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IOT based - Solid Waste Management Using GSM and Arduino

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Abstract: *Internet of things(IOT) is technology that is offering promising solutions to modernize the traditional way of living .In the present scenario, in India garbage system is done by humans. To accelerate the efforts to achieve universal sanitation coverage and to put focus on Swachh Bharat Mission we are going to present a scheme on solid waste management system which is based on IOT ,by using Arduino and GSM .Here, we are using sensors for detection which is Ultrasonic sensor ,for communication we are using GSM. When threshold value is reached ,it will send message to the GCA(Garbage Collector Agent) and control room. After receiving message vehicle were sent for cleanup of overflow bin.*

Keywords: *IOT, GSM, SWM (Solid Waste Management)*

I. INTRODUCTION

Phenomenal growth of population and expansion of the municipal limits have hugely impacted the cleaning arrangement for the city and disposal of garbage ,which is together described as Solid Waste Management(SWM).

In India 2-October,2014 Narendra Modi announced clean Mission launched by government of our country. This mission involves 4041 cities for infrastructure of country. Annual increase in waste generation is around 5%annually at present. India produces 42.0 million tons of municipal solid waste annually at present.[1].Correct management is required to avoid these conditions.

Due to traditional use of trash bin cleaning there were several drawbacks as follows:

Few times garbage collectors don't reach on time due to which odour was caused and also result in several diseases.

Some special days for example , public holidays ,festivals. They get filled faster and need cleaning. The proposed work illustrates the smart waste management that ensures cleaning up of trash bins when the trash gets filled up by sending messages to the garbage collector.

II. RELATED WORKS

- A. Insung Hong et.al [2] outlines that use of RFID garbage collecting system helps to improve their energy efficiency up to 16% and can reduce the food waste reduction .They have installed SGBs(Smart Garbage Bins) to control the energy efficiency of the system.
- B. Rachael E.Marshall et.al [3] outlines that the smart waste management system figure in the high salaried countries and developing countries.
- C. Jose M. Gutierrez et.al [4] proposed the working of smart city and the use of a smart waste management.It uses IOT for sensing the waste level in the dustbins, processing the data and sending it to the server.This process is carried out by the Geographical Information system.
- D. Sivasankari et.al [5] outlines the smart waste management using Wireless Sensor Network to collect the waste.This will also display the level of the bin .
- E. Asim Zebet.al [6] outlines smart waste management using wireless sensors and minimum route coverage .It makes use of maintenance algorithms,end-to-end delay techniques.

III. PROPOSED MODULE

A. Ultrasonic Sensor

An Ultrasonic sensor is a device that can measure the distance to an object by making use of sound waves.It measure distance by sending out sound wave at a specific level of frequency and listening for that sound wave to bounce back.Two ultrasonic sensor were placed at an angle of 120 degrees from each other for wider area so that whole area get covered or else we can use individual one.

B. Arduino Microcontroller

Arduino is an open-source platform used for building electronics projects. It consists of both a physical programmable circuit board and a piece of software, or IDE (Integrated Development Environment) that runs on our computer. It is used to upload computer code onto the board. It does not need separate pieces of hardware in order to load new code onto the board - we can simply use USB cable. It uses a simplified version of C++.

C. Breadboard

It is a solderless device for temporary prototypes with electronics and test circuit designs. Used to create one-of-a-kind systems. In our project we have used breadboards for connecting wires.

D. Jumper Wires

A jumper wire is an electrical wire with a connector or pins at both ends. Jumper Wires were used for making connections between items on breadboard and Arduino header pins.

E. GSM Module

The GSM Modem is a mobile communication modem; it stands for global system for mobile communication (GSM). The GSM is an open and digital cellular technology used for transmitting mobile voice and data services. In this scenario, we are using this for establishing communication when a dustbin gets filled up it will send messages.

IV. WORKING

We are placing the whole circuit at the top of the dustbin. This circuit consists of two ultrasonic sensors so that it can cover the whole area, a GSM module. Ultrasonic sensors transmit and receive pulses continuously to the dustbin and echo pulses reflect back to the ultrasonic sensor whenever there is an object in front of the sensor. So, the ultrasonic sensor continuously checks the level of garbage in the dustbin. If the trash is not exceeding its maximum limit, it cyclically checks the distance. When the level of trash reaches particular threshold values, now the indication is given by the ultrasonic sensor to the Arduino Uno and the GSM will send a message.

V. CONCLUSION AND FUTURE SCOPE

This project work is the implementation of a solid waste management system using an ultrasonic sensor, GSM, and an Arduino microcontroller. This is assuring the cleaning of trash bins when the garbage level reaches its maximum, a message is sent to the authority and garbage picker. It helps to keep cleanliness in an efficient way. GSM helps in sending the message. In the future, we can upload our data to the cloud and we can easily access it from anywhere.

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