



SMART WASTE MANAGEMENT SYSTEM

A Mini Project Report

submitted in partial fulfilment of the

requirements for the award of the degree of

BACHELOR OF TECHNOLOGY

In

ELECTRONICS AND COMMUNICATION ENGINEERING

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(Affiliated to JNTU, KAKINADA)

(Recognized by A.I.C.T.E., Accredited by N.B.A & N.A.A.C with 'A' grade, NEW DELHI)

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(2019-2023)









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BONAFIDE CERTIFICATE

This is to certify that this mini project work entitled

SMART WASTE MANAGEMENT SYSTEM

is the bonafide work of

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CERTIFICATE OF EXAMINATION

This is to certify that we had examined the thesis and here by accord our approval of it as a study carried out and presented in a manned required for its acceptance in a partial fulfilment for the award of **BACHELOR OF TECHNOLOGY** in **ELECTRONICS AND COMMUNICATION ENGINEERING** for which it has been submitted.

This approval does not endorse or accept every statement made, opinion expressed or conclusion drawn as in report. It signifies acceptance of report for the purpose for which it is submitted.

External Examiner

Internal Examiner

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-Project Associates

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1.ABSTRACT:

In the era of developing technology where the urbanization is increasing rapidly, the corresponding waste is increasing exponentially. As the concept of smart cities is emerging, there is a need for a proper framework in order to tackle this problem. Although a lot of efforts have been put by researchers to propose various approaches to circumvent this issue, the problem still remains. The major problem faced while designing a smart method for waste collection and monitoring is the segregation of different types of wastes. The waste is still being segregated manually, thus producing a harmful effect on the segregator itself.

Pollutio

n increases in our day to day life to reduce that an efficient method is required to dispose the waste material. More over waste is not separated in an proper way in which they are deposited in many places, due to this all the materials are mixed and stored in same place in which both the decaying products and non-decaying products are stored in same place. So that decaying products are also not getting decay due to this disorders are caused the including global warming etc.

Here an automated system is provided for segregating wet and dry waste. A mechanical setup can be used for separating wet and dry waste into separate containers here sensors can be used for separating wet and dry. For detecting the presence of any waste wet or dry can be detected using an IR sensor in the next step for detecting wet waste a moister sensor can be used. In this process, if only IR is detected motor will rotate in the direction of the dry waste container if both the sensor detects the waste then it will go to the wet container.

2.INTRODUCTION:

"Smart segregation dry and wet waste classification" for proper management of waste. Automatic waste segregator categorizes the waste as dry and wet waste. The monitoring system helps to monitor the waste collection process.

This method is hazardous to human health, plant and animal life. When waste is segregated into basic streams such as plastic, metallic and organic, the waste has a higher potential of recovery, and then, recycled and reused.

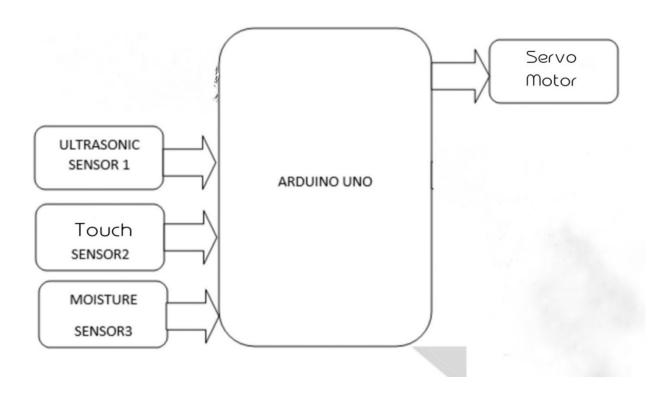
The organic waste is converted either into compost or methane-gas or both. Compost can replace demand for chemical fertilizers, and biogas can be used as a source of energy. The metal waste could be reused or recycled.

Even if there are large scale industrial waste segregators present, it is always feasible to separate the waste at the source itself . The benefit of doing so is that the occupational hazard for waste workers is reduced.

3. PROBLEM STATEMENT:

Basically now a days garbage is thrown sides of the roads or lakes, rivers etc and also burnt because of this actions a lot of infection is caused and also effects life of living organism. In order to reduce this infections which is causing to environment or living organism we came with a new idea of smart waste management system.

4. Methodology:



Methodology for Smart waste management

5.LITERATURE SURVEY:

Solid waste management has become one of a major concern in environmental issues (Mazzanti & Zoboli, 2008).

Waste generation increase proportionally to this population number and income, creating the needs of effective management (Mazzanti & Zoboli, 2008).

Urbanization and industrialization leads to new lifestyles and behaviour which also affects waste composition from mainly organic to synthetic material that last longer such as plastics and other packaging material (Idris et al., 2004).

6.COMPONENTS:

1. Arduino Uno

2. Touch sensor

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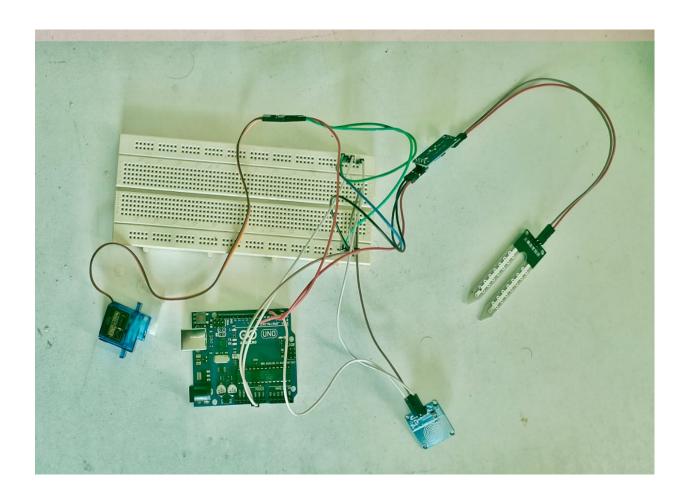
Wire stripper, cutter

Hot glue gun

3.	Soil Moisture sensor
4.	Servo motor
5.	Acrylic Sheets
6.	Breadboard
7.	Jumper wires& 9V batter
SO	FTWARE REQUIRED:
	Arduino IDE
NE	CCESSARY TOOLS:

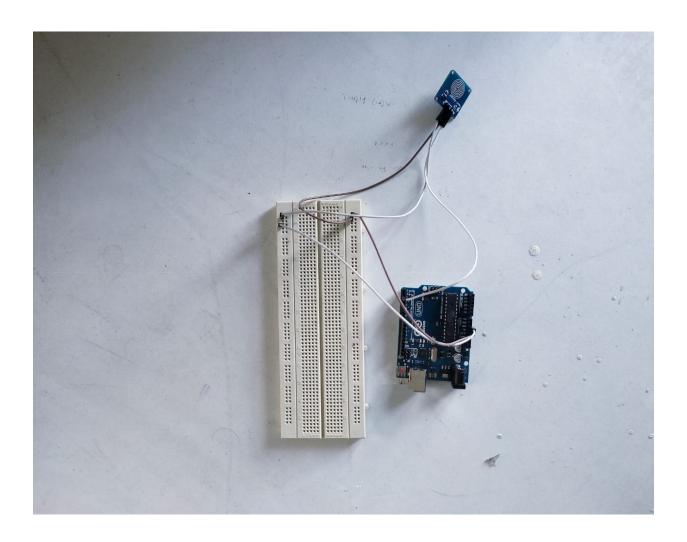
7. CIRCUIT DIAGRAM:

The circuit diagram is shown below:



Circuit diagram for smart waste management

Interfacing of Touch sensor with Arduino



Circuit diagram for touch sensor

8.Implementation and working process Step by Step:

- 1. Step 1: As shown in the above image gather 2 Acrylic sheets. You can get these sheets anywhere in local shops or order it online through amazon.
- 2. Step 2: Make the holes in the acrylic sheets as shown in the image so that you can fix the batter holder to it.
- 3. Step 3: Then on the upper side of the battery holder stick the servo motor pointing straight ahead as shown in the image. You can fix the servo motor by double sided tape or glue gun.
- 4. Step 4: Then take a plastic stationary scale(That you used to use in schools for drawing lines) and make a hole in it at its bottom which will be little less than the diameter of the motor shaft.(You can make the holes by using a hot soldering iron or any other thin steel rod.)
- 5. Step 5: Stick the other acrylic sheet on the top of the scale as shown in the image using glue gun. Make sure it's fixed tight and doesn't move.
- 6. Step 6: Place the moisture sensor and touch sensor on the top of the acrylic plate.

Working of Smart Segregator Step by Step:

- 1. Step 1: Waste is put and lands on moisture sensor.
- 2. Step 2: Depending upon the Threshold set Moisture sensor classifies it as dry or wet.

- 3. Step 3: As soon step 2 is done Servo Motor runs to either direction depending upon the type of waste and the waste goes in the appropriate compartment.
- 4. Step 4: The whole process is autonomous and Continuous.

9.APPLICATIONS:

- **1.** In Underground Cities
- **2.** Useful for recycling
- **3.** In Clean Indian Mission
- **4.** In Municipalities
- **5.** Reduced pollution

10.CONCLUSION

This project is very effective in managing waste in any big city.

Rather than using conventional periodic collection methods here priority system is used to the city is clean all the time without any overflowing dumpsters.

It has been tested and verified properly to make sure all the different parts work together for a smooth function of the whole system.

11.REFERENCE

- 1. H Denicke Solomon, R Abishek, T Ramachandra, P Pavithra, S Ezhilarasi, "A Garbage Disposal Management System to Support Swachh Bharath Mission", 2022 6th International Conference on Devices, Circuits and Systems (ICDCS), pp.205-209, 2022
- 2. Meenakshi Shruti Pal, Munish Bhatia, "Challenges and Proposed Architecture of Municipal Solid Waste in Context of Hilly Terrain Shimla City, India", 2021 International Conference on Computing Sciences (ICCS), pp.178-182, 2021.
- 3. Saurabh Pargaien, Amrita Verma Pargaien, Dikendra Verma, Vatsala Sah, Neeraj Pandey, Neetika Tripathi, "Smart Waste Collection Monitoring System", 2021 Third International Conference on Inventive Research in Computing Applications (ICIRCA), pp.11-16, 2021.

12.CODE:

```
#include <Servo.h>
class Smart_Segregator
 public:
  int servo_pin;
  int moisture_sensor_pin;
  int touch_sensor_pin;
  int detect_moisture;
  int detect_touch;
  Servo servo;
  Smart_Segregator(int pin_1, int pin_2, int pin_3)
   {
    servo_pin = pin_1;
    moisture_sensor_pin = pin_2;
```

```
touch_sensor_pin = pin_3;
 detect_moisture = 0;
 detect_touch = false;
}
 void init()
{
 Serial.begin(9600);
 servo.attach(servo_pin);
 servo.write(90);
 pinMode(moisture_sensor_pin, INPUT);
 pinMode(touch_sensor_pin, INPUT);
Serial.println("Your Smart Segregator is ready to Segregate!");
}
void dry_waste()
{
 servo.write(0);
Serial.println("Dry waste");
}
void wet_waste()
{
 servo.write(180);
```

```
Serial.println("Wet waste");
}
 void neutral_state()
{
 servo.write(90);
 Serial.println("Neutral");
}
void execute()
{
 detect_moisture = digitalRead(moisture_sensor_pin);
 detect_touch = digitalRead(touch_sensor_pin);
 Serial.print(detect_moisture);
 if (detect_moisture == 0 && detect_touch == true)
 {
  wet_waste();
 }
 else if (detect_moisture == 1 && detect_touch == true)
 {
  dry_waste();
 }
 else
```

```
{
    neutral_state();
   }
  }
}
segregator = Smart_Segregator(8,6,2);
void setup()
{
segregator.init();
}
void loop()
{
segregator.execute();
}
```