

# Monitoring Section of IoTs Smart Garbage System

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The benefits of IoTs that are real-time data, improved waste management, healthcare and improved decision making. Thus, any object in the physical world which can be provided with an IP address to enable data transmission over a network can be made part of IoTs system by embedding them with electronic hardware such as sensors, software and networking gear. IoTs is different than Internet as in a way it transcends Internet connectivity by enabling everyday objects that utilizes embedded circuits to interact and communicate with each other utilizing the current Internet infrastructure. Nowadays, the traditional way of monitoring the waste bin is a difficult process and utilizes more human effort, time and cost which can easily be avoided with our present technologies [2]. The waste collection is consistent however the current collection does not allow the local municipal to know the status of the garbage bin either full or empty. As dustbin is considered as a basic need to maintain the level of cleanliness in the city, so it is very important to clean all the dustbins as soon as they get filled. We will use ultrasonic sensors for this system. The sensor will be placed on top of bin which will help in sending the information to the office that the level of garbage has reached its maximum level. After this the bin should be emptied as soon as possible. The concept of IoTsinformation to the office that the level of garbage has reached its maximum level. The concept of IoTs when used in this field will result in a better environment for the people to live in. The real-time information can be gained regarding the level of the dustbin filled on the system itself. It will also help in reducing the cost as the employees will have to go only at that time when the bin is full. This will also help in resource optimization and if the bins will be emptied at time then the environment

## ABSTRACT

Nowadays certain actions are taken to improve the level of cleanliness in the country. The proposed system introduces the design and development of smart green environment of garbage monitoring system by measuring the garbage level in real time and to alert the municipality where the bin is full based on the types of garbage. Thus, Smart Garbage bin was built which is interfaced with Ultrasonic sensor, GPS module and Wi-Fi module (Node MCUs). In this system, we will put a sensor on top of the garbage bin which will detect the total level of garbage inside it according to the total size of the bin. Once the trash increases the threshold level, the notification will pop up in Blynk server. The real time status of how waste collection is being done could be monitored the bins where GPS is shown. Then, the employees can take further actions to empty bins. It is expected that this system can create greener environment by monitoring the collection of garbage smartly through Internet-of-Things.

**KEYWORDS:** Internet of Things (IoT), Waste management, Ultrasonic sensor, Wi-Fi module, GPS module, Blynk server

## I. INTRODUCTION

Internet of Things (IoT) refers to the network of connected physical objects that can communicate and exchange data among themselves. It has the ability to transfer data over a network without human intervention, although people can interact with the devices.

will remain safe and free from all kinds of diseases. The cities will become cleaner and the smells of the garbage will be much less [1].

## II. BLOCK DIAGRAM BASICS

There are five main parts of block diagram: power supply part, sensor, controller, uploading to the server and the monitoring part. Firstly, the ultrasonic sensor senses the garbage level and the GPS co-ordinates of the garbage bin is provided to the Wi-Fi module. The data from the Wi-Fi module upload to the Blynk cloud. And then, the message takes place in phone display with the help of IoTs [4].

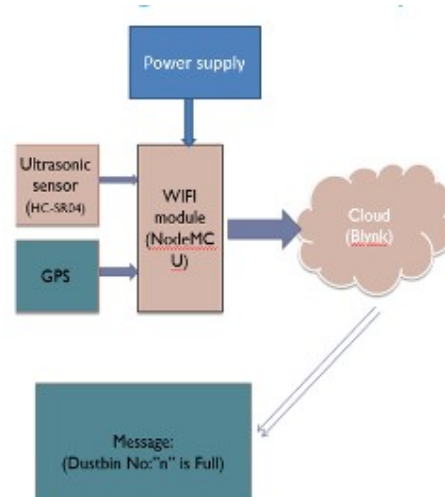


Figure1. Block Diagram of Smart Garbage Monitoring System

### III. SOFTWARE REQUIREMENT

#### A. Internet of Things (IoT's)

This project is based on "Internet of Things" (IoT's). So for smart lifestyle, cleanliness is needed, and cleanliness is begins with Garbage Bin. It is able to communicate with one another and the users, becoming an integral part of the Internet. IoT's devices share the sensor data they collect by connecting to an IoT's gateway or other edge device where data is either sent to the cloud to be analyzed or analyzed locally [3]. Smart garbage monitoring system using Internet of Things, the traditional way of manually monitoring the wastes in waste bins is a cumbersome process and utilizes more human effort, time and cost which can easily be avoided with our present technologies. The sensor has been smartly utilized in the Smart Dustbin for sensing the level of the waste. Once the sensor detects that the bin is full and needs to be cleared it. The IoT's functions enables the user the ability of accessing anything which is connected to IoT's, using a basic internet connection. Applying this in the Smart Dustbin system, it notifies the user that the bin is full and needs to clear. Using IoT's the user can access the bin over internet just with the basic internet connection [5].

#### B. Blynk app

Blynk was designed for the Internet of Things. It allows communication with Wi-Fi compatible micro-controllers. It can control hardware remotely, it can display sensor data, store data, visualize it and do many other cool things. Blynk App that allows to create amazing interfaces for projects using various widgets. Blynk Server that responsible for all the communications between the smart phone and hardware. It is open-source, could easily handle thousands of devices. Blynk can work with any Sensors. Blynk App is a designed interface builder, it works on both IOS and Android [7]. The advantages of using blynk the truck driver sees all the dustbins and then generates the shortest and most efficient route! Although Blynk cloud is a free cloud, it only give 1000 energies to be used. In here the term is the storage of Blynk cloud. For example, one dustbin is required at least three buttons, one is shown for distance, two is for dustbin location and the last is shown for dustbin full or normal conditions. Therefore, for two or more dustbins, we need to buy more energies to operate.



Figure 2. Widget box in Blynk app

#### C. Configuration of Blynk app

To connect the internet we make use of platform called Blynk app. After user install the Blynk app on the smart-

phone, an account to be created because an account is needed to save data and have access multiple devices. Secondly, a step to create a new project to select the hardware model of ESP8266 Wi-Fi module. And next step be a unique authentication code is used by the code to communicate with the projects. Then, it is required to insert the widget in Blynk Cloud. And the blynk needs to be running the project just need to press a button in the Blynk app, the message travels to space the Blynk Cloud, where it magically finds its way to hardware. It works the same in the opposite direction and everything happens in a blynk of an eye [6].

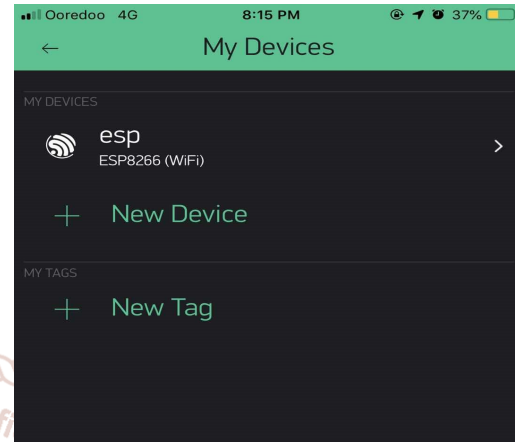


Figure 3. Project of ESP8266 in Blynk Cloud

#### D. Working process

When Wi-Fi module successfully connected to Blynk, the code starts to run. The simple code is given below implemented in the proposed work. Firstly, it is needed to call <SoftwareSerial.h> to enable communication. In Blynk, every project will have its own Auth Token. After a project creation, the Auth Token automatically got on email. It is unique identifier which is needed to connect hardware to smart-phone. To connect to open Wi-Fi network, choose hotspot name "tdh" from Wi-Fi setting on mobile-phone and set password shown in figure 4.

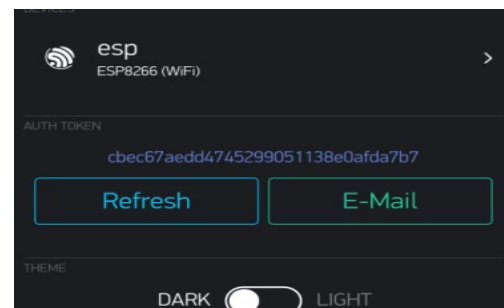


Figure 4. Authentication Code of Blynk

For sending and receiving data, it is required to connect ESP8266 module to Wi-Fi network. It is mean hooking up a mobile phone to a hotspot. When the Blynk with the connection of ultrasonic sensor, it will send a pulse a trigger the detection and then listen for the echo using the pulse function. So, define echoPin 7 and trigPin 8 that variables to hold duration and distance. And then initialize serial port and initialize Pin modes, trigPin be output and echoPin be input. When calculate the distance from the sensor, use the distance formula of  $distance = (duration/2)/29$  (the speed of sound 29 microseconds per centimeter, and the ping travels forth and back, so the distance is half the distance traveled) [8].

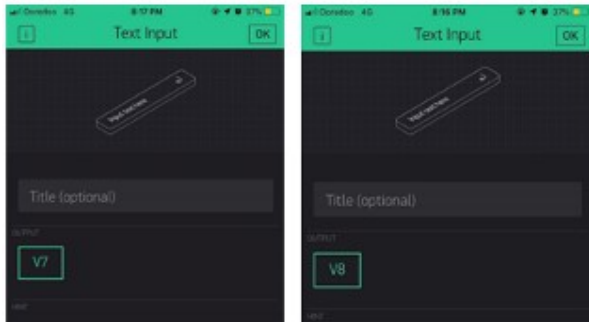


Figure 5. Connecting Ultrasonic Sensor of TrigPin and EchoPin

To get the location, we insert the Google Map API from blynk widget box. Select virtual pin for map be V0. The map widget allows to set points/pins on map from hardware side. For monitoring smart-phone location data such as latitude, longitude, it also can send a point to map with regular virtual write command in figure 6.

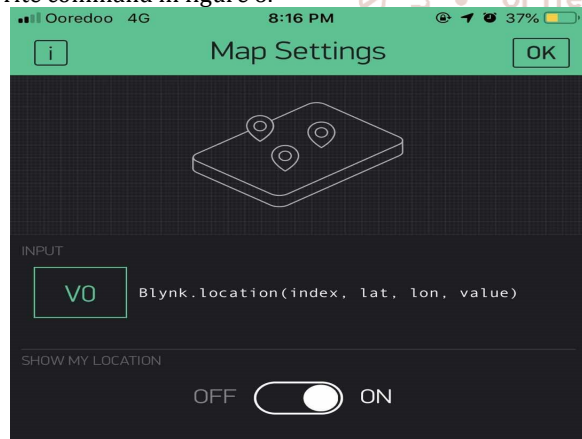


Figure 6. Blynk Cloud of Google Map function

After uploading the program, once the code start to run, first thing it will do is to try and connect to ESP8266 to the access point pre-defined in the code. If the ESP8266 connected the model starts via the Blynk servers by sending a pin message. The system is repeatedly by increasing and decreasing the level of garbage in the bin. The data was sent each time the level got changed. The distance from the ultrasonic sensor will appear on the text button and also mapping where the dustbin placed. The condition of FULL or NORMAL is shown by monitoring system. This monitoring system is developed using blynk cloud. And the location of waste bin is retrieved from blynk server and marked on the map by using Google Map which will notify the corporations to empty the bin on time. The advantage of using the monitoring system, municipal worker do not have to check all the systems manually. What our system does is it gives a real time indicator of the garbage level in a trashcan at any given time.

Using that data we can then optimize waste collection routes and ultimately reduce fuel consumption. Therefore, the monitoring system is also help in resource optimization and if the garbage bin will empty at time then the environment will remain safe and free all kinds of diseases.

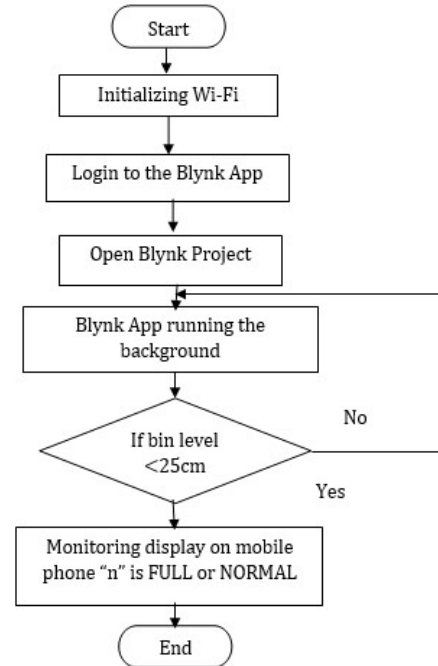


Figure 7. Flow Chart of Working Process for Smart Garbage Monitoring System

#### IV. TEST AND RESULTS

Depend on the level of garbage, distance from ultrasonic sensor, we can know the dustbin is full or empty. In the area of Chanayethazan Township Mandalay, we placed the bin1 at 75x27 street and bin2 at 74x27 street. Both bins are assume under 25 cm from the sensor be full condition and above 25 cm be normal condition. We placed the different locations of bins shown in figure 8(a) and (b) as Bin1 and Bin2. The defined bin1 and bin2 is appeared on map of Blynk cloud. That means each bin has little trash, the data from different bin is uploaded to the same of Blynk cloud, so the monitoring display in Blynk has been shown Normal condition in Figure 9(a). The different level of each bin is filled with the trash which reached the maximum distance 25cm (the distance between garbage and the dustbin lid) is also upload to the cloud in Figure 9(b), the message on monitoring display is shown FULL condition from ultrasonic sensor. Between bin1 and bin2, there is no communication between them. The only network connection has in the Blynk cloud between each bin. Therefore, the monitoring display on mobile phone will take placed from various part of GPS location which are need to clean.

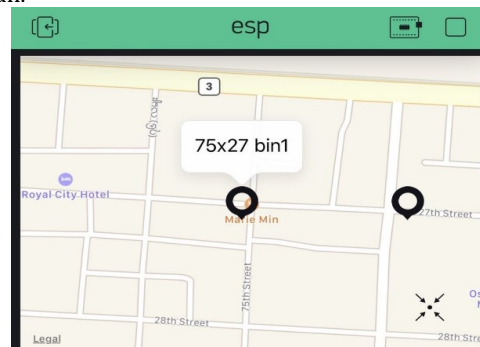
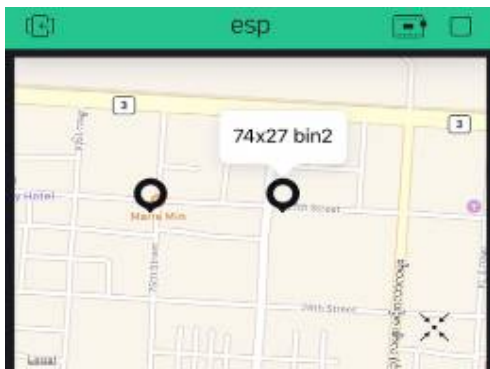


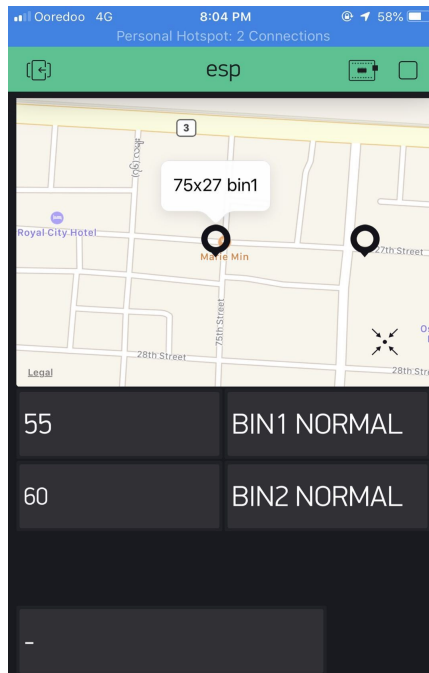
Figure8 (a). Bin1 location at 75 x 27 street



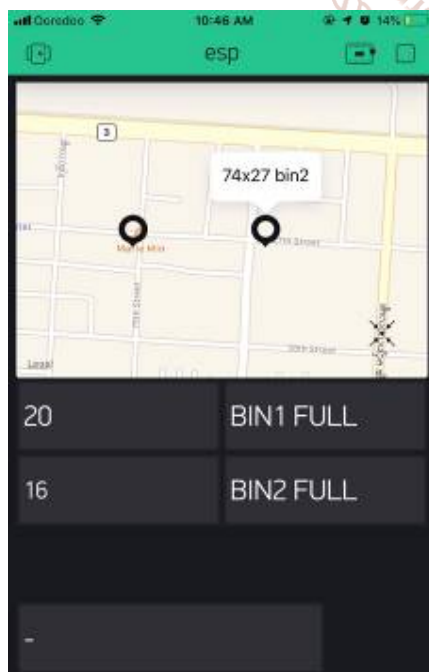


(b)

Figure 8 (b). Bin 2 location 74 x 27 street



(a)



(b)

Figure 9(a). Different Located Bin of Data for Normal Conditions Upload to the Cloud and (b) For FULL Conditions

## V. CONCLUSION

Nowadays, the garbage bins at public places that are filled with lot of waste which won't take care by municipal people due to lack of information about it. This system can easily dispose the waste present in the garbage when compared to the existing method without affecting to the people and keep the surrounding clean. The bins from various part of city constantly upload to the Blynk cloud with the help of IoTs. And the status in the cloud is changed time-to-time depend on the level of garbage. As soon as the garbage in the trashcan crosses the threshold level, then the concerned person immediately inform from monitoring display on mobile phone and take certain actions to empty it. Finally, to implement the different GPS locations of the bins which are placed in various parts of city, collect the data of trash from each dustbin. Thus, this system helps to reduce human intervention in garbage monitoring and makes the entire process more efficient and simple usability.

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