

ASSIGNMENT-4

Date	23 October 2022
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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 "wu05s7PR)ZSegVk&Rx" //Token
13 String data;
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
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") {
159     //     Serial.println("Near");
160     // }
```

esp32-blink.ino ●

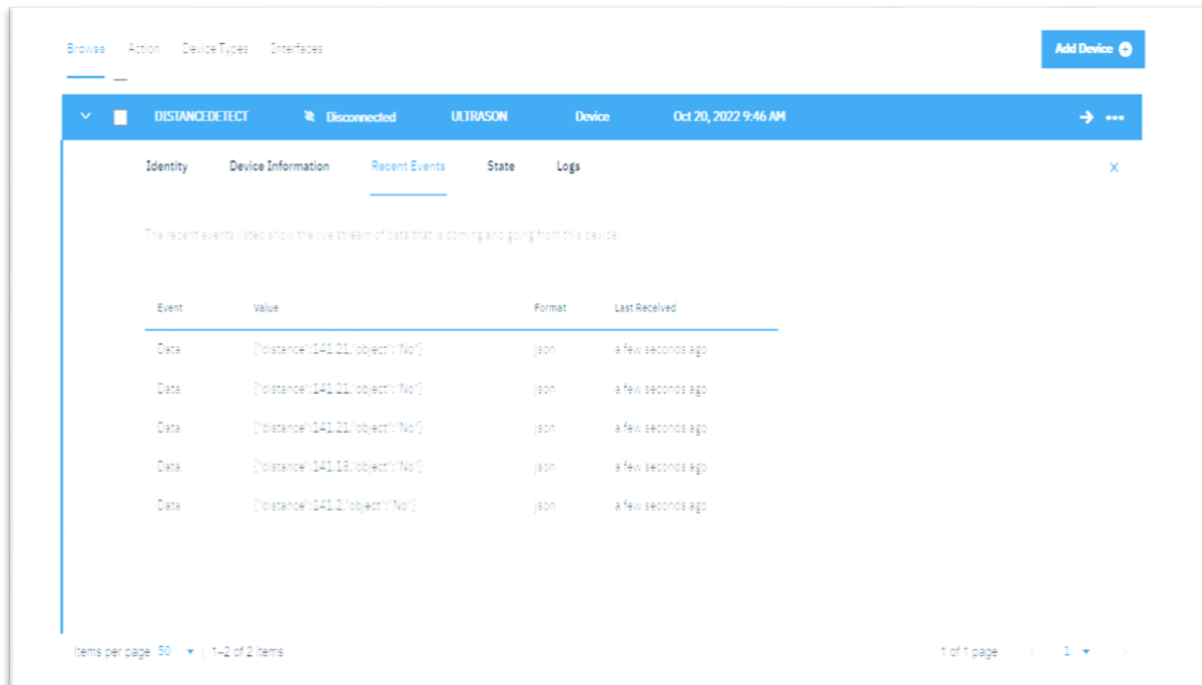
diagram.json ●

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 }
```

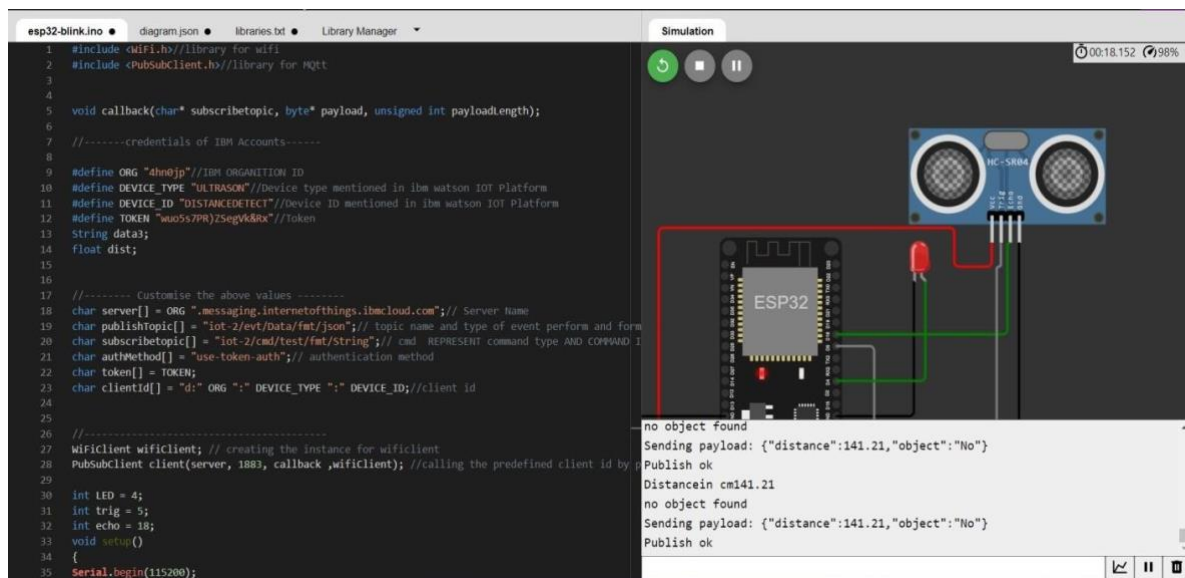
OUTPUT:



The screenshot shows the IBM Watson IoT Platform interface. The top navigation bar includes 'Browse', 'Action', 'Device Types', and 'Interfaces'. A blue 'Add Device' button is in the top right. Below the navigation bar, a header bar displays the device name 'DISTANCEDETECT', its status 'Disconnected', type 'ULTRASON', and a timestamp 'Oct 20, 2022 9:46 AM'. The main content area has tabs for 'Identity', 'Device Information', 'Recent Events', 'State', and 'Logs'. The 'Recent Events' tab is active, showing a table of events. The table has columns for 'Event', 'Value', 'Format', and 'Last Received'. There are five rows of data, each showing a 'Data' event with a JSON payload containing distance and object information. The 'Last Received' column indicates 'a few seconds ago' for each entry. At the bottom, there is a pagination bar showing 'Items per page 50' and '1-2 of 2 items'.

Event	Value	Format	Last Received
Data	{"distance":141.11,"object":"No"}	json	a few seconds ago
Data	{"distance":141.11,"object":"No"}	json	a few seconds ago
Data	{"distance":141.11,"object":"No"}	json	a few seconds ago
Data	{"distance":141.18,"object":"No"}	json	a few seconds ago
Data	{"distance":141.1,"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 the ESP32 device. The code includes comments and defines the device type as 'ULTRASON' and the device ID as 'DISTANCEDETECT'. It also defines the token and client ID. The code is compiled and the simulation is running. The simulation window shows a 3D model of the ESP32 board with an ultrasonic sensor module connected. The console output shows the following messages:

```
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
```

Data sent to the IBMCloud Device when the object is near

The screenshot shows the IBM Cloud IoT Platform interface for a device named 'DISTANCEDETECT'. The device is in a 'Disconnected' state. The 'Recent Events' tab is selected, displaying a table of data points. The table has four columns: 'Event', 'Value', 'Format', and 'Last Received'. All events are of type 'Data' and contain a JSON payload: {"distance": 79.66, "object": "Near"}. The 'Format' column shows 'json' and the 'Last Received' column shows 'a few seconds ago'. The interface also includes a top navigation bar with 'Browse', 'Action', 'Device Types', and 'Interfaces', and a right sidebar with 'Add 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

When object is near to the ultrasonic sensor

The screenshot shows a Wokwi simulation of an ESP32 microcontroller connected to an HC-SR04 ultrasonic sensor. The sensor is connected to the ESP32 via a breadboard. A red LED is also connected to the ESP32. The simulation is running, and the console output shows the following messages:

```
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
```