

IOT BASED GARBAGE MONITORING SYSTEM

**Shripad Mahurkar*¹, Rohan Parkhe*², Tushar Girnare*³,
Shubham Kothari*⁴, Ms. Sujata Suryawanshi*⁵**

*^{1,2,3,4,5}Department Of Information Technology, MVPS'S Karmaveer Adv. Baburao Ganpatrao
Thakare College Of Engineering, Nashik, India.

ABSTRACT

As the globe moves closer to a digital era, technology is being used more wisely to bring about breakthroughs and improve human lifestyles. It's like rowing a boat without a paddle if you don't incorporate these technology improvements into your current lifestyle. The main goal is for smart sensors to work together without the need for human intervention to create a new class of applications. The use of a smart bin is an unavoidable part of this procedure. The goal of this project is to create a smart dustbin utilising an esp8266 module with two primary pins attached to the sensor: the trigger pin and the echo pin. It helps to keep the environment clean while also reducing the need for human labour. When the smart bin detects the level of thrash. This is due to the ultrasonic sensor, which is located on bottom of the lid. When the trash exceeds the set threshold value, the information is sent to another node, which is a Nodemcu, and this node, using socket programming, shows exact location and status of a dustbin with a colour code.

Keywords: Nodemcu Esp8266, Ultrasonic Sensor, Waste Management.

I. INTRODUCTION

The saying states, "Cleanliness is second to Godliness." It is the obligation of each individual to keep their surroundings neat and clean, whether in private and public locations. The creation of waste is something that we see in our daily lives. This trash is generated at home, in the office, and in other public places. This waste generation, if not adequately managed, can result in a slew of ailments, since bacteria, insects, and viruses thrive in this environment. Concepts related to the future internet are being investigated, enlarged, developed, and advanced on a regular basis. One such area is the Internet of Things. It is critical to us that this material is collected on schedule and disposed of in a systematic manner. For a clean and healthy environment, it is necessary to have a foolproof waste management system in place to ensure periodic removal of garbage in both private and public places. With the focus on the Swachh-Bharat mission, there is an innovative idea for garbage storage, detection, and disposal with the smart dustbin using IoT technology. The goal of this project is to help society in a waste management samrtly. It can also be implemented on a huge scale.

II. LITERATURE REVIEW

Swati Sharma [1] demonstrated how to use an esp8266. for sending SMS, which includes a TCP/IP stack and an HTTP server microcontroller. In nature, it is incredibly cost-effective.

"SMART GARBAGE COLLECTION SYSTEM USING INTERNET OF THINGS" Published by Miss. Priya A. Jadhao, Miss. Sonal D. Sakhare, Miss. Kajal G. Bhal dane, Prof. Abhishek P. Narkhede, Prof. Vaibhav S. Girnale. The Internet of Things (IoT) is a cutting-edge system. It's compatible with Arduino. There were two dustbins for dry rubbish and moist garbage, as well as a controller. used. Moisture will detect these two types of waste. The sensor and, as a result, the dustbin will open or close. automatically. An infrared sensor has been installed inside the dustbin to detect the amount of waste When a waste level reaches a certain point, It will then make a call and send a message using the GSM module. to the person in charge of rubbish collection, and the level will be indicated at a web server aided by an IOT module [2].

Ekhlas Hossain [3] Proposed the idea that Environment Pollution is increasing day by day, and various factors are responsible for these, like increasing population is also one of the factors responsible for increasing the pollution in the surrounding. Here we have seen one project were exchange of waste and it is equivalent price for that waste is possible so it is an advantage for the one who proposed the smart bin. Here IOT techniques along with CNN (convolutional neural network) is also get used which is able to recognized the object regarded as garbage by analyzing training features. Here the simple process is just gets the image, detect the object in that image after then resize the separated images according to training of CNN, then feed the separated images

to trained CNN, after then get the labels of the images then count the same label to know the number of same object after that calculate the total recycle value and that's how it works. Such feasible project now-a-days being many useful for the individual and society.

III. PROPOSED SYSTEM

Our project "IoT Based Garbage Monitoring System" is a cutting-edge waste collection system that uses a Nodemcu module and an ultrasonic sensor to detect garbage levels in bins. Make it simple and cost-effective. This project is also centered on the reduction of human labour.

It will improve and simplify the process. As a result of the waste management process as a whole, there is a cost. saving money and reducing pollution. The sensor utilise at the bottom of the lid. The amount will be monitored at the bottom of the lid. The HC-SR-04 ultrasonic sensor is being used. VCC, GND, Trig, and Echo are the four pins. The following is a list of the various uses for the mentioned pins below:

- a. **VCC**-This pin is in charge of providing power and the sensor receives 5V of electricity.
- b. **GND**-This links to the Nodemcu esp8266 module's GND.
- c. **Trigger**-This is sometimes referred to as an input pin. Its purpose is to to send out an ultrasonic wave .
- d. **Echo**-also It's called Output pin. Its purpose is to receives the signal that is sent out by the trigger pin. Using the Trigger pin, the ultrasonic sensor generates an ultrasound wave that can detect any item in its path and returns to the sensor it was received with. with the aid of an Echo pin.

The length of time it took for the wave to hit and returning will assist us in calculating the obstacle's distance. The sensor has detected something. Now, if the amount of trash in the bin exceeds the stated limit, it transfers the data to the cloud, and thus the data that is generated may be accessed conveniently using the Android application "Smart Dustbin." Now, what if the If the amount of trash generated exceeds the stated threshold. As a result, the person collecting the trash examines the real time status of dustbins. This application's coding has the project was completed on the Android platform using XML and Java. XML used to design the app interface, while Java used to connect to the backend using the Nodemcu esp8266 module.

A. SYSTEM ARCHITECETURE:

As Fig. 1 shows the architecture diagram of our proposed idea in a way to collect waste using an esp8266 module and an ultrasonic sensor which detects the level of garbage in the bins. Then It will send data to the cloud and through our app by scanning barcode we can get instant real time monitoring of the data hence enhance and simplify the waste management process on a whole and thus result in cost saving and less pollution.

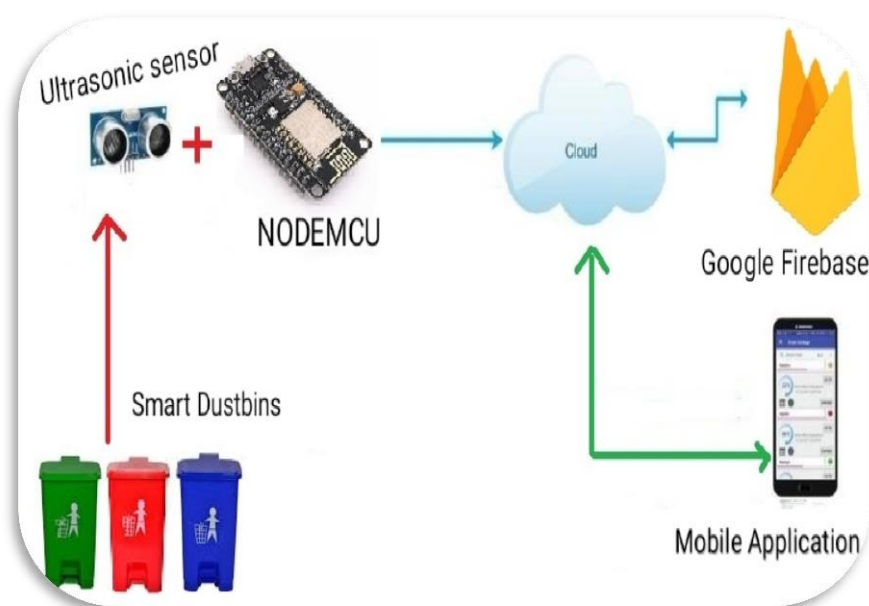


Figure 1: System Architecture Diagram of IOT Based Garbage Monitoring System

B. Software Requirements:

We used Android studio platform for making app using Java and XML and used embedded C for hardware connectivity. For database we use Google firebase for cloud data storage and retrieval.

C. Flowchart:

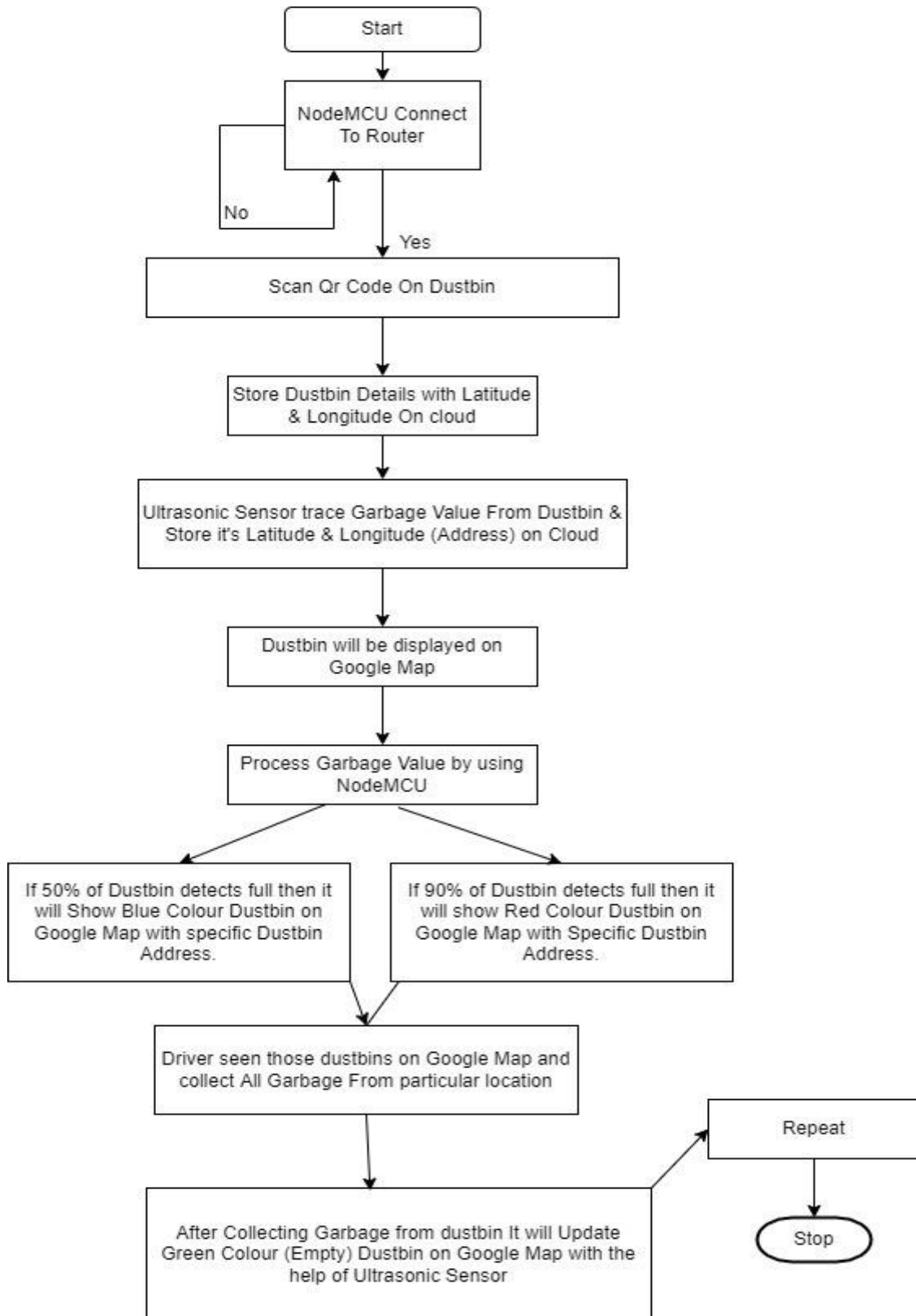


Figure 2: Flowchart of Proposed System.

D. Ultrasonic Sensor:

In IOT an ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal thus IOT ultrasonic sensors are designed for non-contact detection of solid and liquid objects.

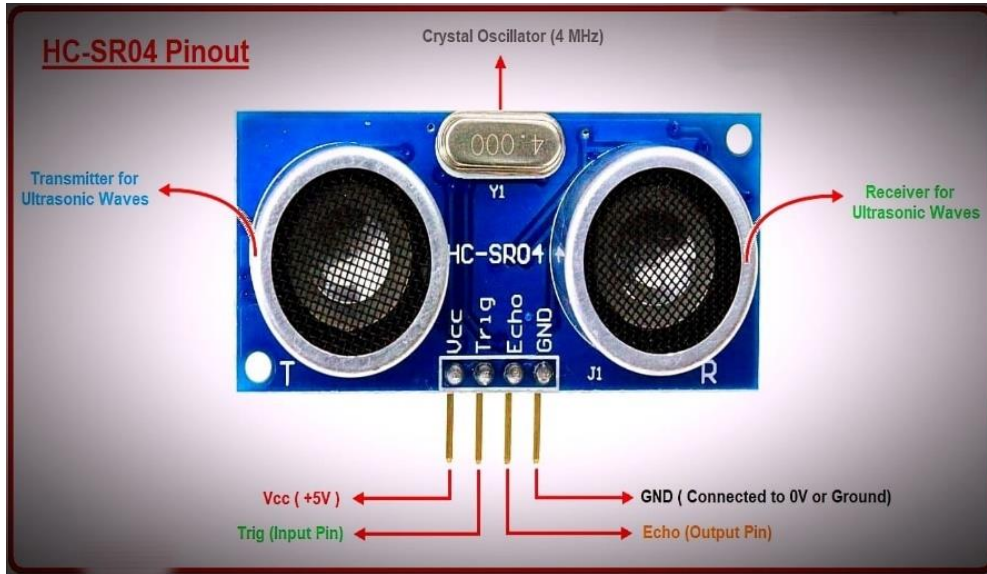


Figure 3: Ultrasonic sensor.

E. Nodemcu esp8266:

Nodemcu is an open supply platform supported ESP8266 which might connect objects and let knowledge transfer victimization the Wi-Fi protocol. additionally, by providing a number of the foremost necessary options of microcontrollers like GPIO, PWM, ADC, and it will solve several of the project's desires alone. As in conjunction with the sensors we tend to used Nodemcu additionally so as to form project a lot of possible.

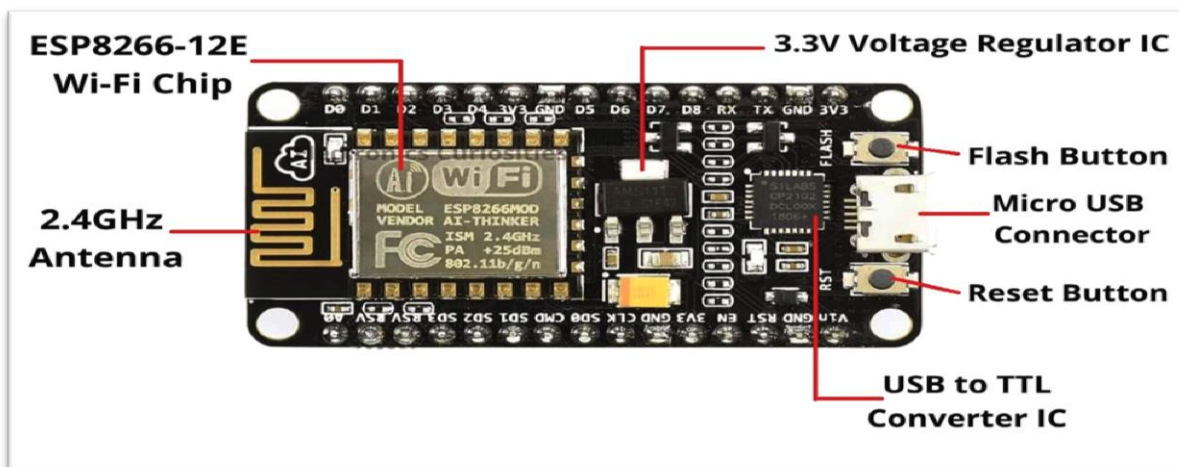


Figure 4: ESP8266 Nodemcu.

F. Power Adaptor:

As we tend to all understand, the IOT is presently utilized in just about each business. So, so as to control the ability provide, we'll want things sort of a power device. associate AC adapter, conjointly called associate AC/DC adapter or AC/DC convertor, may be a style of external power supply that's unremarkably housed instrumentality that appears like an AC socket. Plug pack, plug-in adapter, adapter block, domestic mains adapter, line power adapter, wall wart, power brick, wall charger, and power adapter square measure a number of the opposite frequent names.



Figure 5: Power adaptor

IV. WORKING

After completing all necessary connections and checking the ultrasonic sensor releases an ultrasound wave that can detect any item in its path and reverts back to the sensor, which is received with the help of the Echo pin. Now, if the garbage amount exceeds the given threshold value, the data is sent to the cloud, and these types of data are generated and updated on our app interface. As there is currently an add Dustbin list, add Driver list and Scanner this type of interface on our app, as shown in Fig.6 and 7, the next level is to determine the actual location of the Dustbin using the Longitude & Latitude interface. With the help of the information, we can determine whether the trashcan is full, half or moderate also with help of latitude and longitude know their points and current state with the use of GPS after we have found their location. After that as thrash collected into the bins we monitored it and the data get generated on cloud can fetched via our app hence not only we get current status of bin but also their real time location also so we effectively manage the waste management.

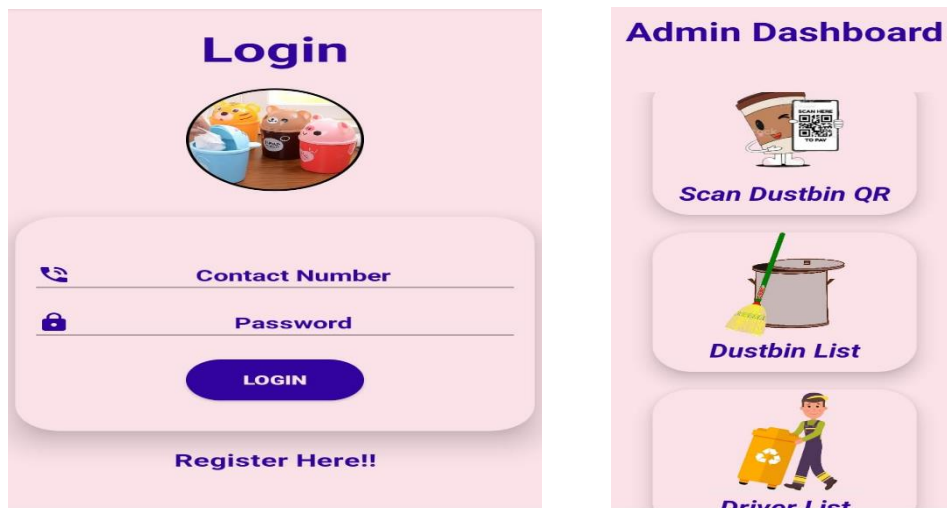


Figure 6: Login and Dashboard snapshots



Figure 7: Snapshot of driver list

V. RESULT AND DISCUSSION

OUTPUT:

As shown in Fig. 8. We can easily monitoring the real time data with the help of Google cloud firebase so, we get updated information regarding the status of thrash and also we get the idea of number of dustbins connected. Hence we can interact, analyse, monitoring through app over the cloud from any time and any where.

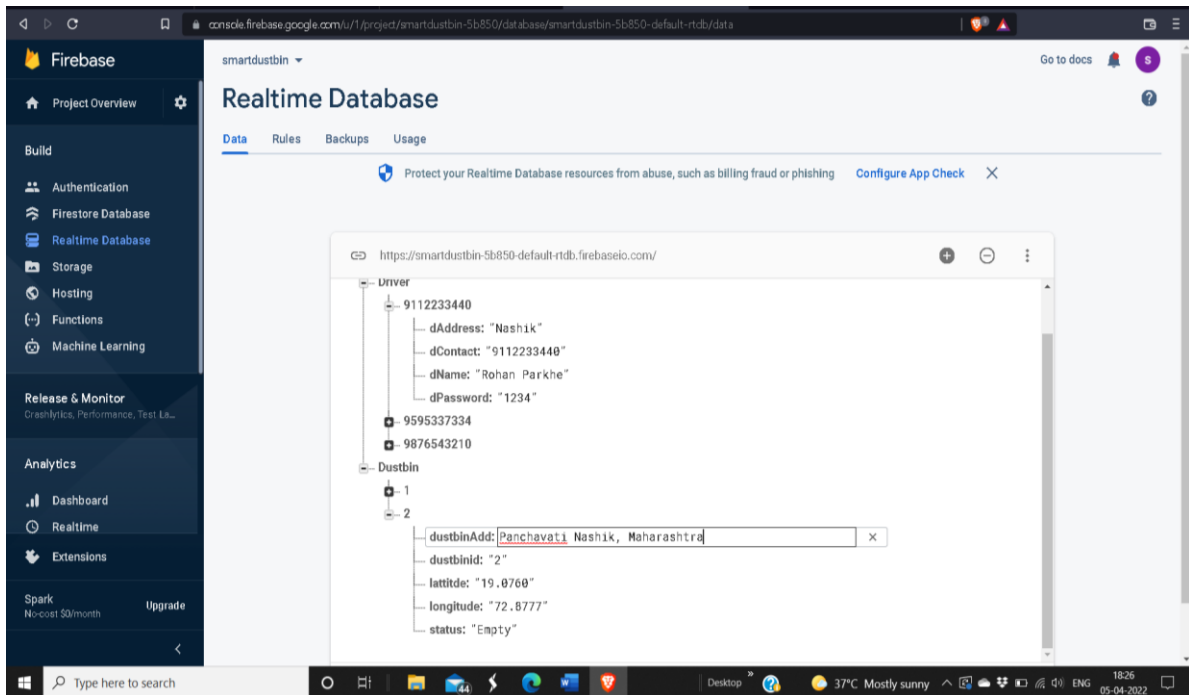


Figure 8: Cloud database for real time monitoring.

As shown in Fig. 9. When a dustbin is empty then automatically it shows green colour not having any thrash and we easily check via our app .

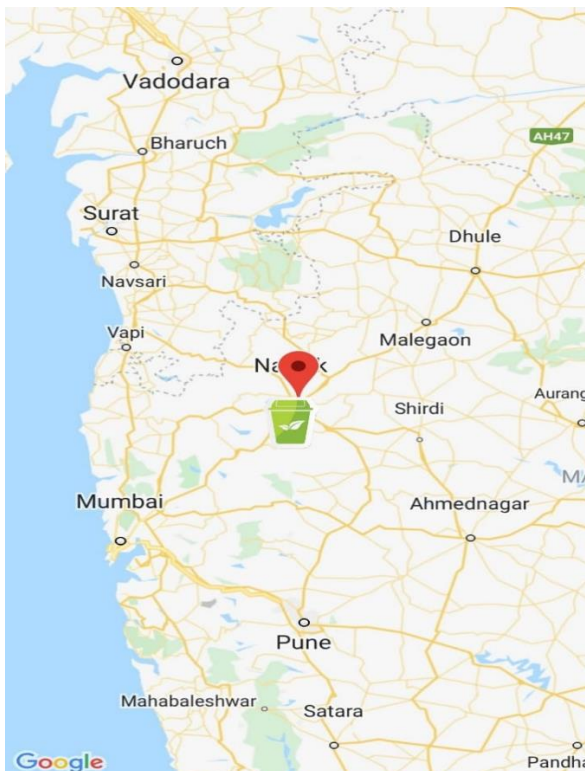


Figure 9: Empty dustbin and colour green on map.

Similarly as shown in Fig.10 it depicts a half-filled trashcan that is blue in colour. Full then it shows red in colour. As a result, the trash will not overflow, ensuring that those who use the smart bin live a clean and healthy lifestyle. As a result, it improves the efficiency of day-to-day garbage collection.

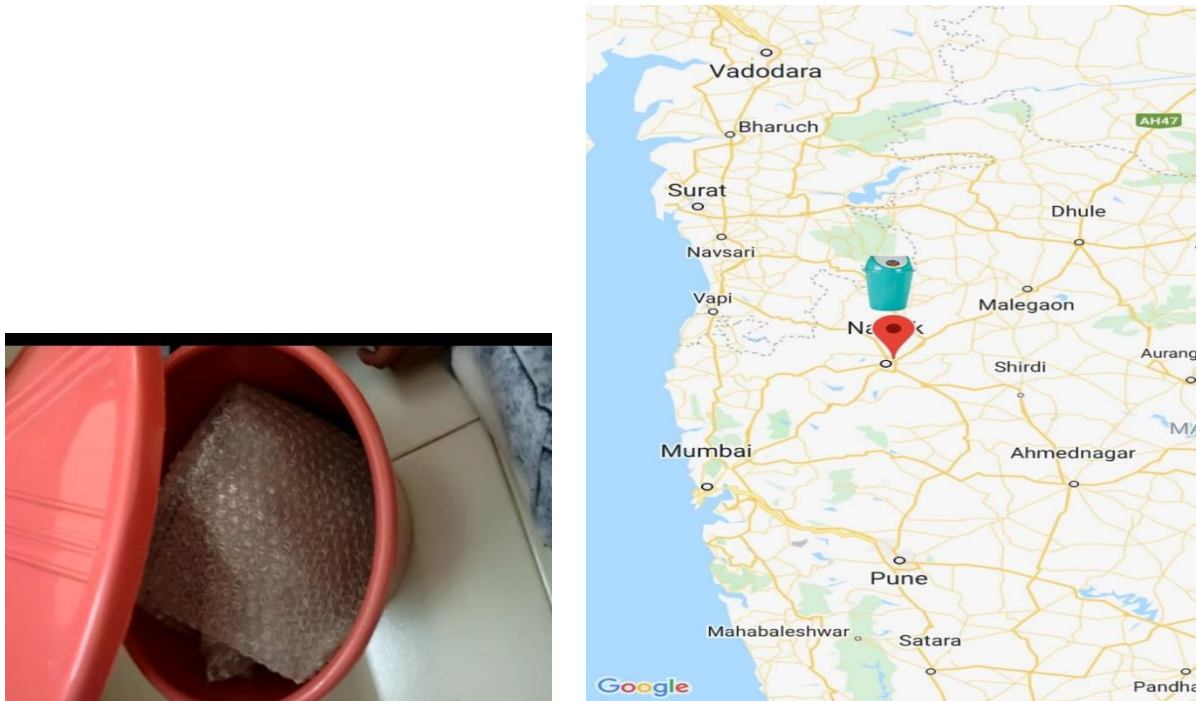


Figure 10: Half-filled dustbin and Blue colour on map.

ADVANTAGE:

- a. Keep Environment green and clean also make ease to decrease the count of the waste.
- b. Saves time and user friendly in nature so easy to handle.

DISADVANTAGE:

- a. Initial cost are high
- b. Implementation can be difficult & time consuming.

VI. CONCLUSION

Our proposed system's main goal is to keep our surroundings clean and green while also helping to reduce human effort. Many key components of garbage monitoring have been highlighted as a result of the literature review and contextual enquiry. There is a demand for an IoT-based smartphone app that addresses issues such as locating garbage containers, obtaining information about overflowing rubbish, locating collection vehicles, and/or identifying biomedical/hazardous waste management in a real time. With the considerations discovered throughout this investigation, an integrated, efficient, and intelligent Internet of Things (IoT)-based Garbage Monitoring system will be created in the future.

VII. REFERENCES

- [1] Swati Sharma, Sarabjit Singh, "Smart dustbin management system." International journal of engineering science and research technology (IJESRT), 2018.
- [2] Miss. Priya A. Jadhao, Miss. Sonal D. Sakhare, Miss. Kajal G. Bhaladane, Prof. Abhishek P. Narkhede, Prof. Vaibhav S. Girnale. SMART GARBAGE COLLECTIONSYSTEM USING INTERNET OF THINGS International Journal of Advance Engineering and Research Development, April 2018.
- [3] Ekhlas Hossain, Shifat Hossain, "Design of a Convolutional Neural Network Based Smart Waste Disposal System" (ICASEERT 2019).