

# International Journal of Innovative Research in Science, Engineering and Technology

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## E-Cleaning Waste Management System

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**ABSTRACT:** In day to day life, one the most important thing is to manage the domestic garbage in the cities. Overflowing garbage bins which are placed at public places pollute the environment and are source of many deadly diseases. The situation is worst at some of the places in under developed countries. To solve this problem, we are proposing the work using the concept of Internet of Things (IOT) “Based Waste Management for Smart Cities”. We are using multiple dustbins located throughout the city or the Campus. These dustbins are provided with low cost embedded device which helps in tracking the level of the garbage bins and a unique ID will be provided for every dustbin in the city so that it is easy to identify which garbage bin is full. When the level reaches the threshold limit, the device will transmit the level along with the unique ID provided. These details can be accessed by the concern authorities from their place with the help of Internet and an immediate action can be made to clean the dustbins and make the city clean and garbage free.

**KEYWORDS:** Ultrasonic sensor, Wi-Fi module, Buzzer, Power Supply.

### I. INTRODUCTION

After doing surveys and interacting with MCD (MUNICIPAL COORPOTRATION DEPARTMENT), we got to know some terrible facts that monitoring and managing of waste is cumbersome task to perform on daily basis especially in metro cities where tons of garbage is generated. Garbage which is overloaded in the bins produces foul smell, giving rise to a lot of diseases here arises an urgent need of developing a “GARBAGE MONITORING SYSTEM” which can handle the situation intelligently before it's too late to handle large tones of garbage. This system monitors the garbage bins and informs about the level of garbage collected in the bins via a web page and concern authorities can excess this web page through their account which can be login anytime and can monitor the status of the bins. In case bin is completely filled an alarm is generated. For instance, if garbage bin gets completely filled the authorities could send concerned person to empty it so that bin is ready to use again.

### II. RELATED WORK

It is important to understand the societal concerns over the increased rate of resource consumption and waste production and therefore till now IR sensor used to monitor garbage level through the depth of bin. RF is used for communicate between trash bin unit and control room unit. The massage is received at control room unit as bin gets filled completely.

In the proposed work we use ultrasonic sensors placed over the bins to detect the height of the bin which is being display on LCD as well as on the website. The system make use of AVR family microcontroller, LCD screen, Wi-Fi modem for sending data and creating hotspot so that live and updated monitoring can be done easily. The authorized person can create an account on this website and get a USER NAME AND PASSWORD. This username and password is used for login into the website. Web page shows the status of the bins to the user. The web page gives a graphical view of the garbage bins and highlights the garbage collected in bins in order to show the level of garbage collected.

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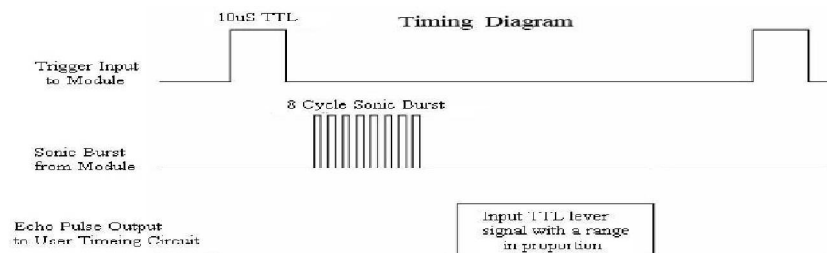
The LCD screen shows the height of the bin to which level it is filled. This system also puts on the buzzer when the level of garbage collected crosses the set limit. Thus this system assist to keep the city clean.

### III. WORKING

#### Ultrasonic Sensor

It uses IO trigger for at least 10µs high level signal. It sends automatically eight 40 KHz echo and check whether there is pulse signal back or not. If the signal is back through high level time of high output IO duration is equal to the time from sending ultrasonic to returning.

$$\text{Test distance} = (\text{high level time} \times \text{velocity of sound (340m/s)} / 2).$$



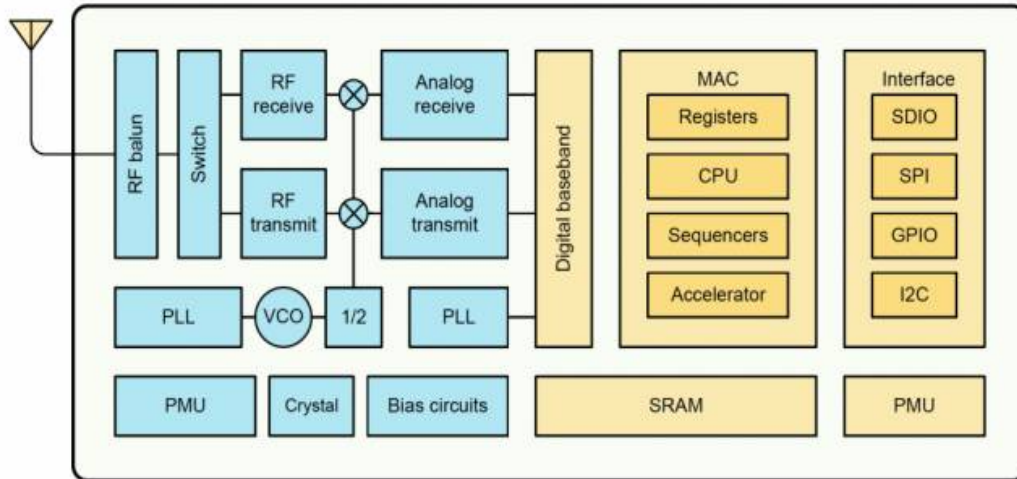
**Fig. 1** Timing diagram of the ultrasonic sensor

In the graph it is shown that how 10µs trigger is generated of high signal. After trigger, eight 40 KHz pulses are generated. If the signal is back through high level, distance is calculated accordingly.



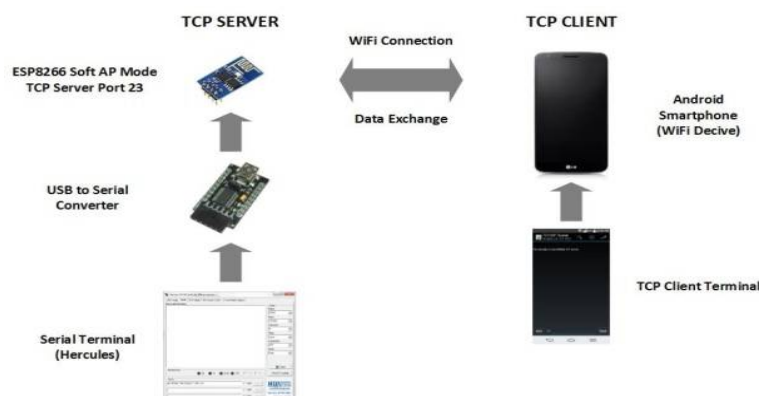
**Fig. 2** Ultrasonic Sensor

In this project, we are using ultrasonic sensor to find out the level of garbage in the bins. The height of the each bin is measured in cm. It is displayed on the LCD. As the bins start filling, it compares with the actual height and then displays the decreasing height of the bin on the LCD.



**Fig. 3** Block diagram of ESP8266.

ESP8266 has been designed for mobile, wearable electronics and Internet of Things applications with the aim of achieving the lowest power consumption. The power saving architecture operates mainly in 3 modes: active mode, sleep mode and deep sleep mode. By using power management techniques and logic to power-down functions not required and to control switching between sleep and active modes, ESP8266 consumes about 60µA in deep sleep mode (with RTC clock still running) and less than 1.0mA (DTIM=3) or less than 0.5mA (DTIM=10) to stay connected to the access point. When in sleep mode, only the calibrated real-time clock and watchdog remains active. The real-time clock can be programmed to wake up the ESP8266 at any required interval. The ESP8266 can be programmed to wake up when a specified condition is detected. This minimal wake-up time feature of the ESP8266 can be utilized by mobile device SOCs, allowing them to remain in the low-power standby mode until Wi-Fi is needed.



**Fig. 4** Connecting ESP8266 with server.

For interfacing Wi-Fi module, we required serial terminal that is Wi-Fi module is connected with USB to serial converter. Wi-Fi module in AP mode work as a server, through Smartphone or laptop we can access this server by creating a hotspot and can exchange data with the server. In this project, we are using Wi-Fi module for creating a server which is giving regular updates of the bins through a website. First we create the hotspot by putting its SSID and

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password. Then we open the website, login into it through our account and can see the graphical representation of all the bins.

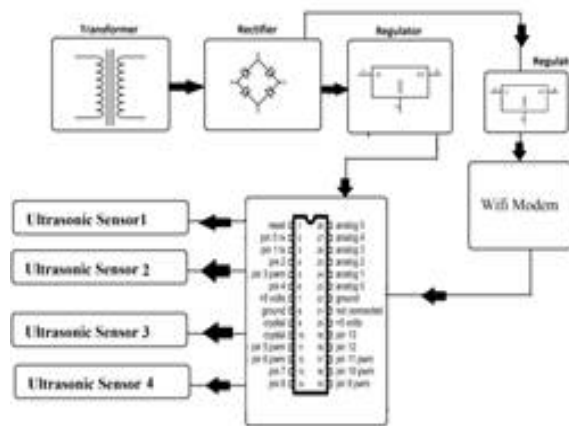


Fig.5 Block diagram of the circuit.

We are using, AVR family microcontroller atmega328p, and Wi-Fi module ultrasonic sensors. All the four ultrasonic sensors are connected with ADC of the microcontroller. Wi-Fi module is connected with the Rx and Tx of the controller.

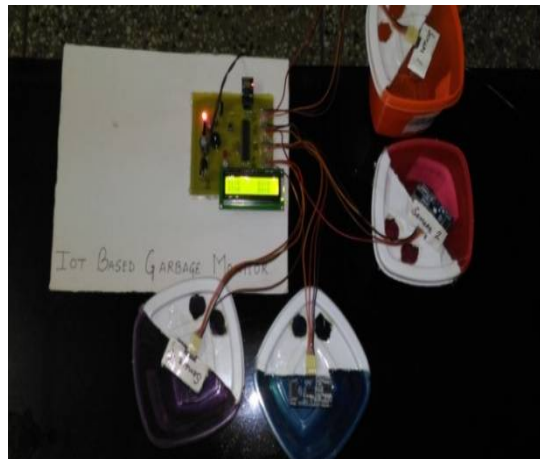


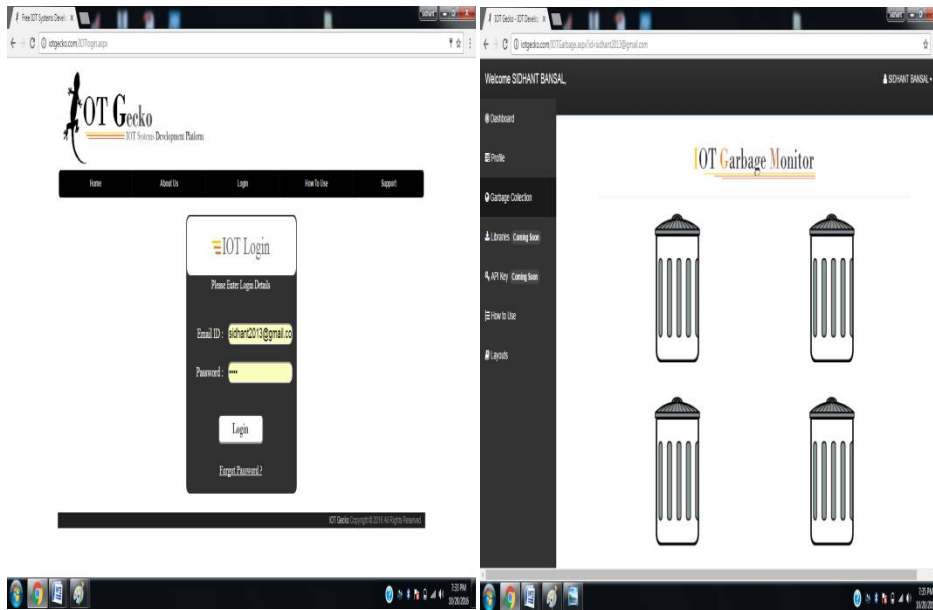
Fig.6 Hardware view

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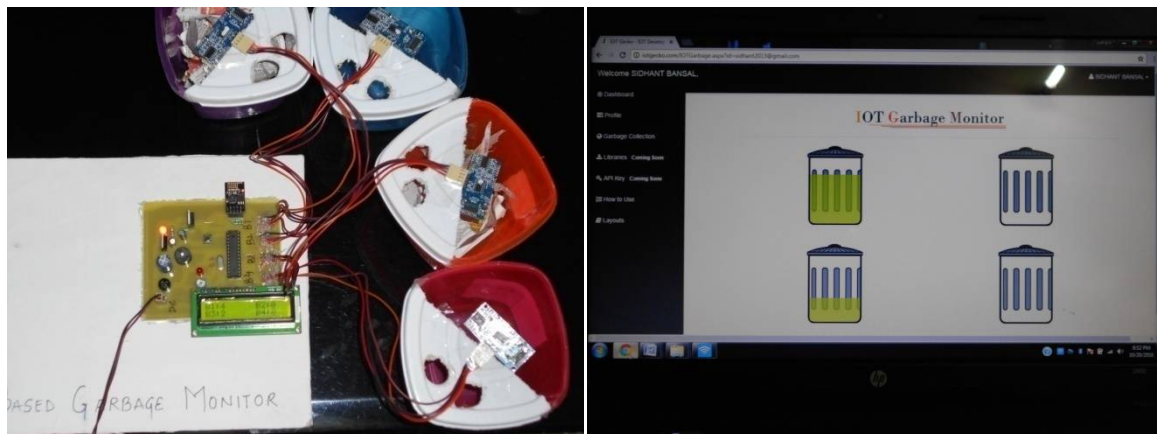
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**Fig. 7** Website (a) login page (b) All the bins are empty

We are using a website name *iotgecko* for this purpose. As you go to this website you can make your account there. A user id and password will be generated, this is used for login into the website and monitors the bins. After login we can see that all the bins are empty.

### LCD View:



**Fig.8** (a) All the bins are at 0cm (b) Bins those are filled.

As bins starts filling, concern person is able to see it on website at what level it is filled easily. If bins cross the limit, an alarm is generated and that bin can be made empty.

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## III. RESULT

We are using a website name 'iotgecko' for this purpose. As you go to this website you can make your account there. A user id and password will be generated; this is used for login into the website and monitors the bins. After login we can see that all the bins are empty. As bins started filling, concern person is able to see it on website at what level it is filled easily. If bins cross the limit, an alarm is generated and that bin can be made empty.

## IV. CONCLUSION

This project is very useful for the waste management authorities in the cities as they are able to monitor and manage waste effectively within due course of time. The main purpose of this system is to keep cities garbage free. It proved to be an intelligent system for waste management authority for effective handling and timely disposal of garbage.

## V. FUTURE SCOPE

- With the help of transmitter and receiver we can make ultrasonic sensor to work wireless. This will reduce the wire cost.
- With the help of website we can make the record of the amount of the garbage produce monthly.
- Using GSM concern authorities can receive a message in case bin overflow.

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