

## Automatic Waste Segregation Using Arduino and IoT

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**Abstract-** The purpose of this system's development is to remove obstacles and problems while also offering a chance for waste management and detecting system enhancements to Automatic garbage. IoT is a management and detection system concept. The proposed system is distributed throughout the cities, with an embedded system to measure and track the bin's level. Concerned authorities are notified of the status of the containers to evacuate the Bins, which may be tracked online and their locations. This system minimizes human involvement, interaction, and spending money and time. With the aid of sensors employed in the system's implementation, this system allows us to detect various sorts of garbage (wet, dry, and metal waste) collected in the dustbin. When an IR sensor detects any people nearby the bin, the bin will immediately open. The moisture sensor may be automatically turned on when moisture is detected. It is metal/electronic waste if the metal sensor detects the waste but the moisture sensor detector does not. The ultrasonic sensor enables percentage calculation and distance measurement from the trash container or bin. If the bin is full, we get a message with a location to the relevant department. This whole process and communication of sensors is done by the node MCU unit.

**Index Terms-** IR sensor, Arduino UNO , Node MCU ,Bin ,Metal sensor, Moisture Sensor

### INTRODUCTION

The Smart City is a current hot topic in terms of enhancing quality of life. The conditions in light of the current situation in the European Union, national governments in the EU as well as private corporations devote a sizeable portion of their budgets each year to the study, creation, and application of the idea of the smart city. When household waste is thrown in an open area, where

it rots and spreads odor, it pollutes the air and the environment. When trash is dumped close to water sources, it pollutes the water. Environmental contamination is primarily caused by waste in both wealthy and poor nations. When garbage is not properly managed and treated, it can reduce pollution and serve as a major source of energy, which can have devastating effects on the



ecosystem. India currently has several environmental difficulties brought on by garbage generation, such as poor waste collection, treatment, transportation, and disposal. The hardest problem is from the point of creation to the point of disposal. Our nation cannot maintain the current structure because of the growing urban population, which leads to environmental and public health problems. Waste poses a concern to human health because it can be either solid or liquid, and each type of waste will require a different means of disposal. Waste management must be done properly if one wants to live a healthy lifestyle. If dustbin flooding occurs daily, waste segmentation will create an unhygienic environment. Separating moist and dry garbage is also essential. Segmenting waste lowers air and water pollution as well as the amount of waste that is incinerated. Compared to mixed waste, it is more expensive to dispose of waste if it is segregated. This application aids in managing and sorting bee populations. Dustbins are placed across the entire city. They are distributed using a low-cost embedded approach to help with rubbish bin tracking. Once a bin is located and filled to the top, an SMS text message is sent to the municipal corporation. When the status of the bin is alerted over the Internet, the appropriate authority will then take immediate action. This system is being suggested and was created using ultrasonic sensors, node MUC, and servomotor.

## RESEARCH ELABORATION

### **i. Algorithm**

False news detection algorithms are helpful in understanding the model in detail. The step-by-step algorithm can be seen below.

**Step 1:**Collect required references from internet.

**Step 2:**Writing abstract for the project.

**Step 3:**Collecting all the necessary components for the project prototype.

**Step 4:**Connecting the components as per circuit diagram.

**Step 5:** Downloading and installing the Arduino IDE in the personal computer.

**Step 6:**Writing the error free embedded c code for project to work.

**Step 7:**Dumping the code to Node MCU using micro-USB cable.

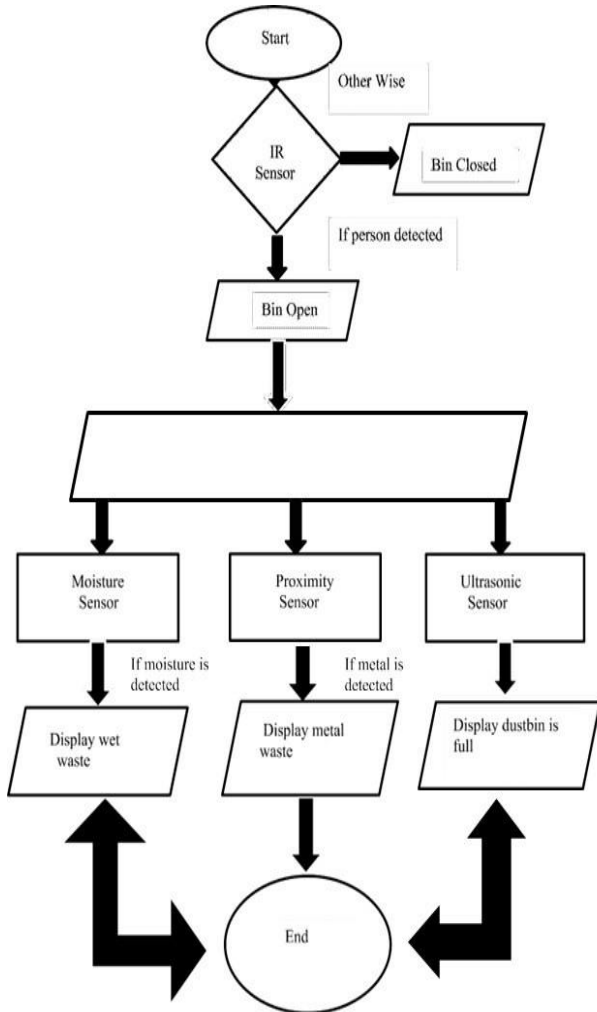
**Step 8:**Establish the connection between Node MCU and mobile using my MQTT application.

**Step 9:**Check for the sensor responses for the different types of waste(wet waste metal waste dry waste) on the desktop screen.

**Step 10:** If bin is filled with waste send a notification for the authorized person's saying that "dustbin is filled".

**Step 11:**Check multiple times to see whether the project prototype is working as expected.

ii. Flow chart



iii. Block diagram

The block diagram of the proposed route consists of different sections and in each section, there are different activities. Each task can be discussed in detail in the following block diagram.

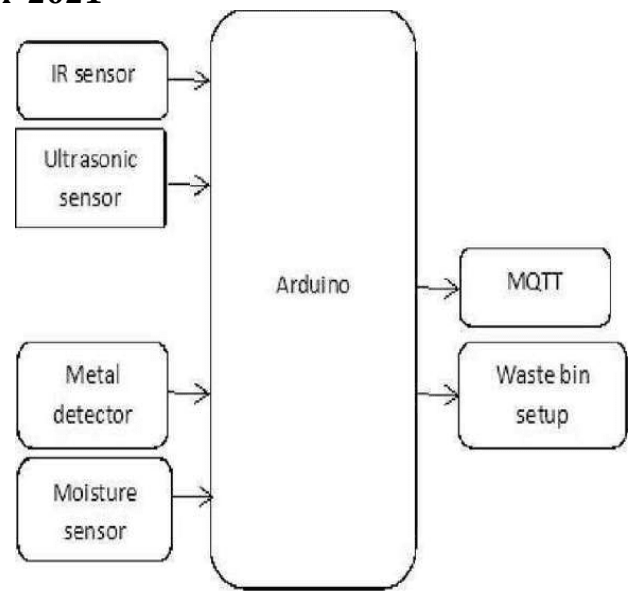
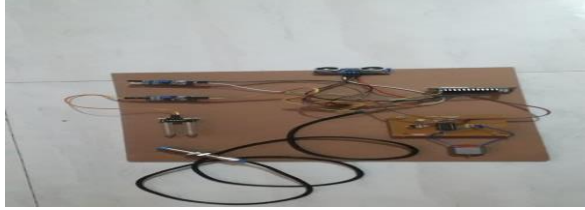


Figure 2: proposed method block diagram

In this proposed system the Arduino micro controller will be the heart of the system. The proposed system integrates the sensors like IR sensor, ultrasonic sensor, GPS, Metal detector, Moisture Sensor. The Arduino gets these data from the sensors and intimates it details to the concerned authority by MQTT protocol via internet. This proposed system automatically detects the person intended to dispose the waste in the garbage bin. It is detected by the IR sensor. The available space inside the garbage bin is detected by the ultrasonic sensor. The bin uses metal detector to detect the presence of any metals inside the garbage collected by the bin. Moisture sensors used to detect the whether the disposed garbage is liquid or degradable.

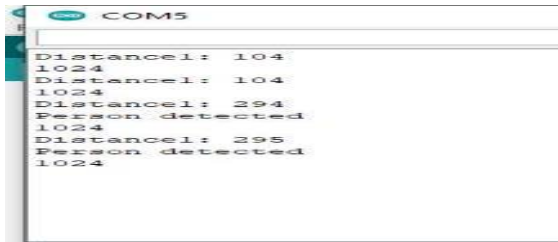
## RESULTS OR FINDING



Prototype



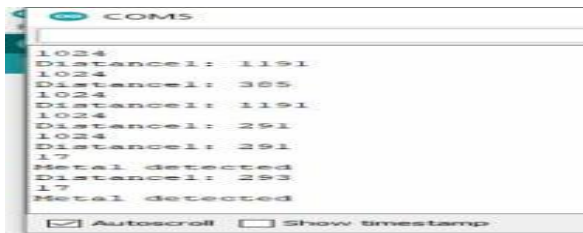
1(a) Working of IR sensor when person is detected Response



1(b) Desktop screen showing IR sensors



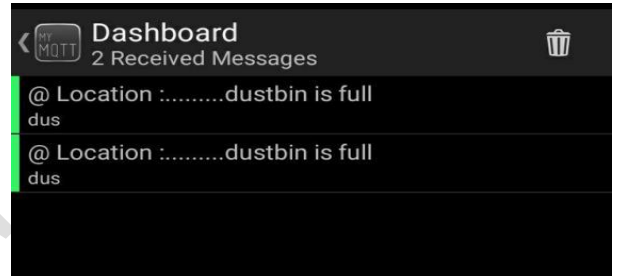
2(a) Working of proximity sensor Response



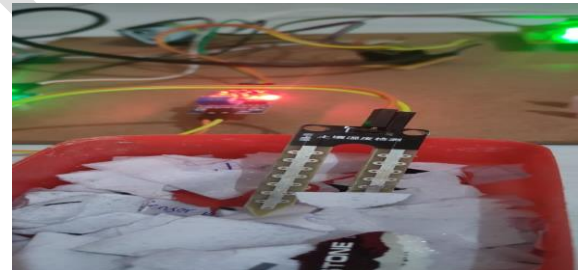
2(b) Desktop screen showing proximity sensor



3(a) working of ultrasonic sensor when bin is filled with waste



3(b) Screen showing message “@ location...dustbin is full.



4(a) working of moisture sensor when wet waste is detected.



4(b) Desktop screen showing moisture sensors response.

## CONCLUSION

Over flowing garbage bins causes fie impacts on health environment are diseases like increasing the risk of contracting with salmonella. Typhoid



fever, food poisoning, gastric problems and major illness we can reduce or control such kind of problems by Implementing of real time waste collection and segregation system by using IOT. In this system the information of all smart bins can be accessed from anywhere anytime by the authenticated person and authenticated person can take decision accordingly. By implementing this system, the cost reduction, resource optimization, effective usage of bins can be done. By reducing unnecessary rounds for garbage collection his system indirectly reduces traffic in the city .This system will inform the status of each and every bin in real time located throughout the city, so that the concerned authority can dispatch the garbage collection vehicle only when the bin is completely filled or is about too full. The traditional garbage collection system is changed into a smart and intelligent system. The integrated IoT system is very useful to remotely monitor the garbage levels in bin, this system also reduces human efforts and its user- friendly system. This system will help to make our environment neat, clean more suitable for living, reducing global warming and making the world healthier.

#### References:

- [1] M. Chan, D. Estéve<sup>1</sup>, C. Escriba and E. Campo, "A review of smart homes: Present state and future challenges", *Comput. Methods Programs Biomed.*, no. 91, pp. 55-81, 2008.
- [2] M. Chan, E. Campo, D. Estéve and J.Y. Fourniols, "Smart homes current features and future perspectives", *Maturitas*, no. 64, pp. 90-97, 2009.
- [3] D. Ding, R.A. Cooper, P.F. Pasquina and L.F. Fici-Pasquina, "Sensor technology for smart homes", *Maturitas*, no. 69, pp. 131-136, 2011.
- [4] W. Granzer, F. Praus and W. Kastner, "Security in building automation systems", *IEEE Trans. Ind. Electron*, vol. 2010, no. 57, pp. 3622-3630.
- [5] Ibrahim, Mr S. Jafar Ali, K. Singaraj, P. Jebaroopan, and S. A. Sheikfareed. "Android Based Robot for Industrial Application." *International Journal of Engineering Research & Technology* 3, no. 3 (2014).
- [6] K.C. Lee and H.H. Lee, "Network-based fire-detection system via controller area network for smart home automation", *IEEE Trans. Consum. Electron.*, no. 50, pp. 1093-1100, 2004.