

**General Objective of the Study**

The main aim of the study is to examine the Social Change and Economic Development of Rural Women attained through Dairy Cooperatives in Chhattisgarh.

**2. Conclusion**

Bringing women into the mainstream of development has thus been major concern of the government since independence. In order to empower and bring them into the mainstream, an enabling environment with requisite policies and programmes, training at various levels and adequate financial resources has all along been tried and created an awareness among the women perspective towards empowerment. A **dairy cooperative** is one such society organization which aims at improving the rural people especially women. Dairying is certainly an agriculture allied sector and indoor economic activity for women living in rural areas. It provides mass employment. There exists a relationship between the social and economic background of rural women members of dairy cooperatives and their level of awareness of dairy cooperatives. Higher the level of awareness of rural women members, the greater will be the level of their participation in dairy cooperatives. And is thereby correlated with the extent of their participation in dairy cooperatives. The conclusion of the present study is that there is a positive relationship between the socio economic and supporting background and awareness level of the women through different approach and change of the mindset towards earning level and empowerment.

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# RURAL DEVELOPMENT

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## ABSTRACT

*Rural development is not a charity program and its objective is to raise the capacity of producing more crops, better crops, variety crops, greater output per unit of input and higher quality of output. It is concerned with creation of increased incentives for putting more efforts and investments for raising efficiency per worker. Therefore education, information, training, research, and application of research is within the range of rural development.*

*The term 'rural development' is of focal interest and is widely acclaimed in both the developed and the developing countries of the world. There is however no universally acceptable definition of rural development and the term is used in different ways and in vastly divergent context. As a concept, it can notes overall development of rural areas with a view to improve the quality of life of rural people. In this sense it is a comprehensive and multidimensional concept and encompasses the development of agriculture and allied activities-village and cottage industries and crafts, socio- economic infrastructure, community services and facilities, and above all, the human resources in rural areas. As a phenomenon, it is the result of interactions between various physical, technological, economic, socio-cultural, and institutional factors. As a strategy, it is designed to improve the economic and social well-being of a specific group of people the rural poor. As a discipline, it is multidisciplinary in nature representing an intersection of agriculture social behavioral, engineering and management sciences. In the words of Robert Chambers, "Rural Development is a strategy to enable a specific group of people poor rural women and men, to gain for themselves and their children more of what they want and need. It involves helping the poorest among these who seek a livelihood in the rural areas to demand and control more of the benefits of rural development. The group includes small scale farmers, tenants and the landless.*

**Keywords:** *Rural development & society, Importance of rural development*

## 1.Introduction

Rural development is the process of improving the quality of life and economic well-being of people living in rural areas, often relatively isolated and sparsely populated areas.

Rural development has traditionally centered on the exploitation of land-intensive natural resources such as agriculture and forestry. However, changes in global production networks and increased urbanization have changed the character of rural areas. Increasingly tourism, niche manufacturers, and recreation have replaced resource extraction and agriculture as dominant economic drivers. The need for rural communities to approach development from a wider perspective has created more focus on a broad range of development goals rather than merely creating incentive for agricultural or resource based businesses. Education, entrepreneurship, physical infrastructure, and social infrastructure all play an important role in developing rural regions.<sup>[3]</sup> Rural development is also characterized by its emphasis on locally produced economic development strategies.<sup>[4]</sup> In contrast to urban regions, which have many similarities, rural areas are highly distinctive from one another. For this reason there are a large variety of rural development approaches used globally.

Rural development is a comprehensive term. It essentially focuses on action for the development of areas outside the mainstream urban economic system. We should think of what type of rural development is needed because modernization of village leads to urbanization and village environment disappears.

Conceptually we can say that the rural development means the whole development for rural area and its people. It may be social, cultural and economical development of people living in rural area as well as the development of human resources like schools, hospitals, local markets, etc. According to G. Shah definition of rural development is “*the development of rural areas, often rural development has meant the extension of irrigation facilities, expansion of electricity, improvement in the techniques of cultivation, construction of school building and provision of educational facilities, health care etc.*”

### 1.1 Objectives

1. To make all the people literate in rural area .
2. To search out characteristics of rural poverty.
3. To identify the factors, that are affecting to the rural poverty.
4. To review in the exacting poverty alleviation program in rural areas and find out the major cons taint in its implementation.
5. To study the various elements related to poverty.

### 1.2 Components of rural development

1. Rural development seeks to transform all the sectors of rural economy—the primary sector, the secondary sector and the tertiary sector.
2. It is concerned with the improvement of the standard of living of the ruralites through the provision of health and medical facilities, employment opportunities including vocational training, educational facilities etc.
3. It brings about significant improvement in the socio-economic conditions of the scheduled castes, scheduled tribes, the landless agricultural labourers and the marginal and small fanners.

### 1.3 Essential aspects of rural development

The essential aspects of rural development are as follows:

1. Agricultural development constitutes the crucial aspect of rural development. Agricultural development is possible through the use of better seeds, adequate fertilizers, manures, and pesticides, adequate supply of water and effective implementation of land reform measures.
2. By effecting changes in the socio-economic institutions, rural development seeks to change the socio-economic structure of the rural community.
3. The effectiveness of the rural development programs necessitates political non- interference. The persons associated with these programs should be given adequate freedom to carry out their plans and programs with undivided attention.
4. The success of the rural development programs depends on the co-operative orientation and attitude among the ruralites. The functioning of the co-operative societies goes a long way in improving the conditions of the vulnerable sections of the rural set-up.
5. Rural development programs demand the active participation of the ruralites. While formulating these programs the opinions, attitudes, drives and interest the rural people should be taken into account. Further,

dedicated and committed village leaders should come forward to guide the masses for bringing about rural development.

#### 1.4 Developmental challenge of rural development

Somnath Chatterjee had said about rural development that this is essentially about helping the rural sector realise its own potential by using the gains of modern science and technology and industrial development.

INDIA IS emerging as a major power with the economy registering high growth rates and our cities and urban centres beginning to display marks of affluence. Yet, there is no uniform development, the rural hinterland not being able to march in tandem with urban India. More than 70 per cent of our people live in villages 80 per cent of our poor also live in rural areas. The benefits of economic growth are not percolating to more than two-thirds of the people. The visible symbols of development should not make us forget the problems of the rural areas.

The Indian economy is the fourth largest in the world. But the growth pattern is not uniform. While the rate of growth for manufacturing, services, and communications sectors has substantially improved, in vital sectors such as agriculture, infrastructure development, and community and social services, and in rural development as a whole, our performance is not appreciable.

Without the development of rural people, the country can never claim to be developed. In recent years, agricultural growth has fallen and so have investment and profitability of agriculture, net sown area under crops, and the area under irrigation. According to the Economic Survey 2006-2007, low yield per unit area across almost all crops has become a regular feature.

Rural India is in crisis. As Dr. M.S. Swaminathan, the distinguished agricultural economist, said, "The agrarian crisis has its roots in the collapse of the rural economy... Unemployment leading to out-migration of the asset-less is growing. The minimum support price mechanism is not operating for most commodities. At every level of the livelihood security system, there is a tendency to make profit out of poverty. Something is terribly wrong in the countryside... "

Today, finding themselves helpless in the face of adversities of various kinds, the peasantry in parts of the country is resorting to extreme measures. Repeated crop failures due to unpredictable climatic variations, inability to meet the rising cost of cultivation, and the increasing debt burden are among the factors leading to frustration. In such a scenario, meeting the challenges of rural reconstruction becomes a formidable and priority task.

Agriculture being the mainstay of our economy, it is imperative that we have a comprehensive and time-bound programme to extricate the sector from stagnation, if not deceleration. Larger irrigation facilities, better seeds and agri-inputs, and fertilizer at reasonable costs will have to be provided to farmers, along with finance and infrastructural and marketing facilities. Agriculture must become an income generating activity and farmers should not be left to the vicissitudes of weather, financial resources, and markets.

## 2. Conclusion

Improvement in the quality of life of rural people is the important agenda of rural development programme. In India – a country where the number of people living in rural areas, rural development programme is necessary aspect. Rural development implies both the economic betterment of people as well as greater social transformation. The basic objective of all rural development endeavors / programmes has been the welfare of the millions. In order to achieve this, planned attempts have been made to eliminate poverty, ignorance and inequality of opportunities. A wide spectrum of programmes has been undertaken so far, to alleviate rural poverty and ensure improved quality of life for the rural population especially those below the poverty line. In the initial phase of planned rural development, the concentration

was on sectors of agriculture industry, communication, education and health. The Ministry of Rural Development places importance now on health, education, drinking water, housing and road so that the quality of life in rural areas improves and the fruit of economic reform are shared by all sections of the society. With time and experience, it is realized that accelerated and meaningful development can be achieved only if people of the grass root are involved, “people’s participation” has become the keyword in rural development programmes. The participation of the people is necessary to provide the rural people with better prospects for economic development.

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# ECONOMIC DEVELOPMENT THROUGH MAHATMA GANDHI NATIONAL RURAL EMPLOYMENT GUARANTEE ACT (MGNREGA) : A CRITICAL ANALYSIS

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## ABSTRACT

*It is not possible to have overall development in India without economic development of rural people. In this context, National Rural Employment Guarantee Act (NREGA) enacted by legislation of India on 25 August 2005 and it was renamed as the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) on 2nd October 2009 on the birth anniversary of Mahatma Gandhi. Keeping this in mind, The present paper discuss the role of MGNREGA in economic development of rural people of India.*

### 1.Introduction:

Rural development is the process of improving the quality of life and economic well-being of people living in rural areas, often relatively isolated and sparsely populated areas. (Moseley, 2003). Rural development is a comprehensive term. It essentially focuses on action for the development of areas outside the mainstream urban economic system. Rural development aims at finding ways to improve rural lives with participation of rural people themselves, so as to meet the required needs of rural communities (Pellissery, (2012). Sustainable rural development means improving the quality of life for the rural poor by developing capacities that promote community participation, health and education, food security, environmental protection and sustainable economic growth, thereby enabling community members to leave the cycle of poverty and achieve their full potential.

According to Census 2011 nearly 70% of Indian population live in rural areas. Hence in order to enhance their quality of life Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) employment guarantee scheme enacted by legislation on August 25, 2005. MGNREGA was launched. This scheme was renamed as the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) on 2nd October 2009 on the birth anniversary of Mahatma Gandhi.

The act aims to remove the extreme poverty and at making villages of country self sustaining through productive assets creation. The Mahatma Gandhi National Rural Employment Guarantee Act. (MGNREGA) was enacted in India with the various multiple objectives of providing employment in a rights-based framework, addressing rural poverty, checking migration, and building rural infrastructure. As such, every year around 15–20 percent of households in India overall and 30 percent in rural India receive some form of employment share under the MGNREGA programme. MGNREGA enshrines the legal right of one hundred days of paid employment to any rural household, on employees demand. Though its scope is nationwide, there have been wide inter-state as well as inter-district variations in the achievement of the objectives of the MGNREGA Act.

## 2. Objective Of This Paper

The main objective of this paper is to analyse the role of MGNREGA in economic development of rural India.

## 3. Methodology

This paper is based on secondary data and it is collected from internet, articles, newspapers, reports, magazines etc.

## 4. Analysis Of Mgnrega In Terms Of Economic Development

The economy of India is the sixth-largest in the world measured by nominal GDP and the third largest by purchasing power parity (PPP). The country is classified as a newly industrialised country, and one of the G-20 major economies, with an average growth rate of approximately 7% over the last two decades. India is also known as an agricultural country, as most of the population of villages depends on agriculture. Agriculture forms the backbone of the country's economy. The agricultural sector contributes most to the overall economic development of the country and therefore the need of development programmes in rural India is substantial. The government of India initiated many employment generating programmes to address development in rural area. The mahatma Ghandi national rural employment guarantee scheme one the of major flagship initiative which enhances the rural development and employment opportunity at rural area, Mahatma Ghandi national rural employment guarantee act aims at to enhance livelihood security in rural areas by providing at least 100 days of guaranteed wage employment in a financial year to every household whose adult members volunteer to do unskilled manual work. This scheme was promoted by Man Mohan Singh government now continued in NDA under Narandar Modi. Budget 2017 allocated Rs. 48000 Cr. Rural Development has different aspect covering long term and short term aspects. Certain activities like sanitation, agriculture, road, electricity, health facility, skill development, market linkage, awareness about basic facilities, digital inclusion etc. Rural population gets wages if drought like situation erupts so it should be continued to stop migration to cities and for rural mass uplift it is necessary. Labour-intensive tasks like creating infrastructure for water harvesting, drought relief and flood control are preferred in MGNREGA which helps the economic development in rural areas.

The MGNREGA provides wages to rural employees against work done for the development of rural areas the various works for the economic development of rural areas are done through MGNREGA are as follows.

1. Water Conservation and water harvesting.
2. Drought proofing, including afforestation and tree plantation.
3. Irrigation canals including micro and minor irrigation works.
4. Irrigation facilities for landowners by households belonging to SC/ST or to land of beneficiaries of the INDIRA AWAAS YOJANA.
5. Renovation of traditional water bodies, including de-sitting of tanks.
6. Land development
7. Flood control and protection of works, including drainage of water-logged areas.
8. Rural connectivity to provide all weather roads.
9. Any other work, which may be notified by the Central government in consultation with the state governments.

## 5. Conclusion:

The description clearly reveal the significant role of MGNREGA on overall poverty reduction and development of rural India. The act and the operational guidelines require the states and the panchayati raj institutions to monitor the implementation of the scheme in a variety of ways Gaps in the envisaged monitoring mechanisms were noticed in a large number of states. There were significant shortages in verification of works by state officials. Quality monitors and vigilance and ineffective to large extent as social audit units had not been established. There were deficiencies in the approval and release of funds by the ministry. The ministry needs to take decisive steps to ensure proper implementation of the scheme. It needs to focus on developing intensive monitoring and evolution systems. An analysis of releases made to states for the period under review and poverty data showed that three states Bihar, Maharashtra and Uttar Pradesh had 46 percent of the rural poor in India, but accounted for only about 20 % of the total funds released under the scheme. This would indicate that the poorest of poor were not fully able to exercise their rights under MGNREGA.

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# AUTOMATION IN AGRICULTURE

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## ABSTRACT

*The world population is expected to reach 9.1 billion by year 2050 says FAO (World Food and Agriculture Organization) and to feed this population food production should be increased by at least 70%. Developing countries have to double their food production. The traditional methods of farming and ever decreasing farm labour availability is making agriculture economically unviable and inefficient. In above context research on development of intelligent, autonomous machinery for carrying agricultural activities is essential to improve the quantity and quality of the agricultural produce. Today there is an urgent need to address the issues like indiscriminate use of agrochemicals, conservation of energy, control on environmental pollution and effects of global warming. Automation of farming practices has proved to increase the food production levels. This paper surveys the work carried out by various researchers to get a holistic picture on current state of implementation of automation in agricultural practices around the w*

## 1.Introduction

Monitoring of the agricultural environment has become a major issue in recent years due to a range of factors including population growth, need for increased food production and the apparent onset of global warming. Population growth has led to environmental problems arising primarily from the pressure to produce more food from an essentially static or even diminishing food production land area. Modern agriculture depends heavily on engineering, technology, biological and physical sciences. Mechanization of agriculture activities have relieved much of the manual work and increased efficiency and productivity of farms with many application examples and recent advances in the field. The complex agricultural environment combined with intensive production requires development of robust systems with short development time at low cost. The unstructured nature of the external environment increases chances of failure. Moreover, the machines are usually operated by low-tech personnel. Therefore, inherent safety and reliability is an important feature. Food safety is also an issue requiring the automated systems to be sanitized and reliable against leakage of contaminations. This chapter reviews agricultural automation systems including field machinery, irrigation systems, greenhouse automation, animal automation systems, and automation of fruit production systems. Each section describes the different automation systems.

## 2.Automation In Agriculture

Sustainable agriculture aims at the production of high-quality food and raw materials in sufficient quantity for a wide range of consumers. Further objectives are the rational use of natural resources and preservation of the environment. For this reason, modern field machinery and equipment should be able to cope with complex agricultural processes and to execute difficult operations at high efficiencies and without environmental pollution. To control the performance of these machines, a large amount of information has to be captured by sensors and transmitted to and stored in data logging systems for further processing. Moreover, agricultural production takes place in an open system that has various relations to its surroundings. Therefore, when these machines and processes are in operation, the state of the surrounding systems, as well as the interactions between the agricultural production process and its environment, must be taken into account.

Mass and energy flows must therefore be accompanied by information flows. These facts require the introduction of an information-based agriculture, the so-called "precision agriculture." "Precision agriculture" means that the production processes must be strictly controlled according to the demands of plants, soil, and environment in a site-specific way. The area of these sites is much smaller than the area of whole fields. For intensive cultures, such as vegetables, a site may even be only one plant. For animal production, this means that each animal is treated individually. Such a site-specific treatment requires the transmission of great amounts of data, such as individual values for references, states, and controlled variables, together with information about weather conditions, date, time, and location. Additionally, technical equipment and production processes should be upgraded with new knowledge, improvements, and enhancements in a simple and compatible way. Furthermore, maintenance and service of modern machines and process equipment should be handled according to their actual wear, operation times and circumstances. This necessitates sampling, transmission, and processing of data in a compatible way, since the data may be generated, transmitted, and processed in different units. In summary, compatible data transmission is a necessary condition for achievement of all the aims formulated above. Communication technology thus serves as the backbone of precision agriculture. In the following, we give three examples for advanced precision agriculture components: combine harvester, sprayer, and fertilizer spreader. This will be followed by a description of the "backbone" communication, which is organized in the form of a specific agricultural bus system and protocol. Spatial variability in soil conditions such as texture, structure, soil moisture, and soil fertility give rise to local variations in crop yield. Although the lack of spatial uniformity of the factors that influence the growth of field crops, and hence their productivity, has been known and appreciated since early times, agricultural practice hardly takes into account this spatial variability in traditional arable crop production. The recent availability of reliable, inexpensive, and precise systems for on-the-go acquisition of the world position of soil tillage tools, machines for crop protection, fertilizers and harvesters during field operation (the Global Positioning System, or GPS, supported by dead reckoning systems), and parallel advances in sensor technology, precision mechanisms, and the information processing power of computers, have led to adoption of the concepts of precision agriculture, site-specific farming, or spatially variable application. In site-specific agriculture, different field operations are adapted to variations in soil conditions, crop growth stage and yield, the spread of weeds and disease infestation within each individual field. Intra-field variations are captured and the registered data are translated into numerous field maps (e.g., weed, disease, yield, and fertilizer and pesticide application maps) with high resolution. These maps are the core of site specific crop management that guarantees a more rational use of raw inputs such as seed for sowing, fertilizer, pesticides, and fuel for mobile agricultural machines.

# SOCIO ECONOMIC ASPECTS OF RURAL DEVELOPMENT OF CHHATTISGARH

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## 1. Introduction

Born on November 1, 2000 Chhattisgarh is one of the youngest states of Indian Union.

The State is committed to the welfare of its people by building up a dynamic and progressive

Economy with social justice and equal opportunity for all. About 80 percent of State's population lives in rural areas, largely dependent on agriculture and allied activities for livelihood. The State thus accords high priority to agriculture and rural development.

The Chhattisgarh economy has grown at an annual rate of over 8% during 2000-01 to 2004-05 (at 1993-94 prices), benefiting millions of poor in the State. The percentage of the population below poverty line has declined drastically from 45 in 1999-2000 to 41 in 2004-05. The rural poor comprise 79% of the total poor in the State. Agriculture (including crops, livestock, fisheries, forestry and mining) is the main source of livelihood for the rural people in the State. The sector contributes about one-third to the State's gross domestic product (GDP), and engages over 70% of the labor force. The sector grew at an annual rate of over 6% between 2000-01 and 2004-05. Agriculture is practiced on 35% of the geographical area, and is largely rainfed. Rice is the main crop occupying about 70 % of the area, but has poor yields. The rural economy in the State is dominated by small farmers (<2ha) comprising over 75 percent of the total farm households. The average size of land holdings in the State is 1.4ha, and is likely to decline with increasing population pressure. Under such a scenario, crop production alone cannot provide an adequate livelihood to the majority rural development.

## 2. What Is Rural Development

Rural development can be defined as, helping rural people set the priorities in their own communities through effective and democratic bodies, by providing the local capacity; investment in basic infrastructure and social services, justice, equity and security, dealing with the injustices of the past and ensuring safety and security of the rural population, especially that of women. In India the Department of Rural Development and Rural Development Ministers of all the states are implementing a number of programmes in rural areas through the state Governments for poverty reduction, employment generation, rural infrastructure habitant development, provision of basic minimum services.

## 3. Social aspects of rural development

Rural Development (RD) is a multidimensional and dynamic concept. RD is more than just economic growth and indicates the positive change of social, economic and political sectors along with other aspects. It not only includes upgrading in physical infrastructures but also rise in production and consumption, fulfillment of basic needs as well as improvement in quality of life. The goal of RD has to be the promotion of access in natural, physical, social, economic & human capital and their sustainable utilization for livelihood. Sustainable resource utilization, population management, Information Technology (IT), development of physical infrastructure, education, health & human resources are different elements of a single system in which a change in one of these elements brings about a change in the whole system. In the absent of appropriate technology and competent human resource, our valuable resources have been less productive than they could have been. The implementation of a new technology will require new form of social organization and human

power. Availability of land, water and forest (Natural capital) are not enough. For Economic growth and poverty reduction through proper utilization of Natural capital, "knowledge and skill" (Human Capital) along with joint effort of concerned people (Social capital) is required. Mutual understanding, cooperation, sense of responsibility and social effort can act as a strong weapon to fight against the severe poverty and scarcity of capital and resources. The basic need of a human being is no longer limited to food, shelter and clothing. It is a broad concept and includes education, health and social security as well. But without fulfilling the conventional fundamental requirements, other needs cannot be addressed properly. First priority of development should be poverty reduction and food security which are very much interrelated and cannot be solved without addressing each other. Alternative production and employment through non-agricultural, non-timber profession can contribute to increase the rural income. Only, then we will be able to achieve rest of the basic needs. Technology, consumption pattern and development strategy should be flexible because human needs change along with time. In this context, prevalent educational system seems to be outdated so in order to adjust with time we need to bring radical changes.

#### 4. Economic Aspects Of Rural Development

Chhattisgarh's gross state domestic product for 2010 is estimated at [INR](#) 600.79 billion in current prices. The economy of Chhattisgarh has grown rapidly in recent years with a growth rate of 11.49 per cent in GDP for 2009–2010.<sup>[56]</sup> Chhattisgarh's success factors in achieving high growth rate are growth in agriculture and industrial production.

- **Tea production**

Chhattisgarh State is ranked as the 17th-largest tea-producing state in India. The districts of Jashpur and Surguja are favourable tea production areas. In Jashpur district, the first tea plantation, Brahmishthajaya Sogara Ashram was established under the direction of Pujya Pad Gurupad. Tea production started after two years at the Sogara Ashram. A tea processing unit was established in Sogara Ashram and the unit name set as the Aghor Tea Processing Plant. The forestry department has also started a tea plantation motivated by the Sogara Ashram. In Surguja district, a tea nursery is being developed by the Margdarshan Sansthan Agriculture College in Ambikapur, Surguja.

- **Agriculture**

Agriculture is counted as the chief economic occupation of the state. According to a government estimate, net sown area of the state is 4.828 million hectares and the gross sown area is 5.788 million hectares.<sup>[57]</sup> Horticulture and animal husbandry also engage a major share of the total population of the state.<sup>[58]</sup> About 80% of the population of the state is rural and the main livelihood of the villagers is agriculture and agriculture-based small industry.

The majority of the farmers are still practising the traditional methods of cultivation, resulting in low growth rates and productivity. The farmers have to be made aware of modern technologies suitable to their holdings. Providing adequate knowledge to the farmers is essential for better implementation of the agricultural development plans and to improve the productivity.<sup>[59]</sup>

#### 5. Agricultural products

The main crops are rice, maize,<sup>[60]</sup> *kodo-kutki* and other small millets and pulses (*tuar*<sup>[61]</sup> and *kulthi*); oilseeds, such as groundnuts (peanuts), soybeans<sup>[62]</sup> and sunflowers, are also grown. In the mid-1990s, most of Chhattisgarh was still a monocrop belt. Only one-fourth to one-fifth of the sown area was double-cropped. When a very substantial portion of the population is dependent on agriculture, a situation where nearly 80% of a state's area is covered only by one crop,

immediate attention to turn them into double crop areas is needed. Also, very few cash crops are grown in Chhattisgarh, so there is a need to diversify the agriculture produce towards oilseeds and other cash crops. Chhattisgarh is also called the "rice bowl of central India".<sup>[57]</sup>

Kodo Millet is used as Life Saving Medicine in Chhattisgarh, India Bastar Beer prepared from Sulfi.

## 6. Irrigation

In Chhattisgarh, rice, the main crop, is grown on about 77% of the net sown area. Only about 20% of the area is under irrigation; the rest depends on rain. Of the three agroclimatic zones, about 73% of the Chhattisgarh plains, 97% of the Bastar plateau and 95% of the northern hills are rainfed. The irrigated area available for double cropping is only 87,000 ha in Chhattisgarh plains and 2300 ha in Bastar plateau and northern hills. Due to this, the productivity of rice and other crops is low, hence the farmers are unable to obtain economic benefits from agriculture and it has remained as subsistence agriculture till now, though agriculture is the main occupation of more than 80% of the population.<sup>[59]</sup> In Chhattisgarh region, about 22% of net cropped area was under irrigation as compared to 36.5% in Madhya Pradesh in 1998–99, whereas the average national irrigation was about 40%. The irrigation is characterised by a high order of variability ranging from 1.6% in Bastar to 75.0% in Dhamtari. Based on an average growth trend in the irrigated area, about 0.43% additional area is brought under irrigation every year as compared to 1.89% in Madhya Pradesh and 1.0% in the country as a whole. Thus, irrigation has been growing at a very low rate in Chhattisgarh and the pace of irrigation is so slow, it would take about 122 years to reach the 75% level of net irrigated area in Chhattisgarh at the present rate of growth.<sup>[59]</sup> Chhattisgarh has a limited [irrigation](#) system, with dams and [canals](#) on some rivers. Average rainfall in the state is around 1400 mm and the entire state falls under the rice agroclimatic zone. The Large variation in the yearly rainfall directly affects the production of rice. Irrigation is the prime need of the state for its overall development and therefore the state government has given top priority to development of irrigation.<sup>[57]</sup> A total of four major, 33 medium and 2199 minor irrigation projects have been completed and five major, 9 medium and 312 minor projects are under construction, as of 31 March 2006.

## 7. Industrial sector

### Power sector

Chhattisgarh is one of the few states of India where the power sector is effectively developed. Based on the current production of surplus electric power, the position of the State is comfortable and profitable. The Chhattisgarh State Electricity Board (CSEB) is in a strong position to meet the electricity requirement of the new state and is in good financial health. Chhattisgarh provides electricity to several other states because of surplus production. In Chhattisgarh, [National Thermal Power Corporation Limited](#) (NTPC) has [Sipat Thermal Power Station](#) with a capacity of 2,980 MW at Sipat, Bilaspur; GMR Power in Tilda and [Korba Super Thermal Power Station](#) with a capacity of 2,600 MW at Korba, while CSEB's units have a thermal capacity of 1,780 MW and hydel capacity of 130 MW. Apart from NTPC and CSEB, there are a number of private generation units of large and small capacity. The state government has pursued a liberal policy with regard to captive generation which has resulted in a number of private players coming up.<sup>[63]</sup>

## 9. Conclusion:

Rural development of Chhattisgarh is a great history in Indian economics. after 1st November 2000 it is created and till now also development process is continued. Chhattisgarh is the fastest growing state of India.

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# RECIRCULATORY AQUACULTURE SYSTEM

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## ABSTRACT

*The State is playing an important role by generating self-employment through fisheries in rural areas which in turn provides nutritious food to rural folks. Fisheries business has generated an employment potential for about 2.09 Lakh persons, most of them belong to weaker section of the society. State has available water resources of which spreads from 67159 Rural Pond area covering 0.839 Lakh ha and 1770 Irrigation Reservoir covering 0.826 Lakh ha Water area totalling to 1.665 Lakh ha water area available for fisheries development up to the 2017-18. Out of the available Water Resources 0.772 lakh ha. rural pond area and 0.800 lakh ha. irrigation reservoir water area, thus totalling 1.572 lakh ha. water has already been brought under fish culture till 2017-18. The state is fastly emerging as fish hub +of central India and is now hope for opening scope in fishery sector or in turn we can say has given new technologies to be adapt by the aquaculture. In this era a different approach is being used combining both Innovation with Technology RAS which help us to save both water and land giving us a higher yield.*

**Keywords:** *Recirculation, Filtration and Highyield*

## 1.Introduction ( Ras)

Recirculation Aquaculture System are land-based fish farms, which allows all year round control and delivery of fish. Whether the facility will use fresh water, brackish or marine water, a R.A.S works on the same principles. The system can achieve optimal temperature and optimal and stable production all year round, independent of seasonal variation, location, climate and environment. Recirculation systems also occupy very little area and require little water consumption compared to other forms of aquaculture. A filtering (Bio filter) system is necessary to purify consumption compared to or detoxify harmful waste products and uneaten feed. Recirculation systems filter and clean the water for recycling back through fish culture tanks. RAS technology steadily developed over the past 30 years and is widely used for Brood Stock, Hatcheries and Rearing for Fish and increasingly for other species of Fish. Recirculation Systems occupy very little area and require little water consumption compared to other forms of Aquaculture. A Filtering system is necessary to purify the water and remove suspended solids or any other detoxifying waste products. Recirculation system include Biofiltration, Ozonation Oxygen Generation which in terms helps us to maintain good water quality and yield in higher production. As these Systems occupy a very small area which allow the grower to stock fish at high densities and produce high yields per unit area. Recirculation systems are becoming popular as they provide a predictable and constant environment for growing fish. Species of Fish that can be cultured with recirculation system include Barramundi, Murrel, Pangasius, and Tilapia etc. Recirculation of waste loaded pond water reduces potential pollutants which assures the availability of quality water for fish farming where the source of Fresh Water is limited. This system eliminates water quality problems. This system of farming highly improves survival and growth performances of fish due to high degree of control over the water quality. Oxygen can be replenished through aeration and the most of carbon dioxide is dispatched hence reduces the risk of disease and parasites infections considerably.

## **2.Benefits Of Ras**

RAS offer fish producers a variety of important advantages over open pond culture. These include a method to maximize production on a limited supply of water and land, nearly complete environmental control to maximize fish growth year-round, the flexibility to locate production facilities near large markets, complete and convenient harvesting, and quick and effective disease control. RAS can be of various sizes ranging from large-scale production systems (over 1 million pounds per year) to intermediate-sized systems (500,000 pounds per year), to small systems (50,000 pounds per year). They can be used as grow-out systems to produce food fish or as hatcheries to produce eggs and fingerling sport fish for stocking and ornamental fish for home aquariums.

### **Intensive Production:**

RAS applies to the broiler house or swine barn concept, so prevalent and effectively used in modern poultry and pork production systems, to rear large numbers of fish in a relatively small space. Indoor fish farming in tanks may revolutionize fish production in the same way that confinement systems altered the pork and poultry farming industries. This is an excellent alternative to open pond culture where low densities (extensive culture) of fish are reared free in large ponds and are subject to losses from diseases, parasites, predation, pollutants, stress, and seasonally suboptimal growing conditions.

### **Water and Land Conserved:**

RAS conserve both water and land. They maximize production in a relatively small area of land and use a relatively small volume of water. For example, using a RAS it is possible to produce over 100,000 pounds of fish in a 5,000 square-foot building, whereas 20 acres of outdoor ponds would be necessary to produce an equal amount of fish with traditional open pond culture. Similarly, since water is reused, the water volume requirements in RAS are only about 20% of what conventional open pond culture demands. They offer a promising solution to water use conflicts, water quality, and waste disposal. These concerns will continue to intensify in the future as water demand for a variety of uses escalates.

### **Location Flexibility:**

RAS are particularly useful in areas where land and water are expensive and not readily available. They require relatively small amounts of land and water. They are most suitable in northern areas where a cold or cool climate can slow fish growth in outdoor systems and prevent year-round production. RAS provide growers who are geographically disadvantaged because of a relatively short growing season (less than 200 days) or extremely dry (desert) conditions, a competitive, profitable, year-round fish production system. They can be located close to large markets (urban areas) and thereby reduce hauling distances and transportation costs. RAS can use municipal water supplies (dechlorination is necessary) and discharge waste into sanitary sewer systems. Nearly all species of food fish and sport fish that are commonly reared in ponds including catfish, trout, and striped bass can readily be grown in high densities when confined in tank systems.

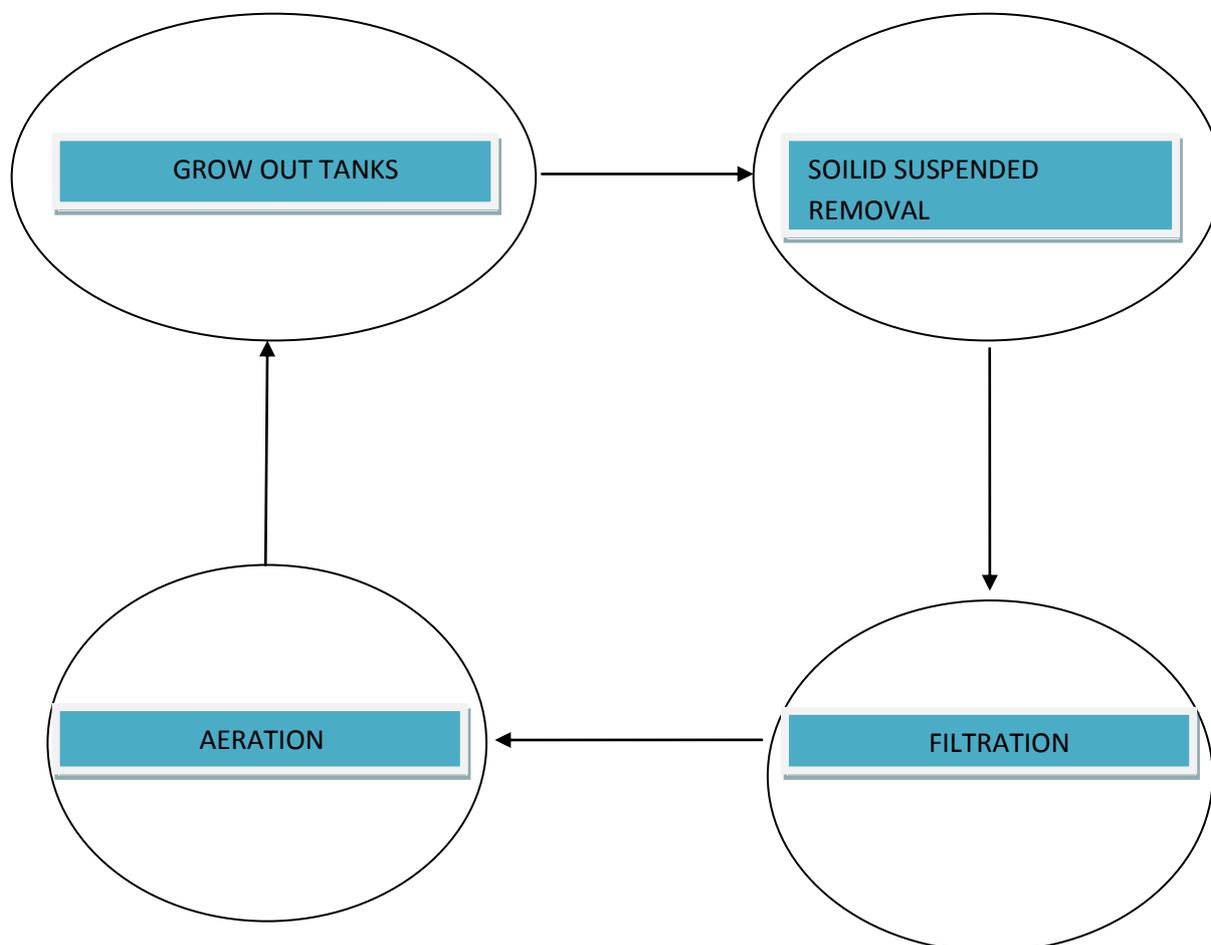
### **Species and Harvest Flexibility:**

RAS are currently being used to grow catfish, striped bass, tilapia, crawfish, blue crabs, oysters, mussels, and aquarium pets. Indoor fish culture systems offer considerable flexibility to (1) grow a wide diversity of fish species, (2) rear a number of different species simultaneously in the same tank (polyculture) or different tanks (monoculture), (3) raise a variety of different sizes of one or several species to another depending on market demand and price. RAS afford growers the opportunity to manipulate production to meet demand throughout the year and to harvest at the most

profitable times during the year. This flexibility in the selection of species and harvest time allows the grower to rapidly respond to a changing marketplace in order to maximize production and profitability. RAS permit the grower to competitively respond to market price and demand fluctuations by altering harvest rates and times and the species cultured. Tank culture systems are now being used to hold and purge (depurate) contaminated of off-flavor, pond reared catfish until they are acceptable for marketing. RAS do have some disadvantages when compared to open pond culture. They are relatively expensive systems to develop (building, tanks, plumbing, biofilters) and to operate (pumping, aerating, heating, lighting). Moreover, they are complex systems and require skilled technical assistance to manage successfully. Constant supervision and skilled technical support are required to manage and maintain the relatively complex circulation, aeration, and biofilter systems, and to conduct water quality analysis. The danger of mechanical or electrical power failure and resulting fish loss is always a major concern when rearing fish in high densities in small water volumes. Operating at or near maximum carrying capacity requires fail-safes in the form of emergency alarms and backup power and pump systems. The business and biological risk factors are correspondingly high. Continuous vigilance and quick reaction times (15 minutes or less) are needed to avert total mortality. However, the higher risk factor, capital investment, and operating costs can be offset by continuous production, reduced stress, improved growth, and production of a superior product in the RAS.

### System Design

The following process helps us to understand the terminology of Low Recirculation Aquaculture System which starts from grow out tanks from where the waters flows to solid suspended removal tanks where solid suspended are being removed through filtration process and their after it being moved to the biological filtration tanks where NH<sub>3</sub> and NH<sub>4</sub> are being removed through plastic media and after that waters flows to the additional filtration tanks where oxygenation and ozone nation can be added and now water is ready for reuse.



### 3. Aquaculture in Chhattisgarh

Chhattisgarh has always known for its paddy Culture in India but now speedily turning out tables in the sectors of Aquaculture too. Main rivers Mahanadi, Indravati and their tributaries flow 3573 Kms. in the state and offer themselves in fishery development activities. Table source wise fish production - 2016-17 Chhattisgarh

Source	Fish production (mt)	% of share in production
Rural Tanks	3,56,100	94.7
Irrigation Tanks	18,375	4.7
River	2,326	0.6
Total	3,76,801	100

Average productivity in rural tanks is 3105 kg/ha/year and 211 Kgs./ha/year in irrigation tanks.

Fish production and productivity is gradually increased due to following action :-

1. Use of balanced nutritious floating feed, fertilizers and high density of seed stocking (based on modern scientific technology) in ponds and tank.
2. Stocking of large size fingerlings (75 mm and above) in selected reservoirs and ponds.
3. Skill training imparted to the fishermen member engaged in reservoirs and ponds for fisheries development.
4. Assistance given to the fishermen for equipping them with net and boats for increasing fishing efforts.
5. Fish seed rearing in seasonal ponds.
6. Establishment of demonstration units. Some progresssive farmers in the state who are successfully harvesting 8000 to 12000 kg /ha major carp fish production & upto 70tons Pungasius fish production.

### 4. Conclusion

A proper filtration process and expects to reuse the 90% of the used water through filtration process. As it will help to culture Pangasius and Tilapia as well other varieties of Cat fish too. A recirculation fish farming system comprises of a number of major components( 24\*7 electricity, water facility Bulk feed storage, Emergency Generator, and Three Phase Electricity, Pump house, Building and Recirculation components)that are necessary for the management of the whole RAS system which need to have both site and system components.

The use of some ecological engineering principles permits production of high value fish crops while meeting stringent nutrient/toxicant discharge regulations. Recirculatory systems are indispensable for sustainable fish culture and as principle that forces to develop ecological engineering design. This system creates greater efficiency and productivity of ponds. The application of ecological engineering principles to water pollution control in fish culture ecosystems can reduce treatment costs. Fish culture systems are generated to have large volumes and system backing to have less polluted water. Since nutrient mass loading is the critical factor which always need to be taken as the most important to look after , treatment of tank water should be in regular practice which will allow us to achieve better results in tank culture.

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# A STUDY ON CONTRIBUTION OF KHADI AND 'KVIC' IN THE ECONOMIC DEVELOPMENT AND EMPLOYMENT GENERATION FOR RURAL CHHATTISGARH

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## ABSTRACT

*The chapter of Khadi was started by Gandhiji for the self-reliance and self-sustainability of spinners and weavers of Rural India. Khadi is considered as the authentic clothing of india. The activities of Khadi were started as a symbol of the 'fight for freedom'. Later, it was modified as Village Industry Movement with the objective of employment generation in the rural areas. Further Khadi & village industry commission (KVIC) was formulated and as a result this industry diversified into making various FMCG products of day-to-day requirements such as soaps, agarbattis, matchboxes, honey, pickles, edible oil, herbal cosmetic products etc. Promotion of traditional skills like pottery, handmade paper, leather etc was also undertaken. Khadi over the decades has moved from a freedom fighters identity to a fashion fabric. It has becoming a brand now and to make the fabric popular, KVIC has tied up with National Institute of Fashion Technology (NIFT) and National Institute of Design (NID) who teach the artisans, how Khadi clothes could be made attractive and preferable for all. As a part of brand promotion, KVIC has already launched some brands but it is high time for KVIC to move from expos to branded outlets nationwide under one brand and through these outlets sell the products globally. Secondly, KVIC should distribute franchisee so that the people get more employment/business opportunity so that brand khadi's presence will increase. This would certainly make the brand compete worldwide and penetrate globally.*

**Keywords-** Khadi, Rural development, KVIC, Cottage industry

## 1.Introduction

The research work titled 'A study on contribution of khadi and KVIC on economic development and employment generation for rural chhattisgarh' is undertaken with a focus on promotion of Khadi for the purpose of employment generation and to facilitate rural development. Indian industry at the beginning consisted of village handicrafts. The rural industries were closely linked with agriculture, as well as handicrafts. The system of hereditary specialization in certain crafts ensured good quality products; however, the division of labour was of low level, which was responsible for comparatively low productivity. The Khadi and Village Industries Commission (KVIC) have contributed significantly to the rural development of the Indian economy through its presence – prior to independence in an unorganized, unstructured manner; as well as in the post independence era in a structured, organized manner.

KVIC was established in 1956, as all India level organizations for the development of Khadi and Village Industries in the rural areas. It took over the activities of the All India Khadi and Village Industries Board and was operational as an exclusive & premier institution for the objective of promoting employment opportunities in the rural areas. It aims at providing financial support to rural artisans to retain and develop their skills, so as to produce marketable goods, thereby contributing to the family income. Since its inception, KVIC has been working in a dedicated manner, to bring about rural development in India.

Since then KVIC has been performing a number of vital functions for development of khadi in the rural sector through planning, promotion, organization, financing, training, processing, marketing, research, experimentation, pilot projects, etc. In 1991 a new package of policy measures for promoting and strengthening the Village Small Scale Industry sector were announced. Since mid 90's KVIC has been broadening its horizon of activities. New plans and schemes are set in motion with emphasis on growth and development in order to capture national and global markets through new initiatives in Marketing, Research and Development, Human Resource Development (HRD), Product Diversification, Concentration on Eco-friendly products, Quality Consciousness and other measures.

India being an agricultural country with a vast landmass and population residing in rural India, it is essential that appropriate policy measures are being taken for the development of Rural India. Often we divide India into two segments i.e. India and Bharat. Those who belong to the underprivileged and less attended population of Rural India are called as the citizens of Bharat. The function of the agencies working for rural India cannot be discounted on any parameters. Rather, considering the total role and importance associated with the objectives of these institutions it becomes essential to find out how appropriately and efficiently these agencies have performed their role.

KVIC is a premier organization in the field of promotion of rural industries and employment. This institution has a long history of five decades. A period of five decades is long enough for any agency to have an image, deliver the suitable goods and succeed in achieving its said objectives. Whether KVIC has stood to this test successfully and what is its overall performance is the subject matter of enquiry.

When one talks of KVIC, Khadi and Village Industries activities, people understand it as only khadi. In reality khadi activity is only 40% and remaining 60% is on FMCG products i.e Cottage/Village Industry. Much research study is already being done on the Khadi Sector. Therefore, we would concentrate on the study of Village Industries as it is an important component of KVIC activities. Of late there has been an increasingly greater thrust on the promotion of Village Industries, as they have good potential for generating employment opportunities along with avenues of self - employment. Under the Village Industries Sector any new business activities or projects are accepted except few items which come under negative list. Thus, the scope for expanding Village Industries activities is unlimited. The study of Village Industries will give an insight into the success and prospects as well as the problems and issues involved in this sector. It would also highlight the role played by KVIC in bringing about rural development through its objective of employment generation.

The KVI sector did not face any big challenge till the year 1991, as KVIC implemented its schemes and programmes in a routine manner as per its set objectives. However, when the country took up the policy of opening up economy, to embrace globalization and liberalization, KVIC had to gear up its strategies and schemes to tackle the new competitive challenges. The present study has a significant importance in the changing economic context. The emergence of new economic era with the promotion of liberalisation, privatisation, globalisation policy has changed the entire economic thinking in the country. The new thrust is on export promotion and global business research, through large scale operations. The earlier thinking of protecting Traditional Small Scale Industries and certain sectors from every kind of competition has wasted. Naturally, the Rural Sector and Rural Industries have lost their protective blanket coming from various Government Agencies. Protectionism, subsidies and various tax benefits are no longer the devices to protect the Rural Industries. Allowing private players in special sectors and industries, dereservations for Small and Tiny sectors has changed the situation in Rural India. KVIC is no longer playing the role of a 'Protective Armor' - but as an 'Intelligent Advisor and Assistant'. It is expected of KVIC to promote rural industrialization, provide rural entrepreneurs with marketing skills and help them to excel in quality and price norms. It is the right time to evaluate the performance of KVIC on this backdrop.

## 2. Statement of hypothesis

Hypothesis implies assumptions or suppositions made by a researcher through a formal statement or question, which one intends to resolve by undertaking the research study. Hypothesis may be stated / put forth as a proposition or a set of presumptions, to guide the investigation process. The current research enquiry is undertaken on the assumption of the following descriptive hypothesis. It is assumed that –

- KVIC has succeeded in developing a suitable climate in the rural areas for Promotion of Khadi Industries and Employment Generation.
- KVIC has contributed in Entrepreneurship Development through the network of its rural branches and allied activities for the development of rural areas.
- KVIC lacks in providing the necessary marketing support required for marketing the products manufactured by rural enterprises. It needs to create a suitable image of its products in the national and international markets.

## 3. Justification of hypothesis

The hypothesis of the research study is justified on the following grounds –

- The stated set of hypothesis is considered and formulated to examine the presence and awareness of KVIC in rural areas and to evaluate KVIC's role in generating employment opportunities in the villages as this has been its primary objective.
- The hypothesis aims at analyzing the role of KVIC in the development of entrepreneurship spirit amongst the rural masses which would lead to self reliance.
- In the global competitive economic scenario, the hypothesis is designed to understand and ascertain the role of KVIC in planning its marketing strategies

## 4. Functional Analysis

The Khadi and Village Industries programmes have great capacity for generation of large employment in the rural areas with less capital investment through the promotion of tiny and small enterprises. Moreover, the low capital intensive industrial units are structured and tuned to utilize the locally available raw materials, manpower and traditional artisan skills for processing and production by application of simple manufacturing techniques. Thus, Entrepreneurship Development is one of the major functions of KVIC. Khadi programme is being conceived as a means of providing additional livelihood avenue to the village communities after fulfilling their routine occupational needs (agricultural).

The Khadi and Village Industries play a very important role in the development of Indian economy, particularly in the development of the rural areas. Khadi symbolized the spirit of self reliance in pre-independence India. It did serve well the historical necessity of a freedom movement and sought to provide livelihood and economic independence to artisans in the villages. The setting up of village industries was aimed at supporting the feasibility of rural artisans to be self reliant.

Rural industrialization facilitates proper utilization of natural resources and helps in the generation of income to the rural masses. KVIC promotes the development of tiny, cottage and small scale enterprises in the rural areas by identifying the possibilities of raw material resource utilization at the local village level for manufacturing products and rendering services which have good marketability and would be beneficial for the development of rural areas.

## 5. Definitions of Key Concepts in Khadi and Village Industries

1. **'Khadi'**: Khadi is a household name reflecting spinning and weaving in the rural areas. The term Khadi means "any cloth woven on handlooms in India from cotton, silk or woolen yarn hand spun in India or from a mixture of any two or all of such yarns". The handlooms used for this purpose are termed as Charkhas. The New Model Charkhas have been introduced in spinning of Khadi yarn in a bid to ensure better living wage to spinners.
2. **'Handloom'**: Handloom is defined as "a loom for weaving of cloth by using yarn made of cotton, silk or woolen, or any type singly or in blends and used normally without the aid of power". Various numbers of handlooms are in operation for weaving Khadi cloth. Khadi is very comfortable to wear since air can pass through it easily. It prevents any skin rash etc., and is more comfortable when compared to the artificially made synthetic fabrics like Nylon, Rayon, Terylene, etc. Khadi is no longer identified with coarse varieties of fabric which was known as Khaddar. Khadi has now reached a fine variety of 400 counts of muslin cloth. Soft and stiff varieties of khadi have been evolved. Khadi Institutions produce very fine variety to coarse varieties of hand spun and hand woven materials in cotton, woolen, silk, and mixture of both i.e. cotton and silk, cotton and polyester, woolen and polyester etc.
3. **Women Enterprises** - Women Enterprises are those small-scale units where one or more women entrepreneurs have not less than 51 % financial holding. Such units are given more concessions and encouragement. Hence it can be said that the scope of small-scale industry is wider than that of the other types. In the case of small scale industries power is used and some hired labour is employed while in the case of cottage industries the work is carried on in the home of the producer with simple tools and without any power or hired labour.
4. **Handicraft** is defined as all articles, which are made by hand or with the aid of small mechanical devices and are artistic in nature either by way of artwork or form, shape and design. 'Handicrafts' involve skilled craftsmanship. The handicraft products are known for their artistic merit, excellence in quality and rare beauty. The production of handicraft goods involves a lot of time and labour of the artists, for creating the product. The products are attractive & relatively sophisticated but the tools, which are used for manufacturing purposes, are simple and modest. The artisans, through middlemen, generally sell the handicraft products. The All India Handicrafts Board looks after the overall development of handicraft industries.
5. **Traditional Industries**: Traditional Industries include the khadi, village industries, handloom, sericulture, handicrafts and coir industrial units. These constitute an important segment of the economy. They facilitate self-employment, wider dispersal of industrial and economic activities, maximum utilization of local resources both physical and material resources. The traditional industries are mostly rural and semi urban in character and help in sustaining and creating employment opportunities, increase income generation and preserve craftsmanship, as well as art and heritage of the country. In simple words, a 'Village Industry' means any small industry, which forms the main integral part of a village economy. Village industries are generally speaking of a traditional nature catering to local markets. They come within the jurisdiction of KVIC. The schedule consists of the following industries:
  - 1) Beekeeping,
  - 2) Cottage match,
  - 3) Cottage pottery,
  - 4) Cottage soap,
  - 5) Flaying, curing and tanning of hides, and skins and ancillary industries connected with the same and cottage leather,
  - 6) Ghani oil,

- 7) Handmade paper,
- 8) Manufacturer of cane-gur and khandsari,
- 9) Palm-gur making and other palm products,
- 10) Processing of cereals and pulses,
- 11) Fibre (other than coir) and
- 12) Blacksmithy and carpentry

## 6. Conclusion

The Khadi and Village Industries play a dominant role in determining the economic well being of the villages. The major involvement / support measure includes, setting up of common facility centers, development of new products, new design for various KVI products, new/ improved packaging, market promotion activities, capacity building activities, such as, exposure visit to other clusters, need based training etc.

Human Resource Management, production management and financial management could be considered as areas for further study to bring out a holistic view about the effectiveness of the overall management of these KVIC units. Contribution of Khadi marketing can be good potential for generating employment opportunities along with avenues of self – employment. KVIC have to gear up its strategies and schemes to tackle the new competitive challenges to promote rural industrialization, provide rural entrepreneurs with marketing skills and help them to excel in quality and price norms. It is the right time to evaluate the performance of KVIC on this backdrop, developing a suitable climate in the rural areas entrepreneurship. Development through the network of its branches and associated activities for the progress of rural areas can create a suitable image of its products in the national and international markets. Thus a systematic appraisal of marketing practices of KVIC units is needed for economic development and employment generation for rural Chhattisgarh.

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# AN ASSESSMENT OF THE GOVERNMENT SPONSORED ECONOMIC DEVELOPMENT PROGRAMS ON THE RURAL DEVELOPMENT OF JASHPUR DISTRICT OF CHHATTISGARH

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## ABSTRACT

*The objective of this study is to assess the impact of Govt sponsored economic development programme on the rural development (especially amongst Pahadi Korva primitive tribe group) of Jashpur district of Chhattisgarh state in India. Data of both types, primary and secondary, have been used for the study. Secondary data has been collected through Governmental reports and published data in public domain. For primary data, using random sampling, 65 questionnaires were distributed, out of which 50 were completed. Data was collected from these 50 respondents who are mainly Pahadi Korba tribal beneficiaries relating to the economic development programme in Jashpur district. The survey was administered between September and November 2017. The researcher found that the economic development programmes facilitated the beneficiaries to bring most of the land under cultivation, which in turn enhanced their living standards.*

**Keywords:** *Rural Entrepreneurship, Primitive Tribe Group, Rural Development Programme*

## 1. Introduction

Rural development is a comprehensive concept, which encompasses enhancement of quality of life and economic advancement of people residing in rural areas. Rural areas are comparatively sparsely populated, and more or less isolated from the mainstream population. As far as economic lives of rural people are concerned, it is mainly focused around agriculture and forestry. But due to globalization and urbanization, the economic scenario in rural areas has changed drastically. There are certain factors like- Effective execution of Govt sponsored economic development programme, Promotion of Rural Entrepreneurship & Education, Infrastructural development, Skill development which has played an instrumental role in holistic development of rural areas. Jashpur district is situated in northern Chhattisgarh. It is a tribal dominated district. Pahadi Korva and Birhor are the primitive tribal groups (PTGs), which forms most of the tribal population of Jashpur. The present study aims to assess the impact of Govt economic development programme on the socio-economic life of the Pahadi Korva primitive tribe group of Jashpur District of CG.

## 2. Literature Review

Mishra DC (2005) in his research regarding the impact of Govt subsidies and local ecosystem on Pahadi Korva tribe has thrown a flood of light on plight of Pahadi Korva, and how the economic development of the Govt have influenced the socio-economic lives of this primitive tribe group.<sup>1</sup> Van Der Ploeg et al (2000) in their scholarly work opined that rural development is analyzed as an autonomous, self driven, multi-level, multi-actor and multi-faceted process deeply rooted in historical traditions that represents at all levels a fundamental rupture.

**Objectives:** The present study aims to assess the impact of Govt economic development programmes on the lives of the Pahadi Korva tribal and to analyze the constraints in implementing the programmes. The study also aims to investigate the aspirations of this tribal community with respect to these rural development programmes of the Govt.

**Hypothesis:** Govt sponsored economic development programmes has increased the agricultural production and enriched the socio-economic lives of the Pahadi Korva tribal.

### 3. Research Methodology & Sample

The Study is based on both primary and secondary sources data. The primary data was collected through structured questionnaire and observation method. The interview schedule contained questions relating to the benefits obtained from various Govt sponsored economic development programmes and their impact on the lives of Pahadi Korva Tribal. Secondary sources were information collected from various Govt departments- Tribal welfare department, Zila Panchayat department, Rural Engineering services department, Agriculture department of District administration, Govt of CG. In order to have an insight into the execution of these programmes at village level, 4 villages (2 villages from Bagicha Tribal Development Block and 2 villages from Manora Tribal Development Block) were selected on the basis of purposive random sampling method. Sample size: The distribution of sample villages and number of beneficiaries is displayed in the Table 1:

**Table 1: Distribution of Sample beneficiaries**

S.No.	Block	Number of Villages	Number of beneficiaries
1	Bagicha	2	25
2	Manora	2	25
	<b>TOTAL</b>	<b>4</b>	<b>50</b>

Thus, in total 50 household beneficiaries (25 from Bagicha and 25 from Manora Block) were selected for this research work. These beneficiaries were benefitted from various developmental schemes and received assistance under economic development programmes.

**Govt sponsored Rural development Programmes in Chhattisgarh:** Ministry of Panchayat & Rural Development (Govt of Chhattisgarh) is running various programmes for the multi-dimensional development of rural areas. These programmes are as follows: [1] Mahatma Gandhi National Rural Employment Guarantee Scheme (MNREGA). [2] Programmes by National Rural Livelihood Mission (NRLM). [3] Atal Khetihar Majdur Beema Yojna. [3] Aam Aadmi Beema Yojna [4] Indira Aawas Yojna. [5] Sanshad Aadarsh Gram Yojna. [6] Akkikrit Jalgrahan Shetra Prabandh Karyakram (I.W.M.P.) [7] Swacha Bharat Mission (Gramin). [8] Pradhanmantri Gram Sadak Yojna. [9] Gramin Yantriki Sewa<sup>3</sup>. Pahadi Korva (Primitive Tribe Group) is branch of Kolarian tribe and belonging Mundari language. According to Anthropological description of family they belong to Austro-Asiatic family. The tribe has two-sub tribe known Pahadi Korva and Dihari Korva<sup>4</sup>. Pahadi Korva Development Agency was constituted on 19<sup>th</sup> May 1978 at District Jashpur (erstwhile Madhya Pradesh) with the sole objective of holistic development and promoting the interest of Pahadi Korva tribal community, which in turn contributes in rural development of the region. Since 1979-80 to 2003-04, the agency received total Rs.7,94,85,000 allocation and expenditure was Rs. 7,80,64,763. Furthermore, the agency spent Rs. 2,16,82,700, Rs. 1,19,10,493 and Rs. 4,44,71,570 in Family Beneficiaries Programme, Community Development

programme and Infrastructure development programme respectively (Source: Pahadi Korva Development Agency, Jashpur-Nagar, C.G). The agency executes following developmental programmes for all around Tribal development of the region, which inevitably helps in the rural development: Supply of Pair of Bullocks, Agriculture development Programme, Animal husbandry development programme (Poultry, Goat Farming, Pig farming), Horticulture Development programme, Land reform and development programme, Land leveling, Organization of Health Camps & Medical Relief, Assistance for House construction, Fisheries Development Programme (Fish seeds distribution), Group Insurance, Training of Shishal rope making & purchase of the machine, Training of Mat- making & supply of the raw material, Supply of School Uniform, Supply of Dhoti, Saris, Woolen clothes & Blankets, Supply of Iodine Salt, Sericulture Development Programme, Training of Wooden Craft, Supply of Toffee, Training of forestry, Milch animal distribution programme, Adult education, Scholarship distribution, Agricultural Tour, Cycle distribution, promotion of cottage industries, Supply of agricultural equipment & Diesel Pumps, medicinal seeds and fertilizers, Industrial Tour, Gobar Gas unit construction, Group Insurance, Inter-State Tour, Legal aid, Distribution of Naspati Plant, Emergency relief, Distribution of Chind grass and Rabi & Kharif seeds, Establishment of Solar units, Supply of Books & Stationary items to students, Soap Distribution, Supply of improved Chulha, Sports activities, Supply of nylon net, Supply of fruit bearing plants, Identity Card Lamination, Assistance for House Construction, Purchase of cultivable land for landless tribal, Tailoring, Black-smithy & Carpentry training etc.

#### 4.Result & Discussion

It is noteworthy that Bagicha and Manora tribal development blocs of Jashpur district constitute about 73% and 83% of tribal population respectively. As a matter of fact, these development blocks have highest concentration of Pahadi Korva tribal population. The Pahadi Korva tribes are concentrated in about 76 villages of Bagicha Block and 12 villages of Manora Block, and constitute 11% and 1.25% of the total Scheduled Tribe population of the block respectively. The total population of Pahadi Korva tribes in Jashpur district is 10725 spread in 2450 families (Source: Pahadi Korva Development Agency, Jashpur-Nagar, C.G). Ten developmental schemes were selected for the purpose of our analysis. These ten schemes and distribution of beneficiaries across the sample block are given in the Table 2. A perusal of the Table 2 shows that in Agricultural area, the most prevalent scheme is Distribution of Pair of Bullock (*Bail-Jodi*). Maximum percentage of Pahadi Korva tribal beneficiaries (74%) have got assistance under this scheme, followed by assistance of distribution of Rabi & Kharif Seeds (72%), Distribution of cultivable Land (70%), Land Reforms (68%), Assistance for Construction of House (66%) and Distribution of Agricultural Equipment (62%). As far as animal husbandry programme is concerned, very few beneficiaries got assistance for Goat rearing (20%), poultry farming (16%), Assistance for rearing Milch animals (6%). It was also found that almost negligible percentage (2%) of beneficiaries was associated with rural entrepreneurship (Like- Carpentry, Black-smithy and Tailoring).

**Table 2: Number and percentage of sample household who got assistance under Economic development****Programme of Pahadi Korva Development Agency**

S.No	Name of the Scheme	Manora Block (N=25)		Bagicha Block (N=25)		Total (N=50)	
		No. of Beneficiaries	%	No. of Beneficiaries	%	No. of Beneficiaries	%
1	Distribution of Pair of Bullock	19	76	18	72	37	74
2	Distribution of Seeds	20	80	16	64	36	72
3	Distribution of Agricultural Equipment	16	64	15	60	31	62
4	Distribution of Cultivable Land	21	84	14	56	35	70
5	Land Reforms	19	76	15	60	34	68
6	Assistance for Construction of House	17	68	16	64	33	66
7	Goat Rearing	4	16	6	24	10	20
8	Poultry	1	4	7	28	8	16
9	Distribution of Milch Animals under Dairy development programme	Nil	Nil	3	12	3	6
10	Small Enterprises (Carpentry, Black-smithy, Tailoring)	Nil	Nil	2	8	1	2

Source: Our Field Survey

This section throws a flood of light on the impact of various rural developmental schemes under tribal development programme of Pahadi Korva Development Agency. As a matter of fact, it is not reasonable to generalize and conclude that such schemes are effective or ineffective. Several socio-economic factors influence the performance of these schemes. It was found out that as a result of the Schemes - Distribution of pair of Bullock, Agricultural equipment and Seeds, the cultivable areas in both the sample block (Manora & Bagicha) increased substantially.

**Constraints in implementation of Economic development programme of Pahadi Korva Development Agency:**

**Lack of Training imparted to the beneficiaries:** Effective training is not imparted to the beneficiaries regarding rearing, keeping and care of Livestock. Furthermore, backward and forward linkages were found lagging in the execution of the schemes. It is imperative that for the success of the schemes related to animal husbandry, the beneficiaries must be trained regarding the skill of rearing and caring of livestock. Thus for the success of the scheme, it is important to see that proper backward and forward linkages are provided. **Inadequate supervision of the scheme:** It was observed that inadequate guidance was given to the beneficiaries and Ineffective supervision was done by the implementing agency. The post-financing implementation part of the scheme, feedback of the programme, monitoring of the physical process of

the scheme under implementation was virtually absent. Personal contact between the beneficiaries and the implementing agency was not all there. Consequently, the scheme became a bit mechanical. **Improper identification of the beneficiaries:** It has been noticed that the selection of the beneficiaries, which is done by the officers of the agency, is improper. The agency officers while making the identification and selection of the beneficiaries, does not take the ability, efficiency, capability, willingness, acumen and aptitude of the beneficiaries into consideration. The officers are, more or less, are focused on completing their target fixed by the State Govt. The suitability of the beneficiary for the scheme is not taken in to account. Resultly, genuine household beneficiary are generally deprived of the benefits of the schemes. It is the Governmental norm that only those beneficiaries, who possess agricultural land in their names, would be entitled for getting the Pair of Bullock scheme. It has been noticed that suppose a beneficiary gets the benefit of Milch animal (Cow, buffalo) scheme, he sells those animals in open market, and purchases Bullock, for cultivation of his encroached forest land. Thus, there is improper monitoring and evaluation of the schemes also. **Poor follow-up of the scheme:** The Follow-up is either very poor or completely absent. After the beneficiary is provided with the assistance, few officers of the implementing agency takes keen interest to meet the beneficiary to check his assets and rectify his problems. **Poor repayment of Loans:** It has been seen that beneficiaries who have taken loan assistance from the banks are very casual and not at all serious for the repayment of the loans. Consequently, the Banks ends up in getting NPA (non performing assets).

**Aspirations of the Pahadi Korva beneficiaries:** The Table 3 displays the aspirations of the Pahadi Korva households with regard to the scheme for rural development. It is clear from the Table 3 that almost all the beneficiaries (94%) aspire for timely distribution of Kharif & Rabi seeds, and distribution of Agricultural equipment. The percentage of beneficiaries aspiring for Pair of Bullocks was quiet high (81%). About 58% and 51% beneficiaries aspired for Land reforms & development and Provision of clean & safe drinking water respectively. In animal husbandry schemes about 44% and 32% beneficiaries aspired for Goat Rearing and Poultry farming respectively. It was interesting to find out that only 22% beneficiaries were interested for getting them recruited in Govt Jobs.

**Table 3: Aspirations of the Pahadi Korva households with regard to the scheme for Rural Development**

S.No.	Programs	Aspiration (in % )
1	Timely distribution of Kharif & Rabi seeds, and distribution of Agricultural equipment	94
2	Distribution of Pair of Bullock	81
3	Land reforms & Land Development	58
4	Goat Rearing	44
5	Poultry Farming	32
6	Government Jobs	22
7	Provision of clean & safe drinking water	51

Source: Our Field Survey

### 3. Conclusion

These economic development programmes (Distribution of Kharif & Rabi seeds, Agricultural Equipment, Pair of Bullocks, and Land Reforms & Development) facilitated the beneficiaries to bring most of the land under cultivation, preferably in the Kharif season. Moreover, the distributed Bullock Pair immensely helped the beneficiaries in leveling of their agricultural land also. There appear to be a very desirable, constructive and positive impact on their economic capabilities. In other words, their income & expenditure level got somewhat enhanced. There was increase in the Agricultural production as well. The beneficiaries showed keen inclination in sending their wards for schooling, intake of proper food and living in well- structured houses. All these are the testimony of the fact that the socio-cultural lives of the beneficiaries has been raised as a result of these schemes, which inevitably resulted in rural development.

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# RURAL DEVELOPMENT THROUGH ORGANIC FARMING CHHATTISGARH

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## ABSTRACT

*The after effects of green revolution have encouraged the farmers to take up organic farming. This paper has reviewed the global and Indian scenario with reference to organic farming. The key issues emerging in organic farming include yield reduction in conversion to organic farm, soil fertility enhancement, integration of livestock, certification constraints, ecology, marketing and policy support. The potential for organic farming, especially in the dry land regions has been discussed. It has been argued that organic farming is productive and sustainable, but there is a need for strong support to it in the form of subsidies, agricultural extension services and research. The paper concludes that understanding the implications of these different organic strategies and their rationales is a prerequisite for policy-makers to tailor policies and programmes aiming to assist rural communities benefit from organic agriculture as a vehicle for advancing green growth & sustainable rural development.*

**Keyterms-** *Chhattisgarh, Organic Agriculture, Livelihood Strategy, Market and Non-Market Values, Poverty*

## 1.Introduction

The Government, since independence is formulating the policies, program's, projects and schemes for rural development. All these programs and schemes are being implemented by the concerned department of the state govt. India being an emerging economy and committed to bring about a rapid and sustainable economic growth through various reforms, the rural development programmes must focus on public participation and rural organizations for its success and growth.

This policies and programmes are aimed at alleviating rural poverty, malnourishments and blind faith among the rural population. The rural development can focus on the elevation of living standards and per capita income of rural population. Green growth and organic agricultural sector is one of the key areas which can be targeted for the sustainable growth.

Over the years we are observed the ill effects of artificial fertilizers, pesticides and insecticides, which has deteriorated the productivity of the soil. This has not only deteriorated the farming output but has also affected the environment and lifecycle of human beings.

The agriculture based on chemicals is not sustainable because of many problems such as loss of soil productivity from excessive erosion and associated plant nutrients losses, surface and ground water pollution from pesticides, fertilizers' and sediments impending shortages of non-renewable resources and low fall income as against high production cost. Therefore there is increasing awareness of the need for alternative agricultural systems. Although, chemical fertilizers play a crucial role to meet the nutrient requirement of the crop, persistent nutrient depletion is posing a greater threat to sustainable agriculture. Therefore there is a urgent need of think over this phenomenon and to find out the alternative methods of safe agriculture.

### Effective of Organic Fertilizers:

The organic farming is an approach for producing agricultural products that is intended to overcome the negative impacts of chemical fertilizers and loss of soil quality. It has been observed that the organic farming is not based exclusively on short term economics, but also considers ecological concepts. The organic form of farming can also be called as sustainable form of farming or sustainable agriculture. Green revolution technology is known to have enhanced agricultural production and productivity. Organic farming is an approach for producing the food products i.e. intended to overcome the negative impacts of artificial fertilizers.

Organic farming system in India is not new is being followed from ancient times. It is a method of farming system which primarily aimed at cultivating the land and raising crops in such a way, as to keep the soil alive and good health by use of organic waste. It also uses the biological material along with beneficial microbes and bio fertilizers to release nutrients to crops for increased sustainable production in an eco friendly pollution free environment.

### Effect of Organic farming on field of tomato crop:

Tomato is one of the most important protective foods both because of its special nutritive value and also because of its wide spread production. Chhattisgarh is one of the main cultivators of tomato production. It has been observed that the yield of tomato can be increased by use of organic manures. Organic manures not only increases the yield but also improves soil's physical, chemical and biological properties with direct impact on moisture retention of soil, nutrient conservation etc. Organic nutrition for vegetables is specially important as they provide quality foods which are very important for providing health security to people. Since, the vegetables are mostly consumed as fresh or partially cooked; they should be devoid of residual effects of chemical fertilizers, insecticides and germicides.

As per the study Conducted by Geetharani, the effect of use of organic biofertilizers has shown a tremendous growth in the crop yield which is indicated in table below:

**Table No.-1**

Treatments	Plant Height(cm)	Days to 50% Flowering	No. of fruits/plant	Fruit yield /plant(kg)	Fruit yield/Plot(kg)
T <sub>1</sub>	57.83	49.0	20.95	0.9	17.62
T <sub>2</sub>	58.30	47.0	30.67	1.1	20.44
T <sub>3</sub>	49.30	47.7	21.83	0.9	18.26
T <sub>4</sub>	57.73	46.0	28.80	1.0	19.45
T <sub>5</sub>	56.40	47.7	23.77	0.9	17.50
T <sub>6</sub>	55.87	46.7	22.80	0.9	17.24

From the above table-1 it can be analyzed that with the use of organic means and methods of manures in agriculture sector, it will lead the farmers of Chhattisgarh towards the sustainable growth and development. If the rural communities joint their hands for the development and growth of agriculture sector through use of organic methods, the community can march towards their overall social and economics.

**Sources of organics manures:**

If the farmers of Chhattisgarh can effectively plan the agriculture farming than they can create various sources of organic manures on their field itself. For example in case of Dairy farming. Poultry farming, goat farming etc. through these animal sources the farmers can get the best quality of organic fertilizers from their field itself. They can recycle the dependency of animals on the agriculture and vice versa. Further the use of most effective organic insecticides derived from neem trees and cow urine can be used as a alternative source in place of hazardous insecticides and pesticides. Thus the farmers can manage these resources in effective way so that their economic development can be accelerated.

**2.Conclusion**

The organic farming is a boon for mankind and it definitely contributes towards the sustainable growth of rural population. They not only get the high yield of the crops but also they can get the alternative means of natural energy in the form of domestic gas, bio electricity etc. Thus through this paper we would like to appeal to the farmers of Chhattisgarh that they can elevate their life style and social and economic standards by utilizing the natural resources.

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# AGRICULTURE RURAL MARKET OPPORTUNITY AND CHALLENGES IN INDIA

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## ABSTRACT

*India has so far been a successful Country in the Asian continent. India is 7<sup>th</sup> Largest Country in terms of area and 2<sup>nd</sup> largest in the terms of population India is the sixth largest economy in the world with a nominal GDP of \$2.45 trillion. The country ranks third in GDP in terms of purchasing power parity at \$9.49 trillion. India's GDP is still highly dependent on Agriculture around 17%. However, India recently overtook China as the fastest growing large economy and is expected to jump up to rank fourth on the list by 2022. Agricultural sector plays a strategic role in the progress of economic development of a country. Agriculture has already made a significant contribution to the economic prosperity of advanced countries and Agriculture have vital role in the development of economic developed countries. On the economic side there are many Challenges, related to the Agricultural production and market for this Agricultural products more focus need to be on enhancing inclusiveness and ensuring that the benefits for the Agricultural Industries. More than 60% percent of Indian live in rural areas depends, directly or indirectly, on agriculture for their livelihood. Hence, an inclusive growth strategy needs to include investments in Agriculture infrastructure as well as programs by Government to increase Agriculture industry in the country.*

**Keywords:** *Economic development, Agriculture, Industry, Growth, Rural, Market, Challenges.*

## 1.Introduction

India is a Land of Agriculture over 58 per cent of the rural households depends on agriculture as their principal means of livelihood. Agriculture plays a vital role in India's economy. As per the 2nd advised estimates by the Central Statistics Office (CSO), the share of agriculture and allied sectors (including agriculture, livestock, forestry and fishery) is estimated to be 17.3 per cent of the Gross Value Added (GVA) during 2016-17. The Indian food industry is poised for huge growth, increasing its contribution to world food trade every year due to its immense potential for value addition, particularly within the food processing industry. The Indian food and grocery market is the world's sixth largest, with retail contributing 70 per cent of the sales. The Indian food processing industry accounts for 32 per cent of the country's total food market, one of the largest industries in India and is ranked fifth in terms of production, consumption, export and expected growth. It contributes around 8.80 and 8.39 per cent of Gross Value Added (GVA) in Manufacturing and Agriculture respectively, 13 per cent of India's exports and six per cent of total industrial investment.

The history of Agriculture in India dates back to Indus Valley Civilization Era and even before that in some parts of Southern India.<sup>[1]</sup> Today, India ranks second worldwide in farm output. Agriculture and allied sectors like forestry and fisheries accounted for 13.7% of the GDP about 50% of the workforce. The economic contribution of agriculture to India's GDP is steadily declining with the country's broad-based economic growth. Still, agriculture is demographically the broadest economic sector and plays a significant role in the overall socio-economic fabric of India. India exported \$38 billion worth of agricultural products in 2013, making it the seventh largest agricultural exporter worldwide and the sixth largest net exporter. Most of its agriculture exports serve developing and least developed

nations. Indian agricultural/horticultural and processed foods are exported to more than 120 countries, primarily in the Middle East, Southeast Asia, SAARC countries, the EU and the United States. India is the world's largest producer of many fresh fruits and vegetables, milk, major spices, select fibrous crops such as jute, staples such as millets and castor oil seed. India is the second largest producer of wheat and rice, the world's major food staples. India is the world's second or third largest producer of several dry fruits, agriculture-based textile rawmaterials, roots and tuber crops, pulses, farmed fish, eggs, coconut, sugarcane and numerous vegetables. India ranked in the world's five largest producers of over 80% of agricultural produce items, including many cash crops such as coffee and cotton, in 2010. India is one of the world's five largest producers of livestock and poultry meat, with one of the fastest growth rates.

Steps taken so far by Government. since 1952 - 2017

1. Subsidies for Agriculture - mainly as Fertilizer subsidies
2. Free /low cost electricity
3. Other subsidies for Agriculture equipment etc.
4. Hybrid seed development through Agriculture universities

### 1.1 Literature Review

As per Kanu Raheja (2005): Furthermore, the rural poor need to participate in the development and implementation of the relevant policies and programs, which need to ensure

As per Fez Ghanem(2014): (1) increasing food reserves and using financial markets for risk reduction, (2) improving the linkage of smallholders and family farmers to markets and helping them increase domestic food production while raising their incomes, and (3) supporting the development of independent producer organizations that provide voice for smallholders and also help them gain better access to input and output markets.

As per Gerard Sylvester(2017):In countries like India, where agriculture is central to the national economy, adequate irrigation is crucial and the water pump is a core component.

As per Dimitris Diakosavvas(2006): A greater improvement has been gained in the field of water quality and Agri-environmental programmes are mainly preserving a “*status quo*” in the relationship between agriculture and environment and the changes it is necessary to make to land-use are not being sufficiently stimulated.

As per Steve Wiggins(2016):The role of small-scale family farms in development and the eventual fate of smallholders(‘peasants’) is one of the longest-standing issues in agricultural development,

### 1.2 Objective

1. To know the living standard of the rural people by providing ways to develop rural India.
2. To know various schemes made by government for developing its rural areas.
3. To know the various ways to Market the Agricultural products in Indian Market.
4. To know the Opportunity and challenges Agricultural sector in India.

### 1.3 Recent Development

According to the Department of Industrial Policy and Promotion (DIPP), the Indian agricultural services and agricultural machinery sectors have cumulatively attracted Foreign Direct Investment (FDI) equity inflow of about US\$ 2.45 billion and the food processing sector has attracted around US\$ 7.81 billion during April 2000 to June 2017.

Some major investments and developments in agriculture are as follows:

India and Brazil have signed a bilateral investment agreement, aimed at enhancing cooperation in areas of agriculture, cattle genomics, ship building, pharmaceuticals, defence production, ethanol production and oil and gas, between the countries.

Parle Agro Pvt Ltd is launching Frooti Fizz, a succession of the original Mango Frooti, which will be retailed across 1.2 million outlets in the country as it targets increasing its annual revenue from Rs 2800 crore (US\$ 0.42 billion) to Rs 5000 crore (US\$ 0.75 billion) by 2018.

Zephyr Peacock, the India-focused private equity fund of US-based Zephyr Management, has invested an undisclosed amount in Bengaluru-based potato seeds firm Utkal Tubers India Pvt Ltd, which will be used to produce high-quality mini-tubers in a tissue culture laboratory and multiply them in its own development farms and through supervised contract farming in different regions of the country.

### 1.4 Government Initiatives

Government of India, in its Budget 2017–18, planned several steps for the sustainable development of agriculture.

Total allocation for rural, agricultural and allied sectors for FY 2017-18 has been increased by 24 per cent year-on-year to Rs 1,87,223 crore (US\$ 28.1 billion). A dedicated micro-irrigation fund will be set up by National Bank for Agriculture and Rural Development (NABARD) with a corpus of Rs 5,000 crore (US\$ 750 million). The government plans to set up a dairy processing fund of Rs 8,000 crore (US\$ 1.2 billion) over three years with initial corpus of Rs 2,000 crore (US\$ 300 million).

The participation of women in Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) has increased to 55 per cent and allocation to the scheme has been increased to a record Rs 48,000 crore (US\$ 7.2 billion) for FY2017-18.

Short-term crop loans up to Rs 300,000 (US\$ 4,500) at subsidised interest rate of 7 per cent per annum would be provided to the farmers. An additional incentive of 3 per cent is provided to farmers for prompt repayment of loans within due date, making an effective interest rate for them at 4 per cent.

### 1.5 Some of the recent major government initiatives in the sector are as follows:

With an aim to boost innovation and entrepreneurship in agriculture, the Government of India is introducing a new AGRI-UDAAN programme to mentor start-ups and to enable them to connect with potential investors.

The Government of India has launched the Pradhan Mantri Krishi Sinchai Yojana (PMKSY) with an investment of Rs 50,000 crore (US\$ 7.7 billion) aimed at development of irrigation sources for providing a permanent solution from drought.

The Government of India plans to triple the capacity of food processing sector in India from the current 10 per cent of agriculture produce and has also committed Rs 6,000 crore (US\$ 936.38 billion) as investments for mega food parks in the country, as a part of the Scheme for Agro-Marine Processing and Development of Agro-Processing Clusters (SAMPADA).

The Union Cabinet, Government of India, approves Rs 9,020 crore (US\$ 1.4 billion) as Extra Budgetary Resources (EBR) for execution of projects under Accelerated Irrigation Benefits Programme (AIBP) and their command area development (CAD) works under PMKSY.

A new platform for selling agricultural produce named e-RaKam has been launched by the Government of India and will operate as a joint initiative of Metal Scrap Trade Corporation Limited and Central Railside Warehouse Company Limited (CRWC).

The NITI Aayog has proposed various reforms in India's agriculture sector, including liberal contract farming, direct purchase from farmers by private players, direct sale by farmers to consumers, and single trader license, among other measures, in order to double rural income in the next five years. The Ministry of Agriculture, Government of India, has been conducting various consultations and seeking suggestions from numerous stakeholders in the agriculture sector, in order to devise a strategy to double the income of farmers by 2022.

The Government of India has allowed 100 per cent FDI in marketing of food products and in food product e-commerce under the automatic route.

The Maharashtra State Agriculture Marketing Board (MSAMB) has operationalised 31 farmer-to-consumer markets in the state, and plans to open 100 more such markets in the future, which would facilitate better financial remunerations for the farmers by allowing them to directly sell their produce in open markets.

The Ministry of Labour and Employment plans to amend the Minimum Wage Act to raise the daily minimum wage of unskilled agricultural labour in C-class towns to Rs 350 (US\$ 5.2) in the central sphere, from the current wage of Rs 160 (US\$ 2.4) per day.

The Government of India and the Government of Israel have expressed their commitment to further strengthen bilateral relations in the field of agriculture and allied sectors, as well as enhance cooperation at the government-to-government and business-to-business levels between the two countries, in a bid to further enhance the relationship.

According to the Agriculture Ministry, 50,000 hectares of area is available for coconut cultivation in Bihar, the Coconut Development Board plans to equip the farmers thus making India the world leader in production, productivity, processing for value addition and export of coconut.

## **1.6 Challenges**

A rural market in India farmers with limited marketing options sell their surplus produce

**Infrastructure:** India lacks cold storage, food packaging as well as safe and efficient rural transport system. This causes one of the world's highest food spoilage rates, particularly during monsoons and other adverse weather conditions. Food travels to the Indian consumer through a slow and inefficient chain of traders. Consumers buy agricultural produce in suburban markets known as 'sabzi mandi' such as one shown or from roadside vendors.

Indian agriculture includes a mix of traditional to modern farming techniques. In some parts of India, traditional use of cattle to plough remains in use. Traditional farms have some of the lowest per capita productivities and farmer incomes.

India has become the world's largest manufacturer of tractors with 29% of world's output in 2013; it is also the world's largest tractor market. Above a tractor in use in north India.

Slow agricultural growth is a concern for policymakers as some two-thirds of India's people depend on rural employment for a living. Current agricultural practices are neither economically nor environmentally sustainable and India's yields for many agricultural commodities are low.

Poorly maintained irrigation systems and almost universal lack of good extension services are among the factors responsible. Farmers' access to markets is hampered by poor roads, rudimentary market infrastructure, and excessive regulation."

### 1.7 Opportunity

There is Various New Opportunity in Indian Agriculture sector.

- 1.) Developed various crop-based producer groups to provide stronger linkages between producers and buyers throughout the region.
- 2.) Expanded access to credit training and technical assistance for loan borrowers and officers.
- 3.) Built the capacity for private sector agribusinesses.
- 4.) Conducted mentoring, training, workshops and technical assistance for private sector agribusinesses.
- 5.) Promoted value addition in targeted sectors and introduced new crops.

### 1.8 Challenges

The major problems were:

- Drought,
- Flood,
- Poor irrigation system,
- Desalination of soil,
- Absence of technology,
- Poverty,
- Less Government support.
- Poor implementation of Government projects.
- Lack of infrastructure
- Lack of coordination Central& State governments and other agencies should work together to develop and implement improved policies and developmental models to radically change and modernise Indian agriculture.

## 2. Conclusion

According to this study India is one of the largest producer of Agriculture product and exporter of Agriculture product in the world. The agricultural sector is of vital importance for the regional and economy development of India. But still India cannot enjoy the optimum benefit from this Agricultural sector. Because there are many challenges are face by this sector and this challenges needed serious attention as soon possible. If India wanted to create rapid pase in the development of India economy then Government should form an new strategy and policy that help to create better market for the this agriculture produces so farmers can get the true value for the yield. Government should also focus on the implementation part of the various scheme and policies so the impact can be seen in the economy development in rapid speed. And also need the flexibility in all the policy and scheme which is formed by the Government. If all go well then definitely with the help of the biggest sector reformed called Agricultural Indian can become one of the biggest economy.

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# INDIA'S DRIVE FOR A CASHLESS ECONOMY- VIRTUES AND CHALLENGE

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## ABSTRACT

*When the Indian government recently banned two high-value currency notes, it led to all sorts of chaos. It led to huge queues to exchange money at banks and ATMs , and this in a country where more than half of its citizens do not have a bank account. According to a 2014 study by Tufts University, The Cost of Cash in India, cash operations cost the Reserve Bank of India (RBI) and commercial banks about Rs21,000 crore annually. Also, a shift away from cash will make it more difficult for tax evaders to hide their income, a substantial benefit in a country that is fiscally constrained. Due to limited banking and credit card penetration India continues to be a cash-based society. At least two places in India have already gone completely cashless. Long before Modi began his monetary purge, Auroville a European-influenced, intentionally developed “hippie” town in Tamil Nadu and the 1,200 person village of Akodara in Gujarat have already eradicated cash in exchange for electronic payment systems. But as the dust continues to settle, a tangible long-term benefit of the process appears to be emerging: moving India towards a digital economy in which electronic transactions play a major role in the financial system. The rush to do this, however, is likely to cause a spike in cybercrime.*

*Purpose: The principal purpose of the work is to understand and define the concept of cashless economy. It also examines the areas where the concept of Cashless Economy finds its application.*

*Methodology: The paper is written based on Digital transaction concept . The paper begins with discussion of concept of cash based society. It then discusses the rationale of Cashless Economy subsequently discussing the Cashless transactions merits and challenges.*

*Practical Implication: This work would help the Economy to understand the importance of Digital Business environment.*

*Paper Type: Conceptual Paper*

**Keywords-** Currency notes, Digital economy, Cash-based society, Commercial banks.

## 1. Introduction

India economy was an incredibly cash-centric. 95% of all transactions moving through accounted for cash , 90% of vendors didn't have card readers or the means of accepting electronic payments, 85% of workers were paid in cash, and almost 50% of the population didn't even have bank accounts. The Cost of Cash In India, cash operations cost the Reserve Bank of India (RBI) and commercial banks about Rs21,000 crore annually. Also, a shift away from cash will make it more difficult for tax evaders to hide their income, a substantial benefit in a country that is fiscally constrained. This article explores the cashless economy concept, highlights different issues, challenges including regulatory and security concerns. It attempts to identify the various aspects involved in the move towards cashless economy for India along with a special focus on significance of such a move in small developing economies. Digital India is the flagship

programme of the Government of India. It was launched on 1st July 2015 by Prime Minister Narendra Modi, with a vision to transform India into a digitally empowered society and knowledge economy. “Faceless, Paperless, Cashless” is one of the professed roles of Digital India. Major progress towards this goal was made in late 2016, when the government took steps to demonetize the country.

### 1.1 Objectives Of The Study

The main objective of the study is to understand and define the concept of cashless economy. It also examines the areas where the concept of Cashless Economy finds its merit, demerits and challenges.

### 1.2 Methodology

The paper attempts to bring forth the conceptual perspective of the Cashless Economy to enable researchers and practitioners understand the concept in its totality. This paper is based on Secondary Data's. It discusses the rationale of Cashless Economy subsequently discussing the Cashless transactions and its merits, demerits and challenges.

**Cashless Economy-** As Prasad said that a cashless economy is an economy which is tracked in real time. “Each transaction is mapped. Every taxman likes numbers. It will certainly help expand the tax net.”

### 1.3 Merits

**Some of the merits** of a cashless economy are listed below, going through these you will realise how significant this initiative is and how it will shape the Indian economy in a positive way.

1. It boost the economy because the cost of making and handling paper money is quite high.
2. It reduces the terrorist activities, as most of the terrorist activities are fueled by the black money in hard cash.
3. This aids the environment, as no trees are cut for printing of paper money.
4. Reduction in crime rates. Crimes with financial motives are rare in cashless economy. An instance of this has been seen in Delhi recently when the government pulled out high value notes.
5. It is the medicine for fake money problem. No cash simply means no fake cash.
6. Adherence to labour laws can be achieved, as now labours will be paid in their bank accounts.

### 1.4 Demerits

Every initiative has a lop side also, some of the demerits of cashless economy with respect to India are given below. In the later part of this article we will talk in detail about the challenges related to cyber security, individual's financial data, and online banking fraud which a cashless economy can face.

1. No cash in hand. Always a dependency on your card or bank system connectivity.
2. Major part of Indian population is not educated about banking systems, specifically about the digital aspect of it. Hence they may resist to make online transactions.
3. Automation and online transactions will cut down large number of jobs.
4. India is dominated by small retailers and they don't have enough resources to invest in electronic payments.
5. Increase in cyber crimes and online banking frauds.

At least two places (**Auroville Tamilnadu and Akodara, Gujrat**) in India have **already gone completely cashless** before started this journey toward digital business transformation.

## 1.5 Government Efforts

Furthermore, the Government of India's additional initiatives like Mobile Seva and reward schemes like Lucky Grahak Yojana and Digi Dhan Vyapar Yojana are supplementing the use of mobile in a cashless economy. Mobile Seva provides a fully operational mobile payment gateway, incorporating various channels for making electronic payments through mobile devices. Government departments and agencies can integrate the gateway with their applications, so that citizens and businesses can make payments for various government services through their mobile devices.

Launched in late 2016, Lucky Grahak Yojana distributes daily and weekly rewards to thousands of retail consumers. Similarly, Digi Dhan Vyapar Yojana distributes weekly rewards to thousands of small businesses. To qualify for these rewards, applicants must make digital payments through a Unified Payment Interface (UPI), RuPay, the Aadhaar Enabled Payment System (AEPS), or an Unstructured Supplementary Service Data (USSD). These initiatives have boosted confidence in digital mediums for payment services and will likely lead to increased private sector mobile payment services, as well.

## 1.6 Challenges

The government's move of demonetization has led to a push towards digital transactions. But the government faces a slew of challenges to mark a shift towards a cashless digital economy. Challenges Government and Institution face in making India shift toward cashless transactions:

- a) **Behavioural change:** Adapting cashless transaction from age old conventional methods will take time to become a habit.
- b) **Psychological change:** Cashless transaction involves people's scepticism and fear of loosing money and whom to approach in case of failed transaction .
- c) **Class divide :** This have widen the gap between banked and unbanked population .This divide will encourage one class while other will take this as a business of other class.
- d) **Divide in internet and mobile reach:** Lack of infrastructure and mobile telephony to rural area are barriers.
- e) **Illiteracy :** it's a biggest barrier toward illiterate people to first understand this change.

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# INDIAN RURAL MARKET: OPPORTUNITIES AND CHALLENGES

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## ABSTRACT

*The rural market is where the markets of the future are likely to be. Urban markets are becoming increasingly competitive for many products. In some cases they are even saturated. The paper reviews various opportunities and challenges available in the rural market in India. In the present scenario various development initiatives taken by the government has opened a new gateway of success for companies to penetrate in rural market. Paper highlights the various initiatives taken and what has been the impact on the development of rural market in India. However, Companies face many challenges, on the other hand, rural markets offer growth opportunities. Rural market is the market of the new millennium. Marketers will have to understand the rural customers before they can make inroads into the rural markets. Thus, looking at the challenges and the opportunities, which rural markets offer to the marketers, it can be said that the future is very promising for those who can understand the dynamics of rural markets and exploit them to their best advantage.*

## 1.Introduction

Today Rural Market has become an important avenue for companies as they have realized that rural markets offer significant growth opportunity, a large proportion have remained unsure of the profitability. However, our interactions with company executives revealed that many have not only started earning profits but have also done so relatively quickly. The economic, demographic and cultural drivers that are shaping India's rural market call for innovative strategies and capabilities. Companies are experimenting with different sales and distribution models to position themselves for the long term. But the results have been mixed, and companies face numerous barriers to efficient sales and distribution. Although many companies are still unsure about how to scale their rural operations, they remain optimistic about the opportunity. To translate that optimism into success, companies will need to join forces with various stakeholders across the rural value chain to create an environment that fosters business expansion. Agricultural development is the demand today and various efforts are required to improve it. If our agricultural growth picks up to 4 percent as envisioned by the Planning Commission, the cascading impact that rural prosperity will have on the national economy could add up to an additional 2 percent to our GDP and enable us to go for double-digits growth. The real income of rural households is projected to rise from 2.8% in the past two decades to 3.6% in the next two. Higher incomes and exposure to urban lifestyles have also raised the aspirations of the rural populace, as they strive to improve their quality of life by gaining access to new technologies, products and services. Rural India consists of 638596 villages that house 742,490,639 people. This figure represents around 70% of the total population of India and 12% of the globe's population. In fact, as per McKinsey, despite rising urbanisation, 63% of India's population will continue to live in the rural areas even in 2025. Further, the number of consumers earning over \$5 a day is projected to catapult from 50 million today to 150 million by 2020.

Demographic classification	No of households (m)		
	Urban	Rural	Total
Rich ( income greater than Rs 1m per annum)	4.8	1.3	6.1
Well off (income greater than Rs 0.5m per annum)	29.5	27.4	56
Total	34.3	28.7	63.0
% of Total	54.4%	45.6%	

Source: Ministry of Communications & Information Technology, India

It is evident from the above figure that both and rural households are increasing at a similar rate. Cut throat competition in urban areas has compelled many companies to look for new, unexploited markets. Rural India has emerged as an answer, owing to lack of strong presence by brands in most sectors as well as a high growth potential. Further, improvement in infrastructure prompted by government initiatives seems to have lowered entry barriers for many companies. Also, rural India is insulated against global economic downturns, which adds to its attractiveness. The Indian rural market with its vast size and demand base offers great opportunities to marketers. Two-thirds of countries consumers live in rural areas and almost half of the national income is generated here. It is only natural that rural markets form an important part of the total market of India. Our nation is classified in around 450 districts, and approximately 630000 villages, which can be sorted in different parameters such as literacy levels, accessibility, income levels, penetration, distances from nearest towns, etc 70 % of India's population lives in 627000 villages in rural areas. According to the NCAER study, there are almost twice as many 'lower middle income' households in rural areas as in the urban areas.

## 2.Literature Review

Mr. Venkatesan said rural markets could be defined on the basis of their location, but the mind set of the people was very urban. “Contrary to popular perceptions, there is high level of disposable income in rural areas. Although the consumers in urban areas have higher income levels, they have to factor in issues like expenses on account of accommodation, travel and other factor. These factors are not present in rural areas, thus ensuring that there is more disposable income. The presence of large number of youth who prefer our products is another factor that drives the growth for us,”. As per Arshi (2013) Rural India offers huge opportunities which companies can tap for their growth and development. However, Companies face many challenges in tackling the rural markets. 833 million people reside in India. According to Suchi Patel (2013) It can be said that the future is very promising for those who can understand the dynamics of rural markets and make use of them to their best advantage. As per Sudesh et al (2013) looking at the challenges and the opportunities, which rural markets offer to the marketers, it can be said that the future is very promising .

## 3.Opportunities for Various Industries in Indian Rural Market

Indian rural market has shown tremendous change in recent years. Government initiatives has brought momentum in the rural market. In Indian context we find that there are many industries which has huge potential in the rural market some of the Industries scenario has been discussed.

**1.Auto Industry:** The Indian auto industry is one of the largest in the world. The industry accounts for 7.1 per cent of the country's Gross Domestic Product (GDP). The Two Wheelers segment with 80 per cent market share is the leader of the Indian Automobile market owing to a growing middle class and a young population. Moreover, the growing interest of the companies in exploring the rural markets further aided the growth of the

sector. Companies has huge potential in the rural area. Due to infrastructure facility connectivity between rural and urban area has increased. Two wheeler market is increasing day by day as given in the data. Companies need to focus on the marketing in this segment.

**2. Consumer Durables:** Indian consumer segment is broadly segregated into urban and rural markets, and is attracting marketers from across the world. The sector comprises of a huge middle class, relatively large affluent class and a small economically disadvantaged class, with spending anticipated to more than double by 2025. India hit ten-year high and stood first among the 63 nations surveyed in the global consumer confidence index with a score of 136 points for the quarter ending December 2016. Global corporations view India as one of the key markets from where future growth is likely to emerge. The growth in India's consumer market would be primarily driven by a favourable population composition and increasing disposable incomes. Increasing electrification of rural areas and wide usability of online sales would also aid growth in demand.

**3. Banking Industry:** Access to banking system has also improved over the years due to persistent government efforts to promote banking-technology and promote expansion in unbanked and non-metropolitan regions. At the same time India's banking sector has remained stable despite global upheavals, thereby retaining public confidence over the years. Deposits under Pradhan Mantri Jan Dhan Yojana (PMJDY) have also increased. As on November 9, 2016, US\$ 6,971.68 million were deposited, while 255.1 million accounts were opened. As per the Reserve Bank of India (RBI), India's banking sector is sufficiently capitalised and well-regulated. The Indian banking system consists of 27 public sector banks, 26 private sector banks, 46 foreign banks, 56 regional rural banks, 1,574 urban cooperative banks and 93,913 rural cooperative banks, in addition to cooperative credit institutions. Public-sector banks control more than 70 per cent of the banking system assets, thereby leaving a comparatively smaller share for its private peers. Banks are also encouraging their customers to manage their finances using mobile phones. Enhanced spending on infrastructure, speedy implementation of projects and continuation of reforms are expected to provide further impetus to growth. All these factors suggest that India's banking sector is also poised for robust growth as the rapidly growing business would turn to banks for their credit needs.

**4. Education Industry:** India holds an important place in the global education industry. The country has more than 1.5 million schools with over 260 million students enrolled and about 751 universities and 35,539 colleges. India has one of the largest higher education systems in the world. However, there is still a lot of potential for further development in the education system. Mr Ravi Shankar Prasad, Minister for Law and Justice and Information Technology, has stated that the Government of India will likely educate over 10 million people on e-payments in rural India, through the newly-launched Digi Dhan Abhiyan or digital financial literacy programme. Government has approved 'Pradhan Mantri Gramin Digital Saksharta Abhiyan' (PMGDISHA) to make 60 million rural households digitally literate. The outlay for this project is Rs 2,351.38 crore (US\$ 353.70 million) to usher in digital literacy in rural India by March, 2019. The Skill India initiative – 'Kaushal Bharat, Kushal Bharat' is another initiative of the government. Under this initiative, the government has set itself a target of training 400 million citizens by 2022 that would enable them to find jobs. The initiatives launched include various programmes like: Pradhan Mantri Kaushal Vikas Yojana (PMKVY), National Policy for Skill Development and Entrepreneurship 2015, Skill Loan scheme, and the National Skill Development Mission. PMKVY is the flagship program under the Skill India Initiative. The Union Government plans to set up skill development centres across India with an investment of Rs 12,000 crore (US\$ 1.8 billion) to create job

opportunities for 10 million individuals by 2020 under PMKVY, as per Mr Bandaru Dattatreya, Minister of Labour and Employment.

**5. FMCG Industry:** Fast-moving consumer goods (FMCG) sector is the 4th largest sector in the Indian economy with Household and Personal Care accounting for 50 per cent of FMCG sales in India. Growing awareness, easier access and changing lifestyles have been the key growth drivers for the sector. The urban segment (accounts for a revenue share of around 40 per cent) is the largest contributor to the overall revenue generated by the FMCG sector in India and recorded a market size of around US\$ 29.4 billion in 2016-17. However, in the last few years, the FMCG market has grown at a faster pace in rural India compared with urban India. Semi-urban and rural segments are growing at a rapid pace and FMCG products account for 50 per cent of total rural spending. In the Union Budget 2017-18, the Government of India has proposed to spend more on the rural side with an aim to double the farmer's income in five years; as well as the cut in income tax rate targeting mainly the small tax payers, focus on affordable housing and infrastructure development will provide multiple growth drivers for the consumer market industry. Rural consumption has increased, led by a combination of increasing incomes and higher aspiration levels; there is an increased demand for branded products in rural India. The rural FMCG market in India is expected to grow at a CAGR of 14.6 per cent, and reach US\$ 220 billion by 2025 from US\$ 29.4 billion in 2016.

**6. Healthcare Industry:** Healthcare has become one of India's largest sectors - both in terms of revenue and employment. Healthcare comprises hospitals, medical devices, clinical trials, outsourcing, telemedicine, medical tourism, health insurance and medical equipment. The Indian healthcare sector is growing at a brisk pace due to its strengthening coverage, services and increasing expenditure by public as well private players. Indian healthcare delivery system is categorised into two major components - public and private. The Government, i.e. public healthcare system comprises limited secondary and tertiary care institutions in key cities and focuses on providing basic healthcare facilities in the form of primary healthcare centres (PHCs) in rural areas. The private sector provides majority of secondary, tertiary and quaternary care institutions with a major concentration in metros, tier I and tier II cities. Rural India, which accounts for over 70 per cent of the population, is set to emerge as a potential demand source. A total of 3,598 hospitals and 25,723 dispensaries across the country offer AYUSH (Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homoeopathy) treatment, thus ensuring availability of alternative medicine and treatment to the people. In 2017, the Government of India has provided grant-in-aid for setting up of AYUSH educational institutions in States and Union Territories. To sum up, there are vast opportunities for investment in healthcare infrastructure in both urban and rural India.

**7. IT Industry:** The global sourcing market in India continues to grow at a higher pace compared to the IT-BPM industry. The global IT & ITeS market (excluding hardware) reached US\$ 1.2 trillion in 2016-17, while the global sourcing market increased by 1.7 times to reach US\$ 173-178 billion. India remained the world's top sourcing destination in 2016-17 with a share of 55 per cent. Indian IT & ITeS companies have set up over 1,000 global delivery centres in over 200 cities around the world. The internet industry in India is likely to double to reach US\$ 250 billion by 2020, growing to 7.5 per cent of gross domestic product (GDP). The number of internet users in India is expected to reach 730 million by 2020, supported by fast adoption of digital technology, according to a report by National Association of Software and Services Companies (NASSCOM). The public cloud services market in India is slated to grow 35.9 per cent to reach US\$ 1.3 billion according to IT

consultancy, Gartner. Increased penetration of internet (including in rural areas) and rapid emergence of e-commerce are the main drivers for continued growth of data centre co-location and hosting market in India. n.

**8. Manufacturing Industry:** Manufacturing has emerged as one of the high growth sectors in India. Government had launched the 'Make in India' program to place India on the world map as a manufacturing hub and give global recognition to the Indian economy. India is expected to become the fifth largest manufacturing country in the world by the end of year 2020\*. India is an attractive hub for foreign investments in the manufacturing sector. Several mobile phone, luxury and automobile brands, among others, have set up or are looking to establish their manufacturing bases in the country. The manufacturing sector of India has the potential to reach US\$ 1 trillion by 2025 and India is expected to rank amongst the top three growth economies and manufacturing destination of the world by the year 2020. The implementation of the Goods and Services Tax (GST) will make India a common market with a GDP of US\$ 2 trillion along with a population of 1.2 billion people, which will be a big draw for investors. With impetus on developing industrial corridors and smart cities, the government aims to ensure holistic development of the nation. The corridors would further assist in integrating, monitoring and developing a conducive environment for the industrial development and will promote advance practices in manufacturing. Looking into various opportunities provided in rural market India is striving hard to develop rural market as business hub for companies. India is a country with huge rural population. The socio economic condition of people has improved and they look for new technologies and they welcome it. Whether it is IT, Education or Healthcare rural market has huge potential. In FMCG sector Unilever and P& G has penetrated deeply into the rural market. As the market is big so it is on the companies to develop new marketing strategies. Every opportunities has to face certain challenges and if these challenges are sorted out rural market in India is the new segment to be tapped.

#### **4.Challenges in Rural Market**

The rural market offers a vast untapped potential, it should be recognised that it is not easy to operate in the market, because of several attendant challenges. Rural market remains untapped because of mainly three challenges:-distance, diversity, and dispersion. As much as Rural India presents a great opportunity, there are still many challenges that have to be overcome. Dispersed population and trade, large number of intermediaries in the value chains leading to the higher costs, scarce bank and credit facilities for rural customers and retailers, highly credit driven market and low investment capacity of retailers are the other roadblocks. Thus, there are several roadblocks that make it difficult to progress in the rural market. Marketers encounter a number of problems like dealing with physical distribution, logistics, proper and effective deployment of sales force and effective marketing communication when they enter into the rural segments.

- 1) The large population base and number of households indicates a widely spread out market and it is a challenge for the marketer to service this dispersed market. The number of the villages is more than five lakhs and is not uniform in size. Nearly half of the population lives in middle sized villages which have a population ranging from 1000 to 5000 persons. These types of distribution of population warrants appropriate distribution and promotion strategies to decide the extent of coverage of rural market.
- 2) The rural per capita income is low as compared to urban area. Low per capita income leads to low purchasing power. This apart, the distribution of income is highly skewed, since the landholding pattern, which is basic asset, is itself skewed. Thus, rural market presents a highly heterogeneous scene. Therefore few challenges arise in this respect, like; off-taking of any product by rural consumer, maintaining of inventory levels, distribution system options, and frequency of distribution. This aspect should be carefully considered by the marketers.

3) There are lacks of proper physical communication facilities in rural areas. Nearly half of the villages in the country do not have all-weather roads. Therefore reaching these villages is very physically taxing. Hence, distribution efforts put up by the marketers prove to be expensive and ineffective.

4) The rural market, by and large, are characterized by underdeveloped people and consequently underdeveloped market. A vast majority of rural people is not financially stable and is tradition-bound, fatalistic, mired in age-old customs, traditions, habits, taboos, and practices. Unfortunately, the impact of agricultural technology has not been felt uniformly throughout the country. The large segments of rural population have remained untouched by technological breakthroughs.

5) There are vast variations in the levels of literacy amongst rural people. Around two-fifth of the rural population is illiterate and only one-fifth holds a matriculate or higher degree. Also, literacy levels vary hugely among different states. These variations pose a challenge to easy and clear comprehension of the message by all sets of rural audience. The limited reach of mass media in rural areas and its regional and state variations pose limitations on a universal approach to communication for rural consumers. Also different perceptions, traditions, and values across states and in some case within a state; are other obstacles in communication development.

6) The distribution of products continues to pose an immense challenge to marketers because reaching of 7.8 million retail outlets spread across 6,40,000 villages and feeding a retail network of villages shops is a distribution nightmare. The challenges for the suppliers is the small size of each villages with low throughout per outlet, coupled with the high cost of distribution since these villages are some distance away from distributors. These factors make high quality distribution unviable. The distribution of any product in the rural areas; agricultural inputs, consumables or durables, should necessarily follow a seasonable pattern. The demand pattern

in the rural areas is seasonable. The distributions in the rural areas are frequent and not uniform throughout the year.

The rural market in India is undergoing a massive change. These changes have resulted in shifting the marketable battlefields from urban to rural. Most of the companies treat rural market as a dumping ground for the lower end products designed for urban audience. But, this scenario is slowly changing and importance is given to the need of the rural customer. Considering the emerging issues and challenges, government support is necessary for the development of marketing. The government may adjust suitable budget allocations to rural infrastructure plans, and proper supervision for effective plan implementations. Marketers should understand

these challenges and then making strategies in the light of these challenges to face them and to tap the rural Indian market and importance is given to the need of the rural customer. Considering the emerging issues and challenges, government support is necessary for the development of marketing. The government may adjust suitable budget allocations to rural infrastructure plans, and proper supervision for effective plan implementations. Marketers should understand these challenges and then making strategies in the light of these challenges to face them and to tap the rural Indian market.

## **5.Development of Strategies**

The firms operating in rural markets have to perceive and weigh the opportunities as well threats that exist in this highly heterogeneous and unpredictable market. The large number of geographically dispersed villages presents a major challenge to the marketer in reaching to rural consumer and this requires exploring innovative ways to reach products and services. Occupation and the income stream have major implications for segmentation and targeting rural marketing effort. In addition to offering appropriate price and package size, the channels to deliver the price and products are influenced by both occupation and income. The majority of consumers with limited income suggest a large market for essential product and a value for money propositions. The marketers need to examine the potential of rural market for a separate market offerings and developing the strategies for marketing mix in rural markets on the basis of three important mix:- Product, Pricing, distribution, and promotional strategies:

- 1) For evolving product strategies, the marketers should think in terms of low unit price and low volume packing's which convey a perception of sturdiness and utility in the minds of rural consumers. Whenever necessary, redesigning of the product can also be thought of depending on the customs, traditions, taboos and habits, of rural customers. In addition, a brand name or logo or symbol, which conveys the purpose, utility and quality of the product, is essential for the rural customer to identify the product with. Marketers should understand the psyche and needs of the rural customers and then produce accordingly.
- 2) Pricing strategies are closely linked to the product strategies. The product packaging and presentation also offer scope for keeping the price low to suit the rural purchasing power. The marketers aim to reduce the value of the product to an affordable level, so that a larger segment of the population can purchase it, thus expanding the market. This is the most common strategies widely adopted by the marketers to enter into the rural market.
- 3) For formulation of distribution strategies in rural areas, it is necessary to keep in mind; the characteristics of the product, consumable and non-consumable, and life cycle and other factors relating to distribution. Marketers should examine carefully the market potential of different villages and target the villages that can be served in a financially viable manner through an organized distribution effort. The marketers may distribute the products through Co-operatives societies and by utilising the services of Public distribution system, utilizing of multi-purpose distribution centres by Petroleum /Oil companies, distribution up to the feeder markets/mandi towns, haats/melas, and agriculture input dealers.
- 4) The promotional measure or strategies chosen should be cost effective, while consumable products may warrant the use of mass media since the target consumers are sizable, durable products will require personal selling efforts because of smaller size of target. The fewer rural population has access to a vernacular newspaper and size of rural population is illiterate and put up the limitation on print media. The audio visuals must be planned by the marketers for promotional purposes. The traditional forms of promotional measure should be used in promotional strategies.

## 5. Conclusions

Indian Rural Market play a pivotal role as it provides great opportunities to the corporations to stretch their reach to nearly seventy percent of population. Rural market also benefits the rural economy by providing infrastructure facilities, uplifting the standard, and quality of life of the people resides in rural area. Though the rural market has become a favourite destination for every marketers but it's important to realize that it has lot of challenges and risk, therefore corporations should assess the obstructions as vigilantly as possible. A thorough understanding of rural markets and systematic move towards are necessary to penetrate rural market. In order to develop marketing strategies and action plans, the corporations need to taken into account the complex factors that influence the rural consumers buying behaviour. The rural market is developed by rising purchasing power, changing consumption pattern, increased access to information and communication technology, improving infrastructure and increased government initiatives to boost the rural economy. The marketers tune to their strategies in accordance to the rural consumer in the coming years. In spite of all complexities involved in the rural marketing, the rural scene of rural environment is changing steadily in India. The biggest challenge today is to develop a scalable model of influencing the rural customer mind over a large period of time and keep it going. Traditional urban marketing strategies will have to be localized as per the demands of the rural markets. It has to reach out to rural consumers and relate to them at an appropriate level, so that it can bring about the desired behavioural change. Government support is necessary for the development of rural market in India to face the emerging issues and challenges in the core areas like; transportation, communication, roads, and credit institutions, crop insurance for better utilization of land and water management. The future no doubt lies in the rural market. In conclusion, the rural markets are enticing and marketing to rural consumers is exciting. However, a clear understanding or the rural consumers and their current and future expectations are the major part of strategies to tap the rural market.

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# SHABARI EMPORIUM: A STUDY OF CUSTOMER SATISFACTION

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## ABSTRACT

*Shabari emporium are sales outlets to sale produce of many heritage handicrafts and disappearing traditional arts of Chhattisgarh State, made by tribal/village artisans. The emporiums are endeavor of Chhattisgarh Handicraft Development Board that is an undertaking of Chhattisgarh Government. There are 19 emporiums of which 2 are situated in out of the state and remain functioning in state. The emporium situated in Chhattisgarh Haat, Pandari, Raipur is the most revenue generating emporium. Customer satisfaction level of this emporium is studied.*

**Keywords-** *Shabari Emporium, Chhattisgarh Haat-Raipur, Heritage Handicraft, Customer Satisfaction.*

## 1. Introduction

Here is a brief introduction to Shabari emporium and customer satisfaction

### 1. Shabari Emporium

Chhattisgarh Handicraft Development Board is an undertaking of Chhattisgarh Government. Main objectives of the board are-

- 1.1.1 Qualitative improvement in product of traditional artisan of Chhattisgarh**
- 1.1.2 Protection, Promotion and Expansion of traditional artisan**
- 1.1.3 Self employment through making handicraft**
- 1.1.4 Financing to produce handicraft**
- 1.1.5 Production and production of disappearing traditional art**

CHDB run Shabari emporium, a medium to sale the produce of traditional artisan of Chhattisgarh. There are 19 Shabari Emporiums of which 2 situated in out of state and remaining in Chhattisgarh. Details of Chhattisgarh location are Ambikapur-1, Bhilai-1, Bilaspur-1, Champaran-1, Jagdalpur-1, Jashpur-1, Kanker-1, Kondagaon-1, Narayanpur-1, Pankhajer-1, Parachpal-1, Raipur-5, Rajnandgaon-1, Sarguja-1

These emporium sales tradition craft of following categories, some of them are more than thousand years old, viz. Bamboo, Bell Metal, Carpet, Clay Art, Embroidery, Godna Craft, Iron Craft, Jute Craft, Shell Craft, Sisal Craft, Stone Craft, Terracotta, Traditional cloth& panting, Tumba, Wood Craft

Selling amount of the emporium goes to artisan after deduction of sales cost that is about 10% of sales price on an average basis.

Shabari Emporium situated in Chhattisgarh Haat, Pandari, Raipur is the most revenue generating emporium. Till quarter 3 of current financial year it has about 30% sales contributions of total revenue.

As per salesmen of this emporium average visitors is 15-18 per day, on routine days and in season like craft exhibition cum sale in Chhattisgarh Haat, etc., it becomes 40-45. 80% of visitors buy something on routine days.

- 1.2 **Customer Satisfaction-** It is marketing terminology that measure customer expectation towards any goods or service. Kotler and Keller explain customer satisfaction is customer feeling of pleasure which resulted from comparing a product's perceived performance or outcome against his/ her expectations.

## 2. Objective of the Study

“To know customer satisfaction towards Shabari Emporium situated in Chhattisgarh Haat, Pandari, Raipur”

## 3. Importance of the Study

Study will help efforts of CHDB toward its highest revenue generating outlet.Help to know the feedback of customer of Chhattisgarh traditional art customer of aforesaid category Ultimately help to better survival of disappearing traditional art of aforesaid 14 categories made by tribal/village artisan of Chhattisgarh.Gartner Group statistics tell that 80% of company's future revenue will come from just 20% of present customers. According to Bain and Company, a 5% increase in customer retention can increase 75% company profit. These studies speak about importance of customer satisfaction.

## 4. Review Of Literature

Kunkel et al.(1986) said that a man selects a store for purchasing based on his experiences while shopping in a store. Sinha & Banerjee (2004) worked upon the factors of retail store selection based on the consumers' perception. Anderson and Sullivan, (1993) stated that customer satisfaction is related to the size and direction of disconfirmation.

## 5. Period of Study

Data is collected from those customers who visited said emporium in last 6 months.

## 6. Research Methodology

- 6.1 Primary data is collected to know satisfaction level.
- 6.2 Sample survey is conducted to know satisfaction of customer by questionnaire method.
- 6.3 A questionnaire is design to check satisfaction in which 10 questions, with a four point of scaling viz., 4/3/2/1, asked.

Questions designed to check Quality of produce, Range of product, Value for money, Product information, Ambiance of emporium, Sales man attention, Timing of emporium, Accessibility of emporium, Costliness of product, Customer opinion to recommend his kith/kin were asked.

### Marking

Above 80% Very Much Satisfied

Up to 60% Satisfied

Below 60% Lower Satisfaction

- 6.4 30 customers are randomly taken to know satisfaction level. Mean, standard deviations are calculated.
- 6.5 Used Formulae

$$6.5.1 \quad \text{Mean} = \frac{\sum X}{n}$$

$$6.5.2 \quad \text{Standard Deviation} = \text{Square Root of } \left[ \frac{\sum (X - \text{mean})^2}{n-1} \right]$$

$$6.5.3 \quad \text{Standard Error of Mean} = \frac{\text{Sample SD}}{\sqrt{n}}$$

Limits of mean  $\pm$  (3 x Standard Error of Mean) at 0.27% of significance level

- 6.6 Hypothesis -Customers are very much satisfied with Shabari Emporium situated in Chhattisgarh Haat, Pandari, Raipur

## 7. Findings

- 7.1 Mean = 3.05
- 7.2 Standard Deviation = 0.57
- 7.3 Test of significance at 0.27% significance level upper limit 3.16 and lower limit 2.94. That falls between 79% to 73.5% limit.
- 7.4 Range of finding says the customer of Shabari Emporium situated in Chhattisgarh Haat, Pandari, Raipur is satisfied.
- 7.5 Hypothesis is not proved.

## 8. Discussion on Findings and Suggestion

- 8.1 Found satisfaction level is good enough, though chances of improvement exist everywhere.
- 8.2 Least average is found for the question of "Costliness of the Produce". It means customers want increase on product variety at an affordable range.
- 8.3 Highest mean is found in quality of product and value for money. So there is need for advertisement of heritage produce.
- 8.4 As per sales men of the emporium , in past two years, 4-5 customers demanded to exchange for what they bought and no product related complaint communicated in emporium by the customers.
- 8.5 The emporium salesmen told that they are finding new location at nearby so that ambiance can be improved.
- 8.6 A suggestion box needs to arrange to get feedback of customers.
- 8.7 Adequate information can be displayed in emporium for each category of aforesaid produce.

## 9. Suggestions for Next Study

- 9.1 Customers satisfaction study on emporiums situated in state and outside of the state should be find out.
- 9.2 More parameters to scale satisfaction should be use.

## 10. Limitations of the Study

- 10.1 Limitations of statistical techniques exist.
- 10.2 Study is based upon some selected parameters for specific sales outlet. There may be more parameters to scale satisfaction

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# EFFECTIVE WAY TO BOOST PERFORMANCE OF RURAL DOCTORS: A CASE STUDY

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## ABSTRACT

*The importance of addressing considerations of rural doctor welfare so as to boost their performance and retention is wide acknowledged; yet there's very little enquiry on the requirement of rural health professionals. We tend to report findings from a qualitative analysis study in rural Chhattisgarh, involving in-depth interviews with thirty five practitioners and knowledge analysis mistreatment the framework approach. Participants' expressions of their wants encompassed a spread of reforms and enhancements, as well as higher salaries and job security, additional rational posting and promotion procedures, and facility enhancements. Opportunities for need-based skills training and better housing additionally emerged as key need, as did better education, assurance of non-public security, and recognition and appreciation of their services by the administration. Improved investment in rural infrastructure and training, better packages of advantages for rural doctors, and governance reforms to boost the internal responsibility of state health services emerge as recommendations from the study.*

## 1.Introduction

The shortage of medical examiners in rural areas may be a countries drawback, however its effects area unit significantly harsh in developing countries (1,2). In India, shortages of qualified rural health personnel severely constrain the health system's ability to deliver services to rural populations. Government estimates indicate that presently, 18% of primary health centres area unit while not a doctor, regarding 38% don't have a laboratory technician and 16% lack a health pharmacist (3). Specialist medical care doctor's area unit significantly in brief provide within the public sector, with 52% of the sanctioned posts of specialists at sub-district hospitals lying vacant (3). Physician absence in government facilities has additional combined the matter of access to quality care (4).The failures of in public provided health services have additionally resulted within the majority of rural households receiving care from suppliers with very little or no formal qualification, with damage to their health (5,6).

State governments have adopted varied ways to resolve problems with access to quality care within the villages. Lately, attention has been drawn to the importance of the welfare and desires of these serving in rural areas, to raising their expertise, and promoting larger motivation and probability of retention. a global review of approaches to health workforce retention in developing countries multifariously identifies factors such as financial reward, better resources and infrastructure, and opportunities for career development as being instrumental within the retention of medical examiners (7). Many studies have known familial and personal needs, such as secure employment for spouses, education of youngsters and safety issues, as contributively factors towards the accomplishment and retention of doctors in rural observe (8). Ebueh and Joseph Campbell (9) reported that money incentives, higher operating conditions, social support systems and opportunities for career development were all crucial motivators for rural practitioners. Butterworth et al. (10) equally drew attention to the importance of career progression and in-service skilled education opportunities, except for financial advantages. Soft factors, such as a positive and appreciative atmosphere, have additionally been observed to play a task within the effectiveness and retention of

health workers in rural areas (11). Systematic reviews on the topic have highlighted these manifold factors and therefore the advanced interaction between them, and recommend careful thought of essential native and discourse factors to develop appropriate workforce strategies (12,13).

Clearly, a better understanding of rural practitioners' requirements is a basic prerequisite to developing policies to improve the performance and effectiveness of rural health services and aid in health worker retention. Yet, the analysis during this space from India is extremely restricted and there's a big gap in knowledge. This article attempts to address the gap through an exploration of rural doctors' perspectives of their specific requirements while in rural service.

## 2.Methodology

This qualitative analysis study was conducted within the state of Chhattisgarh. The study had various objectives, targeted on understanding the experiences and selections of rural government doctors. It additionally explored why some doctors stay in rural service. One objective of the study is addressed in this paper is to understand the perspectives of rural doctors in government service with respect to their requirements which, if met, would improve their expertise of rural service.

A groups of two researchers conducted in-depth interviews with rural government practitioners between June and August 2017. All interviews were conducted privately in the participants' respective places of work usually clinics or government offices. It absolutely was usually a challenge to confirm the privacy of participants, since superiors and colleagues often desired to be within the separate area at the time of the interview.

Essential criteria for the choice of study participants were: recognised medical qualification, and service either in a non-remote rural area for more than five years or in a remote rural area (as defined by official government norms) for more than one year. Government records were used to identify all the doctors fulfilling the essential criteria in four districts. Participants for the primary spherical of interviews were known purposefully from the list of eligible practitioners. most variability principles were applied during this choice to confirm illustration of each ladies and men doctors, those trained in allopathic (western or modern) as well as Indian systems of ayurveda medicine and homoeopathy- collectively categorised as AYUSH, in each classes of employment (i.e. regular and written agreement), and across completely different geographical locations among the state (which wouldn't are attainable through random selection), to permit for larger thematic breadth within the responses (14). Following thirty five interviews in four districts, preliminary listing and analysis of emerging themes unconcealed that no new themes were being generated within the latter interviews and fortification was complete considering principles of information saturation. All thirty five practitioners consented to participation before being interviewed. In-depth interviews were conducted in Hindi.

For organising information from transcripts of interviews, the framework approach of qualitative analysis for applied policy research was applied (16). Framework combines the deductive and inductive approaches of analysis, and involves developing a thematic framework consisting of a priori and emerging thematic codes, followed by application of the thematic framework to the information. The steps within the framework approach as followed by the analysis team area unit are enlisted as follows:

- Familiarisation with information
- Identifying a thematic framework, supported preset objectives, and themes rising from respondent narratives
- Indexing - by applying the thematic framework systematically to the info
- Charting rearranging the info into distilled summaries of views and experiences

- Mapping and interpretation using the charts to locate concepts, phenomena, typologies, and associations between themes.

Practitioners' views of their specific needs while in rural service were extracted from the narrative accounts and classified thematically. Initially, two researchers coded the information one by one using the thematic framework, following that their analyses were compared and revisited to enhance the dependability of interpretations of the information (17). Whereas extracting themes and coding the information, we have a tendency to maintained a stress on extracting underlying implications and meanings that respondents attribute to their experiences, instead of their overtly expressed views and rhetoric.

### 3.Ethical Precautions

In every case, a signed and witnessed statement of the person taking consent, indicating that s/he had explained the context, purpose, procedures and risks concerned and taken free and informed consent, was provided to the study participant, with a duplicate additionally maintained by the scientist. Information was kept in encrypted format with restricted access. Care has been taken to confirm namelessness of all people quoted during this article.

### 4.Results

In the study area, the state of Chhattisgarh is located within the central region of India. The state has a district of a 135,191 sq. km. and a population of 25.5 million (18). 44% of the land is forested and is home to tribes that represent one third of the population. The physical inability to confirm outreach services to forested areas, including the poor economic standing of the social group majority, have unnatural efforts to enhance health and health service indicators within the state. Chhattisgarh has associate inadequate health workforce. According to the Bulletin of Rural Health Statistics in India 2005, the doctor-to-population magnitude relation is 1:3100. Government practitioners were usually the only qualified care suppliers within the rural areas that were the setting for the study. The formal non-public care sector was mostly absent, though there have been many unqualified non-public suppliers operational in rural areas. Table1 presents profiles of the 35 participants within the study, on the basis of various characteristics.

Table 1 Profile of study participants

		Selection (n=35)
<b>Sex</b>	Male	30 (86%)
	Female	5 (14%)
<b>Employment status</b>	Regular	23 (66%)
	Contractual	12 (34%)
<b>System of medicine</b>	Western or modern (allopathic)	31 (89%)
	Indian systems and homoeopathy (AYUSH)	4 (11%)
<b>Years of service</b>	1–5	12 (34%)
	>5	23 (66%)

### 5.Working in adversity

The practitioners were confronted with a complex range of adverse circumstances and phenomena that influenced their professional and personal lives. Basic working conditions were compromised in several instances, and a number of other respondents rumoured having to alter shortages of water, electricity, house and supplies.

There was an epidemic of gastroenteritis here, everyone was in the same condition and we did not have space. There is no hospital building, and every one this (existing facility) is old-style, like within the monsoons it leaks. When there are several patients, we have problems as to where to keep them, so everything was filled with vomit and faeces. However we have a tendency to treated them. (Allopathic doctor, regular, 24 years in rural and remote areas, male)

Problems in travelling to poorly accessible field outposts were frequently reported. Issues with residential facilities were wide reported, with doctors being forced to require up private accommodation or sleep in poorly maintained or inadequate government facilities. many respondents incurring personal expenses to handle local healthcare needs.

There were also many accounts of doctors, nurses and support workers operating overtime, sharing duties and generally dividing their time across two or more facilities in several locations to overcome personnel shortages. Practitioners routinely experienced late payment of salaries, and inability to get promotions or transfers to different locations.

I have been operating here for sixteen years. If we have to go by government norms then once 5 years of duty in a very tribal area I should have been transferred to a different less remote place, however of these things aren't attainable. I don't want to blame the government but this is a fact that without making a lot of personal efforts, there'll be no transfer. (Allopathic doctor and specialist, written agreement, 16 years in remote areas, male)

Problems of access and communication were significantly marked in moer remote areas. Long separations from families, a typical consequence of being placed in remote and inaccessible areas, were usually a cause of distress. many doctors indicated disturbances in spousal relations and estrangements, sequent to the matter of separation.

We are living 500-600 kms away from our family and relatives. Government gives us 18 days casual leave only (in a year). If something good or bad happens in our family then... if you travel 600 km it will take three days to go and three days to come. And I will stay for at least two to three days. So out of 18 days, 10 days are gone like this. (AYUSH doctor, contractual, six years in remote area, male)

Doctors in written agreement of employment reported a definite set of issues, related to insecurities of employment and a widespread perception of their inferiority in relation to regular doctors. Issues of separation from families were reported more often by written agreement of doctors, who had less choice in selection of their locations, and restricted permissible leave of absence. Clearly, written agreement doctors were affected additional severely by issues of job insecurity and poorly confirming operating and body relationships than doctors in regular employment.

In contract service you can't think much - November will come now, then we will come to know if this service will remain or not. If there is a permanent service then a person thinks about the future also - what will one do or not do. But in a contract job - I have one daughter - you can't plan whether you will have a service or not, or will be able to afford a second child or not. You never know what the future holds. (AYUSH doctor, contractual, two-and-a-half years in remote area, male)

### **Expressed needs: job and compensation**

Remarkably few doctors in regular employment (2/23) expressed dissatisfaction with their current salaries. Among written agreement of doctors, higher pay scales were a often expressed need, with a majority of them claiming that their compensation and therefore the terms of their contracts were unfair. A number of respondents reported how their salaries had not been match the inflation of commodities and services.

*They are giving me 25,000 per month, which is nothing. When I joined here, rice was Rs 15 per kg. Now, how can you manage in 25,000? When we used to go to Raipur the fare was Rs 50, today it is Rs 350 and our salary is the same. Our economic condition has been disturbed badly - today if our children fall ill what will we do in Rs 25,000? Salary is not satisfied.* (AYUSH doctor, contractual, six years in remote area, male)

Contractual doctors gave prime importance to the peace of mind of a daily job, highlighting the necessity for job security to confirm continuity in rural practice. Several of them had joined their current written agreement of positions on the premise of assurance or expectation that the written agreement position would be regenerate to a daily position once a amount of your time. The uncertainties of contract employment were exaggerated within the case of AYUSH doctors, since there aren't any regular jobs earmarked for non-allopathic practitioners. Several respondents highlighted the need for more transparent and rational procedures for promotion and transfer. A number of participants expressed the need for government responsiveness to their preferences for postings, and a clear method for reviewing their preferences.

### **Expressed needs: skilled support and training**

Several essential needs for a good rural practice were highlighted by participants, such as well-equipped facilities and improvements in the workplace. Deficient human resources, apart from the problems they create from a planner's perspective, ultimately have a good impact on the work lives of the providers who continue to work in underserved areas. The necessity to handle shortages in personnel by filling existing vacancies was voiced by a majority (31/35) of respondents.

It was stated wide that improving the standard and regularity of medical providers and providing better workplace infrastructure would improve operating conditions and enhance professional satisfaction.

*There is shortage of materials, and it is of very bad quality. We get only one-tenth of the required materials for everything. IV fluid – whether I talk to the CMO, the collector, or give in writing – whatever fluid comes lasts only a week... Ladies come and lie down in the labour room – the rubber sheet is never changed. Fifty deliveries take place on the same sheet. For the past 20 years, I keep hearing this – there is no delivery table, no syringe, no stand or drip, no pads or cotton. If we use one suction tube for one child, we should not be using the same for all the delivered babies. If someone is dying of pain, we should not use used syringes. They give 50 gloves for the month, that too unsterilized, and one has to wash it every time and then use it. There are no blood banks. There is just one in the district which has four bottles of blood. If we don't give blood then patients die every day. At CHC level if blood is not given, then many patients will die. Do write all of this down – if something will happen by your writing it, then do write it. (Allopathic doctor and specialist, regular, 20 years in rural and remote areas, male)*

*When we are do caesarean delivery, most of the items we've got to rearrange (purchase) on our own. As such government is not able to supply all the things to the peripheries like the drugs and equipment there are many things that we have to order personally. (Allopathic doctor and specialist, regular, four years in geographical area, female)*

Another key demand across all the respondents was for more training and skill development such as refresher courses, opportunities for specialisation and trainings in relevant areas. Others claimed particular interests and skills, (eye care, infectious diseases, surgery, obstetrics, health administration, etc.) that they wanted to develop additional by means that of training and better education. They felt that this would help to facilitate in a good rural practice.

Many a time, we are in the field and the condition is such that we feel we dont have enough skills. Especially in surgery and obstetrics, we want to treat, but we don't have the authorisation. Thus it should be sensible to get some training. From the beginning, I even have had associate interest in surgery, however though we wish to try and do it, we are unable to, so this is the only thing left. (Allopathic doctor, regular, eighteen years in rural and remote areas, male)

### **Expressed needs: personal and social support**

A need expressed by a majority of participants (25/35) was the availability of quality education for his or her kids. Availability of good faculties in school was frequently cited as a crucial factor about their selections to remain on or leave.

It is the main reason, if a doctor joins here then there is no facility for water and electricity, there are no doctors' quarters, but the biggest problem is that they can't give their children even primary education. *So according to the times, his children will lag behind.. So because of this, no one desires to join here.* At block level at least there should be a school for children from there, doctors will go daily to their PHCs. This way, there'll be more doctors for rural service. (Allopathic doctor and specialist, regular, eight years in rural and remote areas, male)

Evidently, personal and social need included both tangible parts such as the supply of education and housing, and also softer aspects such as due recognition of services and even public acclaim.

## **6. Discussion And Conclusion**

No employer will afford to neglect the welfare of its employees, and India's government health services are no exception. Ensuring a health workforce delivering quality services in rural areas needs shut attention to their professional, social and personal needs. The narratives of the rural practitioners demonstrate the varied nature of their needs, that can't be addressed through narrowly conceptualised ways, however necessitate strong and holistic policy reforms, with a definite specialise in their overall well-being. Such a holistic approach should involve tangible reforms within the form of improved resource flows and governance arrangements, but also must consider a soft intervention that can help raise the acceptability of employment in rural health services, in addition as improve the image of state health services among rural communities.

The findings of this study are of a subjective nature however highlighting specific systematic enhancements, which can aid in improving the quality of experiences of the general public health workforce, and ultimately its performance and effectiveness. Firstly, while the necessity for associate absolute increase in pay-scales didn't emerge as a as a strong theme among this selection of respondents (except for contractual doctors), the issue of economic returns cannot be thought of insignificant. However, because of the global literature reflects, it's necessary to balance financial incentives with institutional reforms that that provide other benefits and a contributory working environment (19,20). Such institutional reforms (10) include improved workplace arrangements and resources, needs-specific training and skill development, more rational promotions and transfers, and assurance of job security and personal securities. There's a need for higher operating conditions for medical professionals, including better infrastructure, medicines and instruments. Nurturing doctors' professional interests and ambitions, and stemming the erosion of skilled skills is another crucial step in addressing the needs of providers and strengthening the standard of services.

Also very significantly, doctors, like different public service workers, seek and need accountability and respect from their employers. Rational and clear procedures for placement, transfer, promotion and regularisation of written agreement jobs will all play a task in creating rural government service a more attractive proposition. Finally, the goal of larger retention can be served if authorities were to accord formal recognition and reward for services under difficult conditions to health workers with appropriate credentials and histories of rural service.

### **Major requirements described by rural doctors**

#### ***Job and compensation***

Assurance of job security (contractual employees)

Better salaries (contractual employees)

#### ***Professional support***

Improved workplace arrangements and resources

Needs-specific training and skill development

More rational promotions and transfers  
 Recognition and appreciation of services

**Personal support**

Good schools for children  
 Better housing  
 Assurance of personal security

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# A STUDY ABOUT ISSUES RELATED TO MENSTRUAL PRACTICES IN RURAL INDIA: KEY TO DEVELOPMENT

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## ABSTRACT

*Indian rural women suffers from lot of problems & issues in their daily life when it comes to equality, getting education, working as a bread earner for the family etc. But they also face the struggle during the days when they get their menstruation. They face lot of inhuman & follow unhygienic treatments just because of lack of awareness towards knowledge, safety & dignity without social taboos which is their one of the social right. This paper attempts to highlight the issues related to what women are facing especially in rural India on the name of Menstruation & to achieve the stated objectives in light of relevant literature available in the field researcher tried to focus on how to avoid negative outcomes which effect their self esteem & confidence along with their general well being. The suggestions are given related to issues mentioned in the paper like attention & promotion to the menstrual hygiene.*

**Keywords :** *Rural India, Menstrual Practices, awareness & promotion to menstrual hygiene.*

## 1.Introduction

We all know that in India maximum population belongs to rural geographical boundaries where there is lack of things like education, jobs, facilities, transportation even electricity in some of the areas. Can we imagine what kind of life people are living in such areas? Difficulties may also increases when it comes to the female section that belongs to rural areas. Now a day's India is moving towards lot of advancement in the field of education, employment, health etc but still there are communities who belongs to rural areas still deficit in mentioned fields for women where they daily fight for their rights, for their education & other social taboos.

Similarly out of so many issues one is menstrual practices, hygiene & lack of awareness to it along with the non-availability of sanitary pads to rural women. As menstruation is physiological process which starts at sexual maturity in females. But, surprisingly especially in rural India it is misunderstood as a phase of transition of girl into womanhood. In rural areas is taken as unique thing for females which is unclean & dirty. It is socio-cultural factors, beliefs & taboos due to which female population bound to follow false practices even without having complete knowledge about it.

Adolescent girls from rural areas badly affected by these cultural factors in rural areas. It is very clear where almost 85% of the rural female population consider menstruation as most dirty thing happened which is only because of lack of menstruation awareness. In some rural areas women know about the mentioned practices & hygiene but they are bound to follow unhygienic ways of absorbent due to the non availability of sanitary pads in their concerned locality. Substantial knowledge towards menstruation in rural areas could also be seen in negative attitude of parents & related issues in discussing it.

Most of the woman & girls has incomplete & inaccurate knowledge about menstruation physiology & hygiene. Good menstrual hygiene will contribute in women & girls development by gender equality & empowerment.

## Literature Review

As per the researcher Rajkumar Patil, Lokesh Agarwal, M Iqbal Khan, Sanjeev Kumar Gupta, Vedapriya DR , M Raghavia & Anuj Mittal (2011) studied the beliefs regarding menstruation in rural areas of Pondicherry. In this research, the objective was taken to study the various myths and misconceptions about menstruation and ascertain about if there is a difference between illiterates and literates. The findings of the study reveal that most of the population in the concerned area is not aware & strongly believes in old sayings.

Similarly researchers named Rajesh Garg, Shobha Goyal, & Sanjeev Gupta (2011) studied about the issues related to menstruation hygiene practices not only from health point of view but also from the social & human rights point of view. The results of the study concluded that whole population is having their roles to execute if target is menstrual hygiene. This paper highlighted various roles to be performed by the government, teachers & other people from the society. They have also included one provision for sanitary napkin schemes for the availability point of view.

Another researcher S Sangeetha Balamurugan, SS Shilpa & Sheethal Shaji (2013) revealed about hygiene practices during menstruation in Tamil Nadu & also studied the effect of socio- cultural factors over it. The findings reveal that most of the women were found following unhygienic practices due to the lack of their awareness towards it.

Similarly S Senthil, Priya, AS Al Iratnam, & R Shankar (2016) studied about the different types & frequency of menstruation problems faced by the adolescent girls in Tamil Nadu only. They have studied about the cross-sectional 500 adolescent girls aged around 14-19 years. Poor menstruation hygiene was found as a result of the study. Researchers also suggested awareness programmes to be conducted in rural schools in context to genital hygiene practices.

Nivedita Pathak & Jalandhar Pradhan (2016), wrote about the menstrual management & low cost sanitary napkins. In this paper they tried to highlight the issues related to social taboos, lack of toilets, water availability, privacy for changing etc. rather focusing on how to provide the low cost sanitary napkins to rural women. Researchers strongly believe that there should be change in the attitude of individuals towards it. Only providing sanitary napkins is not the only solution to the problem.

Balaji Arumugam, Saranya Nagalingam, Priyadharshini Mahendra Varman, Preethi Ravi, & Roshni Ganesan (2014) conducted a study to analyze how hygienic female is during her menstruation time period in rural as well as in urban areas. The findings of the study results in that hygiene practices are better in urban areas in comparison to rural areas. And also from socio-cultural point of view both the areas women face lot of restriction during menstruation.

P. Seenivasan, K. Caroline Priya, Arthi .E, Gaviya.G, Kanchana Devi.B, Karunya.C, Midhuna.G, Priyadharshini.R & Priyadharshini.S (2016) studied about the knowledge, attitude & practice about menstruation hygiene among the women from rural areas. In this study they conclude that though awareness level in rural areas is now ok but when it come to practice part results were seems to be poor.

Dr Dipanwita Pandit, Dr Prasanta Kumar Bhattacharyya & Dr Raja Bhattacharya (2014) in their study named Menstrual Hygiene: Knowledge and Practice among Adolescent School Girls In rural areas of West Bengal tried to find out the knowledge & practices among school girls. In this study revealed that mother of girl child to be armed with the correct and appropriate information on reproductive health, so that she can give this knowledge to her growing girl child.

Shanbhag D, Shilpa R, D'Souza N, Josephine P, Singh J, Goud BR(2012) studied about the perceptions of individuals regarding menstruation & practices among high school going girls in Karnataka & Bangalore city around areas. This study was conducted in 4 government selected schools. The study reveals that only 28.7% of the girl population had knowledge & awareness about it & rest of the 48.1% only know that it relates to pregnancy. Most of the girls were using clothes.

Likewise Shobha P Shah, Rajesh Nair, Pankaj P Shah, Dhiren K Modi, Shrey A Desai, & Lata Desai (2013) in their paper titled Improving quality of life with new menstrual hygiene practices among adolescent tribal girls in rural Gujarat,

India studied about menstruation health, hygiene practices taken in the tribal areas of Gujarat among adolescent girls. The study concluded that clothes were rapidly used as they were easily available & also cheap in comparison to sanitary napkins.

After reviewing the above literature it is clearly understood that still there is lot of work to be done on the part of government & also as an citizen of the country we need to take initiative in this regarding menstruation & hygiene practices as it is also natural as any other physiological change is men or women. No studied have been found which is done for understanding the routine issues on the basis of experience of women & girls. So, the researcher got the idea to conduct the research by collecting experience of women & girls through interviews.

## 2.Objective of the study

1. To study the issues & problems related to menstruation practices & hygiene in rural areas for women
2. To understand how the traditional myths & social taboos are effecting rural women health, well being & their confidence
3. To highlights the measures taken by some concerns & government of India for menstrual hygiene & awareness.

## Methodology Adopted

**Data-** secondary & primary

**Sampling method-** convenience sampling

**Sample size** – 5 (cases)

The methodology adopted for this study is that researcher contacted few of the females from villages near by Gwalior city (Madhya Pradesh). Out of 15 females only 5 were ready to share about their experiences. So the researcher asked about their experience for menstruation treatments received by them from their parents, in-laws & society. On the basis of their responses researcher compiled few of the situations in the form of cases which are being explained in the paper.

## Experienced based Analysis & its Repercussions

S.No	Status of Respondent	Situation / Case Description	Repercussions
1	Ms. Savitri, house wife in village “Badagaon” nearby Gwalior,(M.P.)	Described about her experience in her early childhood about menstruation treatment & practices. She said that during those days she was not allowed to sit along with other members of the family. She has been taught that every time during menstruation she have to use cloth only & she was not even allowed to speak about it in front of other male members of the family.	<ul style="list-style-type: none"> <li>• Lot of secrecy to maintained on the part of female &amp; only died clothes was available.</li> <li>• She got stressed, worried all the time during her menstruation.</li> <li>• She tolerated lot of pain during her menstruation.</li> </ul>
		She explained that her mother doesn't allow her to eat food in	<ul style="list-style-type: none"> <li>• This led the arousal of a question &amp; stressed to</li> </ul>

2	Ms. Guddi, house maid & her native place is “Banmor” nearby Gwalior (M.P.)	common utensils during her menstruation. She used to be kept locked in a secret room where all the arrangement were provided to use during her menstruation.	Guddi that is menstruation is a crime? Why everyone is behaving an evil to me? <ul style="list-style-type: none"> <li>• She perceived it negatively.</li> </ul>
3	Ms.Usha belongs to “Banmor” nearby Gwalior (M.P.)	She shared about her experience how in initial days she was not allowed to touch any pickle, not allowed to worship & even not allowed to move to school	<ul style="list-style-type: none"> <li>• This results in taking menstruation as a most unfortunate thing for her</li> <li>• He thought the fault is her &amp; he is not capable of even study for this.</li> <li>• It further resulted in high stress</li> </ul>
4	Ms. Shakun, vegetable vendor belongs to remote area near by Gwalior (M.P.)	She described her experience by sharing information that she used clothes during her menstruation & she used to use single cloth for whole cycle. She further described, because of this she got infection one time due to which she faced lot of problem. After marriage her in-laws never allowed her to enter into the kitchen during menstruation cycle.	<ul style="list-style-type: none"> <li>• This resulted in infection which is again not good for the health.</li> <li>• Unfair treatment from family leads to high level of stress.</li> <li>• These unhygienic ways to cure the menstruation may results in major physical problems in future.</li> </ul>
5	Ms. Soni, 17 year old girl.	She shared about her experience when she got first time her periods she was in school. Her clothes got dirty & fellow mates started laughing. There was no one to provide her moral support & even no one there to provide her any sanitary pads. She thought she savior injury at her private part due to which she will die.	<ul style="list-style-type: none"> <li>• High level of stress</li> <li>• No guidance even at school</li> <li>• Lot of humiliation</li> <li>• Non availability of sanitary pads at school &amp; not awareness.</li> </ul>

### Common myths & restrictions

On the basis of experiences which has been shared by girls & women from rural areas & also after studying so many literature reviews the following are some common taboos & restrictions have comes out. These are –

- Menstruation occurred due to the curse of God
- The restrictions were not to go to the temple, not to see the god images,
- Not to go to school,
- Not to touch flowers, not to touch males,
- Not to enter kitchen
- Separate room and to sleep separately during menstruation
- Women say that the shame associated with menstruation prevents them from buying products from male shopkeepers
- Girls experience some problems associated with menstruation, which might indirectly have an impact in their academic excellence, sports activities and their self-esteem
- The lack of clean and separate sanitation facilities in schools discourages many girls from attending school full time and forces some of them to drop out.

### Measures / initiatives

Now a day's awareness has increased at the ground level about so many things be it education, be it about rights etc. similarly rural women have also confronted so many things about menstruation practices & hygiene but still there should be some more efforts to be taken by government for country development point of view & also as an individual we need to fulfill some obligation through changing our attitude towards menstruation. There are so many initiatives taken for the improvement in the field of menstruation hygiene & practices. Few of them mentioned below for the betterment in the concerned field. These are –

1. Awareness programme should be conducted on the regular basis especially in rural areas of where women & girls could freely attend & understand the importance of menstrual hygiene & practices.
2. The disposal of used sanitary napkin should be done through the installing incinerators in schools where girls can easily dispose the solid waste.
3. There should be the promotion of local production of sanitary napkins by self help groups.
4. Medical and Para-medical health professional's attention is necessary to promote menstrual hygiene.
5. The availability of proper washing facilities at schools and work place for menstrual management should be maintained.
6. Mother, family and the community should all be counseled regarding menstrual physiology and hygiene on regular basis.
7. Menstrual hygiene promotion needs to be included in school curriculum. The school teachers should be trained regularly so that they can have the clear idea about how to impart the reproductive health education in classes.
8. The availability of services including the subsidized sanitary napkins is a step forward for initiating the acceptance of the practice.
9. Kishori Shakti Yojana (Adolescent girl empowerment scheme) under Integrated Child Development Scheme (ICDS) in 1991 and this scheme could be utilized to cater the adolescent's reproductive health demands.

10. Mahila Mandal and Stri-Sabha), traditional birth attendants, female shopkeepers etc. should be involved to store and distribute sanitary napkins as girls would be more comfortable to purchase sanitary napkins from them

### 3. Conclusion

The women & girls are facing lot of problem as we can see from their experiences about menstruation management, hygiene practices related to that, availability of sanitary napkins, clean water facilities; disposal of napkins, usage of old clothes during menstruation cycle & so many like that. But, the point is these issues could not be solved by only having discussion on it or by running any scheme for it. The mindset regarding menstruation of people who belongs to rural areas should be channelized in such a way that girls feel safe & secure in sharing their physiological changes front of their family members. This required lot of work to be done by the stakeholder of our societies where they have to take initiatives in counseling the people around in creating health & productive environment for girls or women.

The government of India is also taking several initiative but they need to actually work on ground reality which is still negative when is comes to the execution of their scheme. Effective review is highly required on the part of government of India. Similarly academic institutions should also take the initiatives to teach how menstruation practices could affect health of girls or women. So, teachers should also take the responsibility in promoting right information to others so that myths or social taboos could be eradicated.

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# ROLE OF INTEGRATED MARKETING COMMUNICATION FOR THE INNOVATIONAL DEVELOPMENT IN CHHATTISGARH

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## ABSTRACT

*Integrated marketing communications (IMC) involves coordinating various forms of promotional elements, such as social media, public relations and direct marketing, to communicate the value of a company to their customers. Traditional promotion and advertising was mass marketed on the television, radio, and in print ads. Companies shifted away from traditional promotion and advertising to adapt to the news ways consumers were finding information, to use more targeted communication tools. This study focuses on finding the status of using the marketing communication tools or approach and role Integrated marketing communication. The study is conducted in three parts. First, the literature review through which various tools of integrated marketing communication. This study being carried in Chhattisgarh, by the views and marketing practices in Textile Industry of CG are identified by exploratory research having the Sales Executive of textile industry of Raipur as sample. For main study i.e. knowing the status of using IMC tools and traditional marketing communication tools, again the samples of sales executive were taken and their opinion of six questions were sought in percentage. The questions were related to communication tools working on advertisement, newspapers, T.V advertisement, Display banners, Personal Selling, Web banners and Floating Advertisement, Pop-ups and social media. The response highlighted that the integrated marketing communication are not being used effectively and efficiently, suggesting that this improper usage may be the reason for expensive or less effective marketing communication tools among sales executive of various textile firms from Raipur in Chhattisgarh.*

**Keywords:** *Integrated Marketing Communication, Traditional Marketing tools, Online Marketing.*

## 1.Introduction

Integrated Marketing Communication plays a important role as successful promotional tool. IMC is associated with some positive results like brand awareness, customer satisfaction, brand loyalty, positive brand image, unique brand association, greater profitability, increased sales and cost savings. Consumers were becoming less responsive to traditional media, and the Internet and social media were changing the ways consumers interacted with companies. IMC enables a company to have synergy among their promotional tools and develop more effective marketing communication programs. But all the factors which are influencing the IMC should be managed properly <sup>1</sup>(2013, Rashid Saeed). The inheritance of dimensional techniques from marketing communication order of advertising, marketing publicity, personal selling, and sales promotion are hindrance to new opinion on integration and evaluation. Some authors recommended that measurement of an integrated campaign should begin with its elements. Their contribution should be defined and objectives measured. However, such measurement must take account of the difficulty of isolating the individual parts and in estimating synergistic effect <sup>2</sup> (White 1999, Kitchen and Schultz 1999).

Baldinger (1996) suggests that the substantial body of research on advertising effectiveness makes it an ideal place to start examining the impact of integrated campaigns<sup>3</sup>. Other writers draw from direct marketing to suggest the

consideration of measures such as Customer Lifetime Value or profitability segmentation<sup>4</sup>(Moriarty 1999) or the inclusion of a response device on all communications<sup>5</sup> (Schultz and Barnes 1995).

There is also a body of literature to support the evaluation of the totality of the IMC effect. It is felt that it is impossible to isolate the effect of each individual discipline and the concept of synergy too ambiguous to measure<sup>6</sup>. Schultz (1999) states, there are always some specific objectives behind every strategy and these objectives are the end results of that strategy. IMC strategy of communication is also focused to achieve specific objectives. Katrandjiev (2000) described two conflicting objectives of IMC as to achieve considerable sales and to build a strong brand image<sup>7</sup>. Schultz (1993) said that objective of IMC is to influence the behavior of target audience. The ultimate goal of IMC is to setup customer oriented sensibilities, help in resource allocation, achieve competitive advantage and develop business process in all direction of organization and its operations that add value for its customer. Despite these major objectives, there are some common objectives like create brand awareness, favorable customer attitude and to drive business & revenue<sup>8</sup> (Schultz and Schultz, 2000). Suggest that the best way to ensure the transition in marketing and communication in the new era is to integrate the processes and systems involved in marketing and communication. In short, all communications inside and outside the organization need to be considered holistically<sup>9</sup>

IMC has clearly had an impact on academic thought, curricula development and the practice of marketing; yet, there is a significant area of research ahead of this discipline, particularly in the development of measures of effectiveness, including the challenging of the field's basic constructs of synergy and integration<sup>10</sup>. Duncan and Caywood (1996) and Low (2000) have suggested that a real benefit of IMC lies in the stronger internal coordination of the marketing communication disciplines and the push for shared objectives and greater accountability<sup>11</sup>t the possibility that organizations can actually measure the effectiveness of marketing communication in terms of increased response to increased demand, sales and increased trust of target groups. It is a given that measuring instruments are the basis for achieving the effectiveness of marketing communication, and consequently achieving organizational performance.

## **2.Objective Of The Study**

The prime objective is to know about the status of Textile Industry in Raipur on their practice required to show them that they are involved in Traditional Advertising and updating as per requirement for using Integrated Marketing Communication as promotional tools.. But before that it was necessary to know about the promotional tools they are using and updating practices required for effective and less expensive marketing tools for the innovational solutions for rural development of employability in Chhatisgarh.

## **3.Research Methodolgy**

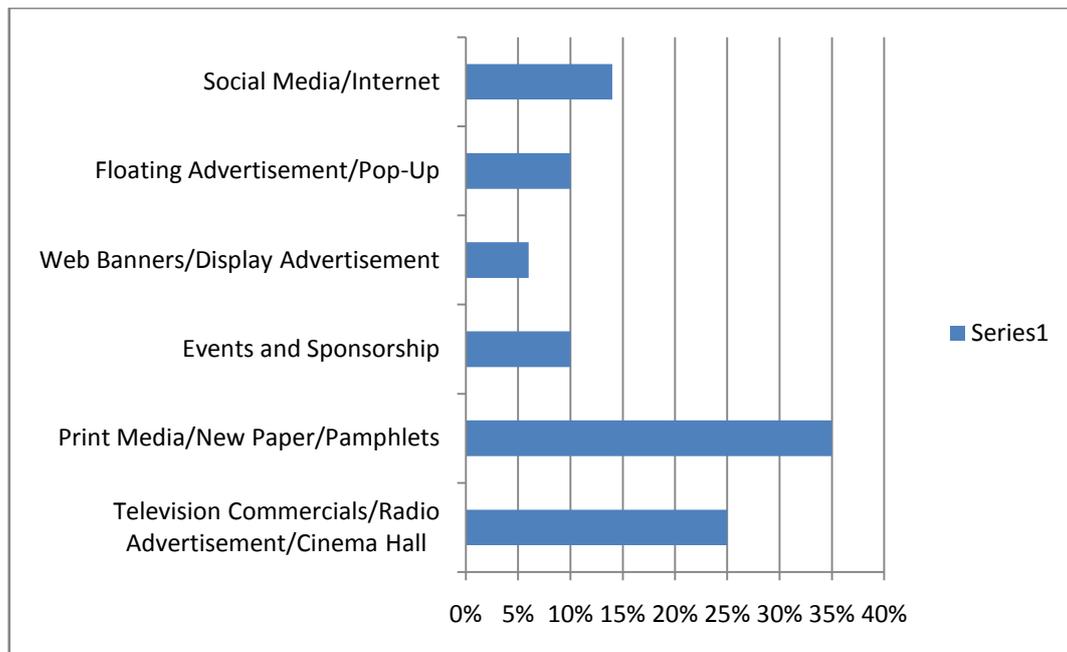
The responses from sample were asked in percentage (%). Responses in percentage form all respondents were added question-wise and then divided by 30 to have overall response question-wise in percentage.

#### 4.Results And Discussion

The findings of this study are given below in table and were presented using bar graph.

Q.No.	Questions	Aggregate responses in percentage
1	Television Commercials/Radio Advertisement/Cinema Hall	25%
2	Print Media/New Paper/Pamphlets	35%
3	Events and Sponsorship	10%
4	Web Banners/Display Advertisement	6%
5	Floating Advertisement/Pop-Up	10%
6	Social Media/Internet	14%

#### Overall Response Question Wise in %



The figures in table show the responses of the Sales Executives of various Textiles Industries in Raipur, Chhattisgarh.

#### 5.Conclusions & Future Scope

As such there is no such standard figure set for the comparison as far as the above activities/ practices are concerned. Still the percentage against all the activities of using promotional tools/ practices is low. The figures above show that Textile Industries are still working on traditional marketing communication. Today consumers turn to as many sources of information, and the value of the integrated marketing communication has grown considerably. Highly targeted, the integrated marketing communication campaigns is based on the strengths of existing communication tools to favorably influence on the behavior of the target audience. Designing of a effective message and selecting the most appropriate communication tools are important steps in the creation and maintenance of consumer preferences for a product/one brand or company. Integrated marketing communication is an activity that allows creating profitable customer

relationships and creates value of the product/brand or of the company. It aims to ensure consistency of the message transmitted through a mix of communication tools such as advertising, sales promotion, direct marketing, public relations, online communication, etc.. Taking into account consumer expectations, an organization can use the integrated marketing communication in an way most effective and economical for it. This study shows that the marketing communication can't be said to be effective and efficient by using traditional marketing tools, updating and innovation is required.

This study is based on the opinion of the Sales. Executive of various Brands of Textile Industries located in Chhattisgarh. The same study can be conducted in other states. Further, to be more precise on the result in this area, research can be conducted taking managers of textile industry as sample and then collecting the data directly from them on the points mentioned above and later find the result. This way exact status of IMC on their marketing communication and updating approach can be known.

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# IMPORTANCE OF SUPPLY CHAIN MANAGEMENT IN PADDY PROCUREMENT AND ITS DISTRIBUTION SYSTEM IN CHHATTISGARH

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## ABSTRACT

*Supply chains are principally concerned with the flow of products and information between supply chain member organizations—procurement of materials, transformation of materials into finished products, and distribution of those products to end customers. Today's information-driven, integrated supply chains are enabling organizations to reduce inventory and costs, add product value, extend resources, accelerate time to market, and retain customers.*

*The real measure of supply chain success is how well activities coordinate across the supply chain to create value for consumers, while increasing the profitability of every link in the supply chain. In other words, supply chain management is the integrated process of producing value for the end user or ultimate consumer.*

*Various innovative methods of reducing leakages and diversion have been tried in the country including bar-coded food coupons, food stamps, biometrically coded ration cards etc. None of these have been entirely successful. . In the State of Chhattisgarh an end to end solution based information technology has been developed and implemented with very encouraging results. Strategy for use of ICT to check diversion in the delivery mechanism, as well as its implementation is discussed in the following sections.*

**Keywords:** PDS, diversion, paddy, CMR, milling, Chhattisgarh

## 1.Introduction

A processing-based and organized agri-supply chain functions as a part of a very complex network. Figure-1 depicts a generic supply chain at the organization level within the context of a complete supply-chain network. Each firm is positioned in a network layer and belongs to at least one supply chain, i.e. it usually has multiple (varying) suppliers and customers at the same time and over time.

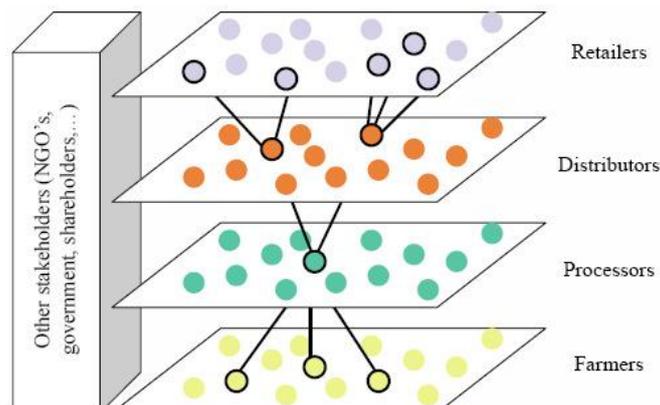


Fig- 1: Schematic Diagram of Supply Chain

### Components of an Agri supply chain

Agribusiness, supply chain management (SCM) implies managing the relationships between the businesses responsible for the efficient production and supply of products from the farm level to the consumers to meet consumers' requirements reliably in terms of quantity, quality and price. In practice, this often includes the management of both horizontal and vertical alliances and the relationships and processes between firms.

Agri-supply chains are economic systems which distribute benefits and apportion risks among participants. Thus, supply chains enforce internal mechanisms and develop chain wide incentives for assuring the timely performance of production and delivery commitments. They are linked and interconnected by virtue of shared information and reciprocal scheduling, product quality assurances and transaction volume commitments. Process linkages add value to agricultural products and require individual participants to coordinate their activities as a continuous improvement process. Costs incurred in one link in the chain are determined in significant measure by actions taken or not taken at other links in the chain. Extensive pre-planning and co-ordination are required up and down the entire chain to affect key control processes such as forecasting, purchase scheduling, production and processing programming, sales promotion, and new market and product launches etc.

Following are the components of an organized agri- supply chain:

1. Procurement or sourcing
2. Logistic management
  - a. Transportation
  - b. Material management
  - c. On the premise of supplying mostly from production not stock
  - d. Warehousing
  - e. Logistics Network modeling
3. Organizational management
  - a. Contracting
  - b. Strategic alliances and partnerships
  - c. Vertical integration
    - i. Long term storage
    - ii. Packaging technology
    - iii. Cold chain management
    - iv. Energy efficient transport
    - v. Quality and safety
4. Application of Efficient Consumer Response (ECR) System
  - a. Electronic scanning of price and product at the point of sale
  - b. Streamline the entire distribution chain

### Automation of Paddy Procurement structure in Chhattisgarh

This paper discusses policy adapted in using ICT to direct diversion and leakage in the delivery mechanism and its thriving function in automation of food grain supply chain. In 2016-17, Government of Chhattisgarh computerized whole food grain supply chain from procurement of paddy at around 1600 purchase centers to transportation of PDS commodities to 10500 FPS for further distribution 3.5 million ration card holders, covering 6 different organizations. As an outcome of the project, 0.80 Million farmers have received computer generated cheques without any delay. Citizen participation has been increased in monitoring PDS. Outcome of the project, Challenges faced are discussed.

Two important schemes of Government of India - paddy procurement at Minimum Support Price (MSP) and Public Distribution System (PDS) - cover the whole food grain supply chain. The two schemes are described here.

- **Procurement of paddy at Minimum Support Price (MSP)**

70% of population of India lives on agriculture. Majority of the farmers are medium and low income group and require selling their produce immediately after production because of mainly two reasons. These farmers do not have adequate storage facilities to store the produce and these farmers require money at the earliest as they have to repay the loans taken for purchasing seeds, fertilizers etc. To check this type of practice and ensure farmers get proper price to their produce Government of India operates a scheme to purchase farmer's produce in the season at MSP.

In Chhattisgarh (one of the states in India), main agricultural produce is paddy. 2.966 million Families live on farming in Chhattisgarh out of which 1.522 million families are small farmers (having less than 2 hectares of land). Government of Chhattisgarh procures paddy in Chhattisgarh on behalf of Government of India. This scheme benefits about 1 million farmer families by procuring about 3 million metric tons of paddy in the Kharif Marketing Season (KMS) of a year, spending about 24000 Million Indian Rupees. (600 Million US Dollars). The procurement takes place through about 1333 Primary Agricultural Societies in the whole state covering geographical area of 135000 Sq. KM. The paddy procured is converted into rice by millers after entering into an agreement, Rice is then handed over to Chhattisgarh State Civil Supplies Corporation to use it in another important scheme for providing food security to the poor i.e. Targeted Public Distribution System.

- **Targeted Public Distribution System (TPDS)**

TPDS is a Government of India's scheme to provide food security in the country. Under this scheme every Below Poverty Line (BPL) family gets 35 KG rice per month at a subsidized rate of Rs 6.25 per KG. According to this criterion there are about 2.4 Million BPL families in Chhattisgarh. Government of Chhattisgarh further augmented this scheme to give 35 KG rice at Rs 3 to about 3.7 million families. Thus GOI and Government of Chhattisgarh spend about 2500 million Indian Rupees every year as a subsidy to operate this scheme for the benefit of 3.7 Million BPL families.

### **Diversification System**

The main objective of total food grain supply chain computerization in Chhattisgarh is to check this diversion. The diversion takes place in three main areas.

1. Diversion in the procurement itself.
2. Diversion in the movement of commodities between CGSCSC warehouses.
3. Diversion while transporting to FPS from CGSCSC warehouses.
4. Diversion at the FPS level.

### **Computerization of paddy Supply Chain**

The case study is complete process computerization of food grain supply chain in Chhattisgarh from paddy procurement from farmers, its storage, milling and distribution of rice and other commodities to 3.7 million ration card holders through 10,416 Fair Price Shops (FPS). As a part of this project, 1532 Paddy procurement centre's, 50 storage centre's, all district offices concerned, 99 Civil Supplies Corporation distribution centre's and 35 FCI rice receiving centre's have been computerized covering six different organizations involved in food grain management viz. Department of food,

Marketing Federation(MARKFED), CG State Civil Supplies Corporation (CGSCSC), Food Corporation of India (FCI), Central Cooperative Bank and Primary Agricultural Cooperative Societies(PACS). Purchase and issue at paddy procurement centre's including generation of cheques has been computerized. Miller's registration, Agreement with millers and generation of Delivery Orders etc. are computerized. 3.7 Million Ration card holders database has been prepared. Calculation of monthly allotment to FPS has been automated. Call centre with a toll free number 1800-233-3663 is operational from 8:00 AM to 10:00 PM to take complaints from citizens and give any desired information about paddy procurement and public distribution. Citizen interface web site is hosted to increase the citizen participation in controlling diversion of PDS commodities. The project can be described in four distinct areas which complete the process computerization of whole food grain supply chain and its monitoring.

### **1. Paddy Procurement and Milling**

All operations carried out by the district level offices such as collector office, DMO of MARKFED and DM of CGSCSC as well as head quarters are computerized through web based applications. At all the 50 storage centres of MARKFED, 2 computers each were installed with a form based module to receive and issue paddy. 70 Custom Milled Rice (CMR) receiving centres of CGSCSC (subset of 99 distribution centres) and 35 CMR receiving centres of FCI are using a web module to generate sample slip, analysis report and acknowledgement report

### **2. Unified Ration Card Database and issue of PDS commodities to FPS**

Unified Ration Card database has been prepared. The ration cards are printed using the database. Only those ration cards having a unique number and a barcode printed through that database, are valid now in Chhattisgarh. The truck challan is also generated using the web application. Thus information regarding allocations, stocks, issue and sales for each FPS is now available on the central server. At least 10% of this data is physically verified by the staff of the food department every month, and action is taken against any FPS giving false declarations.

### **3. Citizen Participation web-site**

Citizen awareness and participation in the public delivery system is a major check against diversion and leakage.

### **4. Call centre and Complaint Monitoring System**

A call centre with a toll free number 1-800-233-3663 is operational. The complaints received by call centre are immediately entered in the system and the complaint number is given to the complainer for further use.

## **Challenges faced in execution the project**

1. Lack of connectivity at paddy procurement centers.
2. Unreliable Power Supply at procurement centers.
3. Massive data entry of beneficiary details in Ration card database.
4. Font compatibility for Hindi data

## **2.Conclusion**

Use of technology in delivery mechanism can definitely reduce corruption when used in a strategic way. The technology itself cannot check corruption. The technology should be used to create transparency combined with a convenient system for a citizen to lodge complaints with confidence that the complaint will be attended to. Manual methods should be replaced by computerizing processes. Data should be captured as and when they are generated instead of developing MIS

applications for entry of data after manual processes are followed. Commitment of higher authorities, Capacity building in the operating personnel and connectivity are the 3 essential things for success and sustainability of any eGovernance project.

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# An Analytical study of Rural Development Schemes in Chhattisgarh: A case study of Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGA)

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## ABSTRACT

*Rural Sector of India has long been a neglected sector in India. It has been suffering from poverty, lack of education and other socio economic backwardness symptoms. The GOI launched various rural development schemes to address this problem. One of the main focus areas has been generation of Employment at rural areas and with particular emphasis on Marginalised communities. To this effect MGNREGA 2005 was formulated and launched throughout the country. The paper studies the status of the MGNREGA in Chhattisgarh state for a period from 2012-13 to 2016-17 and makes suitable suggestion based on the observations and data gathered*

**Keywords:** Rural Areas, MGNREGA, NREGA, Chhattisgarh, Employment

## 1.Introduction

India has a large population of people residing in rural areas. Their percentage to total population is about 70%. Indian rural populace is facing widespread poverty, un employment, lack of education, lack of proper infrastructure and Medical facilities. The socio-economic indicators show that rural areas are performing unfavourably in comparison to urban areas. However the problem of rural areas is not limited to the rural areas itself as the mass exodus from the rural areas has also led to burdening of social infrastructure of urban areas. of Therefore in order to correct this imbalance and to address the various socio economic problems that the government India has launched various schemes for rural development. The GOI has set up Department of Rural development Under Ministry of Rural development to Identify and launch various schemes for rural development. These schemes are expected to address the multidimensional aspects of various socioeconomic aspects of rural areas. These schemes prominently include

1. Pradhan Mantri Awaas Yojna - Gramin
2. DAY-National Rural Livelihoods Mission (DAY-NRLM)
3. National Social Assistance Programme (NSAP)
4. Pradhan Mantri Gram Sadak Yojana (PMGSY)
5. Deen Dayal Upadhyaya Grameen Kaushalya Yojana (DDU-GKY)
6. Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) 2005

Among many others.

Though the rural development has different facets to address yet in view of maintaining a focussed approach this paper has concentrated on the analysis of MGNREGA in Chhattisgarh and its trends and likely impact. The mandate

of the Act is to provide 100 days of guaranteed wage employment in a financial year (FY) to every rural household whose adult members volunteer to do unskilled manual work.

The objectives of the programme include<sup>1</sup>:

1. Ensuring social protection for the most vulnerable people living in rural India through providing employment opportunities,
2. Ensuring livelihood security for the poor through creation of durable assets, improved water security, soil conservation and higher land productivity,
3. Strengthening drought-proofing and flood management in rural India,
4. Aiding in the empowerment of the marginalised communities, especially women, Scheduled Castes (SCs) and Scheduled Tribes (STs), through the processes of a rights-based legislation,
5. Strengthening decentralised, participatory planning through convergence of various anti-poverty and livelihoods initiatives,
6. Deepening democracy at the grass-roots by strengthening the Panchayati Raj Institutions (PRIs),
7. Effecting greater transparency and accountability in governance.

## 2.Coverage

The Act was notified in 200 rural districts in its first phase of implementation (with effect from 2 February 2006). In FY 2007–08, it was extended to an additional 130 rural districts. The remaining districts were notified under MGNREGA with effect from 1 April 2008. Since 2008, MGNREGA has covered the entire country with the exception of districts that have a hundred per cent urban population<sup>2</sup>.

## 3.Research Methodology

The objectives of the paper are as following:-

1. To study the implementation of MGNREGA in Chhattisgarh.
2. To Obtain information on the achievements in terms of no. of working days generated under the MGNREGA
3. To obtain information regarding the state of participation of SC & St categories in the MGNREGA in the Chhattisgarh state.
4. To obtain information regarding the focus areas of different types of works undertaken to generate employment under the MGNREGA scheme in the Chhattisgarh state.
5. To make suitable suggestion for better implementation of the scheme with respect to above objectives in the state.

The paper covers a period from 2012-13 to 2016-17 and makes use of secondary data available from various government websites and its MIS reports to record observation and make analysis. It makes use of both national and state level data for this purpose

The table no. 1 reveals following facts:-

1. The Chhattisgarh state has done well with respect to work completion rate vis a vis the national work completion rate.

2. In the recent years we see that the work completion rate has shown a downward trend.
3. The Number of Gram panchayats with nil expenditure has come down significantly this means that now more gram panchayats are being covered and the benefit of the scheme is reaching to more people.
4. It is also clear that the in the recent years the percentage of expenditure against the available funds has shown in the recent years. This has happened to an extent that in the year 2016-17 the percentage was 103.79. Thus the expenditure on the various projects undertaken was more than the amount available to the state under the scheme.
5. The only down point shown by this table is that the state has always since the year 2013-14 paid a lower notional wage rate than that being paid at the national level

**Table No.1 Showing Status of work completion, Expenditure and Notified wage rate under MGNREGA 2005**

Year	Work Completion Rate		No. of GPs with Nil Expenditure	Percentage of Expenditure Against Available Funds	Notified Wage Rate	
	National	State			National	State
2012-13	98.1	99.69	1458	81.9	136.62	146
2013-14	97.07	99.34	1450	93.24	151.57	146
2014-15	95.35	99.12	1548	96.1	166.83	157
2015-16	77.2	85.41	496	97.5	177.68	159
2016-17	48.63	55.53	112	103.79	186.45	167
2017-18(18/02/2018)	12.4	17.89	85	101.28	191.53	172

Source : Compiled table from various MIS Graphs of <http://nrega.nic.in>

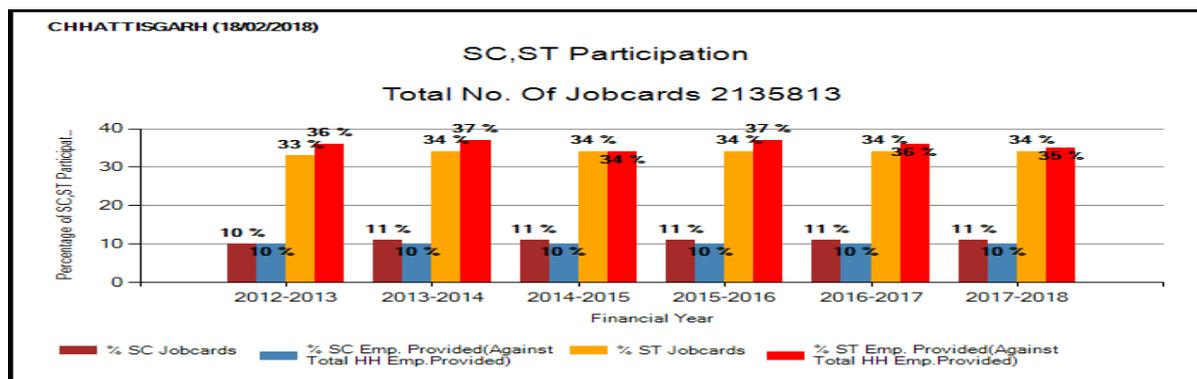
From the table no. 2 we can conclude that the Chhattisgarh state was much ahead of National average in the years 2012-13 to 2014-15. However in the years 2015-16 and 2016-17 the percentage to projected target achieved in Chhattisgarh state was much lesser than that of national level. However the difference was reduced in the most recent years of 2016-17 which is a positive sign. We also find that over the years there has been substantial fall in the projected person days. This trend is visible both in case of Chhattisgarh state as well at National level. However this is more prominent in case of Chhattisgarh state. However in case of Actual person days generated the table shows that while the Chhattisgarh state registered a decline the national level target showed a Increasing trend

**Table No.2 showing Projected Persons days and Persons days Generated Under MGNREGA 2005 from 2012-13 to 2016-17 at Chhattisgarh State and National Level**

Year	Chhattisgarh			National		
	Up to March			Up to March		
	Projected Person days	Person days Generated	Percentage of Projected target Achieved	Projected Person days	Person days Generated	Percentage of Projected target Achieved
2012	136347122	119386787	87.56091	2633952132	2172716883	82.48885
2013	121435931	129883618	106.9565	2435161824	2087863034	85.73816
2014	62438963	55581607	89.0175	2206735270	1661260745	75.28138
2015	123462178	101396458	82.12755	2391120427	2351330116	98.33591
2016	90000000	88594327	98.43814	2209274000	2356732560	106.6745

Source: compiled from various MIS reports of <http://nrega.nic.in>

**Table No. 3 showing participation of SC & ST category in terms of Job cards Issued and Employment Provided against total Household under MGNREGA 2005 by Chhattisgarh State**



**Table Source:** [http://164.100.129.6/GRAPH/State\\_graphs\\_xml.aspx?source=national](http://164.100.129.6/GRAPH/State_graphs_xml.aspx?source=national)

In terms of participation of SC, ST people towards availing the benefit of the Government schemes we find that that the above table no. 3 reveals following Information:-

1. We find that the SC category has been allotted 10% to 11% of all job cards issued till date
2. The percentage of SC Households since 2012-13 to 2016-17 has been a constant 10%. This means that either the Job cards issued have either been fully utilized or partially utilized where the % of SC Job cards issued has been more.
3. We find that the ST category has been allotted 33% to 34% of all job cards issued till date.
4. The percentage of ST Households since 2012-13 to 2016-17 has varied from 34% to 37%. However in all cases it was always equal to or more than the Percentage of jobcards issued in the respective year This means that either the Job cards issued have either been fully utilized or the category people have been in some cases also been given more jobs than their share of Job cards issued
5. In totality we find that SC & ST categories have been issued 43% to 45% of total Job cards and the SC & ST have been provided employment to the tune of 44% to 47%. Thus we can say that the SC& ST category people have always been allotted slightly more Jobs than the percentage of Job cards issued to them.

**No. 4 showing Percentage of Various types of Projects Undertaken by State of Chhattisgarh from Period of 2012-13 to 2016-17 under MGNREGA 2005**

Year	Category IV work	Rural sanitation	water Conservation	Land development	Rural Connectivity	Renovation of traditional water Bodies	Micro Irrigation Works	Drought Proofing	Aangan wadi	Rural Drinking water	Fisheries	Flood Control and Protection	Play Ground	BNR GSK	other Works
2012-13	20.14	2.18	10.1	28.1	23.14	6.41	2.11	4.53	0.02	0.52	0	0.72	0	0.65	1.37
2013-14	17.26	10.5	8.53	27.34	20.19	5.08	1.45	3.9	0.25	1.11	0.03	0.48	0	0.65	3.21
2014-15	16.88	21.21	8.26	20.71	17.86	4.45	1.43	3.46	0.38	0.69	0.04	0.38	0	0.62	3.62
2015-16	24.87	32.52	8.18	10.53	9.49	3.36	1.49	2.59	0.67	0.62	0.04	0.31	0.01	0.38	4.94
2016-17	42.35	30.77	6.14	5.77	4.51	2.02	1.08	1.52	0.84	0.62	0.02	0.21	0.01	0.21	3.9

**Table No. 5 showing Percentage of Expenditure on Various types of Projects Undertaken by State of Chhattisgarh from Period of 2012-13 to 2016-17 under MGNREGA 2005**

Year	Category IV work	Rural sanitation	water Conservation	Land development	Rural Connectivity	Renovation of traditional water Bodies	Micro Irrigation Works	Drought Proofing	Aanganwadi	Rural Drinking water	Fisheries	Flood Control and Protection	Play Ground	BNRGSK	other Works
2012-13	5.18	0.05	14.15	8.42	48.7	13.3	3.81	3.34	0	0.01	0	1.04	0	1.6	0.4
2013-14	4.71	0.2	15.12	8.79	47.57	13.15	2.89	4.58	0.22	0.05	0.01	0.79	0	1.28	0.62
2014-15	4.04	0.66	17.46	8.85	45.04	14.72	3.12	2.72	0.29	0.02	0.01	1.49	0	0.74	0.85
2015-16	11.45	3.55	24.63	6.05	25.83	13.38	5.04	5.45	0.59	0.02	0.23	1.35	0.01	0.97	1.43
2016-17	12.9	13.56	21.63	4.35	20.85	13.22	4.03	3.06	2.83	0.05	0.1	0.88	0.03	0.66	1.82

An analysis of the Table No.4 and table no.5 reveals following trends regarding various programs undertaken under from 2012-13 to 2016-17

1. In terms of total expenditure rural connectivity projects accounted for maximum expenditure in (48.7) 2012-13 though its share was only 23.14 % in terms of projects undertaken in the same year. However its share in terms of both total percentages of projects undertaken as well as the total expenditure has come down significantly by the year 2016-17. Thus there is a significant decline.
2. Land development projects in terms of percentage in number as well in terms of percentage of expenditure shows a declining trend over the years same as rural connectivity. However its decline is lesser than the decline in rural connectivity.
3. Rural sanitation projects have shown a increasing trend over the years. The trend is observable in terms of both percentages to no. of projects undertaken as well as the expenditure on the total projects undertaken. Thus we can say that state government is focussing on rural sanitation in recent years.
4. In case if water conservation projects we find that while the percentage of total projects undertaken has registered a decline yet in terms of expenditure it shows a increasing trend over the years.
5. In terms of Category IV works we find that it shows increasing trend both in terms of percentages to total no. of projects as well as the percentage to total expenditure on the projects. Thus the focus on this particular type of projects is increasing.
6. Renovation of traditional water bodies has shown a decline in terms of total no. of projects undertaken. However the expenditure percentage on its head has more or less remained stable over the years. Thus there is no change in its focus over the years. Same is the case with the Micro irrigation works and drought proofing projects.
7. Among the minor focus projects we find that while Aanganwadi projects have shown increasing trend over the years both in terms of percentage to total no. of projects undertaken and percentage to total expenditure, rural drinking water projects, play ground projects and fisheries projects have more or less shown a stable percentage both in terms of total no. of projects as well as the total expenditure on the projects. Lastly Flood Control and Protection and BNRGSK projects show a declining trend over the years especially with

respect to the expenditure on the projects. Thus we can say that there is declining focus on these projects over the years.

8. Projects or works which do not come under any of these heading have been clubbed under other works heading. In respect of these we find that such works show a increasing trend both in terms of no. of projects undertaken as well as the total expenditure on projects over the years.

#### **4.Conclusion**

Therefore from the analysis of above data we can conclude that the state is doing well in respect of coverage of the targeted Gram panchayats for extending the benefits of the scheme and also in terms of utilisation of available funds for different projects. However there is shortcoming in the sense that not only the notified wage rate is less in the state for the past some years but also the number of the person days generated against the projected person days is also lower than the national average in the last two years. Thus it is advised that the state government focus on increasing the notified wage rate as well as achieving the actual person days generated against the target. The target person days has also registered a higher decline in state than the national level which increases the severity of the shortcoming. In terms of extending the benefit to SC& ST category we find that the state government has been making a determined effort to maintain the percentage of Job cards issued to these categories and of ensuring that these categories get a higher percentage of Jobs than the percentage of Job cards issued to them.

#### **5.Reference:-**

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2. [http://nrega.nic.in/Circular\\_Archive/archive/MGNREGA\\_SAMEEKSHA.pdf](http://nrega.nic.in/Circular_Archive/archive/MGNREGA_SAMEEKSHA.pdf)

# TECHNIQUES FOR NANOPARTICLE SYNTHESIS

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## ABSTRACT

*Innovative Nanoparticles synthesis techniques are very important for the development of Nanotechnology and Nanoscience. The scope for new synthetic methods for nanomaterials preparation has been ever demanding with innovative contribution. Various traditional physical and chemical methods are being used for fabrication of nanomaterials but more recently the advantageous use of biological means for nanoparticles synthesis is gaining importance. As these methods are ecofriendly, nontoxic, economical and easily controllable. In this paper, we discussed different synthesis routes for the fabrication of Nanoparticles.*

**Keywords:** *Nanotechnology, Nanoparticles, Micro-organisms, Phytonanotechnology*

## 1. Introduction

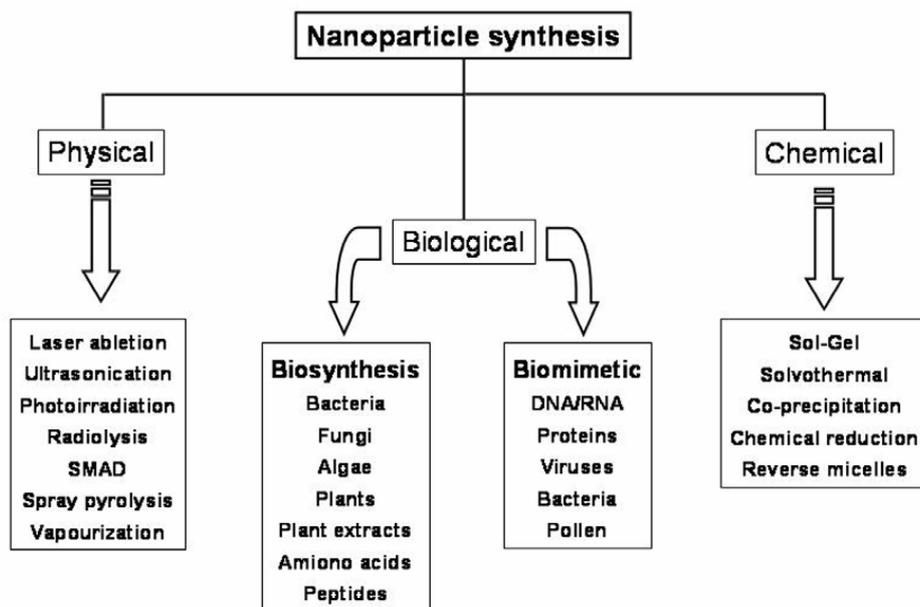
Nanoparticles—particles having one or more dimensions of the order of 100nm or less—have attracted great attention due to their unusual and fascinating properties, and applications advantageous over their bulk counterparts [1]. Although the synthesis of nanoparticles was found in ancient Indian medical and chemical science, where different kinds of Bhasma like Suvarna (gold), Rajat (silver) Bhasma, were used in ayurvedic medicine for the treatment of diseases. However, Michel Faraday is considered as the first to chemically synthesize gold nanoparticles, in solution from aqueous chloroauric acid and phosphorous dispersed in CS<sub>2</sub> [2]. Since then, various physical, chemical and biological methods have been formulated for the fabrication of inorganic nanoparticles with a range of compositions, sizes and shapes. Some of the very successful physical methods for the synthesis of nanoparticles include photoirradiation[3], radiolysis[4], ultrasonication[5], spray pyrolysis, solvated metal atom dispersion[6], chemical vaporization[7], and electrochemical methods[8]. Chemical methods for the synthesis of inorganic nanoparticles are reduction or oxidation of metal ions, or by the precipitation of the necessary precursor ions in the solution phase. The control of size, shape, stability and the assembly of nanoparticles can be achieved by incorporating different capping agents, solvents and templates. Various capping agents ranging from simple ions, to polymers to biomolecules are routinely used for the capping and stabilization of nanoparticles[9]. As a solvent, either water or non-aqueous organic solvents are used for the synthesis of nanoparticles depending on the ultimate application of nanoparticles.

On the other hand, biological methods utilize nature's most efficient machines i.e. living cells for the synthesis of nanoparticles. Biological methods also involve the use of biomolecules as templates or scaffolds for synthesis and assembly of nanoparticles. Many soft and rigid templates such as micelles[10], polymer materials [11], DNA[12], and mesoporous materials[13] have been employed to facilitate control over the formation of desired shape, size and assembly of nanoparticles.

## 1. Physical Synthesis Methods

**1.1 Evaporation methods:** Physical vapor deposition(PVD), sputtering and chemical vapor deposition (CVD) are the commonly used methods to form inorganic nanomaterials [14].

(i) PVD involves condensation from the vapor phase which is composed of three main steps: (a) formation of vapor phase by evaporation or sublimation of the material, (b) transporting the material from the source to the substrate, and (c) formation of the particle and/or film by nucleation and growth. Different techniques have been used to evaporate the source such as electron beam, thermal energy, sputtering, cathodic arc plasma, and pulsed laser. Nanowire, nanorod, nanobelt, nanosheet, nanoribbon, and nanotube, etc., have been synthesized using PVD.



(ii) In CVD, the carrier gases containing the elements of the desired compound flow over the surface to be coated. This surface is heated to a suitable temperature to allow decomposition of the carrier gas and to allow the mobility of the deposited atoms or molecules on the surface. It consists of three steps: (a) mass transport of reactants to the growth surface through a boundary layer by diffusion, (b) chemical reactions on the growth surface, and (c) removal of the gas-phase reaction byproducts from the growth surface.

(iii) In sputtering, a discharge of non reactive ions such as argon is created which fall on the target and break the surface atoms, which are collected on the surface to be coated.

**1.2 Laser Ablation Method:** In this method, metal atom desorption occurs, when intense laser pulses are focused on a metal target. In a Laser ablation experiment, a bulk metal is immersed in a solvent containing surfactant. During the laser irradiation, the metal atoms will vaporize and are immediately solvated by the surfactant molecules to form nanoparticles in solution [15].

**1.3 Solvated Metal Atom Deposition (SMAD) Method:** In SMAD, a bulk metal is evaporated under vacuum and the vapors of the metal are co-condensed with vapors of organic solvents like acetone to form nanoparticles in solution using a physical method [16]. Evaporation of metal is achieved by electrically heating a metal wire under vacuum. The resulting solution would consist only of colloids and solvent with no byproducts.

**1.4 Photolytic and Radiolytic Methods:** These methods involve the reduction of metal salts by radiolytically produced reducing agents such as solvated electrons and free radicals and the photolysis of metal complexes in the presence of some donor ligands [17]. Radiolysis of aqueous solutions of metal ions gives solvated electrons that may directly react with the metal ions or with other dissolved materials to produce secondary radicals, which then reduce the metal ions to form nanoparticles.

On irradiation of UV light, alcohols form radicals which can reduce the metal ions to form Nanoparticles. When UV light is irradiated on mixture of aqueous metal ions and alcohols metallic nanoparticles like gold and silver are synthesized.

## 2. Chemical Synthesis Methods

**2.1 Chemical precipitation:** It is a very simple method of synthesis of nanoparticles. The kinetics of nucleation and particle growth in homogeneous solutions can be adjusted by the controlled release of anions and cations. Careful control of precipitation kinetics can result in monodisperse nanoparticles. Once the solution reaches a critical supersaturation of the species forming particles, only one burst of nuclei occurs. Thus, it is essential to control the factors that determine the precipitation process, such as the pH and the concentration of the reactants and ions. Organic molecules are used to control the release of the reagents and ions in the solution during the precipitation process.

By this method, very complicated nanostructures can also be constructed such as CdS/HgS/CdS, CdS/(HgS)<sub>2</sub>/CdS and HgTe/CdS quantum well systems and other core/shell structures [18].

**2.2 Sol-gel Method:** This method is based on inorganic polymerization reactions. It includes four steps: hydrolysis, polycondensation, drying and thermal decomposition [18]. Precursors of the metal or nonmetal alkoxides hydrolyze with water or alcohols according to the hydrolysis process



where if  $m$  is up to  $x$ , the reaction is total hydrolysis, followed by either a water condensation or alcohol condensation. Any acid or a base can also help to hydrolyze the precursor.

The solvent must be removed after the solution has been condensed to a gel. Higher temperature calcination is needed to decompose the organic precursor. The size of the sol particles depends on the solution composition, pH, and temperature.

**2.3 Hydrothermal Synthesis:** Water at elevated temperatures plays an essential role in the precursor material transformation because the vapor pressure is much higher and the structure of water at elevated temperatures is different from that at room temperature. The properties of the reactants, including their solubility and reactivity, also change at high temperatures. The changes mentioned above provide more parameters to produce different high-quality nanoparticles and nanotubes, which are not possible at low temperatures. During the synthesis of nanocrystals, parameters such as water pressure, temperature, reaction time, and the respective precursor-product system can be tuned to maintain a high simultaneous nucleation rate and good size distribution. Different types of oxides and sulfides nanoparticles such as TiO<sub>2</sub>, LaCrO<sub>3</sub>, ZrO<sub>2</sub>, BaTiO<sub>3</sub>, SrTiO<sub>3</sub>, Y<sub>2</sub>Si<sub>2</sub>O<sub>7</sub>, Sb<sub>2</sub>S<sub>3</sub>, CrN, α-SnS<sub>2</sub>, PbS, Ni<sub>2</sub>P, and SnS<sub>2</sub> nanotubes, Bi<sub>2</sub>S<sub>3</sub> nanorods, and SiC nanowires have been successfully synthesized in this way. The solvent is not limited to water but also includes other polar or nonpolar solvents, such as benzene, and the process is more appropriately called solvothermal synthesis in different solvents. [14,18]

### 3. Biosynthesis of Nanomaterials by Living Organisms

Living organisms, especially micro-organisms like Bacteria, Fungi, Algae, Actinomycetes, Yeast, and Virus etc. have a remarkable ability to form exquisite inorganic structures often in nanodimensions. This ability of living creatures has lured material scientists towards these biological systems to learn and improve the skills for the precise fabrication of nanomaterials at ambient conditions. There exist several examples in biological systems demonstrating not only the efficient synthesis of macroscopic materials like bones and teeth with precise positioning [19] but also in making functional structures in mesoscopic and nanometer dimensions.

Generally synthesis of inorganic nanomaterials by microorganisms has been classified in two categories such as – biologically controlled synthesis and biologically induced synthesis [20]. Biologically controlled synthesis of inorganic materials can often be considered as biomineralization as it is known to occur naturally in few specific organisms. Biogenic nanomaterials commonly have attributes which distinguish them from their inorganic counterparts. The vast array of organisms are now known to synthesize inorganic materials [20], most of them are calcium carbonates, calcium phosphates, silicates, iron oxides and iron sulfides [21].

During biologically controlled synthesis of inorganic materials, inorganic phases grow within or on organic matrix or vesicles inside the cell, allowing the organism to exert a strict control over the composition, grain size, habit, and intracellular or surface location of the produced minerals [20, 22]. Examples of such synthesis include silica biosynthesis in diatoms [23], sponges [24] and radiolarians [25], calcareous structures in coccoliths [26], gypsum in S-layer bacteria [27] and the nanocrystals of magnetite and greigite in magnetotactic bacteria [28].

In Biologically induced synthesis of inorganic materials, organisms modify its ambient microenvironment and create conditions suitable for extracellular precipitation of minerals[28a]. Deliberate synthesis of inorganic nanoparticles is possible because of the specific resistant mechanism exerted by micro-organisms against the high metal ion concentration. At higher concentration of metal ions micro-organisms can cope with the toxic effect of metal ions by one of the defense mechanisms such as effluxing of metal ions by efflux pumps, alteration in the solubility of metal ions, alteration in redox state, extracellular complexation and extracellular precipitation of metal ions etc [29].

#### 3.1 Mechanism of Synthesis of Nanoparticles

Different biological agents react differently with metal ions leading to the formation of Nanoparticles so the precise mechanism for synthesis through biological routes is yet to be conceived. Generally, nanoparticles are biosynthesized when the microorganisms grab target ions from their environment and then turn the metal ions into the element metal through enzymes generated by the cell activities. It can be classified into intracellular and extracellular synthesis according to the location where nanoparticles are formed [30, 31]. The intracellular method consists of transporting ions into the microbial cell to form nanoparticles in the presence of enzymes. In the intracellular synthesis of nanoparticles, the cell wall of the microorganisms plays an important role. The mechanism involves electrostatic interaction of the positive charge of the metal ions with negative charge of the cell wall. The enzymes which are present within the cell wall reduce the ions to nanoparticles and these nanoparticles get diffused off through the Cell wall. The extracellular synthesis of nanoparticles involves trapping the metal ions on the surface of the cells and reducing ions in the presence of enzymes [32]

### 3.2 Synthesis of Nanoparticles using Micro-organisms

The various techniques for the synthesis of nanoparticles by the microorganisms include alteration of solubility and toxicity through reduction or oxidation, lack of specific metal transport system, biosorption, extracellular complexation or precipitation of metals, bioaccumulation and efflux system [33]. Nanomineral crystals and metallic nanoparticles having properties identical to chemically synthesized nanomaterials can be synthesized using microorganisms. Different size, shape and composition of the nanoparticles can also be controlled by using microorganisms.

In recent research, bacteria, including *Pseudomonas deceptionensis* [34], *Weissella oryzae* [35], *Bacillus methylotrophicus* [36], *Brevibacterium frigoritolerans* [37], and *Bhargavaea indica* [38,39], have been explored for silver and gold nanoparticle synthesis. Similar potential for producing nanoparticles has been shown by using several *Bacillus* and other species, including *Bacillus licheniformis*, *Bacillus amyloliquefaciens*, *Rhodobacter sphaeroides* [40-42], *Listeria monocytogenes*, *Bacillus subtilis*, and *Streptomyces anulatus* [42, 43]. Various genera of micro-organisms have been reported for metal nanoparticle synthesis, including *Bacillus*, *Pseudomonas*, *Klebsiella*, *Escherichia*, *Enterobacter*, *Aeromonas*, *Corynebacterium*, *Lactobacillus*, *Pseudomonas*, *Weissella*, *Rhodobacter*, *Rhodococcus*, *Brevibacterium*, *Streptomyces*, *Trichoderma*, *Desulfovibrio*, *Sargassum*, *Shewanella*, *Plectonemaboryanum*, *Rhodospseudomonas*, *Pyrobaculum*, and others [44]. These investigations suggest that the main mechanism of the synthesis of nanoparticles using bacteria depends on enzymes [45]; for instance, the nitrate reductase enzyme was found to be responsible for silver nanoparticle synthesis in *B. licheniformis*. Using Fungi for synthesis of Nanoparticles i.e., Mycosynthesis, is another route for achieving stable and easy biological nanoparticle synthesis. Most fungi containing important metabolites with higher bioaccumulation ability and simple downstream processing are easy to culture for the efficient, low-cost, production of nanoparticles [46]. Moreover, compared with bacteria, fungi have higher tolerances to, and uptake competences for metals, particularly in terms of the high wall-binding capability of metal salts with fungal biomass for the high-yield production of nanoparticles [46,47]. Three possible mechanisms have been proposed to explain the mycosynthesis of metal nanoparticles: nitrate reductase action; electron shuttle quinones; or both [46]. Fungal enzymes, such as the reductase enzymes from *Penicillium* species and *Fusarium oxysporum*, nitrate reductase, and  $\text{-NADPH}$ -dependent reductases, were found to have a significant role in nanoparticle synthesis [48], similarly to the mechanism found in bacteria. The synthesis of nanoparticles using actinomycetes has not been well explored, even though actinomycetes-mediated nanoparticles have good monodispersity and stability and significant biocidal activities against various pathogens [49]. The synthesis of silver, copper, and zinc nanoparticles using *Streptomyces* sp. has demonstrated that the reductase enzyme from *Streptomyces* sp. has a vital role in the reduction of metal salts [50]. Similar to other micro-organisms, yeasts have also been widely investigated for the extracellular synthesis of the nanoparticles on a large scale, with straightforward downstream processing [51-54]. Further-more, virus-mediated synthesis of nanoparticles is also possible. Viruses can be used to synthesize nanowires with functional components that are assembled for various applications, such as battery electrodes, photovoltaic devices, and supercapacitors [55].

### 3.3 Nanoparticle Synthesis Using Plants

Recently, phytonanotechnology has provided new avenues for the synthesis of nanoparticles and is an ecofriendly, simple, rapid, stable, and cost-effective method. Phytonanotechnology has advantages, including biocompatibility, scalability, and the medical applicability of synthesizing nanoparticles using the universal solvent, water, as a reducing medium [56]. Thus, plant-derived nanoparticles produced by readily available plant materials and the nontoxic nature

have significant roles in metal salt reduction and, furthermore, act as capping and stabilizing agents for synthesized nanoparticles [57].

#### 4. Conclusion

Physical and chemical methods for synthesis of nanoparticles are more popular and able to produce large quantities of nanoparticles with a defined size and shape in a relatively short time. But they are complicated, outdated, costly, inefficient and produce hazardous toxic wastes that are harmful, not only to the environment but also to human health[58].

While nanoparticles synthesized by biological process are far superior, in several ways, to those particles produced by chemical methods. Biological methods are reliable, nontoxic, and eco-friendly. With an enzymatic process, the use of expensive chemicals is eliminated, and is not as energy intensive as the chemical method. Nanoparticles synthesis through 'Green' route is easier as it is easy to tailor the size, shape and nature of NPs by simply modifying the culture conditions like temperature, pH, pressure or the nutrient media. They are economically viable as plants and microbes are easily/readily available. The particles generated by these processes have higher catalytic reactivity, greater specific surface area, and an improved contact between the enzyme and metal salt in question due to the bacterial carrier matrix [59, 60]

However, most micro-organism-based synthesis for nanoparticles are slow with low productivity, and the recovery of nanoparticles requires downstream processing. Furthermore, problems related to micro-organism based synthesis for nanoparticles also include the complex steps, such as microbial sampling, isolation, culturing, and maintenance[61].

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