Embedded Systems

Report - Smart bin

Team Members

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Introduction

The Main Objective of the project is to design a smart bin that will help keep our surrounding clean and environmentally friendly. Today technology is becoming increasingly sophisticated day by day, so cleaning up our environment creates a smart dust bin using Arduino. This clever dustbin management system is built into a microcontroller based system with ultrasonic sensors in the dustbin. In this proposed process we designed a smart dust bin using the ARDUINO UNO, as well as an ultrasonic sensor, servo motor, battery and jumper wire.

Problem Statement

Module-1:

Opening the lid when sensing human

Module-2:

Detecting the Garbage level

Module-3:

Sending Indication message using GSM

Components Required

Module-1,2:

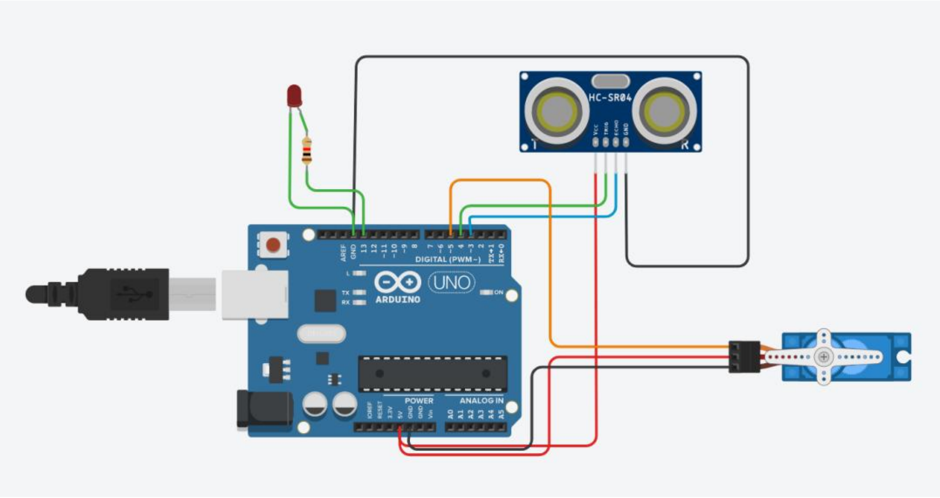
- Arduino Uno R3
- Ultrasonic Distance Sensor
- LED
- Resistor
- Micro Servo

Module-3:

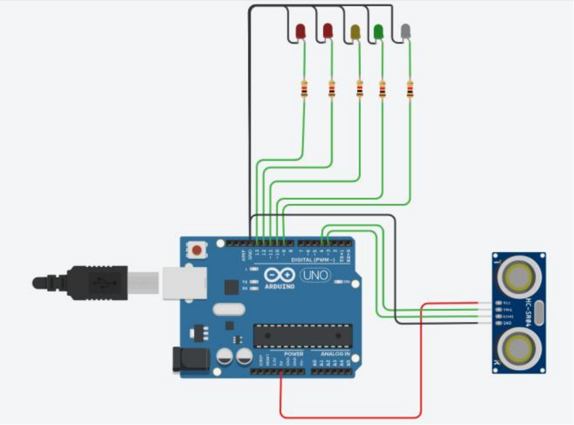
- GSM module
-

Schematic Diagram

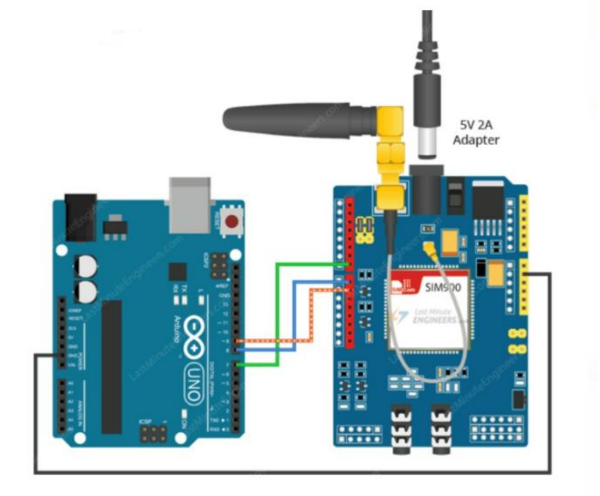
Module1:



Module2:



Module3:



Code

Module1:

```
#include <Servo.h>
Servo servoMain; // Define our Servo
int trigpin = 4;   // Defines Trig and Echo pins of the Ultrasonic Sensor
int echopin = 3;
int led = 13;
int distance;
float duration;
float cm;
void setup(){
servoMain.attach(5); // servo on digital pin 5
pinMode(trigpin, OUTPUT);//  trigPin as an Output
pinMode(led, OUTPUT);// led as an Output
pinMode(echopin, INPUT);// echopin as an Input
}
void loop(){
digitalWrite(trigpin, LOW);
delay(2);
digitalWrite(trigpin, HIGH);
delayMicroseconds(10);
digitalWrite(trigpin, LOW);
duration = pulseIn(echopin, HIGH);// returns the travel time of the sound wave
cm = 0.034*(duration/2);
distance = cm;
if(distance<40){
digitalWrite(led, HIGH);
servoMain.write(180);  // Turn Servo back to center position (90 degrees)
delay(3000);
}
else{
digitalWrite(led,LOW);
servoMain.write(0);
delay(50);
}
}
```

Module2:

```
int trigpin = 4;// Defines Trig and Echo pins of the Ultrasonic Sensor
int echopin = 3;
int led2 = 13;
int led3 = 12;
int led4 = 11;
int led5 = 10;
int led6 = 9;
int x;
float duration;
float cm;
void setup(){
pinMode(trigpin, OUTPUT);// Sets the trigPin as an Output
pinMode(led2, OUTPUT);
pinMode(led3, OUTPUT);
pinMode(led4, OUTPUT);
pinMode(led5, OUTPUT);
pinMode(led6, OUTPUT);
pinMode(echopin, INPUT);
}
void loop(){
digitalWrite(trigpin, LOW);
delay(2);
digitalWrite(trigpin, HIGH);
```

```
delayMicroseconds(10);
digitalWrite(trigpin, LOW);
duration = pulseIn(echopin, HIGH);// Reads the echoPin, returns the sound wave travel time in microseconds
cm = 0.034*(duration/2);
x = cm;
if(x>=50){
digitalWrite(led6, LOW);
digitalWrite(led5, HIGH);
digitalWrite(led4, LOW);
digitalWrite(led3, LOW);
digitalWrite(led2, LOW);
}
else if(x>=40 && x<50){
digitalWrite(led6, LOW);
digitalWrite(led5, HIGH);
digitalWrite(led4, HIGH);
digitalWrite(led3, LOW);
digitalWrite(led2, LOW);
}
else if(x>=30 && x<40){
digitalWrite(led6, LOW);
digitalWrite(led5, HIGH);
digitalWrite(led4, HIGH);
digitalWrite(led3, HIGH);
digitalWrite(led2, LOW);
}
else if(x>=20 && x<30){
digitalWrite(led6, LOW);
digitalWrite(led5, HIGH);
digitalWrite(led4, HIGH);
digitalWrite(led3, HIGH);
digitalWrite(led2, HIGH);
}
else if(x<20)
{
digitalWrite(led6, HIGH);
digitalWrite(led5, HIGH);
digitalWrite(led4, HIGH);
digitalWrite(led3, HIGH);
digitalWrite(led2, HIGH);
}
else{
digitalWrite(led5,HIGH);
```

```
        digitalWrite(led6, LOW);
        digitalWrite(led4, LOW);
        digitalWrite(led3, LOW);
        digitalWrite(led2, LOW);
        }
}
```

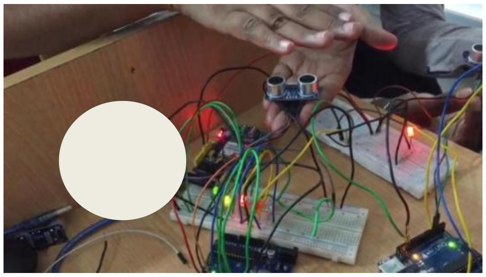
Module3:

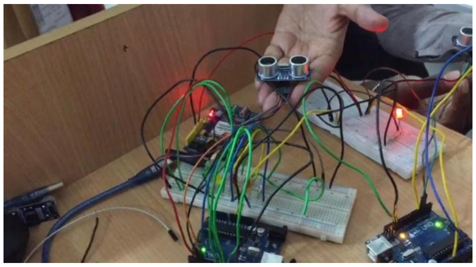
```
        #include <SoftwareSerial.h>        //Create software serial object to communicate with SIM900
        SoftwareSerial mySerial(7, 8);    //SIM900 Tx & Rx is connected to Arduino 7 & 8
        void setup(){
          Serial.begin(9600);                    //Begin serial communication with Arduino and Arduino IDE
          mySerial.begin(9600);              //Begin serial communication with Arduino and SIM900
          Serial.println("Initializing...");
          delay(1000);
           mySerial.println("AT");          //Handshaking with SIM900
          updateSerial();
          mySerial.println("AT+CMGF=1"); // Configuring TEXT mode
          updateSerial();
          mySerial.println("AT+CMGS=\"+916385273501\""); //phone number to sms
          updateSerial();
          mySerial.print("Garage level indication message:The garbage level is almost full. Do take
             appropriate action");            //text content
          updateSerial();
          mySerial.write(26);
        }
        void updateSerial(){
          delay(500);
          while (Serial.available()) {
        mySerial.write(Serial.read()); //Forward what Serial received to Software Serial Port
          }
          while(mySerial.available()) {
            Serial.write(mySerial.read()); //Forward what Software Serial received to Serial Port
          }
}
```

Snapshots

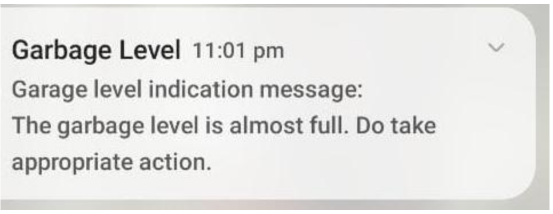
Module1:

Module2:





Module3:

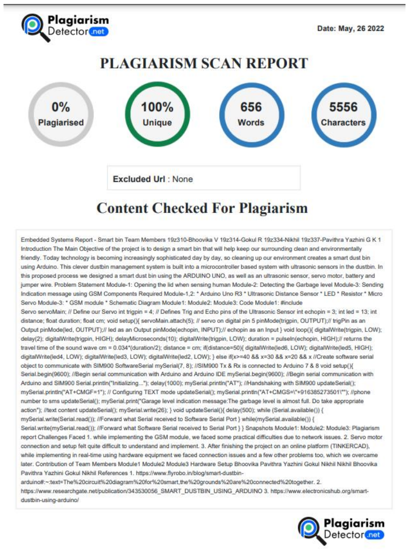


Garbage Level 11:01 pm

Garage level indication message:

The garbage level is almost full. Do take appropriate action.

Plagiarism report



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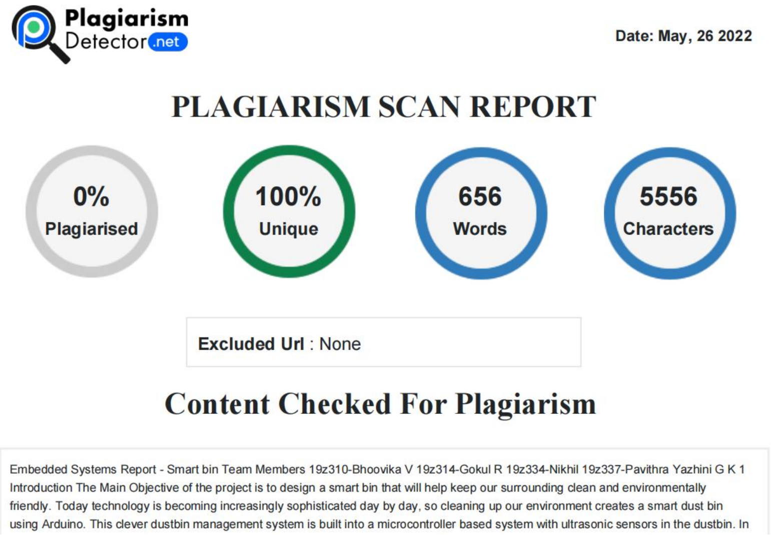

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Contribution of Team Members

Module1	Module2	Module3	Hardware Setup
Bhoovika Pavithra Yazhini	Gokul Nikhil	Nikhil	Bhoovika Pavithra Yazhini Gokul Nikhil

References

1. https://www.flyrobo.in/blog/smart-dustbin-arduino#:~:text=The%20circuit%20diagram%20for%20smart,the%20grounds%20are%20connected%20together.
2. https://www.researchgate.net/publication/343530056_SMART_DUSTBIN_USING_ARDUINO
3. https://www.electronicshub.org/smart-dustbin-using-arduino/