

# A Smart Waste Bin for Waste Disposal

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## Abstract

Many times, in our city we see that the garbage bins or dustbins placed at public places are overloaded. It creates unhygienic conditions for people as well as ugliness to that Place leaving bad smell. To avoid all such situations, we are going to implement a project called Intelligent bin for waste segregation management. These dustbins are interfaced with ARDUINO UNO microcontroller-based system having Ultrasonic sensor detects the human presence and showing current status of garbage. Design and build a prototype for an automatic open dustbin that can automatically open the lid when it detects the human, using a manual switch and bluetooth we can also able open the lid. Major part of our project depends upon the working of the GSM module. When trash level increases more than 90% the a message is sent to the concerned authorities that it is filled. The main aim of this project is to reduce human resources and efforts along with the enhancement of a smart city vision.

**Index Terms-** ARDUINO UNO Microcontroller, Ultrasonic sensor, GSM Module, Power supply, Servo Motor, LED, Bluetooth, Switch;

## 1 INTRODUCTION

Following the onset of industrialization and the sustained urban growth of large population centers, the buildup of waste in the cities caused a rapid deterioration in levels of sanitation and the general quality of urban life. The streets became choked with filth due to the lack of waste clearance regulations. Waste management is all the activities and actions required to manage waste from its inception to its final disposal. This includes amongst other things, collection, transport, treatment and disposal of waste together with monitoring and regulation. It also encompasses the legal and regulatory framework that relates to waste management encompassing guidance on recycling etc. The term usually relates to all kinds of waste, whether



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generated during the extraction of raw materials, the processing of raw materials into intermediate and final products, the consumption of final products, or other human activities, including municipal (residential, institutional, commercial), agricultural, and social (health care, household hazardous wastes, sewage sludge). Waste management is intended to reduce adverse effects of waste on health, the environment or aesthetics. This is a project which proposes the solution for the waste removal with the IOT technology incorporated in Arduino.

In our system, the Smart dustbins are connected to the internet to get the real time information of the smart dustbins. In the recent years, there was a rapid growth in population which leads to more waste disposal. So a proper waste management system is necessary to avoid spreading some deadly diseases. Managing the smart bins by monitoring the status of it and accordingly taking the decision. There are number of dustbins are located throughout the city or the Campus

## **2 PROPOSED METHOD**

Developing a prototype for an automatic open dustbin that can automatically open the lid when it detects the people who want to throw out their trash. Using manual switch and Bluetooth we can also able to open the lid. If the dustbin is full of trash at the certain level, the lid will not open even when there are people who want to throw out their trash. When trash level increases more than 90% then we are sending a sms to the owner that it is filled. The bin is also monitored using LED's (green, yellow and red). If the green light is on then the bin empty, if the yellow light is on then the bin is in middle level, if the red light is on then the bin is full.

The main objectives of our proposed system are as follows:

- Monitoring the waste management.
- Providing a smart technology for waste system.
- Avoiding human intervention.
- Reducing human time and effort
- Resulting in healthy and waste ridden environment.

## **3 ARCHITECTURE**

A system architecture is the model that defines the structure, behavior, and more views of a system. An architecture description is a formal description and representation of a system, organized in a way that supports reasoning about the structures and behaviors of the system.

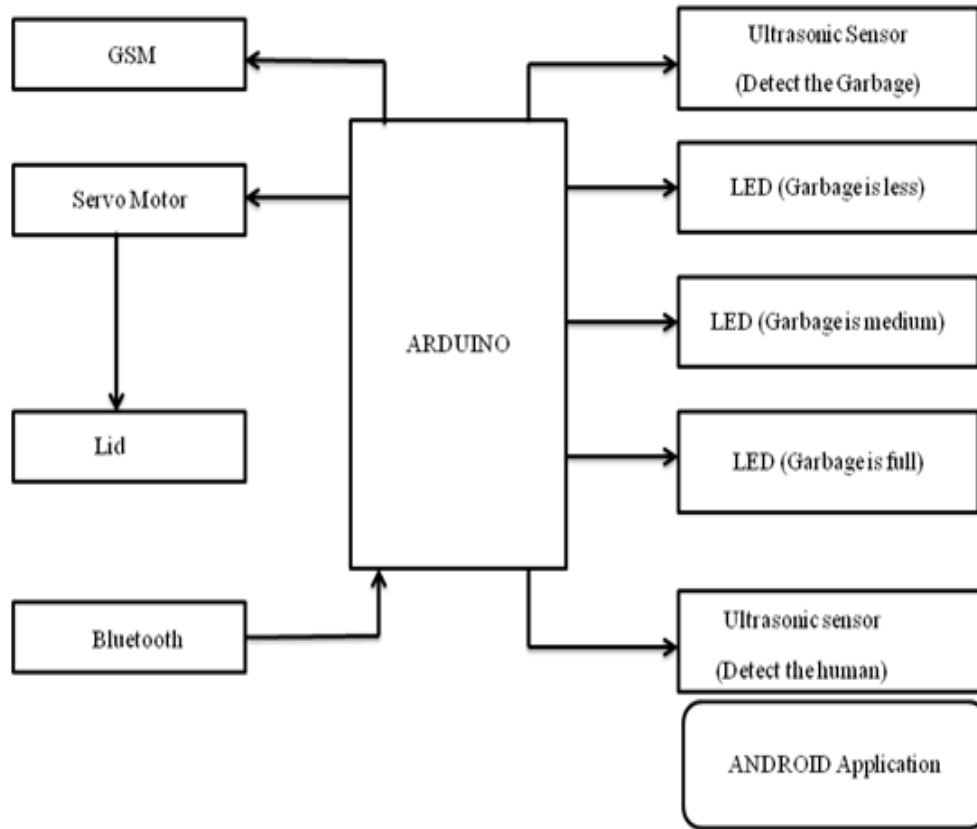


Fig 1: System Architecture

As in Fig 1 the various components integrated in the above architecture are:

**A. Ultrasonic Sensor**

It is used to detect the distances from obstacles thy col-lision can be avoided. It is based on the echolocation process. Transmitted sound waves bounced back and retrieved with some time difference that helps to calculate the distance. It is shown in Fig 2.

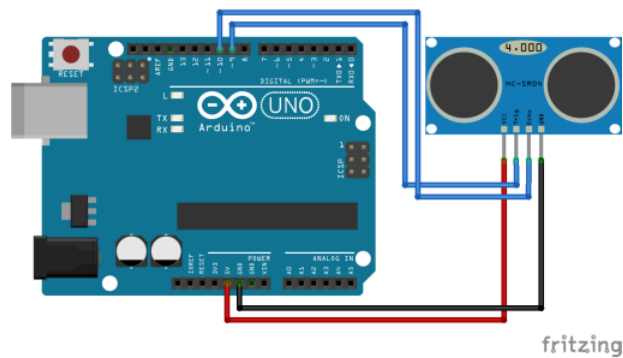


Fig 2: Connection of an Ultrasonic sensor

## B. Arduino UNO

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED.



Fig 3: Sample Arduino Uno

## C. GSM Module

The GSM module sends a message saying that the dust bin is filled along with the position i.e., latitude and longitude of the bin to the garbage collectors number. A notification will be sent to the user's application receiving which the app gets activated. Hence the waste management can be achieved in an efficient way.



Fig 4: Sample GSM Module

#### D. Status Indicator

Once the user logs in successfully he would be able to access the information like status and location of the bin. Two LEDs green and red will be placed on the bin. When the bin is filled or if the weight of the waste inside the bin exceeds a threshold value then the red LED is lit up. And the green LED is on when the bin is empty. The overall process information is being displayed on the LCD display.



Fig 5: Red LED is on when bin is filled



Fig 6: Green LED is on when bin is empty

#### E. Servo Motor

Servo Motor is used for automatic opening and closing of bin. The opening and closing of bin can be monitored using an android phone and manually with the help of switch. Hence the proposed model helps to a great extent in knowing the condition of Waste Bins

## **4 CONCLUSION**

In the entire world, waste management is a major challenging one. If it is not properly disposed or cleaned it might lead to inception of diseases and spoil the green environment. There is need of new mechanism to properly dispose the waste. Embedded Technology has been used to provide better garbage disposal method which can be implemented in urban areas. When bin is filled an authority receives a message to clean the bin.

## **5 FUTURE ENHANCEMENT**

The proposed model can be enhanced to include an image processing module wherein it can detect human existence around the bin. This can be further used to instruct them to dispose the garbage in a better way.

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