

### **Assignment -4**

#### **Distance Detection Using Ultrasonic Sensor**

Assignment Date	25 October 2022
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Maximum Marks	2 Marks

#### **Question-1:**

Write code and connections in wokwi for ultrasonic sensor. Whenever distance is less than 100 cms send "alert" to IBM cloud and display in device recent events. WOKWI LINK:  
<https://wokwi.com/projects/346502216516895315>

**CODE:**

```

#include <WiFi.h>//library for wifi #include
<PubSubClient.h>//library for MQTT

void callback(char* subscribetopic, byte* payload, unsigned intpayloadLength);

//-----credentials of IBM Accounts-----

#define ORG "f59trs"//IBM ORGANITION ID
#define DEVICE_TYPE "ultrasonicsensor"//Device type mentioned inibm watson IOT
Platform
#define DEVICE_ID "distancedetection"//Device ID mentioned in ibmwatson IOT
Platform
#define TOKEN "AlGMGaaF01nawa1QA3" //Token
String data3;
float dist;

//----- Customise the above values -----
char server[] = ORG ".messaging.internetofthings.ibmcloud.com";//Server Name
char publishTopic[] = "iot-2/evt/Data/fmt/json";// topic name andtype of event perform
and format in which data to be send
char subscribetopic[] = "iot-2/cmd/test/fmt/String";//
cmd REPRESENT command type AND COMMAND IS TEST OF FORMAT STRING
char authMethod[] = "use-token-auth";// authentication methodchar token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;//clientid

//
WiFiClient wifiClient; // creating the instance for wificlient

```

```

PubSubClient client(server, 1883, callback ,wifiClient);
//calling the predefined client id by passing parameter like server
id,portand wificredential

int LED = 4; int trig
= 5; int echo =
18; void setup()
{
  Serial.begin(115200);
  pinMode(trig,OUTPUT);
  pinMode(echo,INPUT);
  pinMode(LED, OUTPUT);
  delay(10); wificonnect();
  mqttconnect();
}
void loop()// Recursive Function
{

  digitalWrite(trig,LOW); digitalWrite(trig,HIGH);
  delayMicroseconds(10);
  digitalWrite(trig,LOW);
  float dur = pulseIn(echo,HIGH); float dist
  = (dur * 0.0343)/2; Serial.print
  ("Distancein cm"); Serial.println(dist);

  PublishData(dist);
  delay(1000); if
  (!client.loop()) {
    mqttconnect();
  }
}

/*.....retrieving to
Cloud. .... */

void PublishData(float dist) { mqttconnect();//function call for connecting to
  ibm
  /* creating the String in in form JSon to update the data to ibm cloud
  */
  String object;

```

```

if (dist < 100)
{ digitalWrite(LED, HIGH);
  Serial.println("object is near"); object =
  "Near";
}
else
{ digitalWrite(LED, LOW); Serial.println("no
  object found"); object = "No";
}

String payload = "{\"distance\": "; payload +=
dist;
payload += ", \"object\": \""; payload +=
object; payload += "\"}";

Serial.print("Sending payload: ");
Serial.println(payload);

if (client.publish(publishTopic, (char*) payload.c_str())) {
  Serial.println("Publish ok");// if it successfully upload data on the cloud then it
will print publish ok in Serial monitor or else it will print publish failed
} 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() //function defination for wificonnect
{
    Serial.println(); Serial.print("Connecting to
    ");

    WiFi.begin("Wokwi-GUEST", "", 6); //passing the wifi credentials to establish the
connection 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++) {
        //Serial.print((char)payload[i]); data3 +=
        (char)payload[i];
    }

    // Serial.println("data: "+ data3);
    // if(data3=="Near")
    // {
    // Serial.println(data3);
    // digitalWrite(LED,HIGH);

    // }

    // else
    // {
    // Serial.println(data3);

```

```

// digitalWrite(LED,LOW);

// }
data3="";

}

```

## OUTPUT:

**When object is not near to the ultrasonic sensor**

The screenshot displays the Arduino IDE interface with a simulation. The left pane shows the sketch code, and the right pane shows the simulation of the hardware and the serial monitor output.

**Sketch Code:**

```

1 #include <WiFi.h> //library for wifi
2 #include <PubSubClient.h> //library for MQTT
3
4
5 void callback(char* subscribetopic, byte* payload, unsigned int payloadLength);
6
7 //-----credentials of IBM Accounts-----
8
9 #define ORG "f59trs" //IBM ORGANITION ID
10 #define DEVICE_TYPE "ultrasonicsensor" //Device type mentioned in ibm watson IOT Platform
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12 #define TOKEN "ALGMGaaF0Inawa1QA3" //Token
13 String data3;
14 float dist;
15
16
17 //----- Customise the above values -----
18 char server[] = ORG ".messaging.internetofthings.ibmcloud.com"; // Server Name
19 char publishTopic[] = "iot-2/evt/Data/fmt/json"; // topic name and type of event perform and
20 char subscribetopic[] = "iot-2/cmd/test/fmt/String"; // cmd REPRESENT command type AND COMM
21 char authMethod[] = "use-token-auth"; // authentication method
22 char token[] = TOKEN;
23 char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID; //client id
24
25
26 //-----
27 WifIClient wifIClient; // creating the instance for wifIClient
28 PubSubClient client(server, 1883, callback, wifIClient); //calling the predefined client id
29
30 int LED = 4;
31 int trig = 5;
32 int echo = 18;
33 void setup()

```

**Simulation:** The simulation shows an ESP32 microcontroller connected to an HC-SR04 ultrasonic sensor and an LED. The sensor is connected to the ESP32's VCC, GND, Trig, and Echo pins. The LED is connected to the ESP32's GND and Trig pins.

**Serial Monitor Output:**

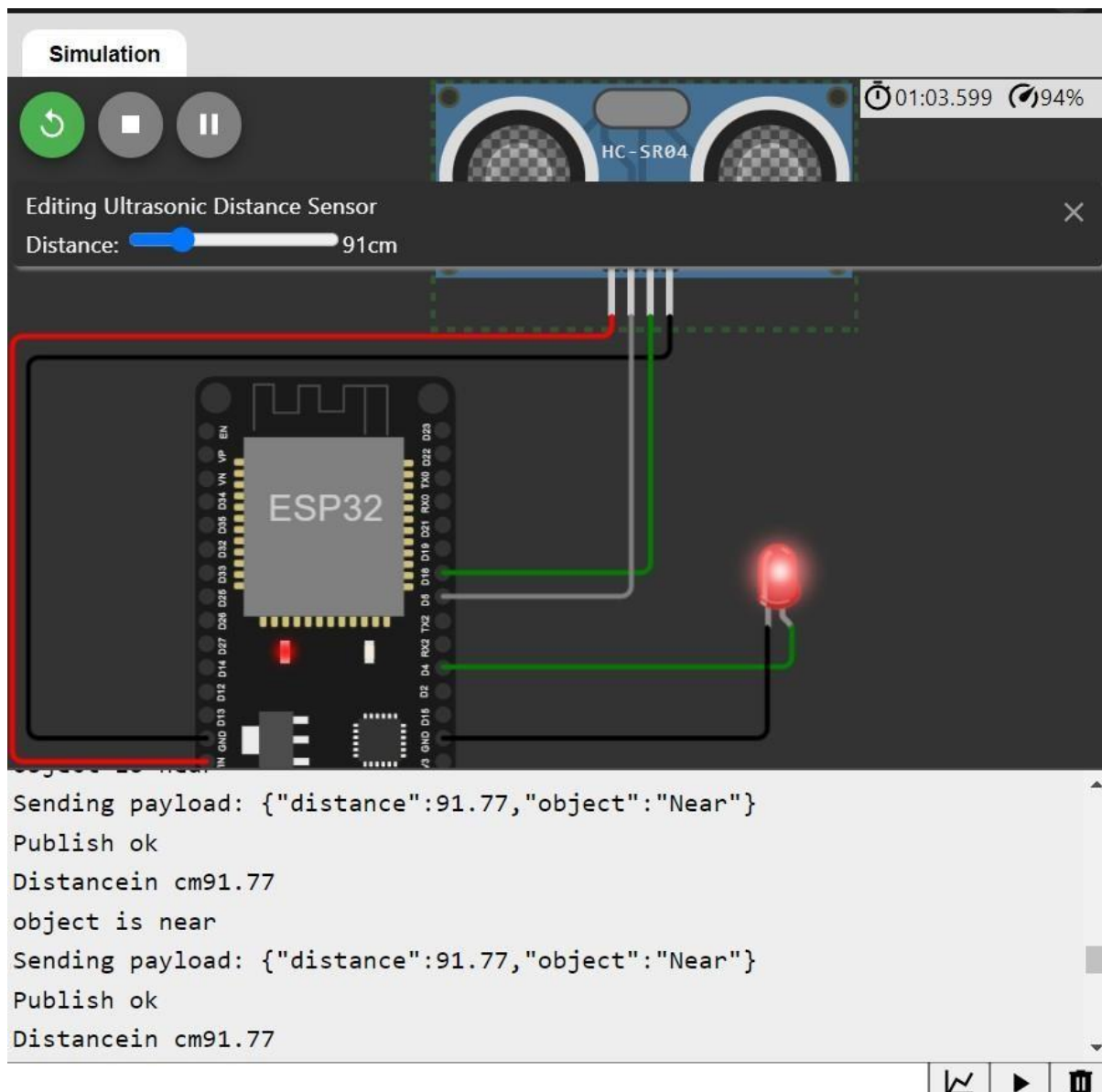
```

no object found
Sending payload: {"distance":403.45,"object":"No"}
Publish ok
Distancein cm233.00
no object found
Sending payload: {"distance":233.00,"object":"No"}
Publish ok

```

**Data sent to the IBM cloud device when the object is far**





**Data sent to the IBM cloud device when the object is near**



