

Assignment -4

Assignment Date
Team ID

25 October 2022
PNT2022TMID38953

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(lcd, 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 += "}";

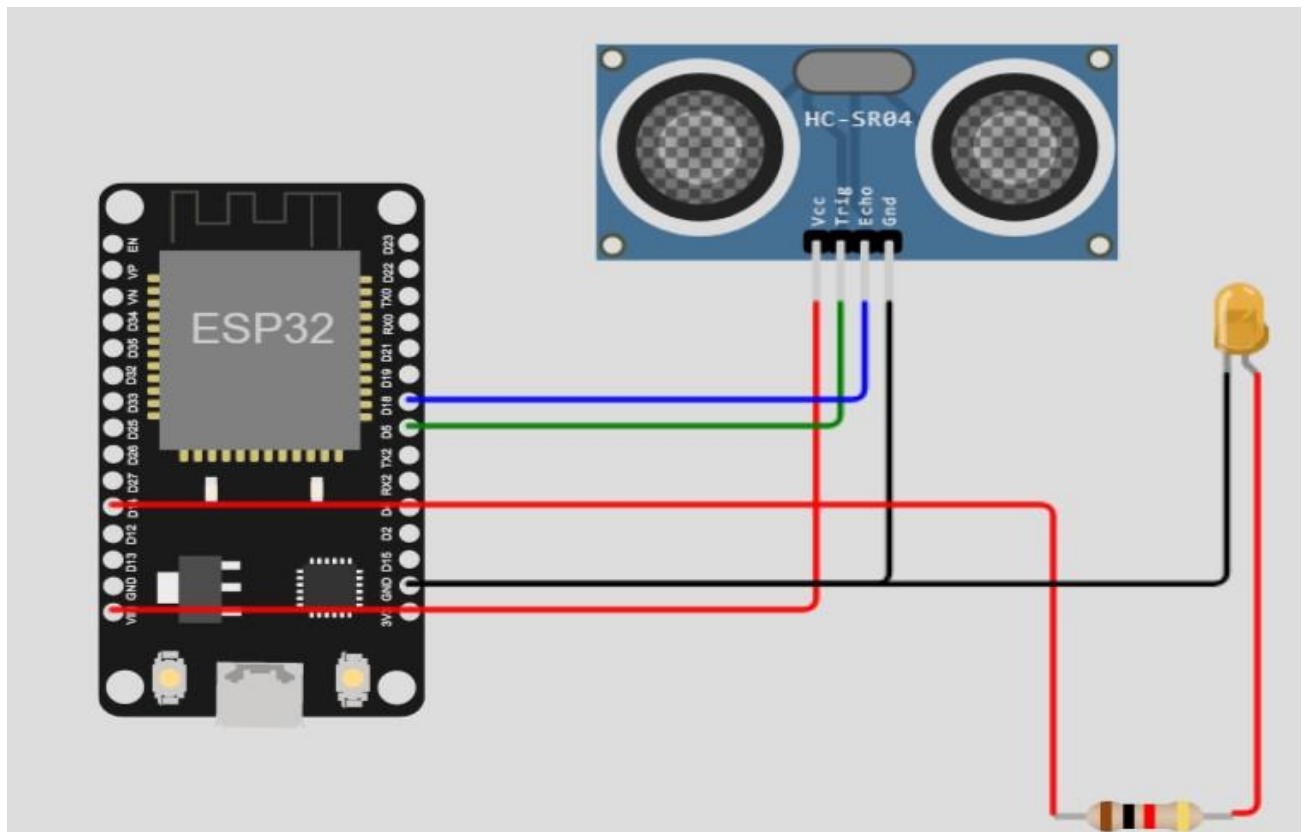
        Serial.print("\n");
        Serial.print("Sending payload: ");
        Serial.println(payload);
        if(client.publish(publishTopic, (char*) payload.c_str())) {
            Serial.println("Publish OK");
        }else {
            Serial.println("Publish FAILED");
        }
    }

}

}

```

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 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 data3;
5 #define ORG "hycgw4"
6 #define DEVICE_TYPE "Distance"
7 #define DEVICE_ID "ultrasonic"
8 #define TOKEN "w06nb(-d2F+X0xqnb)"
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 }
```

The simulation window shows a circuit diagram with an ESP32 microcontroller, an ultrasonic sensor, and an LED. The distance sensor is set to 95cm. 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 IBM Watson IoT Platform interface shows the following details for the device 'hycgw4':

- Device Type: Ultrasonic
- Status: Connected
- Distance: 94.98
- Device: Oct 25, 2022 7:04 PM

The Recent Events tab shows the following data:

| 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 |

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

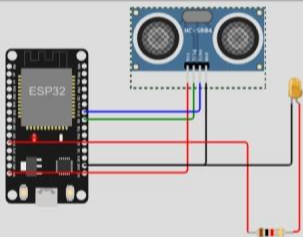
```
1 #include <Wifi.h>
2 #include <PubSubClient.h>
3 WiFiClient wificlient;
4 String data;
5 #define ORG "hycgw4"
6 #define DEVICE_TYPE "Distance"
7 #define DEVICE_ID "ultrasonic"
8 #define TOKEN "wDGHb(-d2F-X0xUqnB"
9 #define speed 0.034
10 #define led 14
11 char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
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17 PubSubClient client(server, 1883, wificlient);
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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 hariprasad.cse19@veltechnmultitech.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 |

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1 Simulation running

3. Distance = 27 cm Status = Alert Message

WOKWI

SAVE SHARE

Docs

sketch.ino diagram.json libraries.txt Library Manager

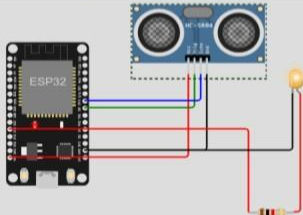
```
1 #include <wifi.h>
2 #include <PubSubClient.h>
3 WiFiClient wificlient;
4 String data;
5 #define ORG "hycgw4"
6 #define DEVICE_TYPE "Distance"
7 #define DEVICE_ID "ultrasonic"
8 #define TOKEN "wD6Hb(-d2F+X0xUqNB"
9 #define speed 0.034
10 #define led 14
11 char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
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
31 void setup()
32 {
33   Serial.begin(115200);
34 }
```

Simulation

01:03.901 99%

Editing Ultrasonic Distance Sensor

Distance: 27cm



Publish OK

Sending payload: {"Alert!! Alert!! Distance":26.98}

Publish OK

Sending payload: {"Alert!! Alert!! Distance":26.98}

Publish OK

IBM Watson IoT Platform

hariprasad.cse19@veltechnmultitech.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 | {"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 |

Items per page 50 | 1-2 of 2 items

1 Simulation running