

PROJECT DEVELOPEMENT PHASE

DELIVERY OF SPRINT – 2

Date	05 November 2022
Team ID	PNT2022TMID46424
Project Name	Project - Smart Waste Management System For Metropolitan Cities

CODE :

```
#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 "cbseji"             // IBM organisation id

#define DEVICE_TYPE "abcd"       // Device type mentioned in ibm watson iot platform

#define DEVICE_ID "1234"         // Device ID mentioned in ibm watson iot platform

#define TOKEN "12345678"        // 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);

#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----- */

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);
        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);
}
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();
}
```

CIRCUIT :

WOKWI

esp32-blink.ino

```
1 #include <WiFi.h> // library for wifi
2 #include <PubSubClient.h> // library for MQTT
3 #include <LiquidCrystal_I2C.h>
4 LiquidCrystal_I2C lcd(0x27, 20, 4);
5
6 //----- credentials of IBM Accounts -----
7
8 #define ORG "cbseji" // IBM organisation id
9 #define DEVICE_TYPE "abcd" // Device type mentioned in ibm watson iot p
10 #define DEVICE_ID "1234" // Device ID mentioned in ibm watson iot platform
11 #define TOKEN "12345678" // Token
12
13 //----- customise above values -----
14
15 char server[] = ORG ".messaging.internetofthings.ibmcloud.com"; // serve
16 char publishTopic[] = "iot-2/evt/data/fmt/json"; // topic
17 char topic[] = "iot-2/cmd/led/fmt/string"; // cmd R
18 char authMethod[] = "use-token-auth"; // auth
19 char token[] = TOKEN;
20 char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID; //client
21
22 //-----
23
24 WiFiClient wifiClient;
25 PubSubClient client(server, 1883, wifiClient); // creati
26
27 #define ECHO_PIN 12
28 #define TRIG_PIN 13
29 float dist;
30
31 void setup()
32 {
33   Serial.begin(115200);
34   pinMode(LED_BUILTIN, OUTPUT);
35   pinMode(TRIG_PIN, OUTPUT);
36   pinMode(ECHO_PIN, INPUT);
37 }
```

Simulation

The circuit diagram shows an ESP32 microcontroller board connected to three components: an HC-SR04 ultrasonic sensor, an LED, and an LCD display. The sensor's VCC pin is connected to the 5V pin of the ESP32, and its GND pin is connected to a GND pin. The sensor's TRIG pin is connected to pin 13 of the ESP32, and its ECHO pin is connected to pin 12. The LED's anode is connected to pin 12 of the ESP32, and its cathode is connected to a GND pin. The LCD display's VCC pin is connected to the 5V pin of the ESP32, and its GND pin is connected to a GND pin. The LCD display's data pins are connected to pins 2, 3, 4, and 5 of the ESP32.

