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#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 "9gbe4w" // IBM organisation id
#define DEVICE_TYPE "SWMSMC" // Device type mentioned in ibm watson iot platform
#define DEVICE_ID "ibmproject" // Device ID mentioned in ibm watson iot platform
#define TOKEN "sUNA41tG6-Pq)0rk5X" // 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

//-----
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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(4, 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);

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    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
    {

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        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);

    }
    else
    {
        digitalWrite(15, LOW);
    }

    if(digitalRead(34)== true)
    {
        if(cm <= 100)                //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 > 150 && cm < 250)
        {
            digitalWrite(4, HIGH);
            Serial.println("Warning!!,Trash is about to cross 50% of bin level");
            digitalWrite(2, LOW);
            digitalWrite(23, LOW);
        }
        else if(cm > 250 && cm <=400)
        {
            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");
    }

    if(cm <= 100)
    {

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digitalWrite(21,HIGH);
String payload = "{\"High Alert!!\":\"\"";
payload += cm;
payload += "left\" }";
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");
}
}
if(cm <= 250)
{
digitalWrite(22,HIGH);
String payload = "{\"Warning!!\":\"\"";
payload += dist;
payload += "left\" }";
Serial.print("\n");
Serial.print("Sending distance: ");
Serial.println(cm);
if(client.publish(publishTopic, (char*) payload.c_str()))
{
Serial.println("Publish OK");
}
else
{
Serial.println("Publish FAILED");
}
}

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();
}

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