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SMART WASTE MANAGEMENT SYSTEM

21 *Group 21 DIY Project Report*

PREPARED BY:

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WASTE SEGREGATOR: INTRODUCTION

ABSTRACT

The rapid increase in population has led to improper waste management in cities resulting in increased pests and diseases. Hence, to overcome this limitation, we've designed a smart waste management system to reduce human efforts and for helping to make a healthier environment. A hardware prototype is developed for the proposed framework. Analysis of the proposed scheme provides better results in waste management.

MOTIVATION

India, dreaming of smart cities not only has to have concern on electric power management, vehicle traffic and pollution management, water supply and management but also has to have a greater deal on waste collection, segregation, transport and disposal. Hence an efficient and convenient system is required to have complete control and management of the mentioned requirements.

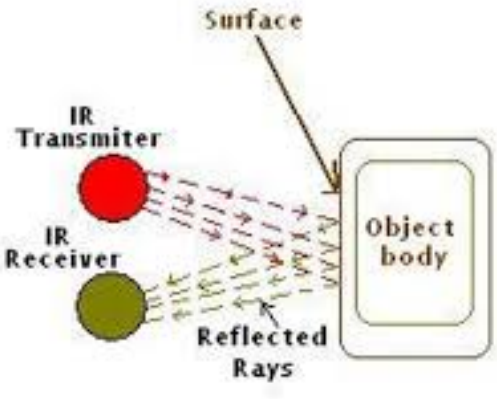
Values

- Eco-friendly
- Time-saving
- Efficient and effortless waste segregation

CONCEPT OF PROOF

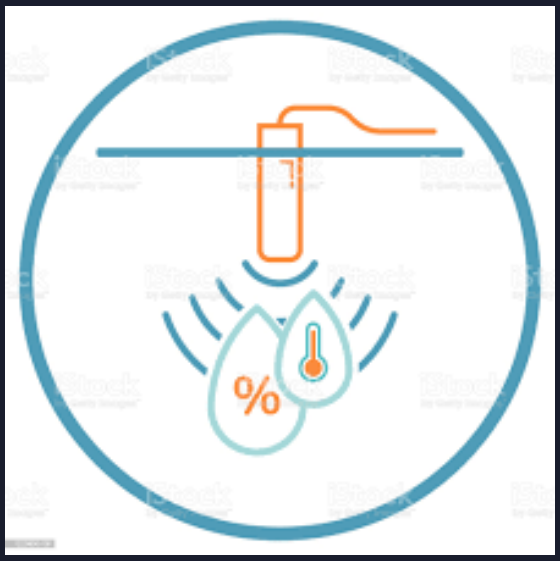
PHASE-1:

- The garbage bin lid has an IR sensor to detect whether there is any type of garbage is there or not
- After checking it sends the required message to the ARDUINO and then the moisture sensor takes over.



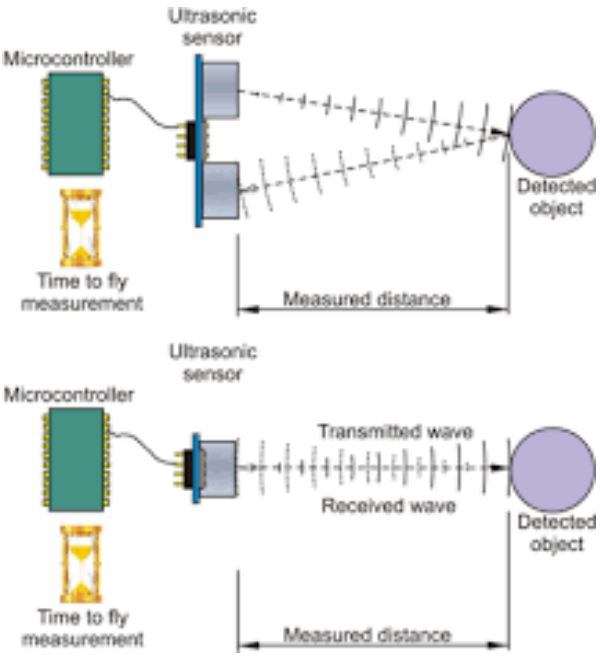
PHASE-2:

- **Moisture sensor is present on top of the lid so that it detects the moisture when garbage is thrown on the lid and sends the detected moisture levels to the ARDUINO.**
- ARDUINO uses the information received from the sensor and displays the moisture content in the waste on the LCD display.



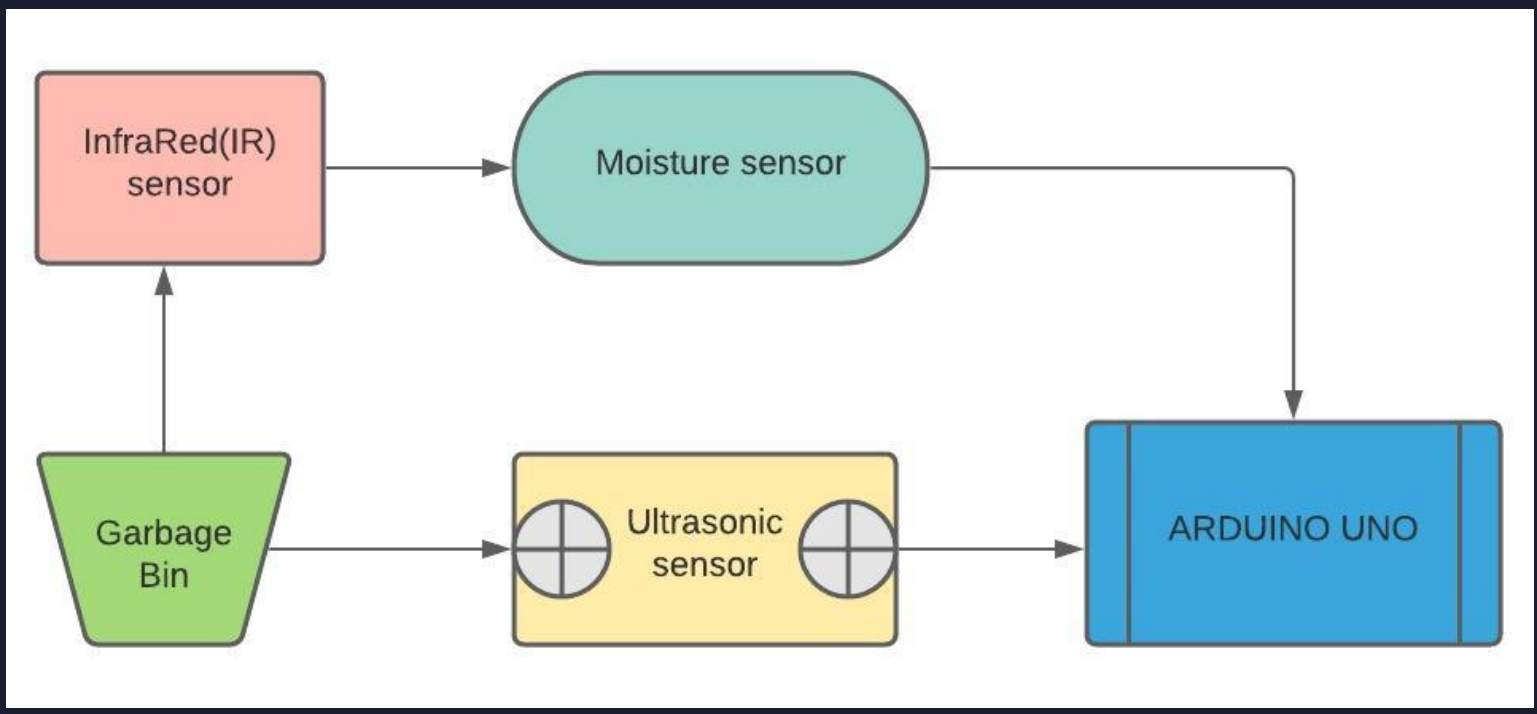
PHASE-3:

- The garbage bin will be fitted with two ultrasonic sensors that sense garbage level in the bin and send it to the ARDUINO UNO.
- ARDUINO uses the information received from the sensor and displays the levels of wet and dry wastes on the LCD display.



METHODOLOGY BEHIND THIS PROJECT:

This section describes the steps to be followed to implement the proposed system and hardware components required.



Our Method

In this project of SMART WASTE MANAGEMENT SYSTEM, we will be using an ultrasonic range sensor to know the amount of garbage collected in garbage containers. To control the required operations, we will be using the Arduino Uno microcontroller.
A moisture sensor is fixed in the model to differentiate between wet waste and dry waste.

OBSERVATIONS:

01

VERSATILE

Easily adaptable in household and elsewhere.

02

ADJUSTABLE

The mechanism can be used different types garbage bins.

03

HANDLING A PILE

It might not able to segregate a pile of garbage at once. So need a conveyer belt mechanism to drop the garbage one by one.

04

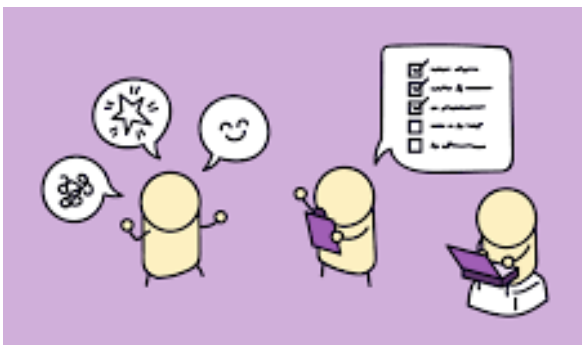
ECO-FRIENDLY

Though it uses electricity it can be modified to use solar energy instead.

05

AVOIDS UNNECESSARY SMELL FORMATION

As the lid always closes automatically and the waste is segregated properly it doesn't alow any insects to breed and cause foul smell around the garbage bin



CONCLUSION AND FUTURE SCOPE

Conclusion

As mentioned in the report, the project's main objective is to monitor the garbage level, sense whether the waste is wet or dry, and segregate them respectively. All the sensors collect the respective information and feed it to the microcontroller. Hence, we tend to conclude that, by implementing this project, we will reduce human efforts to sort waste and provide an efficient and accurate method for the same. The project also helps to make a greener environment by separating wastes and allowing them to be treated accordingly.

Future Scope

1. Servers can be maintained at the WMC's to collect the information from the dustbin using the GSM module and WiFi module.
2. Each level of the dustbin can be recorded instead of just recording the filled level.
3. Whenever a dustbin is filled, a GPS locator can be used to locate another dustbin that is nearer to the user to make the waste disposal convenient to prevent the waste from lying on the open streets.

CREDITS AND RESPONSIBILITIES

RONIT SINGHAL

Roll Number: 20NA10033
Presentation preparation, data accumulation, report making, the outline of the project.

GONNABHAKTHULA AKSHITH

Roll Number: 20BT30009
Presentation preparation, data accumulation, report making, the outline of the project, data curation.

NAVEEN SANI

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Model designing, Video explaining its working, Code editing, Video editing.

SUMAN RAJ

Roll Number: 20NA30027
Code designing, Code editing, Video editing.

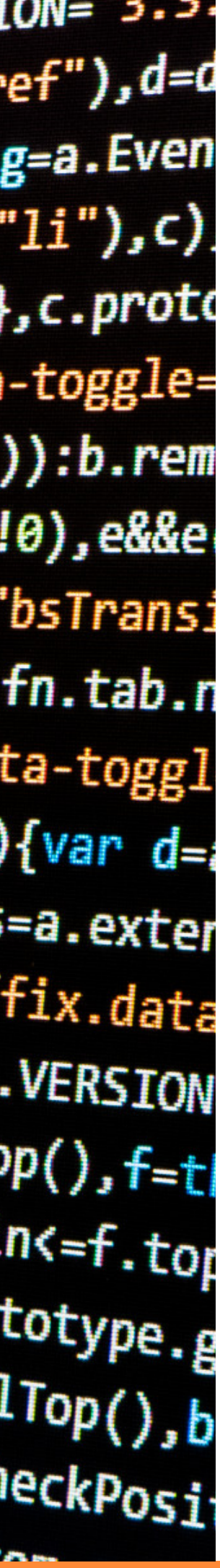
REFERENCES:

- https://www.researchgate.net/publication/342704655_Smart_Garbage_Management_System_for_a_Sustainable_Urban_Life_An_IoT_Based_Application
- https://www.researchgate.net/publication/317718894_Smart_Waste_Management
- https://www.ijsdr.org/papers/IJSDR1609034.pdf
- https://www.youtube.com/watch?v=abXdc9FZmNg
- https://www.youtube.com/watch?v=WVWyvcisdlA

VIDEO LINK

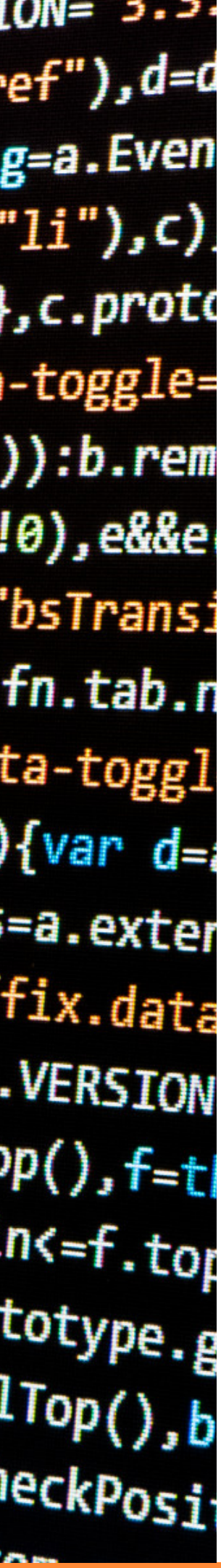
Link 1 (Google drive link):
https://drive.google.com/file/d/1GZbMCpgw3Xsf-TyRTlcLswwlnCCCK_tc/view?usp=sharing

Link 2 (YouTube link):
https://www.youtube.com/watch?v=g310zLau8rE



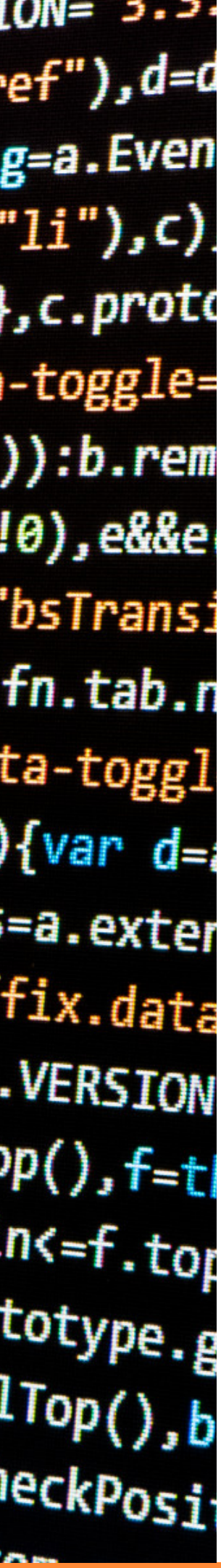
APPENDIX-1
(CODE)

```
#include <Blynk.h>

#include <ESP8266_Lib.h>


#define BLYNK_PRINT Serial
#include <ESP8266_Lib.h>
#include <BlynkSimpleShieldEsp8266.h>
char auth[] = "g_rmdk7Qdme5wVyx1Zzd3axdCml_MJLk";
char ssid[] = "Mywifi";
char pass[] = "123456789";
SimpleTimer timer;
#define ESP8266_BAUD 115200
ESP8266 wifi(&Serial);
//////////////////////////////////////////
#include <LiquidCrystal.h>
LiquidCrystal lcd(6,7,8,9,10,11);//RS,EN,D4,D5,D6,D7
#include <Servo.h>
#define ir1 A1
#define sen1 A0 // moisture
#define buzzer 2
#define trigPin1 A4////right
#define echoPin1 A5
#define trigPin2 A2  //// front
#define echoPin2 A3
#define green 4
#define blue 5
int lvl1=0;
 int lvl2=0;
long duration, distance,sensor1,sensor2; // us variable
int onetime=0,onetime1=0 ;
int wet=0,moisture=0,object=0,cabin2=0,c1=0,c2=0;
Servo myservo;  // create servo object to control a servo
// twelve servo objects can be created on most board
```



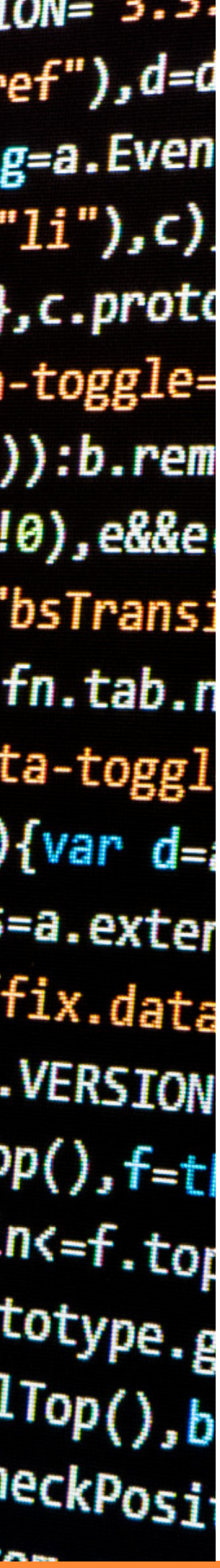
APPENDIX-1
(CODE - CONTINUATION)

```
void setup()
{

 Serial.begin(9600);
 lcd.begin(16, 2);//initializing LCD
 lcd.setCursor(0,0);
 lcd.print("Automatic WASTE");
 delay(3000);
 lcd.setCursor(0,1);
 lcd.print("Segregation sys");
 delay(3000);
 pinMode(ir1,INPUT);
 pinMode(sen1,INPUT);
 pinMode(buzzer,OUTPUT);
 pinMode(trigPin1, OUTPUT);
 pinMode(echoPin1, INPUT);
 pinMode(trigPin2, OUTPUT);
 pinMode(echoPin2, INPUT);
  pinMode(green, OUTPUT);
  pinMode(blue, OUTPUT);
   digitalWrite(green,HIGH);
    digitalWrite(blue,HIGH);
 myservo.attach(3);  // attaches the servo on pin 9 to the
servo object
 myservo.write(75);
 delay(10);
  lcd.clear();
 lcd.print("connecting.....");
 //Blynk.begin(auth, wifi, ssid, pass);
 lcd.clear();
 lcd.print("connected.....");
 delay(1000);
 lcd.clear();
}
```



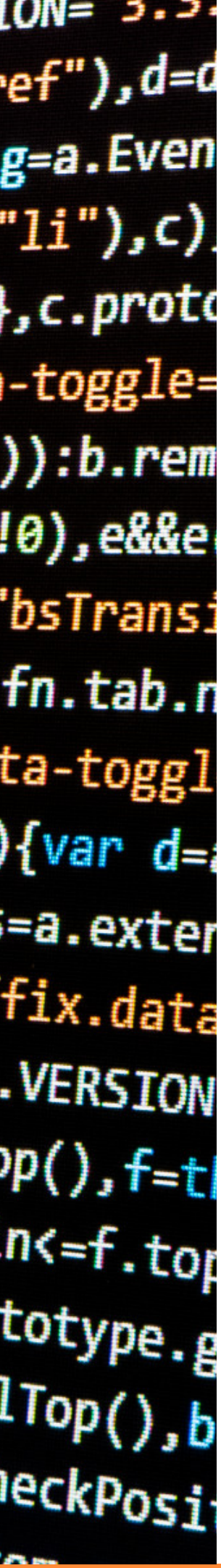
APPENDIX-1
(CODE - CONTINUATION)

```
void loop()
{
 //Blynk.run();
 timer.run();
moisture=analogRead(sen1);
Serial.print("moisture = ");
Serial.println(moisture);
delay(500);
////////////////////////////////////////////////////
ultrasensor(trigPin1, echoPin1);
sensor1 = distance;
delay(10);
ultrasensor(trigPin2, echoPin2);
sensor2 = distance;
delay(10);
Serial.println(sensor1);
Serial.println(sensor2);
lvl1=(28-sensor1)*3.57143;
lvl2=(28-sensor2)*3.57143;
Serial.println(lvl1);
Serial.println(lvl2);
lcd.clear();
lcd.setCursor(0,0);
lcd.print("WET       DRY");
lcd.setCursor(2,1);
lcd.print(lvl1);
lcd.setCursor(11,1);
lcd.print(lvl2);
delay(1000);
```



APPENDIX-1
(CODE - CONTINUATION)

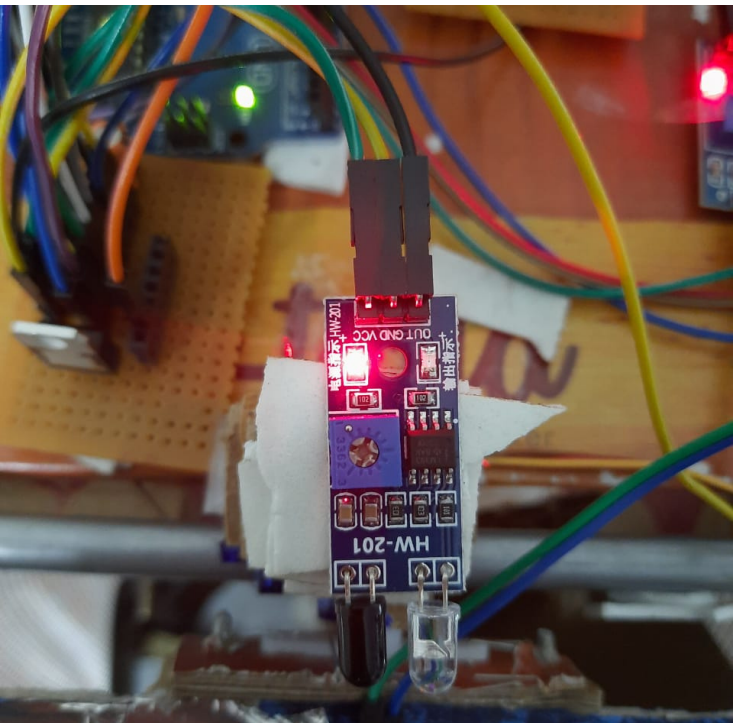
```
object=digitalRead(ir1);
 moisture=analogRead(sen1);
 if(object==LOW)
 {
  Serial.println(object);
  lcd.clear();
  moisture=analogRead(sen1);
  lcd.setCursor(0,0);
  lcd.print("-GARBAGE SENSE-");
 lcd.setCursor(0,1);
 lcd.print("moisture: ");
 lcd.setCursor(12,1);
 lcd.print(moisture);
  digitalWrite(buzzer,HIGH);
  delay(150);
  digitalWrite(buzzer,LOW);
  delay(1000);
  moisture=analogRead(sen1);
  Serial.print("moisture = ");
  Serial.println(moisture);
  delay(500);
  moisture=analogRead(sen1);
  Serial.print("moisture = ");
  Serial.println(moisture);
   delay(500);
   if(moisture>1022)
   {
    lcd.clear();
    lcd.setCursor(0,0);
    lcd.print(" DRY  GARBAGE");
    myservo.write(0);
    delay(5000);
    myservo.write(75);
    delay(2000);
    Serial.println("wet");
   }
```

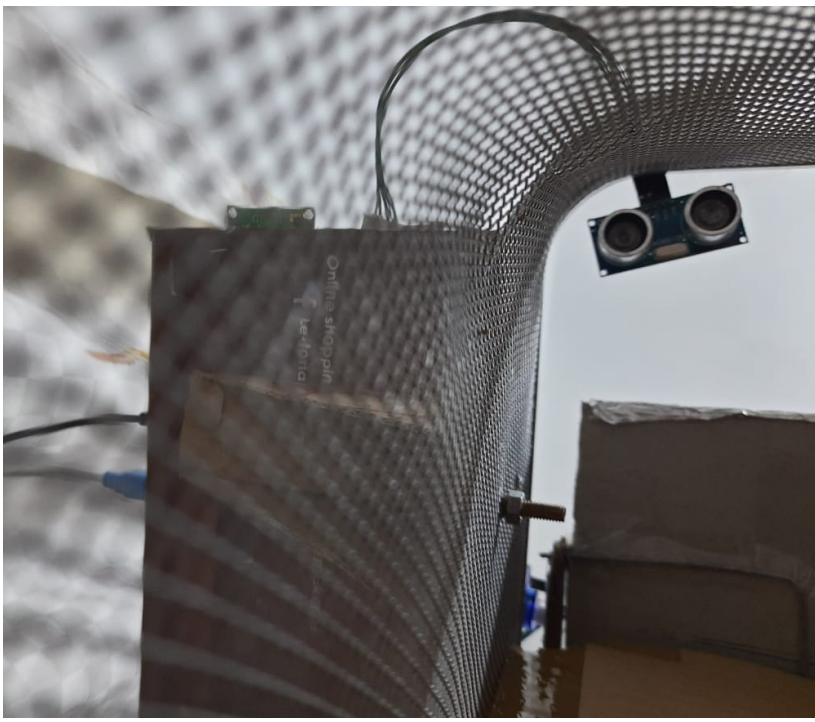


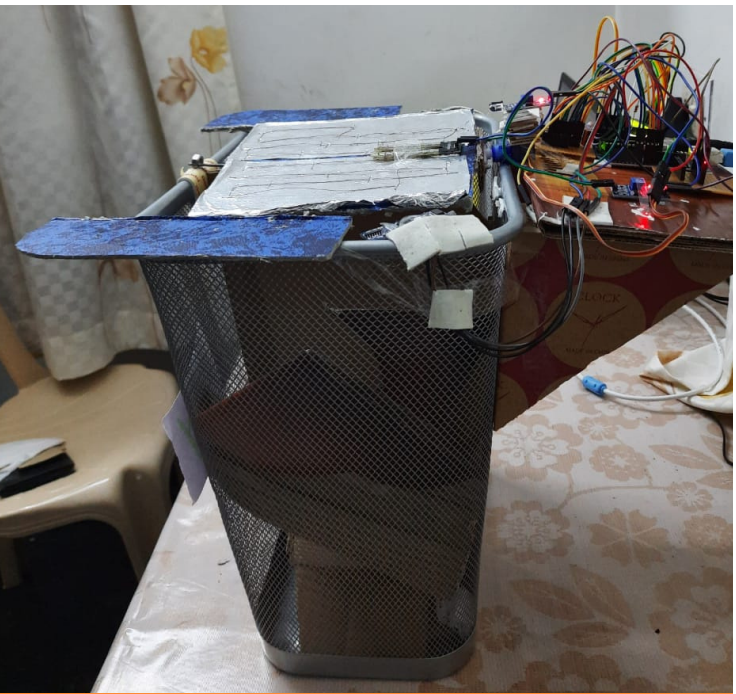
APPENDIX-1
(CODE - CONTINUATION)

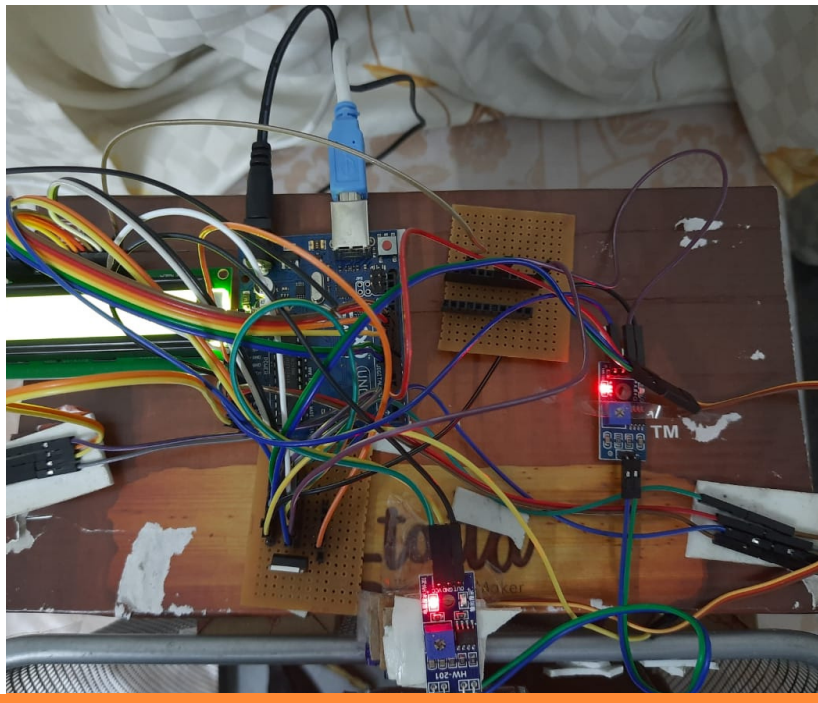
```
else if(moisture>=0)
   {
    lcd.clear();
    lcd.setCursor(0,0);
    lcd.print(" WET  GARBAGE");
    myservo.write(135);
    delay(5000);
    myservo.write(75);
    delay(2000);
    Serial.println("moisture");
    lcd.clear();
   }
  }
 }
void sendSensor()
{
 Blynk.virtualWrite(V5, lvl1); // Humidity for gauge
 Blynk.virtualWrite(V6, lvl2); // Temperature for gauge
}
 void ultrasensor(int trigPin,int echoPin)
 {
  digitalWrite(trigPin, LOW);  // Added this line
  delayMicroseconds(2); // Added this line
  digitalWrite(trigPin, HIGH);
  delayMicroseconds(10); // Added this line
  digitalWrite(trigPin, LOW);
  duration = pulseIn(echoPin, HIGH);
  distance = (duration/ 58.31);
 }
```

APPENDIX 2
Photographs and Diagrams









APPENDIX-3
(MATERIALS USED AND THE BUDGET)

Materials (×Qty):	Cost:
Arduino UNO (×1)	₹500
IR module (×1)	₹70
Ultrasonic sensor (×2)	₹340
LED 5mm (×4)	₹4
LCD 16x2 pinout (×1)	₹150
Servo motor mini (×1)	₹160
7805 Voltage regulator (×1)	₹10
Jumper wires (×100)	₹500
PCB 2x3 (×1)	₹15
Resistor 0.25Ω (×2)	₹2
12V, 2A AIR (×1)	₹230
Moisture sensor (×1)	₹150
Breadboard (x1)	₹80
Berger STR (x2)	₹17
Total	₹2,228