



ANALYSIS ON SMART GARBAGE MONITORING AND MANAGEMENT SYSTEM USING INTERNET OF THINGS

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ABSTRACT

Swachh Bharat Abhiyan, also known as the "Clean India Mission" or "Swachh Bharat Mission," is a nationwide initiative by the Indian government to clean up the nation's streets, roads, and infrastructure. It covers 4,041 statutory cities and towns. With the rise of Internet of Things (IOT) devices like smart phones, sensors, and cameras, the mission's goal is to cover all of the nation's rural and urban regions in order to showcase this nation as an ideal country to the rest of the world. It is feasible to gather a significant amount of trash. In large cities, it is impossible to examine every location to see if the waste dump yard is full or not. So we have used ultrasonic sensor based dustbin levels monitoring based on that it will identify dustbin status automatically. This is a sensor which intimates about the load placed on it. So that the garbage can also be checked in this way. Ultrasonic sensor detect the garbage levels in dustbin and update to web server page automatically, if dustbin full the data automatically gives alert message to the municipality department through internet communication. IoT module interfaced to the controller through which the data is available in the internet.

Keywords: Ultrasonic sensor, IR sensor, Dc motor, Lcd

INTRODUCTION

Dustbins are tiny plastic (or metal) containers that are used to temporarily store rubbish (or waste). They can also be referred to as garbage bins or trash cans. They are frequently used to collect rubbish in houses, workplaces, streets, parks, etc. Small rubbish must be disposed of in public trash cans since littering is a significant crime in several countries. Typically, it is accepted practice to utilize separate bins to collect recyclable and non-recyclable debris that is either wet or dry.

In this project, I've created a straightforward system called a Smart Dustbin that makes use of a NODE MCU, an ultrasonic sensor, a DC motor, and an IR sensor. When a human hand is detected, the dustbin's lid will automatically open. The clever trash can is a deliberately designed solution that solves the social issue of waste disposal; the smart dustbin identifies the kind of material being thrown inside it and segregates it into bio or non-biodegradable.

We are living in an age where tasks and systems are fusing together with the power of IOT to have a more efficient system of working and to execute jobs quickly! With all the power at our finger tips this is what we have come up with. The Internet of Things (IoT) shall be able to incorporate transparently and seamlessly a large number of different systems, while providing data for millions of people to use and capitalize. Building a general architecture for the IoT is hence a very complex task, mainly because of the extremely large variety of devices, link layer technologies, and services that may be involved in such a system.

LITERATURE SURVEY

First is the traditional method or the normal use of Dustbin in our daily life. Each and every person in the world disposes the waste in the dustbin and if the dustbin becomes full, he empties the waste inside the bin and again uses the same Dustbin. This is the basic use of a normal dustbin where no components are used, no coding is done and where everything is manual i.e. everything is done by hand. No batteries, no electronic components such as Arduino, NODE MCU are used. Only way of disposal is open the lid of the

dustbin and dispose the waste in it and clean or empty it when it becomes full. When the same thing is applied in a neighbourhood or in a colony, the waste becomes more to dispose and if the dustbin is full people start throwing the waste around the dustbin which leads to different diseases.

EXISTING METHOD

The maintenance of the bin is not proper where overflowing of the waste from the bin, overflow of dustbin which leads to pollution. These are unhygienic so, it affects the environment. Each and every person in the world disposes the waste in the dustbin and if it is full, they empty the waste inside the bin. This is the basic use of a normal dustbin where no components are used, no coding is performed, and everything is manual 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.

PROPOSED SYSTEM

The aim of the mission is to cover all the rural and urban areas of the country to present this country as an ideal country before the world. With the proliferation of Internet of Things (IOT) devices such as smart phones, sensors, cameras. It is possible to collect massive amount of garbage. In the metropolitan cities it is not possible to check each and every place where the garbage dumpyard is full or not. So we have used Ultrasonic sensor based dustbin levels monitoring based on that it will identify dustbin status automatically. This is a sensor which intimates about the load placed on it. So that the garbage can also be checked in this way. Ultrasonic sensor detect the garbage levels in dustbin and update to web server page automatically, if dustbin full the data automatically gives alert message to the municipality department through internet communication. IOT module interfaced to the NODE MCU through which the data is available in the internet.



FIG 1: PROPOSED SYSTEM

SOFTWARE

When you use the Node MCU with the Arduino IDE, it will write directly to the firmware, of NodeMCU erasing the original firmware, So if you want back the Lua SDK, use the “flasher” to re-install the firmware.

Dustbin Telegram Alert is developed in Arduino sketch which utilizes nodeMCU to push an alert message to telegram bot. It is used to detect the presence of dust inside the dustbin. Once the dustbin is filled, it will send an alert message to telegram bot. It utilizes Ultrasonic sensor to detect the dust inside the dustbin and nodeMCU to push an alert message to the telegram bot. system is to improve the garbage collection methods by making smart dustbin mobile application that helps garbage collector to collect garbage.

EXPERIMENTAL RESULT

The prototype is constructed as follows: Taking a plastic container or a dustbin, placing an IR sensor at the front part of the dustbin. The lid of the dustbin is taken and a DC motor is placed on the lid. Ultrasonic sensor is placed inside the dustbin. The code of this project is divided into two parts. The first part code indicates the working of the dustbin i.e. mainly opening the lid of the dustbin. The second part code

indicates the notification part which is received on the mobile using the Telegram bot app. The Ultrasonic sensor placed in the dustbin has four pins named Vcc, GND, ECHO and TRIG. trig and echo pin connected to 32,33 pins of (data pins) of NODE MCU.

In this project, we use an IR sensor which is also known as a proximity sensor. This sensor will send a high output whenever it detects some obstacle in its range otherwise its output is low. For opening and closing the lid of the smart dustbin we use a DC motor. The Arduino is programmed in such a way that if the IR sensor detects someone near the dustbin the dc motor will rotate to open the lid and after a delay of some time, the DC motor will rotate again and closes the lid. In this way, the Smart dustbin works and helps to maintain the hygiene of the place.



Fig.2 Experimental setup Ultrasonic sensor placed inside the dustbin is responsible for monitoring the level of garbage. The level detected by the ultrasonic sensor is shown on the LCD screen.



Fig.3 Garbage level detection Now the waste is collected inside the bin.

The NodeMCU is connected to a Wi-Fi

hotspot or a connection that is known by giving its SSID and PASSWORD which are required to connect to a particular network connection. The Ultrasonic sensor detects the level of distance of waste inside the bin and message is sent when the bin is full through telegram bot.

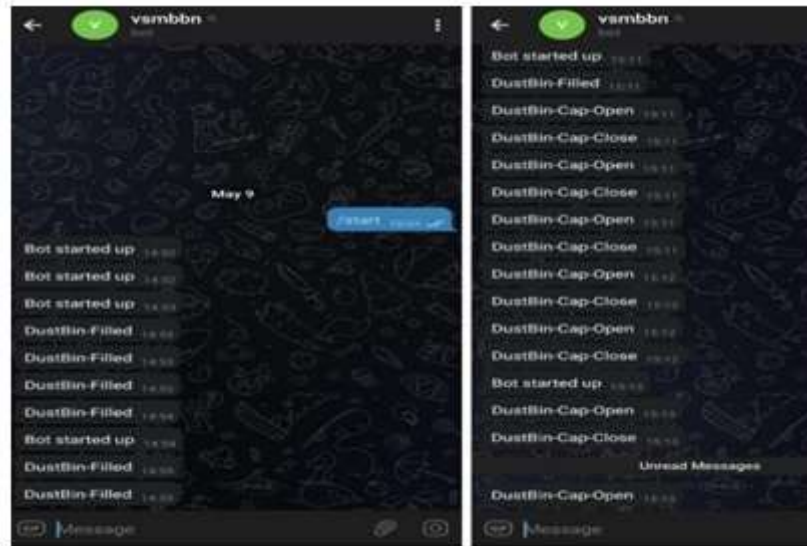


Fig.4 Message sent to Telegram bot by wifi module

ADVANTAGES

1. It saves time and money by using smart waste collection bins and systems equipped with fill level sensors. As smart transport vehicles go only to the filled containers or bins. It reduces infrastructure, operating and maintenance costs by upto 30%.
2. It decreases traffic flow and consecutively noise due to less air pollution as result of less waste collection vehicles on the roads. This has become possible due to two way communication between smart dustbins and service operators.
3. It keeps our surroundings clean and green and free from bad odour of wastes, emphasizes on healthy environment and keep cities more beautiful.
4. It further reduces manpower requirements to handle the garbage collection process.
5. Applying smart waste management process to the city optimizes management, resources and costs which makes it a "smart city".
6. It helps administration to generate extra revenue by advertisements on smart device.

CONCLUSION

By employing smart trash cans, we have put into place a real-time waste management system that verifies whether the trash cans are full or not. The concerned individual may view all of the smart trash cans' information in this system from any location at any time, allowing him or her to make an informed choice. Implementing the suggested method will result in cost savings, resource optimization, and efficient use of smart trash cans. The city's traffic is indirectly decreased by this technique. Depending on the population of the region, the garbage collection van may visit the area twice or three times each day in big cities, and the dustbins may not always 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 garbage collection vehicle only when the dustbin is full. 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.

FUTURE ENHANCEMENT

This method described above is to move towards IOT implantation. All smart dustbin methods based on IOT are very helpful for cleaning the waste. An Ultrasonic sensor utilize the maximum



peaks of rubbish on a dustbin. Many devices may be used in a variety of systems. The problems of foul odour and manual controlled mobility calls for the future scope which includes the odour control mechanism to get rid of foul smell of organic garbage. Also, realising the requirement of an autonomous dustbin, GPS module can be implemented for path planning combined with Ultrasonic sensor for obstacle avoidance.

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