

# INDUSTRY – SPECIFIC INTELLIGENT FIRE MANAGEMENT SYSTEM

## ASSIGNMENT – 4

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.

### **SOURCE CODE:**

```
#include <WiFi.h>
#include <PubSubClient.h>
#define ORG "486ral"
#define DEVICE_TYPE "IOT"
#define DEVICE_ID "id07"
#define TOKEN "123456789"
#define trigpin 5
#define echopin 18

char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
char publishTopic[] = "iot-2/evt/data/fmt/json";
char authMethod[] = "use-token-auth";
char token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;
```

```
WiFiClient wifiClient;
```

```
PubSubClient client(server, 1883, wifiClient);
```

```
long duration;
```

```
float dist;
```

```
void setup()
```

```
{
```

```
  Serial.begin(9900);
```

```
  pinMode(trigpin, OUTPUT);
```

```
  pinMode(echopin, INPUT);
```

```
  wifiConnect();
```

```
  mqttConnect();
```

```
}
```

```
void loop() {
```

```
  publishData();
```

```
  delay(500);
```

```
  if (!client.loop())
```

```
  {
```

```
    mqttConnect();
```

```
  }
```

```
}
```

```
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);
    }

    Serial.println();
  }
}
```

```

void publishData()
{
    digitalWrite(trigpin,LOW);
    digitalWrite(trigpin,HIGH);
    delayMicroseconds(10);
    digitalWrite(trigpin,LOW);
    duration=pulseIn(echopin,HIGH);
    dist=duration*0.034 /2;
    if(dist<100)
    {

        String payload = "{\\"Distance\":";
        payload += dist;
        payload += ",";
        payload += "\\"Status\":";
        payload += "\\"Alert\":";

        Serial.print("\n");
        Serial.print("Sending payload: ");
        Serial.println(payload);
        if (client.publish(publishTopic, (char*) payload.c_str()))
        {
            Serial.println("Publish OK");
        }

    }

    if(dist>100)

```

```

{

    String payload = "{\\\"Distance\\\":";
    payload += dist;
    payload += ",";
    payload += "\\\"Status\\\":";
    payload += "\\\"Normal\\\"}";

    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");
    }
}
}
}

```

**diagram.json:**

```

{
    "version": 1,
    "author": "Uri Shaked",
    "editor": "wokwi",
    "parts": [
        { "type": "wokwi-esp32-devkit-v1", "id": "esp", "top": 0, "left": 0, "attrs": { } },
        { "type": "wokwi-hc-sr04", "id": "ultrasonic1", "top": -109.38, "left": 180.61, "attrs": { } }
    ]
}

```

```

],
"connections": [
  [ "esp:TX0", "$serialMonitor:RX", "", [] ],
  [ "esp:RX0", "$serialMonitor:TX", "", [] ],
  [ "ultrasonic1:ECHO", "esp:D18", "green", [ "v0" ] ],
  [ "ultrasonic1:TRIG", "esp:D5", "orange", [ "v0" ] ],
  [
    "ultrasonic1:VCC",
    "esp:VIN",
    "red",
    [ "v22.14", "h-48.86", "v-27.94", "h-253.24", "v173.77" ]
  ],
  [ "ultrasonic1:GND", "esp:GND.2", "black", [ "v250.04", "h-311.59", "v3.06" ] ]
]
}

```

## OUTPUT:

The screenshot shows the Wokwi IDE interface. On the left, the code for `esp32-blink.ino` is displayed. The code includes headers for `WiFi.h` and `PubSubClient.h`, defines pins for TRIG (5), ECHO (18), and VCC (VIN), and sets up an MQTT client to publish distance data to the topic `iot-2/evt/data/fmt/json`. The `setup` function initializes the serial port and connects to the MQTT broker. The `loop` function publishes the distance data.

On the right, the simulation window shows the hardware setup. An ESP32 module is connected to an HC-SR04 ultrasonic sensor. The sensor's VCC is connected to the ESP32's VIN (red), its GND is connected to the ESP32's GND (black), and its TRIG and ECHO pins are connected to the ESP32's D5 and D18 pins (orange and green).

The console output shows the MQTT payload being sent: `{\"Distance\":399.92,\"Status\":\"Normal\"}`. The status is "Normal".

WOKWI LINK: <https://wokwi.com/projects/322410731508073042>

IBM CLOUD OUTPUT:

Connection Information

Recent Events

State

Device Information

Metadata

Diagnostics

Connection Logs

Device Actions

Recent Events

The recent events listed show the live stream of data that is coming and going from this device.

Event	Value	Format	Last Received
data	{"Distance":29.99,"Status":"Alert"}	json	a few seconds ago
data	{"Distance":29.99,"Status":"Alert"}	json	a few seconds ago
data	{"Distance":29.99,"Status":"Alert"}	json	a few seconds ago
data	{"Distance":29.99,"Status":"Alert"}	json	a few seconds ago
data	{"Distance":29.99,"Status":"Alert"}	json	a few seconds ago