

## ASSIGNMENT-4

Date	20 Oct 2022
Team ID	PNT2022TMID04699
Project Name	Smart Farmer-IOT Enabled Smart Farming Application
Maximum Marks	2 Marks

### 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)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,portand wificredential
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

```

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     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 // digitalWrite(LED_BUILTIN,
```

esp32-blink.ino ●

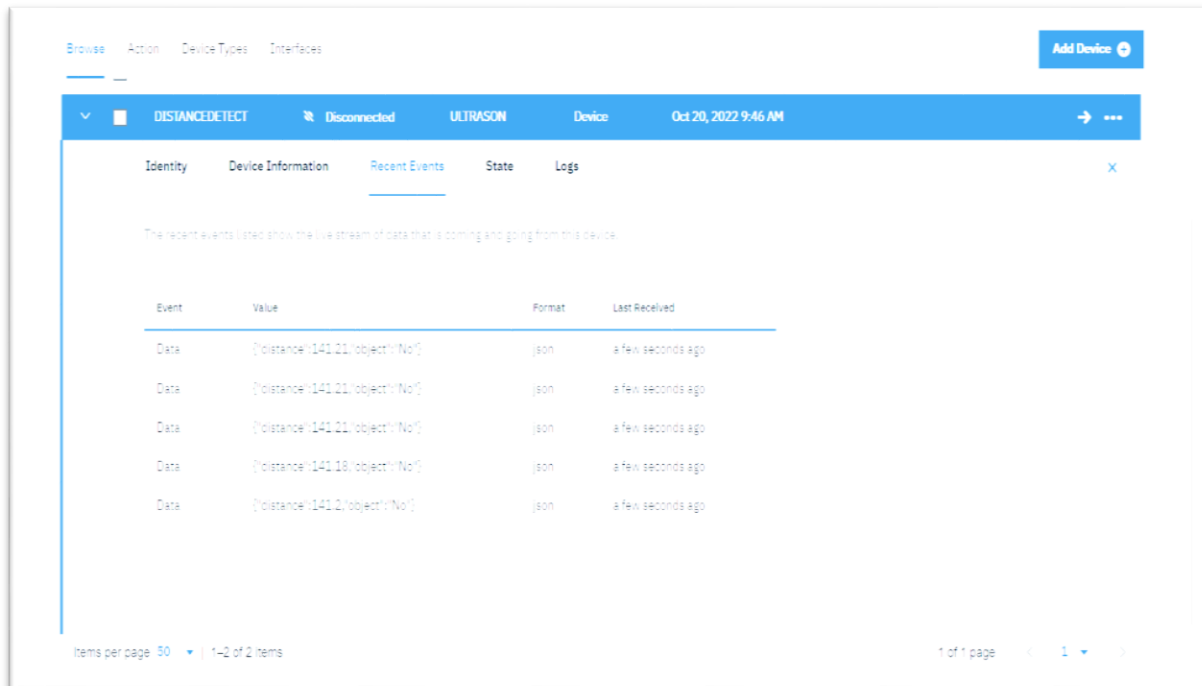
diagram.json ●

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 }
```

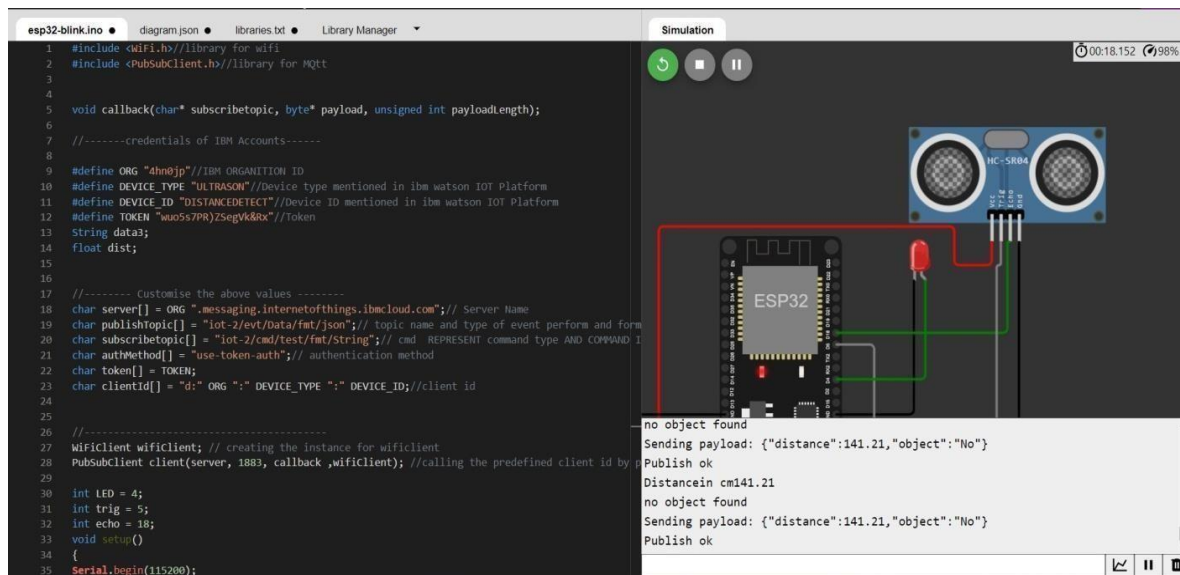
## OUTPUT:



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 location 'Device'. Below this, 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 and an object status of 'No'. The interface also includes a pagination bar at the bottom 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 objectics 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. It uses the MQTT library to send data to the IBM Watson IoT Platform. The simulation window shows the physical components and the output of the code, including the payload being sent and the status of the publish operation.

```
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4 void callback(char* topic, byte* payload, unsigned int payloadlength);
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11 #define TOKEN "wuo5s7PR)2SegvK&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
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21 char token[] = TOKEN;
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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);
```

Simulation

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 Dashboard interface. At the top, there are tabs for 'Browse', 'Actions', 'Device Types', and 'Interfaces'. A blue header bar contains the device name 'DISTANCEDETECT', its status 'Disconnected', type 'ULTRASON', and location 'Device'. The date and time 'Oct 20, 2022 9:46 AM' are also displayed. Below the header, 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 with the same value: '{"distance":79.66,"object":"Near"}'. The 'Last Received' column shows '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":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

