

NAME: MAHENDIRAN V

REG. NO: 2019504034

ASSIGNMENT - IV

- Write code and connections in wokwi for the ultrasonic sensor.
- Whenever the distance is less than 100 cms send an "alert" to the IBM cloud and display in the device recent events.
- Upload document with wokwi share link and images of IBM cloud.

SOURCE CODE:

```
#include <WiFi.h>
#include <PubSubClient.h>
void callback(char* subscribtopic,byte* payload, unsigned int
payloadLength);
#define ORG "qbjx1g"
#define DEVICE_TYPE "ESP"
#define DEVICE_ID "1234"
#define TOKEN "12345678"
String data3;
char server[]= ORG ".messaging.internetofthings.ibmcloud.com";
char publishTopic[]="iot-2/evt/distance/fmt/json";
char subscribeTopic[]="iot-2/cmd/test/fmt/String";
char authMethod[]="use-token-auth";
char token[]=TOKEN;
char clientID[]="d:"ORG":"DEVICE_TYPE":"DEVICE_ID";
WiFiClient wifiClient;
PubSubClient client(server,1883,callback,wifiClient);
#define ECHO_PIN 14
#define TRIG_PIN 12
#define led 27
void setup() {
// put your setup code here, to run once:
Serial.begin(115200);
pinMode(led, OUTPUT);
pinMode(TRIG_PIN, OUTPUT);
pinMode(ECHO_PIN, INPUT);
wificonnect();
mqttconnect();
}
float readDistanceCM() {
digitalWrite(TRIG_PIN, LOW);// Clear the trigger
delayMicroseconds(2);

digitalWrite(TRIG_PIN, HIGH);// Sets the trigger pin to HIGH state for 10
microseconds
```

```

delayMicroseconds(10);
digitalWrite(TRIG_PIN, LOW);
int duration=pulseIn(ECHO_PIN, HIGH);
//Serial.println(duration);
//duration = pulseIn(ECHO_PIN, HIGH);
return duration*0.017;
//Serial.println(duration);
}
void loop() {
float distance = readDistanceCM();
//Serial.println(distance);
bool isNearby = distance < 100;
digitalWrite(led, isNearby);
Serial.print("Measured distance: ");
Serial.println(distance);
if(distance<100){
PublishData2(distance);
}else{
PublishData1(distance);
}
//PublishData(distance);
delay(1000);
if(!client.loop()){
mqttconnect();
}
//delay(2000);
}
void PublishData1(float dist){
mqttconnect();
String payload= "{\"distance\":\"";
payload += dist;
payload+="}";
Serial.print("Sending payload:");
Serial.println(payload);
if(client.publish(publishTopic,(char*)payload.c_str())){
Serial.println("publish ok");
} else{
Serial.println("publish failed");
}
}
void PublishData2(float dist){
mqttconnect();
String payload= "{\"ALERT\":\"";
payload += dist;
payload+="}";
Serial.print("Sending payload:");
Serial.println(payload);
if(client.publish(publishTopic,(char*)payload.c_str())){
Serial.println("publish ok");
} else{

Serial.println("publish failed");
}
}

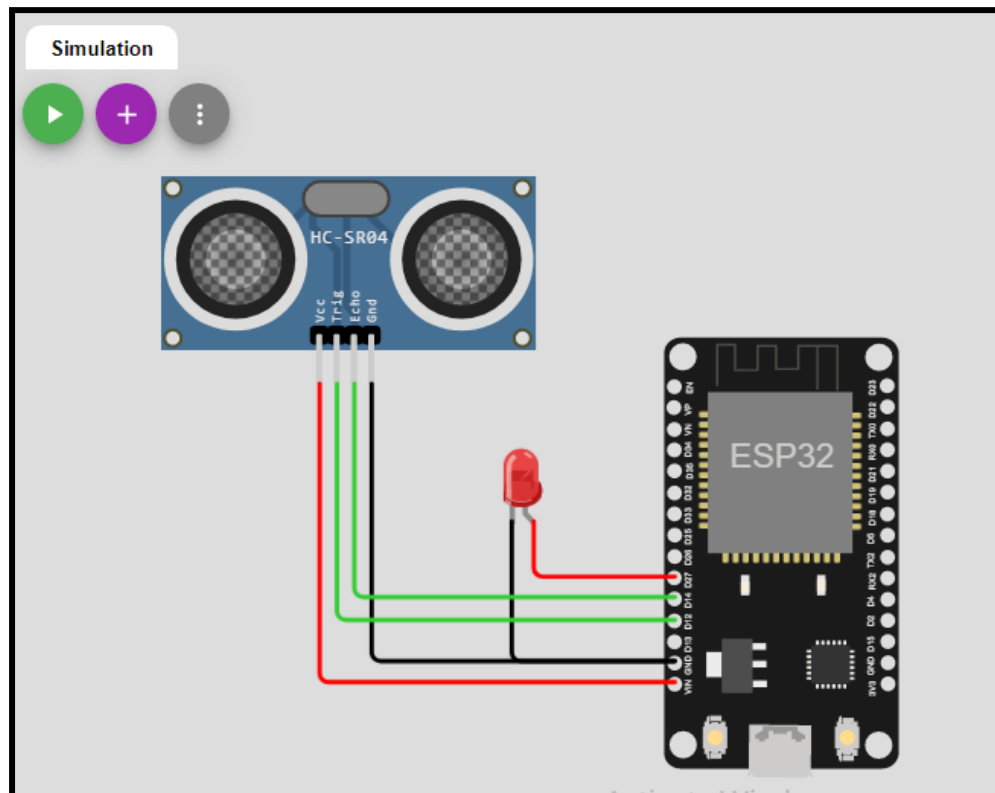
```

```
}  
}
```

```
void mqttconnect(){  
  
    if(!client.connected()){  
        Serial.print("Reconnecting to ");  
        Serial.println(server);  
        while(!!!client.connect(clientID, authMethod, token)){  
            Serial.print(".");  
            delay(500);  
        }  
        initManagedDevice();  
        Serial.println();  
    }  
}  
  
void wificonnect(){  
    Serial.println();  
    Serial.print("Connecting to");  
    WiFi.begin("Wokwi-GUEST", "", 6);  
    while(WiFi.status() != WL_CONNECTED){  
        delay(500);  
        Serial.print(".");  
    }  
    Serial.println("");  
    Serial.println("WIFI CONNECTED");  
    Serial.println("IP address:");  
    Serial.println(WiFi.localIP());  
}  
  
void initManagedDevice(){  
    if(client.subscribe(subscribeTopic)){  
        Serial.println((subscribeTopic));  
        Serial.println("subscribe to cmd ok");  
    }else{  
        Serial.println("subscribe to cmd failed");  
    }  
}  
  
void callback(char* subscribeTopic, byte* payload, unsigned int  
payloadLength){  
    Serial.print("callback invoked for topic:");  
    Serial.println(subscribeTopic);  
    for(int i=0; i<payloadLength; i++){  
        data3 += (char)payload[i];  
    }  
    Serial.println("data:" + data3);  
    if(data3=="lighton"){  
        Serial.println(data3);  
        digitalWrite(led, HIGH);  
    }else{  
        Serial.println(data3);  
        digitalWrite(led, LOW);  
    }  
    data3="";  
}
```

OUTPUT:

CONNECTION IN WOWKI FOR ULTRASONIC SENSOR:



NORMAL CASE: (distance > 100cms)

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

```
1 #include <Wifi.h>
2 #include <PubSubClient.h>
3 void callback(char* subscribtopic,byte* payload,unsigned int
4 payloadLength);
5 #define ORG "qbjx1g"
6 #define DEVICE_TYPE "ESP"
7 #define DEVICE_ID "1234"
8 #define TOKEN "12345678"
9 String data3;
10 char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
11 char publishTopic[] = "iot-2/evt/distance/fmt/json";
12 char subscribeTopic[] = "iot-2/cmd/test/fmt/String";
13 char authMethod[] = "use-token-auth";
14 char token[] = TOKEN;
15 char clientID[] = "d:" + ORG + ":" + DEVICE_TYPE + ":" + DEVICE_ID;
16 WiFiClient wifiClient;
17 PubSubClient client(server,1883,callback,wifiClient);
18 #define ECHO_PIN 14
19 #define TRIG_PIN 12
20 #define led 27
21 void setup() {
22 // put your setup code here, to run once:
23 Serial.begin(115200);
24 pinMode(led, OUTPUT);
25 pinMode(TRIG_PIN, OUTPUT);
26 pinMode(ECHO_PIN, INPUT);
27 wificonnect();
28 }
```

On the right, the 'Simulation' window shows a circuit diagram with an ESP32 microcontroller, an Ultrasonic Distance Sensor, and a red LED. The sensor's distance is set to 290cm. Below the diagram, a console window displays the following output:

```
WIFI CONNECTED
IP address:
10.10.0.2
Reconnecting to qbjx1g.messaging.internetofthings.ibmcloud.com
...iot-2/cmd/test/fmt/String
subscribe to cmd ok
```

ALERT CASE: (distance < 100cms)

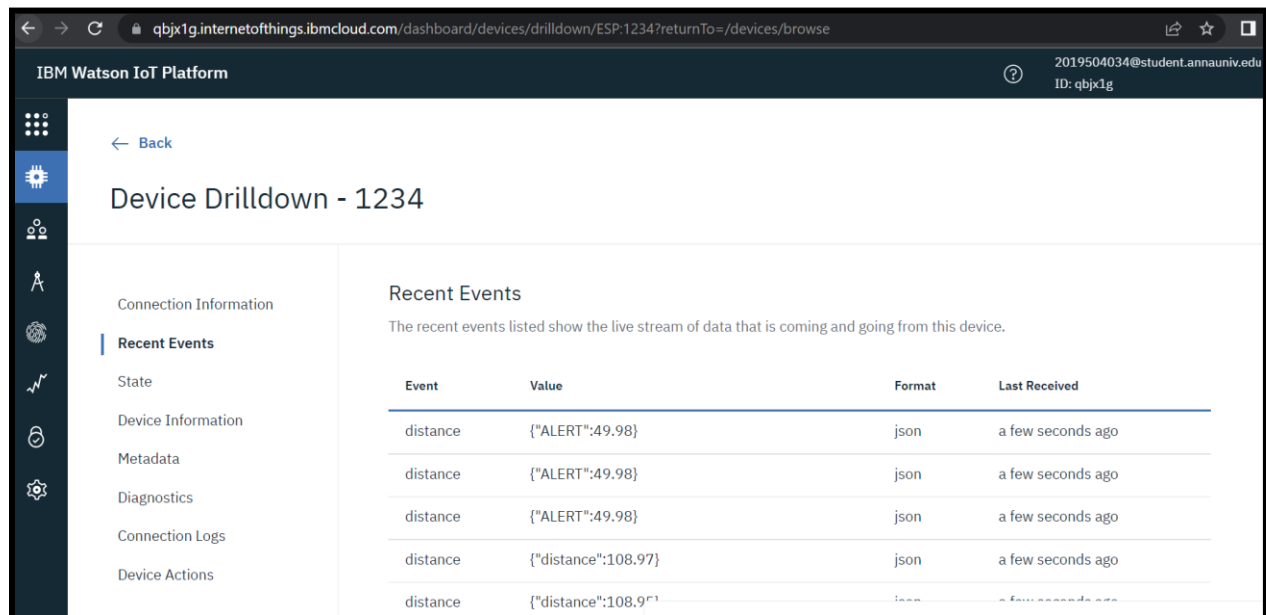
The screenshot shows the Wokwi web IDE interface. On the left, the 'sketch.ino' file is open, displaying the following code:

```
1 #include <Wifi.h>
2 #include <PubSubClient.h>
3 void callback(char* subscribtopic,byte* payload,unsigned int
4 payloadLength);
5 #define ORG "qbjx1g"
6 #define DEVICE_TYPE "ESP"
7 #define DEVICE_ID "1234"
8 #define TOKEN "12345678"
9 String data3;
10 char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
11 char publishTopic[] = "iot-2/evt/distance/fmt/json";
12 char subscribeTopic[] = "iot-2/cmd/test/fmt/String";
13 char authMethod[] = "use-token-auth";
14 char token[] = TOKEN;
15 char clientID[] = "d:" + ORG + ":" + DEVICE_TYPE + ":" + DEVICE_ID;
16 WiFiClient wifiClient;
17 PubSubClient client(server,1883,callback,wifiClient);
18 #define ECHO_PIN 14
19 #define TRIG_PIN 12
20 #define led 27
21 void setup() {
22 // put your setup code here, to run once:
23 Serial.begin(115200);
24 pinMode(led, OUTPUT);
25 pinMode(TRIG_PIN, OUTPUT);
26 pinMode(ECHO_PIN, INPUT);
27 wificonnect();
28 }
```

On the right, the 'Simulation' window shows the same circuit diagram. The sensor's distance is now set to 39cm, and the red LED is illuminated. The console window displays the following output:

```
WIFI CONNECTED
IP address:
10.10.0.2
Reconnecting to qbjx1g.messaging.internetofthings.ibmcloud.com
...iot-2/cmd/test/fmt/String
subscribe to cmd ok
```

IBM CLOUD DISPLAY IN RECENT EVENTS:



IBM Watson IoT Platform

2019504034@student.annauniv.edu
ID: qbjx1g

← Back

Device Drilldown - 1234

Connection Information

Recent Events

State

Device Information

Metadata

Diagnostics

Connection Logs

Device Actions

Recent Events

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

Event	Value	Format	Last Received
distance	{"ALERT":49.98}	json	a few seconds ago
distance	{"ALERT":49.98}	json	a few seconds ago
distance	{"ALERT":49.98}	json	a few seconds ago
distance	{"distance":108.97}	json	a few seconds ago
distance	{"distance":108.97}	json	a few seconds ago

DISCUSSION OF THE RESULT:

- The connection has been made for ultrasonic sensor using LED and ESP32 using wowki simulator.
- It is observed that when the distance is greater than 100cms, it doesn't send any alert message.
- But, when the distance is less than 100cms, it sends an alert message to the IBM cloud and the corresponding message can be viewed under IBM cloud device recent events.