

## Assignment-4

### Distance Detection Using Ultrasonic Sensor

Date	04 November 2022
Team ID	PNT2022TMID10108
Project Name	Industry-Specific Intelligent Fire Management System

#### Question-1:

Write code and connections in wokwi for ultrasonic sensor. Whenever distance is less than 100cms send "alert" to IBM cloud and display in device recent events.

WOKWI LINK : <https://wokwi.com/projects/346515191471538772>

**CODE:**

```

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

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

#define ORG "f59trs"
#define DEVICE_TYPE "ultrasonicsensor"
#define DEVICE_ID "distancedetection"
#define TOKEN "AlGMGaaF01nawa1QA3"
String data3;
float dist;

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);

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();
}
void loop()
{
    digitalWrite(trig, LOW);
    digitalWrite(trig, HIGH);
    delayMicroseconds(10);
    digitalWrite(trig, LOW);
    float dur = pulseIn(echo, HIGH);
    float dist = (dur * 0.0343)/2;
    Serial.print ("Distance in cm :");
    Serial.println(dist);

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

void PublishData(float dist) {
    mqttconnect();
    String object;
    if (dist < 100)

```

```

    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");
    } 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");
    }
}

```

```

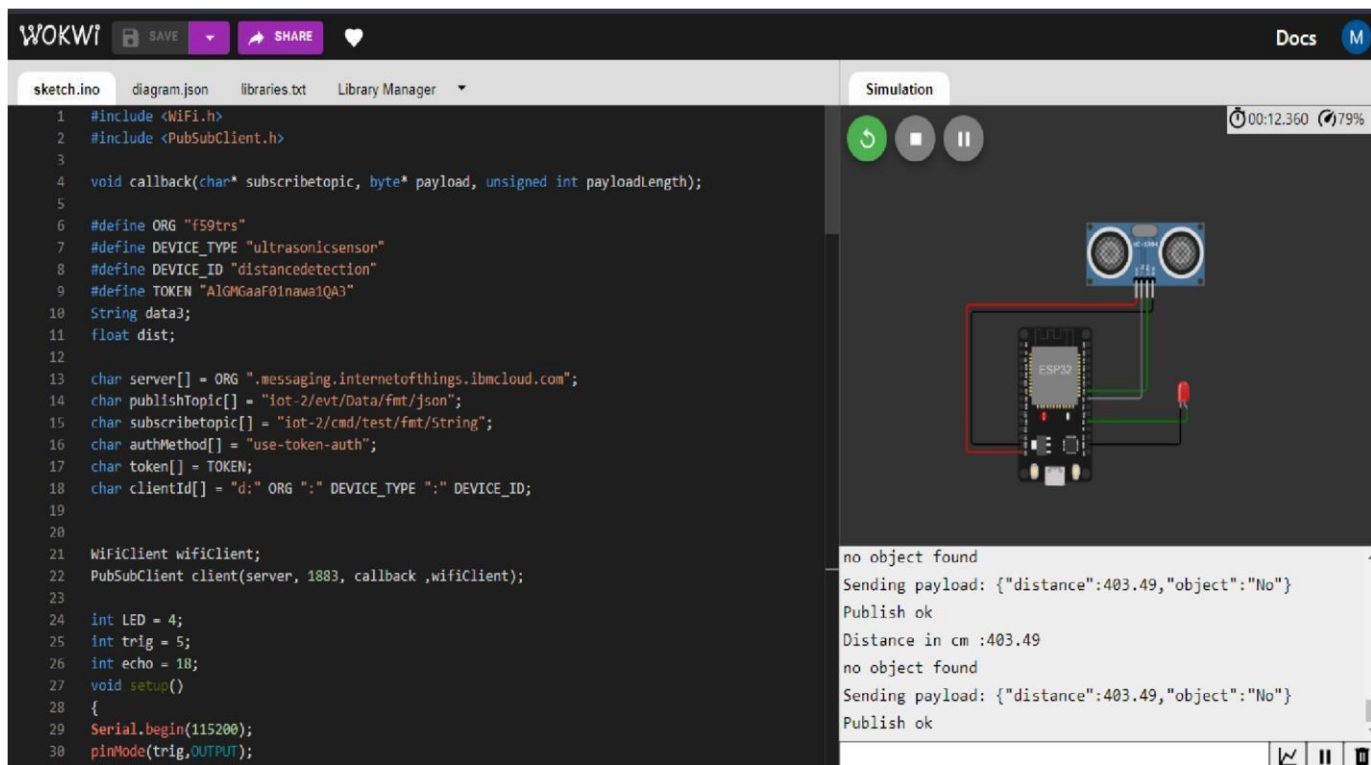
        Serial.println("subscribe to cmd FAILED");
    }
}

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];
    }
    data3="";
}

```

## OUTPUT:

### When object is not near to the ultrasonic sensor



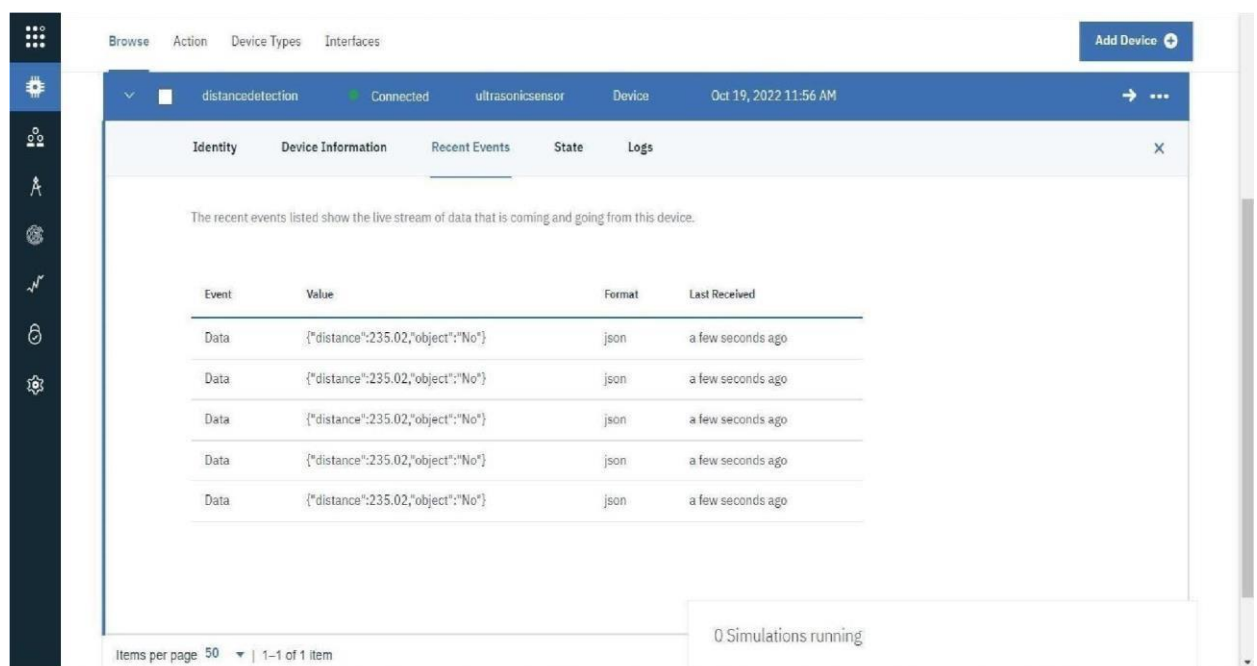
The screenshot shows the Wokwi IoT simulator interface. On the left is a code editor with a sketch.ino file containing the following code:

```
1 #include <WiFi.h>
2 #include <PubSubClient.h>
3
4 void callback(char* subscribetopic, byte* payload, unsigned int payloadlength);
5
6 #define ORG "f59trs"
7 #define DEVICE_TYPE "ultrasonicsensor"
8 #define DEVICE_ID "distancedetection"
9 #define TOKEN "ALGMGaaF0inawa1QA3"
10 String data3;
11 float dist;
12
13 char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
14 char publishTopic[] = "iot-2/evt/Data/fmt/json";
15 char subscribetopic[] = "iot-2/cmd/test/fmt/String";
16 char authMethod[] = "use-token-auth";
17 char token[] = TOKEN;
18 char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;
19
20
21 WiFiClient wifiClient;
22 PubSubClient client(server, 1883, callback ,wifiClient);
23
24 int LED = 4;
25 int trig = 5;
26 int echo = 18;
27 void setup()
28 {
29   Serial.begin(115200);
30   pinMode(trig,OUTPUT);
```

On the right is the simulation window, which displays a virtual circuit with an ESP32 microcontroller and an ultrasonic sensor. Below the circuit, the simulation output shows the following messages:

```
no object found
Sending payload: {"distance":403.49,"object":"No"}
Publish ok
Distance in cm :403.49
no object found
Sending payload: {"distance":403.49,"object":"No"}
Publish ok
```

### Data sent to the IBM cloud device when the object is far



The screenshot shows the IBM IoT Platform dashboard. The top navigation bar includes 'Browse', 'Action', 'Device Types', and 'Interfaces'. A sidebar on the left contains icons for various functions. The main content area displays a table of recent events for a device named 'distancedetection'.

Event	Value	Format	Last Received
Data	{"distance":235.02,"object":"No"}	json	a few seconds ago
Data	{"distance":235.02,"object":"No"}	json	a few seconds ago
Data	{"distance":235.02,"object":"No"}	json	a few seconds ago
Data	{"distance":235.02,"object":"No"}	json	a few seconds ago
Data	{"distance":235.02,"object":"No"}	json	a few seconds ago

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

## When object is nearer to the ultrasonic sensor

WOKWI

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Docs M

sketch.ino diagram.json libraries.txt Library Manager

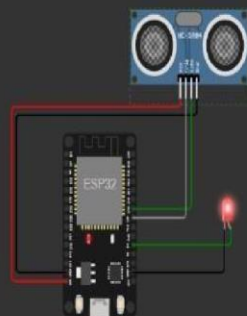
```
1 #include <WiFi.h>
2 #include <PubSubClient.h>
3
4 void callback(char* subscribetopic, byte* payload, unsigned int payloadLength);
5
6 #define ORG "f59trs"
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24 int LED = 4;
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26 int echo = 18;
27 void setup()
28 {
29   Serial.begin(115200);
30   pinMode(trig, OUTPUT);
```

Simulation

00:54.571 100%

Editing Ultrasonic Distance Sensor

Distance: 52cm



object is near  
Sending payload: {"distance":52.44,"object":"Near"}  
Publish ok  
Distance in cm :52.44  
object is near  
Sending payload: {"distance":52.44,"object":"Near"}  
Publish ok

## Data sent to the IBM cloud device when the object is near

Browse Action Device Types Interfaces

Add Device

Device ID	Status	Device Type	Class ID	Date Added	Descriptive Location
distancedetection	Connected	ultrasonicsensor	Device	Oct 19, 2022 11:56 AM	

Identity Device Information Recent Events State Logs

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":91.77,"object":"Near"}	json	a few seconds ago
Data	{"distance":91.75,"object":"Near"}	json	a few seconds ago
Data	{"distance":91.77,"object":"Near"}	json	a few seconds ago
Data	{"distance":91.79,"object":"Near"}	json	a few seconds ago
Data	{"distance":91.8,"object":"Near"}	json	a few seconds ago

0 Simulations running

<https://wokwi.com/projects/346515191471538772>