

PROJECT REPORT

MICROPROCESSOR AND INTERFACING (CSE2006)

SMART GARBAGE MONITORING

Submitted by

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ABSTRACT

The main objective is to create a smart waste management system through which we can provide an efficient solution to the problem of waste accumulation and over flooding of garbage bins. A major environmental concern of our society today is proper management and disposal of solid waste, which is crucial to the cleanliness and overall health of our society.

Traditional monitoring and disposal of waste are highly inefficient as it requires a lot of time and human effort. Using the power of Internet of Things (IoT), Smart Bin is designed for efficient and smart waste monitoring.

Our mission is to make India clean again by efficient management of waste with the use of technology. We tried to find out the existing waste management solutions currently being implemented, but we found that manual waste collection without any technological aid is the only way of garbage collection in our country. Therefore, we decided to take inefficient garbage collection and an urgent need for cleanliness as our opportunity to build a product and service to address this issue.

The project is aimed to generate alerts and assist the waste dumping authorities for regular and proper waste collection from garbage bins through our proposed technological product.

ULTIMATE OBJECTIVE

In our project, we will be making a smart dustbin which will send out alerts whenever the dustbin is about to get full. It will notify the authorities of the same and thus would help them collect it on time. Using the power of Internet of Things (IoT), Smart Bin is designed for efficient and smart waste monitoring. Our project will be one of the very first steps to clean India.

PROPOSED PROJECT MODEL

Our Smart Garbage Collection project is aimed to generate alerts and assist the waste dumping authorities for regular and proper waste collection from garbage bins through our proposed technological product. Using the power of Internet of Things (IoT), Smart Bin is designed for efficient and smart waste monitoring.

The Smart Bin uses ultrasonic sensors to monitor the height of garbage in any dustbin. Ultrasonic sensors are placed on the interior side of the lid of each dustbin.

DISADVANTAGE OF EXISTING MODEL

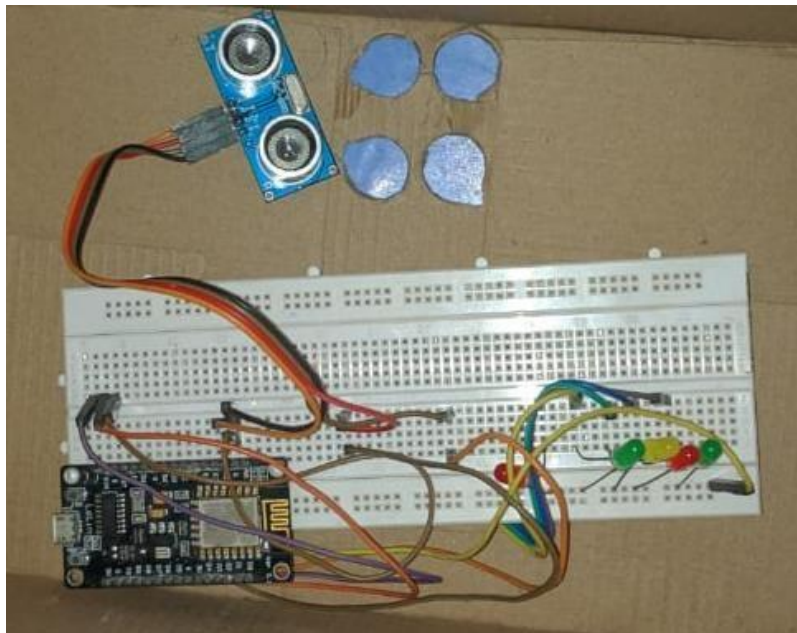
In the existing system, the dustbins are not technologically advanced. They are often full and authorities don't get the information regarding it which leads to overflow of garbage. This is the beginning of a harmful surrounding and unpleasant smell.

The Smart Garbage Collection project aims to solve this problem by sending alerts to the authorities and thus scheduling timely collection.

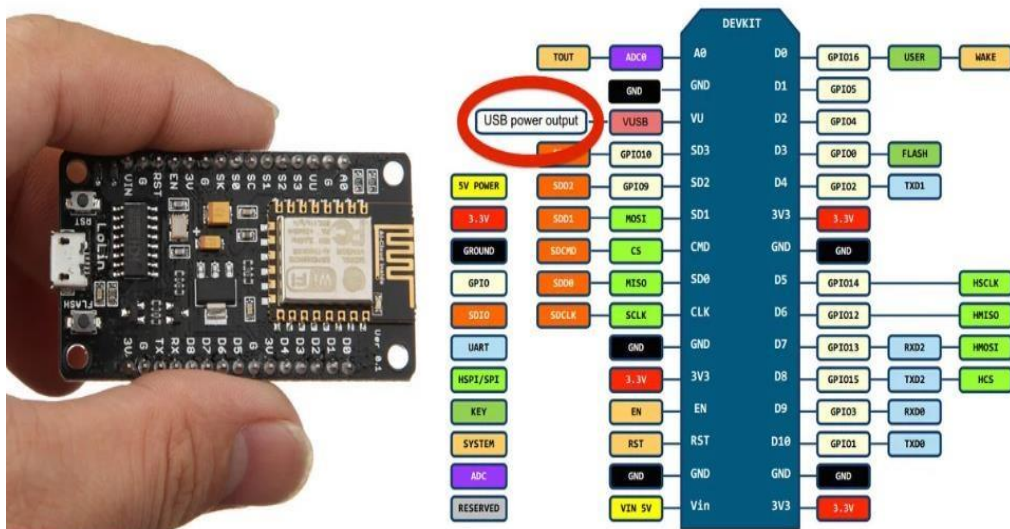
TOOLS, COMPONENTS, HARDWARE, SOFTWARE

- Garbage Bin
- Battery
- LiLon NodeMCU V3
- Arduino IDE
- Ultrasonic Sensor
- Breadboard
- Jumper Wires
- LED: For indication purpose.

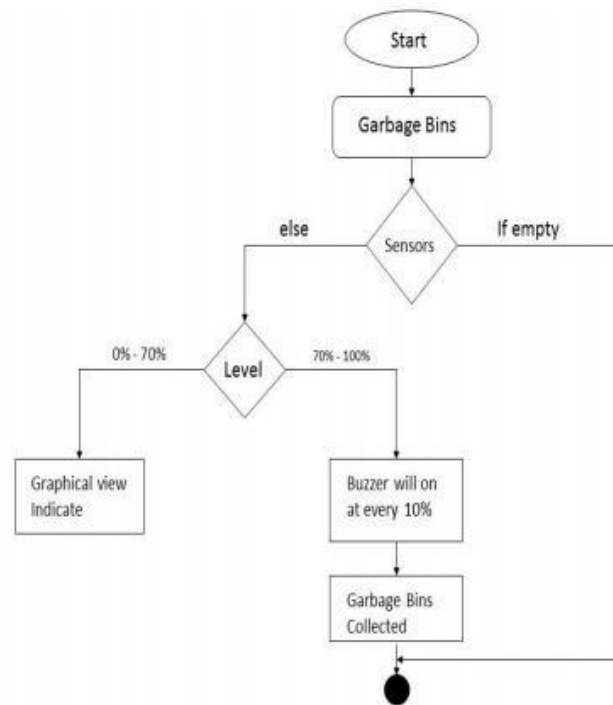
SYSTEM ARCHITECTURE



LiLon NodeMCU V3



FLOWCHART:



CODE:

```
#include <FirebaseArduino.h>

#include <Arduino.h>

#include <ESP8266WiFi.h>

#include <ESP8266HTTPClient.h>

const char* ssid    = "TheAlgo";
const char* password = "project1234";

#define FIREBASE_HOST "friendlychat-6bd7a.firebaseio.com"
#define FIREBASE_AUTH "WehKXhUO22JG8msnzGJaMXcBZPEke9JxC2BNMvFS"

#define pin1 D0
#define pin2 D1
#define pin3 D2
#define pin4 D3
#define pin5 D4

#define TRIGGER D7
#define ECHO    D8

long maximum = 40;
long block = maximum/4;

bool started = true;
int id; int led = 0;
bool blinkAll = false;
bool blinkOn = false;

HTTPClient http;

void setup() {
  Serial.begin(115200);
  Serial.println("started");

  pinMode(pin1, OUTPUT);
  pinMode(pin2, OUTPUT); pinMode(pin3,
  OUTPUT); pinMode(pin4, OUTPUT);
  pinMode(pin5, OUTPUT);
```

```

pinMode(TRIGGER,OUTPUT);
pinMode(ECHO,INPUT);

WiFi.begin(ssid, password);

while (WiFi.status() != WL_CONNECTED) {
  delay(500);
  Serial.print(".");
}

Serial.println("");
Serial.println("WiFi connected");
Serial.println("IP address: ");
Serial.println(WiFi.localIP());

Firebase.begin(FIREBASE_HOST, FIREBASE_AUTH);
Firebase.setFloat("bin001-max",    maximum);          if
(Firebase.failed()) {
  Serial.print("setting /number failed:");
  Serial.println(Firebase.error());
  return;
}
}

int getReading(){
  long duration, distance;
  digitalWrite(TRIGGER, LOW);
  delayMicroseconds(2);

  digitalWrite(TRIGGER, HIGH);
  delayMicroseconds(10);

  digitalWrite(TRIGGER, LOW);
  duration = pulseIn(ECHO, HIGH);
  // Serial.println(duration);
  distance = (duration/2) / 29.1;
  // The speed of sound is 340 m/s or 29 microseconds per centimeter.
  // The ping travels out and back, so to find the distance of the  //
  object we take half of the distance travelled.

  Serial.print(distance);
  Serial.println(" cm");

```

```
    return distance;
}
```

```
void displayLED(byte data){
digitalWrite(pin1, (data & 0b0001)>>0);
digitalWrite(pin2, (data & 0b0010)>>1);
digitalWrite(pin3, (data & 0b0100)>>2);
digitalWrite(pin4, (data & 0b1000)>>3);
}
```

```
long lastSent = 0;
long sendFirebaseInterval = 500;
```

```
void loop() {  int dist =
getReading();
    if(dist > block)blinkAll = false;  if(dist >
maximum)displayLED(0b0001);  else
if(dist > block*3)displayLED(0b0010);  else
if(dist > block*2)displayLED(0b0100);  else
if(dist > block*1)displayLED(0b1000);
    else blinkAll = true;
```

```
    if(blinkAll){
blinkOn = !blinkOn;
    displayLED(blinkOn ? 0b1111 : 0b0000);
    }
```

```
    long current = millis();
```

```
    if((current - lastSent) >= sendFirebaseInterval){
        Firebase.setFloat("bin001-dist", dist);
    }
```

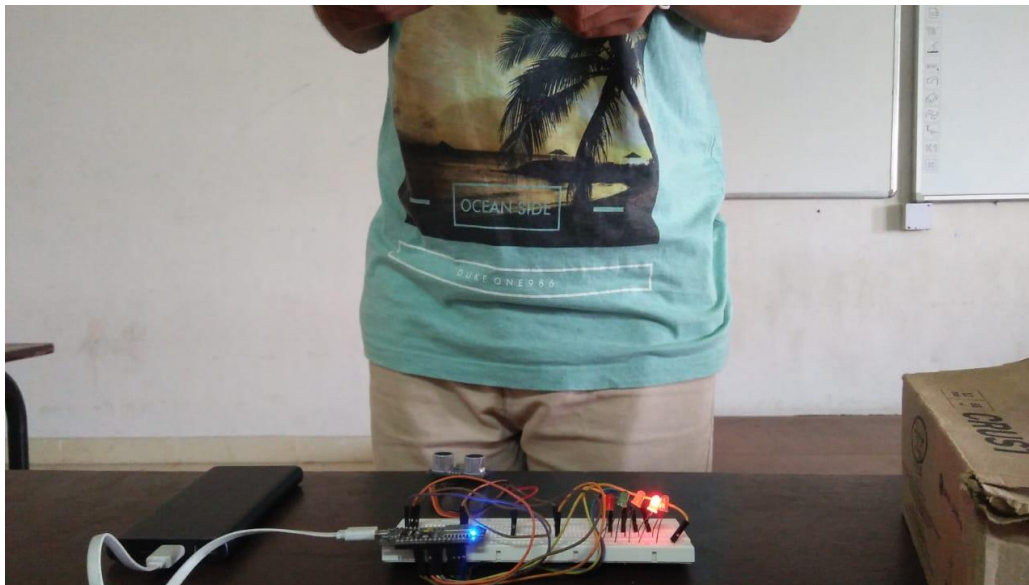
```
    delay(100);
}
```


OUTPUT:

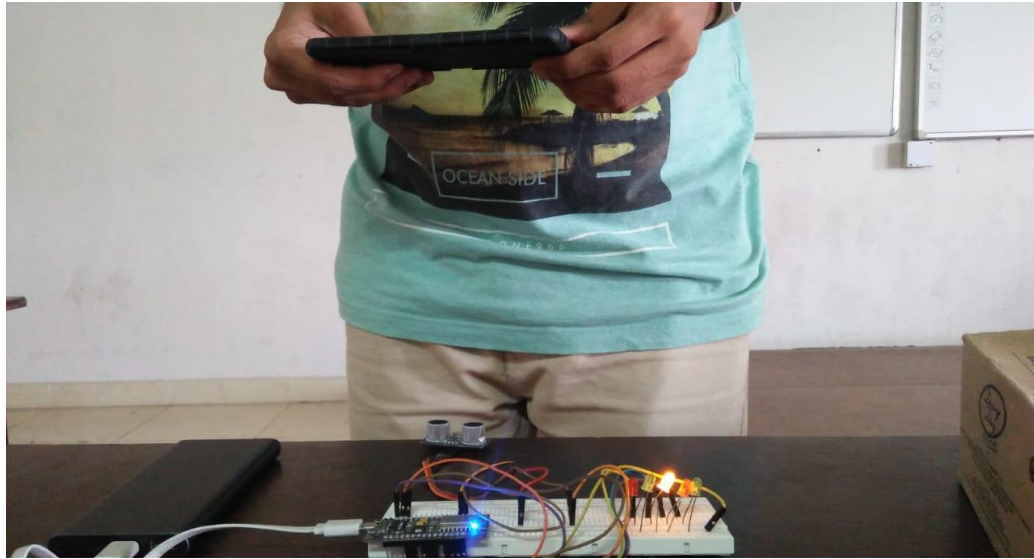
AT 40 cm:



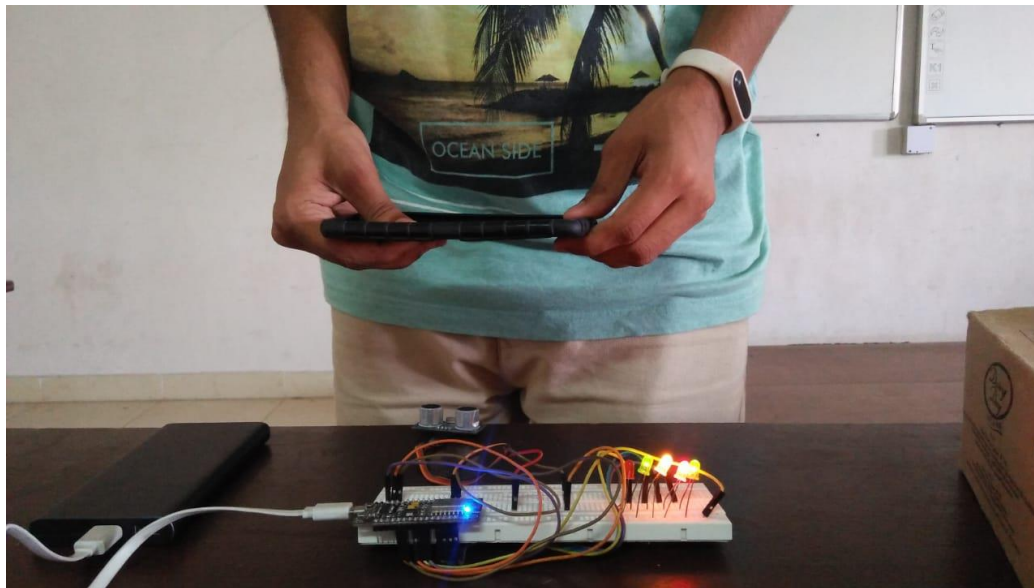
At 30 cm:



At 20 cm:



AT 10 cm:



CONCLUSION

The Internet of Things (IoT) shall be able to incorporate transparently and seamlessly many different systems, while providing data for millions of people to use and capitalize. Building a general architecture for the IoT is hence a very complex task, mainly because of the extremely large variety of devices, link layer technologies, and services that may be involved in such a system.

One of the main concerns with our environment has been solid waste management which impacts the health and environment of our society. The detection, monitoring and management of wastes is one of the primary problems of the present era. The traditional way of manually monitoring the wastes in waste bins is a cumbersome process and utilizes more human effort, time and cost which can easily be avoided with our present technologies.

This is our solution, a method in which waste management is automated. This is our IoT Garbage Monitoring system, an innovative way that will help to keep the cities clean and healthy.

REFERENCES

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