

## Assignment -4

Assignment Date	28 Oct 2022
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Project Name	SmartFarmer-IoT Enabled Smart Farming Application

### Question:

Write a Code and Connections in wokwi for **ultrasonic sensor**.Whenever distance is less than 100 cms send “**alert**” to ibm cloud and display in device recent events

### Code:

```
#include <WiFi.h> //library for wifi
#include <PubSubClient.h> //library for MQTT
WiFiClient wifiClient;
String data3;
#define ORG "g05aq3"
#define DEVICE_TYPE "selva"
#define DEVICE_ID "selva_assignment_4"
#define TOKEN "qwertyuio"
#define speed 0.034
#define led 14
char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
```

```
char publishTopic[] = "iot-2/evt/selva/fmt/json";
char topic[] = "iot-2/cmd/status/fmt/String";
char authMethod[] = "use-token-auth";
char token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;
PubSubClient client(server, 1883, wifiClient);
```

```
const int trigpin=19;
const int echopin=18;
String command;
String data="";
```

```
long duration;
float dist;
```

```
void setup()
{
    Serial.begin(115200);
    pinMode(led, OUTPUT);
    pinMode(trigpin, OUTPUT);
    pinMode(echopin, INPUT);
    wifiConnect();
    mqttConnect();
}
```

```
void loop()
{
```

```

bool isNearby = dist < 100;
digitalWrite(led, isNearby);

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);
    }
    initManagedDevice();
    Serial.println();
}
}

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

void publishData()
{
    digitalWrite(trigpin,LOW);
    digitalWrite(trigpin,HIGH);
    delayMicroseconds(10);
    digitalWrite(trigpin,LOW);
    duration=pulseIn(echopin,HIGH);
    dist=duration*speed/2;
    if(dist<100)
    {
        String payload = "{\"Alert Distance\":\"";
        payload += dist;
    }
}

```

```
payload += "}";

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 += "}";

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");
}

}

}
```

## Output:

### 1. When distance greater than 100 cm

Wokwi IoT Platform interface showing a simulation of an ESP32 microcontroller connected to an HC-SR04 ultrasonic sensor. The code in the sketch.ino file defines the MQTT configuration and the sensor pins.

```
1 #include <WiFi.h> //library for wifi
2 #include <PubSubClient.h> //library for MQTT
3 WiFiClient wificlient;
4 String data3;
5 #define ORG "g05aq3"
6 #define DEVICE_TYPE "selva"
7 #define DEVICE_ID "selva_assignment_4"
8 #define TOKEN "qwertyuio"
9 #define speed 0.034
10 #define led 14
11 char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
12 char publishTopic[] = "iot-2/evt/selva/fmt/json";
13 char topic[] = "iot-2/cmd/status/fmt/String";
14 char authMethod[] = "use-token-auth";
15 char token[] = TOKEN;
16 char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;
17 PubSubClient client(server, 1883, wificlient);
18
19
20
21 const int trigpin=19;
22 const int echopin=18;
23 String command;
24 String data="";
25
26 long duration;
27 float dist;
```

The simulation shows the ESP32 connected to the HC-SR04 sensor. The output log displays the following messages:

```
Publish OK
Sending payload: {"Distance":160.97}
Publish OK
Sending payload: {"Distance":160.97}
Publish OK
```

The system clock shows 20:38 on 24-10-2022.

## IBM RECENT EVENTS:

The screenshot displays the IBM Watson IoT Platform interface. The top navigation bar includes the platform name, a user profile, and the ID '312819106034@smartinternz.com'. The main content area shows a device named 'selva\_assignment\_4' in a 'Connected' state. Below this, the 'Recent Events' tab is active, displaying a table of live data events. The table has four columns: Event, Value, Format, and Last Received. Five events are listed, all with a 'Distance' value in JSON format, received 'a few seconds ago'. A notification at the bottom right indicates '1 Simulation running'.

IBM Watson IoT Platform

312819106034@smartinternz.com  
ID: g05aq3

Browse Action Device Types Interfaces

selva\_assignment\_4 Connected selva Device Oct 24, 2022 8:13 PM

Add Device

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
selva	{"Distance":160.97}	json	a few seconds ago
selva	{"Distance":160.97}	json	a few seconds ago
selva	{"Distance":160.96}	json	a few seconds ago
selva	{"Distance":160.97}	json	a few seconds ago
selva	{"Distance":153.97}	json	a few seconds ago

1 Simulation running

Type here to search

20:37  
24-10-2022

## 2. When distance less than 100 cm

Screenshot of the Wokwi IoT Platform interface showing a simulation of an ESP32 microcontroller connected to an Ultrasonic Distance Sensor.

**Sketch Code (sketch.ino):**

```
1 #include <WiFi.h> //library for wifi
2 #include <PubSubClient.h> //library for MQTT
3 WiFiClient wifiClient;
4 String data3;
5 #define ORG "g05aq3"
6 #define DEVICE_TYPE "selva"
7 #define DEVICE_ID "selva_assignment_4"
8 #define TOKEN "qwertyuio"
9 #define speed 0.034
10 #define led 14
11 char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
12 char publishTopic[] = "iot-2/evt/selva/fmt/json";
13 char topic[] = "iot-2/cmd/status/fmt/String";
14 char authMethod[] = "use-token-auth";
15 char token[] = TOKEN;
16 char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;
17 PubSubClient client(server, 1883, wifiClient);
18
19
20
21 const int trigpin=19;
22 const int echopin=18;
23 String command;
24 String data="";
25
26 long duration;
27 float dist;
28
29
30
```

**Simulation Interface:**

- Editing Ultrasonic Distance Sensor:** Distance: 87cm
- ESP32 Microcontroller:** Labeled "ESP32"
- Log Output:**
  - Publish OK
  - Sending payload: {"Alert Distance":86.96}
  - Publish OK
  - Sending payload: {"Alert Distance":86.96}
  - Publish OK

The interface also shows a Windows taskbar at the bottom with the search bar and system tray.



## IBM RECENT EVENTS:

The screenshot displays the IBM Watson IoT Platform interface. The top navigation bar includes the IBM logo, the text 'Selvaraj Assignment 4 - Wokwi A', and the 'IBM Watson IoT Platform' title. The main header shows the user's email '312819106034@smartinternz.com' and ID 'g05aq3'. The left sidebar contains various icons for navigation. The main content area is titled 'Browse' and includes tabs for 'Identity', 'Device Information', 'Recent Events', 'State', and 'Logs'. The 'Recent Events' tab is active, showing a table of events for the device 'selva'. The table has columns for 'Event', 'Value', 'Format', and 'Last Received'. The events are all of type 'Alert Distance' with a value of 86.96, received in JSON format. A status box at the bottom right indicates '1 Simulation running'.

Event	Value	Format	Last Received
selva	{"Alert Distance":86.96}	json	a few seconds ago
selva	{"Alert Distance":86.96}	json	a few seconds ago
selva	{"Alert Distance":86.96}	json	a few seconds ago
selva	{"Alert Distance":86.96}	json	a few seconds ago
selva	{"Alert Distance":86.96}	json	a few seconds ago

WOKWI LINK :- <https://wokwi.com/projects/346410390406562387>