DEVELOPMENT OF WASTE MANAGEMENT SYSTEM IN RAILWAYS USING IoT

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ABSTRACT

Waste management or waste disposals are the actions required to manage waste from its collection to its final disposal in railways to maintain the hygiene. This includes few steps like collecting, transporting, treating and disposing of waste together with monitoring and regulation on time-to-time basis. It also includes different types of things like the legal and regulatory framework that is related to waste management encompassing helping on recycling methodology. In this system the wastage is collected from the running train using waste management bins. The IR sensor will sense the level of wastage in the tank and send the information to cloud for the storage of data. The station master will receive the alert regarding the wastage level in the tank from the cloud and arrange for disposal in the railway station .They will control the disposal of solid waste through the Bluetooth technology. We infer that by using this technology the overall waste management in the railways can be done effectively.

Keywords: Waste management, IR sensor, Cloud, Bluetooth technology

1. INTRODUCTION

Developing countries like India are progressing in urbanization and economic profile but at the same time monitoring the public service systems manually is getting more complicated. If we consider an example of Indian railways, there is a large amount of waste generated in running trains as well as stations which includes waste from passengers, visitors, suppliers and the staff. The management of the waste will be very crucial to maintain the hygiene in the train as well as station. Generally all the solid waste collected will be taken to the nearest designated municipal location. This requires manual work which requires immense effort in terms of physical transformation.

But the waste that is collected in the running trains need to be collected eventually without any delay. It is difficult to assign an individual to check the wastage level, based on the number of trains in the railways this leads to delay in disposal and if the waste starts degrading it may cause the unhygienic environment. To avoid

this we can go for automatic waste monitoring system which will monitor the levels of waste collected in the storage bins.

By using the IR sensor that are fixed at different levels in the storage bins will provide the wastage levels and the same data will be sent to the cloud for storage. The same date will be sent to the next or nearest station where an individual staff will be monitoring all the trains that are passing by the stations. Based on the information provided by the level sensors on the trains, the station controller will allot the slots for the disposal of the waste without any overlapping between the trains so that no delay will occur in the train schedule and the complete application is done using the ATMEGA LM328 microcontroller which will monitor the different signals.

The flow is as follows, the data obtained by the IR sensors in the running trains is sent to cloud using wi-fi module and the same data is displayed at the nearest station. If the level has exceeded the range then the station-master will arrange for the disposal based on the priority. The signal will be sent back to the train master indicating the disposal can be done or not. If the disposal can be done at the station, then by using Bluetooth module the station master will activate the disposal operation and the filled disposal bins will be replaced with the empty bins and thus the effective disposal management will be done. The Figure-1 is the transmitter module fixed in the running train. The figure-2 is the receiver module at the individual stations for monitoring.

2. LITERATURE SURVEY

Due to more number of travelers and running trains, Indian Railways is suffering by a very sophisticated problem that is solid waste disposal in running trains due to travelers and goods without any treatment on time-to-time basis. Several models and techniques were proposed to solve the Indian railways toilet problems.

Controlled discharge toilet system (CDTS)dispose the human waste in the running trains on the run-way only after the train speed reaches the speed limit of 30kmph.CDTS used a more efficient system that used GPS for the monitoring. Discharge of the waste takes place away from the station, which helps in keeping the station clean and hygiene [2].

Another effort in this direction is zero discharge toilet system(ZDTS) was developed by IIT Kanpur and research development and standards organization(RDSO), Lucknow. ZDTS separates solid waste and liquid waste, recycling the liquid waste to be used for flushing. Solid waste in the running train is stored in a closed box and treated with anaerobic bacteria which will degrade it to manure. the box is to be emptied at stations based on its level conditions.

IR engineers and DRDO biotechnologists developed Bio-toilet. The technology being developed uses special trains of bacteria to biodegrade human waste intro harmless and odorless products which can be used as manure. several other methods are also in process in parallel such as vacuum toilet technology method. The proposed models and technologies have certain limitations in terms of cost, complexities, and requirement of large

infrastructure at stations, maintenance and several other factors. controlled discharge toilet system were very expensive. Removing solid waste from waste management tanks was a problem (ZDTS),and vacuum machines are prone to technical glitches[1].
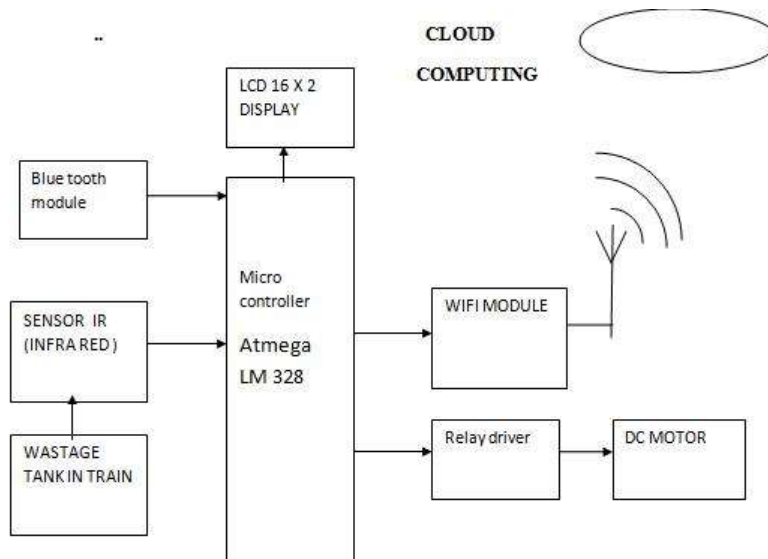
3. Proposed Model

Fig 1: Transmitter Model

The figure-1 represents the transmitter model that is fixed on the running train for monitoring the wastage level.
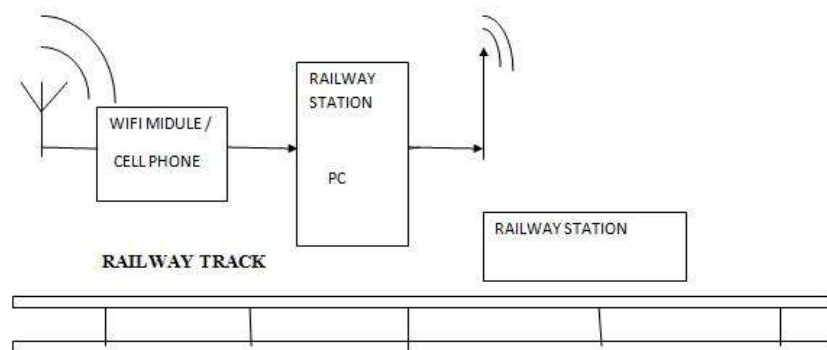

Fig 2: Receiver Model

The figure-2 represents the receiver model that is located in the indivisual railway stations for monitoring and controlling.

4. Results

Fig-3: indicating the wastage level exceeding the threshold

Fig-4: indicating the wastage level below the threshold

5. CONCLUSIONS

This surveys focus is on more energy-efficient IoT based Bluetooth as an enabler of various applications including waste management. Specifically, it aims to present a large set of models dealing with the efficient waste management. Special attention is paid on the waste collection. We present efforts for the intelligent within the context of IoT and railway for waste collection. We propose an inductive taxonomy to perform comparative assessment of the surveyed models. We focus only on efforts that incorporate ICT models for waste collection in railway we deliver the strengths and weaknesses of the surveyed models. Finally, our future work is focused mainly on the definition of an effective IoT-enabled model for waste management system.

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