

# Smart Garbage Monitoring System using Ultra Sonic Sensor and Node MCU

Y. Nithish, D. Sreekar Varma, L. Pavan Koundinya, B. Sekahr Babu

**ABSTRACT:** Waste oversight economy will be a standout amongst the exceptional issues that the globe confronts in any case of the case about formed or Creating country, the way issue inside the waste management is that those junk bin's In the open spots gets overflowed great ahead in the recent past the beginning of the cleaning methodology. It thus prompts Different dangers for example, terrible smell & offensiveness to that spot which might make those root reason for spread from claiming Different illnesses. Will evade every last bit such perilous circumstances and look after government funded cleanliness and wellbeing this worth of effort may be mounted around a sensible trash framework. That fundamental subject of the worth of effort is to create an sensible canny trash following framework for An right waste administration. The Trash can is equipped with the ultrasonic sensor and a Node MCU micro controller. The ultrasonic sensor attached to the bin will check the status of the bin, that is whether the bin is full or not. The whole system is connected to the Wi-Fi router nearby using the Node MCU and Arduino IDE, once the ultrasonic sensor detects that the level of the bin as full, the level of the trash can is displayed on the webpage thereby intimating the local authorities to empty the bin. Thus, the system can help in increasing overall productivity and cleanliness. To facilitate the entire system a website is developed which is equipped with three core modules such as Data monitoring, Data viewing and Data analysis. Each module facilitates the entire system to operate.

**Keywords:** Node MCU, Ultra Sonic and level sensor, Wi-fi

## I. INTRODUCTION

The unstoppable number blast need prompted an enormous build in preparation from claiming crude materials also consumable end-user items. The measure for waste produced will be straightforwardly proportional of the creation. Since the era from claiming declines can't make controlled anytime soon, those just elective is canny waste management polishes. The set characteristic assets have proficient techniques What's more frameworks for reusing and preparing of the wastes to a better, cleaner earth. Urban areas need aid getting to be progressively mindful of the issues identified with routine systems for waste accumulation. In General, waste might make characterized Likewise unwanted materials that would not prime results which would of no further essentials will a human to their real manifestation. Waste might be created Throughout the extraction or preparing from claiming crude materials, utilization for last results Furthermore mankind's exercises.

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**Y. Nithish**, UG Student, Dept. of ECE, KL University, Vijayawada, India

**D. Sreekar Varma**, UG Student, Dept. of ECE, KL University, Vijayawada, India

**L. Pavan Koundinya**, UG Student, Dept. of ECE, KL University, Vijayawada, India

**B. Sekahr Babu**, UG Student, Dept. of ECE, KL University, Vijayawada, India

They can consequently make ordered Similarly as modern waste, clinical waste, What's more down home waste. Shameful transfer about trash need a significant number dangers influencing every one manifestations of life prompting sully for air, water, What's more soil Also likewise reasons risky maladies for individuals. In spite of exactly movement need been taken starting with those administration against this, poor management for waste need prompted those emanation for greenhouse gasses. Risky wastes contaminate nature's domain to Different approaches. Actually in front of such wastes need aid securely arranged of, they contaminate those air, water, soil and likewise pose An risk will human term. Those way issue in the waste administration may be that the waste receptacle In the open spots gets overflowed great ahead of time When the beginning of the next cleaning methodology. It, clinched alongside turn, prompts Different dangers for example, awful smell & grotesqueness to that put which might a chance to be those root reason to the spread of Different sicknesses. On evade every last bit such unsafe situation Also look after general population cleanliness Also wellbeing this worth of effort is mounted with respect to An advanced mobile waste framework. Those principle topic of the fill in may be to create a advanced mobile shrewdly trash observing framework to a correct waste oversight economy utilizing Node MCU Also ultra nationalistic sensor. This project proposes an advanced mobile caution framework to waste freedom by providing for a caution indicator of the metropolitan powers for moment cleaning about dustbin with fitting confirmation dependent upon that level for trash filling.

## II. EXISTING SYSTEM

Traditionally, litter bins need aid exhausted toward sure intervals Eventually Tom's perusing cleaners. This strategy need a few drawbacks For example, exactly litter bins top off considerably quicker over the rate from claiming discharging Furthermore they are full when the following booked period to gathering. This prompts flooding from claiming dust bin's Furthermore postures cleanliness dangers. There would extraordinary periods (e. G. Festivals, weekends, Furthermore general population holidays) the point when certain litter bins top off verwoerd rapidly Also there may be An need to expanded accumulation intervals. It may be a test will administer a clean city.

## III. PROPOSED SYSTEM

The proposed system actively monitors the level of the trashcan using the ultrasonic sensor as shown the figure 1. The NodeMCU unit is used to link all the information collected from the ultrasonic sensor and the webpage.



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Therefore, with the above aid now the authorities can monitor the level of the garbage in the trashcan lively and empty the trash cans as soon as they are full, eradicating the hazardous problems and ensuring a clean environment.

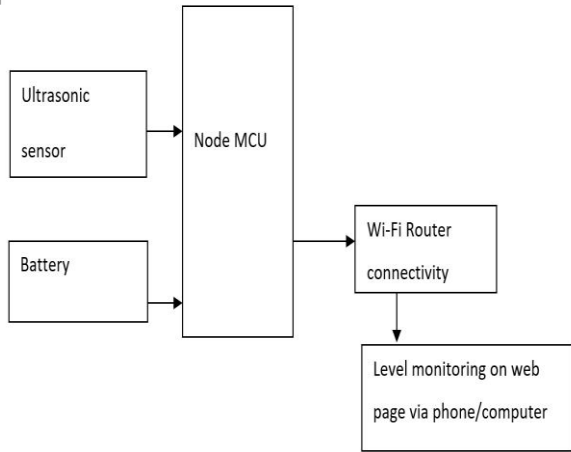


Figure .1. Flowchart of the system

## 3.1 Node Mcu V3(Esp2688 Wi-Fi Soc) And Its Configuration

Node MCU may be an open hotspot IoT stage. It incorporates firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, Also equipment which is dependent upon the ESP-12 module.

### 3.2 Pin Configurations

Knowing the pin configurations can help in writing programs that simulate the hardware with appropriate inputs and outputs as shown in figure 3.

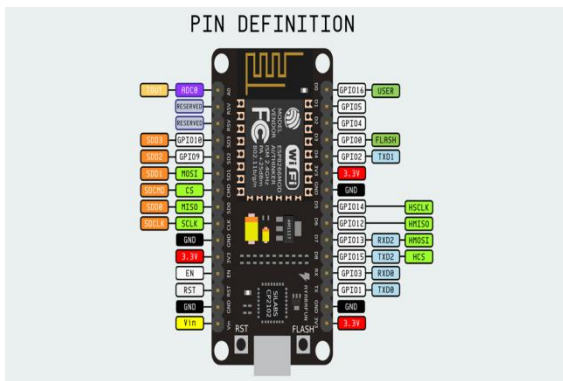


Figure .2. Pin Configuration of Node MCU

### 3.2 Ultra Sonic Sensor

The estimation of Trash can fill level should be possible by numerous methods, for example, estimating the separation between the top and waste substance level. Another conceivable estimation could be estimating the heaviness of the waste can by means of a heap cell (weight sensor). Anyway because of the way that junk substance could shift in nature, (for example, strong waste versus plastic or paper) estimating weight couldn't ensure a precise fill level. Along these lines estimating void space stays most common-sense approach to gauge the fill substance. It additionally streamlines the structure since all the hardware could be contained at one place, i.e. the highest point of waste can. That sensor leader produces An ultra nationalistic wave and

gets the wave reflected at the end of the day from those target. Ultra nationalistic Sensors measure those detachment of the destination Toward estimating the the long haul between those outpouring and gathering. Those trigger could a chance to be seen as an fundamental pulse that turns the sensor on, every the long run a detachment will be evaluated. It should last 10 smaller scale seconds. The resound is the yield flag. The length of the flag is relative to the separation estimated and is subsequently used to quantify the real separation. In our application, trigger is associated with the stick 5 (GPIO) and reverberate is associated with stick 6 (GPIO).

Knowing that, the distance can be calculated by:

$2 \times \text{Distance} = (\text{Echo Duration}) * (\text{Ultrasonic Velocity})$  Note that there is a 2 x factor in the equation. This is because the formula is used to measure the total distance travelled by the ultrasonic waves, hence it accounts for both directions of travel. Knowing that the ultrasonic velocity is of X m/s, the Distance can be calculated as in table 1.

$$\text{Distance} = (\text{Echo Duration}) * 17150$$

Pin Number	Pin Name	Description
1	Vcc	The Vcc pin powers the sensor, typically with +5V
2	Trigger	Trigger pin is an Input pin. This pin has to be kept high for 10us to initialize measurement by sending US wave.
3	Echo	Echo pin is an Output pin. This pin goes high for a period of time which will be equal to the time taken for the US wave to return back to the sensor.
4	Ground	This pin is connected to the Ground of the system.

Table.1. Ultrasonic Sensor Pin configuration

### 3.3 Connecting Node MCU (ESP8266) with Ultrasonic Sensor

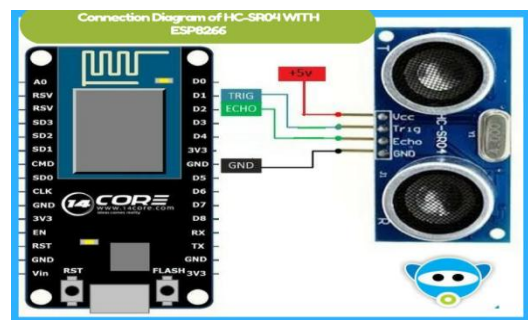


Figure .3. Connecting Arduino to NodeMCU

### 3.4 Arduino Integrated Development Environment

The Arduino incorporated improvement surroundings - or Arduino programming (IDE) - holds An content supervisor to forming code, a message region, a substance support, An toolbar for catches for ordinary capacities Furthermore An progression about menus. It interfaces with those Arduino Furthermore Genuino gear on exchange projects and talk with them. The NodeMCU board is associated with a PC by means of USB as in figure 3, where it interfaces with the Arduino improvement condition (IDE). The client composes the code in the IDE, at that point transfers it to the board which executes the code, cooperating with information sources and yields, for example, sensors, engines, and lights.

### 3.4. ESP8266 Wi-Fi Library

ESP8266 is all about Wi-Fi. We connect ESP8266 module to Wi-Fi network to start sending and receiving data. The Wi-Fi library for ESP8266 has been created dependent on ESP8266 SDK, utilizing naming tradition and usefulness logic of Arduino Wi-Fi Library. After some time, the riches Wi-Fi highlights ported from ESP9266 SDK to esp8266/Arduino exceeded Arduino Wi-Fi Library. This documentation will walk you through a few classes, strategies and properties of ESP8266 Wi-Fi library. The extent of usefulness offered by ESP8266 Wi-Fi library is very broad and consequently this portrayal has been separated into discrete archives. To connect ESP module to Wi-Fi (like attaching a cell phone to a problem area), you require simply couple of lines of code. In the accordance WI-FI. Begin ("network-name", "pass-to-network") displace network-name Furthermore pass-to-network with sake What's more watchword of the Wi-Fi system you similar to with associate. That point transfers this sketch will esp module Furthermore open serial screen.

## IV. RESULTS

The level of the trash can is sensed by the ultrasonic sensor which in turn is connected to the NodeMCU. The NodeMCU is simulated using the code written in Arduino IDE. The NodeMCU is connected to the Personal computer using a Usb cable at a baud rate of 9600. And the system is connected to the Wi-Fi using username and password which are explicitly written in code before the execution as shown the figure 4. The code above shows that the Pulse In command will calculate the time difference between the two states high and low which are given as outputs from the ultrasonic sensor and stores it in duration 1 variable. The later part of the code shows the connectivity of the system with Wi-Fi module with the help of classes from the ESP8266 library. When the Level of the bin is completely full the a half circle in green color is seen indicating that the bin is full. Along with the level indication the code also displays the Wi-Fi Signal strength as in figure 5.

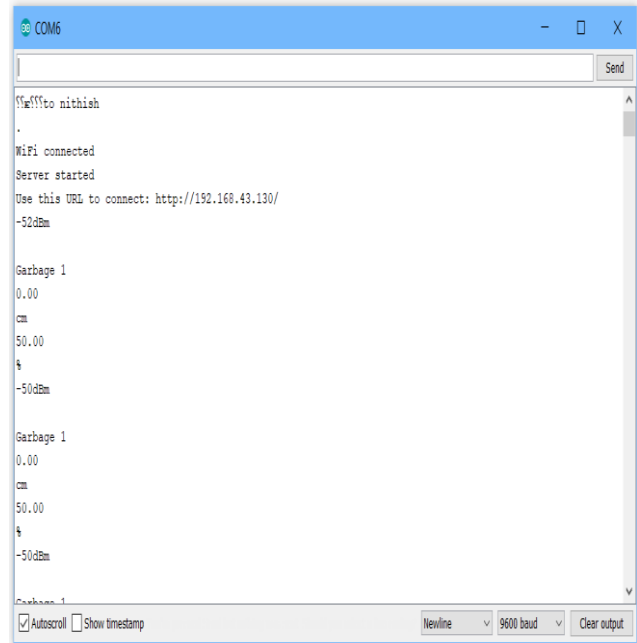


Figure 4. Output on Serial Monitor



Figure .5. Output on webpage

## V. CONCLUSION

A handy framework for screen the dimension of rubbish is being exhibited in this task. This undertaking actualizing continuous waste administration framework by utilizing sensors to check the dimension of refuse in the dustbin. In this framework, the data of the dustbin can have gotten to from anyplace and whenever. This framework will help educate the status of every dustbin continuously. Along these lines, squander administration can send the city worker to get the junk when the dustbin is full. The scope of ultrasonic sensor can identify remove is between 2cm until the point that 400cm. This sensor will contrast the profundity of the dustbin with demonstrate the dimension of refuse in the container.

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This sensor will gather the information and sent to microcontroller to show on LCD.

## REFERENCES

1. Daniel V., Puglia P.A., and M. Puglia (2007). "RFID-A Guide to Radio Frequency Identification", Technology Research Corporation.
2. Flora, A. (2009). "Towards a clean environment: A proposal on sustainable and integrated solid waste management system for university Kebangsaan Malaysia". Report from Alam Flora.
3. Gogoi.L (2012). "Solid Waste Disposal and its Health Implications in Guwahati City: A Study in Medical Geography", Lambert Academic Publishing, Germany, ISBN 978-3-8454-0149-2.
4. Hannan, M., A., Arebey, M., Basri, H. (2010). "Intelligent Solid Waste Bin monitoring and Management System", Australian Journal of Basic and Applied Sciences, 4(10): 5314-5319, 2010, ISSN 1991-8178.
5. Md. Liakot Ali, Mahbulul Alam, Md. Abu Nayeem Redwanur Rahaman, (2012). "RFID based E-monitoring System for Municipal Solid Waste Management", International Conference on Electrical and Computer Engineering, Pg 474-477.
6. Rahman, H., Al-Muyeed, A. (2010). "Solid and Hazardous Waste Management", ITN-BUET, Center for Water Supply and Waste