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IOT BASED WASTE MANAGEMENT IN SMART CITY

Ms. N. Rajavizhi[1], Ms. P. Hamsaveni[2], Ms. P. Kavya[3], Ms. K. Priyadharshini[4]

[1] *Assistant Professor, Department of Information Technology, Jeppiaar SRR Engineering College, Chennai, Tamil Nadu, India*

[2,3,4] *Department of Information Technology, Jeppiaar SRR Engineering College, Chennai, Tamil Nadu, India*

Abstract - *Internet of Things (IoT) is enabled by the proliferation of various devices like RFIDs, sensors, and actuators. The Internet of Things (IoT), as expected infrastructure for envisioned concept of Smart City, brings new possibilities for the city management. IoT vision introduces promising and economical solutions for massive data collection. In many places, it can be seen that the Municipal garbage bins are overflowing and they are not cleaned at proper time. As a result of which the consequences are severe. The concept of the project is, the ultrasonic sensor which is placed in the dustbin will detect the depth of the waste and the data will be stored in the microcontroller. The stored data will be displayed on the webpage through WIFI. The water sensor will be placed on the top of the bin which will sense the raining water and closes the bin automatically. This system maintains dry waste and wet waste separately.*

***Key Words*: Sensors, IoT, Garbage bins, Waste management**

1. INTRODUCTION

Things (Embedded devices) 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 dust bins are connected to the internet to get the real time information of the smart dust bins. In the recent years, there was a rapid growth in population which leads to more waste disposal. So proper waste management system is necessary to avoid spreading some deadly diseases. The basic project idea is to design a smart waste detection system which would automatically notify the officials about the current status of various garbage bins in the city, would have real-time monitoring capabilities. The Ultrasonic sensor detects the level of the dust in dustbin and sends the signals to micro controller, which would be remotely controlled using IoT techniques.

2. EXISTING SYSTEM

In the existing system there is no indication whether the dustbin is full or empty. The corporation has to collect the garbage by weekly once or by 2 days once, though the garbage shrinks or overflows the bin and pollutes the environment. This will cause severe consequences. The rain water gets filled in the bin along with the waste which creates a bad smell.

Limitations of the existing system:

- Time consuming and less effective.
- High costs.
- Unhygienic environment.
- Cause illness to human beings.

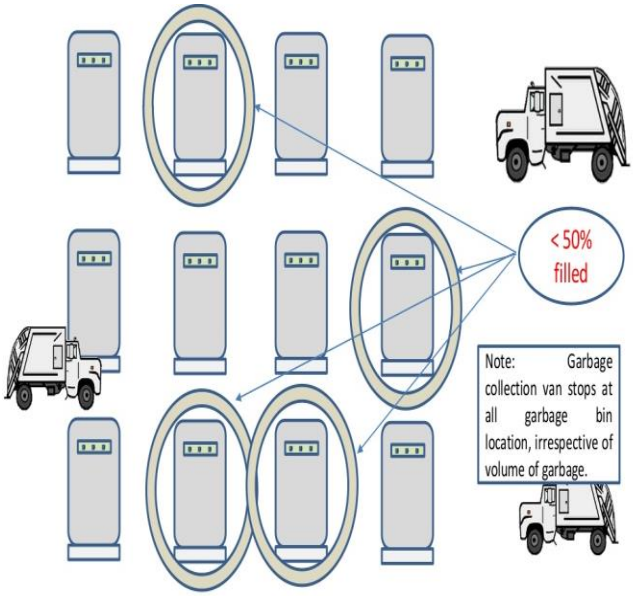

Fig -2a: wastage of time in collecting unfilled bins

3. PROPOSED SYSTEM:

The proposed method for the management of waste is efficient and time saving process. The ultrasonic sensor which is placed in the dustbin will detect the depth of the waste and the data will be stored in the microcontroller and displayed in the webpage. The water sensor will be placed on the top of the bin which will sense the raining water and closes the bin automatically and maintains dry waste and wet waste separately. This can be implemented at any place with ease and within reasonable amount of time and reliable with long distance coverage.

Advantages:

- It is a time saving process.
- It supports low cost of transportation (fuel consumption).

- The information will be updated every 5 minutes.
- Reduce human efforts.
- Enhancement of a smart city vision.
- Reduce environmental pollution.

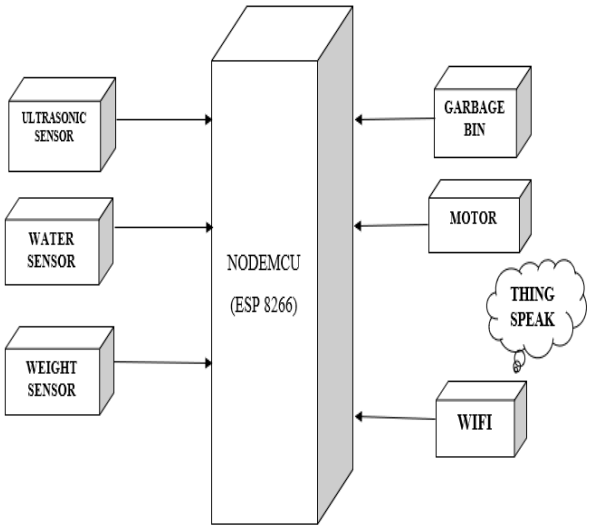

Fig -3a: Block diagram

4. MODULE DESCRIPTION

4.1 Sensing the data

The Ultrasonic sensor detects the depth(level) of the garbage present in the dustbin. This sensor transmits the ultrasonic waves within the range of 100cm. Ultrasonic sensor transmits the ultrasonic waves from its sensor head and again receives the ultrasonic waves reflected from an obstacle(object). If they hit any object, they reflect back echo signal to the sensor.

water sensors measure the volumetric water content indirectly by using some other property of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons. Once the wet waste gets detected by the sensor, the motor gets ON and the waste is dumped into separate space.

Rain drop sensor detects the water once it starts raining and close the bin automatically with the help of motor.

4.2 Analog to digital conversion

The data which have been retrieved from the sensor will be stored in microcontroller. The ESP8266 runs on anything from 2.8 to 3.5 volts. Most of us use a 3.3 volt regulated power source. The conversion consists of certain steps such as sampling, quantizing, encoding. The power adapter is used in which 230v is given as a input but the output will be in 9v.

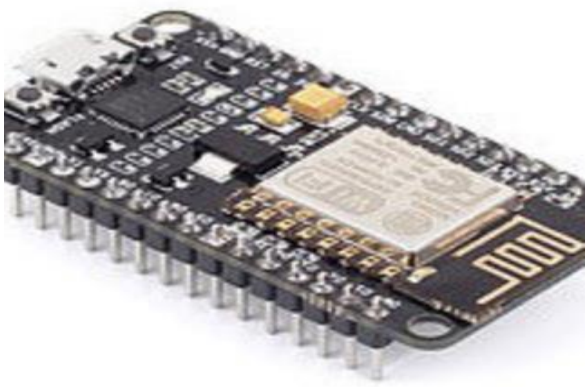

Fig -4.2a: Node MCU (ESP8266)

The microcontroller used is Node MCU (ESP 8266). The ESP8266 module is a IoT device consisting of a 32-bit ARM microprocessor with support of WIFI network and built-in flash memory. The data which have been retrieved from the sensor will be stored in microcontroller. It has got Micro USB slot that can be directly connected to the computer or other USB host devices.

4.3 Data storing

The data stored in the microcontroller is transferred to the SQL Database through WiFi. The WiFi is utilized with the help of inbuilt WiFi in the microcontroller.

The cloud server which is used in this project is Thing Speak. It is an open source Internet of Things (IoT) application and API to store and retrieve data from things using HTTP protocol over the Internet or via a Local Area Network. Thing Speak enables the creation of sensor logging applications, location tracking applications, and a social network of things with status updates. The data sensed from the ultrasonic sensor and weight sensor are stored in this cloud storage.

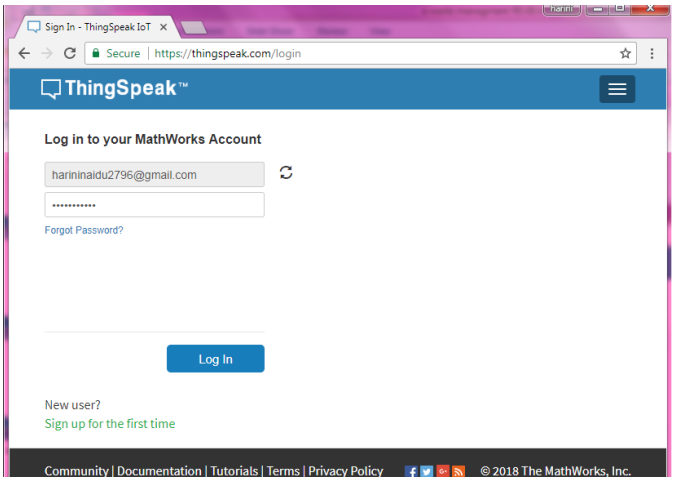

Fig -4.3a Login page

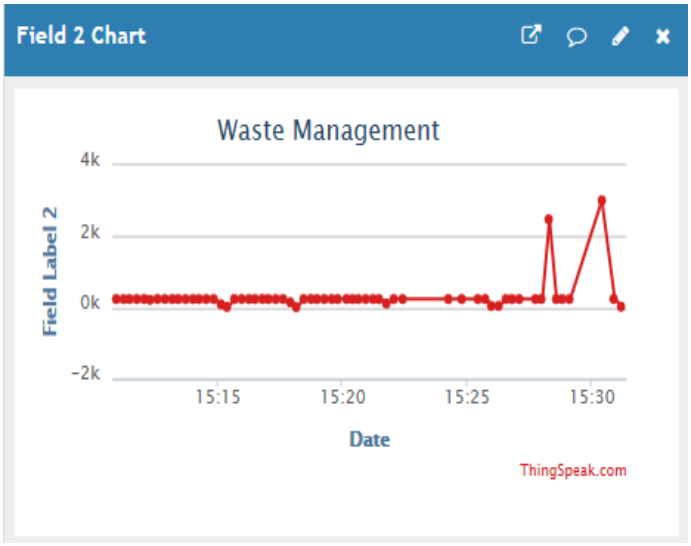

Fig -4.3b Display of garbage level

5. APPLICATIONS OF THE PROPOSED WORK

1. Waste Level detection inside the garbage bins. Transmission of the information wirelessly to concerned officials.

2. System can be accessed anytime and from anywhere.

3. Real-time data transmission and access.

4. Avoids the overflows of garbage bins.

5. This project can only be used by municipal authorities or other private firms to tackle the current problem of urban waste collection.

6. Improves Environment quality-Fewer smells-Cleaner cities.

7. This system has no individual use, but can be used by a city, state or a country.

8. Using this system, waste collection would become efficient and also reduction in transportation costs can be witnessed.

6. CONCLUSION

This project work is the implementation of smart garbage management system using ultrasonic sensor, microcontroller and Wi-Fi module. This system assures the cleaning of dustbins soon when the garbage level reaches its maximum. Therefore, the smart garbage management system makes the garbage collection more efficient. In real time, this setup can be implemented in the environment. This set up can also be implemented in Industry based areas. The future work may be implemented by interfacing the devices with google maps to find the optimal(shortest) path.

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BIOGRAPHIES

Ms. N. RAJAVIZHI
She is an Assistant Professor in the Department of Information Technology in Jeppiaar SRR Engineering College, Chennai, Tamil Nadu. She got her Master's degree in Software Engineering from Jayaram College of Engineering and Technology.

Ms. P. HAMSAVENI
Pursuing Degree in Information technology at Jeppiaar SRR Engineering College, Chennai, Tamil Nadu.

Ms. P. KAVYA
Pursuing Degree in Information technology at Jeppiaar SRR Engineering College, Chennai, Tamil Nadu.

Ms. K. PRIYADHARSHINI
Pursuing Degree in Information technology at Jeppiaar SRR Engineering College, Chennai, Tamil Nadu.