IoT Based Garbage Monitoring System Using Arduino Microcontroller

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Abstract: The Internet of Things (IoT) shall be able to incorporate transparently and seamlessly a large number of different and heterogeneous end systems, while providing open access to selected subsets of data for the development of a plethora of digital services. One of the main concerns with our environment has been solid waste management which in addition to disturbing the balance of the environment also has adverse effects on the health of the society. The detection, monitoring and management of wastes is one of the primary problems of the present era. The traditional way of manually monitoring the wastes in waste bins is a complex, cumbersome process and utilizes more human effort, time and cost which is not compatible with the present day technologies in any way. This an advanced method in which waste management is automated. This project IoT Garbage monitoring system is a very innovative system which will help to keep the cities clean. This system monitors the garbage bins and informs about the level of garbage collected in the garbage bins via a web page. This web page also sends all information to garbage collection vehicles.

Index Terms – **Arduino, IoT, IR Sensor, UV Sensor etc.**

1. INTRODUCTION

Garbage Monitoring System: - Garbage may consist of the unwanted material left over from City, Public area, Society, College, home etc. This project is related to the "Smart City" and based on "Internet of Things" (IOT). So for smart lifestyle, cleanliness is needed, and cleanliness is begins with Garbage Bin. This project will help to eradicate or minimize the garbage disposal problem. The Internet of Things (IoT) is a recent communication paradigm that envisions near future, in which the objects of everyday life will be equipped with Arduino, transceivers for digital communication, and suitable protocol stacks that will make them able to communicate with one another and with the users, becoming an integral part of the Internet.

This paper IOT Garbage Monitoring system is a very innovative system which will help to keep the cities clean. This system monitors the garbage bins and informs about the level of garbage collected in the garbage bins via a cloud server. For this the system uses ultrasonic sensors placed over the bins to detect the garbage level. The system makes use of Arduino family microcontroller, LCD screen, GPRS for sending data and a buzzer. The system is powered by a 12V transformer. The LCD screen is used to display the status of the level of garbage collected in the bins. Whereas a cloud server is built to show the status to the user monitoring it. The cloud server gives a graphical view of the garbage bins and highlights the garbage collected in color in order to show the level of garbage collected. The LCD screen shows the status of the garbage level. This system helps to keep the city clean by informing about the garbage levels of the bins by providing graphical image of the bins via a cloud server.

2. LITARATURE SURVEY

A. Navghane S.S., Killedar M.S., RohokaleDr.V.M, IoT Based Smart Garbage and Waste Collection Bin, International Journal of Advanced Research in Electronics and Communication Engineering (IJARECE) 5(5) (2016).

The employees of Municipal Corporation often shows irregularity in inspection of The employees of Municipal Corporation often shows irregularity in inspection of dustbins of different areas as it made them to do a lot of manual effort. Hence to reduce their manual effort technology of IOT based embedded devices is used to introduce the smart garbage collection systems is that majorly have two units one is master unit to undertake allocation of work to available truck drivers for respective area and slave unit that keep record of all the garbage collection in different areas . However the task of allocation of work and keeping records is done with the help of a device equipped with these dustbins. These devices generally consist of sensors like weight sensor for getting level of dustbin, Arduino UNO board for controlling device functioning, and Wi-Fi module so that status of dustbin can be updated on government's web server .Further advancement is done in the system where the GSM module is used in addition, to above proposed system to introduce a feature according to which the device will send the message to the respective truck drivers when dustbin is

full for collecting garbage from respective area as well as ultrasonic sensor used in place of weight sensor for level detection . At some systems dustbin is equipped with RF transmitter which will send information regarding status of dustbin to central level having RF receiver at central level from where data is sent to cloud used further for presenting status of dustbin on respective server. To show the status of device,

B. Gaikwad Prajakta, Jadhav Kalyani, MachaleSnehal, Smart Garbage Collection System In Resedential Area, International Journal of Research in Engineering and Technology 04(03) (2015)

Smart cities should be equipped with basic infrastructure and technological advancements to provide better ambience and comfort for living. As an important aspect of smarter life, much cleaner and hygienic environment should also be assured. To ensure such a pristine environment, we have designed a project named "IOT based Garbage Management System for Smart Cities" with the help of Internet of Things (IOT) and cloud computing. In the GMS (Garbage Management System), a robot moves on the overhead rail which is constructed along the locality of the smart city. It carries a bin which collects waste from the people in that particular locality. The robot collects the waste and dumps it in the main bin placed at a safe distance from the locality, which when reaches a threshold point, intimates the concerned authorities to clear the waste from it LESS.

3. METHODOLOGY

A. *Existing System*

In the existing system, garbage bins are manually managed and it needs human effort to check every time. Monitoring and management of wastes is one of the primary issues in the cities. In the proposed system we have automated this process.

B. *Proposed System*

In the proposed system we have automated this process. Here we are using ultrasonic sensors and IR sensors which are fixed over the dustbins. When waste is filled in the bins the distance will be decreased between the waste and sensors. Every time it will check the level and calculates the distance. This live data is sent to Arduino. Arduino will process the data and send to the cloud server through GSM/GPRS. Through this webpage the user can access the data and plan

according to that; which bin needs attention and certain action will be taken to clean the bins. By using cloud server to show the date-to-date up dation.
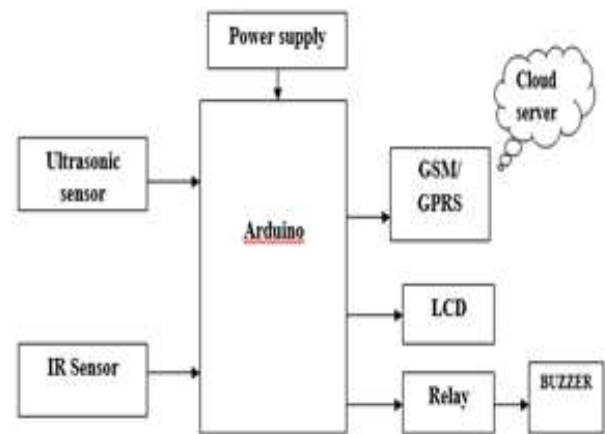
Fig.1 Proposed Block diagram

It consists of ultrasonic and IR sensor, GSM/GPRS, LCD, Relay , buzzer, Arduino board, power supply, by using ultrasonic and IR sensor to determine waste

4. EXPERIMENTAL RESULTS

Fig.2 Hardware Equipment

The hardware equipment consists of transformer, voltage regulator, Arduino board, GSM/GPRS, Relays, Ultrasonic sensors, IR sensors, Buzzers, LCD, connecting Wires, patch cards and dustbins. Connect the power supply to Transformer it converts 230V ac to 5v dc and it is given to voltage regulator. It is needed to keep voltages within the prescribed range .This is connected to Arduino board and GSM. In Arduino the program can be dumped from arduino IDE software, it connects to LCD, GSM, voltage regulator, and it is given to relay circuit. it is used to control the circuit operation. and connect buzzer ,through the dust bin. place ultrasonic and IR sensor top of bin . If the bin is full greater than 80% it indicates buzzer sound and send SMS to GSM through the mobile. By using thingspeak.com it shows the day-day filling of bin.

Fig.3 Output of Garbage Monitoring System

Fig.3 shows the output of garbage monitoring system with hardware and software requirements. By dumping the code to hardware component Arduino. The program of an garbage monitoring system is dumped and it will shows the output. The location based garbage monitoring system means we have to our predefined locations and monitoring it.

Fig.4 Cloud SERVER Performance

Fig.4 shows the cloud server output performance. After duping the program of Arduino board, the link in program is thingspeak.com/channels/1006425. This can be copied into chrome it will shows the results in above figure.

5.   CONCLUSION

This paper is an integrated system of Ultrasonic sensor, controller and GSM/GPRS. Ultrasonic sensor will give the readings more accurately, it is introduced for economic and efficient garbage collection. By implementing this project we can avoid the overflowing of trash bins in residential areas which will prevent many diseases and hence we can maintain a clean environment. This system will automatically send the notification to the municipal corporation. The proposed system is more efficient and practical then the existing scenario of processing solid waste collection in which everything is manually done. Every smart dustbins will be given a specific ID number which will be send in the notification by using that we will get to know the location of dustbins. This system will reduce the wastage of fuel by reducing number of trips of garbage collection vehicle.

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