

#### Assignment -4

|                     |                 |
|---------------------|-----------------|
| Assignment Date     | 26 October 2022 |
| Student Name        | KARTHICK M      |
| Student Roll Number | 95071914045     |

#### Question-1:

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

#### Code :

```
#include <WiFi.h>
#include <PubSubClient.h>
WiFiClient wifiClient;
String data3;
#define ORG "hycgw4"
#define DEVICE_TYPE "Distance"
#define DEVICE_ID "Ultrasonic"
#define TOKEN "WD6Mb(-d2F+X0xWqnB"
#define speed 0.034
#define led 14
char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
char publishTopic[] = "iot-2/evt/event2/fmt/json";
char topic[] = "iot-2/cmd/home/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=5;
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!! 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 += "}";

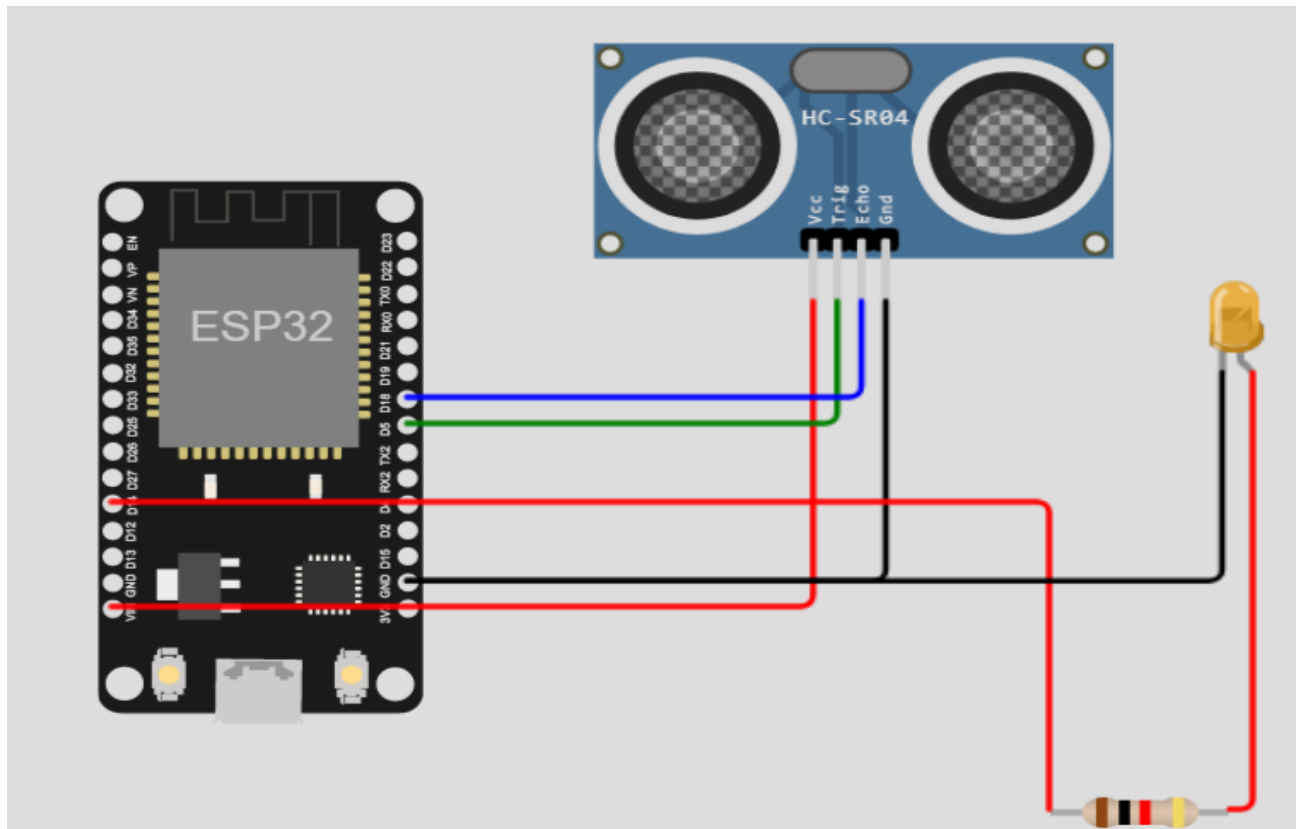
        Serial.print("\n");
        Serial.print("Sending payload: ");
        Serial.println(payload);
        if(client.publish(publishTopic, (char*) payload.c_str())) {
            Serial.println("Publish OK");
        }else {
            Serial.println("Publish FAILED");
        }
    }

}

}

```

## Connections:



## WOKWI AND IBM CLOUD CONNECTED:

IBM Watson IoT Platform

hariprasad.cse19@veltechmultitech.org  
ID: hycgw4

Browse Action Device Types Interfaces

Add Device

### Browse Devices

All Devices Diagnose

This table shows a summary of all devices that have been added. It can be filtered, organized, and searched on using different criteria. To get started, you can add devices by using the Add Device button, or by using API.

Search by Device ID

Device Simulator

| Device ID  | Status       | Device Type | Class ID | Date Added           | Descriptive Location |
|------------|--------------|-------------|----------|----------------------|----------------------|
| 12         | Disconnected | abcd        | Device   | Oct 12, 2022 6:39 PM |                      |
| Ultrasonic | Connected    | Distance    | Device   | Oct 25, 2022 7:04 PM |                      |

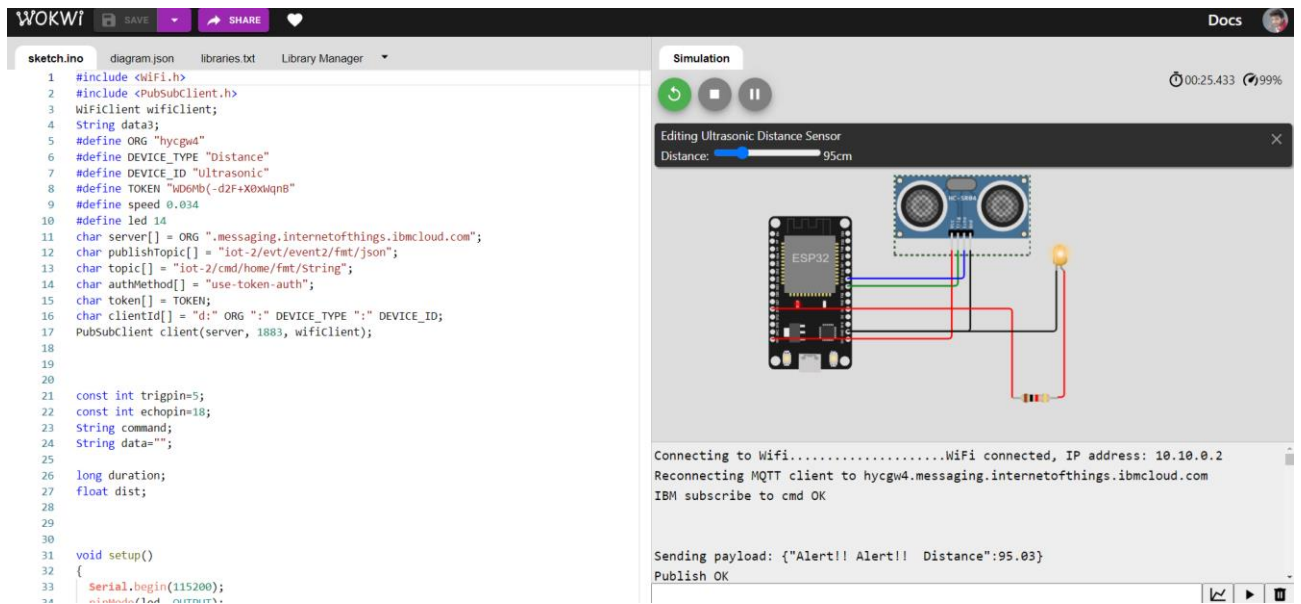
Items per page 50 of 2 items

1 of 1 page

1 Simulation running

## OUTPUT:

1. Distance = 95 cm  
Status = Alert Message



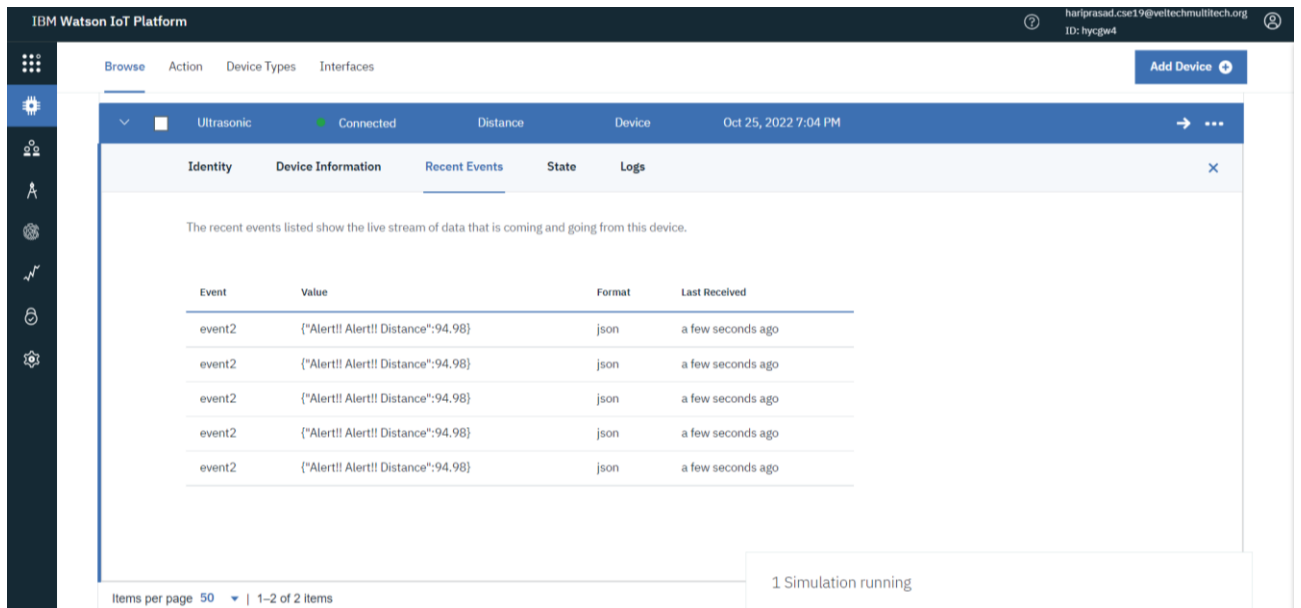
The screenshot shows the Wokwi IDE interface. On the left, the 'sketch.ino' file is open, displaying the following code:

```
1 #include <WiFi.h>
2 #include <PubSubClient.h>
3 WiFiClient wifiClient;
4 String data3;
5 #define ORG "hycgw4"
6 #define DEVICE_TYPE "Distance"
7 #define DEVICE_ID "Ultrasonic"
8 #define TOKEN "WD6MB(-d2F-X0xkqNB"
9 #define speed 0.034
10 #define led 14
11 char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
12 char publishTopic[] = "iot-2/evt/event2/fmt/json";
13 char topic[] = "iot-2/cmd/home/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=5;
22 const int echopin=18;
23 String command;
24 String data="";
25
26 long duration;
27 float dist;
28
29
30
31 void setup()
32 {
33   Serial.begin(115200);
34   pinMode(trigpin, OUTPUT);
35 }
```

On the right, the 'Simulation' window shows a circuit diagram of an ESP32 connected to an Ultrasonic Distance Sensor and an LED. Below the diagram, the simulation log displays the following messages:

```
Connecting to Wifi.....Wifi connected, IP address: 10.10.0.2
Reconnecting MQTT client to hycgw4.messaging.internetofthings.ibmcloud.com
IBM subscribe to cmd OK

Sending payload: {"Alert!! Alert!! Distance":95.03}
Publish OK
```



The screenshot shows the IBM Watson IoT Platform interface. The top navigation bar includes 'Browse', 'Action', 'Device Types', and 'Interfaces'. The main content area displays a table of device events for the 'Ultrasonic' device, which is 'Connected'.

| 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     |      |
| event2   | {"Alert!! Alert!! Distance":94.98} | json          | a few seconds ago |      |
| event2   | {"Alert!! Alert!! Distance":94.98} | json          | a few seconds ago |      |
| event2   | {"Alert!! Alert!! Distance":94.98} | json          | a few seconds ago |      |
| event2   | {"Alert!! Alert!! Distance":94.98} | json          | a few seconds ago |      |
| event2   | {"Alert!! Alert!! Distance":94.98} | json          | a few seconds ago |      |

At the bottom right, it indicates '1 Simulation running'.

**Wokwi data publishing to ibm cloud**

## 2. Distance = 162 cm Status = Normal

WOKWI

SAVE SHARE

Docs

sketch.ino diagram.json libraries.bt Library Manager

```
1 #include <WiFi.h>
2 #include <PubSubClient.h>
3 WiFiClient wifiClient;
4 String data3;
5 #define ORG "hycgw4"
6 #define DEVICE_TYPE "Distance"
7 #define DEVICE_ID "ultrasonic"
8 #define TOKEN "wD6Mb(-d2F+X0xiqnB"
9 #define speed 0.034
10 #define led 14
11 char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
12 char publishTopic[] = "iot-2/evt/event2/fmt/json";
13 char topic[] = "iot-2/cmd/home/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=5;
22 const int echopin=18;
23 String command;
24 String data="";
25
26 long duration;
27 float dist;
28
29
30
31 void setup()
32 {
33   Serial.begin(115200);
34 }
```

Simulation

00:54.434 96%

Editing Ultrasonic Distance Sensor

Distance: 162cm

Publish OK

Sending payload: {"Distance":162.25}

Publish OK

Sending payload: {"Distance":161.94}

Publish OK

IBM Watson IoT Platform

harpasad.cse19@veltechmultitech.org ID: hycgw4

Browse Action Device Types Interfaces

Add Device

▼ Ultrasonic Connected Distance Device Oct 25, 2022 7:04 PM

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     |
|--------|---------------------|--------|-------------------|
| event2 | {"Distance":161.94} | json   | a few seconds ago |
| event2 | {"Distance":161.94} | json   | a few seconds ago |
| event2 | {"Distance":161.94} | json   | a few seconds ago |
| event2 | {"Distance":161.94} | json   | a few seconds ago |
| event2 | {"Distance":161.94} | json   | a few seconds ago |

Items per page 50 | 1-2 of 2 items

1 Simulation running

### 3. Distance = 27 cm Status = Alert Message

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

```
1 #include <WiFi.h>
2 #include <PubSubClient.h>
3 WiFiClient wificlient;
4 String data;
5 #define ORG "hycgw4"
6 #define DEVICE_TYPE "Distance"
7 #define DEVICE_ID "Ultrasonic"
8 #define TOKEN "b0d6Mb(-d2F+X0xskqNB"
9 #define speed 0.034
10 #define led 14
11 char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
12 char publishTopic[] = "iot-2/evt/event2/fmt/json";
13 char topic[] = "iot-2/cmd/home/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=5;
22 const int echopin=18;
23 String command;
24 String data="";
25
26 long duration;
27 float dist;
28
29
30
31 void setup()
32 {
33   Serial.begin(115200);
34   //initiated server...
```

On the right, the 'Simulation' window shows a circuit diagram of an ESP32 microcontroller connected to an Ultrasonic Distance Sensor and an LED. The sensor's distance is set to 27 cm. Below the diagram, the 'Publish' button is clicked, and the following payload is sent:

```
Sending payload: {"Alert!! Alert!! Distance":26.98}
Publish OK
```

The simulation is running, and the distance is 27 cm.

The screenshot shows the IBM Watson IoT Platform interface. The 'Recent Events' tab is selected, displaying a table of events:

| Event  | Value                              | Format | Last Received     |
|--------|------------------------------------|--------|-------------------|
| event2 | {"Alert!! Alert!! Distance":26.98} | json   | a few seconds ago |
| event2 | {"Alert!! Alert!! Distance":26.98} | json   | a few seconds ago |
| event2 | {"Alert!! Alert!! Distance":26.98} | json   | a few seconds ago |
| event2 | {"Alert!! Alert!! Distance":26.98} | json   | a few seconds ago |
| event2 | {"Alert!! Alert!! Distance":26.98} | json   | a few seconds ago |

The table shows 5 items per page, and 1 simulation is running.

Reference link = <https://wokwi.com/projects/346498745135792724>