

Smart Garbage Monitoring System

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Abstract- Within recent decades urbanization has redoubled staggeringly. At the constant part, there's an associate degree increase in waste production. The spillover of waste in civic areas generates the contaminated condition in the neighbour areas. one amongst the most issues with our surroundings has been solid waste management that additionally to worrying the balance of the atmosphere conjointly has adverse effects on the health of the society. The detection, watching and management of wastes is one of the major issues of this era. the normal manner of manually watching the wastes in waste bins could be a complicated, cumbersome method and utilizes additional human effort, time and price which isn't compatible with this day technologies in any manner. We are going to attempt to build a system that can give notice to the authorized folks to empty the bin on time. In this system, we are going to place a sensing element on prime of the rubbish bin which can discover the entire level of garbage within it in keeping with the entire size of the bin. once the garbage has reached the utmost level, notification is sent to the authorized User, then the workers will take more actions to empty the bin. this technique can facilitate in improvement town during a higher manner. By mistreatment, this technique people don't get to check all the systems manually however they're going to get a notification once the bin will get filled.

Index terms- Garbage, Node MCU, Ultra Sonic Sensor, Blynk application

I.INTRODUCTION

Even though the globe is during a part of up-gradation, there's yet one more issue that has got to be managed. Garbage! Pictures of garbage bins being glutted and also the refuse being spilled out from the containers are often seen all around. Garbage monitoring System: - Garbage could consist of the unwanted material leftover from town, Public space,

Society, College, home, etc. This project is expounded on the "Smart City" and supported the "Internet of Things" (IoT). Thus for a sensible way, cleanliness is required, and cleanliness begins with Garbage Bin.

This project IoT Garbage monitoring system could be an innovative system which can facilitate to stay the cities clean. This method monitors the rubbish bins and informs concerning the amount of garbage collected within the garbage bins via a Blynk Application. For this, the system uses an Ultrasonic sensor placed over the bins to discover the waste level and compare it with the depth of the bin.

The system makes use of Node MCU, Ultrasonic Sonic sensor, LED to display the level of garbage collected within the bins.

II. LITERATURE REVIEW

The paper "IoT based smart garbage alert system using Arduino UNO" by Dr. N. Sathish Kumar, B. Vijayalakshmi [1] proposes a sensible alert system for garbage clearance aided by the ultrasonic sensor which is interfaced with Arduino Uno to see the extent of garbage-filled within the dustbin and sends the aware of the municipal web server once if garbage is filled. After cleaning the dustbin, the driving force confirms the task of emptying the rubbish with the help of the RFID tag. the entire process is upheld by an embedded module integrated with RFID and IoT facilitation. An android application is developed and linked to an internet server and therefore the notifications are sent to the android application using the Wi-fi module.

G.k Shyam [2] proposed a sensible method for garbage management with the assistance of sensors capable of detecting the waste levels within the bin. Sensor data is transferred via the online to a database

server to store and process mechanisms. These data are used to observe the dust bins and to figure out the optimized routes for waste collection. the foremost important feature of this technique is that the routes are decided not only supported the waste level but also expect the upcoming state concerning factors like traffic jams within the world where bins are placed, the speed at which the bins get filled. Once the waste bins are identified, the shortest path for the gathering of waste is achieved by using the shortest path spanning tree algorithm.

Another work by Mohd Yusof [3] N provides a Smart Garbage Monitoring System specifically to apartment, condominium or flat type residency that has a trash chute. This proof of concept system uses ultrasonic to measure the waste level and Arduino Uno as a microcontroller.

The ultrasonic sensor will continuously measure the waste level and notify the residence and garbage collector regarding the waste status. The system sends a notification through SMS to collector whenever the waste bin is almost or already full. Indicators can be put at each level of the resident to alert the residencies to minimize or stop dispose of waste.

III. EXISTING SYSTEM

In the existing system, the waste is collected by the municipality servants on the scheduled routine basis i.e, weekly or 2-3 times within the months. As we see repeatedly that garbage bins are placed publicly places within the cities that are overflowing thanks to a rise within the waste a day .thanks to this, the garbage shrinks and produce the bad smell which can tend to cause pollution and spread diseases. Also finding the trail of garbage bin is one of the tasks especially for the new driver.

3.1. Disadvantages

- Time consuming and less effective, trucks go and empty containers whether they are full or not.
- High costs.
- Unhygienic Environment and look of the city.

IV. PROPOSED SYSTEM

The Block diagram shows the arrangement of different components used in the Smart trash can

system. Ultrasonic sensor, Node MCU Wi-Fi module- ESP8266 for connecting to internet, power supply. The project module is divided into two parts sensor section and Node MCU Wi-Fi module ESP8266 section. Sensors are attached to the trash can. Sensors are used to detect the level in the trashcan whether it is full or empty. The sensor senses the content of the trash can and sends the signals or the data to the Node MCU. Wi- Fi Module helps us to send the information of the trash can at the receiver side through the internet. In this project, the ultrasonic sensor will send the distance to Node MCU Wi- Fi Module ESP8266 and if the distance is less than threshold values it will send an alert message or notification to the concerned authorities or users.

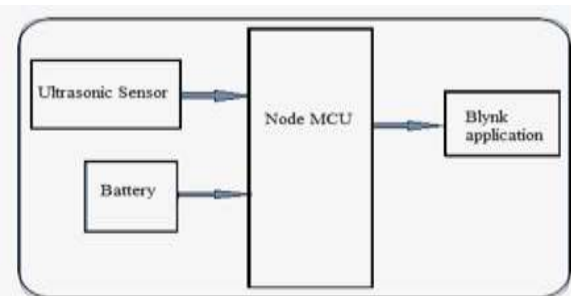


Figure.1. Flowchart of the system

4.1 Advantages

- Monitors the garbage bins and informs about the level of garbage collected in the garbage bins.
- To keep our Environment clean & green.
- The cost & effort are less in this system.

V. SYSTEM REQUIREMENTS

To be used efficiently, all computer software needs certain hardware components or other software resources to be present on a computer. These prerequisites are known as system requirements.

5.1. Hardware Used

Node MCU

Node MCU is an embedded IOT platform, the board is just like an arduino which comes with a (ESP8266) Wi-Fi module built-in. The Node MCU is an open-source Wi-Fi system on chip produced by Espressif Systems. It is an integrated chip that provides full internet connectivity to the embedded circuit in which it is present. It can be programmed through a

USB port using the Arduino IDE. It has a total of 30 pins in which 9 pins are digital pins while 1 pin is an analog pin. It is a tool that is employed for Wi-Fi networking. It has low power consumption. In this project, it has been employed as the main microcontroller owing to its inbuilt Wi-Fi connecting capacity which can be exploited to transmit real-time monitored sensor data to web and mobile interfaces.

Node MCU pin configuration

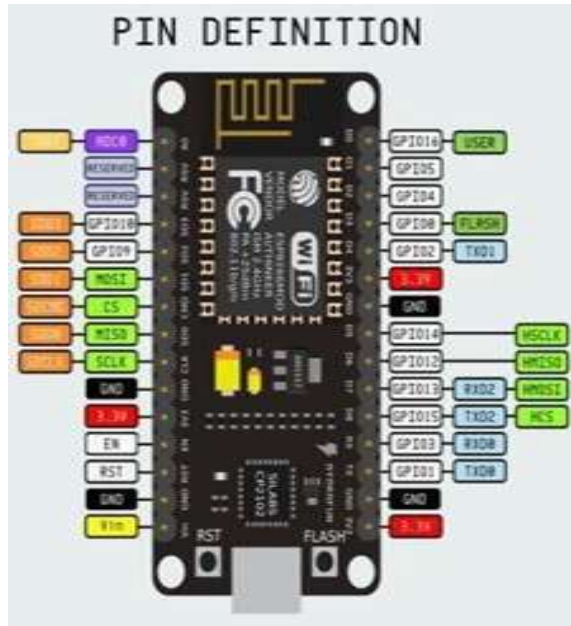


Figure.2. Node MCU Pin Configuration

Ultrasonic Sensor

Ultrasonic Sensor - Ultrasonic Sensor HC-SR04 is used to detect the level of the garbage in the container. According to (Alexnieva 2016), “Ultrasonic sensor has 2 operation modes, which are Reflection Mode and Direct Measurement Mode.” In this proposed project, the Reflection Mode will be used to get the distance between the sensor and the object

So, we are using an Ultrasonic Ranging Module (HC-SR04) which has 4 pins: Vcc, Trigger, Echo, and GND. The Vcc pin provides the power to produce the ultrasonic pulses. The ground (GND) pin is coupled to the ground. The Trigger (Trig) pin is where the ultrasonic range finder drives the information to the controller about the period taken by the ultrasonic pulse (i.e. we send a triggering pulse to the sensor).



Figure.3. Ultrasonic Sensor

5.2. Software Used

Arduino IDE

Arduino IDE – Arduino IDE is a program that enables the user to program the Arduino microcontroller in ease, by just selecting the correct port and Arduino model in the program setting, then the coding can then be fetched into the respective microcontroller. This program provides a simple user interface and ease for development; tons of libraries can be installed and used easily. The sample interface of the program is as illustrated below.

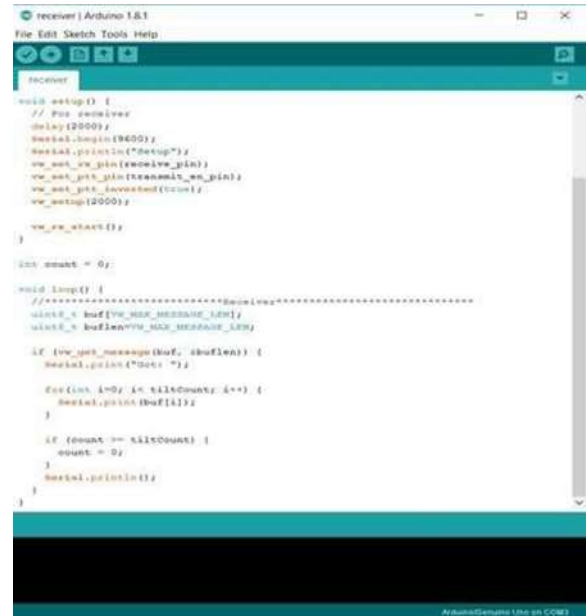


Figure.4: Interface of Arduino.exe

Blynk Application

Blynk is an open source software application. Which is used to connect hardware components to the application via Wi-Fi. This application can be used on Smartphones.

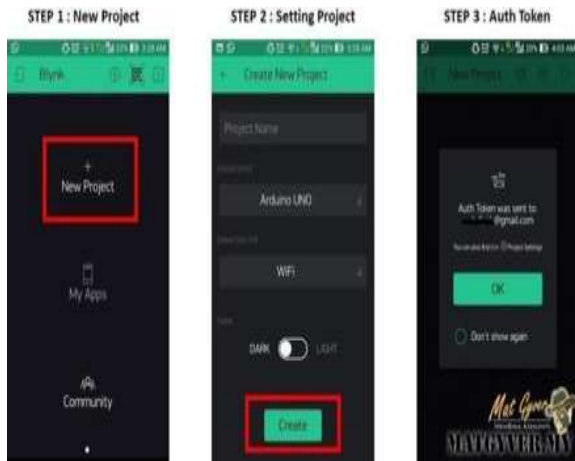


Figure.5. Blynk Application

VI. RESULTS

The level of the Garbage bin is sensed by the ultrasonic sensor which in turn is connected to the Node MCU. The Node MCU is simulated using the code written in Arduino IDE and connected to the Blynk application through Wi-Fi. The Node MCU is connected to the Personal computer using a USB cable at a certain baud rate. And the system is connected to the Wi-Fi using username and password which are explicit. The later part of the code shows the connectivity of the system with a Wi-Fi module with the help of classes from the ESP8266 library. When the Level of the bin is full the message pop up in a Blynk app indicating that Garbage overflow, and when the level of the bin is low the message pop up in a Blynk app indicating that the Garbage is low with its amount of trash filled as shown in figure 6.

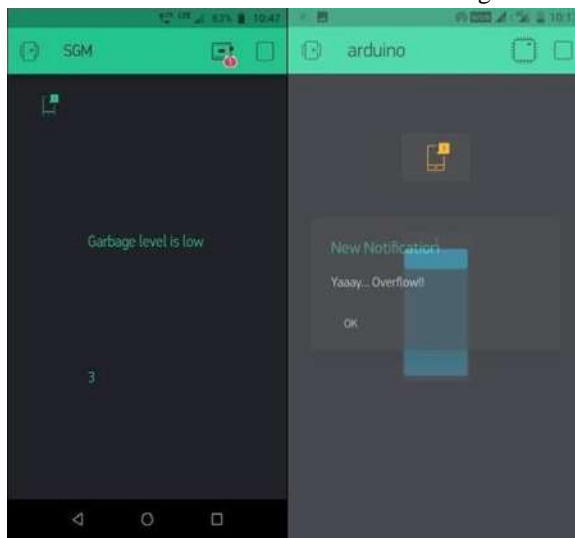


Figure.6. Final results in Blynk Application

VII. CONCLUSION

In this project, An integrated system of Wi-Fi electronic equipment, the Ultrasonic sonic sensing element is introduced for economical and economic pickup. By implementing this project we'll avoid overflowing of garbage from the instrumentality in the district that is antecedently either loaded manually or with the assistance of loaders in ancient trucks. It will mechanically monitor the rubbish level & send the knowledge to an authorised person. The technologies that area unit utilized in the projected system area unit adequate to make sure the sensible and ideal for solid pickup method watching and management for the inexperienced setting.

REFERENCE

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