

**Assignment -4**  
**Python Programming**

Assignment Date	25 October 2022
Student Name	ABINESH K
Student Roll Number	412519205002
Maximum Marks	2 Marks

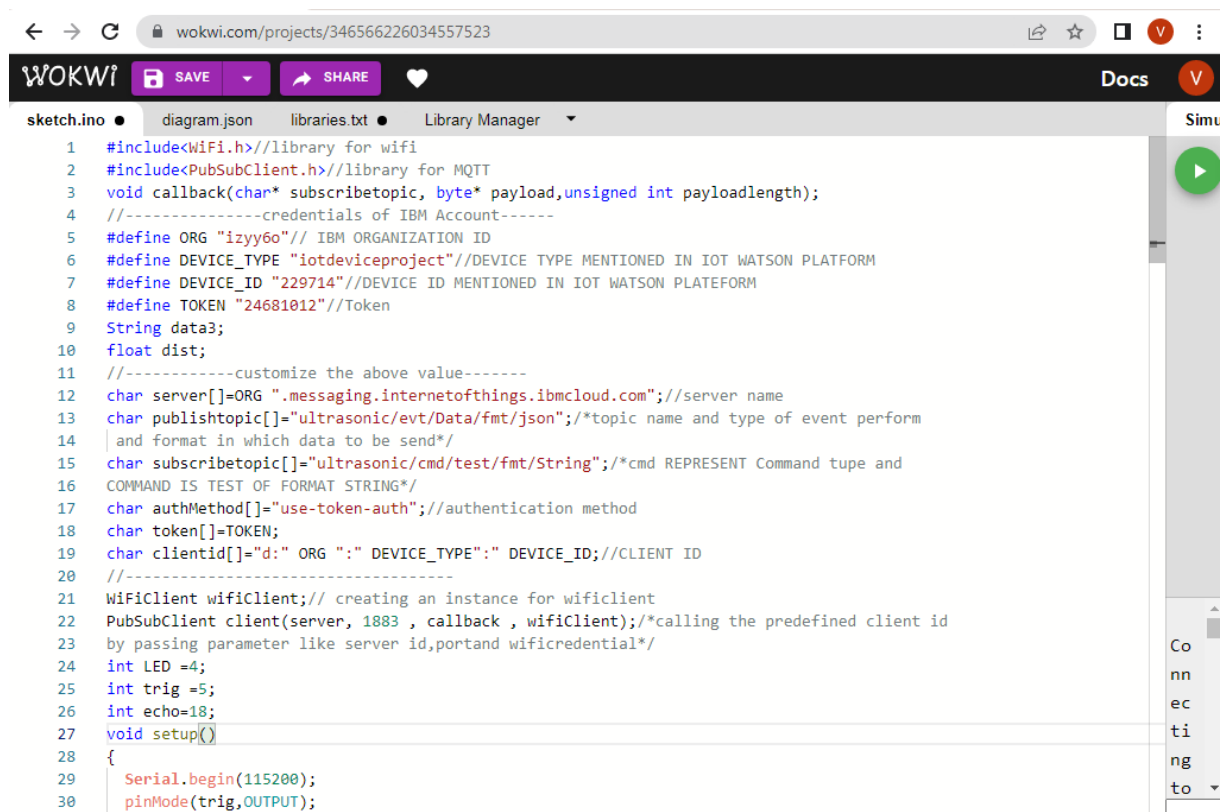
**Question-1:**

**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.**

**Upload document with wokwi share link and images of ibm cloud**

**Solution:**



```
1 #include<WiFi.h>//library for wifi
2 #include<PubSubClient.h>//library for MQTT
3 void callback(char* subscribetopic, 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 perform
14 |and format in which data to be send*/
15 char subscribetopic[]="ultrasonic/cmd/test/fmt/String";//cmd REPRESENT Command tupe and
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 client id
23 by passing parameter like server id,portand wificredential*/
24 int LED =4;
25 int trig =5;
26 int echo=18;
27 void setup()
28 {
29   Serial.begin(115200);
30   pinMode(trig,OUTPUT);
```

← → ↻ wokwi.com/projects/346566226034557523

WOKWI SAVE SHARE

Docs

sketch.ino diagram.json libraries.txt Library Manager

```
31 pinMode(echo,INPUT);
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);
```

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```
61 Serial.println("no object is near");
62 object="Near";
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 it will print
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);
```

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sketch.ino diagram.json libraries.txt Library Manager

```
92 }
93   initManagedDevice();
94   Serial.println();
95 }
96 }
97 void wificonnect();//function defenition for wificonnect
98 {
99   Serial.println();
100   Serial.print("Connecting to ");
101   WiFi.begin("Wokwi.GUEST", "",6);//PASSING THE WIFI CREDENTIALS TO ESTABLISH CONNECTION
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];
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 }
```

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```
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 }
```

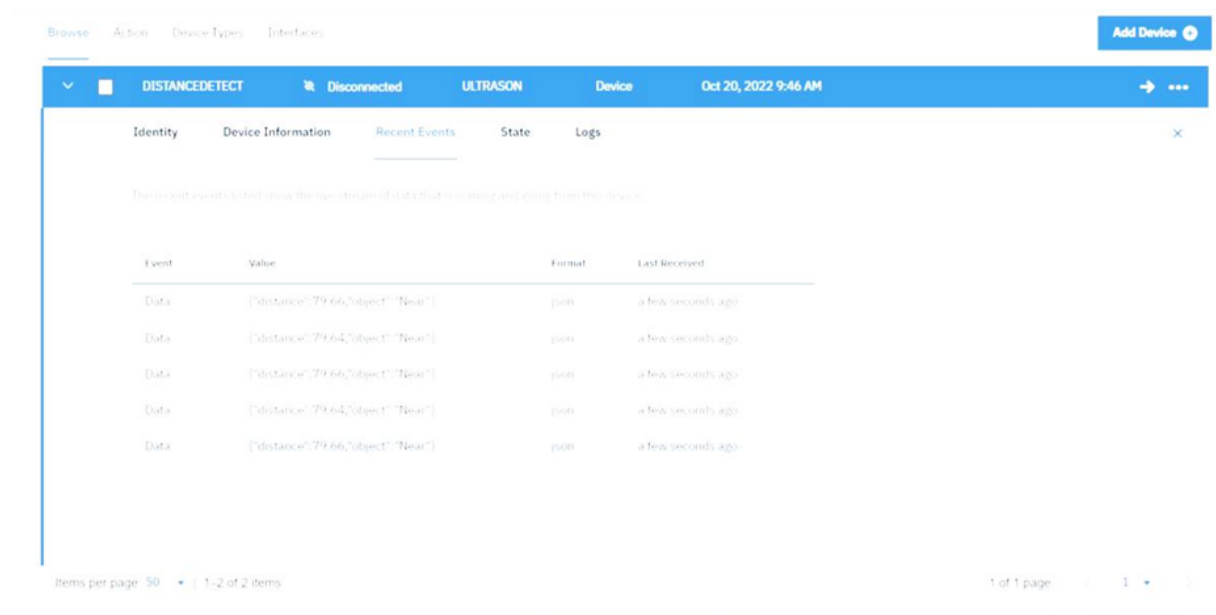
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OUTPUT:

<https://wokwi.com/projects/346572482591851092>

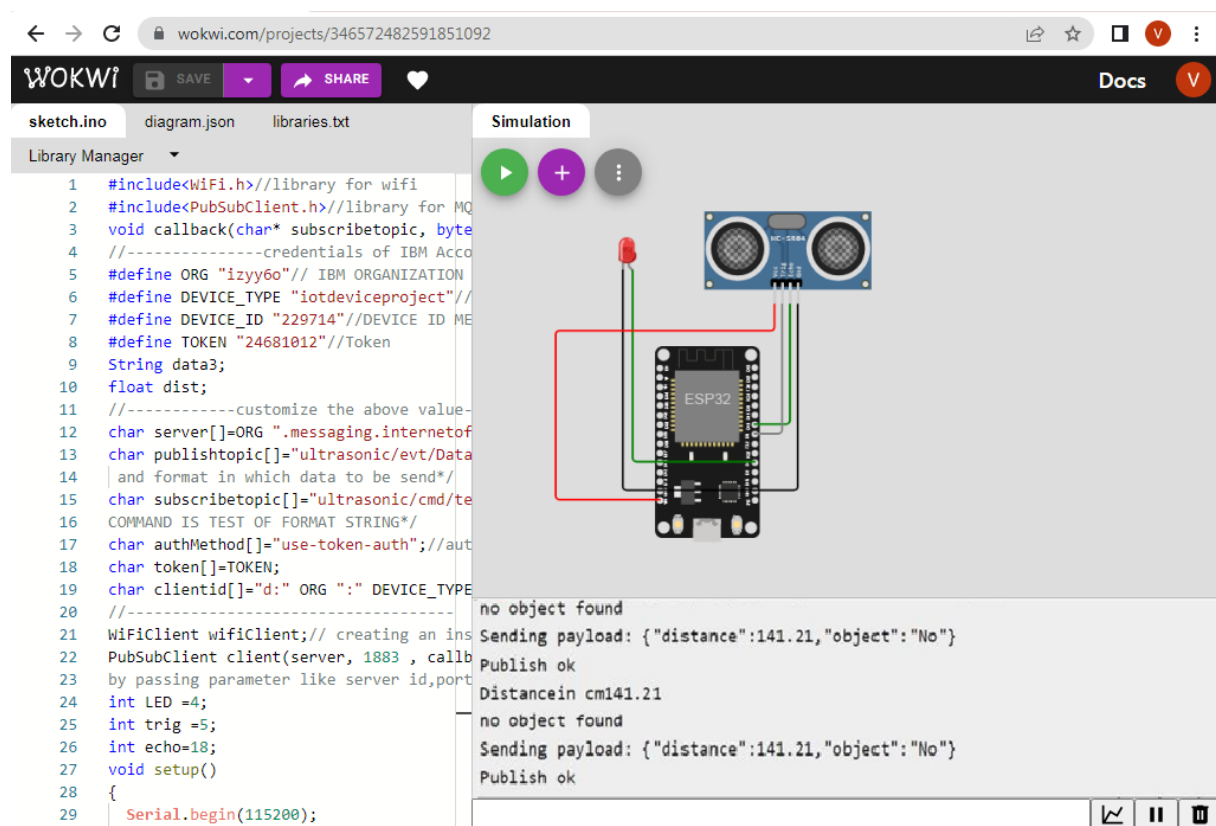
## DATA SENT TO IBM CLOUD ON NO OBJECT DETECTED



The screenshot shows the IBM Cloud IoT Platform interface. At the top, there's a navigation bar with '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 tabs for 'Identity', 'Device Information', 'Recent Events', 'State', and 'Logs'. The 'Recent Events' tab is active, displaying a table of events. The table has columns for 'Event', 'Value', 'Format', and 'Last Received'. It shows five identical entries of 'Data' events with a value of '["distance":79.66,"object":"Near"]' in 'json' format, received 'a few seconds ago'. At the bottom, there's 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 NO OBJECT DETECTED BY ULTRASONIC DETECTOR



The screenshot shows the Wokwi IDE interface. The top bar includes navigation icons, the URL 'wokwi.com/projects/346572482591851092', and buttons for 'SAVE', 'SHARE', and 'Docs'. Below the top bar, there are tabs for 'sketch.ino', 'diagram.json', and 'libraries.txt'. The 'sketch.ino' tab is active, displaying 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 length) {
4 //-----credentials of IBM Account-----
5 #define ORG "izyy6o"// IBM ORGANIZATION
6 #define DEVICE_TYPE "iotdeviceproject"//
7 #define DEVICE_ID "229714"//DEVICE ID ME
8 #define TOKEN "24681012"//Token
9 String data3;
10 float dist;
11 //-----customize the above value-----
12 char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
13 char publishTopic[] = "ultrasonic/evt/Data";
14 //and format in which data to be send*/
15 char subscribeTopic[] = "ultrasonic/cmd/test";
16 //COMMAND IS TEST OF FORMAT STRING*/
17 char authMethod[] = "use-token-auth"; //auth
18 char token[] = TOKEN;
19 char clientId[] = "d:" ORG ":" DEVICE_TYPE";
20 //-----
21 WiFiClient wifiClient; // creating an instance of the WiFiClient
22 PubSubClient client(server, 1883, callback, wifiClient);
23 by passing parameter like server id, port, authMethod, token, clientId
24 int LED = 4;
25 int trig = 5;
26 int echo = 18;
27 void setup() {
28 {
29 Serial.begin(115200);
```

The 'Simulation' tab is also active, showing a visual representation of the ESP32 microcontroller connected to an ultrasonic sensor. The simulation output window displays the following text:

```
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 IBM CLOUD ON OBJECT BEING DETECTED

