

Assignment -4

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Project Name	INDUSTRY SPECIFIC INTELLIGENT FIRE MANAGEMENT SYSTEM	

Question-1:

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 link and images of IBM cloud

CODE 1 :

```
#include <WiFi.h>
#include <PubSubClient.h>

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

#define ORG "92zbfc"
#define DEVICE_TYPE "esp32"
#define DEVICE_ID "12345"
#define TOKEN "12345678"
String data3;
char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
char publishTopic[] = "iot-2/evt/Data/fmt/json";
char subscribetopic[] = "iot-2/cmd/test/fmt/String";
char authMethod[] = "use-token-auth";
char token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;
WiFiClient wifiClient;
PubSubClient client(server, 1883, callback, wifiClient);
const int trigPin = 5;
const int echoPin = 18;
#define SOUND_SPEED 0.034
long duration;
float distance;
void setup() {
  Serial.begin(115200);
  pinMode(trigPin, OUTPUT);
  pinMode(echoPin, INPUT);
  wificonnect();
  mqttconnect();
}
void loop()
{
  digitalWrite(trigPin, LOW);
  delayMicroseconds(2);
  digitalWrite(trigPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigPin, LOW);
  duration = pulseIn(echoPin, HIGH);
  distance = duration * SOUND_SPEED/2;
  Serial.print("Distance (cm): ");
  Serial.println(distance);
  if(distance<100)
  {
    Serial.println("ALERT!!");
    delay(1000);
    PublishData(distance);
  }
}
```

```

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

void PublishData(float dist) {
  mqttconnect();
  String payload = "{\"Distance\":";
  payload += dist;
  payload += ", \"ALERT!!\": \"\"Distance less than 100cms\"\"";
  payload += "}";
  Serial.print("Sending payload: ");
  Serial.println(payload);

  if (client.publish(publishTopic, (char*) payload.c_str())) {
    Serial.println("Publish ok");
  } else {
    Serial.println("Publish failed");
  }
}

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()
{
  Serial.println();
  Serial.print("Connecting to ");
  WiFi.begin("Wokwi-GUEST", "", 6);
  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++)
  {
    data3 += (char)payload[i];
  }
  Serial.println("data: " + data3);
  data3="";
}

```

Wokwi Link :

Output and Simulation :

The screenshot shows the Wokwi simulation environment. On the left, the sketch.ino file contains the following code:

```
1 #include <WiFi.h>
2 #include <PubSubClient.h>
3 void callback(char* topic, byte* payload, unsigned int payloadLength);
4 #define ORG "92zbfc"
5 #define DEVICE_TYPE "esp32"
6 #define DEVICE_ID "12345"
7 #define TOKEN "12345678"
8 String data;
9 char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
10 char publishTopic[] = "iot-2/evt/Data/fmt/json";
11 char subscribeTopic[] = "iot-2/cmd/test/fmt/string";
12 char authMethod[] = "use-token-auth";
13 char token[] = TOKEN;
14 char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;
15 WiFiClient wifiClient;
16 PubSubClient client(server, 1883, callback, wifiClient);
17 const int trigPin = 5;
18 const int echoPin = 18;
19 #define SOUND_SPEED 0.034
20 long duration;
21 float distance;
22 void setup() {
23   Serial.begin(115200);
24   pinMode(trigPin, OUTPUT);
25   pinMode(echoPin, INPUT);
26   wifiConnect();
27   mqttConnect();
28 }
29 void loop() {
30   {
31     digitalWrite(trigPin, LOW);
32     delayMicroseconds(2);
33     digitalWrite(trigPin, HIGH);
34     delayMicroseconds(10);
```

The simulation on the right shows the ESP32 connected to the HC-SR04 sensor. The sensor's output is displayed as "Distance: 73cm". The MQTT client is sending the following payload: {"Distance":72.96,"ALERT!!":"Distance less than 100cms"}. The output shows the payload being sent and the distance being 72.96 cm.

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

The screenshot shows the IBM Watson IoT Platform dashboard. The device details for device ID 12345 are displayed. The 'Recent Events' tab is selected, showing a list of events with their values and timestamps.

Event	Value	Format	Last Received
Data	{"Distance":72.96,"ALERT!!":"Distance less than ...	json	a few seconds ago
Data	{"Distance":72.96,"ALERT!!":"Distance less than ...	json	a few seconds ago
Data	{"Distance":72.96,"ALERT!!":"Distance less than ...	json	a few seconds ago