

# Smart Bio Dustbin

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## ABSTRACT

This paper aims to explain the applications made to help medical field. We saw that in hospitals all type of garbage e.g. degradable and non-degradable are throw in same dustbin. Because of these the things which is recyclable and used up by doctors again are also wasted. These types of garbage are hard to organize and also cause many diseases.

**Keywords-Smart:** Waste; Bin; Management; Disposable; Pattern

## I. INTRODUCTION

According to the existing process, government let the households and other entities to categorize their waste by themselves before it collects by collectors. This is not a successful system, as it is not going to be a motivating factor for people and organizations for the classification of wastes. Because the trash that is used for the removal of the waste is being used by every single person in the world. The most important thing is that you can find in your local community for the disposal of waste into the trash bin. The Smart Bio Dustbin is not an ordinary garbage dump, where anyone can throw trash, besides this it includes some of the equipment that has been running for a more efficient operation [1]. A Smart Trash can that is integrated with some of the hardware components such as the Arduino UNO, servo motor, ultrasonic sensors, ESP32 camera module. These items can help when you open the lid to search for a person by means of object detection, camera [2].

## II. LITERATURE REVIEW

First of all, it is the traditional method or the use of the rack in our day-to-day life. Everyone else in the world, throwing garbage in recycle bin, and the bin is completely destroyed, the debris in the basket, which is then re-used in the same basket [3]. This is the most important application of the normal recycle bin, in which no function has been used, no encoding will be done, where everything is done by hand, that is, everything has to be done by hand. Components like Arduino, ultrasonic sensor, camera module is used. The only way to get them out of the opening lid of the trash container to throw out the garbage and clean it, and clean it when it is full [4]. The official, who was to empty the basket, it will periodically clean the litter will be on the line in this hotel for a couple of weeks, as the cause of an unhealthy environment, and lead to a variety of illnesses. Internet of Things (IoT) is generally utilized in interfacing gadgets and gathering information data [5].

The maintenance and servicing of the unit is not only in the area of the lid is broken, which leads to an overflow of the waste in the waste container. The advantages of the use of this treatment method are that the waste is to be disposed of in a basket, and empty it will be easy, because of the use of the electronic components. In this way, it is a plastic container for storage of garbage, but this path leads to several defects, which is to be preferred. Several disadvantages are that, as to the operation of the unit is not working correctly, then it is a foul-smelling odour. If the basket is not cleared immediately after it starts to fill up, then there are various flies, mosquitoes, and other insects around, which in turn leads to the creation of a wide range of diseases. If the fuel tank has been fitted with a lid, and it will be an overflow, the waste from the hopper, it may cause damage to the environment [6].

The second method is to use a variety of different divisions in a society, such as the green and blue garbage cans at each other, or the trash bins, where they only need to be disposed of by recycling. This method has the same advantages and disadvantages as well [7].

The third method is the Smart Bio Dustbin which uses electronic components like Arduino, Servo Motor, Ultrasonic Sensor and ESP32 camera module [8]. The ultrasonic sensor is located on the front panel of the system, and the sensor is attached to the lid of the waste container for proper disposal.

## III. METHODOLOGY

### A. Hardware Requirements

The hardware Requirements for the system are as follows: Power supply, Arduino UNO, ultra-sonic sensor HC-SR04, servo motor, ESP32 camera module, SD card, Wi-Fi.

### 3.1 Arduino UNO

Arduino UNO: It is a microcontroller board has fourteen digital I/ o, six analog inputs, a USB connection, a power jack, a 16 MHz quartz crystal, an ICSP header,

and a reset button. Components, such as a servo motor and an ultrasonic sensor will be attached to the board. If the sensors do not work properly, press the reset button, so that your code and the microcontroller is pre-programmed to re-boot, and the sensors do the work. This UNO board, Arduino IDE and Python 3.x IDE are required as shown in fig 3.1.



Fig 3.1 Microcontroller Arduino UNO board

### 3.2 Ultrasonic Sensor

An Ultrasonic sensor is a device that measures the distance from the waste by the use of ultrasonic waves. It has a sensor that helps to make and receive ultrasonic pulses, depending on the distance to the object. To detect objects, and debris (waste material). It is as shown in fig 3.2.



Fig 3.2 Ultrasonic Sensor

### 3.3 Servo Motor

Servo motor helps to ensure the basket to open the lid. The Arduino is programmed in such a way that as a waste, it is detected by ultrasonic sensor, the lid will automatically open, and this can be done with the help of this motor. It is as depicted in fig 3.3.



Fig 3.3 Servo Motor

### 3.4 Wi-Fi module and ESP32 + SD card

ESP32-CAM is a small size, and low power-based camera module. It is supplied with a OV2640 camera. With the ESP32-S-on-board module which supports Wi-Fi + Bluetooth. OV2640-camera flash. Built-in TF card slot, support 4G TF card. This module helps in capturing real time image and object detection. SD card is used for the storage purpose which contains the database. The camera module is as shown in fig 3.4.



Fig 3.4 ESP32 camera module

### 3.5 Buzzer

The sensor will check the dustbin level is full or not, if dustbin is full automatically sms is send to the sweeper or supervisor. The SMS will contain information about how a specific ID to the container, and the location of that container. If the dustbin is empty the control is back to previous state. Buzzer is as depicted in fig 3.5.

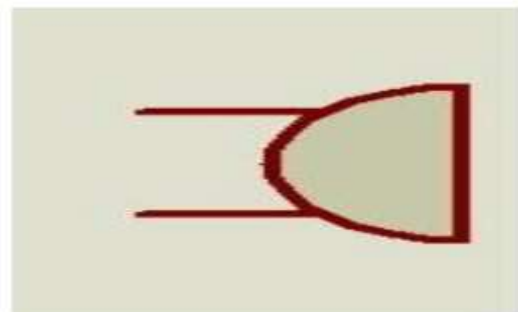


Fig 3.5 Buzzer

### B. Software Requirements

The software requirements for this project are Arduino IDE and Python 3.x.

**Arduino IDE:** The Arduino Integrated Development Environment is a cross-platform application that is used to upload the program to a compatible board. The Arduino IDE supports the C and C++, with the help of a code of principles. As soon as the code is written, it must be tested and compatible with both the board that you want to upload [9]. IDE Arduino is as shown in fig 3.6.



Fig 3.6 Arduino IDE

**Python IDE:** We use python with camera module for face and object detection and integrate it with Arduino. As python is best suitable for object and face recognition and it is easy for implementation purpose [10-11].

#### IV. WORKING

Our Smart Bio Dustbin first detects the distance of a person and then by object recognition, it recognizes whether the waste is of plastic or any other type. Fig 3.7 & 3.8 shows the waste collecting process & its implementation. If the waste is of plastic or related to medical waste then it opens otherwise not [10].

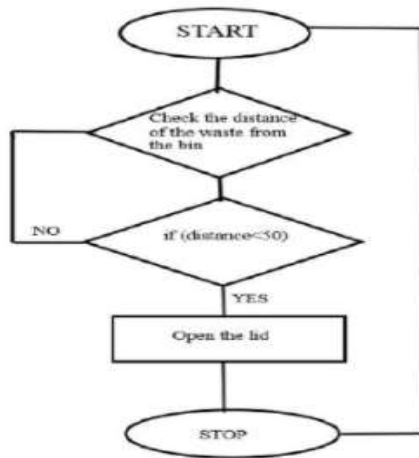


Fig 3.7 Cycle of collecting waste

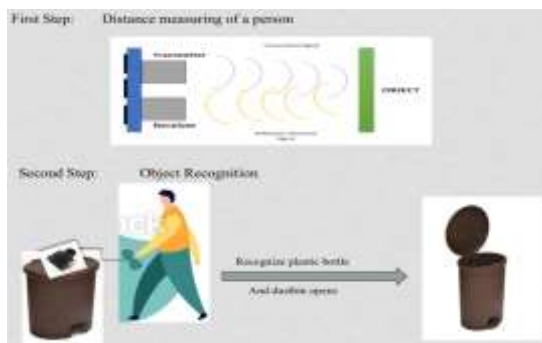


Fig 3.8 Process of Implementation

#### V. FUTURE ROAD MAP

Our Project is only a sample for one dustbin that only accepts plastic waste of medical field. But later we can work on that so that not only one dustbin should be smart even other dustbin should be smart and recognize different kind of waste [12,13].

#### VI. CONCLUSION

The Smart Bio Dustbin and point rewarding system concept which designed are an optimal solution to manage waste collection in an efficient way. IOT based garbage cans that can help people to manage their wastes, and reduce the work on the call of the expectations in relation to a particular person, and makes a healthier environment to live. It will have no disease, and that the people are healthy and have not been exposed to the diseases that are associated with waste products.

#### REFERENCES

- [1] T. Sinha, K. M. Kumar, and P. Saisharan, “Smart dustbin,” International Journal of Industrial Electronics and Electrical Engineering, ISSN: 2347-6982, vol. 3, issue 5, May 2015.
- [2] Harleen Viridi, Manish Kr. Mukhija, “Multi Layer Data Security Through Data Obscuring”, International Journal of Scientific Research & Growth, Vol.3, Issue 1, pp. 14-21, ISSN: 2456-1363, June 2018.
- [3] Ravi Khandelwal, Manish Kumar Mukhija, Satish Alaria, “Numerical Simulation and Performance Assessment of Improved Particle Swarm Optimization Based Request Scheduling in Edge Computing for IOT Applications”, International Journal of Contemporary Architecture "The New ARCH" ISSN 2198-7688, pp 155-169, Vol. 8, No. 2 (2021).
- [4] L. A. Guerrero et al., “Solid waste management challenges for cities in developing countries,” Science Direct, vol. 33, issue 1, January 2013, pp. 220-232.
- [5] Parkash, Prabu V – Iot Based Waste Management For Smart City(Ijarcet) Volume 4, Issue 2, February 2016 ISSN(Online): 2320-980.
- [6] G. K. Soni, S. Gour, Mr. K. Agarwal, A. Sharma, C. S. Shekhawat, B. Sharma, “ IOT Based Smart Agriculture Monitoring System”, Design Engineering, Issue-6, pp. 2243- 2253, 2021.
- [7] Abhishek, A., Utsav, A., Kant, K., & Priya, R. (2021). Prototype Design of Smart Dustbin and Solid Waste Management using IoT. Available at SSRN 3768273.
- [8] Pooja Saini, Manish Mukhija,, Prakash Dangi ,“ Design simulation of Efficient Character Recognition System Using Improved Pre Processing and Feature Extraction Process” ,Journal of The Gujrat Research Society ,Vol.-21, Issue 16, pp. 1883-1889, ISSN: 0374-8588, December 2019.

- [9] Mohanram, P. B., S. Karthik Viswanath, PM Mohamed Musaraf, R. Karthikeyan, KR Sarath Chandran, and S. Angel Deborah. "IoT Based Smart Waste Management Reporting And Monitoring System." In 2021 5th International Conference on Computer, Communication and Signal Processing (ICCCSP), pp. 208-215. IEEE, 2021.
- [10] Chittrakshi Jain, Manish Mukhija "Various Approaches for flower detection & Surveillance: A Performance Evaluation", International Journal of Innovative Science and Research Technology Vol.1, Issue 3, pp 20-22, Article Digital No. IJSRT16JU06, June 2016.
- [11] Monika Mehra, Manish Kumar, Anjali Maurya, Charu Sharma, Shanu, "MERN Stack Web Development", Annals of the Romanian Society for Cell Biology, 25(6), 11756–11761, 2021.
- [12] Noiki, Ayodeji, Sunday A. Afolalu, Abiodun A. Abioye, Christian A. Bolu, and Moses E. Emeteri. "Smart waste bin system: a review." In IOP Conference Series: Earth and Environmental Science, vol. 655, no. 1, p. 012036. IOP Publishing, 2021.
- [13] Varudandi, Shaunak, Raj Mehta, Jahnvi Mahetalia, Harshwardhan Parmar, and Krishna Samdani. "A Smart Waste Management and Segregation System that Uses Internet of Things, Machine Learning and Android Application." In 2021 6th International Conference for Convergence in Technology (I2CT), pp. 1-6. IEEE, 2021.
- [14] Shyama Yadav, Manish Mukhija, "Design and simulation of efficient multi Input Quick Response code (QR) Generation System" Journal of The Gujrat Research Society, Vol.-21, Issue 16, pp. 1897-1903, ISSN: 0374-8588, December 2019.
- [15] G. Soni, V. Poddar, Y. Sahu and P. Suryawanshi, "Hand Gesture Recognition Based Wheel Chair Direction Control Using AVR Microcontroller", International Journal of Advanced Research in Computer and Communication Engineering, vol. 5, no. 3, pp. 344-348, 2016.
- [16] Shyama Yadav Manish Mukhija, "Design and simulation of Efficient multi Input Quick Response code (QR) Generation System", Journal of The Gujrat Research Society, vol -21, 2019.