

ASSIGNMENT-4

Date	19 OCTOBER 2022
Team ID	PNT2022TMID04713
Project Name	IoT BASED SMART CROP PROTECTION FOR AGRICULTURE
Maximum Marks	2 Marks

Question1:

Write code and connections in wokwi for the ultrasonic sensor. Whenever distance is less than 100 cms send "alert" to the 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)ZSegVx&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
```

```

69  // creating the String in in form JSON to update the data to ibm cloud
70  */
71  String object;
72  if (dist <100)
73  {
74      digitalWrite(LED,HIGH);
75      Serial.println("object is near");
76      object = "Near";
77  }
78  else
79  {
80      digitalWrite(LED,LOW);
81      Serial.println("no object found");
82      object = "No";
83  }
84
85  String payload = "{\"distance\":";
86  payload += dist;
87  payload += "," " \"object\":";
88  payload += object;
89  payload += "\"}";
90
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          initManagedDevice();
115          Serial.println();
116      }
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     // Serial.println("data received");
159 }
```

esp32-blink.ino ●

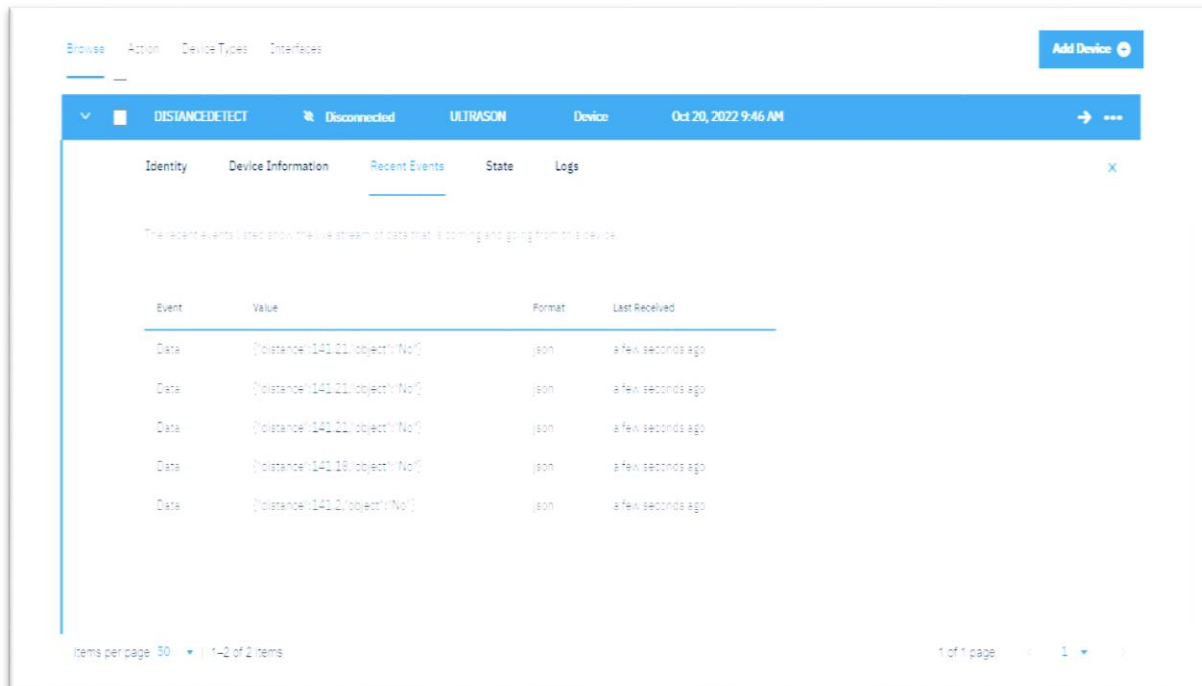
diagram.json ●

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:

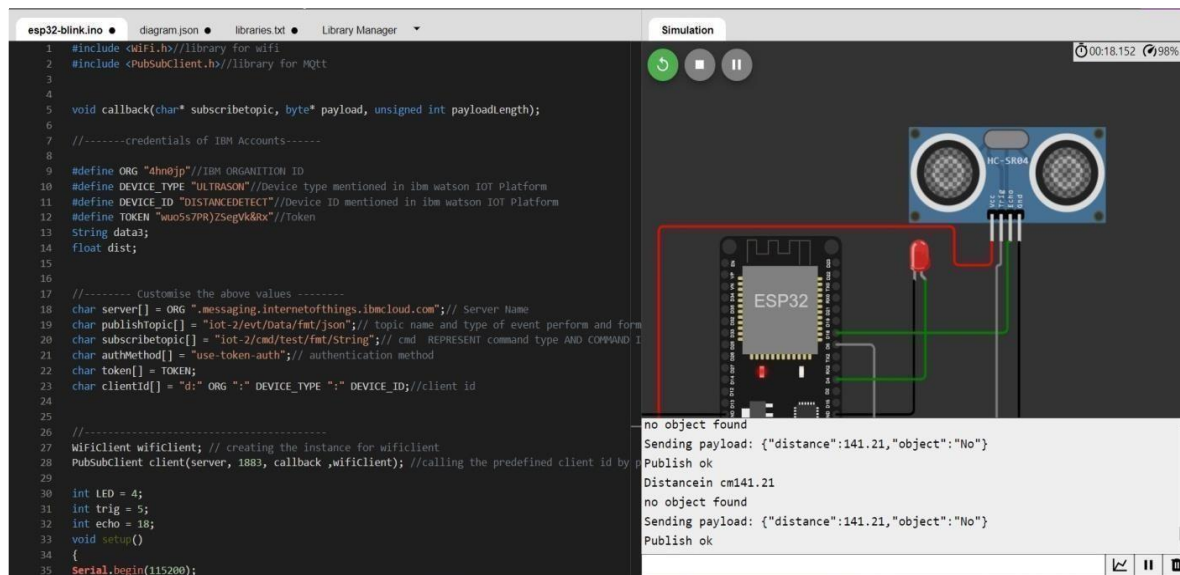


The screenshot shows the IBM Watson IoT Platform interface. At the top, there are tabs for 'Browse', 'Action', 'Device Types', and 'Interfaces'. A blue header bar contains the device name 'DISTANCEDETECT', its status 'Disconnected', type 'ULTRASON', and a timestamp 'Oct 20, 2022 9:46 AM'. Below this, there are sub-tabs: 'Identity', 'Device Information', 'Recent Events' (which is selected), 'State', and 'Logs'. A message states: 'The recent events listed show the live stream of data that is coming and going from this device.' Below this is a table with the following data:

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

At the bottom, there is a pagination bar showing 'Items per page 30' and '1-2 of 2 items'.

Data send to the IBM Cloud device when the object is far



The screenshot shows the Arduino IDE with the following code in the main editor:

```
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-----
7
8 #define ORG "ibm" //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 "wuo5s7PR)2segV&Rc" //Token
12 String data;
13 float dist;
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15 //----- Customise the above values -----
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17 char server[] = ORG ".messaging.internetofthings.ibmcloud.com"; // Server Name
18 char publishTopic[] = "iot-2/evt/data/fmt/json"; // topic name and type of event perform and form
19 char subscribeTopic[] = "iot-2/cmd/test/fmt/String"; // cmd REPRESENT command type AND COMMAND I
20 char authMethod[] = "use-token-auth"; // authentication method
21 char token[] = TOKEN;
22 char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID; //client id
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25
26 WiFiClient wifiClient; // creating the instance for wifiClient
27 PubSubClient client(server, 1883, callback, wifiClient); //calling the predefined client id by
28
29 int LED = 4;
30 int trig = 5;
31 int echo = 18;
32 void setup()
33 {
34   Serial.begin(115200);
```

The simulation window on the right shows a circuit diagram with an ESP32 microcontroller and an HC-SR04 ultrasonic sensor. The sensor's output is displayed in a text box:

```
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 IBM Cloud Device when the object is near

The screenshot shows the IBM Cloud IoT Platform interface for a device named 'DISTANCEDETECT'. The device is currently 'Disconnected'. The 'Recent Events' tab is selected, displaying a table of events. The table has four columns: 'Event', 'Value', 'Format', and 'Last Received'. There are five rows of data, all with the same JSON payload: `{\"distance\":79.66,\"object\":\"Near\"}`. The 'Last Received' times are all 'a few seconds ago'. At the bottom, it shows 'Items per page: 50' and '1-2 of 2 items'.

Event	Value	Format	Last Received
Data	<code>{\"distance\":79.66,\"object\":\"Near\"}</code>	json	a few seconds ago
Data	<code>{\"distance\":79.64,\"object\":\"Near\"}</code>	json	a few seconds ago
Data	<code>{\"distance\":79.66,\"object\":\"Near\"}</code>	json	a few seconds ago
Data	<code>{\"distance\":79.64,\"object\":\"Near\"}</code>	json	a few seconds ago
Data	<code>{\"distance\":79.66,\"object\":\"Near\"}</code>	json	a few seconds ago

When objects near to the ultrasonic sensor

