

## Assignment -4

Assignment Date	1 October 2022
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Student Roll Number	622119104126
Maximum Marks	2 Marks

### Question-1:

Write code and connections in wokwi for ultrasonic sensor. Whenever distance is less than 100 cms send "alert" to ibm cloud and display in device recent events.

The screenshot displays the Wokwi IDE interface. On the left, the 'sketch.ino' file contains the following code:

```
1 #include<WiFi.h> //library for wifi
2 #include<PubSubClient.h> //library for MQTT
3 void callback(char* topic, byte* payload, unsigned int payloadlength);
4 //-----credentials of IBM Account-----
5 #define ORG "izyy6o" // IBM ORGANIZATION ID
6 #define DEVICE_TYPE "iotdeviceproject" //DEVICE TYPE MENTIONED IN IOT WATSON PLATFORM
7 #define DEVICE_ID "229714" //DEVICE ID MENTIONED IN IOT WATSON PLATFORM
8 #define TOKEN "24681012" //Token
9 String data3;
10 float dist;
11 //-----customize the above value-----
12 char server[] = ORG ".messaging.internetofthings.ibmcloud.com"; //server name
13 char publishTopic[] = "ultrasonic/evt/Data/fmt/json"; //topic name and type of event per
14 | and format in which data to be send"/
15 char subscribeTopic[] = "ultrasonic/cmd/test/fmt/String"; //cmd REPRESENT Command tupe a
16 | COMMAND IS TEST OF FORMAT STRING"/
17 char authMethod[] = "use-token-auth"; //authentication method
18 char token[] = TOKEN;
19 char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID; //CLIENT ID
20 //-----
21 WiFiClient wifiClient; // creating an instance for wifiClient
22 PubSubClient client(server, 1883, callback, wifiClient); //calling the predefined cl
23 | by passing parameter like server id, port and wifi credential"/
24 int LED = 4;
25 int trig = 5;
26 int echo = 18;
27 void setup()
28 {
29   Serial.begin(115200);
30   pinMode(trig, OUTPUT);
31   pinMode(echo, INPUT);
32   pinMode(LED, OUTPUT);
```

On the right, the 'Simulation' window shows a 3D model of the hardware. An ESP32 module is connected to an HC-SR04 ultrasonic sensor. The sensor's VCC pin is connected to the ESP32's 5V pin, and its GND pin is connected to the ESP32's GND pin. The sensor's TRIG pin is connected to the ESP32's pin 5, and its ECHO pin is connected to the ESP32's pin 18. A red LED is also connected to the ESP32's pin 4.

WOKWI

SAVE

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Docs

sketch.ino

diagram.json

libraries.txt

Library Manager

Simulation

```

32 pinMode(LED,OUTPUT);
33 delay(10);
34 wifiConnect();
35 mqttconnect();
36 }
37 void loop()//recursive function
38 {
39   digitalWrite(trig,LOW);
40   digitalWrite(trig,HIGH);
41   delayMicroseconds(10);
42   digitalWrite(trig,LOW);
43   float dur=pulseIn(echo,HIGH);
44   float dist=(dur * 0.0343)/2;
45   Serial.print("distance in cm");
46   Serial.println(dist);
47   PublishData(dist);
48   delay(1000);
49   if (!client.loop()){
50     mqttconnect();
51   }
52 }
53 /*.....retriving to cloud.....*/
54 void PublishData(float dist){
55   mqttconnect();//function call for connecting to ibm
56   /*creating the string in form of JSON to update the data to ibm cloud*/
57   String object;
58   if(dist<100)
59   {
60     digitalWrite(LED,HIGH);
61     Serial.println("no object is near");
62     object="Near";
63   }

```

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Simulation

```

63 }
64 else
65 {
66   digitalWrite(LED,LOW);
67   Serial.println("no object found");
68   object="No";
69 }
70 String payload="{\"distance\": ";
71 payload +=dist;
72 payload +="," \"object\": \"";
73 payload += object;
74 payload += "\";";
75
76 Serial.print("Sending payload: ");
77 Serial.println(payload);
78 if(client.publish(publishtopic, (char*) payload.c_str())){
79   Serial.println("Publish ok");/* if its sucessfully upload data on the cloud then
80   publish ok in serial monitor or else it will print publish failed*/
81 } else{
82   Serial.println("Publish failed");
83 }
84 }
85 void mqttconnect(){
86   if(!client.connected()){
87     Serial.print("Reconnecting client to ");
88     Serial.println(server);
89     while(!client.connect(clientid,authMethod, token)){
90       Serial.print(".");
91       delay(500);
92     }
93   }
94   initManagedDevice();
95   Serial.println();

```

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Library Manager

```

93  initManagedDevice();
94  Serial.println();
95  }
96  }
97  void wificonnect()//function definition for wificonnect
98  {
99      Serial.println();
100     Serial.print("connecting to ");
101     Wifi.begin("Mokwi.GUEST", "",6);//PASSING THE WIFI CREDENTIALS TO ESTABLISH CONNE
102     while (Wifi.status() !=WL_CONNECTED){
103         delay(500);
104         Serial.print(".");
105     }
106     Serial.println("");
107     Serial.println("Wifi connected");
108     Serial.println("IP address");
109     Serial.println(Wifi.localIP());
110 }
111 void initManagedDevice(){
112     if(client.subscribe(subscribetopic)){
113         Serial.println((subscribetopic));
114         Serial.println("subscribe to cmd OK");
115     }else{
116         Serial.println("subscribe to cmd failed");
117     }
118 }
119 void callback(char* subscribetopic,byte*payload,unsigned int payloadlength)
120 {
121     Serial.print("callback invoked for topic: ");
122     Serial.println(subscribetopic);
123     for(int i=0; i< payloadlength; i++){
124         //Serial.print((char)payload[i]);
125         data3 +=(char)payload[i];

```

Simulation

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Library Manager

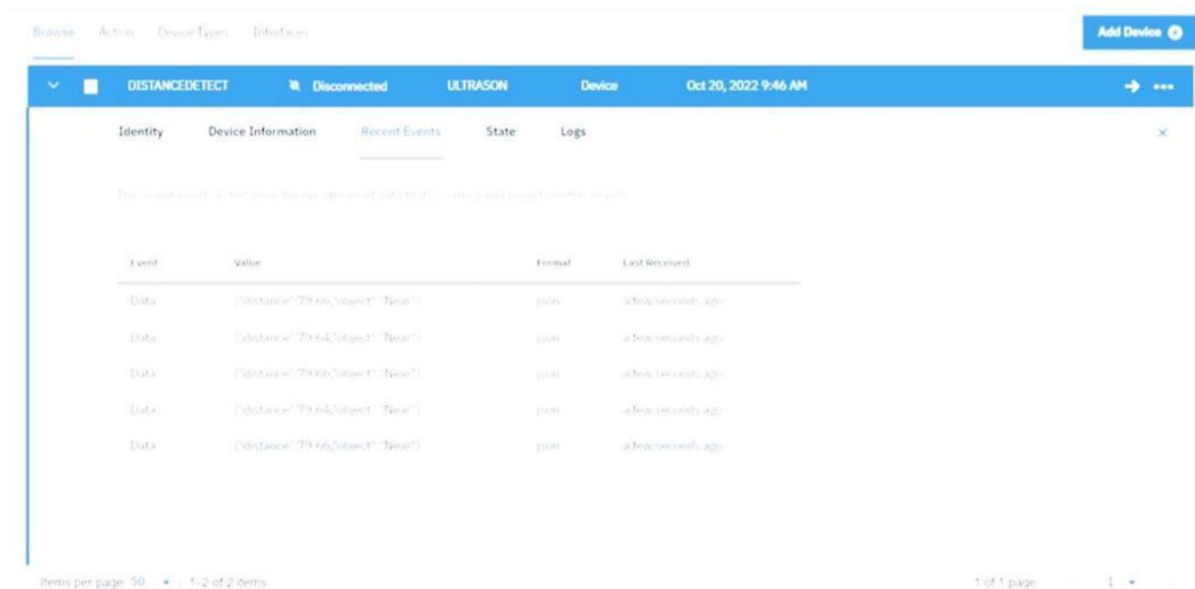
```

111 void initManagedDevice(){
112     if(client.subscribe(subscribetopic)){
113         Serial.println((subscribetopic));
114         Serial.println("subscribe to cmd OK");
115     }else{
116         Serial.println("subscribe to cmd failed");
117     }
118 }
119 void callback(char* subscribetopic,byte*payload,unsigned int payloadlength)
120 {
121     Serial.print("callback invoked for topic: ");
122     Serial.println(subscribetopic);
123     for(int i=0; i< payloadlength; i++){
124         //Serial.print((char)payload[i]);
125         data3 +=(char)payload[i];
126     }
127     //Serial.println("dta: "+ data3);
128     //if(data3=="Near")
129     //{
130     //Serial.println(data3);
131     //digitalWrite(LED,HIGH);
132     //}
133     //else
134     //{
135     //Serial.println(data3);
136     //digitalWrite(LED,LOW);
137     //}
138     data3="";
139 }

```

Simulation

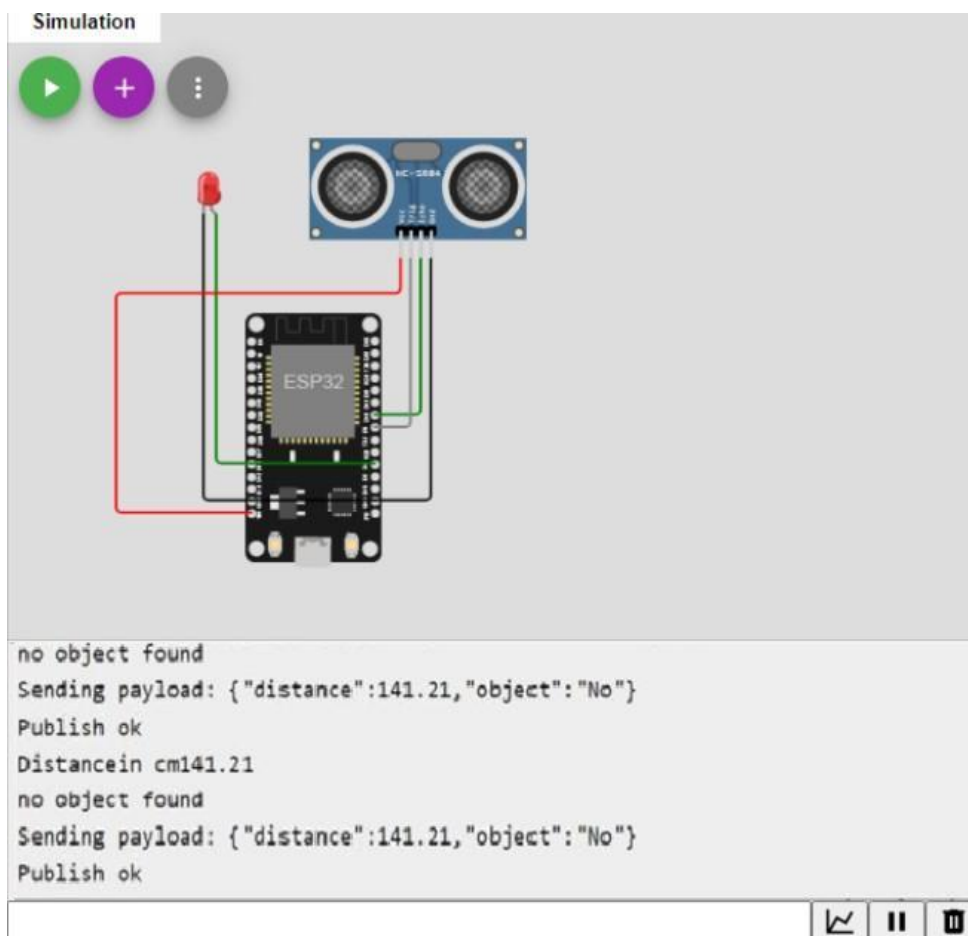
## DATA SENT TO IBM CLOUD ON NO OBJECT DETECTED



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', the type 'ULTRASON', and the 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 four columns: 'Event', 'Value', 'Format', and 'Last Received'. There are five rows of data, all with the same value: '{"distance":79.66,"object":"None"}'. The 'Format' column shows 'json' and the 'Last Received' column shows 'a few seconds ago'. At the bottom, there is a pagination bar showing 'Items per page: 50' and '1 of 1 page'.

Event	Value	Format	Last Received
Data	{"distance":79.66,"object":"None"}	json	a few seconds ago
Data	{"distance":79.66,"object":"None"}	json	a few seconds ago
Data	{"distance":79.66,"object":"None"}	json	a few seconds ago
Data	{"distance":79.66,"object":"None"}	json	a few seconds ago
Data	{"distance":79.66,"object":"None"}	json	a few seconds ago

## WHEN OBJECT DETECTED BY ULTRASONIC DETECTOR SENSOR



The image shows a simulation of an ESP32 microcontroller board connected to an HC-SR04 ultrasonic sensor. The sensor is connected to the ESP32 via four wires: red (VCC), green (GND), yellow (Trig), and blue (Echo). A red LED is also connected to the ESP32. Below the simulation, there is a text area showing the output of the program. The text indicates that no object was found and that a payload was sent to IBM Cloud. The payload is {"distance":141.21,"object":"No"}. The text also shows 'Publish ok' and 'Distance in cm 141.21'.

```
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
```

