

ASSIGNMENT-4

Date	26 October 2022
TeamID	PNT2022TMID06680
Name	POOVARASAN N
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* subscribtopic, 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)ZSegV&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 subscribtopic[] = "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     Serial.print("callback invoked for topic: ");
147     Serial.println(subscribetopic);
148     for (int i = 0; i < payloadLength; i++) {
149         //Serial.print((char)payload[i]);
150         data3 += (char)payload[i];
151     }
152 }
153
154 // Serial.println("data: "+ data3);
155 // if(data3=="Near")
156 // {
157 // Serial.println(data3);
158 // if(data3=="Near") {

```

esp32-blink.ino ●

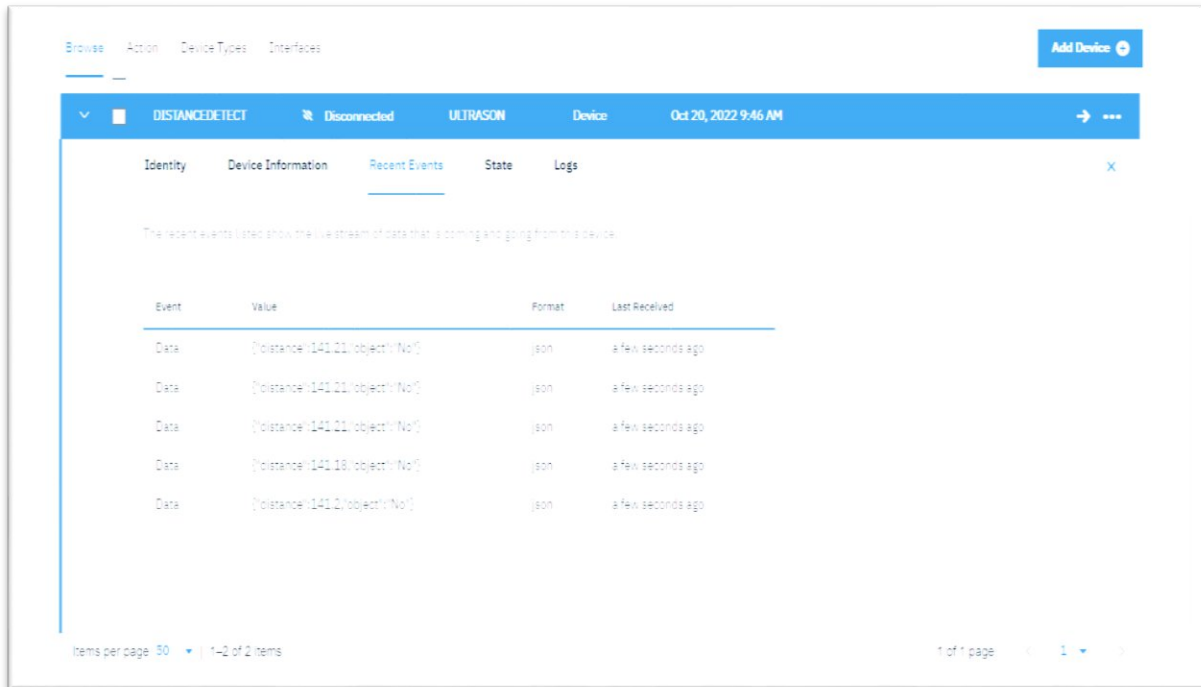
diagram.json ●

libraries.txt ●

Library Manager ▼

```
142 }
143
144 void callback(char* subscribetopic, byte* payload, unsigned int payloadLength)
145 {
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     // digitalWrite(LED,HIGH);
159
160     // }
161
162     // else
163     // {
164     // Serial.println(data3);
165     // digitalWrite(LED,LOW);
166
167     // }
168     data3="";
169
170
171 }
```

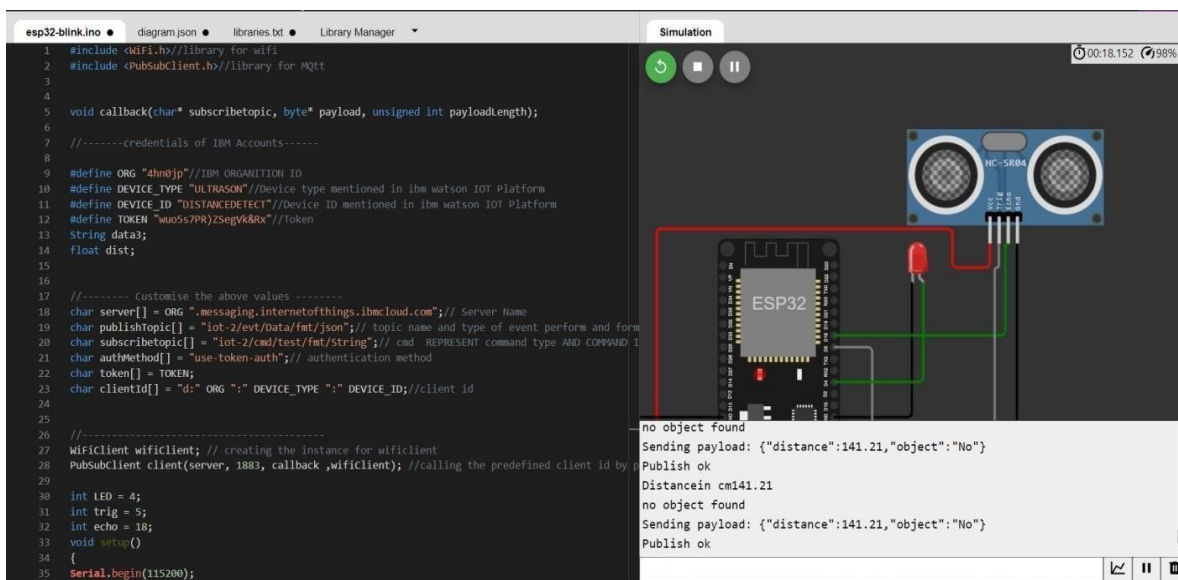
OUTPUT:



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 contains the device name 'DISTANCEDETECT', its status 'Disconnected', the device type 'ULTRASON', and the date 'Oct 20, 2022 9:46 AM'. 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 with the code for an ESP32 connected to an HC-SR04 ultrasonic sensor. The code is in C++ and includes the following sections:

```
1 #include <WiFi.h> //library for wifi
2 #include <PubSubClient.h> //library for MQTT
3
4 void callback(char* topic, byte* payload, unsigned int payloadLength);
5
6 //-----credentials of IBM Accounts-----
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8 #define ORG "dhn0jp" //IBM ORGANIZATION ID
9 #define DEVICE_TYPE "ULTRASON" //Device type mentioned in ibm watson IOT Platform
10 #define DEVICE_ID "DISTANCEDETECT" //Device ID mentioned in ibm watson IOT Platform
11 #define TOKEN "wuo557PR)ZsegV&Rk" //Token
12 String data3;
13 float dist;
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15 //----- Customise the above values -----
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17 char publishTopic[] = "iot-2/evt/Data/fmt/json"; // topic name and type of event perform and form
18 char subscribTopic[] = "iot-2/cmd/test/fmt/String"; // cmd REPRESENT command type AND COMMAND ID
19 char authMethod[] = "use-token-auth"; // authentication method
20 char token[] = TOKEN;
21 char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID; //client id
22
23 //-----
24 WiFiClient wifiClient; // creating the instance for wifiClient
25 PubSubClient client(server, 1883, callback, wifiClient); //calling the predefined client id by
26
27 int LED = 4;
28 int trig = 5;
29 int echo = 18;
30 void setup()
31 {
32   Serial.begin(115200);
```

The right side of the image shows a simulation of the hardware. It features an ESP32 microcontroller board connected to an HC-SR04 ultrasonic sensor. The sensor is connected to the ESP32 via a breadboard. The simulation window shows the following output:

```
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