

## IOT Based Garbage Monitoring System

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Article Received: 29 August 2018

Article Accepted: 28 November 2018

Article Published: 21 January 2019

### ABSTRACT

Smart garbage waste management is essential to develop an efficient and dynamic waste management system. This research presents the implementation and execution of an integrated sensing system for solid waste bin to automate the solid waste management process. Several sensing methods have been integrated and have combined their verdicts that offer the detection of bin condition. 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 Smart garbage waste management 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 by ultrasonic sensor collected in the garbage bins via the internet to the municipality and the sweepers having garbage collection vehicles. If the bin pushed by any animals or other else, the garbage spreads in the places is sensed by MEMS and the information sent to the municipality and the sweepers. The load cell connected to the controller will weigh the weight of the garbage bin if heavy weight of dust blocks the entire space of bin and send the information to the respective monitoring unit. The microcontroller controls all the sensors and collects, shares the information given by sensors to IOT. The garbage bin closes automatically by the motor driver after dumping the garbage. This project can be used in the "SMART CITY". This project is also helpful in the government project of "SWACHH BHARAT ABHIYAN".

### 1. INTRODUCTION

Waste management problem is an actual problem both for the Russian cities and throughout the world. In every city there are special organizations and companies engaged in the collection and removal of waste in the special refusal places. All such companies manage waste disposal management according to the schedule or on demand of the customers. However, there are situations when the garbage collection truck (GCT) arrives but garbage containers are half-filled; at the same time the GCT does not arrive to the real full garbage container. This is due to the fact that manager does not take into account the real container fullness. As the population in our country is increasing day by day, tonnes of trash are generated. Improper management of waste affects quality life of the citizens. Thus, waste management is an important issue to be considered.

### 2. LITERATURE SURVEY

According to Kanjan mahajan, in waste bin monitoring system using zig bee and global mobile communication system (GSM).The sensors are place in the common garbage bins placed at the public place when the garbage reaches the level of sensors. Then that indicated will give in the indication to the driver by ARM 7 they sending SMS using GSM technology. The technology use by zigbee, Global Mobile System (GSM), ARM 7 controller. The range of communication of the zigbee is almost 50 meter. They use for range GSM Module, analysing the image we get an idea about level of garbage. The zigbee and GSM system would be able to monitor the solid waste collection process.

In this paper by BT winkle Sinha, A single directional cylinder is suspended next to the lid of dustbin. The piston is free to move up and down vertically inside the dustbin to a certain level. A plate is attached to the cylinder for

compressing the garbage. The shape of this plate depends upon the shape of the dustbin. The compressing plate consists of a side hole through which the leaf switch is suspended upside down. This technology use piston, switch, microcontroller, the single directional cylinder, smart dustbin. Only use for smart dustbins, they are not provide garbage collection. Smart dustbins can prevent the accumulation of the garbage along the roadside to a great extent thereby controlling the widespread of many diseases. It can prevent pollution and also prevent the consumption of the spread out garbage by the street animals.

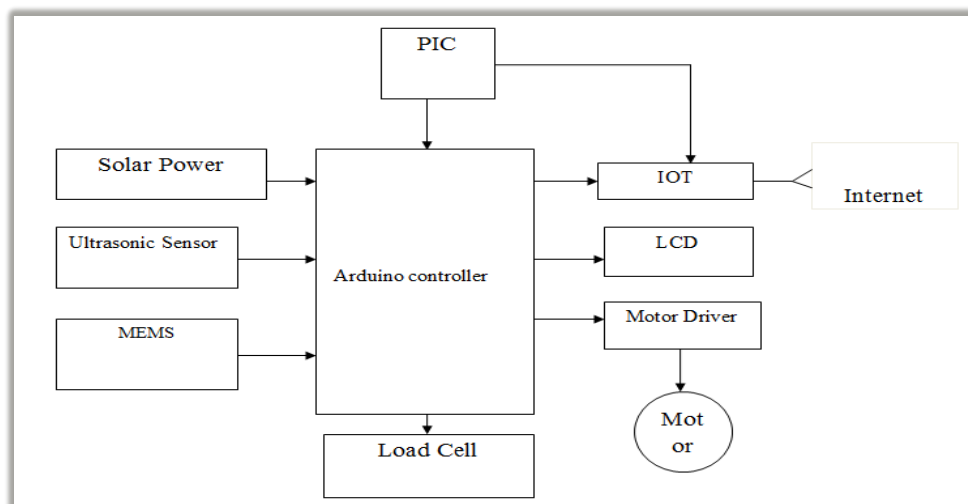
The paper consists of three modules namely smart trash, truck, corporation office. The trash consists of two sensors namely IR and gas sensors. The IR sensor placed inside the trash sense the level of trash and gas sensor will sense the toxic gases. The ZigBee placed inside the trash will intimate about the overflowing of trash to the corporation office. The ZigBee placed at corporation office is serial interfaced with PC. The visual display is coded with VB coding. From the corporation office the information regarding the removal of trash is sent to the respective area truck and it will be displayed in LCD. The ZigBee placed at the truck intimates the driver about the location of the field trash.

### 3. PROPOSED SYSTEM

The proposed system consists of a dustbin with has three sensors namely ultrasonic sensor, load cell, memes. Ultrasonic sensor is used to measure the level of the trash in dustbin and load cell is used to measure the weight of the trash and MEMS is for fall detection. Once the dustbin is filled with trash it is indicated in LCD display and the message will be transmitted to the corporation office through IOT. And the main feature of this system is that the dustbin will be closed automatically once it is filled with trash so that we could avoid spillage of wastes. The dustbin is provided with the solar panel as the energy source.

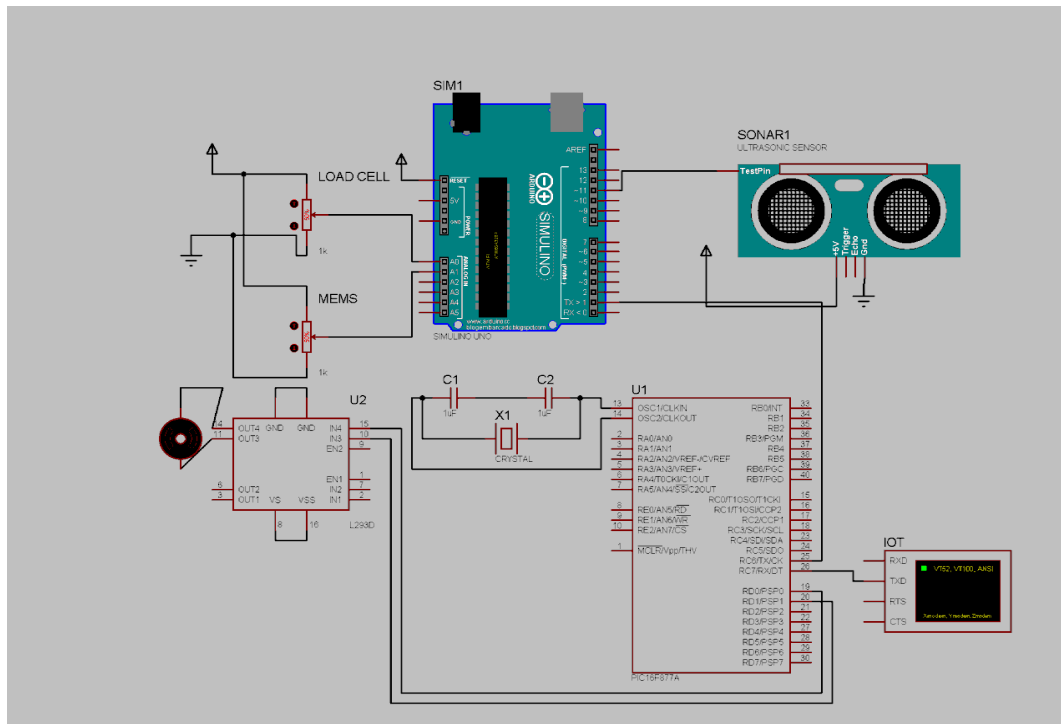
#### 3.1 BLOCK DIAGRAM

The following are the components of the block diagram, Arduino microcontroller, Pic microcontroller, Ultrasonic sensor, Load cell, MEMS, Solar panel, Iot kit, Motor driver, Motor.



**Fig no: 1** Block diagram

### 3.2 CIRCUIT DIAGRAM



### 3.3 WORKING

Once we are ready with our hardware and code, plug the IOT board to the power supply and switch on the circuit. After the garbage is filled with particular level ultrasonic sensor will indicate that the “GARBAGE IS FULL”. Once the dustbin gets filled with more than 40 KG weight sensor indicates that the “DUSTBIN IS OVERLOADED”. If the animals or the people pushes the dustbin down it would cause the garbage spillage to avoid that condition we have kept memes which indicates the “FALL DOWN”. So these information’s are collectively updated in the website through IOT in corporation office so that workers could dispose it as soon as possible.

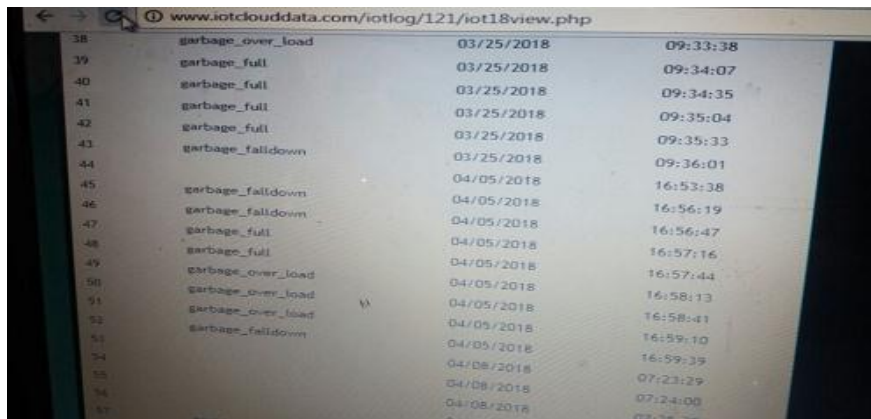
### 4. RESULT AND DISCUSSION



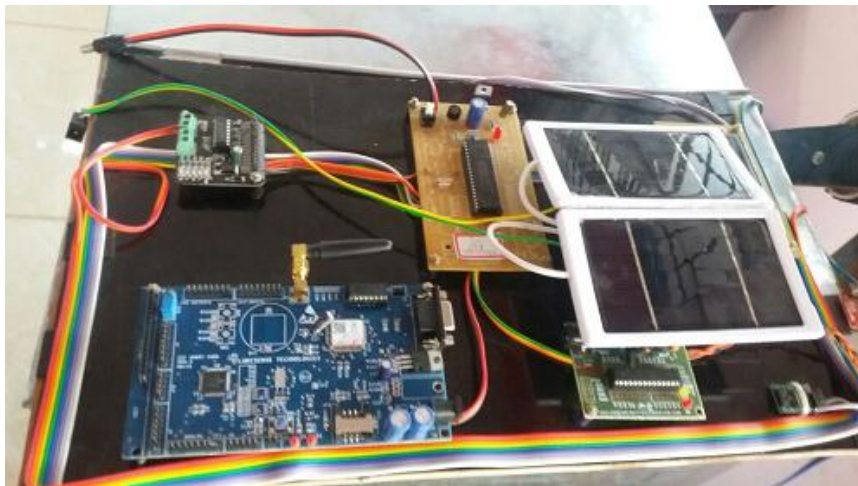
Once the level of the garbage is full, That information is sensed by the sensors and it will passed to the controllers and that indication will be displayed in the LCD display.



The mems sensor detects the fall detection and that indication will be given to the controller. If the dustbin falls any of the side, the mems sensors detects and that information will be displayed in the LCD.



The information given by the sensors will be passed to the controller and the indication will be given in the LCD display. Also the information will be send through the IOT that will be displayed in the above figure.





The overall view of the project is shown in the above figures, after the dustbin gets filled the lid will close automatically and the results will be displayed in the LCD display.

## 5. CONCLUSION AND FUTURE WORK

The complete design of the dustbin is given, the circuit for the automatic locking system is simulated and the desired results are obtained. Due to his human effort is reduced because automatically the level is displayed .So it is not necessary to check it manually. Solar panel is implemented so that the wastage of electricity during day time is stopped. This system will reduce the wastage of fuel by reducing number of trips of garbage collecting vehicle. In our project we have developed an efficient waste management system. We have used various sensors to indicate if the bins are filled. Once the dustbin is filled the information is passed to head office (or) main center through IOT. The level of the dustbin is also displayed, and the lid of the dustbin is closed automatically. This system is highly efficient and cheap and that's why it's affordable.

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