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Solid waste management in railway wagon

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ABSTRACT

Solid waste management has been a major problem in railway wagons for many decades in India. It is a well-known fact that if solid waste is not taken care properly it is going to harm the environment drastically. The purpose of this project is to collect solid waste thrown out of the window by the passengers and recycle or reuse. Two conveyor belts are fixed one above another between two parallel frames of the window. Four collecting tanks, each pair at both ends of one conveyor belt are also attached. The tanks are equipped with a level sensor (Ultrasonic sensor) and a GSM module. Two outlet pipes are attached from inside that direct the waste onto the conveyor. Inside the coach, each coop is provided with a switch, which on pressing the conveyor belt starts and thus prevent it to run for the whole time without any work to be done. The whole system comprising of two sets of the conveyor belt is enclosed in a casing between the parallel frames of the window.

Keywords— *Solid waste management, GSM module, Ultrasonic sensor, Solid waste, Conveyor setup, Railway wagon*

1. SOLID WASTE MANAGEMENT

Sturdy Waste administration is the control rule related to control of age, stockpiling, isolation, transport or alternate, getting prepared and transfer of robust waste substances such that fine signifies the collection of ultra-modern wellness, safety, economic subjects different ecological contemplations. Robust waste control board consists of organizing, authoritative, cash associated, constructing and lawful capacities. Preparations include complex among disciplinary relations which are stretched, for instance, standard wellbeing, political idea, topography, human technology, monetary matters, town, and territorial arranging, similarity and protection, and sorbent sciences. Robust waste administration techniques range for present-day makers and personal, for the city and provincial area, and for created and developing nations. In metropolitan territories, the administration of not perilous waste is the hobby of nearby venture experts. 3 R s methodology – Reduce, reuse and recycle for waste transfer should concentrate on waste avoidance. In light of this order, squander transfer methodologies are 'end of the passage' arrangements and ought to be the least worthy alternative. Accentuation ought to be put on the generation of less waste which should be discarded is being delivered.

2. OBJECTIVE

- The primary motive of solid waste managing solid waste management in railroad wagon is limiting and wiping out the unfavorable impacts of waste on human wellbeing and the earth.
- The project's main objective is to develop a proper waste management system.
- This may reduce the problem of waste scattered around the tracks since the system.
- Our main goal is to assist such problem by managing the waste. We all know the plastic bottles are purchased by the vendors as it is further be used for recycling.
- There is a huge scope of items utilized on a consistent schedule created from polythene canister liners, reused plastic, etc...

3. WASTE MANAGEMENT POLICIES IN RAILWAYS

Time to time policy hints had been issued with respect to the executives on Indian railways which includes the accompanying components:

- Proper handling of municipal stable waste arising within the railway station vicinity.
- Safe and hygienic disposal of garbage springing up from catering offerings.
- Bio-degradable and no bio- degradable wastes must be segregated.
- Practising of burning waste in the open air must be prohibited.

4. DESIGN AND CONNECTIONS

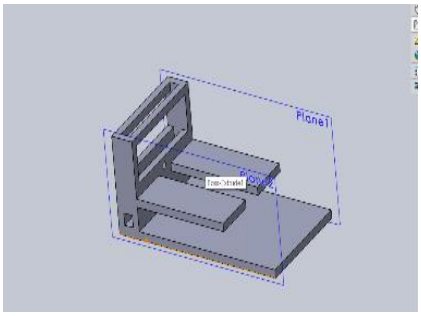

Fig. 1: 3D design of the frame

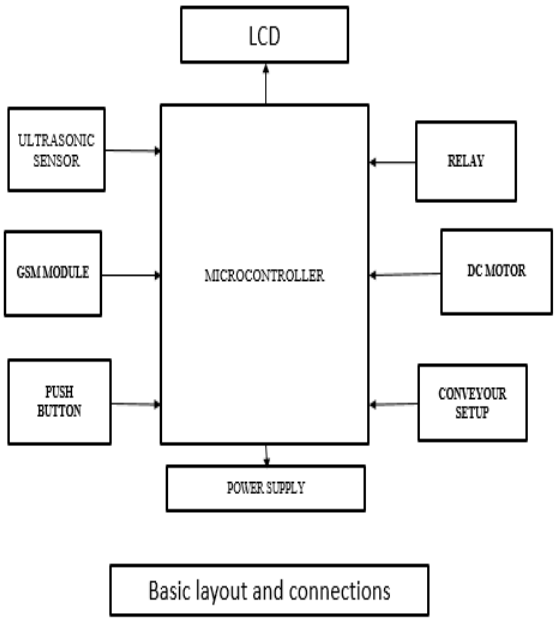

Fig. 2: Components and electrical connections

Fig. 3: Sample working of the project

5. RESEARCH AND AREA OF FOCUS

5.1 Location

We referred several journals to know the consequence of the solid waste produced from the railway wagon. Thus several statistics were collected and studied from different journals. The statistics were based on the data collected from the New Delhi station. New Delhi is the capital of India, it is situated on the geological zone of 42.7 sq.km. The co-ordinates of Delhi are 28.6139° north, 77.2090° east. New Delhi railroad station is located in East Delhi. This city experiences limits temperature both in summers and winters. Geologically, the capital is trisected into the Delhi edge, the flood plain of Yamuna, and fields. It starts showering in Delhi from June until October. Maximum precipitation takes place in the month of July.

5.2 Methodology

Presently the area of research work is a sort of analytic and initial study which enrols the issues related to administrating the waste amid the railroad venture. The essential information is gathered with the assistance of individual meetings and surveys, while the optional information is gathered from research papers, diaries and articles.

6. ANALYSIS

6.1 Qualitative analysis

- **Examining of strong waste:** Gather trial of MSW made at 16 organizes and collected outside the platform arena. After that, the solid wastes are segregated among bio- degradable and non-bio degradable materials.
- **Planning the analysis for the sample collected:** Approximately 105 Kg of the strong waste model was accumulated and separated away from the stack to discover the tangible associations in MSW. The tangible association of MSW made at Delhi rail arenas is explained and understood from table 5.2 and figure. 5.1 independently.

Table 1: Contribution of different types of waste towards total composition

S no.	Type of waste	Composition (% by weight)
1	Green wastes (Fruits and vegetables)	23
2	Papers	23.2
3	Glass	5
4	Plastic usable	8
5	apparel	1.5
6	Plastic	21.5
7	Metal	0.5
8	Hazardous waste	0.6
9	Dust	20

6.2 Quantitative analysis

It is seen that the aggregate of explorers (dynamic) from the rail station of New Delhi spanning between the years 2010-2011 are 2,25,100/day. The almost an exact number is required to be returning. Thus we can conclude this figure as 2, 50,100 x 2=5, 00,200 explorers/day. People who are working in the railway areas and managing the whole system are in the recently concluded number. Generally, the measure of solid waste delivered/explorer is 64gms, thusly a check of 32,000 Kg of solid waste is made in New Delhi station each day. From the quantitative examination, it is found out that the strong waste conveyed each and every day eventually at the railroad station of New Delhi approximates nearly to 32000 kg.

7. FINDINGS AND DISCUSSION

7.1 Findings

The information was assembled from 50 respondents by topping off the organized poll. The investigation of the assembled information uncovered that nearly 79 % of the people from the total sample size reacted by saying that IR does not contain an appropriate unwanted waste administration framework set up. Strikingly, 20% of the respondents announced that they are not in any case mindful of the garbage bins in each and every wagons. Very nearly 87 % of the total sample of people revealed that the significant sort of unwanted materials produced amid the railroad venture is that of polythene, it may be as plastic containers, polythene sacks or wrappers. The same number of as 14% detailed that they just discard the loss from the window. Practically 66% of the respondents said that the encompassing condition crosswise over railroad is filled up by the unwanted materials tossed outside by travelers amid the rail route venture.

Very nearly 81 % of the people uncovered the requirement to provision the garbage bins in each wagons.
Few suggestions were made based on the result of the investigation:

- At present each coach of a train consists of only two waste canisters which are impossible to contain the rubbish of 70 odd travelers. Thus it is advised to increase the trash receptacles inside mentors by avoiding normal dustbins crosswise over mentors at all costs of certain seats.
- Keeping dispensable sacks in various hues for gathering the solid waste.
- Most of the travelers particularly all in all class don't have a clue about that a dustbin exists under wash bowl. Along these lines, Indian Railways can advertise about the utilization of garbage bins.
- To advise the cleaner to isolate the diverse kind of unwanted materials from the trains amid accumulation.
- Improvising the plastic waste accumulation framework. Travelers ought to be remunerated in the event that they gather and arrange plastic containers and polythene packs at the ideal spot.

7.2 Discussion

The problem of waste generated inside the running train and around the railway track has become a growing concern over the years. The 1, 15,000 Km area around the railway track in India is the biggest source of a waste generation which has never been cleaned. It is imperative that the railways draw up an efficient waste management system. It simply cannot continue to pollute the entire rail network spread across the length and breadth of the country, contaminating land and soil, and polluting waterbodies. The efficient waste management system inside railways would not only make IR cleaner but also the surrounding environment greener.

8. ADVANTAGES

- Highly sustainable system.
- Efficient collection of solid waste.
- Less clogging of drainage systems in the vicinity of the railwaytrack.
- Require less amount of training and expertise to operate.

9. DISADVANTAGES

- It will take a certain period of time to implement this setup in all the railway coaches across the country.
- Modification of design will take some time.
- Clogging of outlet pipes.

10. CONCLUSION

The issue of waste delivered inside the on administration express trains and the encompassing of the railroad tracks is creating at a high rate. The issue has achieved a specific stature since plastic holders and polythene packs were introduced in the railroad. The unusable, reused item made from the on administration wagon is missing real gathering, disengagement and carriage issue. To helpfully deal with the delivered waste it needs improvement alongside the establishment of central workplaces reliant on an ideal administration plan. This would help the distinctive accomplices by taking remedial measures and assurance capable waste organization strategy helping in making the IR eco-accommodating.

11. ACKNOWLEDGEMENT

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