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SOLID WASTE MANAGEMENT SYSTEM

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ABSRACT

Solid waste is one of the major problem in Indian cities. Most of the time as we see that the garbage bins being overfull and it creates unhygienic condition in the near by surrounding area. This creates pollution and spread diseases. There are number of techniques which are purposefully used for collection and management of garbage. This paper deals with development work for continuously monitoring and management of solid waste. By using proposed system, we will be able to monitor the solid waste collection, manage the transportation system and we can control the overall process automatically. Solid waste management is comprises in only four activities: waste generation, collection, transportation and disposal. We have focus on collection and transportation solid waste. This proposed system is an integration of ARM7, with various wireless communication technologies such as GSM, GPS, GIS. The ultrasonic sensor would be placed in garbage bin. When garbage reaches at a particular level of garbage bin, sensor gives indication to ARM7 controller. Controller will send message to nearest truck driver through GSM. To identify which truck is nearest to respective garbage bin, there will be tracking device on each truck which will collect location information of truck. This location information continuously transfer to central database through GSM. According to information available on central database, controller will decide the nearest truck driver, and send message to respective truck simultaneously controller will close the cap of garbage bin through motor.

Key Words: ARM7, Minimum route, Waste collection

INTRODUCTION

Now a days, solid waste has became a big social issue in many countries. An effective and robust system is, therefore, needed to maximize waste management efficiency through the monitoring of bin status contents and it surrounding areas, collecting time vehicle location(Latifah et al., 2009).

[1]The conventional waste collection and management approach has the following problems:
1) Lack of information about the collecting time and area.
2) Lack of proper monitoring system for tracking all activities related to solid waste management.
3) Lack of monitoring of the status of the bin.
4) Wastage of fuel as well as time.
4) Requires manual control.

Proper solid waste management is required for green and healthy environment. Growth in population, dense in residential area resulting in increasing waste due to which solid waste management framework becomes complicated. In conventional approach, many trucks collects the garbage then transfer their solid waste in specified location. However all above activities are not properly monitored and controlled.

Proposed system will avoid disadvantages of existing system such as wastage of fuel manual controlled of SWM system, lack of information about location of truck.

BLOCK DIAGRAM :

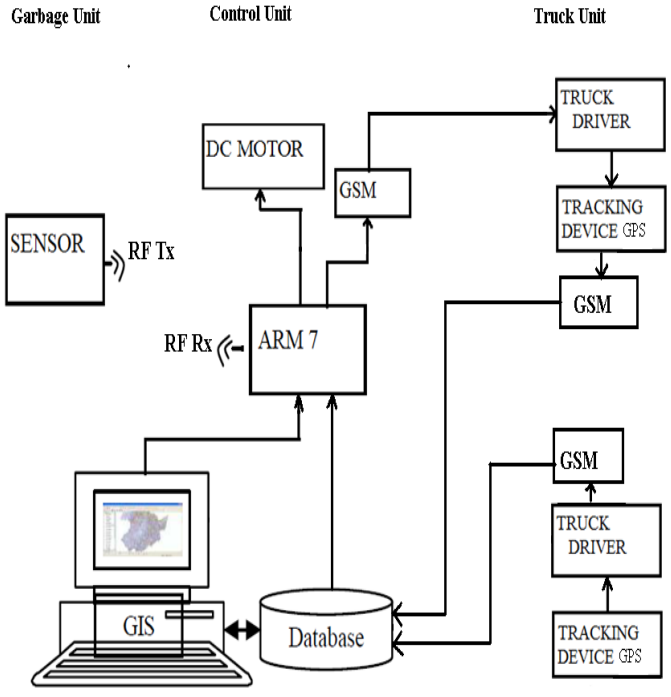

Fig 1: Block diagram

HARDWARE DISCRIPTION:

Input

The input to the sensor module would come from the waste bin which are placed at different localities in the public area.

Sensor

Ultrasonic sensor is used to measure the level of garbage in garbage bin. Ultrasonic sensors have an acoustic transducer which is vibrating at ultrasonic frequencies. The pulses are emitted in a cone-shaped beam and aimed at a target object. Pulses reflected by the target to the sensor are detected as echoes. The device measures the time delay between each emitted and echo pulse to accurately determine the sensor-to-target distance. When level of garbage reaches at particular threshold distance then sensor gives signal indication to ARM controller.

RF MODULE:

The RF module operates at Radio Frequency. The corresponding frequency range varies between 30 kHz & 300 GHz. This circuit utilizes the RF module (Tx/Rx) for sending sensor data to controller. RF module uses radio frequency to send signals. These signals are transmitted at a particular frequency and a baud rate. A receiver can receive these signals only if it is configured for that frequency.

CONTROLLER:

It is used to process information that is been given by the sensors. It compares the received data with the threshold level set and accordingly output is generated. After getting indication from sensor, controller will send the message to nearest truck driver.

The LPC2141/42/44/46/48 microcontrollers are based on a 16-bit/32-bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combine microcontroller with embedded high speed flash memory ranging from 32 kB to 512 kB. A 128-bit wide memory interface and a unique accelerator architecture enable 32-bit code execution at the maximum clock rate

GSM:

GSM is an open, digital cellular technology used for transmitting mobile voice and data services. Controller will send the message to truck driver through GSM module. The SIM900 delivers GSM/GPRS 850/900/1800/1900MHz performance for voice, SMS, Data, and Fax in a small form factor and with low power consumption. With a tiny configuration of 24mm x 24mm x 3 mm, SIM900 can fit almost all the space requirements in your M2M application, especially for slim and compact demand of design.

GPS:

GPS used as a tracking device to track the location of truck. To identify which garbage collection truck is nearest to respective garbage bin, There will be GPS mounted on each truck, Which will collect location information of truck. **GPS** receivers use a constellation of satellites and ground stations to compute position and time almost anywhere on earth. Notice the moving point on the globe and the number of visible satellites. At any given time, there are at least 24 active satellites orbiting over 12,000 miles above earth.

GIS:

A geographic information system or geographical information system (GIS) is a system designed to capture, store, manipulate, analyze, manage, and present all types of spatial or geographical data. Truck location information will be displayed on digital map, which is made available by GIS system.

RESULT AND DISCUSSION:

There were many system used for solid waste management:

MAHER AREBEY(2010) carried out study on SWM system which contains RFID, Camera and control unit placed in truck. In this system there is an integration of passive RFID, GPS tracking and low cost camera to enhance solid waste collection efficiency. It also provides real-time bin status, information of solid waste amount and time and location of the truck service[2].

M. A. HENNAN (2011) Carried out study on the method for management of solid waste. system consist of RFID, GSM, GPRS ,GPS with GIS. Implementation of GIS is contributed to provide graphical data about vehicle location. So this information can be use effectively which truck is near to respective garbage bin. So it reduces wastage of fuel and time[3].

SUYOG GUPTA(2015) Carried out study on the development of solid waste management system by integrating RFID tag with GSM to provide real time information of garbage from generation point to disposal point[4].

Table no 1: Literature review

Sr no.	PUBLICATION AUTHOR YEAR	ABSRACT	FINDING
1	International conference Hasan basri 2012	Paper introduces SWM based on RFID GPS, GPRS and WEB CAMERA	Efficient system for garbage management
2	IEEE paper Meher Arbey 2013	Paper introduce integration of RFID, GPS,GPRS,GIS.	Estimate the effective solid wast management
3	IEEE Paper R.A.Begam 2014	Introduces system i.e integrated with the level sensor, ARM 7, GSM, Zigbee	Fuel efficient and effective Method of SWM.

After reviewing the previous literature we come to know that previous SWM system has many limitation which includes:
1) When RFID is used in SWM there is need of RFID reader to come in range of RFID tag. So truck needs to come near garbage bin, there is wastage of fuel and time as well.
2) Some system needed that control unit have to place in each truck. So it increases requirement of number of control unit, ultimately result in increase in cost.
3) existing system uses Zigbee which limits the range of communication[5].
4) IR sensor has some limitation. IR can travel through short distances making it unsuitable for long range applications. Also, while IR mostly operates in line-of-sight mode.

To overcome above limitations, instead of RFID tag, reader and camera, we have used ultrasonic sensor with RF module to convey the status 0f bin to controller. We are using GSM for long range communication over Zigbee.

CONCLUSION:

In this paper, new method of solid waste management has developed to improve the performance efficiency of existing SWM system. By implementing this system one can keep environment clean by avoiding overflow of garbage. In this system there is no need of manual control and it also monitor the activities related to SWM. This system is fuel efficient and saves time as well.

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