

## ASSIGNMENT-4

Date	26 October 2022
TeamID	PNT2022TMID06680
Name	JAYAPANDI S
MaximumMarks	2Marks

### Question1:

Write code and connections in work for ultrasonic sensor. Whenever distance is less than 100cms send "alert" to ibm cloud and display in device recent events.

#### 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 "4hn0jp" //IBM ORGANITION ID
10 #define DEVICE_TYPE "ULTRASON" //Device type mentioned in ibm watson IOT Platform
11 #define DEVICE_ID "DISTANCEDETECT" //Device ID mentioned in ibm watson IOT Platform
12 #define TOKEN "wuo5s7PR)ZSegVv&Rx" //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 format in which data to be send
20 char subscribetopic[] = "iot-2/cmd/test/fmt/String"; // cmd REPRESENT command type AND COMMAND IS TEST OF FORMAT STRING
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 by passing parameter like server id,portand wificredential
29
30 int LED = 4;
31 int trig = 5;
32 int echo = 18;
33 void setup()
34 {
35   Serial.begin(115200);
```

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```
36  pinMode(trig,OUTPUT);
37  pinMode(echo,INPUT);
38  pinMode(LED, OUTPUT);
39  delay(10);
40  wificonnect();
41  mqttconnect();
42  }
43  void loop()// Recursive Function
44  {
45
46      digitalWrite(trig,LOW);
47      digitalWrite(trig,HIGH);
48      delayMicroseconds(10);
49      digitalWrite(trig,LOW);
50      float dur = pulseIn(echo,HIGH);
51      float dist = (dur * 0.0343)/2;
52      Serial.print ("Distancein cm");
53      Serial.println(dist);
54
55
56      PublishData(dist);
57      delay(1000);
58      if (!client.loop()) {
59          mqttconnect();
60      }
61  }
62
63
64
65  /*.....retrieving to Cloud.....*/
66
67  void PublishData(float dist) {
68      mqttconnect();//function call for connecting to ibm
69      /*
70      | creating the String in in form JSON to update the data to ibm cloud
```

```

70 | | creating the String in in form JSon to update the data to ibm cloud
71 | */
72 String object;
73 if (dist <100)
74 {
75     digitalWrite(LED,HIGH);
76     Serial.println("object is near");
77     object = "Near";
78 }
79 else
80 {
81     digitalWrite(LED,LOW);
82     Serial.println("no object found");
83     object = "No";
84 }
85
86 String payload = "{\"distance\": ";
87 payload += dist;
88 payload += ", \"object\": \"";
89 payload += object;
90 payload += "\"}";
91
92
93 Serial.print("Sending payload: ");
94 Serial.println(payload);
95
96
97
98

```

```

esp32-blink.ino • diagram.json • libraries.txt • Library Manager
98
99 if (client.publish(publishTopic, (char*) payload.c_str())) {
100     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
101 } else {
102     Serial.println("Publish failed");
103 }
104
105 }
106 void mqttconnect() {
107     if (!client.connected()) {
108         Serial.print("Reconnecting client to ");
109         Serial.println(server);
110         while (!client.connect(clientId, authMethod, token)) {
111             Serial.print(".");
112             delay(500);
113         }
114
115         initManagedDevice();
116         Serial.println();
117     }
118 }
119 void wificonnect() //function defination for wificonnect
120 {
121     Serial.println();
122     Serial.print("connecting to ");
123
124     WiFi.begin("Wokwi-GUEST", "", 6);//passing the wifi credentials to establish the connection
125     while (WiFi.status() != WL_CONNECTED) {
126         delay(500);
127         Serial.print(".");
128     }
129     Serial.println("");
130     Serial.println("WiFi connected");
131     Serial.println("IP address: ");
132     Serial.println(WiFi.localIP());

```

```

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123
124   WiFi.begin("Wokwi-GUEST", "", 6); //passing the wifi credentials to establish the connection
125   while (WiFi.status() != WL_CONNECTED) {
126       delay(500);
127       Serial.print(".");
128   }
129   Serial.println("");
130   Serial.println("WiFi connected");
131   Serial.println("IP address: ");
132   Serial.println(WiFi.localIP());
133   }
134
135   void initManagedDevice() {
136       if (client.subscribe(subscribetopic)) {
137           Serial.println((subscribetopic));
138           Serial.println("subscribe to cmd OK");
139       } else {
140           Serial.println("subscribe to cmd FAILED");
141       }
142   }
143
144   void callback(char* subscribetopic, byte* payload, unsigned int payloadLength)
145   {
146
147       Serial.print("callback invoked for topic: ");
148       Serial.println(subscribetopic);
149       for (int i = 0; i < payloadLength; i++) {
150           //Serial.print((char)payload[i]);
151           data3 += (char)payload[i];
152       }
153
154       // Serial.println("data: "+ data3);
155       // if(data3=="Near")
156       // {
157       // Serial.println(data3);
158       // if(data3=="Near") {

```

esp32-blink.ino ●

diagram.json ●

libraries.txt ●

Library Manager ▼

```
142 }
143
144 void callback(char* subscribetopic, byte* payload, unsigned int payloadLength)
145 {
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147     Serial.print("callback invoked for topic: ");
148     Serial.println(subscribetopic);
149     for (int i = 0; i < payloadLength; i++) {
150         //Serial.print((char)payload[i]);
151         data3 += (char)payload[i];
152     }
153
154     // Serial.println("data: "+ data3);
155     // if(data3=="Near")
156     // {
157     // Serial.println(data3);
158     // digitalWrite(LED,HIGH);
159
160     // }
161
162     // else
163     // {
164     // Serial.println(data3);
165     // digitalWrite(LED,LOW);
166
167     // }
168     data3="";
169
170
171 }
```

## OUTPUT:

The screenshot shows the IBM Watson IoT Platform interface. At the top, there are tabs for 'Browse', 'Action', 'Device Types', and 'Interfaces'. A blue bar at the top displays the device name 'DISTANCEDETECT', its status 'Disconnected', the device type 'ULTRASON', and the location 'Device'. The date and time 'Oct 20, 2022 9:46 AM' are also shown. Below this bar, there are tabs for 'Identity', 'Device Information', 'Recent Events', 'State', and 'Logs'. The 'Recent Events' tab is selected, showing a table of events. The table has columns for 'Event', 'Value', 'Format', and 'Last Received'. There are five rows of data, all showing a distance of 141.21 cm and an object status of 'No'. The bottom of the interface shows 'Items per page: 50' and '1-2 of 2 items'.

Event	Value	Format	Last Received
Data	{\"distance\":141.21,\"object\":\"No\"}	json	a few seconds ago
Data	{\"distance\":141.21,\"object\":\"No\"}	json	a few seconds ago
Data	{\"distance\":141.21,\"object\":\"No\"}	json	a few seconds ago
Data	{\"distance\":141.18,\"object\":\"No\"}	json	a few seconds ago
Data	{\"distance\":141.2,\"object\":\"No\"}	json	a few seconds ago

Data send to the IBMcloud device when the objectics far

The screenshot shows the Arduino IDE interface. On the left, the code for the ESP32 device is displayed. The code includes headers for WiFi and MQTT, defines the device type as 'ULTRASON', and sets up the MQTT client. The main loop sends a payload to the MQTT broker every 5 seconds. The payload is a JSON object containing the distance and object status. On the right, the simulation window shows a 3D model of the ESP32 device connected to an ultrasonic sensor. The simulation results window at the bottom shows the output of the code, including the distance and object status.

```
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19 char authMethod[] = "use-token-auth"; // authentication method
20 char token[] = TOKEN;
21 char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID; //client id
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23 //-----
24 WiFiClient wifiClient; // creating the instance for wifiClient
25 PubSubClient client(server, 1883, callback, wifiClient); //calling the predefined client id by
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27 int LED = 4;
28 int trig = 5;
29 int echo = 18;
30 void setup()
31 {
32   Serial.begin(115200);
```

Simulation window shows the output of the code:

```
no object found
Sending payload: {"distance":141.21,"object":"No"}
Publish ok
Distance in cm 141.21
no object found
Sending payload: {"distance":141.21,"object":"No"}
Publish ok
```

## Data sent to the IBMCloud Device when the object is near

Browse Action Device Types Interfaces Add Device

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

Identity Device Information **Recent Events** State Logs

The following events are being received from this device:

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

Items per page: 50 1-2 of 2 items 1 of 1 page 1

## When object is near to the ultrasonic sensor

wokwi.com/projects/305566932847821378

esp32-arduino.ino by urish

Simulation

00:12.028 100%

object is near  
Sending payload: {"distance":97.82,"object":"Near"}  
Publish ok  
Distance in cm 97.82  
object is near  
Sending payload: {"distance":97.82,"object":"Near"}  
Publish ok