

ASSIGNMENT-4

Date	23 October 2022
TeamID	PNT2022TMID49507
Name	DHARANI.P
Student roll number	923819106012
Maximum Marks	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* topic, byte* payload, unsigned int length);
6
7  //-----credentials of IBM Accounts-----
8
9  #define ORG "4hn0jp" //IBM ORGANIZATION 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 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, port and wifi credential
29
30 int LED = 4;
31 int trig = 5;
32 int echo = 18;
33 void setup()
34 {
35   Serial.begin(115200);
```

esp32-blink.ino • diagram.json • libraries.txt • Library Manager ▼

```
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());

```

esp32-blink.ino • diagram.json • libraries.txt • Library Manager ▾

```
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     // digitalWrite(LED_BUILTIN, HIGH);
159 }
```

esp32-blink.ino ●

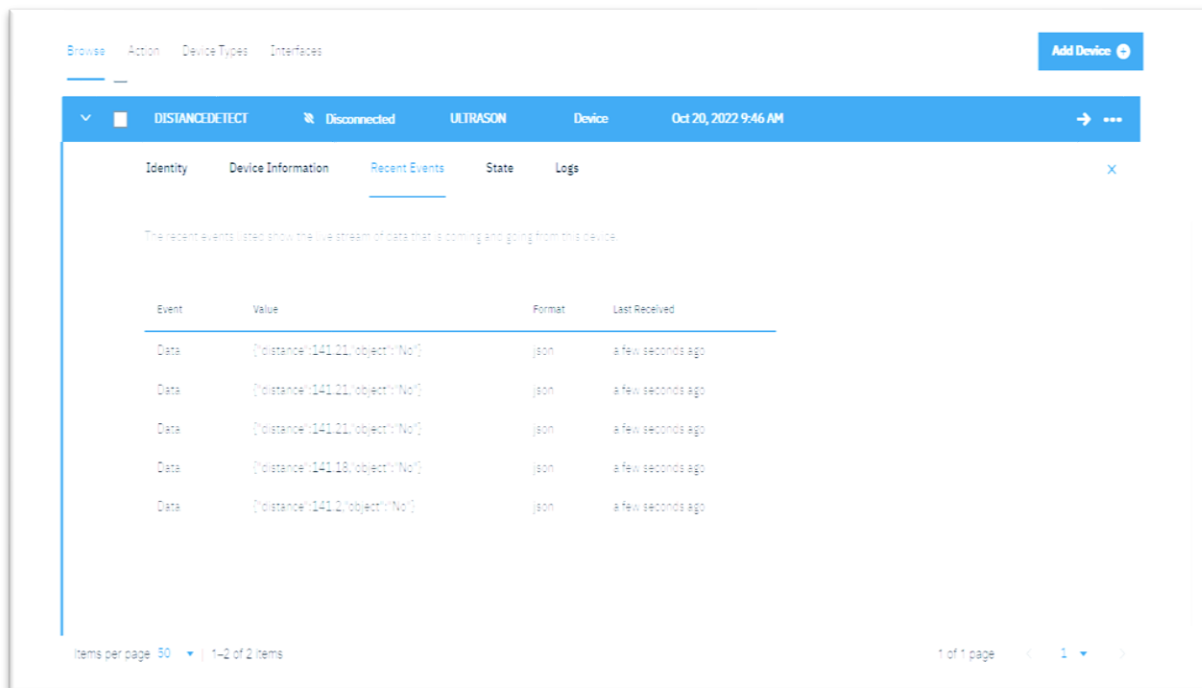
diagram.json ●

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 }
```

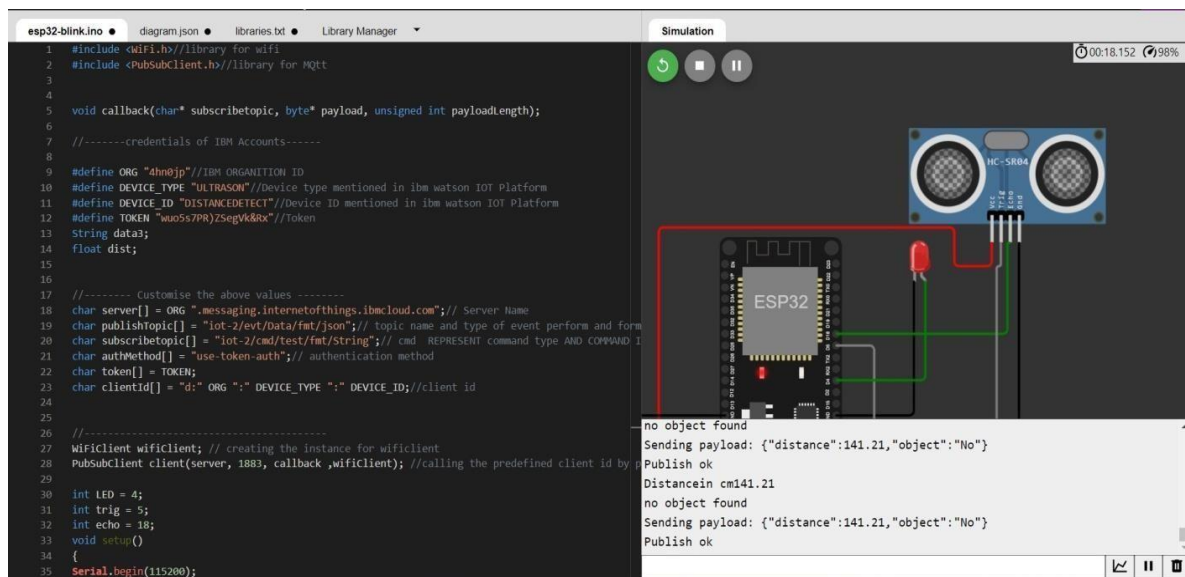
OUTPUT:



The screenshot shows the IBM Watson IoT Platform interface. At the top, there are tabs for 'Browse', 'Action', 'Device Types', and 'Interfaces'. Below these, a blue header bar displays the device name 'DISTANCEDETECT', its status 'Disconnected', type 'ULTRASON', and location 'Device'. The date and time 'Oct 20, 2022 9:46 AM' are also shown. The main content area has 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 and an object of 'No'. The status 'Disconnected' is indicated by a red icon. 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\":141.21,\"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

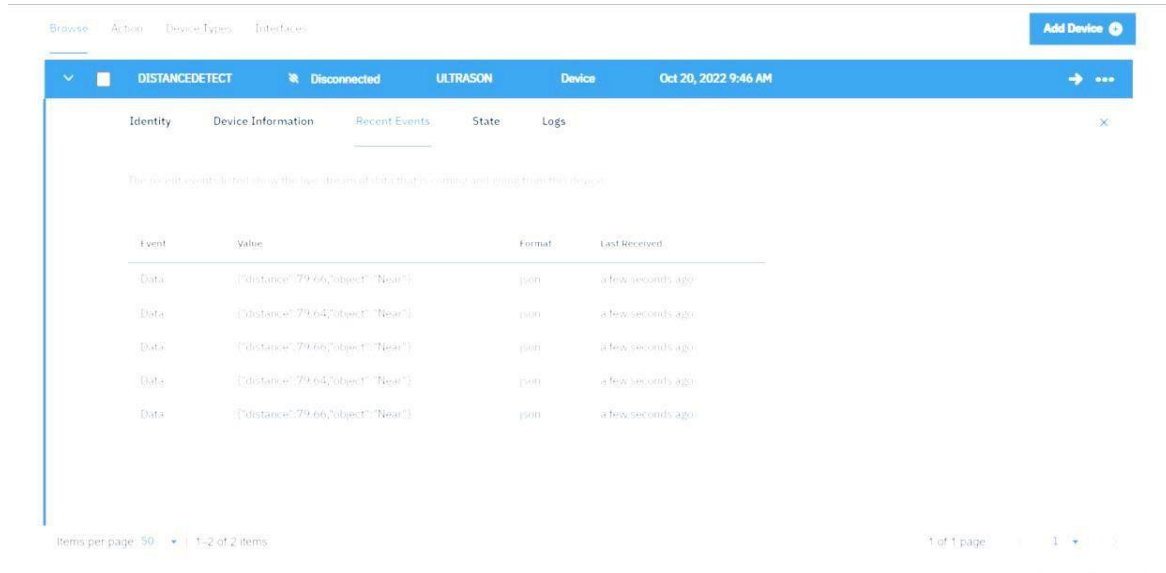
Data send to the IBMcloud device when the object is far



The screenshot shows the Arduino IDE with a code editor on the left and a simulation window on the right. The code is for an ESP32 device connected to an HC-SR04 ultrasonic sensor. The code defines the sensor's pin configuration and sets up the communication with the IBM Watson IoT Platform. The simulation window shows the physical components: an ESP32 microcontroller, an HC-SR04 ultrasonic sensor, and a red LED. The simulation output shows the device sending a payload to the IoT platform when the distance is 141.21 cm and the object is 'No'.

```
1 #include <WiFi.h> //library for wifi
2 #include <PubSubClient.h> //library for MQTT
3
4
5 void callback(char* topic, byte* payload, unsigned int payloadLength);
6
7 //-----credentials of IBM Accounts-----
8
9 #define ORG "alm0jp" //IBM ORGANIZATION 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)2SegV&8x" //Token
13 String data;
14 float dist;
15
16 //----- Customise the above values -----
17
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 form
20 char subscribeTopic[] = "iot-2/cmd/test/fmt/String"; // cmd REPRESENT command type AND COMMAND ID
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
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30 int LED = 4;
31 int trig = 5;
32 int echo = 18;
33 void setup()
34 {
35   Serial.begin(115200);
```

Data sent to the IBMCloud Device when the object is near

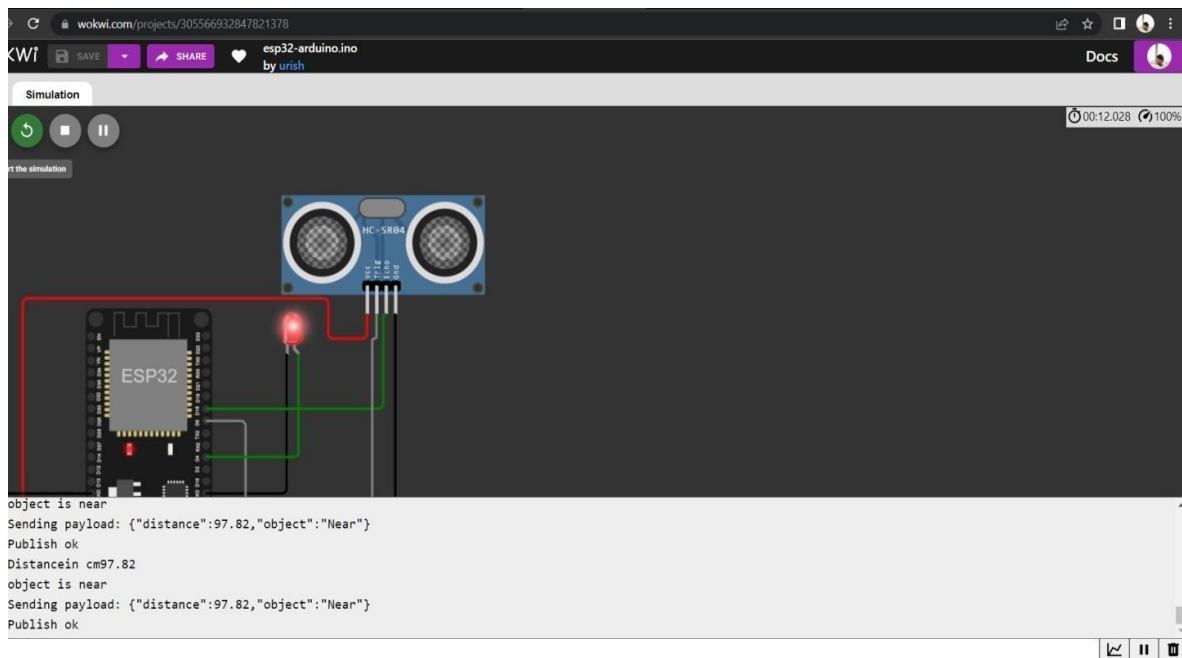


The screenshot shows the IBM Cloud IoT Platform interface for a device named 'DISTANCEDETECT'. The device is in a 'Disconnected' state. The 'Recent Events' tab is selected, displaying a table of data points. The table has columns for 'Event', 'Value', 'Format', and 'Last Received'. The data points show a distance of 79.66 cm and the object is 'Near'.

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



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. 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
```