Garbage Monitoring System using GSM

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Abstract:
With increase in population cleanliness with respect to garbage management is degrading continuously. It creates unhygienic condition for the people and creates bad smell around the surroundings which leads to spreading of some deadly diseases & human illness. This requires a necessary step towards economical urban development. So by using the emerging technologies, smart cities are being developed all over the world which would also include smart waste management system. This paper proposes such a system “Garbage Monitoring System Using GSM”. We are designing the system based on Arduino for monitoring garbage from particular area to avoid pollution, unhygienic condition, bad smell, etc. In the proposed system the level of garbage in the dustbins is detected with the help of Ultrasonic sensors which are interfaced to the Arduino. Arduino will be programmed in such a way that when the dustbin is being filled, the remaining height from the threshold height will be displayed the detected garbage level is communicated to the authorized control room through GSM Module. Micro-controller is used to interface the sensor system with GSM system. So continuous monitoring of garbage bins will keep the environment clean.

Keywords: Arduino Uno, GSM Modem, Ultrasonic Sensor,

I. INTRODUCCION

Due to a tremendous increase in population, rapid urbanization, developing countries lack awareness towards waste management which creates huge health issues. Proper management of waste materials is important to maintain healthy and hygienic environment to live. It has been estimated that India generates about 60 million tonnes of trash every year.10 million tonnes garbage is generated in just metropolitan cities like Delhi, Mumbai, Chennai, etc. CPHEEO, a department under the Ministry of Urban Development estimated that the total amount of waste generated in India is approximately 1.3 pounds per person everyday in the United State (U.S.) [7]. But the U.S. population was approximately 307 million in July 2009, whereas India’s population was 1.2 billion. These statistics shows that India is generating almost 27 million more tons of waste than the U.S. every year [8]. To avoid overflow of garbage in many areas a smart garbage management system is developed in this paper. Global system for mobile communication (GSM) is the latest trend used now a day and so is used for our project. In this project, smart bin is built on a microcontroller based platform Arduino Uno board which is interfaced with GSM modem and Ultrasonic sensor. The main control unit consists of the Arduino, it will receive the output signal of sensor, process it and according to that it will send the message to office user. Ultrasonic sensor is placed at the top of the dustbin which will measure the stature of the dustbin. The threshold stature is set. Once the garbage reaches the threshold level ultrasonic sensor will trigger the GSM modem which will continuously alert the required authority until the garbage in the dustbin is squashed. Once the dustbin is squashed, people can reuse the dustbin. At regular intervals dustbin will be squashed. Once these smart bins are implemented on a large scale, by replacing our traditional bins present today, waste can be managed efficiently as it avoids unnecessary lumping of wastes on roadsides.

II. LITERATURE REVIEW

[1] City Garbage collection indicator using RF(Zigbee) and GSM technology. This paper gave the details for the module required for the transmission of the data to the receiver side and also the main channel follow of the project.

[2] In waste been monitoring system using integrated technologies by Kanchan Mahajan the sensor is placed in the garbage bin at the top level, if that level is crossed by the garbage in bin, then it will be sensed by sensor and communicated to ARM7 controller through Zig Bee technology, which overcomes the limits of wired connection systems.

[3] Smart Garbage Management System by Vikrant Bhor, Pankaj Morahkar, Maheshwar Gurav, Dishant Pandya uses infrared sensor for garbage detection but we’ll be using the ultrasonic sensor since it is more reliable, as the infrared sensors values seem to fluctuate a lot in different light conditions.

[4] Garbage and street light monitoring system using internet of things by Prof.R.M.Sahu, Akshay Godse, Pramod Shinde, Reshma Shinde includes garbage as well as street light monitoring which helps in avoiding accident during night as well as monitors garbage.

[5] A Novel Approach to Garbage Management Using Internet of Things for Smart Cities in addition uses GUI, which is developed to supervise the desired information related to the garbage for various selected locations.

III. METHODOLOGY

Smart bin is built on Aurduino board platform. It is interfaced with a GSM modem (SIM 900A) and the bin is equipped with Ultrasonic sensor (HC-SR04).

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The specifications of all modules are enlisted one by one in detail in the following subsection.

### 3.1 ARDUINO UNO

The main control unit consists of Arduino Uno. The output signal of the sensor is given to it. The program is written on the Arduino software. The Arduino Uno board used for programming includes Microcontroller Atmega328. This Microcontroller is a high-performance 8-bit AVR RISC-based microcontroller.

### 3.2 ULTRASONIC SENSOR

An Ultrasonic sensor is a device that can measure the distance to an object by using sound waves. It measures distance by sending out a sound wave at a specific frequency and listening for that sound wave to bounce back. The ultrasonic sensor has two pins: Trigger and Echo, which are used for calculating the distance of the object by generating sound waves and thus calculating the time duration of the echo that is generated.

### 3.3 GSM MODULE

A GSM module is basically a GSM Modem (like SIM900) connected to a PCB with different types of output taken from the board.

A GSM modem is a specialized type wireless modem that works with a GSM wireless network. It accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. In this project GSM 900 modem is used to send the messages. It consists of a GSM/GPRS modem with standard communication interfaces like RS-232 (Serial Port), USB, so that it can be easily connected to the other devices.

### IV. IMPLEMENTATION

Ultrasonic sensor is used to detect the level of the garbage in the dustbin. The output signal of sensor is in analog form, it is necessary to convert it into digital signal. This signal is given to the main control unit i.e. Arduino. Arduino reads the data from sensor and process it. ECHO and TRIGGER pins of sensor are connected to digital pins of Arduino board. When the dustbin is filled, the output becomes active low. This output is given to microcontroller to send the message to the Control room via GSM module. Interfacing is done between GSM module and Arduino board by connecting RX pin of module to TX pin of board and vice-versa. As soon as an SMS alert is received, the concerned authority can order the workers to clean the filled bins on time without allowing them to overflow.

### V. FLOWCHART

![Flowchart](image)

### VI. CONCLUSION

This paper shows the implementation of smart garbage Management system using Ultrasonic sensor, microcontroller and GSM module. This Smart Dustbin can contribute a lot
towards clean and hygienic environment in building a smart city. The cleaning of dustbins is assured as soon as the garbage bin gets filled. If the dustbin is not cleaned at the right time then a report will be sent to the higher authorities. It also helps in saving the fuel by reducing the number of trips of the garbage collecting vehicle as it would only come to collect the garbage when the bin reaches its maximum level. By implementing this proposed system the cost reduction, resource optimization, effective usage of smart dustbins can be done.

VII. FUTURE ENHANCEMENT

We can add GPS modem to this project; hence it will help to track the position of dust bin. In future it can also be implemented with a time stamp in which a person will be showed the time at which the dustbin gets full and the time at which garbage is picked. Also, the use of solar panels in such system may reduce energy consumption.

VIII. REFERENCES


[7]. “Trash Plant: India”, by Marian Look earth911B.

[8]. Feature of “Solid waste Management Project”.