E-TRACKING OF SOLID WASTE MANAGEMENT USING RFID AND GPS TECHNOLOGY

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ABSTRACT: With the expand of population of a country, suitable management of cumulative of Municipal stable Waste (MSW) becomes more acute for maintaining green environment. In conventional approach a number of trucks accumulate the MSW after which transport transfer these MSW in a defined area, however all of the above jobs are usually not thoroughly monitored. It is rather important to observe the vehicles and file the understanding concerning the collecting time and subject from a relevant area to make certain the job well carried out. The proposed work exploits the huge vigour of RFID technology and grants the development of an electronic monitoring (e-monitoring) system to overcome the above challenge within the traditional strategy. This e-monitoring procedure is an embedded process that consists of RFID technological know-how interfaced with P.C. Micro-controller and an online based computerized application. A based GUI in from anyplace and know-how can also be viewed by one-of-a-kind group of persons. The GUI could have the facility for the order that the approach will also be accessed citizens to place their complaints and comments on the carrier. It has been proven within the laboratory environment as well as within the subject environment. The experiment results show that the method capabilities correctly and is working actual time. Municipal authority can monitor the SW amassing status by way of the system and scans generate specific reviews to toughen the performance of their provider.

Keywords: E-Tracking, PIC microcontroller, Infrared sensor (IR), Radio frequency identification (RFID), GPS, GSM, Mobile App.

I. INTRODUCTION:

Solid waste is one of the major problems in Indian cities. Generally, the solid waste is defined from household's refusal and non-hazardous solid waste is from industrial, commercial and institutional establishments such as hospitals, market waste, yard waste and street sweepings. In developing countries, waste management is becoming a social issue due to unmonitored act a significant amount of solid profusion generated in clean are not stacked and managed properly. Wastes are either burned openly in the streets or end up with empty land, rivers and thereby creating a serious health issue to public. Today, Solid waste management has changed a long way from the old days when garbage was collected by horse and disposed outside of town, today it is almost intimately to manage surplus collection behavior and administration without fancy technology to pinpoint the locations of vehicles and recycling bins. In the developing countries, waste management is becoming an acute problem as urbanization and economic development increase leading to larger quantities of waste materials. Different methods have been proposed for carrying the work few of them are discussed below,

The one of paper is proposed by Maher Arebey M A Hannan, Hannan Basri and Huda Abdula on solid waste monitoring and management using RFID,GSM, and GPS. The developed system would pioneer field for solid profusion collection fashion monitoring and management but this system did not give the driver authentication for the proper information of authorize person driving the vehicle [1].

Another system proposed in [2] is of solid waste monitoring system integration based on RFID, GPS and camera. The implementation of the system with graphical user interface can contribute to provide data about the truck and bin. This system cannot give the information about the level of garbage so we would enhance the system by improving it.

The system for municipal solid waste management based on E-monitoring and RFID is proposed by Md.Liakot Ali, Mahbubul Alam and Md Abu Nayeem has intelligent monitoring position for having to do with management of MSW. This system can be enhanced by giving the real time information and tracking the garbage vehicle [3]. From these discussions it is required to improve the existing work for level detection, providing driver authentication facility for knowing the information of authorize person and real time tracking provided by GPS, real time information about collection and management of waste are major issues in this work.

The important issues of the prevailing solid waste collection method and management are like unavailability of fast response to patron's complaints about uncollected waste, lack of the information, procedure for monitoring, tracking of the truck of garbage or waste. Also it is not possible to get the entire services in time.

To solve the problem mentioned above of solid waste management system we have proposed the solutions to provide real time tracking of the vehicle carrying waste. The real time information of collection and management of waste can be send to mobile application showing all the information with detail. And by using radio communication technology enhance the system to uniquely identify tagged object.

The paper is organized in following way the first section include introduction of the system. The section II includes architecture of proposed system and its description. The section III includes the result of proposed work, Followed by application of the proposed system and Conclusion in the section IV respectively.

II. ARCHITECTURE OF PROPOSED SYSTEM:

The main objective of this work is to develop a solution using RFID and real time tracking to proper management of solid waste material. Planning of solid waste management involved examination of current state of waste production, collection and transport in study area, development of a conceptual frame work of the proposed model shown in below Fig-1.

In the below Fig-1 whenever any municipal garbage collecting vehicle equipped with the embedded system comes to the frequency range of RFID tag mounted with the waste collecting container or waste bin, the embedded system sends a request signal to the tag.

Then the tag responds to the embedded system carrying RFID reader and data is read by the embedded system through the RFID reader. And the status of the bin is collected from by sensing.
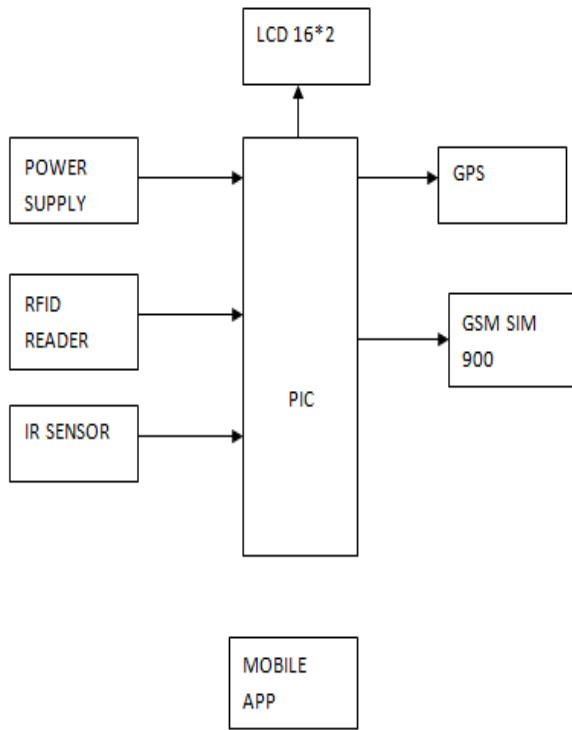
Fig-1: Block diagram of solid waste management system.

After reading the data controller verifies it for further processing of the system. If data is valid then the embedded system passes it to GSM, to send the message. After that, it sends the data to the GPS module via GSM to send SMS. The real time information will be provided with all the information of location and status of garbage level on the mobile app.

RFID Reader and Tag: In our proposed system the RFID reader are place on vehicle and RFID tag which are placed on every Bin in the area as shown in Fig-2. These RFID tags are having unique identification nos. The RFID reader will read the data from RFID tag and send it to microcontroller for further processing. RFID is used for radio frequency identification of any object at a distance or through a physical barrier. RFID output will be given to microcontroller.
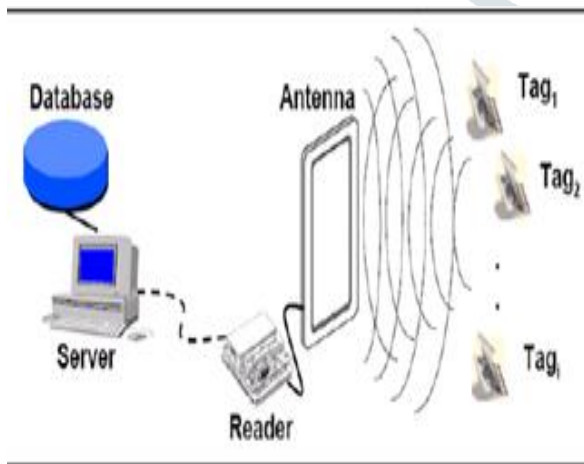

Fig-2: RFID reader and RFID tag.

IR sensor: Infra-red sensors work by using a specific light sensor to detect a select light wavelength in the Infra-Red (IR) spectrum. IR sensor will be placed in garbage carrying vehicle to detect the level of waste it contains.

PIC Microcontroller:
Microchip PIC18F5240 has been used in this system. It will take the input from RFID reader and process it in proper format and then send it to output via GSM to mobile app. GSM is at port number C_6 of transmitter and GPS is at port number C_7 at receiver of microcontroller whereas RFID is at port number RC_1 and RC_2 and IR sensor is given at port RA_1 and RA_2 of microcontroller.

GSM/GPS: In this system GSM sim900 is used. GSM is an open, digital cellular technology used for transmitting mobile voice and data services. In this system the message of location, latitude, longitude will be send via GSM. GPS is used for tracking device to track the location of truck carrying waste and send real time information to mobile app via GSM. The purpose of GSM is to send the information via SMS to the Governing System so that the monitoring is done properly and the effective action will be taken for the fast and productive action.

LCD: Liquid crystal display is used to display the message of real time information of waste collected. LCD used is of 16*2 with 16 characters and 2 lines. This display will be present on Truck for the formal information display.

Mobile App: Mobile app will give the all information related to collection and management of waste and the track route of waste vehicle on your mobile.

ALGORITHM:
1. The vehicle equipped with embedded system will come near the frequency range RFID reader.
2. RFID reader will read the data that is unique identification number from RFID tag.
3. RFID tag will respond to RFID reader.
4. The data will be passed from RFID reader to microcontroller.
5. Then microcontroller will send the message to GSM.
6. From GSM the message will be send to mobile app with all the information.
7.

III. RESULT
The results can be shown but the tabular way by the situation is considered and only it is described in theoretical way.

Case-1:
When the garbage vehicle equipped with the embedded system comes near to frequency range of RFID tag then microcontroller will read RFID unique identification number and message is send by GSM to authorized person on mobile app for information. If the waste is collected then IR sensor will detect the level of garbage and message will be send for the collection of waste.

Case-2:
If one of the waste bin get missed by the waste collecting vehicle then message will not be send and there will be driver authentication facility to provide the information about driver who missed that bin and the location of waste bin from which garbage is not collected will be shown on map of mobile app.

VI. APPLICATION
This system can further advanced by using robotic arm for automatic collection of garbage.
1. Other than garbage vehicles we can able to track the other vehicle carrying goods or something for real time information about it.
2. By using GPRS this system will operate in real time mode.
3. This system can be used in rural as well as in urban areas for proper management of solid waste.

4. This system also can be implemented in any other sector where real time tracking and real time information need to be collected.

V. CONCLUSION:

In this paper, a new method of E- tracking solid waste management has been proposed, the methods integrates communication technology to improve the solid waste collection efficiency. The implementation of the system with graphical user interface is contributed to provide data about the trucks and enhance the collection process. This proposed system would not only function for collecting and updating data automatically and timely, but also it could analyze and use data intelligently. The proposed system would solve a lot of problem related to solid waste collection, tracking, minimizing cost and accelerate the management.

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