Waste Segregation System

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Introduction

By referring Press Information Bureau, India generates 62 million tonnes of waste (mixed waste containing both recyclable and non- recyclable waste) every year, with an average annual growth rate of 4% (PIB 2016). The generation and disposal of waste in large amounts have created great concern overtime for the world which is adversely affecting human lives and environmental conditions. The common method for disposal of waste at the industrial level is uncontrolled and unplanned it involves dumping of waste into open fields, landfills, or into the water body.

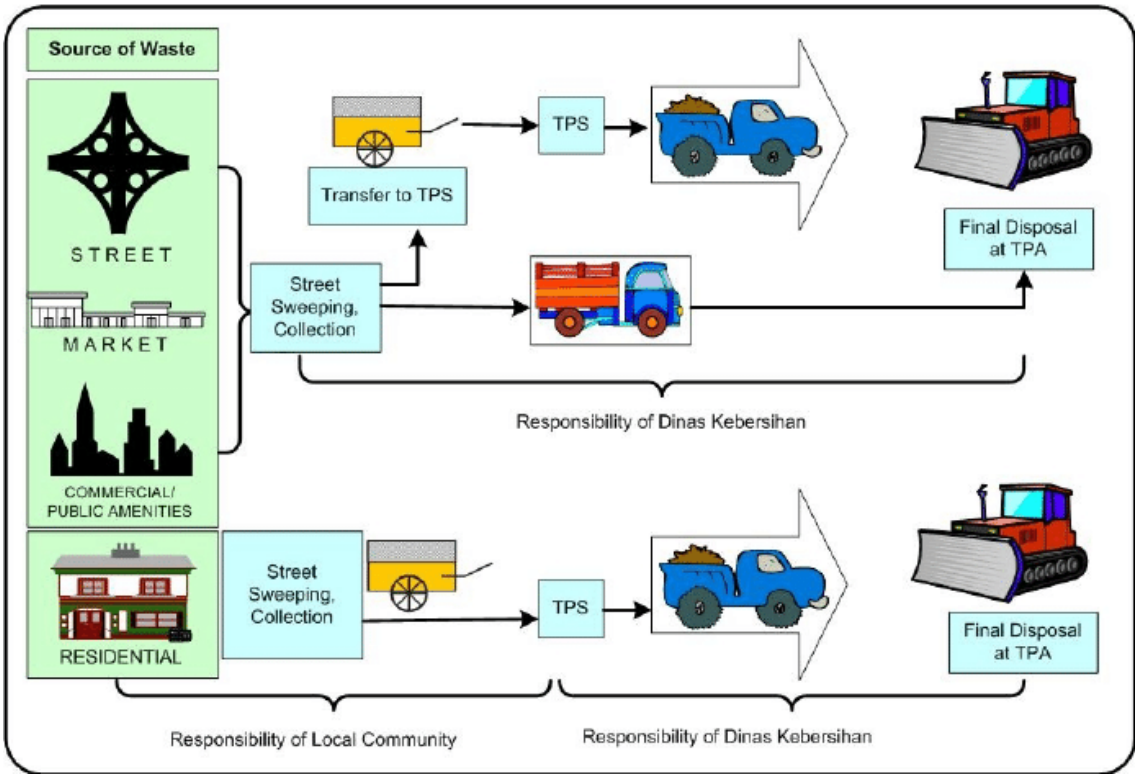
Thus, affecting the environment and animals. So a segregation method must be set up for proper disposal of waste in modern society in an environment safety mode means it should be done in such a way that it doesn't affect the environment and beings living in it.

In this modern world with a growing population, the rate atwhich waste is produced on a daily scale has doubled. Sixty two million tons of garbage is generated every day by the 377 million people living in urban India, now considered as the world's third-largest garbage generator .With changing consumption patterns and rapid economic growth, urban municipal solid waste generation will increase to approximately 165 million tons in 2030. In the 2016-17 budget, Rs. 237.4 crore was allocated for the solid waste management, yet the problem of solid waste management still prevails..

In India, the informal sector characterized by rag pickers plays an important role in waste segregation. Waste pickers collect glass bottles, plastic bottles, metal scraps, tires, etc. from the dumps and sell them to earn money. Waste picking is 0the source of livelihood for the significant number of people in India. A recent survey on six Indian cities depicts that approximately 20% of waste is recovered by the waste pickers, while 80,000 people are involved in recycling nearly three million tons. This shows that waste pickers make a significant contribution towards keeping cities clean. Despite this fact, waste-pickers suffer through various health issues like muscular-skeletal problems, respiratory and gastrointestinal ailments, infections of the skin, multisystem allergic disorders due to a high prevalence of bites of rodents, dogs and othervermin.

Existing System:

The existing waste process can be summarized in the following steps:



The specific steps in the waste process may vary depending on the type of waste, the location, and the regulations in place.

Challenges of the existing waste process

The existing waste process faces a number of challenges, including:

- Increasing waste generation: The amount of waste generated globally is increasing. This is due to a number of factors, including population growth, urbanization, and economic development.
- Limited landfill space: Landfills are the primary method of waste disposal in many countries. However, landfill space is limited and is becoming increasingly scarce.
- Environmental impacts: Waste management can have a number of negative environmental impacts, including air pollution, water pollution, and greenhouse gas emissions.

Problem Definition

The problem definition of an automatic waste segregator is to develop a machine that can accurately and efficiently separate different types of waste, such as wet waste, dry waste, and metal waste. This machine should be able to reduce the need for human intervention in the waste segregation process, improve hygiene, and reduce the environmental impacts of waste management.

The specific requirements of an automatic waste segregator will vary depending on the application. However, some common requirements include:

Accuracy: The machine should be able to accurately identify and separate different types of waste.

Efficiency: The machine should be able to segregate waste quickly and efficiently.

Reliability: The machine should be reliable and able to operate without frequent downtime.

Safety: The machine should be safe to operate and maintain.

Cost-effectiveness: The machine should be cost-effective to purchase and operate

Proposed System:

An automatic waste segregator is a machine that uses sensors to identify and separate different types of waste. This can include wet waste, dry waste, and metal waste. Automatic waste segregators are becoming increasingly popular, as they offer a number of advantages over traditional manual waste segregation methods.

Advantages of Waste Segregators

- Accuracy and efficiency: Automatic waste segregators are more accurate and efficient than manual waste segregation methods. This is because they use sensors to identify the type of waste, rather than relying on human judgment.

- Reduced human intervention: Automatic waste segregators reduce the need for human intervention in the waste segregation process. This can free up workers to focus on other tasks, and it can also help to improve the safety of the work environment.
- Improved hygiene: Automatic waste segregators can help to improve hygiene by reducing the contact between workers and waste. This is especially important for wet waste, which can contain harmful bacteria and viruses.
- Environmental benefits: Automatic waste segregation can help to improve the environment by reducing the amount of waste that goes to landfills. This is because segregated waste can be more easily recycled and composted.

Objective: How Waste Segregators Work ?

This waste segregators work by using a combination of sensors to identify the type of waste. Some of the most common sensors used in automatic waste segregators include:

- Optical sensors: Optical sensors use light to identify the type of waste. For example, an optical sensor can be used to identify the color of a waste item, which can then be used to determine the type of waste it is.
- Metal detectors: Metal detectors are used to identify metal waste items.
- Moisture sensors: Moisture sensors are used to identify wet waste items.

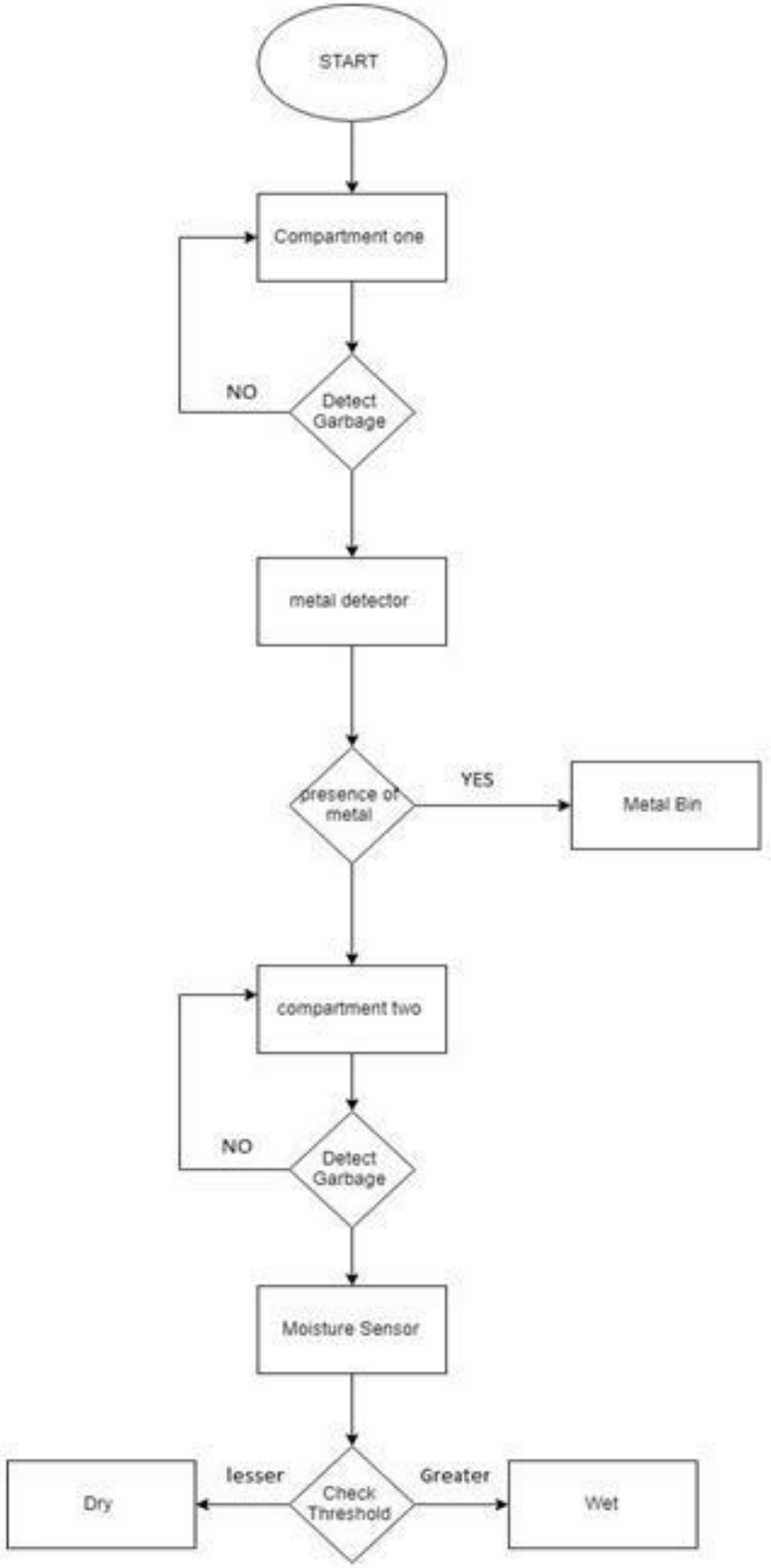
Once the type of waste has been identified, the automatic waste segregator will sort the waste item into the corresponding bin.

Applications of Automatic Waste Segregators

This waste segregators can be used in a variety of applications, including:

➔ Homes, Schools, Offices, Hospitals, Hotels, Shopping malls, ect.

Block Diagram



Hardware Requirements

1.Arduino Uno

2.Ultrasonic sensor

3. Moisture sensor

4.DC motor

5.LCD

6.Microcontroller

7.Power supply

8. Arduino cable

9.Infrared sensor

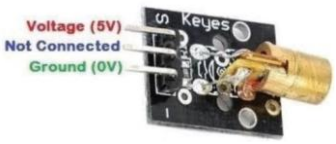
10.Metal sensor

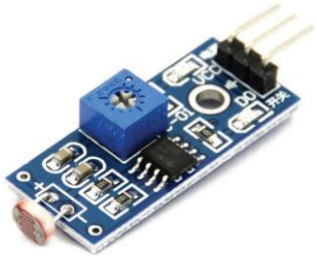
11. Motor driver circuit

12. Load Cells

13.Enclosure for Arduino Uno

14. Bins and containers





Budget

Arduino Uno – 1699

Ultrasonic sensor – 150

Moisture sensor – 250

DC motor – 113

LCD – 250

Microcontroller – 160

Power supply – 900

Arduino cable - 110

Infrared sensor – 500

Metal sensor - 347

Motor driver circuit - 174

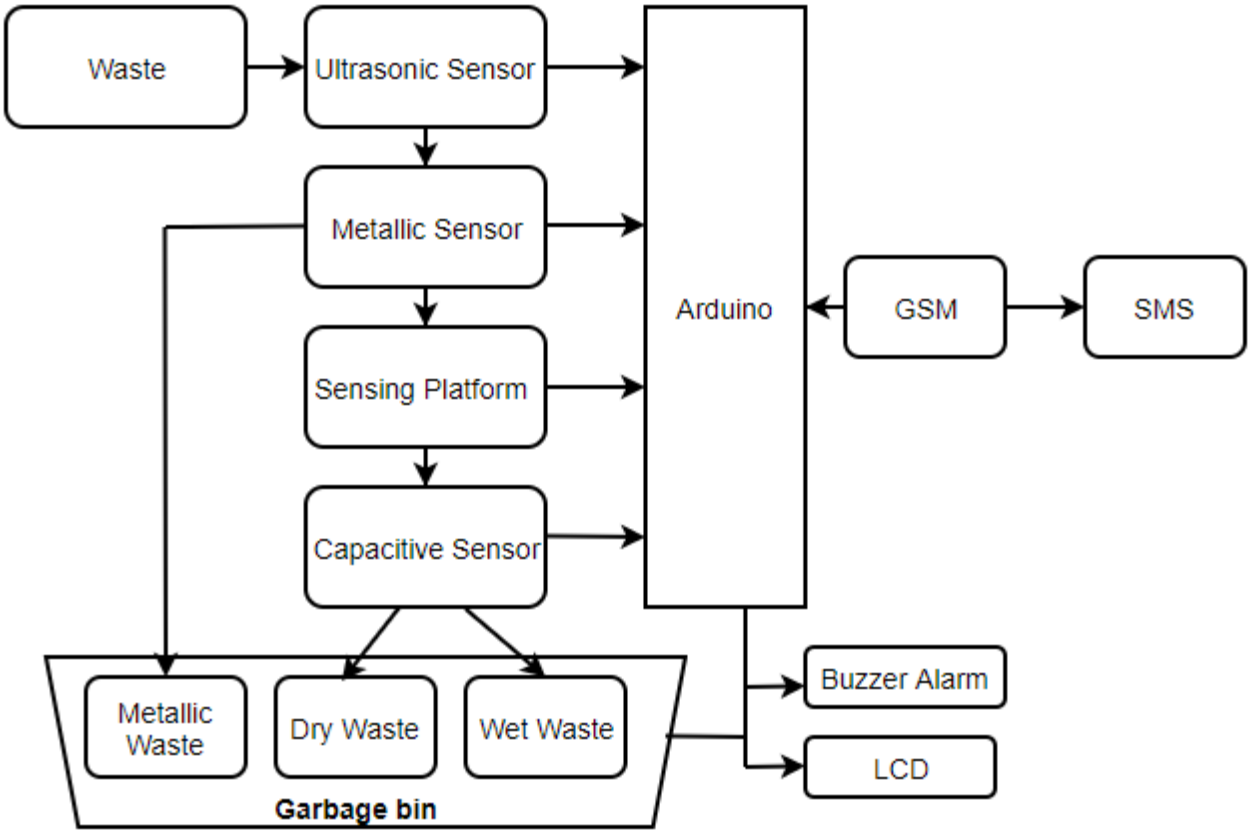
Load Cells - 119

Enclosure for Arduino Uno - 50

Bins and containers – 400

Total amount - 5232

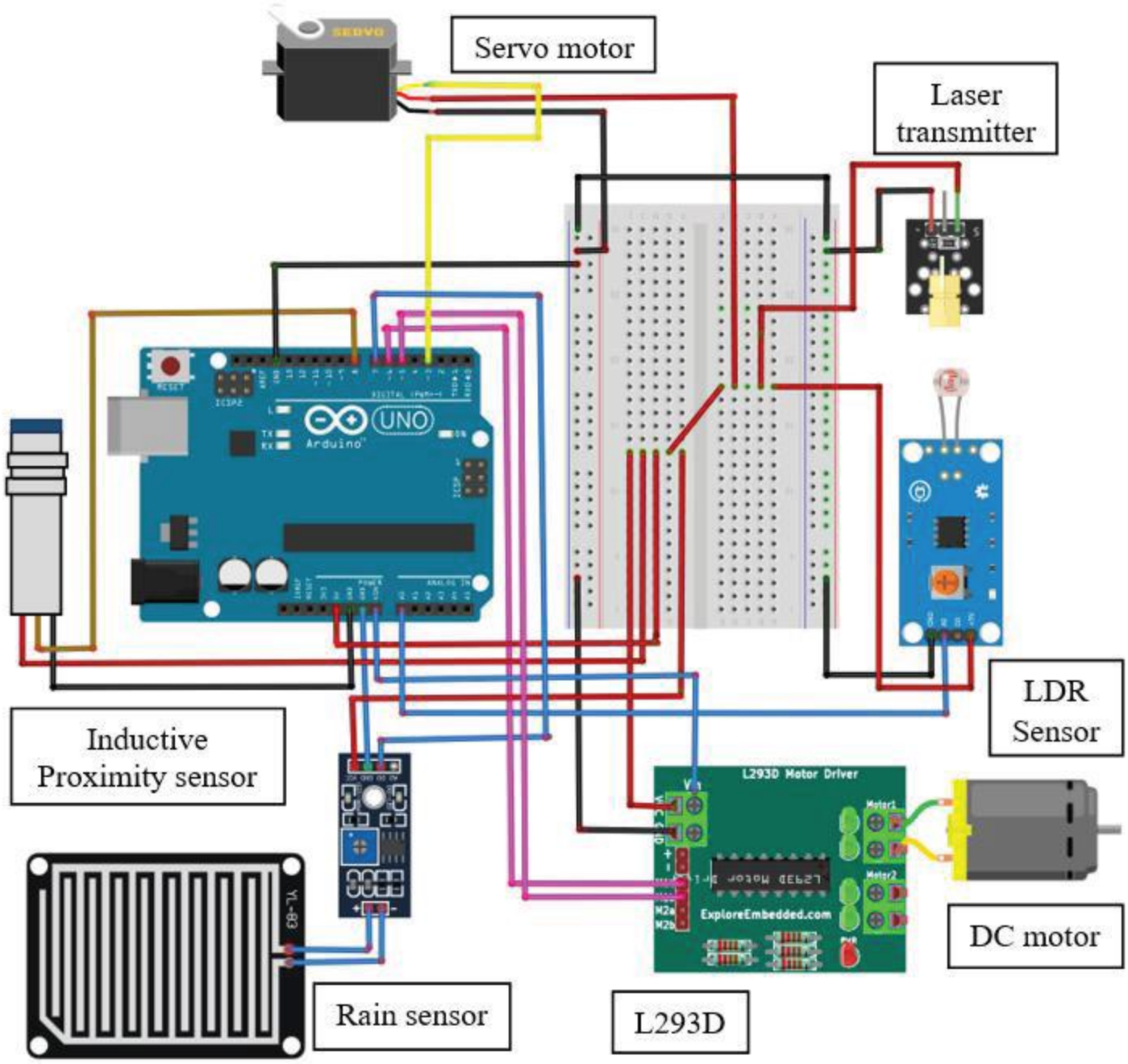
Plan Of Action



At first, waste is pushed through a funnel wherein the system detects the arrival of garbage with the help of the ultrasonic sensor. This sensor is attached to a funnel from where the waste passes. Once the presence of waste is detected, it will send a signal to the Arduino, and the system will be switched on The funnel is wounded by a single stand wire that acts as a metallic sensor. As soon as the object passes through the funnel, the metallic sensor checks for any metal content. If metal is detected, the sensor sends the signal to Arduino. On receiving the signal, the Arduino provides the value of the metal detected and triggers the motor driver, which in turn drives the motor. This triggering of motor leads to the flipping of the sensing platform, and thus, the metal object is dropped directly into a metal bin.

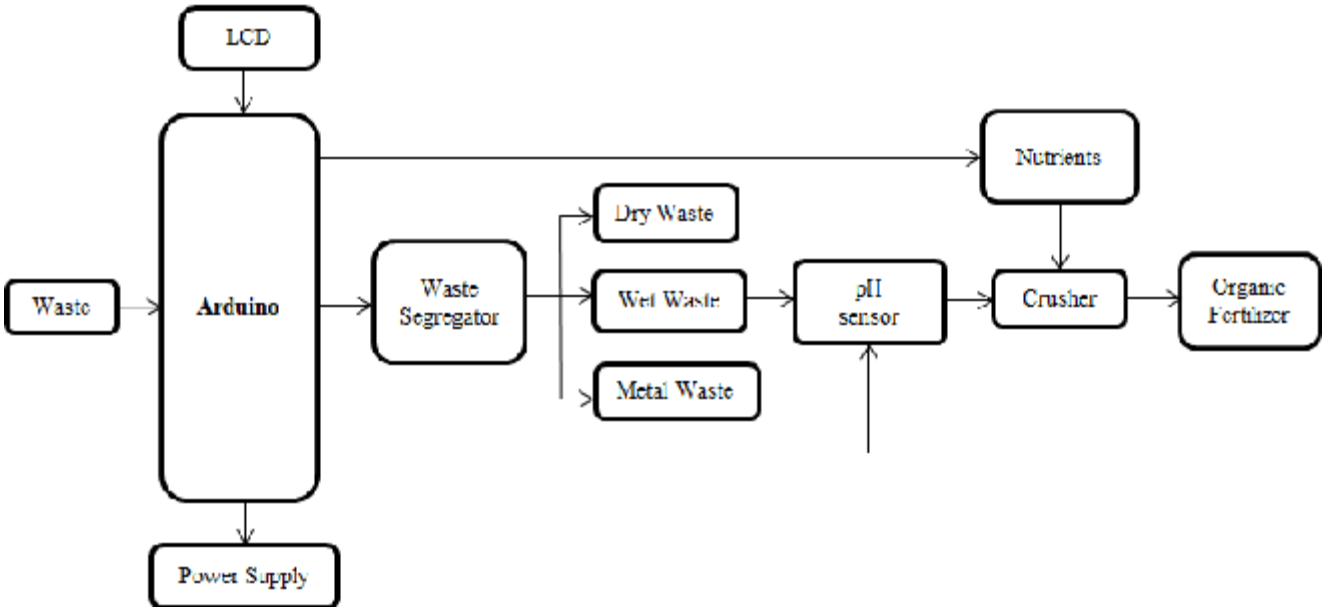
On the other hand, if the object turns out to be a non-metal, the object is placed on the sensing platform. While the object is on sensing platform, the capacitive sensors sense the object based on the moisture content in it. These sensors are placed on

the lower surface of the sensing platform. The moisture content signals are again sent to Arduino. If the moisture content is higher than the specified threshold, the object is considered as wet waste, and the wiper pushes the object towards the wet waste bin. After that, the motor flips the platform, and the object is dropped into wet bin. After the waste is dumped, the wiper will clean the sensing platform. Likewise, if the moisture content is low than the specified threshold, the object will be considered as dry waste, and the wiper will move the object towards the dry waste bin. Then the motor flips the platform and the object is thrown into dry bin. In this manner, the waste passed through the funnel is successfully segregated into a dry, wet, and metal waste without any human intervention**.**



Basic daigram of circuit we propose (it might defer from original)

Future Development



(Wet waste can be converted further into organic compost)

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