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Smart Dustbin Management System Based on IoT

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SMART DUSTBIN MANAGEMENT SYSTEM BASED ON IoT

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ABSTRACT

In this project, smart bin is constructed on a micro-controller based platform Node MCU, PIR sensor and Ultrasonic sensor. Ultrasonic sensor is placed at the top of the dustbin which will measure the level of the dustbin and also PIR sensor used with buzzer to indicate if bin is filled. if the dustbin reaches the maximum level, ultrasonic sensor will trigger the Node MCU which will send the message to authority that the dustbin is filled and process updated in IOT platform. We can also determine the usage of non-biodegradable wastes based on the filling count of dustbin in particular area.

Keywords: *Ultrasonic sensor, Node MCU, IOT.*

1. INTRODUCTION:

More than 1.3 billion populations are present in India; Wastes are the one which grows with the growth of the country so Segregation of waste is important thing to do. For proper disposal of waste we must built the modern dustbin which satisfy economical need and gives the way to prefect management system. Thus the improvement of the solid waste management system is much needed in recent time and proper way to monitor the status of solid waste dustbin in real time which confirming green environment and gives proper outlook of national streets and roads[4]. At present condition, the volume of generation of municipal solid waste (MSW) is increasing rapidly with the increase of population, economic growth, industrial development, change in consumption habit and life style of urban population. It became a great challenge to manage MSW to the authorities in charge for waste management. Non-biodegradable waste are most important things that should be in under control, exists amount of non-biodegradable waste infects the groundwater penetration and being pollutant to our society [1].

2. EXISTING SYSTEM:

For detection of solid waste in dustbin, weight sensors and IR sensors are already in the use. IR and weight sensors were practically not successful. But here we are using ultrasonic sensors which give us direct information about percentage of trash in the dustbins [4]. In existing system interfacing microcontroller tool is based on the platform of Arduino Uno which is practically slow at configurations. Ultrasonic sensors is advantageous over weight sensors because weight sensors only tells us about the weight of the garbage, but this does not let us know the level of garbage in the bins [2].

3. LITERATURE SURVEY

TITLE	ISSUED	METHODS USED
Design and implementation of smart Trash bin	Academic Journal of Nawroz University (AJNU) on June 2019	Using weight sensors interfaced with Arduino
Waste Management System Based On using IoT	International Research Journal of Engineering and Technology (IRJET) Volume: 05 Issue: 03 | Mar-2018	Uses ultrasonic sensors to detect and GSM for messages
Challenges and Opportunities of Waste Management in IoT-Enabled Smart Cities	IEEE TRANSACTIONS ON SUSTAINABLE COMPUTING, VOL. 2, NO:3, SEPTEMBER 2017	Using cameras to detect the level. Rf ID to detect the dustbin for collection on daily basis
Smart dustbin for economical growth	Research gate on VIT University on MAY 2107	Uses Arduino and GSM module to send messages

TABLE 1: LITERATURE SURVEY

4. PROPOSED SYSTEM

A Dustbin is connected to the level detector (ultrasonic sensor) and with PIR sensor which indicates that the dustbin is filled by creating beep sounds in buzzer, thus buzzer is attached with bin to indicate no more waste products are accepted,
Here we using separate dustbins for Bio degradable and Non-Biodegradable wastes Data received from the ultrasonic sensors from the both the dustbins are interfaced with Node MCU [6]. If the dustbin is filled a normal SMS is sent by Node MCU using IoT platform to the local sweeper to remove the wastes from the bin finally dustbin is squashed in proper interval of time, and count of filled dustbin is monitored via web server. so we can easily detect the count of dustbins with filled Bio and non-Biodegradable waste. If the usages of non-biodegradable things in the particular area is very high, it can be detected by wastage non-biodegradable in that area. We can reduce the usage of non-bio things in those area with the help of filling count.

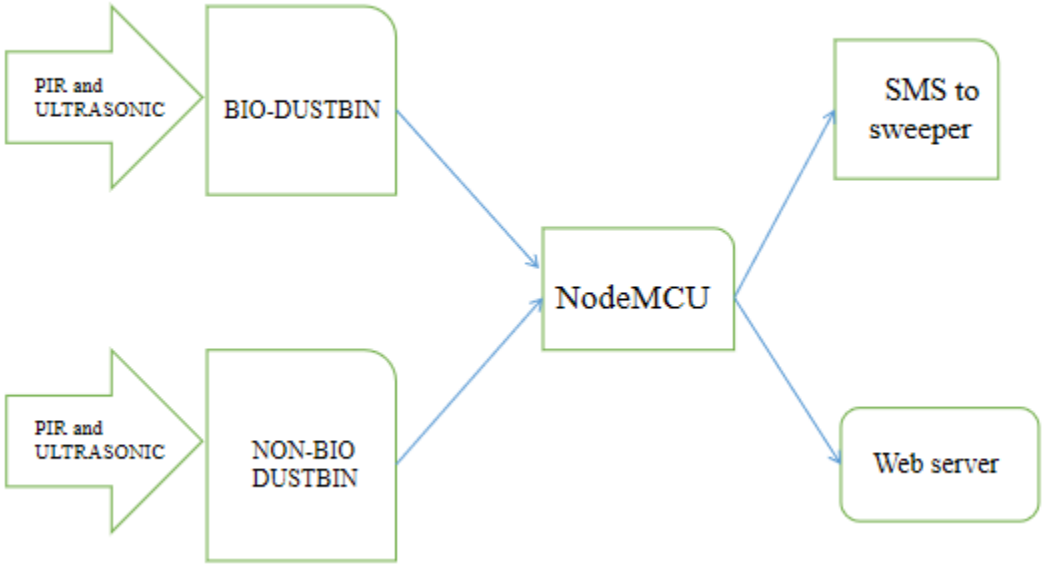

Fig.1: BASIC BLOCK DIAGRAM

Components used for the circuits are

- Ultrasonic sensors
- PIR sensors
- Node MCU
- Buzzer
- Bread board
- 5V battery for power supply

A. Ultrasonic sensor

An ultrasonic sensor is an instrument that generally measures the distance to an object using ultrasonic sound waves, the working principle of this module is simple as follow. It sends an ultrasonic pulse out at 40kHz which travels through the air and if there is an obstacle or object, pulse will bounce back to the sensor [8]. By calculating the travel time and the speed of sound, the distance can be calculated.

Fig 2: ULTRASONIC SENSOR

B. PIR sensor

PIR sensor detects a human being moving around within approximately 10m from the sensor. As the actual detection range is between 5m and 12m. PIR are made of a pyroelectric(passive) sensor, which can detect levels of infrared radiation [8]. Most PIR sensors have a 3-pin connection at the side or at the bottom. One pin for the ground, another pin will be signal and the last pin for power. Power is usually up to 5V [9].

Fig 3:PIR SENSOR

C. Node MCU

Node MCU is an open source firmware developed for ESP8266 Wi-Fi chip. By exploring functionality with ESP8266 chip, Node MCU firmware comes with ESP8266 Development kit. Since Node MCU is open source platform, their hardware design is open for edit/modify/build [8]. The ESP8266 is a low-cost Wi-Fi chip developed by Espress if Systems with TCP/IP protocol. Node MCU Kit has Arduino like Analog (i.e. A0) and Digital (D0-D8) pins on its board. It supports serial communication protocols [10].

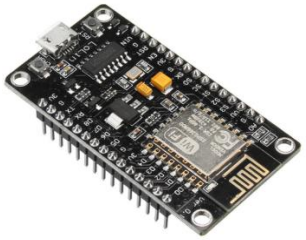

Fig 3: Node MCU

D. Buzzer

A buzzer or beeper is an audio signaling device, which is piezoelectric, which needs voltage with different frequency so that it can make sound accordingly. The pitch becomes louder when the frequency gets higher[10].

Fig 4: BUZZER

5. RESULT

This system assures the cleaning of dustbins as soon when the garbage level reaches its maximum. It ultimately helps to keep cleanliness in the society. Detecting the area with high quantity of non-biodegradable waste exceeding the extremity which leads to eco-friendly environment.

References

1. Dr.Anilkumar C.S, “A Smart Dustbin using Mobile Application”, International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-8 Issue-11, September 2019

2. Anuarg Tiwari Sr. Asst professor, “Solid Waste management” -case study, Artical-January 2015.

3. S. Navghane, M. S. Killedar, and V. M. Rohokale, “IoT Based Smart Garbage and Waste Collection Bin,” Int. J. Adv. Res. Electron. Commun. Eng., vol. 5, no. 5, pp. 1576–1578, 2016.

4. Prof. Nagaraju urlagunta, “Smart Tashbin” , VIT University ,Trash bin case study , Artical-May 2018.

5. aDr.Sapna Suryawanshi, “Waste Management System Based On IoT”, International Research Journal of Engineering and Technology (IRJET) Volume: 05 Issue: 03 | Mar-2018

6. TWINKLE SINHA, “SMART DUSTBIN”, International Journal of Industrial Electronics and Electrical Engineering, ISSN: 2347-6982 Volume-3, Issue-5, May-2015

7. Dr.Venkata Siva Reddy.R(2017) “Smart Solid and Liquid Waste Management Using IoT” CiiT International Journal of Programmable Device Circuits and Systems, Vol 10, No 1, January 2018 ISSN: 0974 – 9624

8. www.maxbotix.com

9. www.electronicwings.com

10. www.instructables.com