

#### Assignment -4

Assignment Date	25 October 2022
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Student Roll Number	113119UG03010

#### 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 += "}";

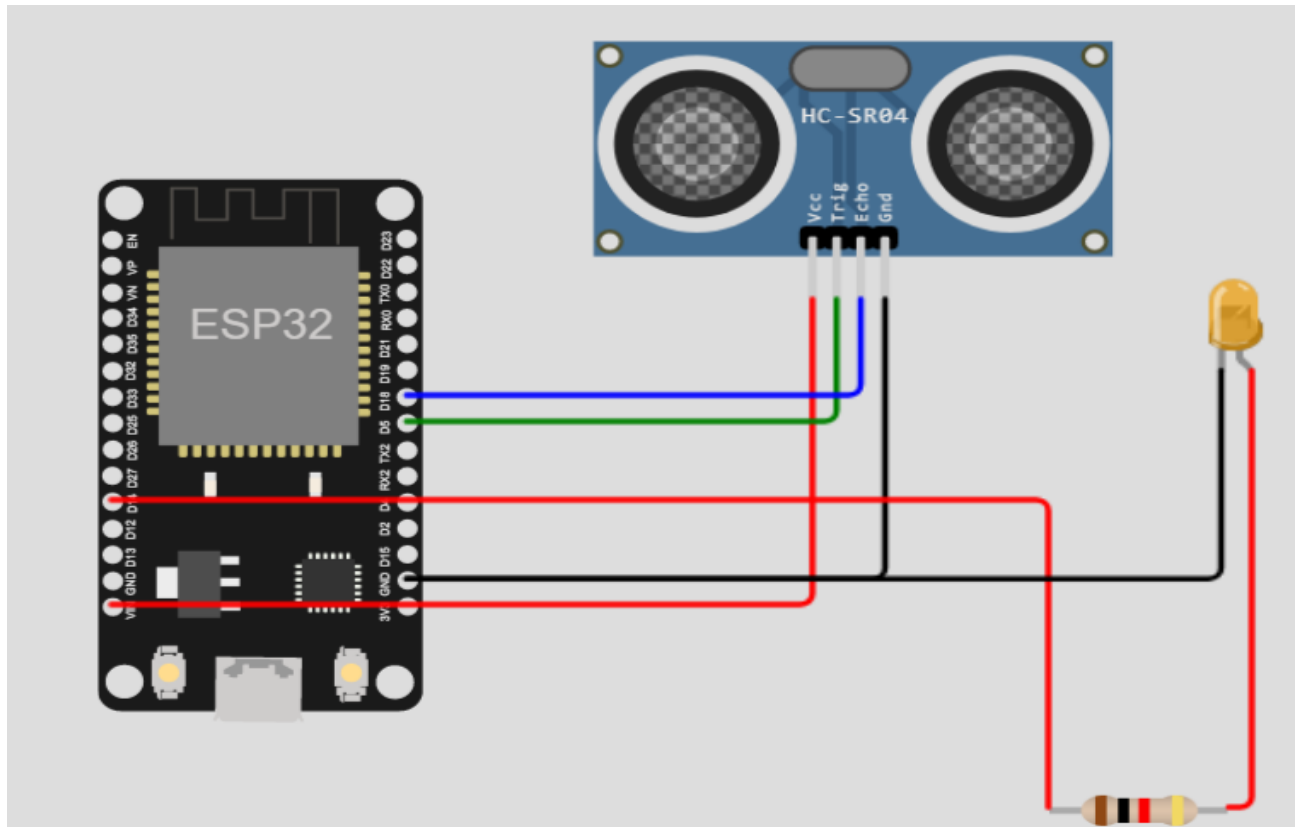
        Serial.print("\n");
        Serial.print("Sending payload: ");
        Serial.println(payload);
        if(client.publish(publishTopic, (char*) payload.c_str())) {
            Serial.println("Publish OK");
        }else {
            Serial.println("Publish FAILED");
        }
    }

}

}

```

## Connections:



## WOKWI AND IBM CLOUD CONNECTED:

IBM Watson IoT Platform

hariiprasad.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(led, OUTPUT);
```

On the right, the 'Simulation' window shows a visual representation of the hardware: an ESP32 microcontroller, an Ultrasonic Distance Sensor, and an LED. Below the simulation, the console output shows 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'.

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, a status bar 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.txt Library Manager

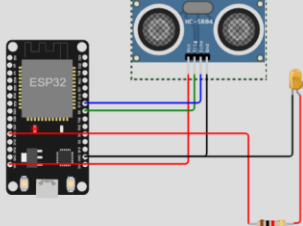
```
1 #include <WiFi.h>
2 #include <PubSubClient.h>
3 WiFiClient wifiClient;
4 String data3;
5 #define ORG "hycgw4"
6 #define DEVICE_TYPE "Distance"
7 #define DEVICE_ID "Ultrasonic"
8 #define TOKEN "wD6Mb(-d2F+X0xkqNB"
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15 char token[] = TOKEN;
16 char 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

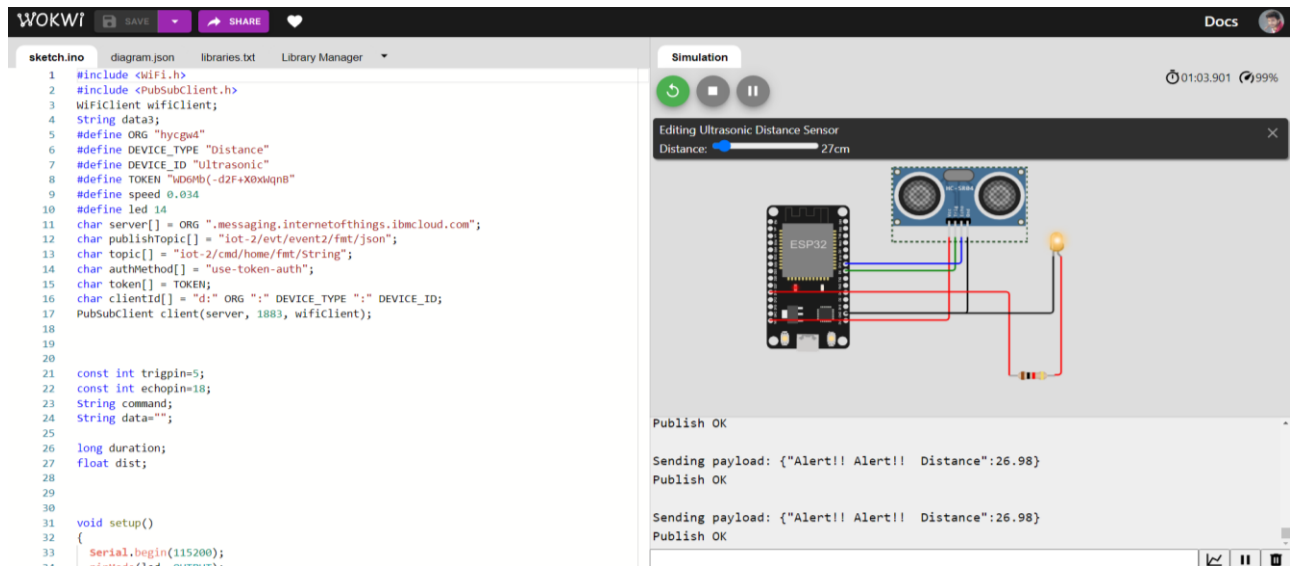
The recent events listed show the live stream of data that is coming and going from this device.

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

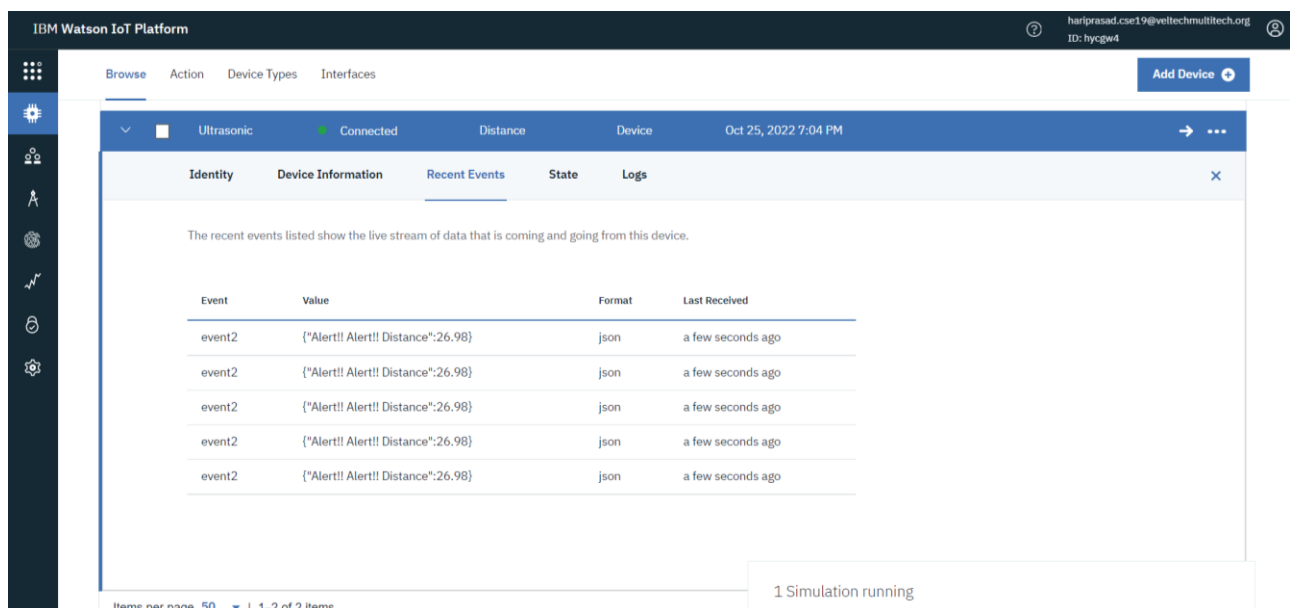
### 3. Distance = 27 cm Status = Alert Message



The Wokwi simulation interface displays the following code in the sketch.ino file:

```
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 "wD6Mb(-dZF4X0xkqNB"
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[] = "id:" 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 void setup()
31 {
32   Serial.begin(115200);
33   // ...
34 }
```

The simulation window shows a circuit diagram with an ESP32 microcontroller, an Ultrasonic Distance Sensor, and an LED. The sensor is connected to the ESP32 and is currently measuring a distance of 27 cm. The LED is connected to the ESP32 and is currently on. The simulation is running at 01:03.901 with 99% battery.



The IBM Watson IoT Platform interface shows the following details:

- Device:** Ultrasonic
- Status:** Connected
- Distance:** 26.98
- Device ID:** hycgw4
- Recent 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

1 Simulation running

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