**SPRINT 2**

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|---|---|
| **Date** | 11 November 2022 |
| **Team ID** | PNT2022TMID26095 |
| **Project Name** | Smart Waste Management System for Metropolitan cities |

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

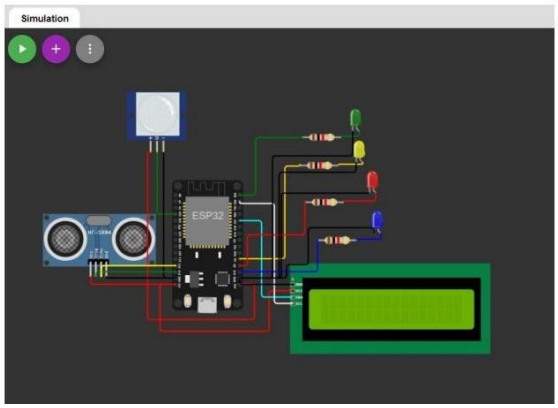
**esp32-dht22.ino:**

```
#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);
```

**CIRCUIT DIAGRAM:**




**IBM WATSON IOT PLATFORM OUTPUT:**