SPRINT - 2

Date	5 NOV 2022
Team ID	PNT2022TMID53567
Project Name	Smart Waste Management System for Metropolitan Cities

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

esp32-dht22.ino:

```
#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);

#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();
}
```

diagram.json:

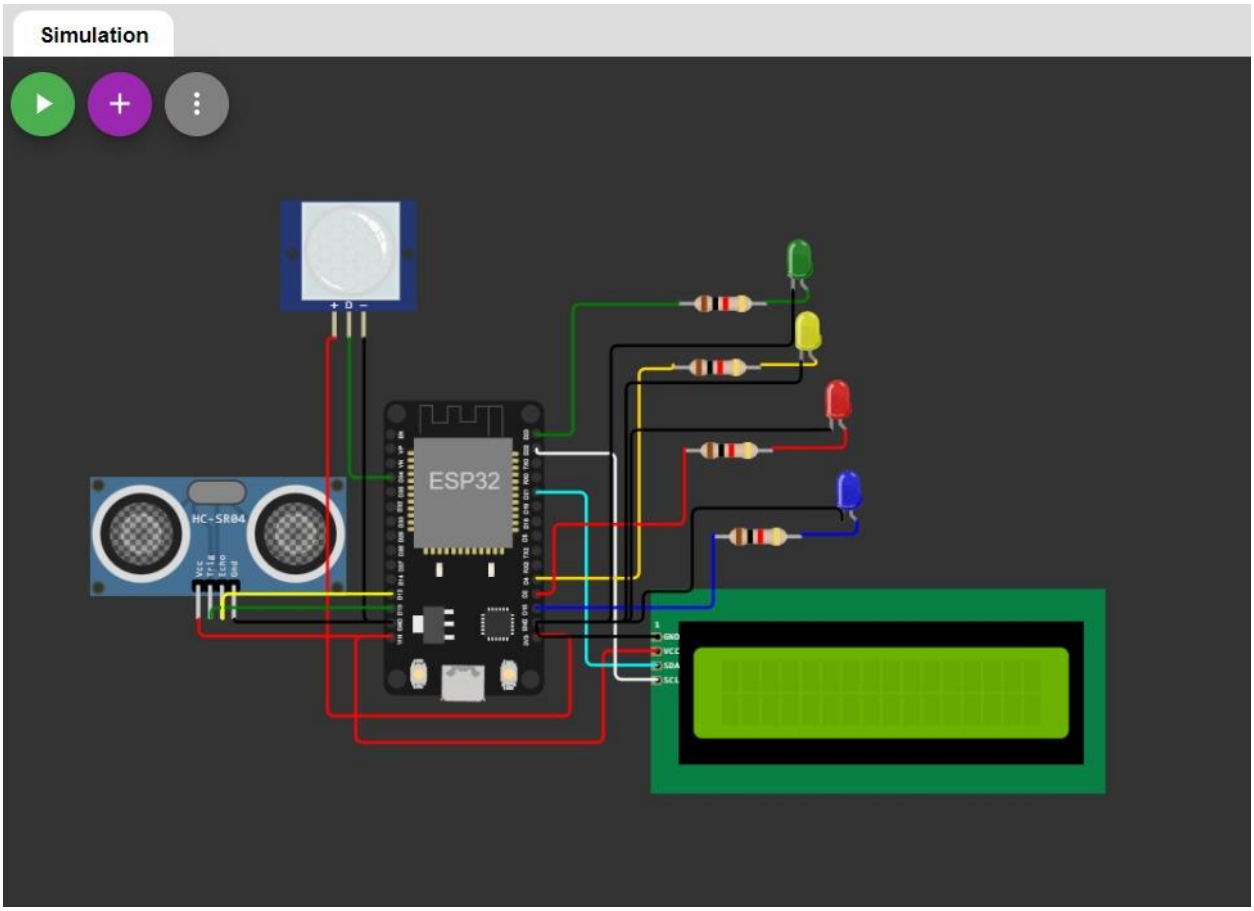
```
{
  "version": 1,
  "author": "Uri Shaked",
  "editor": "wokwi",
  "parts": [
```

```
    { "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",
```

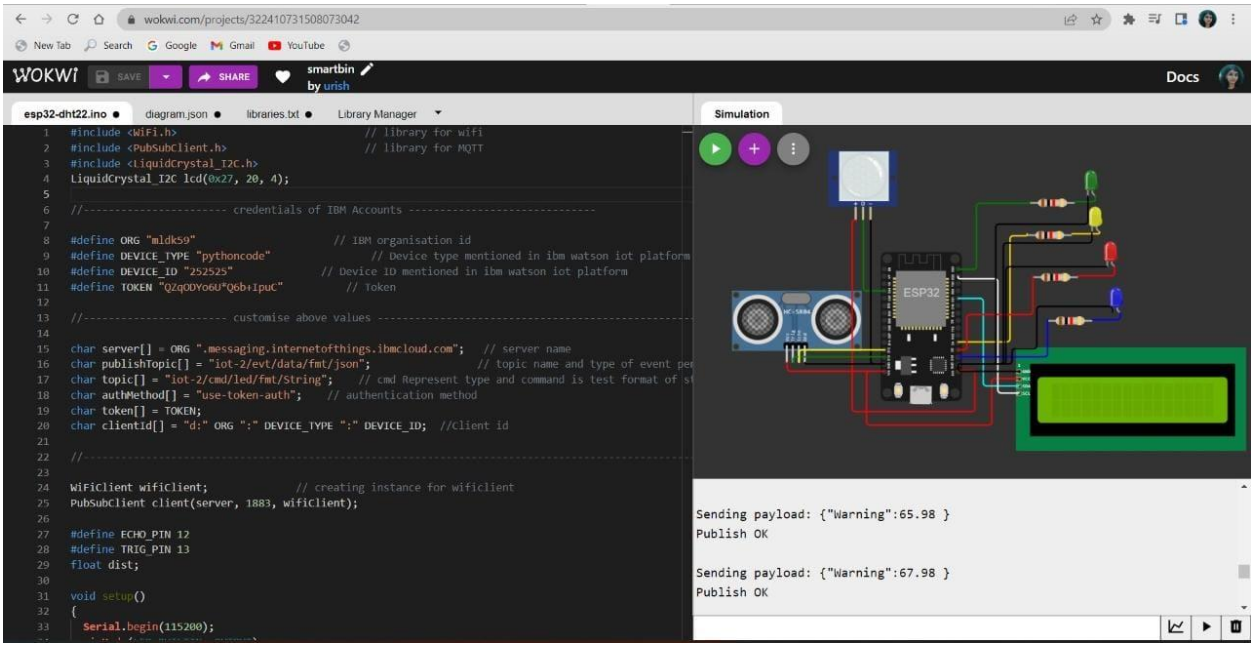
```
      "id": "r5",
      "top": 11.77,
      "left": 246.83,
      "attrs": { "value": "1000" }
    },
    {
      "type": "wokwi-resistor",
      "id": "r6",
      "top": 67.1,
      "left": 254.16,
      "attrs": { "value": "1000" }
    },
    {
      "type": "wokwi-resistor",
      "id": "r7",
      "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:



WOKWI LINK: https://wokwi.com/projects/348033452840321618

IBM WATSON IOT PLATFORM OUTPUT: