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MONITORING SYSTEM FOR WASTEMANAGEMENT USING IoT

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Abstract

In the current scheme, scrap binsplaced at public places are overflowing. This creates unhygienic terrain, spreading some deadly conditions and mortal illness. Therefore, Monitoring system for waste management using IoT is proposed. In the proposed system, multiple bins are installed throughout the mega city or the campus. These bins are handed with the unique ID and position. So that it's easy to identify which scrap bin is full. The scrap bins are attached with an ultrasonic sensor, a gas sensor and an IR sensor.Ultrasonic sensor is used for detecting the level of the waste in the scrap bin. Gas sensor helps in detecting the anonymous feasts. IR detector is used to open the lid of the scrap bin whenever the hand gestures appears. Sensors affair is connected to a ESP32S microcontrollerwhich is programmed to shoot a communication to the control room. If the scrap is full and isn't disposed for a long time, the microcontroller sends a communication to separate director along with the handed unique ID and position. These details can be penetrated by the concern authorities from their place with the help of internet and an immediate action can be made to clean the scrap bins.

Keywords: ESP32S Microcontroller, Gas Sensor, Ultrasonic Sensor, IR Sensor, Micro Servo Motor,Internet of Things.

I. Introduction

Things that are connected to Internet and sometimes these devices can be controlled from the internet is commonly called as Internet of Things. In our system, the smart dust bins are connected to the internet to get the real time information of the smart dustbins. In the recent years, there was a rapid growth in population which leads to more waste disposal. So a proper waste management system is necessary to avoid spreading some deadly diseases. Managing the smart bins by monitoring the status of it and accordingly taking the decision. There are multiple dustbins are located throughout the city or the campus (Educational Institutions, Companies, Hospitals, etc.). These dustbins are interfaced with micro controller based system with IR sensors, ultrasonic sensor, gas sensor, and ESP32S Microcontroller. Where the

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ultrasonic sensor detects the level of the dust in dustbin, Gas sensor detects the gases in dustbin and IR sensor used to open the lid of dustbin whenever the hand motions appears. If the garbage is full or gases detected and is not disposed for a long time, then the microcontroller sends a message to separate administrator.

II. Existing System

The existing system collects garbage once a day. It can also happen that sometimes waste spills out of the bins. Its unhygienic for the people too and leads to bad odor around the surrounding and leads to spreading some deadly diseases. To tackle such situation, a system is proposed named as IoT based monitoring system for waste management.Some of the drawbacks of existing system are:

- It won't give the immediate updates.
- It won't detect the gas.
- Public don't know the status of Garbage level.

III. Proposed System

The below figure 1 shows the architecture of proposed system.

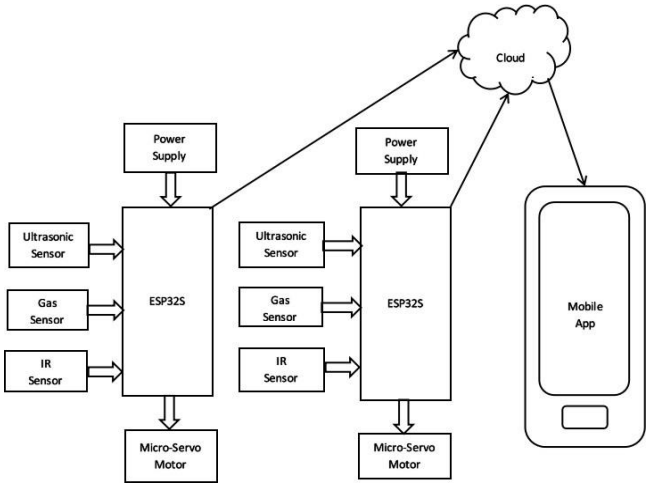

Figure 1: Architecture of proposed System

This proposed method provides real time monitoring to the garbage bins. These garbage bins have been assigned with a unique id which used to determine the garbage bin identity. The garbage bins are build with a sensor module (Ultrasonic sensor, Gas sensor, IR sensor) which continuously monitors the garbage level and harmful gases inside the garbage bin. IR Sensor for associate automatic open trash barrel which will mechanically open the lid once it detects the folks that wish to throw out their trash. Any moment the garbage level passes over the critical level (i.e 80%) or detects the gases, the system generates a notification to the monitoring panel (admin panel/garbage cleaning team). These details can be accessed by the concern authorities from their place with the help of internet and an immediate action can be made to clean the dustbins.

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IV. Hardware used in proposed system

IOT are connected to the web and controlled by the user through the internet and can also be called as web of things. The IOT is used with the hardware components to collect the data like the sensor that senses and gives the data to the IOT devices. Some of the hardware components used is described below.

1. ESP32S Microcontroller

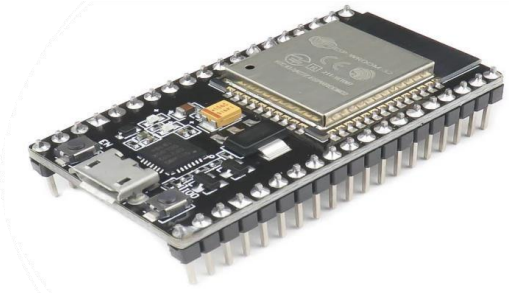

Figure 2: ESP32S Microcontroller

The ESP-32S is the latest version Wifi Bluetooth combo module is ultra-high performance and ultra-low-power consumption. Wi-Fi and Bluetooth combo wireless platform based on ESPRESSIF ESP32 chip-set.

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2. Ultrasonic Sensor

Figure 3: Ultrasonic Sensor

Ultrasonic sensors are used to calculate the distance between the objects by acoustic waves. The period taken for sound wave production and active use is also calculated.

3. Gas Sensor

Figure 4: Gas Sensor

The MQ4 methane gas sensor is extremely used for detecting gas leakage at home or in industries like Methane (CH4) & CNG Gas. This gas sensor is highly responsive in very little time, so based on the sensitivity requirements, it can be adjusted through a potentiometer.

4. IR Sensor

Figure 5: IR Sensor

IR sensor is the combination of IR LED act as transmitter and photo-detector act as receiver. An IR sensor can measure the heat of an object as well as detects the motion.

V. Results

The following are the results which obtained fromthis work,

- Waste Level detection inside the dustbin
- Transmit the information wirelessly to concerned
- The data can be accessed anytime and from anywhere
- Avoids the overflows of dustbins

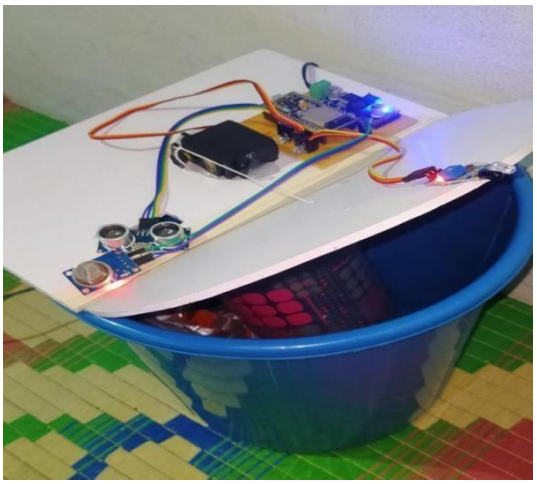

Figure 6: Smart dustbin

Figure 6 shows that smart dustbin in which the IR sensor is deployed to open the lid of the dustbin automatically by using servo motor, ultrasonic sensor is to detect the level of the dust inside the dustbin and gas sensor is to detect the gasesleaking from the dustbin.

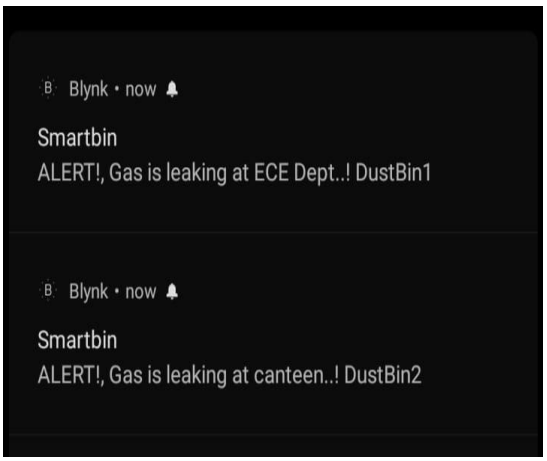

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Figure 7: Gas leaking alert notification

Figure 7 shows that gas leaking notification viablynk app.

Figure 8 : Dustbin full alert notification

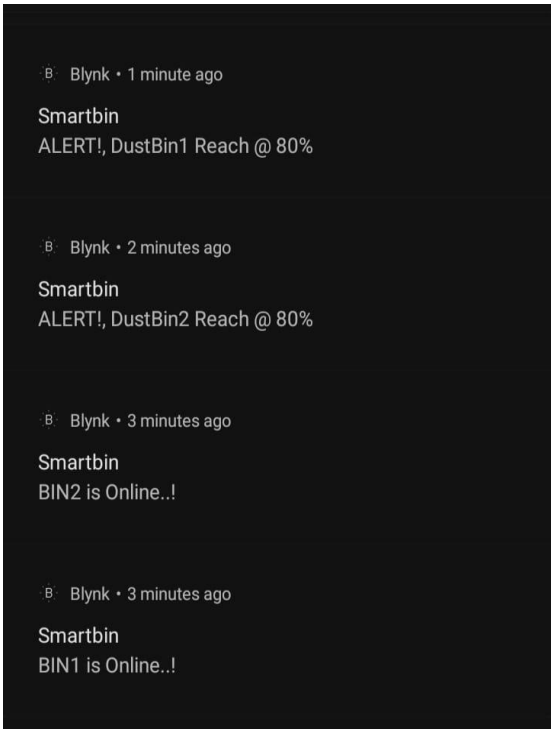

Figure 8 shows the dustbin fill notification at 80%of dustbin is filled via blynk app and also dustbin online notification.

Figure 9: Blynk app view

Figure 9 shows the blynk app view of the dustbins. Here we can gets the information about the level of garbage and level of gases inside the dustbins and we can also knows the mode of the dustbin whether it is how-long online or offline.

1. Conclusion

We have implemented real time waste management system by using smart dustbins to check the fill level of smart dustbins whether the dustbin are full or not. In this system the information of all smart dustbins can be accessed from anywhere and anytime by the concern person. By implementing this proposed system the cost reduction, resource optimization, effective usage of smart dustbins can be done.This system indirectly reducing traffic in the city. In major cities the garbage collection vehicle visit the area's everyday twice or thrice depends on the population of the particular area and sometimes these dustbins may not be full. Our System will inform the status of each and every dust bin in real time so that the concerned authority can send the

VII. Future work

The scope for the future work is the moisture

sensor can be implemented with the help of other sensors and the compartments for segregating the dry and wet waste can be created which will solve the issues related to waste segregation and also this system can be implemented with time stamp in which real-time clock shown to the concern person at what time dust bin is full and at what time the waste is collected from the smart dustbins

VII. References

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