Smart Dustbin for Smart City using Solar

Mohd Javed[1], Akhilesh Kumar[2], Kamaljeet Verma[3], Poornendu Mishra[4], Rajat Singh Yadav[5], Saroj Kumar[6]

[1,2,3,4,5]Student, IMS Engineering College, Ghaziabad, Uttar Pradesh
[6]Assistant Professor, IMS Engineering College, Ghaziabad, Uttar Pradesh

ABSTRACT

This paper offers a new method for the garbage collection by garbage level detection. This study has been undertaken to investigate the garbage level in different levels by using smart dustbins. In the modern age, Urbanization has increased tremendously. At the same phase, there is an increase in waste production. Waste management has been a crucial issue to be considered. So, inspired by the Swachh Bharat Mission, we developed a Smart Dustbin which will sense the position of human and automatically opens the lid of the dustbins. It monitors the garbage bins and informs about the levels of garbage collected in the garbage bins via sending SMS to the cleaning staff and supervisor of the Municipal Corporation. Once the garbage reaches the threshold level ultrasonic sensor will trigger the GSM modem which will continuously alert the cleaning staff and supervisor until the garbage in the dustbin is squashed. Foul smell from the rotten wastes that remain untreated for a long time, due to the negligence of authorities and carelessness of public may lead to long-term problems. [1] So 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 the roadside and keeps the city clean.

Keyword: *GSM, GUI, Wi-Fi, LED, SPL.*

1. INTRODUCTION

In the present era, to protect the environment is our first priority. Nowadays due to global warming, there are abrupt changes in the atmosphere. There is a sudden increase in temperature which extremely affects the animals & their habitat. In this paper, the smart bin is built on a microcontroller-based platform Arduino Uno board which is interfaced with GSM modem and Ultrasonic sensor. One ultrasonic sensor is used for the position sensing of the human for opening the lid of the dustbin and another ultrasonic sensor is used to sense the height of the garbage in the dustbin and compare it with the garbage bin depth. The system makes use of Arduino, GSM module for sending a message, servomotor to open the lid, buzzer, LED as an indicator and Solar panel of the street light. The system is powered by a 12V battery which gets charged by a solar panel. When the level of garbage crosses the set limit, the system puts on the buzzer. Once the garbage reaches the threshold level ultrasonic sensor will trigger the GSM modem which will continuously alert the cleaning staff and supervisor until the garbage in the dustbin is squashed. This system uses the solar panel of the street light as the power source which is the advantage of this project. A 12 V battery is also used in this system for the power supply which gets charged via a solar panel. In bad weather condition, the battery is used as a power backup.

2. SYSTEM OVERVIEW

For communication purpose, Wi-Fi module can also be used in the transmitter section. Wi-Fi is a facility allowing computers, smartphones, or other devices to connect to the Internet or communicate with one another wirelessly within a particular area. The typical range of a common 802.11g network with standard equipment is on the order of tens of meters. While sufficient for a typical home, it will be insufficient in a larger structure. To obtain additional range, repeaters or additional access points will have to be purchased. Costs for these items can add up quickly. A GSM modem is a specialized type wireless modem that works with a GSM wireless network. [2] It accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone.
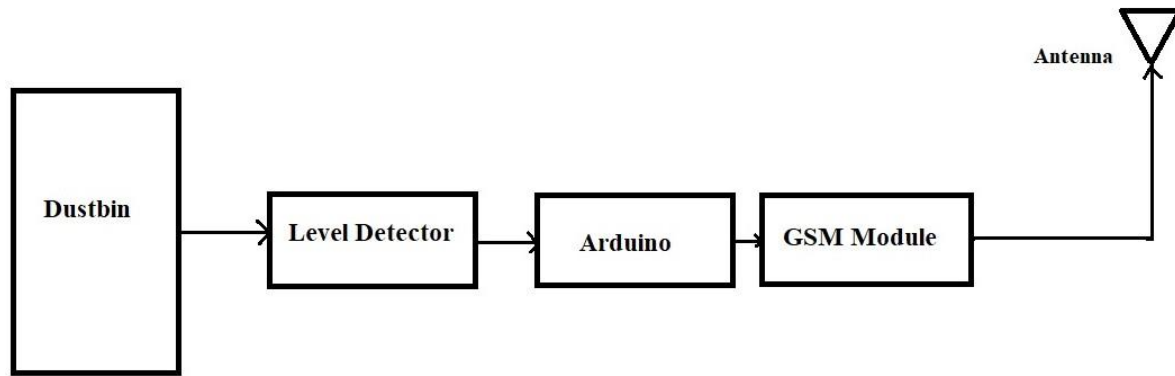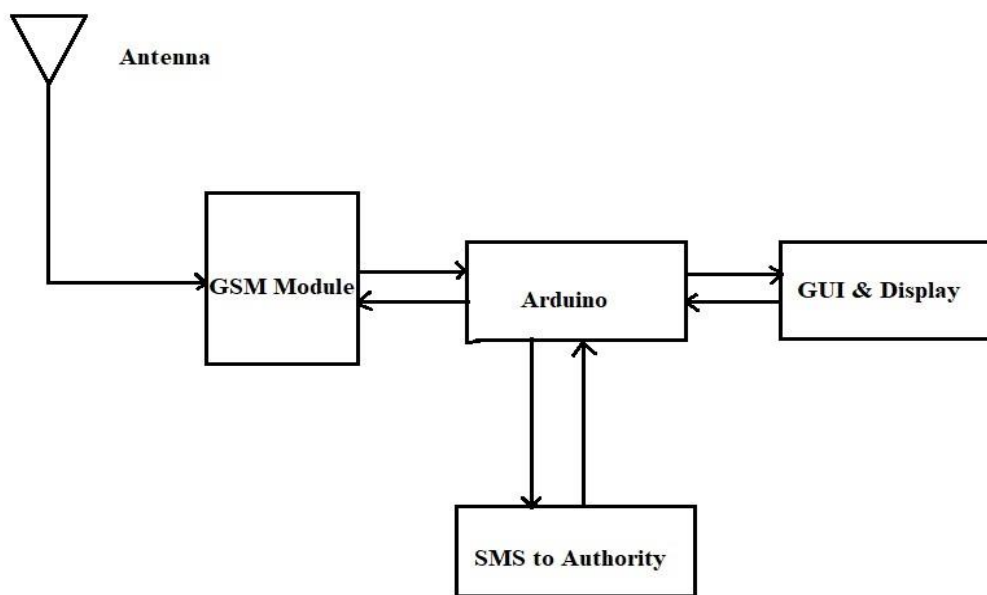
Fig-1: Transmitter part of Dustbin

Fig -2: Receiver part to the dustbin

3. HARDWARE AND SOFTWARE USED IN SYSTEM

Table -1: Hardware Used

Name of Hardware	Use of Hardware in proposed system and specification
Arduino Uno	To control and operate the system. It is connected to all the components of the system. Specifications: 32KB Flash memory, 1KB EEPROM, 2KB SRAM, 16MHz Clock, 14 Digital I/O, 6 Analog Inputs, 6 PWM Output Pins, 12C Bus, Serial Bus (Tx, Rx). [3]
Ultrasonic sensor	To sense the height of the garbage in the dustbin and compare it with the garbage bin depth. Supply voltage 5 v, Global Current Consumption 15 mA Ultrasonic Frequency 40k Hz, Maximal Range 400 cm, Minimal Range 3 cm, Resolution 1 cm, Trigger Pulse Width 10 µs, Outline Dimension 43x20x15 mm.
GSM Module	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. [4]

Buzzer	It acts as an alarm Operation Voltage: 3-5V DC, Current: <25mA, SPL: 85dBA/10cm Frequency: 2,300Hz, Operating Temperature: - 20° to +65°C
Solar Panel	PV solar panels generate direct current (DC) electricity. With DC electricity, electrons flow in one direction around a circuit.
Battery	12 V, 1 amp
Servomotor	Used to open the lid of the dustbin

Table -2: Software Used

Name of Software	Use of software in the proposed system
Arduino IDE	For Programming and Uploading the code to Arduino UNO Board, connected via USB cable to the computer.

4. CONCLUSIONS

This project work is the implementation of Automatic Garbage detection and Alerting system using the Ultrasonic sensor, Arduino Uno, Buzzer, GSM module & servomotor. This system assures the cleaning of dustbins soon when the garbage level reaches its maximum. It will take the power supply with the help of Solar panel. [5] If the dustbin is not cleaned at specific time, then the record is sent to the Sweeper or higher authority who can take appropriate action against the concerned contractor. This system also helps to monitor the fake reports and hence can reduce the corruption in the overall system. This reduces the total number of trips of garbage collection vehicle and hence reduces the overall expenditure associated with the garbage collection. It ultimately helps to keep cleanliness in the society. Therefore, the Smart Dustbin Using Solar Panel system makes the garbage collection more efficient.

5. ACKNOWLEDGEMENT

6. REFERENCES

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7. BIOGRAPHIES

Name: Mohd Javed

Year: 4th year

Branch: Electrical & Electronics Engineering

College: IMS Engineering College, Ghaziabad, U.P

Name: Akhilesh Kumar

Year: 4th year

Branch: Electrical & Electronics Engineering

College: IMS Engineering College, Ghaziabad, U.P

Name: Kamaljeet Verma

Year: 4th year

Branch: Electrical & Electronics Engineering

College: IMS Engineering College, Ghaziabad, U.P

Name: Poornendu Mishra

Year: 4th year

Branch: Electrical & Electronics Engineering

College: IMS Engineering College, Ghaziabad, U.P

Name: Rajat Singh Yadav

Year: 4th year

Branch: Electrical & Electronics Engineering

College: IMS Engineering College, Ghaziabad, U.P

Name: Mr. Saroj Kumar

Designation: Assistant Professor

Department: Electrical & Electronics Engineering

College: IMS Engineering College, Ghaziabad, U.P