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Waste Segregation and Monitoring System Using IOT

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***Abstract*—** An The aim of the project is to implement an efficient method to manage the waste in big cities as well as small ones. The issue of disorganized garbage collection is the biggest hurdle in our everyday life to reduce it, an IoT system is developed that will keep track of each bin depending upon the level filled. This is through an electronic system which segregates wet and dry waste. A setup consists of several sensors which includes IR sensor for detecting the presence of any waste and soil moisture sensor to detect whether the waste is dry or wet. Here, whenever the IR sensor detects any waste, the motor will turn towards either dry bin or wet bin depending on the soil moisture sensor's value. Ultrasonic sensors are placed at the top of each bin and is used for calculating duration by sending a signal. The signal is thus used to calculate the amount of space available in the bin, thereby helps to clear the bin as and when the bin is near to full . It will show the notification on blynk cloud .

Keywords— Automated system, IoT, IR Sensor, Ultrasonic Sensor, Waste segregation

INTRODUCTION

The abundant increase in population led to the improper waste disposal. Managing the garbage consumes more time and requires a lot of man power. In recent years the waste disposal is becoming a huge cause. The most of common method of waste disposal is unplanned and it is dumped at the landfill sites this method causes ill effects to all living beings. This method can generate liquid leachate and other fungus which pollute the surface and underground water also accelerates harmful diseases which leads to the degradation of an aesthetic value of environment. In India recycling of solid waste is done by the ragpickers who play an important role in this process while doing the ragpickers get affected with many health problems such as skin infections ,respiratory problems the dependent of ragpickers can be reduced if the automatic waste segregation takes place in the dustbin. The wastes is segregated into basic main streams such as metallic ,dry and wet these waste has a large potential of recycled and reused . even through there are multiple industrial waste segregators present , it is always better to segregate the waste at source itself. The advantage of doing this type of segregation is, there is no need of rag pickers to segregate the waste Currently there is no such system for the automatic segregation of waste into dry and wet waste, the main purpose of this project is compact, low cost and user friendly waste segregation system for urban cities to streamline the waste management process.

I. LETRATURE REVIEW

There are various systems available that are used for learning web application development. Some of the systems are studied as follows.

A. Segregation System using IOT

Smart bins are a popular solution for waste segregation using IoT. These bins are equipped with sensors that can detect the type of waste that is being deposited, such as plastic, paper, or organic waste. The data collected by these sensors is then transmitted to a cloud-based platform where it can be analysed and used to optimize waste collection and disposal

B. IOT – based Waste Manegment System

This study proposes an IoT-based waste management system that uses ultrasonic sensors and a microcontroller to monitor the fill level of waste bins in real-time. The system also includes a mobile application that allows users to report any issues with the waste bins.

C. Dry and Wet Waste Segregation and Management System

It is a smart waste management system that uses IoT sensors to monitor the fill level of waste bins and provide real-time data on waste generation patterns. The system uses this data to optimize waste collection and disposal, reducing costs and improving efficiency.

D. . Automatic Segregation System using IoT.

It is a smart waste management system that uses IoT sensors to monitor the fill level of waste bins in real-time. The system uses machine learning algorithms to predict when a bin will be full and sends alerts to waste collection teams to empty the bin before it overflows.

E. Smart Waste Management System using IoT:

This study proposes a smart waste management system that uses IoT devices to monitor and segregate waste in real-time. The system includes sensors that can detect the type of waste and a machine learning algorithm that can classify the waste into recyclable and non-recyclable categories.

II.PROPOSED SYSTEM

We have developed a garbage classification system that can classify waste into two categorize i.e wet and dry , through sensors i.e Moisture sensor and IR sensor. The system also includes an Node MCU esp 8266 microcontroller and a servo motor that opens the appropriate bin based on the classification output.

It senses the moisture content of waste using the dielectric permittivity of the medium which is a function of water content. Then it sends the notification to the user whether this detected waste is dry or wet based on a previously set threshold value.

With the help of Servo motor, the wastes are moved into their respective bins. The IR sensors in both bins are used to detect the amount of garbage inside it. The system will check for moisture content of waste then it will segregate waste into dry or wet waste based on previously set values. If the bin is filled then the message will be sent to the user for collection of garbage, then the bin will be emptied.

III.SYSTEM IMPLEMENTATION

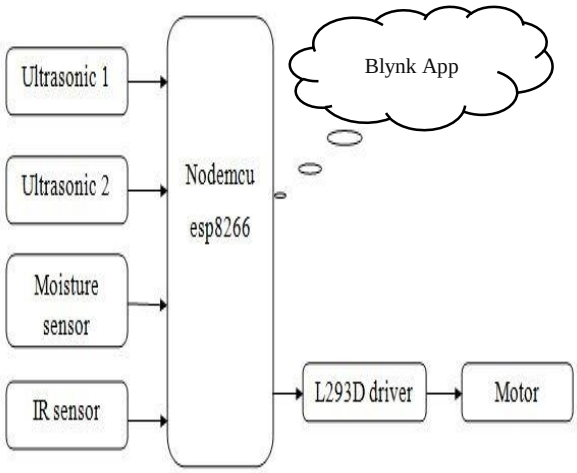


Fig 3 .1 : Block Diagram

Most of the times, the garbage bins are overflowing with excess waste and are scattered out in the street. These scattered wastes get either decayed or burnt in that place or overflows all over which leads to serious health issues to humans. The wastes which are dumped are segregated by Humans which leads to health problems to them. To overcome this problem a well organized waste segregation and monitoring system has been designed. It is an IoT based Waste Segregation and Monitoring system which is an innovative way to keep the cities clean and healthy. Since the population of our world is increasing rapidly, the environment should be clean and hygienic in order to lead a better life. This is a model for Waste Segregation for Smart cities.

The system uses electronic sensors and IoT applications to detect and segregate waste into two categories: wet, and dry waste, with the help of appropriate sensors deployed in each bin. The foremost goal of this project is to automatically segregate the wastes and to perceive the level of the dustbins which is delivered through wireless mesh network. With such information, litter bin providers and cleaning contractors are able to make better decision for the efficient disposal . IR sensor identifies the objects, Moisture and metal sensors detects the wet and metal waste. Ultrasonic sensor observes the levels of bin. The waste is dropped inside the bin where the sensor identifies the type of the waste. The Bin consists of three partitions inside were each bin collects each waste respectively. The motor then rotates and respective partitions gets opened and respective wastes are collected. The status of the bin is displayed in blynk server. The sub-bins for the different types of waste are made into two separate layers. The sub-bins are removable for cleaning purposes. The design uses a dual motor and tray mechanism. The waste is disposed off into a common waste tray, the only part visible to the user. It is detected by the IR sensor. This activates the moisture sensor which is fitted on the tray. There is a pre-set threshold value for classification as dry or wet waste. If the moisture sensor reading is above that value, it is classified as wet waste else it is classified as dry waste. The pre-set value may be suitably chosen to provide accurate segregation. The three bins for dry waste , wet waste and metal waste are fixed in position below, on the left and right sides of the tray. The Ultrasonic sensor senses the levels of the garbage in the bin. And the sensed data is sent through the node MCU Microcontroller

IV WORKING

Following Fig. describes the block diagram of the model. Node MCU esp826 is the microcontroller that controls the entire working of the system. The IR sensor is attached to a vertical panel, and it detects the presence of any garbage if it has been thrown by a user. Immediately as it detects the presence of any trash, the other two sensors, namely, the ultrasonic sensor and the soil moisture sensor get activated. As the item is dropped into the container, it lands on the soil moisture sensor that is fixed at top of the container. The moisture sensor measures the water content present in the waste item. Based on the content of moisture present in the item and its metallic properties, the scrap is classified into wet, dry.

- If the moisture level percentage present in the item is above a certain threshold value, 5% in this case, it can be classified as wet waste.
- If the measured moisture level is less than the threshold value (5%), it gets classified as dry waste.

The base of the system is circular, with a DC motor attached at its bottom. Two dustbins are placed on the circular base for two types of scraps. These bins are positioned at specific angles: 0° for dry waste, 90° for wet waste. After categorization, this base gets adjusted such that the respective dustbin gets placed exactly below the panel. Once the base gets adjusted, the flap present at the base of the panel opens, and the trash is dropped into the corresponding bins. A DC motor SG90 is attached to the flap as well, which allows it to act as a hatch for the vertical panel. An external voltage supply of 12 volts is sufficient for the entire operation of the system to operate. In this way, waste management and segregation are achieved using collaborative IOT technology.

The proposed model was structured by assembling all the components as shown in Fig. 2. The system requires a power supply for its proper functioning. With minimal power consumption by the model, this procedure for the classification of waste works with great efficiency. Firstly, the system detected the presence of the object and then sorted it into predefined categories. The presence of trash on the surface of the flap was picked up by the ultrasonic sensor. It was experimented with and tested by placing different kinds of presumably waste items, such as banana peels, moist tissue paper or wet cloth, lemons, etc., which were detected as wet waste, whereas dry cloth, cardboard, paper, and plastic were classified as dry waste. In order to classify an object as wet, we have used a moisture sensor. The minimum value of moisture content that should be present in the trash is set to 5%. This value can be increased or decreased as per the use case of the model. Things such as aluminum sheet, tin can lids, and keys were labeled as metallic waste by the inductive sensor. The sensors correctly identify the type of garbage, and it is dropped into the respective container.



Fig.4.1.Model of waste segregation and monitoring system using IOT

When the object is classified into any of the groups, the base of the model rotates according to the placement of the respective container to dispose of trash. This usable model functions very well, both for the categorization and the placement of the garbage into bins. This model can be implemented at public places or transportation hubs to prevent trash from accumulating and creating an unhealthy environment

IV. ANALYSIS AND RESULTS

This project can be used in our day-to-day life, which will be able to segregate the dry and wet waste.

• This system monitors the status of the bin and intimates it to the user.

• It avoids overflow of bins which in turn reduces the environmental pollution and hazards to human health.

• It enables the wireless transmission of data and its data can be accessed anywhere at any time. The proposed system can be implemented everywhere in the cities and also in urban areas to which pollution free and creates an environment friendly atmosphere which helps to lead healthy, hazardous free life. It saves the life of the people without causing hazards to life by avoiding the overflow.

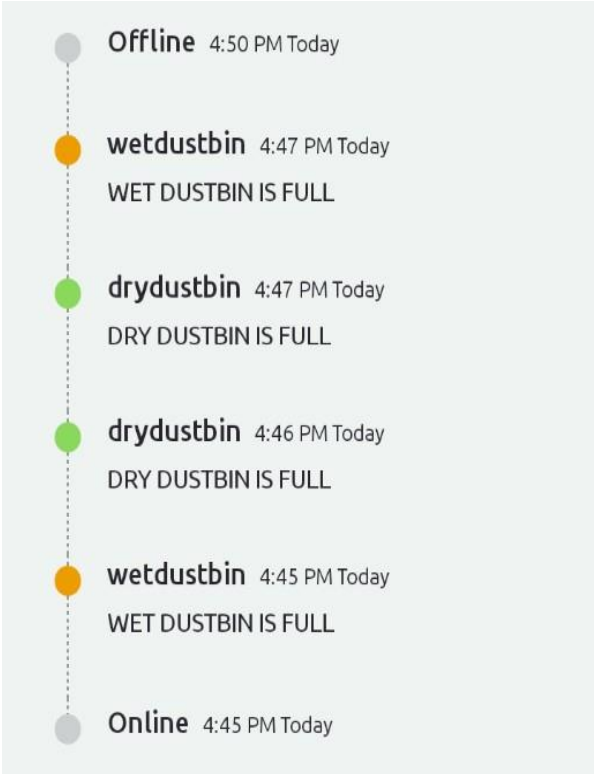


Fig 5.1 : Timeline of notifications





VI. CONCLUSION AND FUTURE WORK

This paper enhances the cleanliness of the smart cities by the practical application of "Automatic waste management and segregation system using IOT". With urbanization and increasing population, disposal of waste is a major concern. This proposed system is an effective waste segregation system that has no human intervention or interference to separate dry and wet waste. It provides timely collection and disposal. The proposed system can be deployed on a domestic scale in a household or a large scale in public places

The scope for the future work is 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.

REFERENCES

- https://www.researchgate.net/publication/349530230_Smart_Waste_Segregation_and_Monitoring_System_using_IoT
- International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 08 Issue: 08 | Aug 2021 www.irjet.net p-ISSN: 2395-0072
- https://www.pantechsolutions.net/iot-based-smart-waste-management-system-for-smart-city
- "Automatic Waste Segregator and Monitoring System", Aleena, Kavya Balakrishnan, Rosmi, Journal of Microcontroller Engineering and Applications 2016.
- "Smart Garbage Management System" Vikrant Bhor ,Pankaj Morajkar, Maheshwar Gurav , Dishant Pandya. (IJERT)2015.