

## Assignment -4

Assignment Date	30 October 2022
Student Name	HEMANTH
Student Roll Number	PNT2022TMID02410
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.

The image shows the Wokwi IDE interface with a C++ sketch for an ESP32 microcontroller connected to an HC-SR04 ultrasonic sensor. The sketch includes the necessary libraries and defines the server, topic, and device credentials for IBM Cloud IoT. It sets up the sensor pins and configures the ESP32 pins for the sensor's operation.

```
1 #include<WiFi.h> //library for wifi
2 #include<PubSubClient.h> //library for MQTT
3 void callback(char* subscribetopic, byte* payload,unsigned int payloadlength);
4 //-----credentials of IBM Account-----
5 #define ORG "izyy6o" // IBM ORGANIZATION ID
6 #define DEVICE_TYPE "iotdeviceproject" //DEVICE TYPE MENTIONED IN IOT WATSON PLATFORM
7 #define DEVICE_ID "229714" //DEVICE ID MENTIONED IN IOT WATSON PLATFORM
8 #define TOKEN "24681012" //Token
9 String data3;
10 float dist;
11 //-----customize the above value-----
12 char server[] = ORG ".messaging.internetofthings.ibmcloud.com"; //server name
13 char publishTopic[] = "ultrasonic/evt/Data/fmt/json"; //topic name and type of event per
14 | and format in which data to be send*/
15 char subscribetopic[] = "ultrasonic/cmd/test/fmt/String"; //cmd REPRESENT Command tupe a
16 COMMAND IS TEST OF FORMAT STRING*/
17 char authMethod[] = "use-token-auth"; //authentication method
18 char token[] = TOKEN;
19 char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID; //CLIENT ID
20 //-----
21 WiFiClient wifiClient; // creating an instance for wifiClient
22 PubSubClient client(server, 1883, callback, wifiClient); //calling the predefined cl
23 by passing parameter like server id,portand wificredential*/
24 int LED = 4;
25 int trig = 5;
26 int echo = 18;
27 void setup()
28 {
29   Serial.begin(115200);
30   pinMode(trig, OUTPUT);
31   pinMode(echo, INPUT);
32   pinMode(LED, OUTPUT);
```

The simulation shows the ESP32 microcontroller connected to the HC-SR04 ultrasonic sensor. The sensor's VCC pin is connected to the ESP32's 5V pin, and its GND pin is connected to the ESP32's GND pin. The sensor's TRIG pin is connected to the ESP32's pin 5, and its ECHO pin is connected to the ESP32's pin 18. A red LED is connected to the ESP32's pin 4, with its anode to the pin and its cathode to the GND pin.

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Simulation

```

32 pinMode(LED,OUTPUT);
33 delay(10);
34 wifiConnect();
35 mqttConnect();
36 }
37 void loop()//recursive function
38 {
39   digitalWrite(trig,LOW);
40   digitalWrite(trig,HIGH);
41   delayMicroseconds(10);
42   digitalWrite(trig,LOW);
43   float dur=pulseIn(echo,HIGH);
44   float dist=(dur * 0.0343)/2;
45   Serial.print("distance in cm");
46   Serial.println(dist);
47   PublishData(dist);
48   delay(1000);
49   if (!client.loop()){
50     mqttConnect();
51   }
52 }
53 .....retriving to cloud.....
54 void PublishData(float dist){
55   mqttConnect();//function call for connecting to ibm
56   /*creating the string in form of JSON to update the data to ibm cloud*/
57   String object;
58   if(dist<100)
59   {
60     digitalWrite(LED,HIGH);
61     Serial.println("no object is near");
62     object="Near";
63   }

```

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```

63 }
64 else
65 {
66   digitalWrite(LED,LOW);
67   Serial.println("no object found");
68   object="No";
69 }
70 String payload="{\"distance\": ";
71 payload +=dist;
72 payload +=",\" \"object\":\":\"";
73 payload += object;
74 payload += "\":\"";
75
76 Serial.print("Sending payload: ");
77 Serial.println(payload);
78 if(client.publish(publishtopic, (char*) payload.c_str())){
79   Serial.println("Publish ok");// if its sucessfully upload data on the cloud then
80   publish ok in serial monitor or else it will print publish failed*/
81 } else{
82   Serial.println("Publish failed");
83 }
84 }
85 void mqttConnect(){
86   if(!client.connected()){
87     Serial.print("Reconnecting client to ");
88     Serial.println(server);
89     while(!client.connect(clientid,authMethod, token)){
90       Serial.print(".");
91       delay(500);
92     }
93   }
94   initManagedDevice();
95   Serial.println();

```

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Library Manager

```

93   initManagedDevice();
94   Serial.println();
95   }
96   }
97   void wificonnect()//function definition for wificonnect
98   {
99       Serial.println();
100      Serial.print("Connecting to ");
101      WiFi.begin("Wokwi.GUEST", ""); //PASSING THE WIFI CREDENTIALS TO ESTABLISH CONNE
102      while (WiFi.status() != WL_CONNECTED){
103          delay(500);
104          Serial.print(".");
105      }
106      Serial.println("");
107      Serial.println("WiFi connected");
108      Serial.println("IP address");
109      Serial.println(WiFi.localIP());
110  }
111  void initManagedDevice(){
112      if(client.subscribe(subscribetopic)){
113          Serial.println((subscribetopic));
114          Serial.println("subscribe to cmd OK");
115      }else{
116          Serial.println("subscribe to cmd failed");
117      }
118  }
119  void callback(char* subscribetopic,byte*payload,unsigned int payloadlength)
120  {
121      Serial.print("callback invoked for topic: ");
122      Serial.println(subscribetopic);
123      for(int i=0; i< payloadlength; i++){
124          //Serial.print((char)payload[i]);
125          data3 +=(char)payload[i];

```

Simulation

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Library Manager

```

111  void initManagedDevice(){
112      if(client.subscribe(subscribetopic)){
113          Serial.println((subscribetopic));
114          Serial.println("subscribe to cmd OK");
115      }else{
116          Serial.println("subscribe to cmd failed");
117      }
118  }
119  void callback(char* subscribetopic,byte*payload,unsigned int payloadlength)
120  {
121      Serial.print("callback invoked for topic: ");
122      Serial.println(subscribetopic);
123      for(int i=0; i< payloadlength; i++){
124          //Serial.print((char)payload[i]);
125          data3 +=(char)payload[i];
126      }
127      //Serial.println("dta: "+ data3);
128      //if(data3=="Near")
129      //{
130      //Serial.println(data3);
131      //digitalWrite(LED,HIGH);
132      //}
133      //else
134      //{
135      //Serial.println(data3);
136      //digitalWrite(LED,LOW);
137      //}
138      data3="";
139  }

```

Simulation

## DATA SENT TO IBM CLOUD ON NO OBJECT DETECTED

Browser Action Device Types Interfaces

Add Device

DISTANCEDETECT Disconnected ULTRASON Device Oct 20, 2022 9:46 AM

Identity Device Information Recent Events State Logs

The latest event is listed above. For type information of data that is returned, see the device's response.

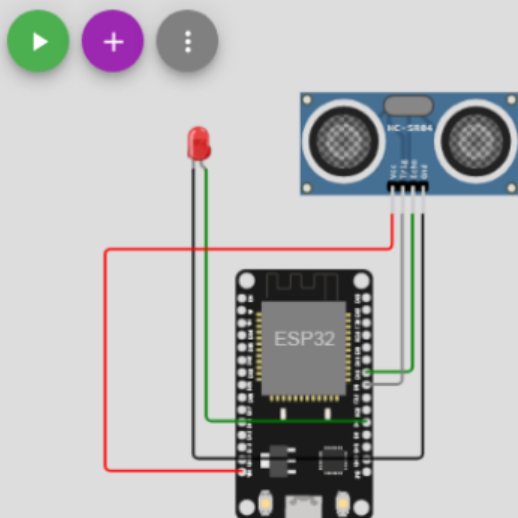
Event	Value	Format	Last Received
Data	["distance":79.66,"object":"Near"]	json	a few seconds ago
Data	["distance":79.64,"object":"Near"]	json	a few seconds ago
Data	["distance":79.66,"object":"Near"]	json	a few seconds ago
Data	["distance":79.64,"object":"Near"]	json	a few seconds ago
Data	["distance":79.66,"object":"Near"]	json	a few seconds ago

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## WHEN OBJECT DETECTED BY ULTRASONIC DETECTOR SENSOR

Simulation



```
no object found
Sending payload: {"distance":141.21,"object":"No"}
Publish ok
Distancein cm141.21
no object found
Sending payload: {"distance":141.21,"object":"No"}
Publish ok
```

