

# Internet Of Things (IoT) Based Garbage Clearing System Nodemcu

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**Abstract:** Today world population is increasing, has led to tremendous degradation in the state of affairs of hygiene with respect to waste management system. The main concerns with our environment have been solid waste management. It impacts the health and environment of our society. It may cause numerous severe diseases for the nearby people. This will humiliate the appraisal of the affected area. The garbage monitoring and clearing are one of the primary problems of the present era. The present methods used for monitoring and clearing the garbage are time consuming process. They will take more human effort, time and cost which can easily be avoided with our present technologies. It requires 'smartness based waste management system. This paper is proposed IoT based garbage clearing system using NodeMcu. The garbage cleaning system checks the waste level over the dustbins by using Sensor systems. Once it detected immediately this system altered to concern authorized through SMS. For this system used NodeMcu as an interface between the sensor system and SMS server. To monitor and integrate an IP based web server is developed for the desired information which is related to the various level of waste in different locations. This is used in the greenish in the environment and support for Swatch Baharat for cleanness.

**Keywords**— WiFi Wireless network, NodeMCU, SMS Server, Internet of Things (IoT), HTTP Post.

## 1.INTRODUCTION

Presently many existing expertise mechanism are available for handling as well as managing garbage. But, there is lacking for gathering information is a major challenging task. This miscommunication will affect the fast national growth rate in dense suburban area and also it is increasing demand for urban ecological protection. This is a major Challenging in waste management system to create a prototype because the lack of coordination among government, people and local authority for shipping and processing waste. Currently the waste gathering is conventional which acquire a lot of labors and is time overwhelming process.

In Bengaluru kind of city affected a cruel garbage crisis since August 2012 onwards, as two dumpsites in the suburbs of the urban were close by villagers against weakening the ecological and health situation. The municipality came to be idle as huge kind of garbage put down spotted on lane and open plot cross urban. The crisis condition pressed the Bruhat Bengaluru MahanagaraPalike (BBMP) to make amend in route near sustainable devastate organization exercise. The BBMP determined to impose waste parting and distribute waste processing to redirect squander left from the landfills and endeavor. During which BBMP initiated and gave emphasis on many programs such as Information Education and Communication (IEC) campaign and Wake-Up Clean-Up Campaign. IEC campaign was established to endorse waste isolation at base.

The "KasaMuktha" ward program was started by BBMO for wide opportunity in learning and communication to extend the knowledge about waste isolation from the starting place then pass on message to the people about the innovative technology about the garbage gathering and clearance from their area. The government had made a public awareness through daily and electronic media for cleanness program. This program was theoretical exhibition about the waste management by bringing in cooperation all the people including administration authority, mass producer, business place, NGOs and ecological association, firm squander specialist, service contributor and society at outsized in to one stage and construct great size agreement about sustainable dissipate organization exercise.

Internet of Things (IoT) is an ecological unit of associated corporal substance which is reachable during the internet. The 'thing' in IoT could be physical devices with sensor capabilities which are capable to send information through IP address and ability to communicate information to base station automatically. This technology helps the object interrelate with inner and outer side, in revolve involve the choice chosen. Internet of Things is able to interact in various systems over internet. The objects can embody digitally which can be operated or monitored around the world. This will help the people who can confine extra information from different places which is guarantee for increasing effectiveness and recuperating protection and defense. In this project work bring

new direction for integrating IOT for green environment by cleaning the garbage.

**2.PURPOSE**

Internet of Things (IoT) garbage clearing system using NodeMcu is cost effective device for garbage clearing. This system does is it gives a real

time indicator of the garbage level in a waste bin at any given time. Using the data from smart device, we can then optimize waste collection routes and ultimately reduce fuel consumption. It allows garbage bin collectors to plan their daily/weekly pick up schedule.



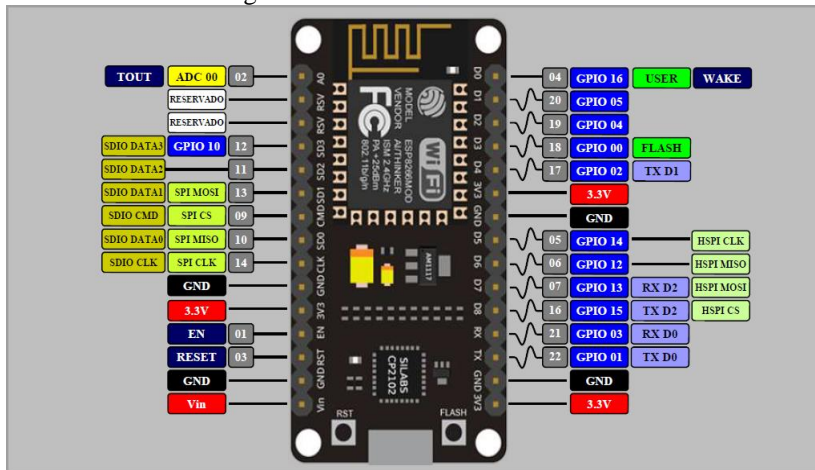
**Figure 1: IoT based Garbage clearing system**

**3.HARDWARE USED**

**A. NodeMCU**

NodeMcu consist of both microcontroller and Wi-Fi module on single chip. It can be configured as router or station mode. When NodeMcu hosts the application, it is able to boot up directly from an external flash. It has integrated

cache memory to improve the performance of the system, and to minimize the memory requirements. With the Wi-Fi station mode, wireless internet access can be added to microcontroller-based applications with simple connectivity through UART interface.



**Figure 2: NodeMCU.**

**B. Ultrasonic Sensor**

Ultrasonic sensors are used for distance measuring system. These sensors regularly transmit a short burst of ultrasonic sound to a target, which

reflects the sound back to the sensor. The distance measuring system then measures the time for the echo to return to the sensor. It computes the distance

to the target using the speed of sound within the medium.



Figure 3: Ultrasonic Sensor

**Features: Ultrasonic Sensor**

- Input Supply voltage: 5V (DC).
- Input Supply current: 15mA.
- Transmit Modulation frequency: 40Hz.
- Output voltage: 0 – 5V (Output high when obstacle detected in its range).
- Transmit Beam Angle: Max 15 degree.
- Maximum measurable Distance: 2cm – 400cm.

- Accuracy in distance: 0.3cm.
- Communication: Positive TTL pulse.

**C. Force Sensor**

The Force sensor acts as a force sensing resistor in an electrical circuit. When the force sensor is force free, its resistance is very high. When a force is applied to this, there is a proportional decrease in resistance. It is used to measurement of loads.



Figure 4: Force Sensor

**Features: Of Force Sensor**

- Force sensor sizes: Max=20''x24''  
Min=0.2''x0.2''.
- Force sensor Device thickness: 0.008'' to 0.50''.
- Force sensor force sensitivity range < 100g to >10kg
- Force sensor temperature range: -30C to +70C

**D. Wi-Fi Router**

A wireless router is an electronic device. It performs the functions of a routing. It also includes the functions of a wireless access point. It also used to provide access to the Internet or a private computer network.

**Wi-Fi Router Features:**

- High Capacity Load Balancing
- Scalability
- Network Management System
- Role Based Access Control
- Indoor as well as Outdoor coverage options
- Ability to Measure Performance
- Network Access Control
- Ability to communicate with both 2.4 GHz devices and 5 GHz devices

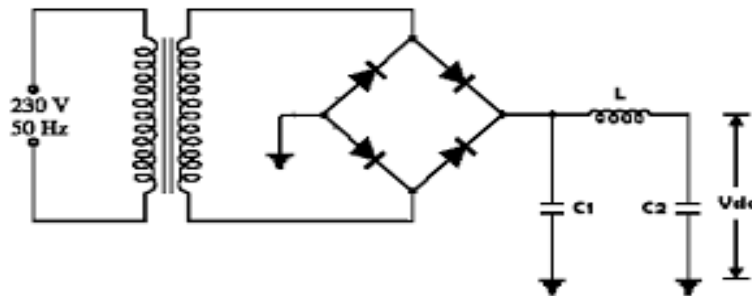


**Figure 5: Wi-Fi Router**

**E. Regulated Power Supply**

A regulated power supply is an embedded circuit. It converts unregulated AC into a constant

DC. Rectifier converts AC supply into DC. Its function is to supply a stable 5V, 1Amp.



**Figure 5: Regulated Power Supply**

**F. Sms Web Server**

SMS Web Server is an application programming interface (API). It uses standard internet protocols. SMS Web Server is completely vendor, platform and language independent, enabling multiple methods of connection.

Hosted at this .NET web service allows external users to connect via HTTP or SOAP, send, receive and monitor messages

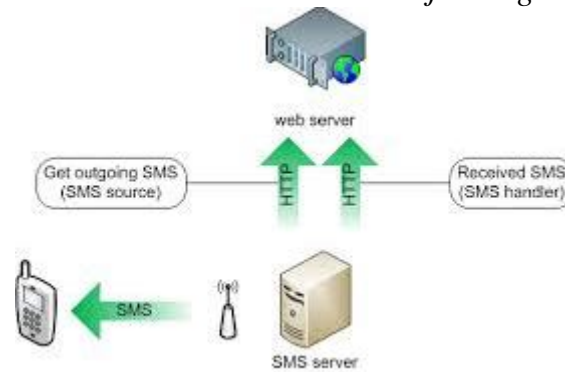


Figure 6: SMS WEB SERVER

#### G. Led Indicators

A light-emitting diode (LED) is a semiconductor light source that emits light when

current flows through it. These are used for the status of the system and waste Bin

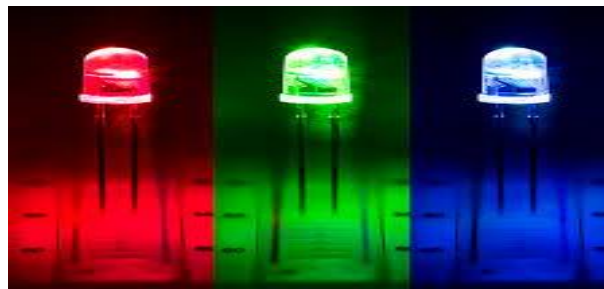


Figure 7: LED INDICATORS

### 4. IoT Based Garbage Collector

In the proposed system, the level of garbage in the dustbins is detected with the help of Ultrasonic sensor. Force sensor is used to measure the weight of the garbage bin. When the measured value of sensors exceeds a certain threshold value Then red led becomes ON (i.e.it indicates dustbin is filled else green led is ON) this information with Google maps location where the dust bin is located is communicated to android device through SMS Server. Android device will detects, in which area dustbin is located, by comparing coordinates and updates the location and inform the respective vehicle to collect the waste. NodeMcu is used to interface the sensor system with SMS Server. This will help in managing the garbage collection efficiently.

BelalChowdhury, Morshed U Chowdhury explained, an RFID is used to provide a specific identity to the bins. Each house bins have been assigned with a unique RFID, using which the administrator of the municipal area can detect the amount of waste generated from the particular house. The RFID (Radio Frequency Identification) along with cell sensor technology is mitigated waste management costs and facilitated smart waste management systems. Waste management administrators can assign an RFID waste tag to take away from bin and this is totally password protected which ensure data security. The administrator is able to search for a particular client or house number or write the aadhar card number to the waste tag using the “Write to Waste Tag” button.

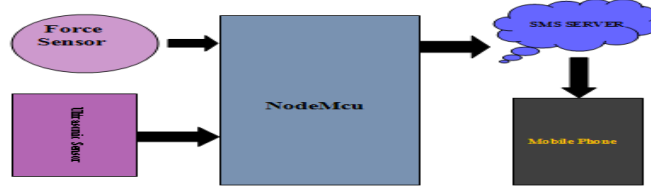


Figure 7: Block diagram of Garbage Clearing System

**H. Motivation**

The key motivation is in achieving efficiency in at the national level. The organization is inadequate to address the existing identified problems in garbage clearing. There is no community participation towards management of garbage clearing and sanitation. Effective guideline garbage clearing must be provided to the public according to the regional requirements and constraints. This job can be done by NGOs present in the area. In order to maintain clean and hygienic environment in the area around us, we are using the technology for better garbage monitoring system.

**5.SYSTEM IMPLIMENTATION**

The system is implemented with the help of different modules which are explained in this section.

**I. User settings**

- The user opens the web page with 192.168.4.1 IP address, after successful connection with correct system SSID and password.
- He has to enter Correct Router SSID and Password which has external internet.
- User has to provide authorized person mobile Number and Geo-Location using Google Maps.  
Tirumala Engineering College Geo Location from Google maps  
<https://goo.gl/maps/DiotwVKkw3T2>



Figure 10: User Setting page

**J. Status Indicators**

- Once the user login successfully he would be able to access the information like status and location of the bin to mobile and IP address.
- 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.



Figure 11: Status Indicators at bin

**K. SMS**

The Web Server 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.

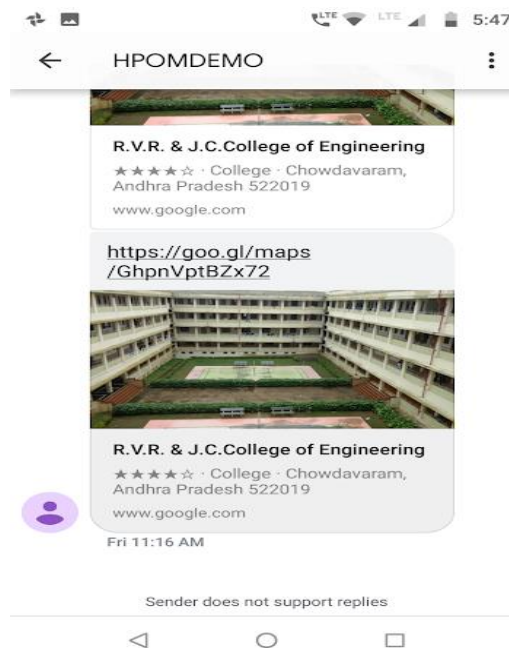


Figure 12: SMS received from system

**6. RESULTS AND DISCUSSIONS**

The hardware components should be connected properly and the Wi-Fi Router should be placed near to Bin to provide signals to NodeMcu. When the user clicks on the Map button, he will be taken to the Google Maps where the location of the bin is displayed.

**7. CONCLUSION**

In the entire world, garbage cleaning is a major challenging one. If it is not properly disposed or cleaned which will cause a lot of diseases and

spoil the green environment. There is a need for a new mechanism to properly dispose of waste. In our project, we have developed an efficient garbage cleaning system. Technology is used to provide better garbage disposal methods in urban areas. We have used sensors to indicate if bins are filled or empty. When filled, a truck driver receives a message to clean the bin. This system eliminates the current day status about bins, which are most of the time in a pathetic situation regarding being full of garbage without being cleaned. We have also developed an IP Address based web server and an Android application through which the user can change settings to his preferred location. This gives a direct connection where every citizen is

doing his part in maintain a clean environment around him. A web server is also been set up through which the municipal authorities also get information about the garbage bins in their area.

### 8.FUTURE WORK

This paper is providing lot of opportunity for improvement and future scope. In this project, the following enhancements can be made.

- This project is made for demo concern; it can be taken to product level
- It can be made durable, by making it compact and cost effective
- All the components and controlling unit can be embedded on the bin
- Two bins can be placed to collect wet and dry waste separately. Wet garbage can be decomposed and used for making biogas.
- In future we can design android application to find the nearest bin to users

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