

**Assignment -4**  
Ultrasonic Sensor

Assignment Date	10 November 2022
Student Name	Mr. Sham Ganesh
Student Roll Number	2019503559
Maximum Marks	2 Marks

**Question-1:**

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.

**Source Code:**

```
#include <WiFi.h>
#include <PubSubClient.h>
void callback(char* subscribetopic, byte* payload, unsigned int payloadLength);
#define ORG "ir6i2l"
#define DEVICE_TYPE "node_assgn4"
#define DEVICE_ID "73585"
#define TOKEN "91766210"
String data3;
char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
char publishTopic[] = "iot-2/evt/Data/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);
const int trigPin = 5;
const int echoPin = 18;
#define SOUND_SPEED 0.034
long duration;
float distance;
void setup() {
  Serial.begin(115200);
  pinMode(trigPin, OUTPUT);
  pinMode(echoPin, INPUT);
  wificonnect();
  mqttconnect();
}
void loop()
{
  digitalWrite(trigPin, LOW);
  delayMicroseconds(2);
  digitalWrite(trigPin, HIGH);
  delayMicroseconds(10);
  digitalWrite(trigPin, LOW);
  duration = pulseIn(echoPin, HIGH);
  distance = duration * SOUND_SPEED/2;
  Serial.print("Distance (cm): ");
```

```

Serial.println(distance);
if(distance<100)
{
Serial.println("ALERT!!");
delay(1000);
PublishData(distance);
delay(1000);
if (!client.loop()) {
mqttconnect();
}
}
delay(1000);
}
void PublishData(float dist) {
mqttconnect();
String payload = "{\"Distance\":\"";
payload += dist;
payload += "\",\"ALERT!!\":\"\"Distance less than 100cms\"";
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 client 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());
}

```

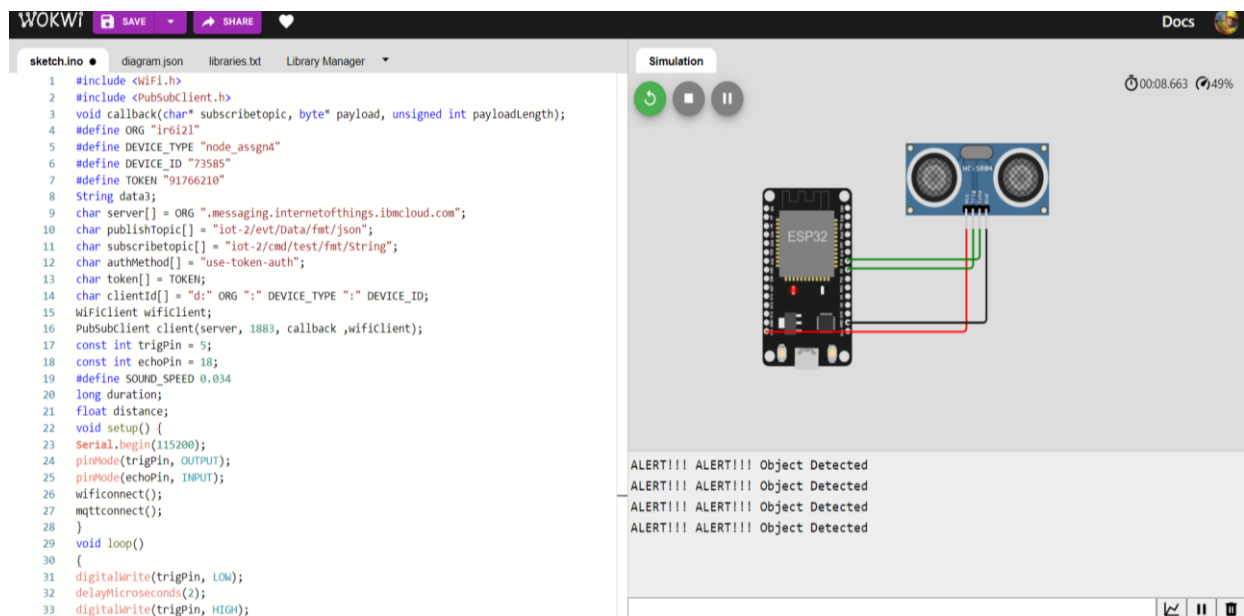
```

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);
  data3="";
}

```

## Output:



The screenshot displays the Wokwi IoT simulator interface. On the left, the 'sketch.ino' file is open in a code editor, showing the following code:

```

1 #include <WiFi.h>
2 #include <PubSubClient.h>
3 void callback(char* subscribetopic, byte* payload, unsigned int payloadLength);
4 #define ORG "ir6i2l"
5 #define DEVICE_TYPE "node_assgn4"
6 #define DEVICE_ID "73585"
7 #define TOKEN "91766210"
8 String data3;
9 char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
10 char publishTopic[] = "iot-2/evt/Data/fmt/json";
11 char subscribetopic[] = "iot-2/cmd/test/fmt/String";
12 char authMethod[] = "use-token-auth";
13 char token[] = TOKEN;
14 char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;
15 WiFiClient wificlient;
16 PubSubClient client(server, 1883, callback, wificlient);
17 const int trigPin = 5;
18 const int echoPin = 18;
19 #define SOUND_SPEED 0.034
20 long duration;
21 float distance;
22 void setup() {
23   Serial.begin(115200);
24   pinMode(trigPin, OUTPUT);
25   pinMode(echoPin, INPUT);
26   wificlient.connect();
27   mqttconnect();
28 }
29 void loop()
30 {
31   digitalWrite(trigPin, LOW);
32   delayMicroseconds(2);
33   digitalWrite(trigPin, HIGH);

```

On the right, the 'Simulation' window shows a visual representation of the hardware: an ESP32 microcontroller board connected to an HC-SR04 ultrasonic sensor. The sensor is connected to the ESP32 via three wires (red, green, and blue). Below the hardware diagram, the simulation output log displays the following messages:

```

ALERT!!! ALERT!!! Object Detected
ALERT!!! ALERT!!! Object Detected
ALERT!!! ALERT!!! Object Detected
ALERT!!! ALERT!!! Object Detected

```

The simulation window also includes a status bar at the bottom right showing a play button, a pause button, and a stop button, along with a timer indicating 00:08.663 and a battery level of 49%.

IBM Watson IoT Platform

2019503559@smartinternz.com ID: ir6121

Browse Action Device Types Interfaces

Add Device

Search by Device ID

Device Simulator

Device ID	Status	Device Type	Class ID	Date Added	Descriptive Location
> <input type="checkbox"/> 73585	Disconnected	DeviceNode	Device	Nov 22, 2022 10:35 PM	→ ...
> <input type="checkbox"/> 73585	Disconnected	NodeMCU	Device	Nov 21, 2022 10:52 PM	
▼ <input checked="" type="checkbox"/> 73585	Disconnected	node_assgn4	Device	Nov 25, 2022 10:41 AM	→ ...

Identity

Device Information

Recent Events

State

Logs

×

Device ID

Device Type

Date Added

Added By

Connection Status

73585

node\_assgn4

Nov 25, 2022 10:41 AM

2019503559@smartinternz.com

Disconnected

> ☐ abcd\_1

Disconnected

abcd

Device

Nc

2 Simulations running