Assignment – 4
Distance Detection using Ultrasonic Sensor

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Question:

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.

Wokwi Link:

https://wokwi.com/projects/346942115517825620

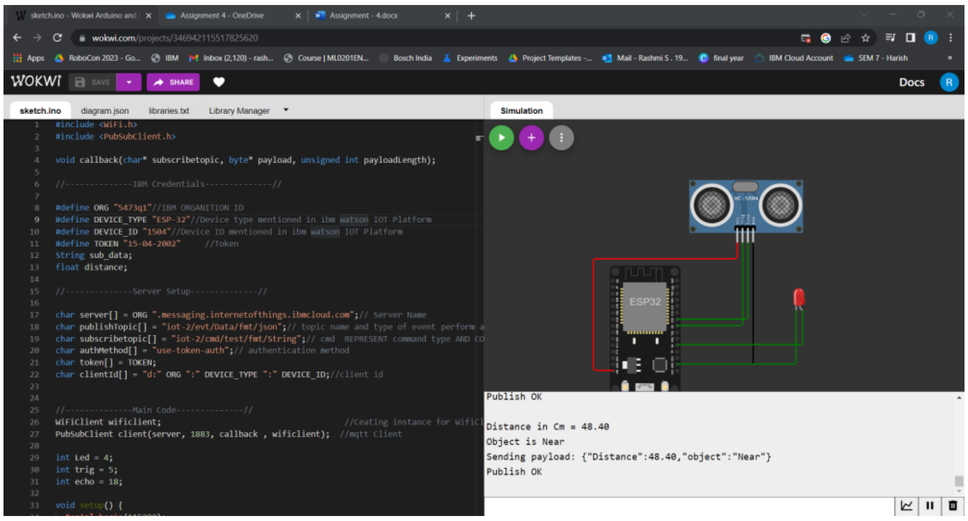
Code:

```
#include <WiFi.h>

#include <PubSubClient.h>

void callback(char* subscribetopic, byte* payload,
unsigned int payloadLength);

//-------------IBM Credentials-------------//

#define ORG "5473q1"//IBM ORGANITION ID

#define DEVICE_TYPE "ESP-32"//Device type
mentioned in ibm watson IOT Platform

#define DEVICE_ID "1504"//Device ID mentioned
in ibm watson IOT Platform

#define TOKEN "15-04-2002"     //Token

String sub_data;

float distance;

//-------------Server Setup-------------//

char server[] = ORG
".messaging.internetofthings.ibmcloud.com";//
Server Name

char publishTopic[] = "iot-2/evt/Data/fmt/json";//
topic name and type of event perform and format
in which data to be send

char subscribetopic[] = "iot-
2/cmd/test/fmt/String";// cmd  REPRESENT
command type AND COMMAND IS TEST OF
FORMAT STRING

char authMethod[] = "use-token-auth";//
authentication method

char token[] = TOKEN;

char clientId[] = "d:" ORG ":" DEVICE_TYPE ":"
DEVICE_ID;//client id

//-------------Main Code-------------//

WiFiClient wificlient;
//Ceating instance for WifiClient

PubSubClient client(server, 1883, callback ,
wificlient);  //mqtt Client

int Led = 4;

int trig = 5;

int echo = 18;

void setup() {

 Serial.begin(115200);

 pinMode(trig, OUTPUT);

 pinMode(Led, OUTPUT);

 pinMode(echo, OUTPUT);

 delay(10);

 wificonnect();

 mqttconnect();

}

void loop() {

 digitalWrite(trig, LOW);

 digitalWrite(trig, HIGH);

 delayMicroseconds(10);

 digitalWrite(trig, LOW);

 float duration = pulseIn(echo, HIGH);
 float distance = (duration * 0.0343) / 2;
 Serial.print("Distance in Cm = ");
 Serial.println(distance);
 Publish_Data(distance);
 delay(1000);
 if (!client.loop()) {
   mqttconnect();
 }
}
void Publish_Data(float dist) {
 mqttconnect();  //Connect to Server
 /* Creating the String in JSON format to send to
the Cloud
      according to the diatance from the Ultrasonic
Sensor*/
 String object;
 if (dist < 100) {
   digitalWrite(Led, HIGH);
   Serial.println("Object is Near");
   object = "Near";
 }
 else {
   digitalWrite(Led, LOW);
   Serial.println("No Object Found");
   object = "No Object";
 }
 String payload = "{\"Distance\":";
 payload += dist;
 payload += "," "\"object\":\"";
 payload += object;
 payload += "\"}";
 Serial.print("Sending payload: ");
 Serial.println(payload);
 //Publish payload Message
 if (client.publish(publishTopic , (char*)
payload.c_str())) {
   Serial.println("Publish OK");
 } else {
   Serial.println("Publish Failed");
 }
 Serial.println("");
}
//--------------User Fuctions--------------//
//Connect to Mqtt
void mqttconnect() {
 if (!client.connected()) {
   Serial.print("Reconnecting client to ");
   Serial.println(server);
   while (!!!client.connect(clientId, authMethod,
token)) {
     Serial.print(".");
     delay(500);
   }
   //initManagedDevice();
   Serial.println();
 }
}
void wificonnect() //function defination for
wificonnect
{
 Serial.println();
 Serial.print("Connecting to ");
 WiFi.begin("Wokwi-GUEST", "", 6);//passing the
wifi credentials to establish the connection
 while (WiFi.status() != WL_CONNECTED) {
   delay(500);
   Serial.print(".");
 }
 Serial.println("");
 Serial.println("WiFi connected");
 Serial.println("IP address: ");
 Serial.println(WiFi.localIP());
```

```
}
void initManagedDevice() {
 if (client.subscribe(subscribetopic)) {
   Serial.println((subscribetopic));
   Serial.println("subscribe to cmd OK");
 } else {
   Serial.println("subscribe to cmd FAILED");
 }
}
void callback(char* subscribetopic, byte* payload,
unsigned int payloadLength)
{
  Serial.print("Callback invoked for topic: ");
  Serial.println(subscribetopic);
  for (int i = 0; i < payloadLength; i++) {
    //Serial.print((char)payload[i]);
    sub_data += (char)payload[i];
  }
  Serial.println("data: "+ sub_data);
sub_data="";
}
```

Output:

Object is Near:



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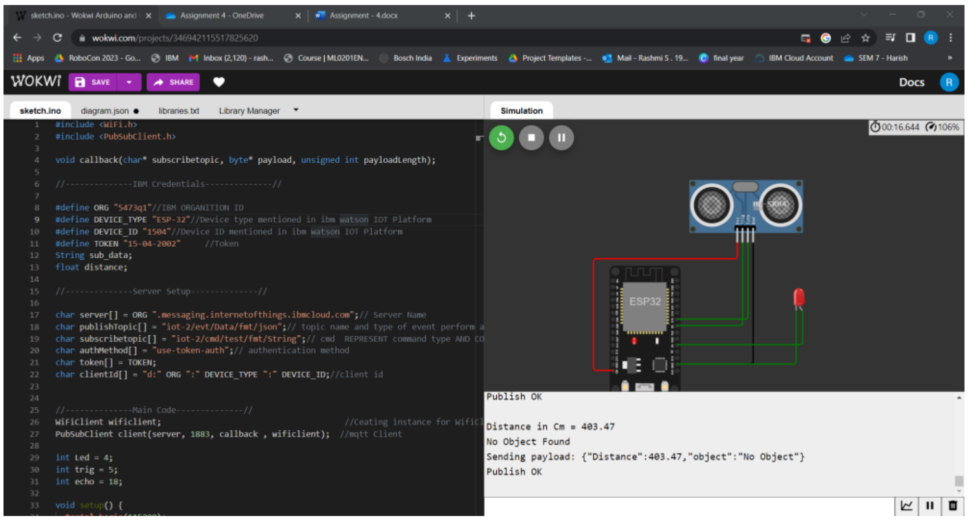
int echo = 18;

void setup() {
```

```
Publish OK

Distance in Cm = 48.40
Object is Near
Sending payload: {"Distance":48.40,"object":"Near"}
Publish OK
```

Object is Far:



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void setup() {
```
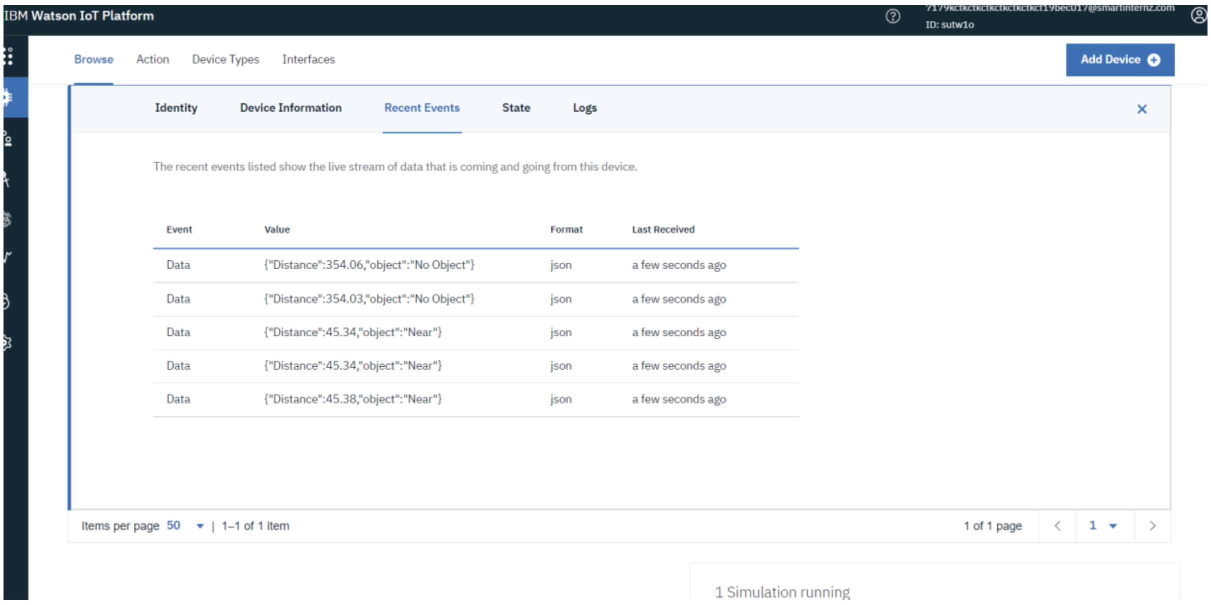

```
Publish OK

Distance in Cm = 403.47
No Object Found
Sending payload: {"Distance":403.47,"object":"No Object"}
Publish OK
```

IBM Watson IoT Platform:



The recent events listed show the live stream of data that is coming and going from this device.

Event	Value	Format	Last Received
Data	{"Distance":354.06,"object":"No Object"}	json	a few seconds ago
Data	{"Distance":354.03,"object":"No Object"}	json	a few seconds ago
Data	{"Distance":45.34,"object":"Near"}	json	a few seconds ago
Data	{"Distance":45.34,"object":"Near"}	json	a few seconds ago
Data	{"Distance":45.38,"object":"Near"}	json	a few seconds ago