

## ASSIGNMENT 4

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**Project Name: IoT based safety gadget for child safety monitoring and notification**

### QUESTION:

Write code and connections in wokwi for the ultrasonic sensor.

Whenever the distance is less than 100 cms send an "alert" to the IBM cloud and display in the device recent events.

Upload document with wokwi share the link and image of IBM cloud

### CODE:

```
#include <WiFi.h> //library for wifi
#include <PubSubClient.h> //library for MQTT

void callback(char* subscribetopic, byte* payload, unsigned int payloadLength);

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

#define ORG "ulzaqt" //IBM ORGANITION ID
#define DEVICE_TYPE "IoT_Child_Safety" //Device type mentioned in ibm watson IOT Platform
#define DEVICE_ID "ran123" //Device ID mentioned in ibm watson IOT Platform
#define TOKEN "12345678" //Token
String data3;
float dist;
//----- Customise the 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 subscribetopic[] = "iot-2/cmd/test/fmt/String"; // cmd REPRESENT command type AND COMMAND
IS TEST OF FORMAT STRING
char authMethod[] = "use-token-auth"; // authentication method
char token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID; //client id

//-----
WiFiClient wifiClient; // creating the instance for wificlient
PubSubClient client(server, 1883, callback, wifiClient); //calling the predefined client id by
passing parameter like server id,portand wificredential

int LED = 4;
int trig = 5;
int echo = 18;
void setup()
{
  Serial.begin(115200);
  pinMode(trig, OUTPUT);
  pinMode(echo, INPUT);
  pinMode(LED, OUTPUT);
  delay(10);
  wifiConnect();
  mqttConnect();
}
```

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```
}
void loop()// Recursive Function
{

    digitalWrite(trig,LOW);
    digitalWrite(trig,HIGH);
    delayMicroseconds(10);
    digitalWrite(trig,LOW);
    float dur = pulseIn(echo,HIGH);
    float dist = (dur * 0.0343)/2;
    Serial.print ("Distancein cm");
    Serial.println(dist);

    PublishData(dist);
    delay(1000);
    if (!client.loop()) {
        mqttconnect();
    }
}

/*.....retrieving to Cloud .....*/

void PublishData(float dist) {
    mqttconnect();//function call for connecting to ibm
    /*
        creating the String in in form JSON to update the data to ibm cloud
    */
    String object;
    if (dist <100)
    {
        digitalWrite(LED,HIGH);
        Serial.println("object is near");
        object = "Near";
    }
    else
    {
        digitalWrite(LED,LOW);
        Serial.println("no object found");
        object = "No";
    }

    String payload = "{\"distance\":";
    payload += dist;
    payload += "," "\"object\": \"";
    payload += object;
    payload += "\"}";

    Serial.print("Sending payload: ");
    Serial.println(payload);

    if (client.publish(publishTopic, (char*) payload.c_str())) {
        Serial.println("Publish ok");// if it sucessfully upload data on the cloud then it will
        print publish ok in Serial monitor or else it will print publish failed
    } else {
        Serial.println("Publish failed");
    }
}
```

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```
}
void mqttconnect() {
    if (!client.connected()) {
        Serial.print("Reconnecting client to ");
        Serial.println(server);
        while (!client.connect(clientId, authMethod, token)) {
            Serial.print(".");
            delay(500);
        }

        initManagedDevice();
        Serial.println();
    }
}
void wificonnect() //function defination for wificonnect
{
    Serial.println();
    Serial.print("Connecting to ");

    WiFi.begin("Wokwi-GUEST", "", 6); //passing the wifi credentials to establish the connection
    while (WiFi.status() != WL_CONNECTED) {
        delay(500);
        Serial.print(".");
    }
    Serial.println("");
    Serial.println("WiFi connected");
    Serial.println("IP address: ");
    Serial.println(WiFi.localIP());
}

void initManagedDevice() {
    if (client.subscribe(subscribetopic)) {
        Serial.println((subscribetopic));
        Serial.println("subscribe to cmd OK");
    } else {
        Serial.println("subscribe to cmd FAILED");
    }
}

void callback(char* subscribetopic, byte* payload, unsigned int payloadLength)
{
    Serial.print("callback invoked for topic: ");
    Serial.println(subscribetopic);
    for (int i = 0; i < payloadLength; i++) {
        //Serial.print((char)payload[i]);
        data3 += (char)payload[i];
    }
    // Serial.println("data: "+ data3);
    // if(data3=="Near")
    // {
    // Serial.println(data3);
    // digitalWrite(LED,HIGH);

    // }

    // else
    // {
    // Serial.println(data3);
    // digitalWrite(LED,LOW);
    // }
```

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```
// }  
data3="";
```

```
}
```

Reference: <https://wokwi.com/projects/348499877626380883>

The screenshot shows the Wokwi IDE interface. On the left, the 'sketch.ino' file is open, displaying the following code:

```
1 #include <WiFi.h> //library for wifi  
2 #include <PubSubClient.h> //library for MQTT  
3  
4  
5 void callback(char* subscribetopic, byte* payload, unsigned int payloadLength)  
6  
7 //-----credentials of IBM Accounts-----  
8  
9 #define ORG "ulzaqt" //IBM ORGANITION ID  
10 #define DEVICE_TYPE "IoT_Child_Safety" //Device type mentioned in ibm watson IO  
11 #define DEVICE_ID "ran123" //Device ID mentioned in ibm watson IOT Platform  
12 #define TOKEN "12345678" //Token  
13 String data3;  
14 float dist;  
15 //----- Customise the above values -----  
16 char server[] = ORG ".messaging.internetofthings.ibmcloud.com"; // Server Name  
17 char publishTopic[] = "iot-2/evt/Data/fmt/json"; // topic name and type of even  
18 char subscribetopic[] = "iot-2/cmd/test/fmt/String"; // cmd REPRESENT command  
19 char authMethod[] = "use-token-auth"; // authentication method  
20 char token[] = TOKEN;  
21 char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID; //client id  
22  
23 //-----  
24 WiFiClient wificlient; // creating the instance for wificlient  
25 PubSubClient client(server, 1883, callback, wificlient); //calling the predefi  
26  
27 int LED = 4;  
28 int trig = 5;  
29 int echo = 18;  
30 void setup()
```

On the right, the 'Simulation' window shows a virtual circuit. An ESP32 microcontroller is connected to an HC-SR04 ultrasonic sensor. The sensor's VCC pin is connected to the ESP32's 5V pin, and its GND pin is connected to the ESP32's GND pin. The sensor's Trig pin is connected to the ESP32's pin 5, and its Echo pin is connected to the ESP32's pin 18. A red LED is connected to the ESP32's pin 4 (labeled LED) and its GND pin is connected to the ESP32's GND pin. The simulation is running, and the console output shows the following messages:

```
object is near  
Sending payload: {"distance":83.67,"object":"Near"}  
Publish ok  
Distancein cm83.67  
object is near  
Sending payload: {"distance":83.67,"object":"Near"}  
Publish ok
```

The screenshot shows the IBM Watson IoT Platform dashboard. The top navigation bar includes 'Browse', 'Action', 'Device Types', and 'Interfaces'. The 'Add Device' button is visible in the top right corner. The main content area displays the details for the device 'ran123', which is connected to the 'IoT\_Child\_Safety' device type. The device was last updated on Nov 16, 2022 8:49 PM. The 'Recent Events' tab is selected, showing a table of events:

Event	Value	Format	Last Received
Data	{"distance":108.92,"object":"No"}	json	a few seconds ago
Data	{"distance":83.67,"object":"Near"}	json	a few seconds ago
Data	{"distance":83.67,"object":"Near"}	json	a few seconds ago
Data	{"distance":83.67,"object":"Near"}	json	a few seconds ago
Data	{"distance":83.67,"object":"Near"}	json	a few seconds ago

At the bottom of the dashboard, it indicates '0 Simulations running'.