Assignment - 4

ESP 32 – Ultrasonic Sensor

Assignment Date	3 NOVEMBER 2022
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Maximum Marks	2 Marks

Question-1:

Write code and Connection in Wokwi for ultrasonic sensor. Whenever distance is less than 100cms send “alert” to the ibm cloud and display in device recent events.

Solution:

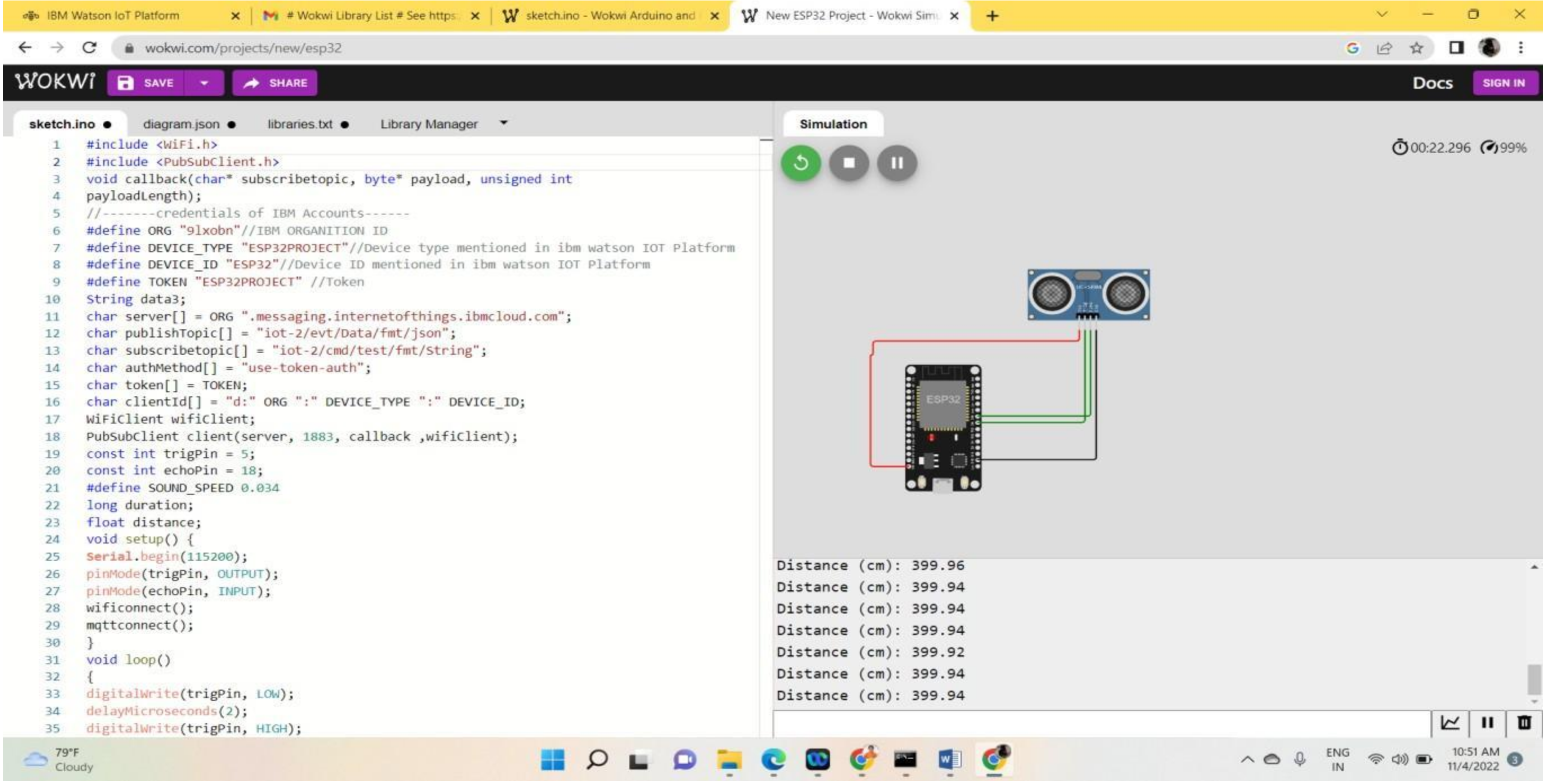
Program:

```
#include <WiFi.h> #include
<WiFiClient.h> #include
<PubSubClient.h> const  int
trigPin  =  5; const  int  echoPin
=  18;
//define sound speed in cm/uS
#define  SOUND_SPEED
0.034#define  CM_TO_INCH
0.393701 long duration;
float  distanceCm; float
distanceInch;


void  callback(char*  subscribetopic,  byte*  payload,  unsigned  int payloadLength);
 //-------credentials  of  IBM  Accounts------

#define  ORG  “b31tni”//IBM  ORGANITION  ID
#define  DEVICE_TYPE  "Assignment4"//Device  type  mentioned  in  ibm  watson  IOT
Platform
#define  DEVICE_ID  "assignment"//Device  ID  mentioned  in  ibm  watson  IOT
Platform#define  TOKEN  "6r?TKCIuy+okJ?9B+7"  //Token
String data3;



//--------  Customise  the  above  values  --------
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

WiFiClient wifiClient; // creating the instance for wificlient PubSubClient  client(server,
1883,  callback  ,wifiClient);

void setup() {
   Serial.begin(115200);  //  Starts  the  serial  communication pinMode(trigPin,
   OUTPUT);  //  Sets  the  trigPin  as  an  Output pinMode(echoPin,  INPUT);  //  Sets  the
   echoPin  as  an  Input Serial.println();
   wificonnect();
   mqttconnect();

}

void loop() {
   // Clears the trigPin
   digitalWrite(trigPin,  LOW);
   delayMicroseconds(2);
   //  Sets  the  trigPin  on  HIGH  state  for  10  micro  seconds digitalWrite(trigPin,  HIGH);
   delayMicroseconds(10);
   digitalWrite(trigPin,  LOW);

   // Reads the echoPin, returns the sound wave travel time in microseconds duration  =
   pulseIn(echoPin,  HIGH);

   //  Calculate  the  distance
   distanceCm  =  duration  *  SOUND_SPEED/2;

   //  Convert  to  inches
   distanceInch  =  distanceCm  *  CM_TO_INCH;

   // Prints the distance in the Serial Monitor
   Serial.print("Distance  (cm):  ");
   Serial.println(distanceCm); Serial.print("Distance
   (inch):  "); Serial.println(distanceInch);

   PublishData(distanceCm);
   delay(1000);
   if  (!client.loop())  {
      mqttconnect();
   }
}

   void  PublishData(float  Cm)  {
```

```
  mqttconnect();//function call for connecting to ibm
  /*
     creating the String in in form JSon to update the data to ibm cloud
  */
  String payload = "{\"Distance (cm)\":"; payload +=
  Cm;
  payload += "}";


  Serial.print("Sending payload: ");
  Serial.println(payload);


  if (client.publish(publishTopic, (char*) payload.c_str())) {
    Serial.println("Publish ok");// if it sucessfully upload data on the cloud then it will print
publish ok in Serial monitor or else it will print publish failed
  } else {
    Serial.println("Publish failed");
  }

}
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]); data3  +=
        (char)payload[i];
    }
}
```

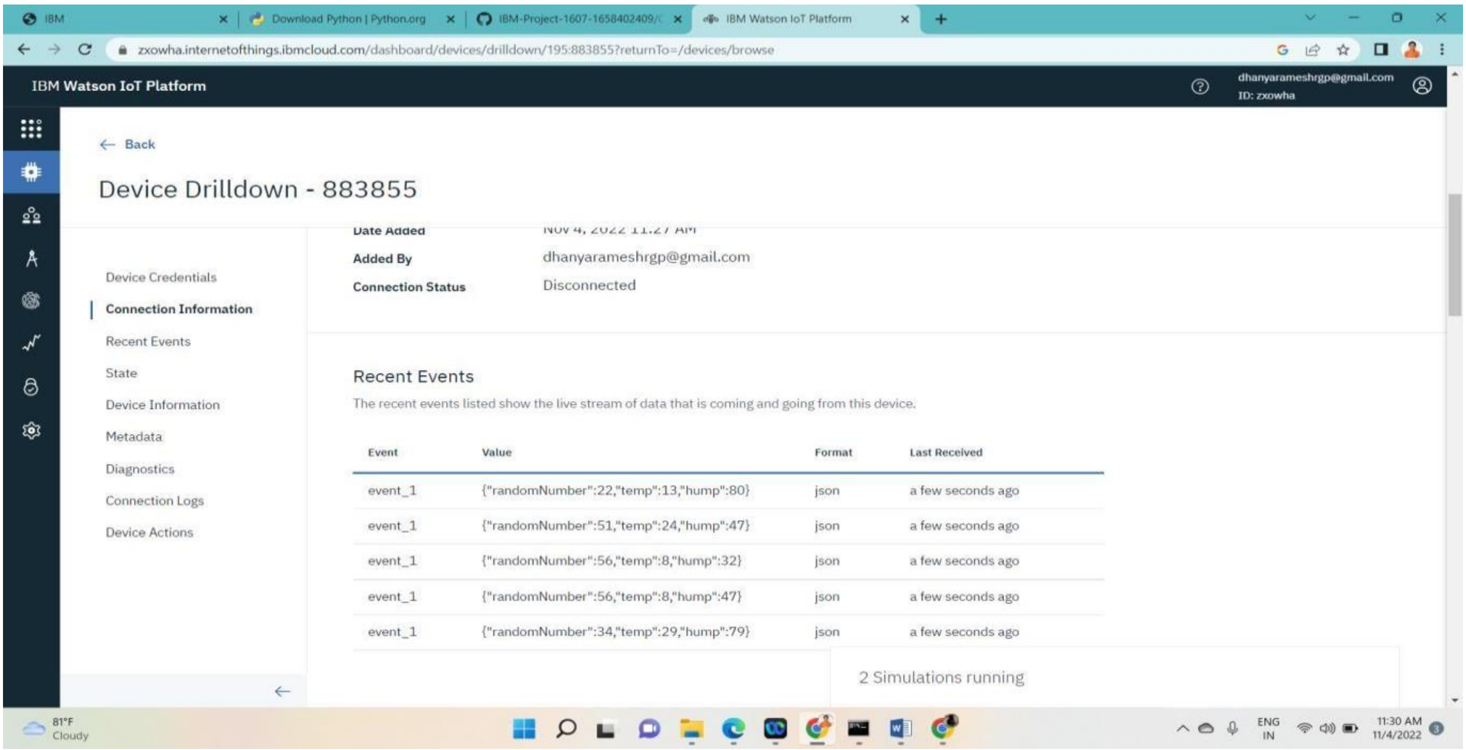
Wokwi Simulation:



```
#include <WiFi.h>
#include <PubSubClient.h>
void callback(char* subscribetopic, byte* payload, unsigned int
payloadLength);
//-------credentials of IBM Accounts------
#define ORG "9lxobn"//IBM ORGANITION ID
#define DEVICE_TYPE "ESP32PROJECT"//Device type mentioned in ibm watson IOT Platform
#define DEVICE_ID "ESP32"//Device ID mentioned in ibm watson IOT Platform
#define TOKEN "ESP32PROJECT" //Token
String data3;
char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
char publishTopic[] = "iot-2/evt/Data/fmt/json";
char subscribetopic[] = "iot-2/cmd/test/fmt/String";
char authMethod[] = "use-token-auth";
char token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;
WiFiClient wifiClient;
PubSubClient client(server, 1883, callback ,wifiClient);
const int trigPin = 5;
const int echoPin = 18;
#define SOUND_SPEED 0.034
long duration;
float distance;
void setup() {
Serial.begin(115200);
pinMode(trigPin, OUTPUT);
pinMode(echoPin, INPUT);
wificonnect();
mqttconnect();
}
void loop()
{
digitalWrite(trigPin, LOW);
delayMicroseconds(2);
digitalWrite(trigPin, HIGH);
```

```
Distance (cm): 399.96
Distance (cm): 399.94
Distance (cm): 399.94
Distance (cm): 399.94
Distance (cm): 399.92
Distance (cm): 399.94
Distance (cm): 399.94
```

IoT Watson Platform:



Device Drilldown - 883855

Date Added	Nov 4, 2022 11:27 AM
Added By	dhanyarameshrgp@gmail.com
Connection Status	Disconnected

Recent Events

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

Event	Value	Format	Last Received
event_1	{"randomNumber":22,"temp":13,"hump":80}	json	a few seconds ago
event_1	{"randomNumber":51,"temp":24,"hump":47}	json	a few seconds ago
event_1	{"randomNumber":56,"temp":8,"hump":32}	json	a few seconds ago
event_1	{"randomNumber":56,"temp":8,"hump":47}	json	a few seconds ago
event_1	{"randomNumber":34,"temp":29,"hump":79}	json	a few seconds ago

2 Simulations running

https://wokwi.com/projects/347372760316510804