# SPRINT – 2

| DATE | 5 NOV 2022 |
|---|---|
| TEAM ID | PNT2022TMID37949 |
| PROJECT NAME | SMART WASTE MANAGEMENT SYSTEM FOR METROPOLITAN CITIES |

## CODE FOR DETECTING BIN LEVEL AND DISPLAYING IT IN IBM CLOUD:

```
#include <WiFi.h> // library for wifi
#include <PubSubClient.h> // library for MQTT
#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x27, 20, 4);


//--------------------- credentials of IBM Accounts ----------------------
---

#define ORG "mldk59"     // IBM organisation id
#define DEVICE_TYPE "pythoncode"   // Device type mentioned in ibm
watson iot platform
#define DEVICE_ID "252525"  // Device ID mentioned in ibm watson iot
platform
#define TOKEN "QZqODYo6U*Q6b+IpuC" // Token


//--------------------- customise above values ---------------------------
--- --------------------

char server[] = ORG ".messaging.internetofthings.ibmcloud.com"; // server name
char publishTopic[] = "iot-2/evt/data/fmt/json";   // topic name
and type of event perform and format in which data to be send
char topic[] = "iot-2/cmd/led/fmt/String"; // cmd Represent type and command
is test format of strings
char authMethod[] = "use-token-auth"; // authentication method
char token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID; //Client id

//-------------------------------------------------------------------------
---
---------------------------------------
 WiFiClient wifiClient;  // creating instance for wificlient

PubSubClient client(server, 1883, wifiClient);
```

```cpp
#define ECHO_PIN 12
#define TRIG_PIN 13
float dist;

void setup()
{
 Serial.begin(115200);
 pinMode(LED_BUILTIN, OUTPUT);
 pinMode(TRIG_PIN, OUTPUT);
 pinMode(ECHO_PIN, INPUT);
 //pir pin
 pinMode(34, INPUT);

 //ledpins
 pinMode(23, OUTPUT);
 pinMode(2, OUTPUT);
 pinMode(4, OUTPUT);
 pinMode(15, OUTPUT);

 lcd.init();
 lcd.backlight();
 lcd.setCursor(1, 0);
 lcd.print("");
 wifiConnect();
 mqttConnect();
}
float readcmCM()
{
 digitalWrite(TRIG_PIN, LOW);
 delayMicroseconds(2);
 digitalWrite(TRIG_PIN, HIGH);
 delayMicroseconds(10);
 digitalWrite(TRIG_PIN, LOW);
 int duration = pulseIn(ECHO_PIN, HIGH);
 return duration * 0.034 / 2;
}
void loop()
{

lcd.clear();
publishData();
delay(500);
if (!client.loop())
 {
  mqttConnect(); // function call to connect to IBM
 }
}
/* -------------------------------retrieving to cloud-----------------------
---
------------------------*/
```

```cpp
void wifiConnect()
{
 Serial.print("Connecting to ");
 Serial.print("Wifi");
 WiFi.begin("Wokwi-GUEST", "", 6);
 while (WiFi.status() != WL_CONNECTED)
  {
    delay(500);
    Serial.print(".");
  }
Serial.print("WiFi connected, IP address: ");
Serial.println(WiFi.localIP());
}
void mqttConnect()
 {
   if (!client.connected())
    {
      Serial.print("Reconnecting MQTT client to ");
      Serial.println(server);
      while (!client.connect(clientId, authMethod, token))
        {
            Serial.print(".");
            delay(500);
        }
    initManagedDevice();
    Serial.println();
    }
}
void initManagedDevice()
 {

   if (client.subscribe(topic))
    {
     Serial.println("IBM subscribe to cmd OK");
    }
else
 {
    Serial.println("subscribe to cmd FAILED");
  }
}
void publishData()
 {
   float cm = readcmCM();

if(digitalRead(34)) //pir motion detection
{
  Serial.println("Motion Detected");
  Serial.println("Lid Opened");
  digitalWrite(15, HIGH);
```

```arduino
if(digitalRead(34)== true)
 {
  if(cm <= 60) //Bin level detection
   {
      digitalWrite(2, HIGH);
      Serial.println("High Alert!!!,Trash bin is about to be full");
      Serial.println("Lid Closed");
      lcd.print("Full! Don't use");
      delay(2000);
      lcd.clear();
      digitalWrite(4, LOW);
      digitalWrite(23, LOW);
}
else if(cm > 60 && cm < 120)
{
   digitalWrite(4, HIGH);
   Serial.println("Warning!!,Trash is about to cross 50% of bin level");
   digitalWrite(2, LOW);
   digitalWrite(23, LOW);
}
else if(cm > 120)
{

 digitalWrite(23, HIGH);

 Serial.println("Bin is available");

 digitalWrite(2,LOW);

 digitalWrite(4, LOW);
}
 delay(10000);
 Serial.println("Lid Closed");
}

else
{
 Serial.println("No motion detected");
 digitalWrite(2, LOW);
 digitalWrite(15, LOW);
 digitalWrite(4, LOW);
 digitalWrite(23, LOW);

}

}
else
{
 digitalWrite(15, LOW);
}
```

```cpp
if(cm <= 60)
 {
    digitalWrite(21,HIGH);
    String payload = "{\"High_Alert\":";
    payload += cm;
    payload += " }";
    Serial.print("\n");
    Serial.print("Sending payload: ");
    Serial.println(payload);


if (client.publish(publishTopic, (char*) payload.c_str())) // if data is
uploaded to cloud successfully,prints publish ok else prints publish failed
{
Serial.println("Publish OK");
}
}
else if(cm <= 120)
{

   digitalWrite(22,HIGH);
   String payload = "{\"Warning\":";
   payload += cm ;
   payload += " }";
   Serial.print("\n");
   Serial.print("Sending payload: ");
   Serial.println(payload);
if(client.publish(publishTopic, (char*) payload.c_str()))
 {
    Serial.println("Publish OK");
 }
else
{
   Serial.println("Publish FAILED");
}
}
else
{
 Serial.println();
}

 float inches = (cm / 2.54); //print on lcd
 lcd.setCursor(0,0);
 lcd.print("Inches");
 lcd.setCursor(4,0);
 lcd.setCursor(12,0);
 lcd.print("cm");
 lcd.setCursor(1,1);
 lcd.print(inches, 1);
 lcd.setCursor(11,1);
 lcd.print(cm, 1);
 lcd.setCursor(14,1);
 delay(1000);
 lcd.clear();
}
```

**diagram.json:**

```json
{
  "version": 1,
  "author": "Uri Shaked",
  "editor": "wokwi",
  "parts": [

  { "type": "wokwi-esp32-devkit-v1", "id": "esp", "top": 42.67, "left": 54.67,
"attrs": {} },
  { "type": "wokwi-pir-motion-sensor", "id": "pir1", "top": -88.9, "left": -
14.5, "attrs": {} },
  { "type": "wokwi-hc-sr04", "id": "ultrasonic1", "top": 95.1, "left": -140.5,
"attrs": {} },
    {
      "type": "wokwi-lcd1602",
      "id": "lcd1",
      "top": 169.37,
      "left": 232.3,
      "attrs": { "pins": "i2c" }
    },
    {
      "type": "wokwi-led",
      "id": "led1",
      "top": -70.9,
      "left": 311.51,
      "attrs": { "color": "green" }
    },
    {
      "type": "wokwi-led",
      "id": "led2",
      "top": -23.57,
      "left": 316.84,
      "attrs": { "color": "yellow" }
    },
    {
      "type": "wokwi-led",
      "id": "led3",
      "top": 82.44,
      "left": 344.17,
      "attrs": { "color": "blue" }
    },
    { "type": "wokwi-led", "id": "led4", "top": 22.1, "left": 336.5, "attrs": {
"color": "red" } },
    {
      "type": "wokwi-resistor",
      "id": "r1",
      "top": -30.23,
      "left": 250.17,
      "attrs": { "value": "1000" }
    },
    {
      "type": "wokwi-resistor",
```

```json
      "id": "r5",
      "top": 11.77,
      "left": 246.83,
      "attrs": { "value": "1000" }

    },

    {

      "type": "wokwi-resistor",

      "id": "r6",

      "top": 67.1,
      "left": 254.16,
      "attrs": { "value": "1000" }
    },
    {
      "type": "wokwi-resistor",
      "id": "r7",
      "top": 124.44,
      "left": 273.5,
      "attrs": { "value": "1000" }
    }
  ],

  "connections": [
  [ "esp:TX0", "$serialMonitor:RX", "", [] ],
  [ "esp:RX0", "$serialMonitor:TX", "", [] ],
  [ "pir1:OUT", "esp:D34", "green", [ "v0" ] ],
  [ "esp:GND.2", "pir1:GND", "black", [ "h0" ] ],
  [ "esp:3V3", "pir1:VCC", "red", [ "v-1", "h22.2", "v54", "h-161.33", "v-10"]
  ],
  [ "ultrasonic1:VCC", "esp:VIN", "red", [ "v0" ] ],
  [ "ultrasonic1:TRIG", "esp:D13", "green", [ "v0" ] ],
  [ "ultrasonic1:ECHO", "esp:D12", "yellow", [ "v0" ] ],
  [ "ultrasonic1:GND", "esp:GND.2", "black", [ "v0" ] ],
  [ "lcd1:VCC", "esp:VIN", "red", [ "h-36", "v60.89", "h-164.67", "v-3.33" ] ],
  [ "lcd1:SDA", "esp:D21", "cyan", [ "h-47.34", "v-111.94" ] ],
  [ "lcd1:SCL", "esp:D22", "white", [ "h-28", "v-150.11", "h-0.67" ] ],
  [ "lcd1:GND", "esp:GND.1", "black", [ "h0" ] ],
  [ "led1:A", "r1:2", "green", [ "v0" ] ],
  [ "r1:1", "esp:D23", "green", [ "v2.06", "h-70", "v86.67", "h-12.67" ] ],
  [ "led2:A", "r5:2", "gold", [ "v0" ] ],
  [ "r5:1", "esp:D4", "gold", [ "v2.73", "h-22.66", "v2.67" ] ],
  [ "led4:A", "r6:2", "red", [ "v14.07" ] ],
  [ "r6:1", "esp:D2", "red", [ "v50.73", "h-86.66", "v45.33" ] ],
  [ "led3:A", "r7:2", "blue", [ "v0" ] ],
  [ "r7:1", "esp:D15", "blue", [ "v0" ] ],
  [ "led1:C", "esp:GND.1", "black", [ "v37.07", "h-121.01", "v188" ] ],
  [ "led2:C", "esp:GND.1", "black", [ "v14.4", "h-116.34", "v160.67" ] ],

  [ "led4:C", "esp:GND.1", "black", [ "v0.07", "h-132.67", "v125.33" ] ],
  [ "led3:C", "esp:GND.1", "black", [ "v-8.27", "h-99.67", "v55.33", "h-32.67",
  "v17.33" ] ]
  ]
  }
```
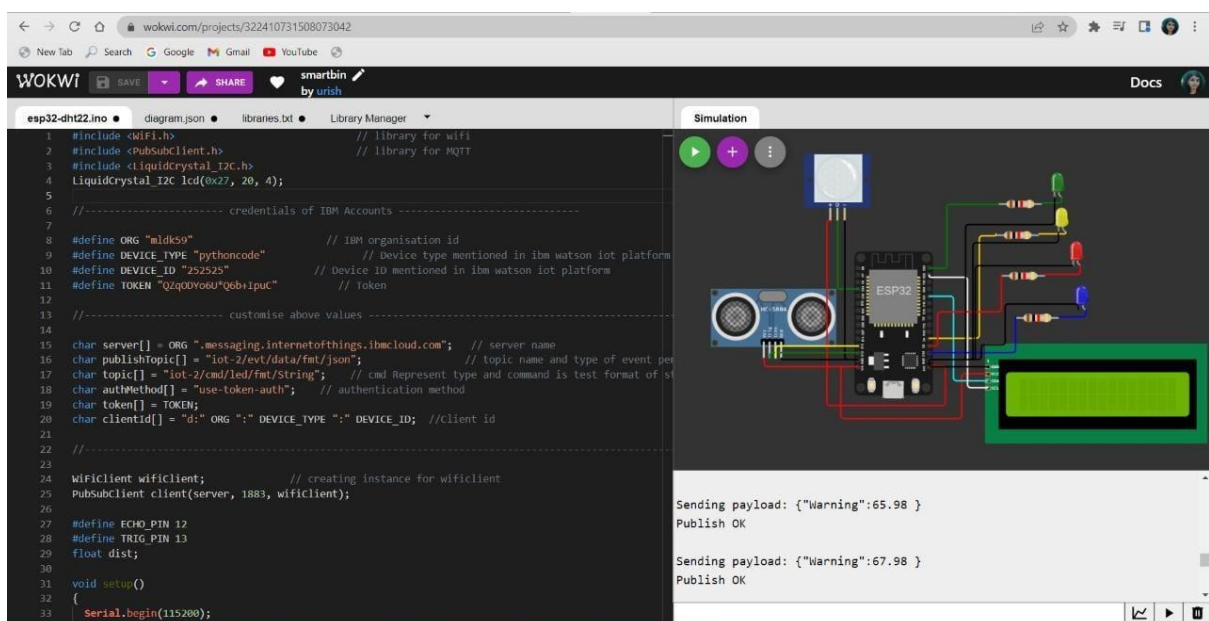
## CIRCUIT DIAGRAM:
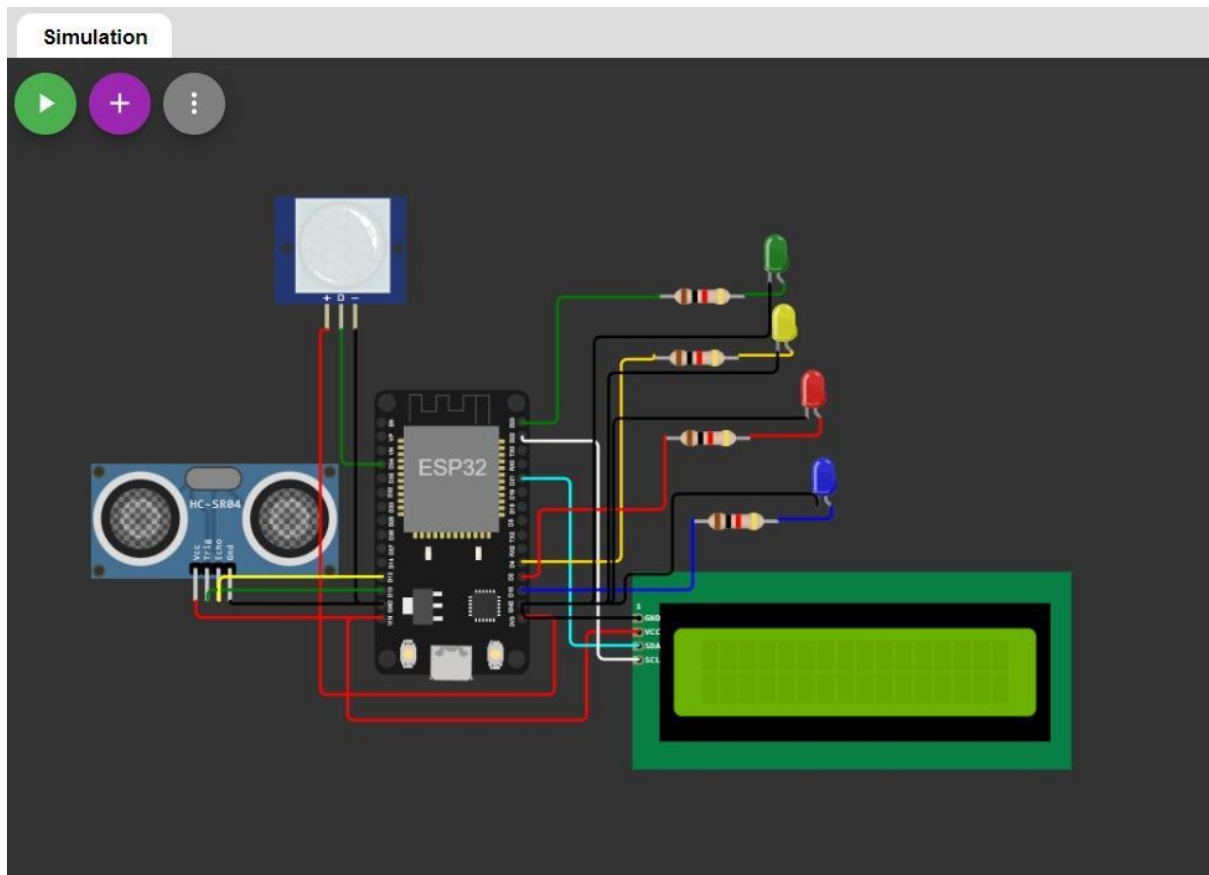


## SIMULATION IN WOKWI:

# IBM WATSON IOT PLATFORM OUTPUT: