

Assignment -4
Python Programming

Assignment Date	25 October 2022
Student Name	M SANJULA
Student Roll Number	713619106019
Maximum Marks	2 Marks

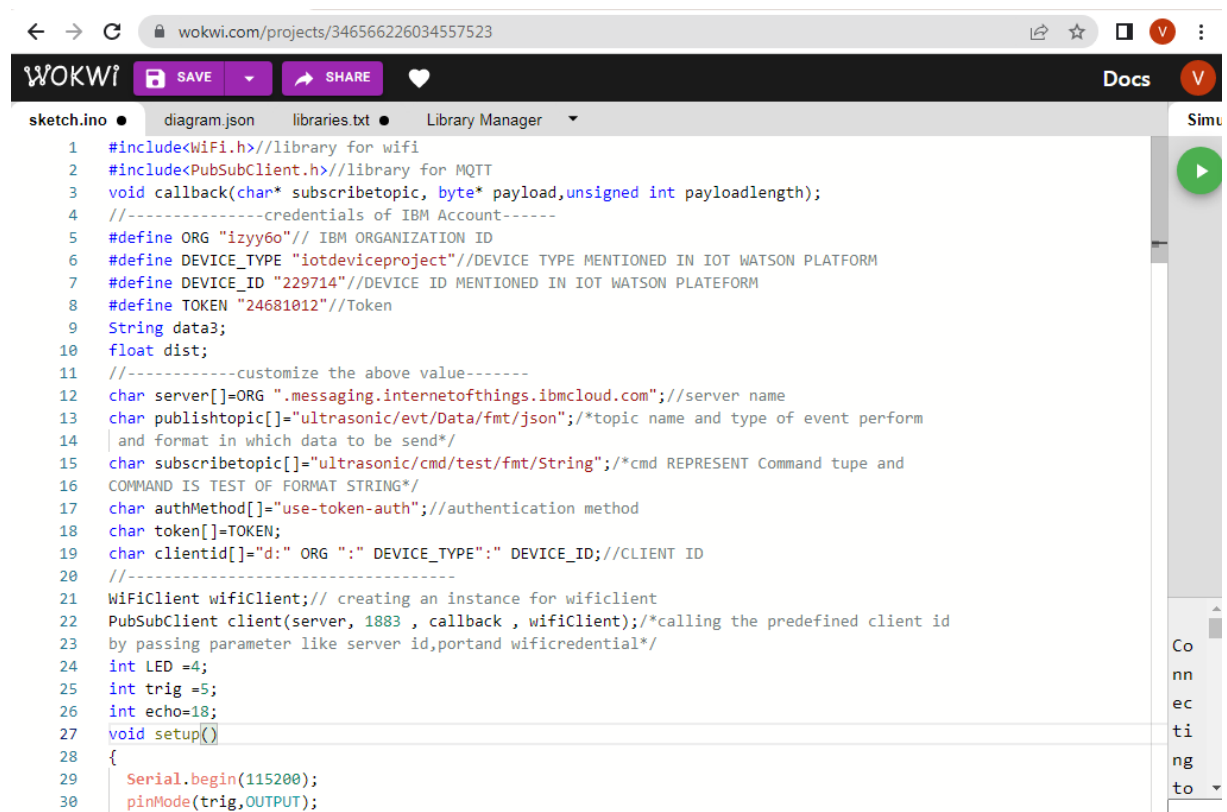
Question-1:

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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sketch.ino

diagram.json

libraries.txt

Library Manager

Simu

```
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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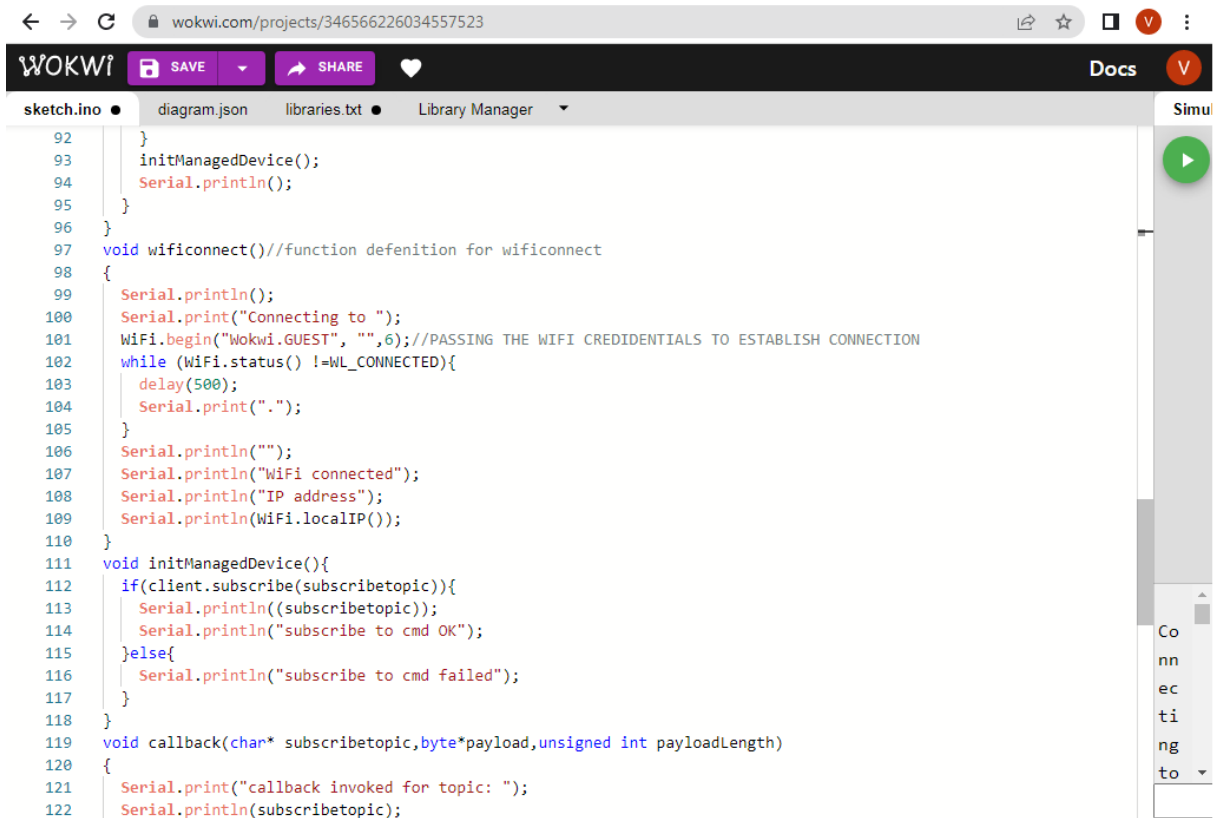
diagram.json

libraries.txt

Library Manager

Simu

```
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);
```



```
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);
```

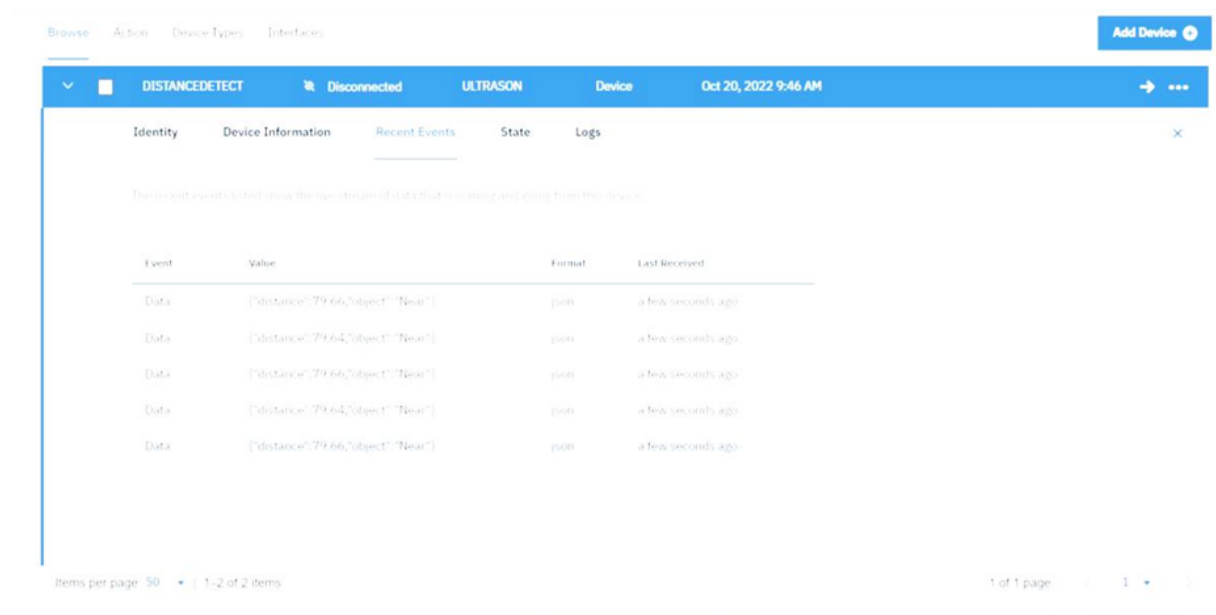


```
123   for(int i=0; i< payloadLength; i++){
124     //Serial.print((char)payload[i]);
125     data3 +=(char)payload[i];
126   }
127   //Serial.println("dta: "+ data3);
128   //if(data3=="Near")
129   //{
130   //Serial.println(data3);
131   //digitalWrite(LED,HIGH);
132   //}
133   //else
134   //{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

OUTPUT:

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

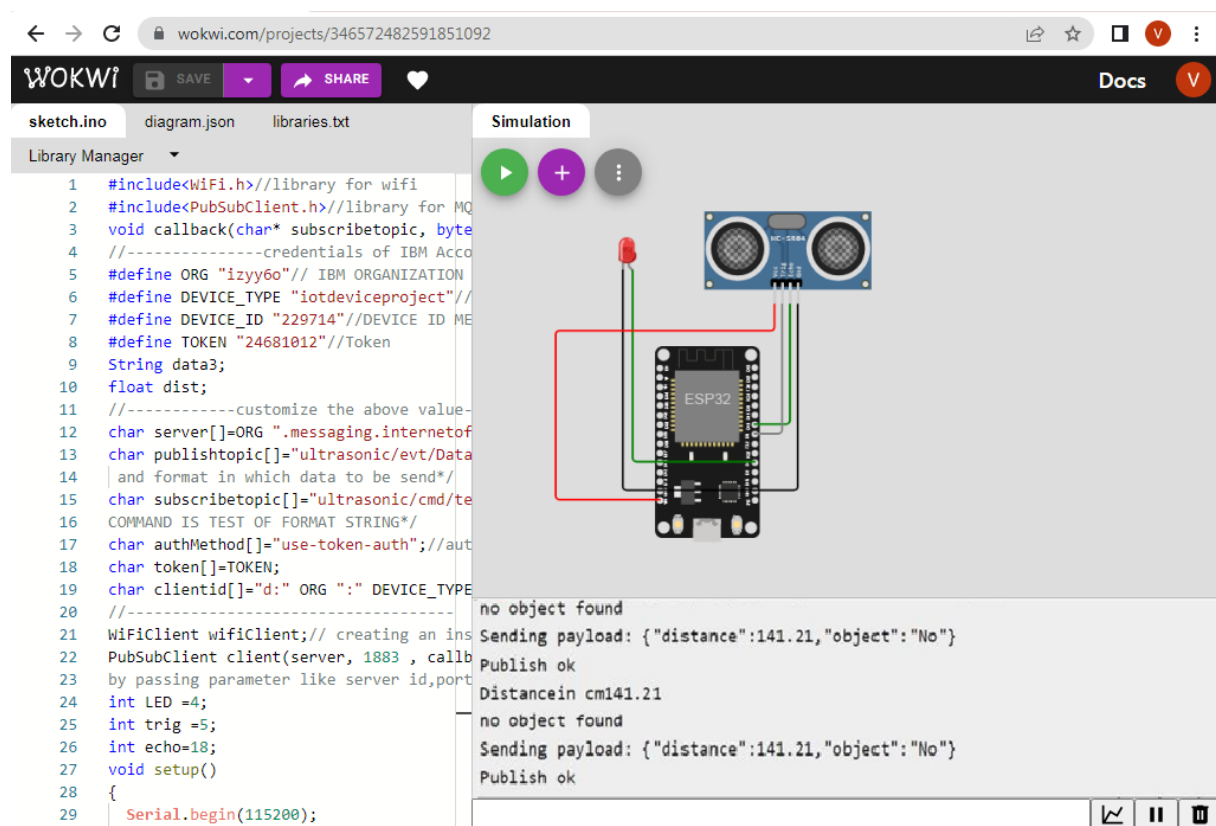
DATA SENT TO IBM CLOUD ON NO OBJECT DETECTED



The screenshot shows the IBM Cloud IoT Platform interface for a device named 'DISTANCEDETECT'. The device is in a 'Disconnected' state. The 'Recent Events' tab is selected, showing a list of events. The events are all of type 'Data' and contain the same payload: '{"distance":79.66,"object":"Near"}'. The events were received 'a few seconds ago'.

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 simulation environment. On the left, the 'sketch.ino' file is open, showing the code for the ESP32. The code includes the necessary libraries and defines the device type as 'iotdeviceproject'. The main loop of the code checks for an object and sends a payload to the IBM Cloud IoT Platform. The payload is '{"distance":141.21,"object":"No"}' when no object is found.

```
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 client
22 PubSubClient client(server, 1883, callback, wifiClient);
23 by passing parameter like server id, port, token, clientId, authMethod
24 int LED = 4;
25 int trig = 5;
26 int echo = 18;
27 void setup() {
28 {
29 Serial.begin(115200);
30 }
```

The simulation shows an ESP32 microcontroller connected to an ultrasonic sensor. The sensor is connected to the ESP32 via a breadboard. The sensor's output is connected to the ESP32's digital pins. The sensor is labeled 'HC-SR04'.

The simulation output shows the following sequence of events:

- 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

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 top 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 cm97.82

2 object is near

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

2 Publish ok

2

2

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