

## ASSIGNMENT IV

### Python Programming

Assignment Date	25 October 2022
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Student Roll Number	822119106005
Maximum Marks	2 Marks

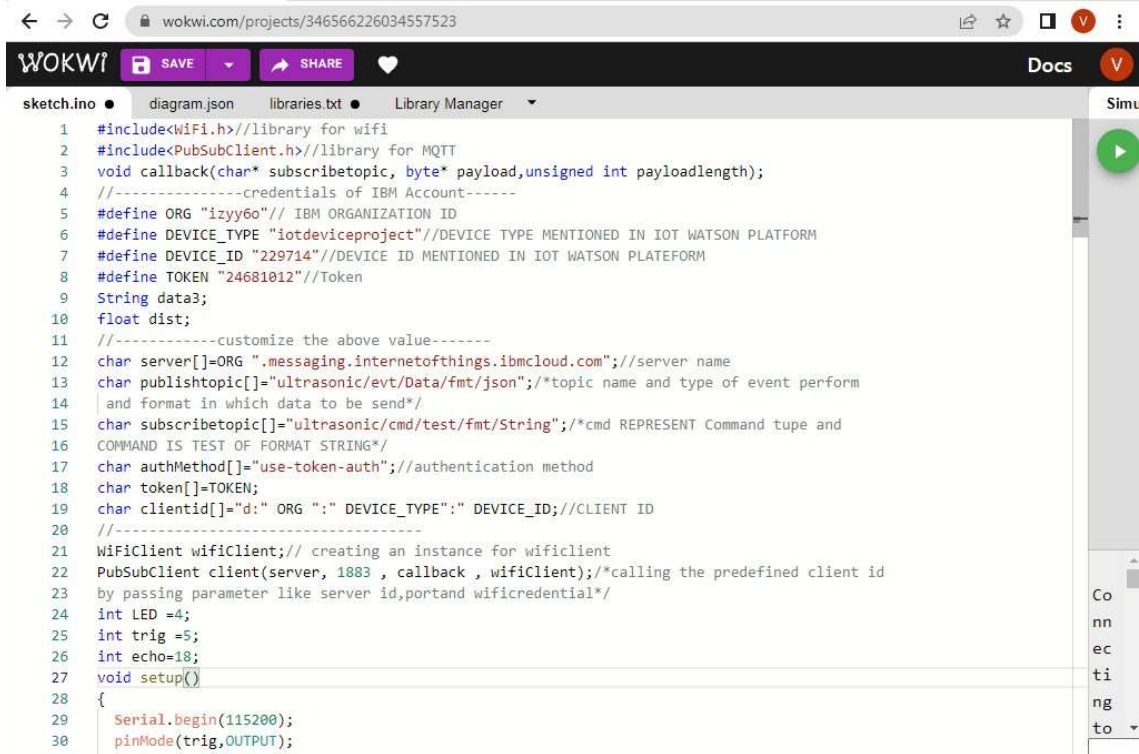
#### Question-1:

Write code and connections in wokwi for ultrasonic sensor.

Whenever distance is less than 100 cms send "alert" to ibm cloud and display in devicerecent 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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sketch.ino

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);
```

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sketch.ino  diagram.json  libraries.txt  Library Manager  Simu

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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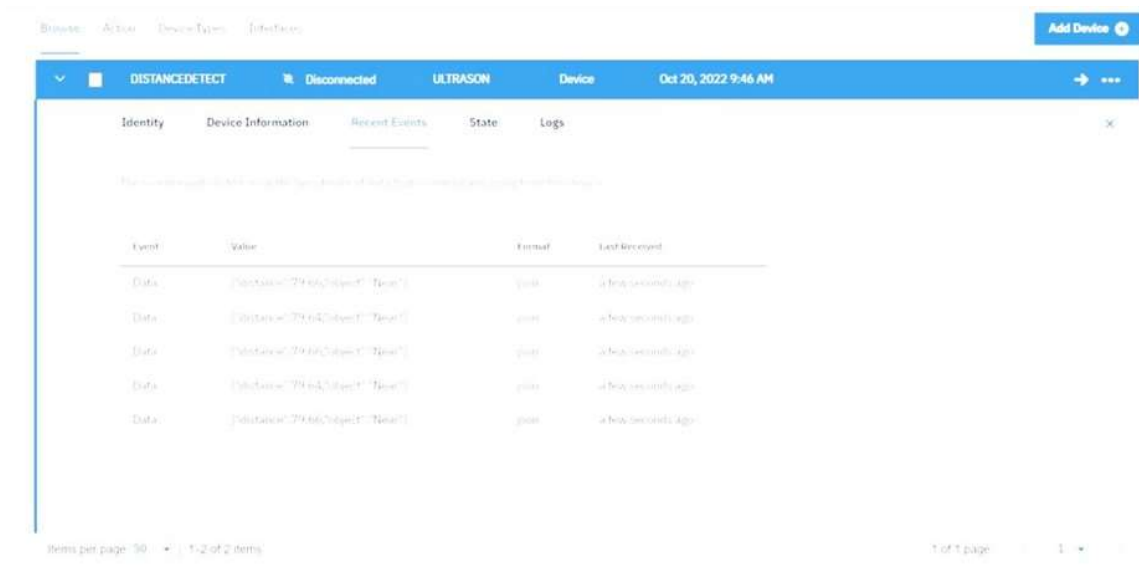
sketch.ino  diagram.json  libraries.txt  Library Manager  Simu

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>

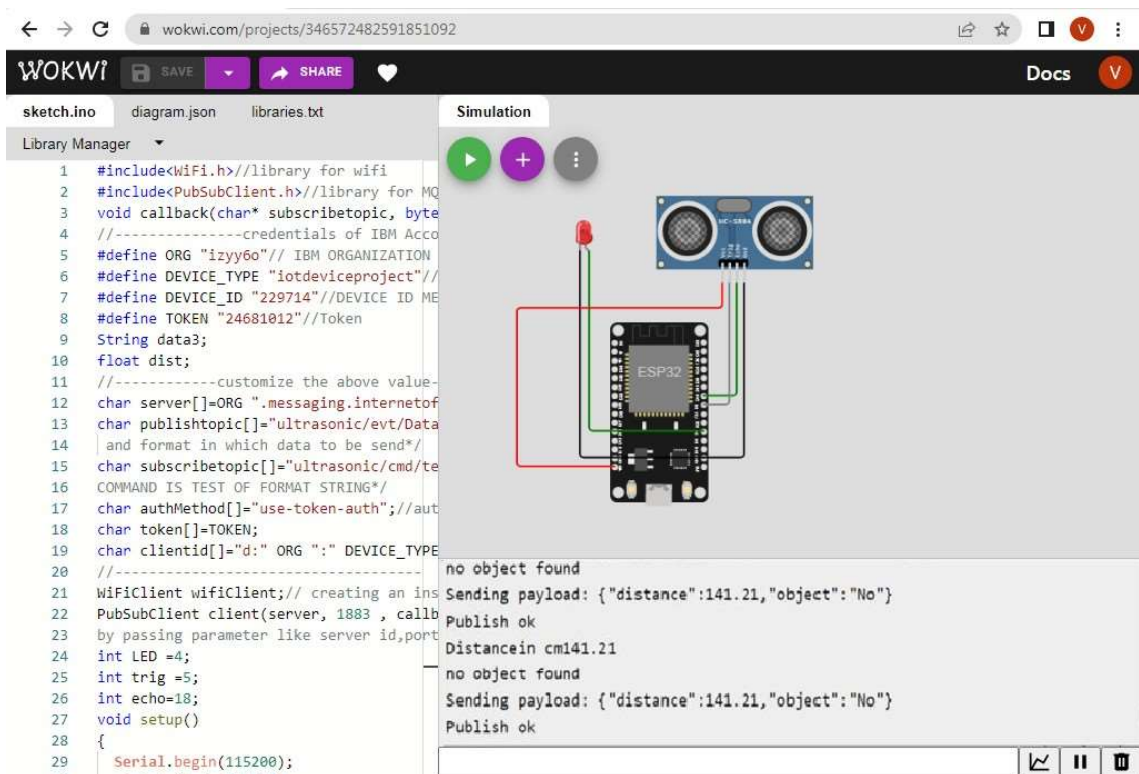
## DATA SENT TO IBM CLOUD ON NO OBJECT DETECTED



The screenshot shows the IBM Cloud IoT Dashboard for a device named "DISTANCEDETECT". The device is in a "Disconnected" state. The "Recent Events" tab is selected, showing a table of events. The table has columns for "Event", "Value", "Format", and "Last Received". The events are all of type "Data" and contain a JSON payload: {"distance": 141.21, "object": "None"}.

Event	Value	Format	Last Received
Data	{"distance": 141.21, "object": "None"}	json	4 hrs 45 mins 40 secs ago
Data	{"distance": 141.21, "object": "None"}	json	4 hrs 45 mins 40 secs ago
Data	{"distance": 141.21, "object": "None"}	json	4 hrs 45 mins 40 secs ago
Data	{"distance": 141.21, "object": "None"}	json	4 hrs 45 mins 40 secs ago
Data	{"distance": 141.21, "object": "None"}	json	4 hrs 45 mins 40 secs ago

## WHEN NO OBJECT DETECTED BY ULTRASONIC DETECTOR



The screenshot shows the Wokwi IDE interface. On the left, the "Library Manager" is open, showing the "sketch.ino" file. The code in the sketch.ino file is as follows:

```
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 values-----
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);
```

On the right, the "Simulation" window shows a circuit diagram of an ESP32 connected to an ultrasonic sensor. The sensor is connected to the ESP32's trig pin (pin 5) and echo pin (pin 18). The sensor's VCC is connected to the ESP32's VCC (pin 1) and GND is connected to the ESP32's GND (pin 4).

The simulation output shows the following messages:

```
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

Wokwi IoT Dashboard

DistanceDetect Disconnected ULTRASON Device Oct 20, 2022 9:46 AM

Identity Device Information Recent Events State Logs

This device is not connected to any network. It is not possible to view its logs.

Event	Value	Format	Last Received
Data	{distance: 79.82, object: "Near"}	json	14 hrs, 26 mins, 11 ago
Data	{distance: 79.82, object: "Near"}	json	14 hrs, 26 mins, 11 ago
Data	{distance: 79.82, object: "Near"}	json	14 hrs, 26 mins, 11 ago
Data	{distance: 79.82, object: "Near"}	json	14 hrs, 26 mins, 11 ago
Data	{distance: 79.82, object: "Near"}	json	14 hrs, 26 mins, 11 ago

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## WHEN OBJECT DETECTED BY ULTRASONIC DETECTOR SENSOR

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sketch Simulation

diagram

library

Libraries

ESP32

HC-SR04

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

2