

ASSIGNMENT 4

TEAM ID : PNT2022TMID12810
PROJECT TITLE : SmartFarmer – IoT Enabled Smart Farming Application
SUBMITTED BY : Tharun G (718019L144)

GIVEN PROBLEM:

Write code and connections in wokwi for ultrasonic sensor. Whenever distance is less than 100 meters send “alert” to IBM cloud and display in device recent events.

ESP32 CODE:

```
#include <WiFi.h>
#include "PubSubClient.h"

#define ECHO 2
#define TRIG 15
#define L LOW
#define H HIGH
#define ORG "b6kdov"
#define DEVICE_TYPE "ESP32"
#define DEVICE_ID "24_0A_C4_00_01_10"
#define TOKEN "G8F*JZcTgYJl6h!17W"

int distance = 0;
char SSID[] = "Wokwi-GUEST";
char PASSWORD[] = "";

char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
char publishTopic[] = "iot-2/evt/update/fmt/json";
char topic[] = "iot-2/cmd/update/fmt/Number";
char AUTH[] = "use-token-auth";
char token[] = "G8F*JZcTgYJl6h!17W";
char CLIENTID[] = "d:"ORG":DEVICE_TYPE":DEVICE_ID;
```

```
WiFiClient wifiClient;
PubSubClient client(server, 1883, wifiClient);

void setup()
{
  Serial.begin(115200);
  pinMode(TRIG, OUTPUT);
  pinMode(ECHO, OUTPUT);
  pinMode(LED_BUILTIN, OUTPUT);

  WiFi.mode(WIFI_STA);
  WiFi.begin(SSID, PASSWORD);
  Serial.print("Trying to connect to WiFi.");
  while (WiFi.status() != WL_CONNECTED) {
    delay(500);
    Serial.print(".");
  }
  Serial.println();

  Serial.print("Connected to ");
  Serial.print(SSID);
  Serial.print("(IP Address: ");
  Serial.print(WiFi.localIP());
  Serial.println(")");

  Serial.print("MAC Address: ");
  Serial.println(WiFi.macAddress());

  mqttConnect();
```

```
}
```

```
float readDistanceValue()
```

```
{
```

```
    digitalWrite(TRIG, L);
```

```
    delayMicroseconds(2);
```

```
    digitalWrite(TRIG, H);
```

```
    delayMicroseconds(10);
```

```
    digitalWrite(TRIG, L);
```

```
    distance = pulseIn(ECHO, HIGH) * 0.034 / 2;
```

```
    return distance;
```

```
}
```

```
void mqttConnect()
```

```
{
```

```
    if (!client.connected())
```

```
    {
```

```
        Serial.print("Client trying to reconnect to ");
```

```
        Serial.println(server);
```

```
        while (!client.connect( CLIENTID, AUTH, TOKEN))
```

```
        {
```

```
            Serial.print(".");
```

```
            delay(500);
```

```
        }
```

```
        Serial.println();
```

```
        if (client.subscribe(topic))
```

```
        {
```

```
            Serial.println("Subscription Success!");
```

```
        }
```

```
    else
```

```

    {
        Serial.println("Subscription Failed!");
    }
}
}

void loop() {
    float currDistance = readDistanceValue();
    Serial.println("Distance: " + String(currDistance, 2) + "m");
    Serial.println("-----");

    if (currDistance < 100)
    {
        String payload = "{\\\"Alert distance\\\":";
        payload += currDistance;
        payload += "}";
        Serial.print("Payload: ");
        Serial.println(payload);

        if (client.publish(publishTopic, (char *) payload.c_str()))
        {
            Serial.println("Published Successfully!");
        }
        else
        {
            Serial.println("Publish Failed!");
        }
    }
    else
    {

```

```

String payload = "{\"Distance\":";
payload += currDistance;
payload += "}";
Serial.print("Payload: ");
Serial.println(payload);

if (client.publish(publishTopic, (char *) payload.c_str()))
{
    Serial.println("Published Successfully!");
}
else
{
    Serial.println("Publish Failed!");
}
}
if (!client.loop())
{
    mqttConnect();
}
delay(10000);
}

```

DIAGRAM.JSON

```

{
    "version": 1,
    "author": "Uri Shaked",
    "editor": "wokwi",
    "parts": [
        { "type": "wokwi-esp32-devkit-v1", "id": "esp", "top": 0, "left": -48, "attrs": {} },
        {
            "type": "wokwi-hc-sr04",

```

```

    "id": "ultrasonic1",

    "top": -54.23,

    "left": 108.84,

    "attrs": { "distance": "110" }

  }

],

"connections": [

  [ "esp:TX0", "$serialMonitor:RX", "", [] ],

  [ "esp:RX0", "$serialMonitor:TX", "", [] ],

  [ "ultrasonic1:VCC", "esp:3V3", "red", [ "v119.23", "h-125.12" ] ],

  [ "ultrasonic1:GND", "esp:GND.1", "black", [ "v108.56", "h-150.12" ] ],

  [ "ultrasonic1:TRIG", "esp:D15", "green", [ "v98.81", "h-133.94" ] ],

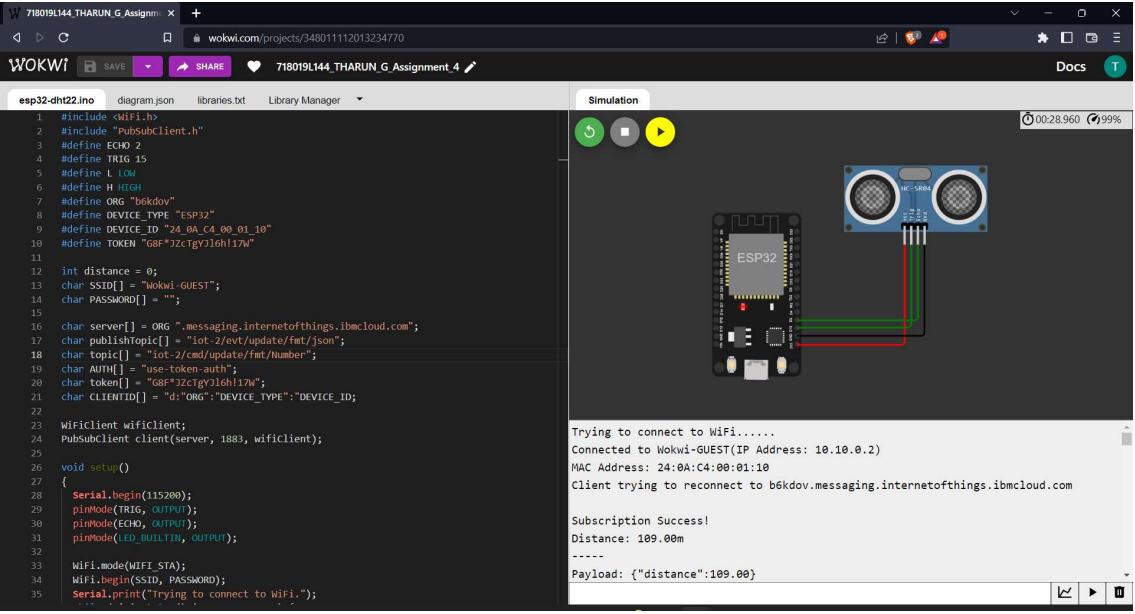
  [ "ultrasonic1:ECHO", "esp:D2", "green", [ "v90.31", "h-145.07" ] ]

]

}

```

OUTPUT SNIPPETS:



The screenshot displays the Wokwi IDE interface. On the left, the code editor shows a C++ program for an ESP32 connected to an HC-SR04 ultrasonic sensor. The code includes headers for `WiFi.h` and `PubSubClient.h`, defines constants for pin numbers and sensor parameters, and implements a `setup` function that initializes the serial port, pins, and WiFi connection. The right side of the interface shows a 3D simulation of the hardware setup. Below the simulation, the serial monitor displays the output of the program, showing the connection process and the successful subscription to a topic, resulting in a distance measurement of 109.00m.

```

1 #include <WiFi.h>
2 #include "PubSubClient.h"
3 #define ECHO 2
4 #define TRIG 15
5 #define L LOW
6 #define H HIGH
7 #define ORG "b6kdov"
8 #define DEVICE_TYPE "ESP32"
9 #define DEVICE_ID "24 0A C4 00 01 10"
10 #define TOKEN "GBF*JZcTgy3l6h117w"
11
12 int distance = 0;
13 char SSID[] = "wokwi-GUEST";
14 char PASSWORD[] = "";
15
16 char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
17 char publishTopic[] = "iot-2/evt/update/fmt/json";
18 char topic[] = "iot-2/cmd/update/fmt/number";
19 char AUTH[] = "use-token-auth";
20 char token[] = "GBF*JZcTgy3l6h117w";
21 char CLIENTID[] = "d:"ORG:"DEVICE_TYPE":"DEVICE_ID";
22
23 WiFiClient wificlient;
24 PubSubClient client(server, 1883, wificlient);
25
26 void setup()
27 {
28   Serial.begin(115200);
29   pinMode(TRIG, OUTPUT);
30   pinMode(ECHO, OUTPUT);
31   pinMode(LED_BUILTIN, OUTPUT);
32
33   WiFi.mode(WIFI_STA);
34   WiFi.begin(SSID, PASSWORD);
35   Serial.print("Trying to connect to WiFi.");

```

Trying to connect to WiFi.....
Connected to Wokwi-GUEST (IP Address: 10.10.0.2)
MAC Address: 24:0A:C4:00:01:10
Client trying to reconnect to b6kdov.messaging.internetofthings.ibmcloud.com

Subscription Success!
Distance: 109.00m

Payload: {"distance":109.00}

WOKWI

esp32-dht22.ino

```
1 #include <WiFi.h>
2 #include "PubSubClient.h"
3 #define ECHO 2
4 #define TRIG 15
5 #define L LOW
6 #define H HIGH
7 #define ORG "b6kdov"
8 #define DEVICE_TYPE "ESP32"
9 #define DEVICE_ID "24_0A_C4_00_01_10"
10 #define TOKEN "GBR*JZc1gY16h117u"
11
12 int distance = 0;
13 char SSID[] = "Wokwi-GUEST";
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20 char token[] = "GBR*JZc1gY16h117u";
21 char CLIENTID[] = "d:"ORG:"DEVICE_TYPE":"DEVICE_ID";
22
23 WiFiClient wifiClient;
24 PubSubClient client(server, 1883, wifiClient);
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26 void setup()
27 {
28   Serial.begin(115200);
29   pinMode(TRIG, OUTPUT);
30   pinMode(ECHO, OUTPUT);
31   pinMode(LED_BUILTIN, OUTPUT);
32
33   WiFi.mode(WIFI_STA);
34   WiFi.begin(SSID, PASSWORD);
35   Serial.print("Trying to connect to WiFi.");
```

Simulation

00:28.960 99%

ESP32

HC-5984

Payload: {"Alert Distance":43.00}
Published Successfully!
Distance: 117.00m

Payload: {"distance":117.00}
Published Successfully!
Distance: 252.00m

IBM Watson IoT Platform

b6kdov.internetofthings.ibmcloud.com/dashboard/devices/browse

191.144@psgtech.ac.in
ID: b6kdov

IBM Watson IoT Platform

Browse Action Device Types Interfaces

Search by Device ID

Device Simulator

Device ID	Status	Device Type	Class ID	Date Added	Descriptive Location
24_0A_C4_00_01_10	Disconnected	ESP32	Device	Nov 11, 2022 12:59 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
update	{"distance":334}	json	a few seconds ago
update	{"distance":314}	json	a few seconds ago
update	{"distance":252}	json	a few seconds ago
update	{"distance":117}	json	a few seconds ago
update	{"Alert Distance":43}	json	a few seconds ago

0 Simulations running