# Automatic Waste Management

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***Abstract-*** *In order to ensure efficient and sustainable waste management, national and local governments are facing an increasingly pressing challenge as a result of the solid and hazardous waste kinds and volumes that are rapidly increasing as a result of ongoing economic expansion, urbanization, and industrialization. Global waste management market report 2007 estimates that in 2006, the total volume of municipal solid trash created worldwide reached 2.02 billion tones, a 7% yearly growth since 2003. To reduce the risk to patients' health and safety as well as the public's and the environment's, waste management, transportation, and disposal must be carefully controlled. Waste is most effectively utilized economically when it is separated. There isn't one in place at the moment to separate dry, moist, and metallic wastes.*

## I. INTRODUCTION

Effective urban waste management is essential to preserving environmental purity and optimizing resource use. Automatic methods are necessary for recycling and reuse because manual trash management is expensive and time-consuming. In the European Union, 24% of garbage generated in 2016 was gathered in landfills, whereas 56% of waste was recycled domestically. Effective waste management is necessary to reduce production and recycle. The circular economy seeks to maximize all available resources, including waste, and boost resource efficiency. Effective management of urban garbage poses a problem to both developing and underdeveloped nations. Only 1800 tons of the 3500 tons of mixed solid waste that are produced everyday in Bangladesh are collected and disposed of. Waste segregation machines were launched as a pollution prevention measure, however the tendency has shifted as more people become urbanized and socialized. Developments in Artificial Intelligence

### 1.1 Background

A. Definition:

The automatic waste segregator and monitoring system is a cost-effective, simple controller for segregating plastic, dry, wet, and metallic waste without human intervention.
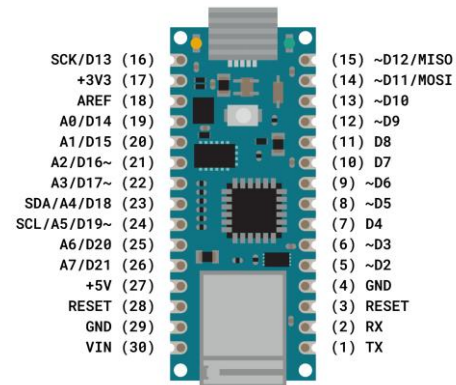
B. Arduino Nano:



Fig 1: Arduino Nano

The smallest and most traditional Arduino board, the Nano, is made to work on a breadboard. The Arduino Nano has a Mini-B USB connector and pin headers that make it simple to link it to a breadboard.

C. Metal Sensor :



Fig 2: Metal Sensor

We own an extensive assortment of Proximity Sensors. Our clients around the world value our provided sensors for their superior features. When creating the full line, we only employ the best components and the newest technologies. Our knowledgeable experts evaluate these products on predetermined parameters to guarantee their quality. In addition, we offer the full variety at reasonable costs

D. Rain Sensor :

Fig 3: Rain Sensor

The TA rain sensor is a device that activates whilst rainfall happens, frequently for water conservation in irrigation structures and protecting automobile interiors. It operates on overall inner mirrored image, detecting infrared light from windshields at a 45-diploma angle. It also triggers rain blowers in professional satellite tv for pc communications antennas.

E. IR E 18 Sensor :



Fig 4: IR E 18 Sensor

The E18-D80NK NPN-NO Adjustable IR Sensor Proximity switch is a compact, cost-effective, and flexible sensor with an adjustable detection range of three to 80cm, suitable for numerous applications

F. Servo Motor:



Fig 5: Servo Motor

The Tower pro MG90S Micro virtual Servo is a 360-rotation servo with advanced inner circuitry, providing terrific torque and maintaining power. Its water and dust-resistant plastic case is appropriate for diverse RC pastimes, and it

comes with a 3-wire JR servo plug well matched with Futaba connectors

G. 16 X 2 LCD Display:



The 16x2 LCD Display Green WITH IIC I2C Serial Interface Adapter Module is an electronic device that visually presents information or images. It consists of display technology such as LCD (Liquid Crystal Display), OLED (Organic Light-Emitting Diode), or LED (Light-Emitting Diode). Display modules have a grid of pixels that form the visual content, with higher resolution displays offering greater detail and clarity.

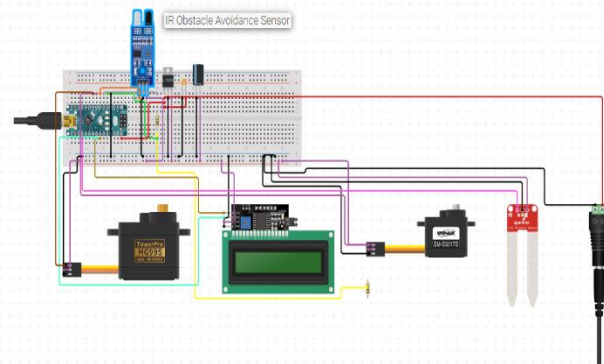**1.2** Configuration of Automatic Waste Segrigation**:**



**Fig -4**Configuration of Automatic Waste Segrigation**:**

## II. DESIGN METHODS

A.   Material and tools:

Accoutrements used in the design of tackle, among others

1.   Arduino nano
2.   Metal sensor
3.   Rain sensor
4.   IR E18 Sensor
5.   Servo motor MG90
6.   Servo Motor MG996R

7. LCD 16x2 I2C
8. PVC Pipes
9. Bottles

**B. Software:**

The supporting software's used in our work are

1) The Arduino IDE is used to produce the program in the microcontroller.
2) AdaFruit library and detectors perceptivity operation.

**C. Hardware Design:**

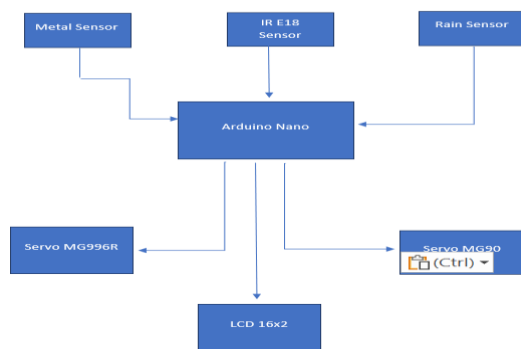The general description of the system can be observed on block diagram below:



**Fig -5** Block Diagram of Automatic Waste Sagrigation



**Fig -6**. Actual Automatic Waste Sagrigation

### III. RESULT

The model was trained using an 80/20 split, 150 x 150 image size, and 12 batch sizes. After 30 epochs, the model achieved 77.60% training accuracy and 83.54% validation accuracy. The training loss was 62.69%, while the validation loss varied but ended at 39.83%. The model was tested with waste in an enclosure, achieving 89% accuracy overall. The most accurate class was metal, likely due to an inductive

sensor. The system took 8.12 seconds from waste input to segregation.

### IV. CONCLUSION

Development of a GSM-based home automation system is presented. The system enables one remotely control electrical appliances requiring 220/240V 50Hz power source (such as refrigerators and water heaters) from anywhere in the world. This is achieved by simply sending an SMS command to a dedicated SIM card embedded in the system. It is recommended that the system is enhanced to provide feedback to the user in other to know the system status after each controlled operation carried out.

### REFERENCES

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