

Assignment -4
Python Programming

Assignment Date	25 October 2022
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Student Roll Number	720819106107
Maximum Marks	2 Marks

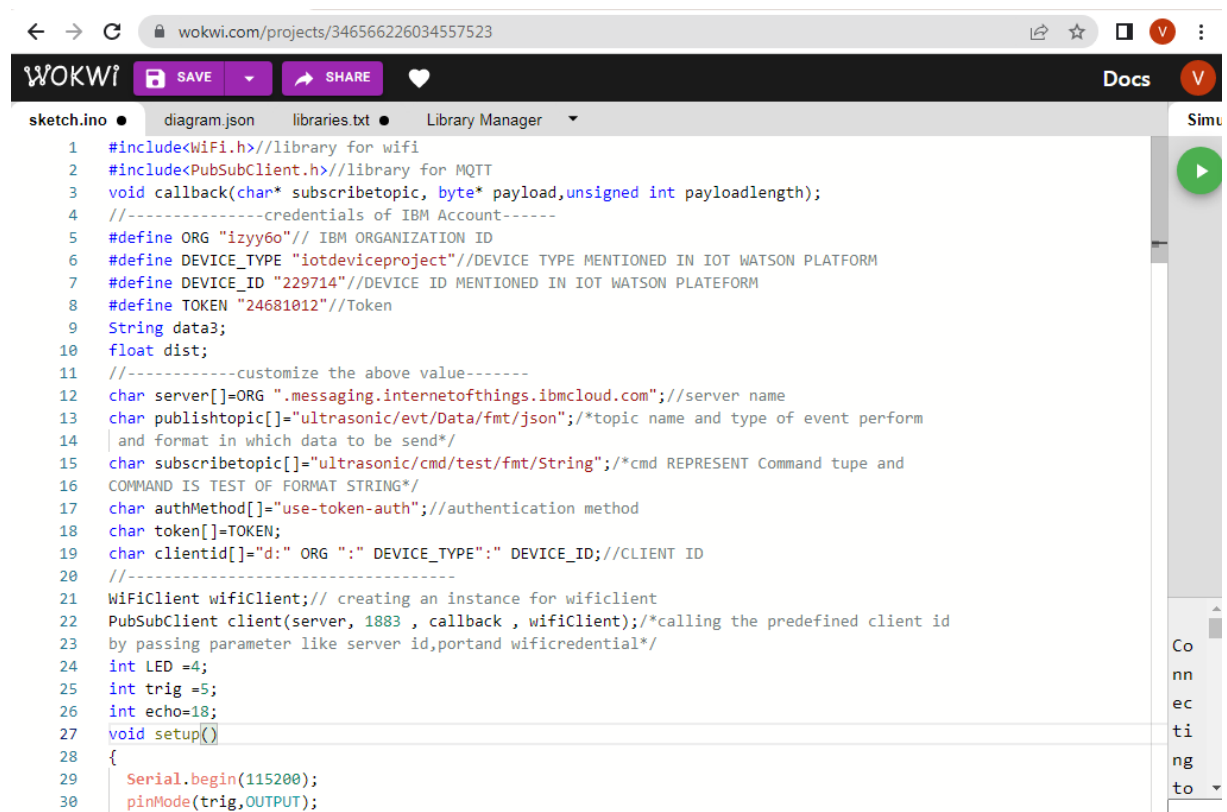
Question-1:

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);
```

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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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```
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);
```

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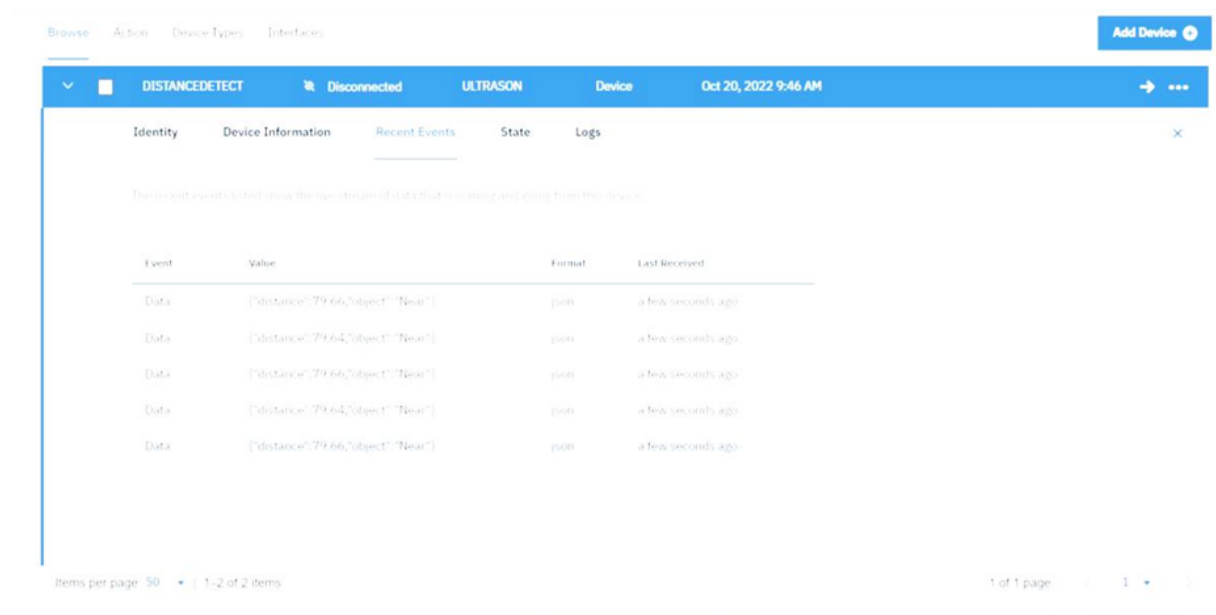
```
123   for(int i=0; i< payloadLength; i++){
124     //Serial.print((char)payload[i]);
125     data3 +=(char)payload[i];
126   }
127   //Serial.println("dta: "+ data3);
128   //if(data3=="Near")
129   //{
130   //Serial.println(data3);
131   //digitalWrite(LED,HIGH);
132   //}
133   //else
134   //{
135   //Serial.println(data3);
136   //digitalWrite(LED,LOW);
137   //}
138   data3="";
139 }
```

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OUTPUT:

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

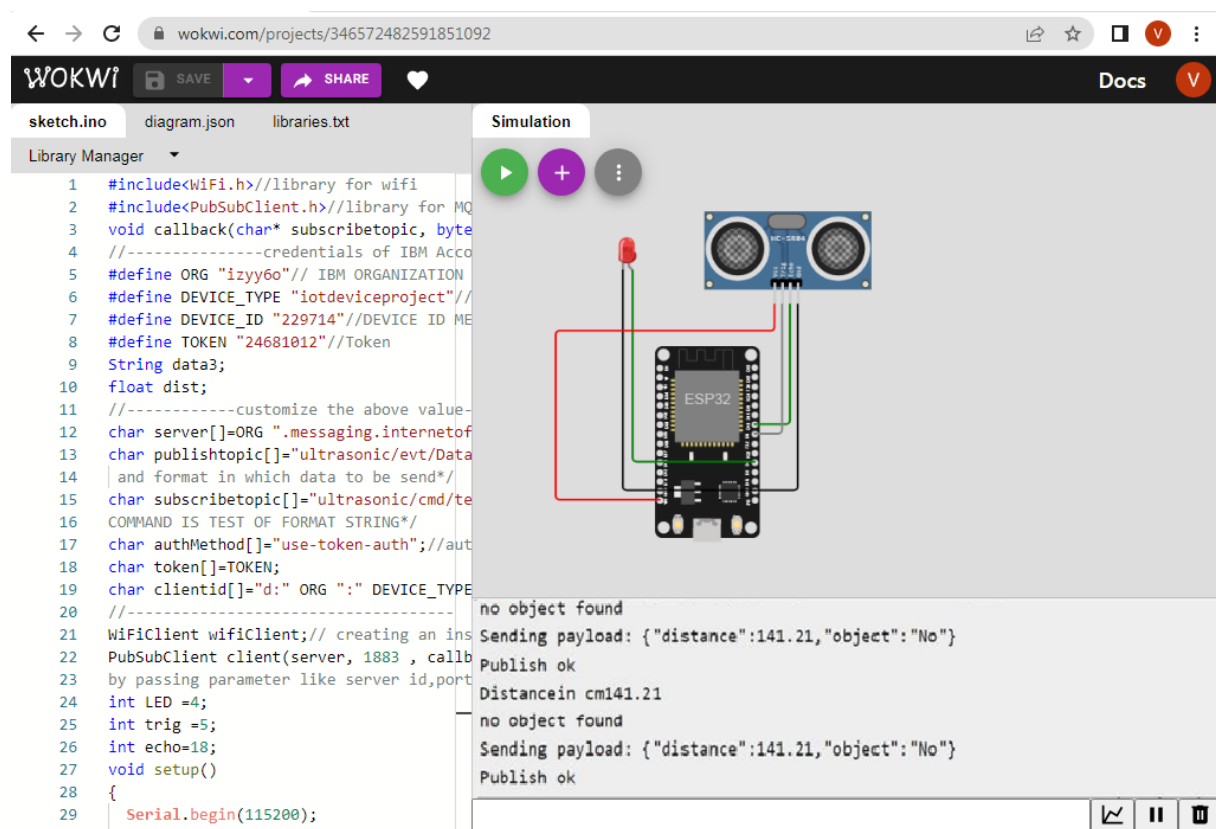
DATA SENT TO IBM CLOUD ON NO OBJECT DETECTED



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', the type 'ULTRASON', and the time '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 and the URL 'wokwi.com/projects/346572482591851092'. Below the 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 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 circuit diagram of an ESP32 connected to an ultrasonic sensor. The simulation output shows the following sequence of events:

```
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

DISTANCEDETECT				
Disconnected		ULTRASON	Device	Oct 20, 2022 9:46 AM
Identity	Device Information	Recent Events	State	Logs
The recent events listed along the bottom stream of data that is coming and going from this device.				
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 DETECTED BY ULTRASONIC DETECTOR SENSOR

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sketch

Simulation

diagram

library

Libraries Manager

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1 object is near

1 Sending payload: {"distance":97.82,"object":"Near"}

1 Publish ok

1 Distance in cm 97.82

2 object is near

2 Sending payload: {"distance":97.82,"object":"Near"}

2 Publish ok

2

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