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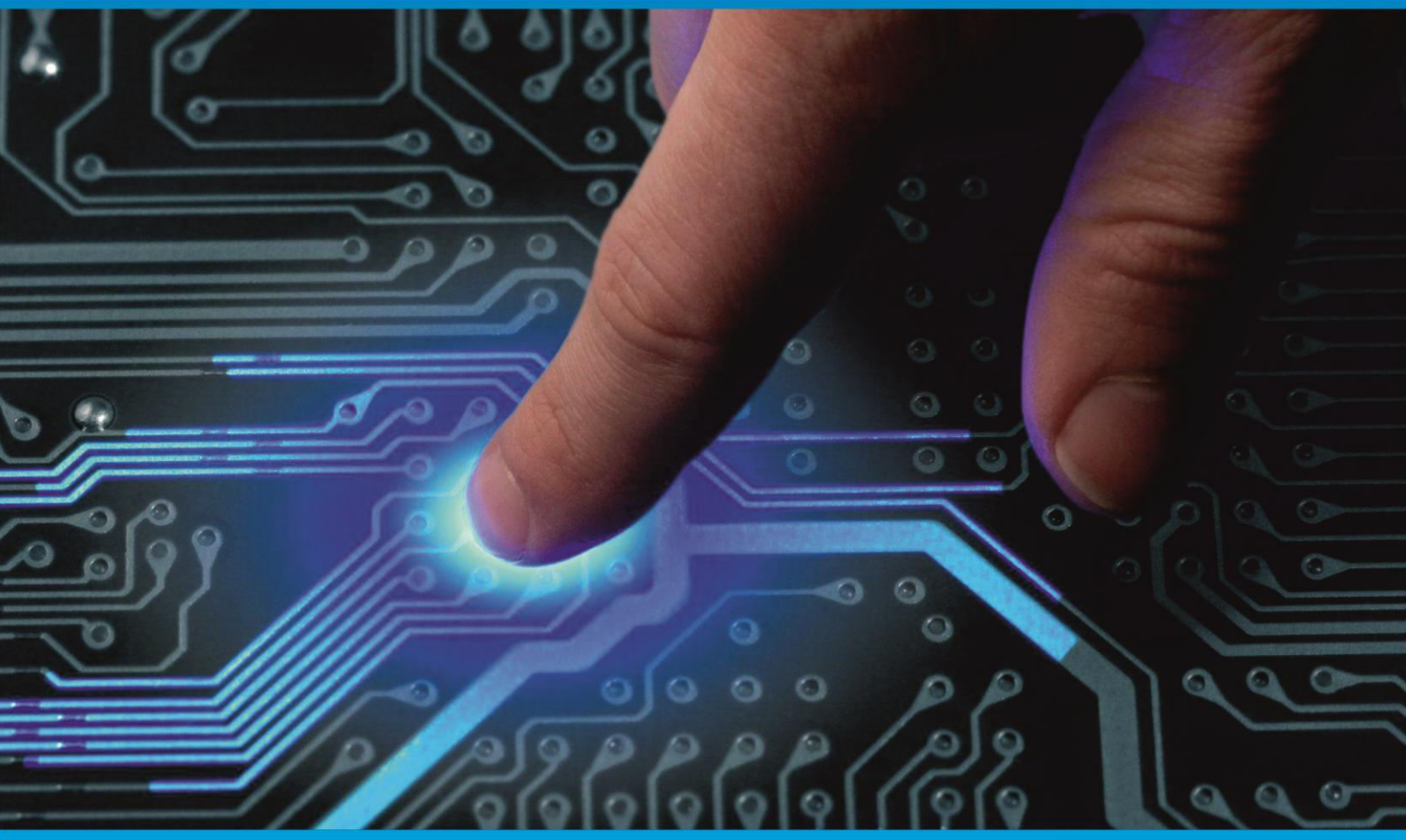

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Smart Waste Bin using IOT

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ABSTRACT: The smart bin is designed in such a way to solve the social issue of waste disposal. Our project aims to find a solution by using a smart bin which is GSM and GPS enabled. It is also implemented with a programmed chip and Ultrasonic Sensor. Our smart bin is connected with a mobile application helping to notify once the smart bin has reached it's weight limit, signalling respective organizations to collect. Since it's GPS enabled, locating the smart bin would not be difficult wherever it is.

KEYWORDS: IOT, Waste Management, GPS , GSM, Ultrasonic Sensor.

I. INTRODUCTION

Environmental issues square measure raised by trendy cities for waste assortment and disposal. Therefore, sensible waste management systems became essential for cities that aim to cut back value and manage resources and time. Currently, the trend is shifting towards sensible devices and net of things (IoT) solutions to beat common issues like waste management problems. Optimizing the strategy of garbage pickup is that the most purpose of the sensible solutions provided by business. However, the worth of applying such solutions remains comparatively high. the aim of this work is to gift a cost-effective sensible garbage can for localized and small-scale cases, like little parks, university field and hospitals. The literature of this paper can gift a literature review of past connected papers and industrial solutions. Then methodology and strategies section can make a case for the work of the system and every one the hardware and package utilized in this work, besides the look of the sensible ash-bin. Finally, the results of tests are mentioned followed by conclusions and future work

II. RELATED WORK

The most current connected work is done by Zavare and his colleagues on device nodes connected to an Arduino board primarily based management station, that uses a GSM module to send the device nodes information by SMS to the rubbish assembling vehicle and to a server hosting net application by a Wi-Fi affiliation. The device nodes of the sensible bins have faith in the supersonic device to sense the fullness share in line with pre-calculated bin depth. Moreover, a GPS module is employed to get the bin location. The GPS module and the supersonic device are controlled by Amica R2 NodeMCU microcontroller board that encompasses a constitutional Wi-Fi module, that's wont to hook up with the management station. Another work on wireless device network is finished by Singh, Mahajan and Bagai. The bins in his work ar equipped with an measuring device device to sense the gap and shutting of the bin lid, a temperature and wetness device to envision the current organic waste, and an supersonic device to sense the fullness standing of the bin. of these sensors ar controlled by Zigbee professional microcontroller board, that encompasses a constitutional Wi-Fi module that's wont to send the sensors information to a entry. This paper conjointly used the same sort of microcontroller board in the entry to receive the bins information and send it to an impression station, that contains a server, over GPRS. The server in the management station depends on Caspio information management system with a net primarily based interface. A paper by Navghane, Killedar and Rohokale examined the employment of weight device and 3 IR sensors to envision the fullness standing of the sensible bin and send the sensors information to

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a net page over Wi-Fi network to a mobile phone. The microcontroller board used in this paper was ARM LPC2148. A report was done by students of American state polytechnic institute State University, completely exploited the economic and power consumption aspects of changing a standard outside trash bin into a sensible one. According to the literature, the project is primarily based on ublox C027-U20 microcontroller board, that has constitutional GPS module and cellular module. The board is used to management HC-SR04 supersonic device, that measures

III. PROPOSED SYSTEM

A. *Architecture:*

- The proposed system with each component.

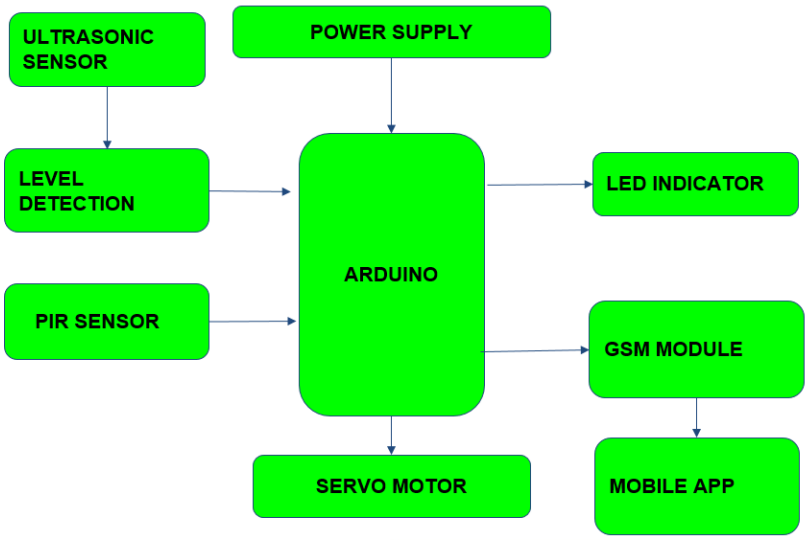

Fig.1.System Architecture

B. *Flowchart:*

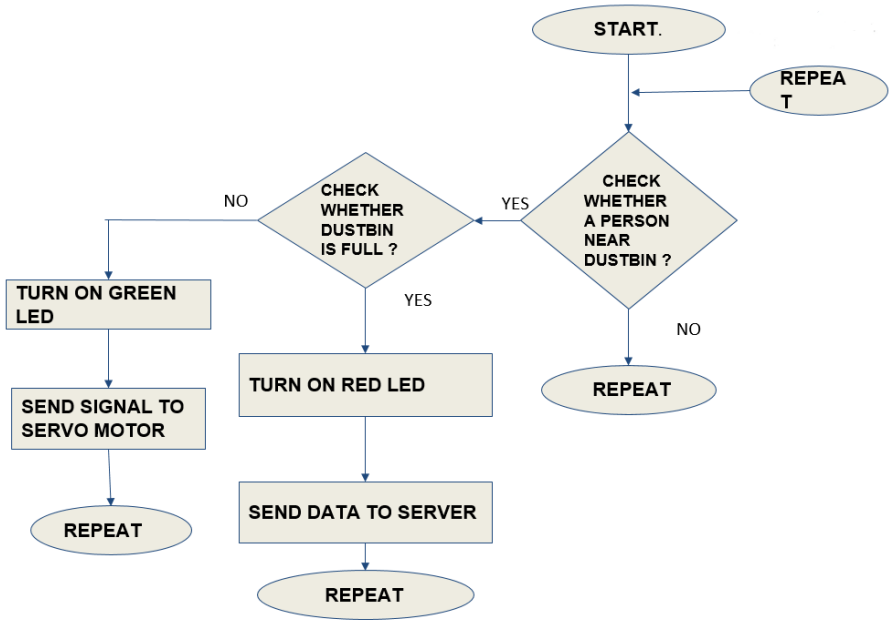

Fig.2.FlowChart

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C. *Circuit Diagram:*

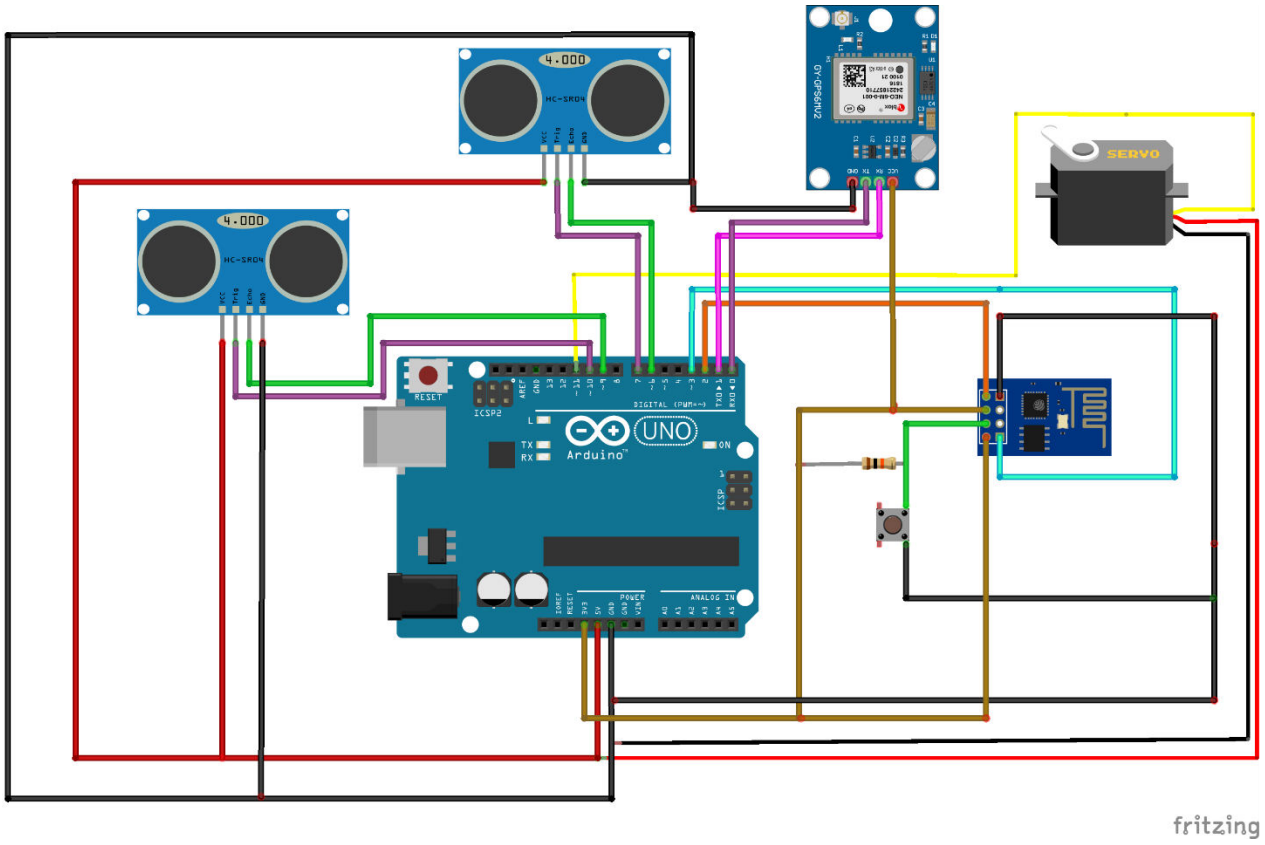

Fig.3.Circuit Diagram

D. *Methodology*

In light of IoT technology, waste management is an important service that is supported by IoT. In today's time, waste management is a collective issue in most countries, which needs uninterrupted importance for management. In traditional waste management systems, the rapid growth of garbage leaves the public places unhygienic and dirty. The unhygienic environment can cause various deadly diseases. The prior research focused on the centralized system for waste management that is managed by a central authority. In this study, we are proposing a smart waste management system for real-time monitoring of "trash bins" in order to take timely actions for cleaning the bins and maintaining a disease-free environment for the people. The working of the bin is explained below: If a person comes with a rubbish near to the bin, the Ultrasonic sensor present in the bin detect the person and sends a message to the Arduino and it calculates the length of the person and bin and drive it to the servo motor and slowly opens the lid. When the person disappears from the location, the ultrasonic sensor checks whether there is any obstacle or not and sends a message to Arduino. Arduino drives the message to servo motor and the lid is slowly closed. If any changes occurred to the length of the bin the level of the bin, latitude longitude will be send to the server. This process repeats every 30secs if there is a change or not. For this Purpose there will be an ultrasonic sensor placed at the top of the bin to check the length of the bin. In case of application google map is connected to the app and using this we can locate the bins present in the town.

There will be 3 colored bins present in the map and they are:-

- Yellow = Indicates the bin is partially filled.
- Red = Indicates the bin is full and ready to pick up.
- Green = Indicates the bin is empty.

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If we click on the bin it will show the percentage of waste present inside the bin and there will be navigation to bin available

IV. RESULTS

The smart bin was tested first indoor with the power bank. The system worked as intended for it to do. Then the bin was installed outdoor in the main building of Mea Engineering campus for a period of seven days. However, after examining the CSV files on the Micro SD card, the realization was that the Ultrasonic sensor kept going off and interrupt the Arduino board to play the audio message. The main reasons behind this behaviour are heat exposure and reflected sunlight from objects inside or around the bin, even though the Ultrasonicsensor datasheet points that the operating temperature of the sensor is between -30O C to +70O C. The data sheet also noted that light and wind flow can be considered as interference sources. Therefore, a second outdoor test was done for another seven days with the Ultrasonic sensor is disabled. Despite that, the bin did not get full during this period but the system sent SMS fullness message every time fullness status simulated by putting an obstacle in front of the ultrasonic sensor.In terms of power consumption, the measured current drawn by the whole system was 400mA, despite that the GSM module has a power rate of 2W/5V. According to the measured current, the power bank will last for 30 hours. This is can be feasible during summer long days, as shown in the first test. However, the GSM module has a sleep mode which reduces the current consumption of the module to 1.5mA during the idle period. This mode could not be implemented because of the power bank is designed to be automatically turned off
when the power consumption is too low.

The pictures of prototype model.

Fig.4.Model Bin

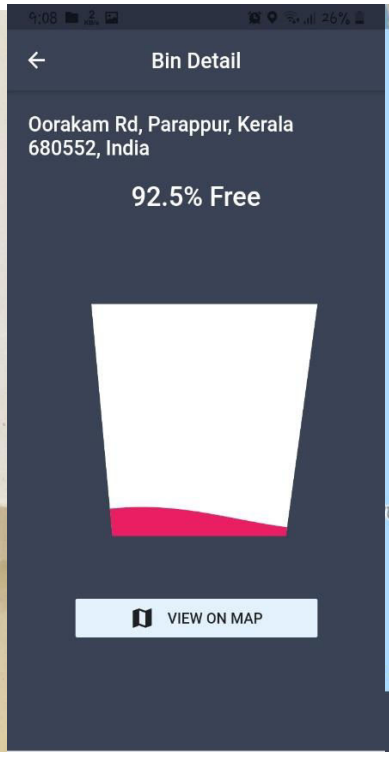

Fig.5 Bin Status on App

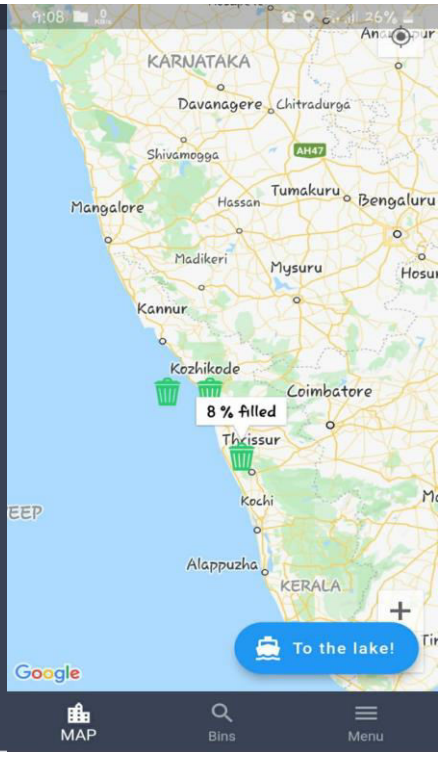

Fig.6 Bin location on App

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Table 1 shows the overall cost of the system without the cost of the bin itself, because of the system can be applied.

Table 1. Overall cost of the system

SN.	Component	Cost
1	Arduino	400
2	Ultrasonic sensor	200
3	GSM Module	900
4	Jumper Wires	60
5	Power Bank	500
6	LED	20
7	Servo Motor	150
8	Bread Board	100
	Total Cost	2330

V. CONCLUSION AND FUTURE WORK

The smart bin designed by us is an innovative solution to the waste management problem that our nation faces. We believe this smart bin to be answer of some of the question posed by our garbage collection system also it would help improve the effectiveness of the municipal department trying to clean our nation under the shade of "SWACHH BHARAT INITIATIVE".In the future, the model may be extended to an alternate and the shortest path finding for collecting vehicles in order to enhance transportation and remove collecting barriers. In addition, adding alternate sources for connectivity in case of power failure or weather hindrance may also be considered. Further, to facilitate the mechanism and save more energy, automated segregating trash bins can be installed for dry, wet, and hazardous types of wast

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