

#### Assignment -4

Assignment Date	25 October 2022
Student Name	Mr.S.HARIPRASAD
Student Roll Number	113119UG03301

#### 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 += "}";

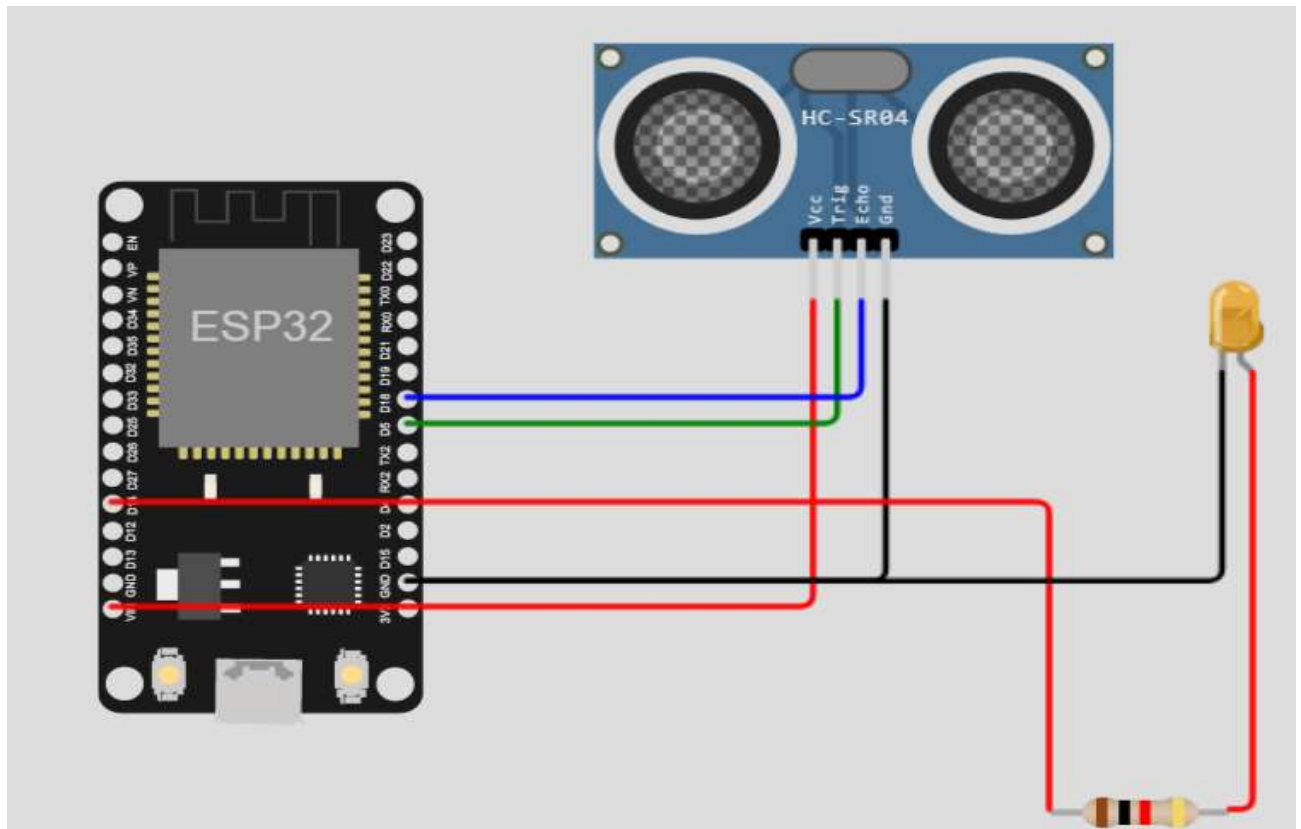
        Serial.print("\n");
        Serial.print("Sending payload: ");
        Serial.println(payload);
        if(client.publish(publishTopic, (char*) payload.c_str())) {
            Serial.println("Publish OK");
        }else {
            Serial.println("Publish FAILED");
        }
    }

}

}

```

## 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

<input type="checkbox"/>	Device ID	Status	Device Type	Class ID	Date Added	Descriptive Location
> <input type="checkbox"/>	12	Disconnected	abcd	Device	Oct 12, 2022 6:39 PM	
> <input type="checkbox"/>	Ultrasonic	Connected	Distance	Device	Oct 25, 2022 7:04 PM	→ ...

Items per page 50 Ultrasonic 2 of 2 items

1 of 1 page < 1 >

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 }
```

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'.

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 of the interface, it indicates '1 Simulation running'.

Wokwi data publishing to ibm cloud

## 2. Distance = 162 cm Status = Normal

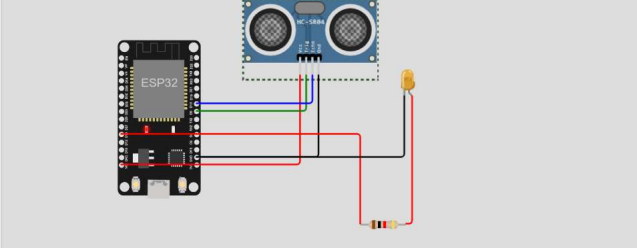
**WOKWI** SAVE SHARE Docs

sketch.ino diagram.json libraries.txt Library Manager

```
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(-d2F+X0x4qnB"
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);
```

**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** hariprasad.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 sketch 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 "wD6MB(-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 void setup()
31 {
32   Serial.begin(115200);
33   //modified server...
```

The simulation window shows the Ultrasonic sensor's distance at 27 cm. The device is publishing the following payload:

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

The IBM Watson IoT Platform interface shows the device 'Ultrasonic' connected. The 'Recent Events' tab displays the following 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>