

**Assignment -4**  
Distance Detection Using Ultrasonic Sensor

Assignment Date	13 November 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/345964118720643668>

**CODE:**

```

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

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

//-----credentials of IBM Accounts-----
#define ORG "f59trs"//IBM ORGANITION ID
#define DEVICE_TYPE "ultrasonicsensor"//Device type mentioned in
ibm watson IOT Platform
#define DEVICE_ID "distancedetection"//Device ID mentioned in ibm
watson 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
and type 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 method char
token[] = TOKEN; char clientId[] = "d:" ORG ":" DEVICE_TYPE ":"
DEVICE_ID;//client id

//-----
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 sucessfully 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 sketch on the left and a simulation on the right. The sketch, named `sketch.ino`, includes libraries for WiFi and PubSubClient, and defines constants for an IBM Cloud IoT instance. It sets up an ESP32, an HC-SR04 ultrasonic sensor, and an LED. The `setup` function initializes the WiFi and PubSubClient. The `loop` function (partially visible) checks for objects and sends JSON payloads to the IBM Cloud IoT platform. The simulation on the right shows the physical components: an ESP32 module, an HC-SR04 sensor, and a red LED. The console output shows the sensor detecting a distance of 403.45 cm, reporting 'no object found', and sending a payload with 'object': 'No'. This process repeats with a distance of 233.00 cm, also reporting 'no object found' and sending a 'No' object.

```
1 #include <WiFi.h> //library for wifi
2 #include <PubSubClient.h> //library for MQTT
3
4
5 void callback(char* subscribtopic, 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
11 #define DEVICE_ID "distancedetection" //Device ID mentioned in ibm watson IOT Platform
12 #define TOKEN "AlGMGaaF01nawa1QA3" //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 subscribtopic[] = "iot-2/cmd/test/fmt/String"; // cmd REPRESENT command type AND COMMA
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()
```

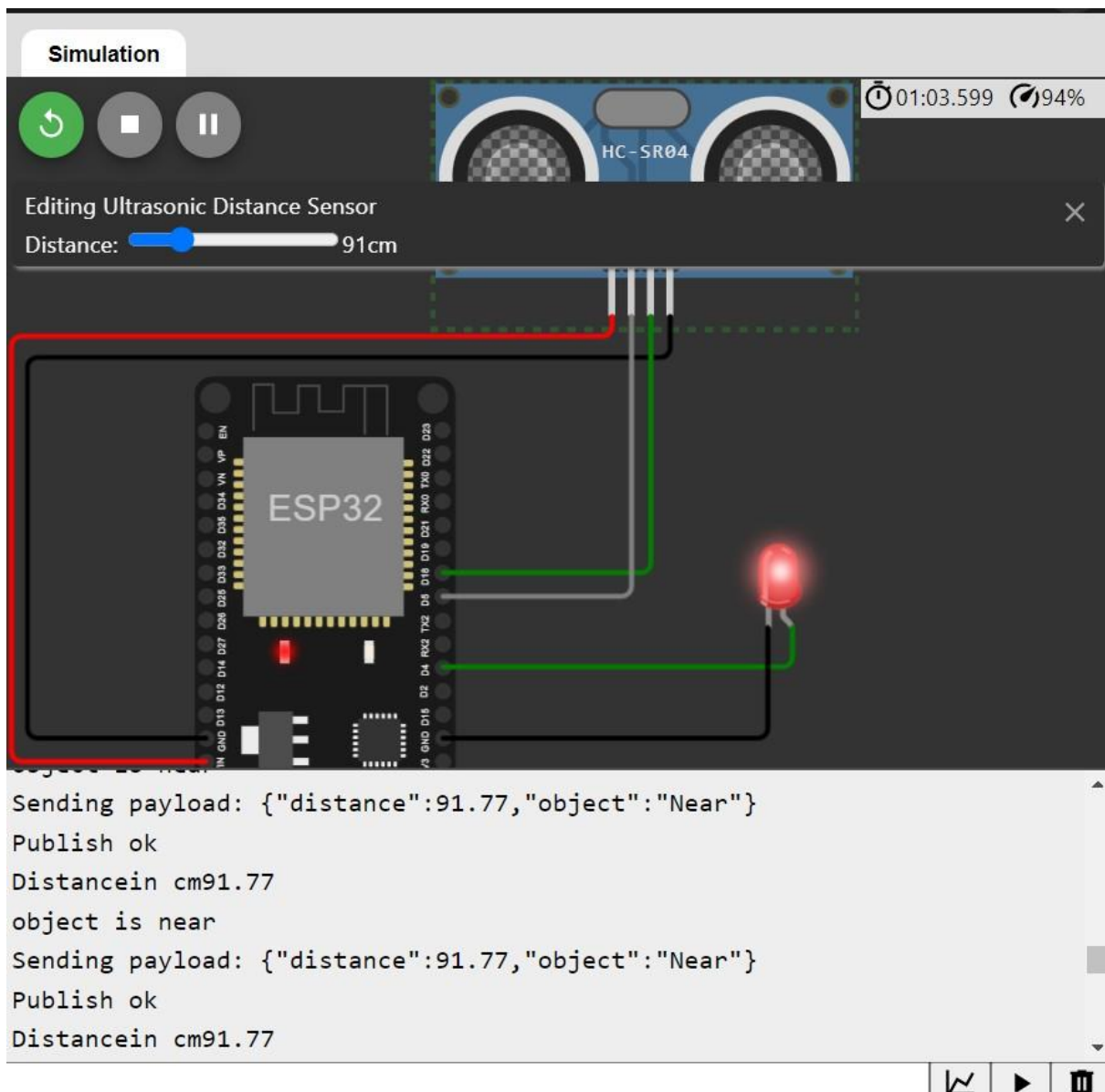
Simulation console output:

```
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**



