

## Waste Bifurcation

Mrs. M S Shobha<sup>1</sup>, Deepa S<sup>2</sup>, Ashwini Singh A<sup>2</sup>, Pavithra P S<sup>2</sup>

<sup>1</sup>Sr.Assistant Professor, Department of Information Science, New Horizon College of Engineering, Bangalore, Karnataka, India

<sup>2</sup>Department of Information Science, New Horizon College of Engineering, Bangalore, Karnataka, India

### ABSTRACT

This paper discusses the questions about which waste management is automated. This is our IOT Garbage Monitoring System, an innovative way that will help to stay the cities clean and healthy. We live in an age where tasks and systems are fusing alongside the facility of IoT to possess a more efficient system of working and to execute jobs quickly! With all the power at our fingertips, this is what we have come up with. The Internet of Things shall be ready to incorporate transparently and seamlessly an out sized number of various systems while providing data for many people to use and maximize. Building a general architecture for the IoT is thus a really complex task, mainly due to the extremely large sort of devices, link layer technologies, and services that will be involved in such a system. One of the most concerns with our surroundings has been solid waste management which impacts the health and environment of our society. The detection, monitoring, and management of wastes are among the first problems of this era. The traditional way of manually monitoring the waste in waste bins may be a tedious process and utilizes more humans' effort, time and price which may easily be avoided with our present technologies.

**Keywords :** Waste Segregation, Arduino Mega, Sensor Alert, Dry Waste, Wet Waste, Automation, Smart Bin

### I. INTRODUCTION

The rising population of India poses serious threats with reference to the supply of lebensraum, utilization of natural resources and raw materials, education, and employment. But another serious issue that follows is the escalating amount of waste generated each minute by an individual. Every city is struggling with the threat of ever-increasing waste. An astonishing 0.1 million tonnes of waste is generated each day in our country. Sadly, only 5% of this large amount of waste is recycled. In India, the collection, transportation, and disposal are unscientific and chaotic. Uncontrolled disposal of waste on the outskirts of towns and cities have created overflowing landfills which aren't only impossible to reclaim due to the

haphazard manner of dumping but also have serious environmental implications. When viewed on a larger scale, the poor recovery rate has obstructed the growth of the country as well as the economy of the nation. One possible solution for this problem might be segregating the waste at the disposal level itself. We have come up with an Automatic waste segregator that categorizes the waste as wet or dry at the start level. The bin is automated to reduce human efforts and the time consumed during the manual segregation process. The bin will be attached with an ultrasonic sensor the senses the motion of an object at a particular distance and opens the lid to make it easier to dispose of waste. The bin will be divided into two parts of Wet and Dry respectively to store the segregated waste. Wet and dry waste can be distinguished based on their moisture

content the moisture sensor connection on the flaps, detects whether it is wet or dry waste. The rotation of the flaps allows the waste to enter the respective side. As the waste gets accumulated, the light indicator attached shows intensity variation. The ultrasonic sensor identifies the status when it is completely filled and sends the alert. This cost-effective system is particularly suitable for installation at restaurants, shops, homes. It is now time to give back to Mother Nature. Therefore to set the ball rolling, we have proposed this project to give back to our nation, making our India a 'Swachh Bharath'.

## II. RELATED WORK

1) In [1] the author tells us about the detection of the level of garbage-filled in the bins and alerts the control room to empty the bin when the container is full. Here the level of garbage in the dustbins is detected from the ultrasonic sensor and the ultrasonic sensor provides the real-time results using the ESP8266 Wi-Fi Module sends it to the web application. The Web Application shows the sensor results in a graphical form. In case if the dustbin is filled with garbage like 80 to 100 % then Web Application automatically sends the SMS to the specific mobile number and shows the location of a specific dustbin and also provides the optimized route to reduce time and fuel cost. The garbage is collected only from the filled Containers by the real-time information of filled level id provided by the sensor. The main aim of this system is to keep our environment clean and ensure hygienic surroundings as proper disposal and improper maintenance of domestic garbage creates issues in public health and environmental pollution. This project attempts to provide practical solutions to help the local municipal administrator in the garbage management system.

2) In [2] paper, the author has briefly explained the segregation of waste into wet, dry, metallic, and send information about the dumped garbage so that the respective action can be taken with the help of Various sensors and motors that are interfaced with Arduino

board in this system. The bin is divided into three compartments. Each compartment has its own function, the first compartment consists of an IR sensor and a metal detector and the second compartment consists of another IR sensor and a moisture sensor for detecting dry and wet waste, the last compartment is subdivided into three bins for the collection of the segregated waste respectively. The whole system is controlled by the Arduino Mega Board. When the contents of the first compartment are deemed to be non-metallic, they are sent to the second compartment where an IR sensor is used to verify the presence of the garbage. Depending on the output given by the IR sensor the moisture sensor gets activated or stays inactive. When the garbage is detected in the second compartment, the moisture sensor becomes active and is used to decide if the waste that is dumped is dry or wet waste. The storage system consists of a rotating table with three bins namely dry, wet, and metal.

3) The [3] paper has briefly explained the most goal of the project is to style and develop a sorting system that sorts and waste automatically into four categories namely metal waste, wet waste, dry waste, glass waste. Waste is pushed through a flap in the proposed system. An IR proximity sensor detects this and starts the whole system. Waste then falls on the metal detection system. this technique is employed to detect metallic waste. After this, the thing falls into the capacitive sensing module. This module distinguishes between wet and dry waste. After this, the waste falls into LDR+LASER for sensing plastic waste. After the identification of waste, there will be a circular base that holds containers for dry. Wet and metallic waste is rotated. The collapsible flap is lowered once the container like the sort of garbage is positioned thereunder. The waste falls into the container and therefore the flap is raised. The waste within the containers now are often collected separately and sent for further processing.

4) The paper [4] tells about a simple 8051 microcontroller that forms the heart of the system. It

controls the working and timing of all the sub-sections so as to sort the waste into the three primary categories. The waste segregator because the name suggests segregates the waste into three major classes: dry, wet, metallic. The permanent magnets that are placed within the metallic bin further sorts ferrous and non-ferrous metals. The inlet section is provided with an open and close mechanism to modulate the flow of waste on to the conveyor. An inductive proximity sensor is used to detect metallic waste. The signal from the proximity sensor will initiate the push mechanism to discard the metallic waste. A blower mechanism is employed to segregate dry and wet waste. The timing and movement of the conveyor belt are controlled by the 8051 controllers. Continuous and unnecessary operation of any particular section will thus be avoided.

5) The paper [5] tells about Programmable Logic Controller(PLC) based on waste segregation. This paper is dedicated to solving the problem occurring at the time of segregation of the solid waste which is produced by the manufacturing process in the industry. We are using a programmable logic controller (PLC) as the automation controller of the whole system . PLC is basically a digital computer that helps to control the automated manufacturing process in the industry. It provides high reliability on the automation process. The main concept of this project is to achieve the effective segregation of waste material in the section of metal and non-metal which is the first process of waste segregation. The Working methodology of this system is that the whole scrap (waste) is placed on the conveyor 1. The conveyor is the main medium to carry the waste material for the segregation process. As the waste reaches the end of the conveyor 1 it gets separated by the separator and goes into respective next conveyor which is conveyor 2 and conveyor 3. Then the Metallic material from the waste is sensed with the help of a metal detector sensor, the proximity sensor is used as the metal detector sensor and then it is dumped to the collector box with the help of a piston. The remaining non-metal waste is

moved forward to the end of the conveyor and dumped into a non-metallic section for further treatment. This system effectively segregates the metallic and non- metallic waste and then placed them for further treatment. This paper meets the demand for waste management inefficiently way in such a way that society is not getting suffered from any hazardous effect generated from unmanaged waste.

6) The paper [6] tells about waste segregation using image processing and classifier techniques. In our proposed paper web camera is used to overcome these disadvantages in the previous system and it separates glass wastes based on pixel rate accuracy. In this work, a fully automated waste separation system to segregate recyclable and non-recyclable waste of different classifications such as glass, metal, dry waste of household, as well as industrial wastes, is proposed. Its main objective is to build a unique kind of algorithm to achieve a new kind of approachability in the field of waste management. Segregation of waste management had been fully automated used for both household and industry purposes. The system consists of four types of sensors namely Ultrasonic sensor, IR sensor, Metal sensor, moisture sensor, and also, a web camera that might be used in segregation management. These sensors are used to detect the kinds of waste such as metal, glass, or dry waste. The sensor's values are very useful in the separation of waste unit management. The web camera is used to find whether the captured waste is glass or not. A driver circuit is connected with the Arduino UNO device to supply the power in terms of voltage required by the dc motors which are all used to run the conveyor belt and for the purpose of segregation. Embedded C language is used in order to run the conveyor belt of the sorting system and to sort the wastage units according to their types such as metal and dry waste.

### III. PROPOSED SYSTEM

Nowadays the dustbins are getting overflowed, this proposed system helps to avoid the dustbin from

overflowing. It will provide the actual information about the dustbin level. This projected structure of waste management is capable to solve the above-mentioned problems and can save time. This also reduces the human effort and consequently the cost of the whole process. This structure can be done at any location which is trouble-free and makes reliable quant of time. At first, the ultrasonic sensor senses the movement of the person and auto open the lid of the dust bin which helps in hazel free disposal of waste. Then the waste that is disposed of on the slab that is attached based on the diameter of the dustbin waste gets segregated into dry or wet. The waste is then analyzed based on its moisture content present if the moisture level is above the level that is stored then the wastes will be disposed of in the wet section of the dustbin. If the moisture content is below the level stored then it will be disposed of in the dry section of the bin. Once the moisture content in the waste disposed of is analyzed the type will be displayed on the screen. On the screen, the type of waste, the amount of waste-filled in each side that is the dry side and wet side will be shown. Once any one side of the bin is filled there will be an alert so that that particular side will be cleared. This project aims to avoid human intervention, reducing human time and effort and resulting in a healthy and waste ridden environment. The execution expense for automation is also reasonable.

#### IV. METHODS AND MATERIAL

There are 6 main components which are included in the implementation. They are:

1. Arduino Mega: The Arduino Mega 2560 may be a comptroller board that supported the ATmega2560. It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 hardware serial ports, a 16 MHz crystal oscillator, a USB connection, an influence jack, an ICSP header, and a push-button. It contains everything needed to support

the comptroller. Connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to urge started. The Mega 2560 board is compatible with most shields designed for the UNO and therefore the former board's Misdemeanour or Dissimilar.



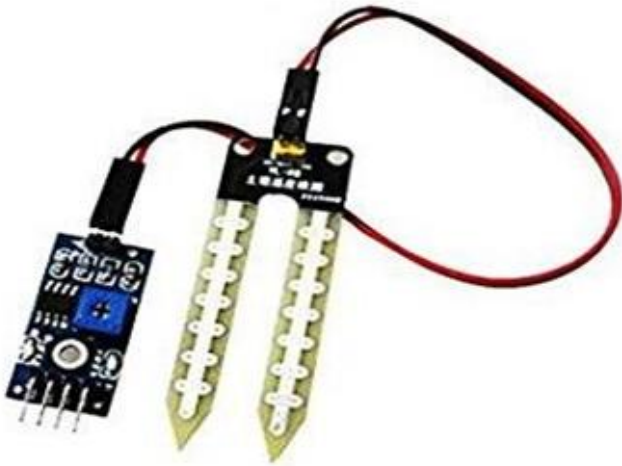
2. LCD Display: TFT stands for thin-film transistor and is used with LCD to improve image quality over older digital display technologies. Each pixel on a TFT LCD has its own transistor on the glass itself, which offers greater control over the images and colors that it renders. All the pixels on a TFT screen are configured in a row- and-column format, and each pixel is attached to an amorphous silicon transistor that rests directly on the glass panel. This allows each pixel to be given a charge and for the charge to be kept even when the screen is refreshed to produce a new image.



3. Ultra sonic sensor: An ultrasonic sensor is an instrument that measures the distance to an object using ultrasonic sound waves. An ultrasonic sensor uses a transducer to send and receive ultrasonic pulses that relay back information about an object's proximity. High-frequency sound waves reflect from boundaries to produce distinct echo patterns.



4. Moisture sensor : Soil moisture sensors typically refer to sensors that estimate volumetric water content. Another class of sensors measure another property of moisture in soils called water potential, these sensors are usually referred to as soil water potential sensors and include tensiometers and gypsum blocks.



5. Infrared proximity sensor : Proximity Sensor are used to detect objects and obstacles in front of sensor. Sensor keeps transmitting infrared light and when any object comes near, it is detected by the sensor by monitoring the reflected light from the object.



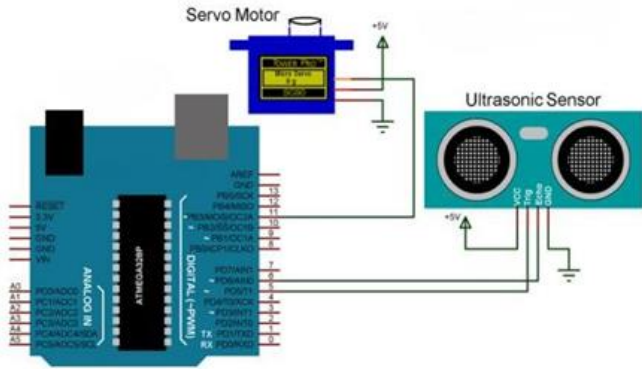
6. Servo Motor : A servo motor is an electrical device which can push or rotate an object with great precision. If you want to rotate an object at some specific angles or distance, then you use servo motor. It is just made up of simple motor which run through servo mechanism. If motor is used is DC powered then it is called DC servo motor, and if it is AC powered motor then it is called AC servo motor.



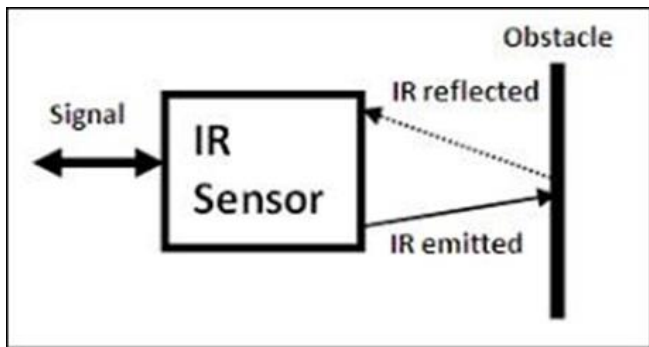
The implementation process is divided into 3 modules:

- i. Motion Sensing Module
- ii. Detection of waste Module
- iii. Bifurcation Module

1. Motion Sensing Module: According to the proposed methodology, the block diagrams were proposed to meet the requirements of the system. The main concept of this system is to reduce human efforts and to save human time. The ultrasonic sensor measures the distance to an object using ultrasonic sound waves and then the servo motor opens the lid so that the waste can be discarded into the dustbin.



2. Detection of waste Module: According to the proposed system once the waste is been dumped into the dustbin the moisture sensor should be notified that the waste is present so that the moisture sensing process starts. So in the existing system, an IR sensor is attached to detect the waste and notify the moisture sensor.



3. Bifurcation Module: The waste that is in the dust bin will be analyzed with respect to the moisture content present in the with the help of the moisture sensors. If the moisture content is sensed then the waste will be put into the wet section, else the waste will be put into the dry section. The segregation of waste takes place with the help of the moisture sensor.

## SYSTEM DESIGN



## V. RESULTS AND DISCUSSION

We have simulated the practical situations in which the smart bin is to be operated. The results show the functioning of the bin undergoing the segregation process. Each step is displayed in the LCD and the process output is uploaded on to the server for further usage. Monitoring the fullness of bins through the use of sensors, it is possible to achieve a more efficient system than the currently existing. The idea of “Waste Bifurcation”, mainly concentrates on Monitoring the waste management, providing smart technology for waste systems, avoiding human intervention, reducing human time and effort, and which results in a healthy and waste ridden environment. The proposed system can be implemented for smart cities where the residents would be busy enough with their hectic schedule and wouldn’t have enough time for managing waste. The bins can be implemented in a city if desired where there would be a large bin that can have the capacity to store the waste of solid type for a single apartment.

## VI. CONCLUSION

The proposed model ensures that solid waste management is done in an effective manner. The

effectiveness lies in the fact that the real-time monitoring of solid waste management helps in the timely removal of garbage and the prevention of any harmful waste from harming the environment. Thus the smart dustbin can play a major role in accomplishing a clean and green environment. With the help of the smart waste detection, we can get a hassle-free way of segregating waste into dry or wet. This project is an improvement in the automation field which will reflect in managing our day to day problem of waste management.

## VII. REFERENCES

- [1]. "Intelligent System for Garbage collection: IoT technology with Ultrasonic sensor and Arduino Mega", Najaf Ali ,M. Muzammul and Ayesha Zafar September 2018.
- [2]. "IoT Based Automated Waste Segregator for Efficient Recycling", T.Saminathan, Akash Musipatla, P. Manideep Varma, P. Shahid Khan, G.Mahesh Kumar April 2019.
- [3]. "Automated waste segregator" by Ashwini D.Awale.
- [4]. "Micro controller Based Automatic Waste Segregator" by M.K. Pushpa.
- [5]. "Iot Based Waste Management For Smart City" Parkash, Prabu V.
- [6]. "Waste Segregation Management Using Object Sorting Robot", S. Lokesh, S. Kiran, B. Vijay, S.B Yuvaraj, S. Yuvaraj.
- [7]. "Automatic waste segregator", Sharanya.A, U. Harika, N. Sriya, Sreeja Kochuvila.
- [8]. "IOT Based Intelligent Bin for Smart Cities" Meghana K C, Dr. K R Nataraj.
- [9]. Navghane S S, Killedar M S and Rohokale D V 2016 IoT Based Smart Garbage and waste collection, International Journal of Advanced Research in Electronics And Communication.
- [10]. Monika K A, Rao N, Prapulla S B and Shobha G 2016 Smart Dustbin-An Efficient Garbage

Monitoring System International Journal of Engineering Science and Computing. •

- [11]. [www.buildofy.in/smart\\_home\\_designs](http://www.buildofy.in/smart_home_designs).
- [12]. <https://create.arduino.cc/projecthub/Technovation/smart-garbage-monitoring-system-using-arduino>.
- [13]. <https://github.com/sourabhdeshmukh/Smart-Dustbin>.

### Cite this article as :

Mrs. M S Shobha, Deepa S, Ashwini Singh A, Pavithra P S, "Waste Bifurcation", International Journal of Scientific Research in Computer Science, Engineering and Information Technology (IJSRCSEIT), ISSN : 2456-3307, Volume 6 Issue 2, pp. 453-459, March-April 2020. Available at doi : <https://doi.org/10.32628/CSEIT2062131>  
Journal URL : <http://ijsrcseit.com/CSEIT2062131>