

Assignment -4
Distance Detection Using Ultrasonic Sensor

Assignment Date	19 October 2022
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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.

WOKWI LINK : <https://wokwi.com/projects/346017500771648082>

CODE:

```
#include <WiFi.h> //library for wifi
#include <PubSubClient.h> //library for MQTT

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

//-----credentials of IBM Accounts-----

#define ORG "9a7os9" //IBM ORGANITION ID
#define DEVICE_TYPE "ULTRASONICSENSOR" //Device type mentioned in
ibm watson IOT Platform
#define DEVICE_ID "distancedetection" //Device ID mentioned in ibm
watson IOT Platform
#define TOKEN "r8*G0FF!4miEvwlQ7Q" //Token
String data3;
float dist;

//----- 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);
//calling the predefined client id by passing parameter like
server id,portand wificredential

int LED = 4;
int trig = 5;
int echo = 18;
void setup()
{
  Serial.begin(115200);
  pinMode(trig,OUTPUT);
  pinMode(echo,INPUT);
  pinMode(LED, OUTPUT);
  delay(10);
  wificonnect();
  mqttconnect();
}
void loop()// Recursive Function
{

  digitalWrite(trig,LOW);
  digitalWrite(trig,HIGH);
  delayMicroseconds(10);
  digitalWrite(trig,LOW);
  float dur = pulseIn(echo,HIGH);
  float dist = (dur * 0.0343)/2;
  Serial.print ("Distancein cm");
  Serial.println(dist);

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

/*.....retrieving to
Cloud. .... */

void PublishData(float dist) {
  mqttconnect();//function call for connecting to ibm
  /*
    creating the String in in form JSON to update the data to
    ibm cloud
  */
  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";
}

String payload = "{\"distance\": ";
payload += dist;
payload += ", \"object\": \"";
payload += object;
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];
    }

    // Serial.println("data: "+ data3);
    // if(data3=="Near")
    // {
    // Serial.println(data3);
    // digitalWrite(LED,HIGH);

    // }

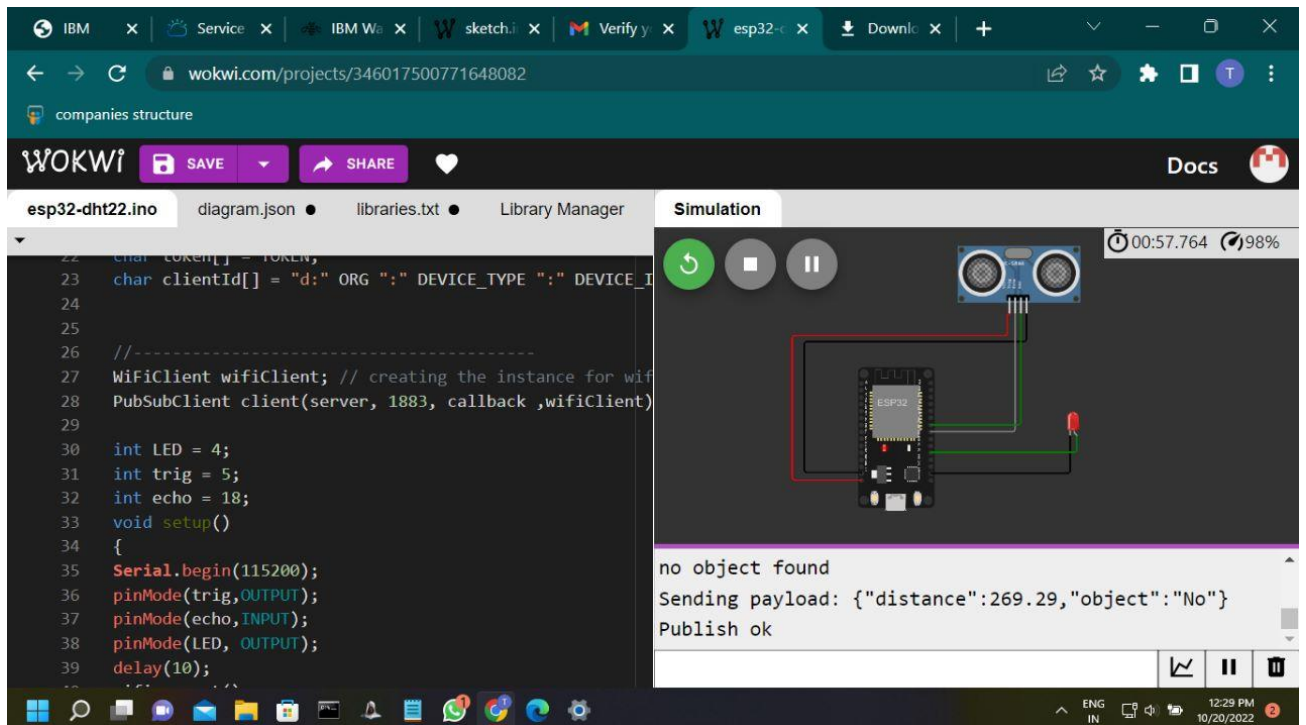
    // else
    // {
    // Serial.println(data3);

```

```
// digitalWrite(LED,LOW);  
  
// }  
data3="";  
  
}
```

OUTPUT :

When object is not near to the ultrasonic sensor



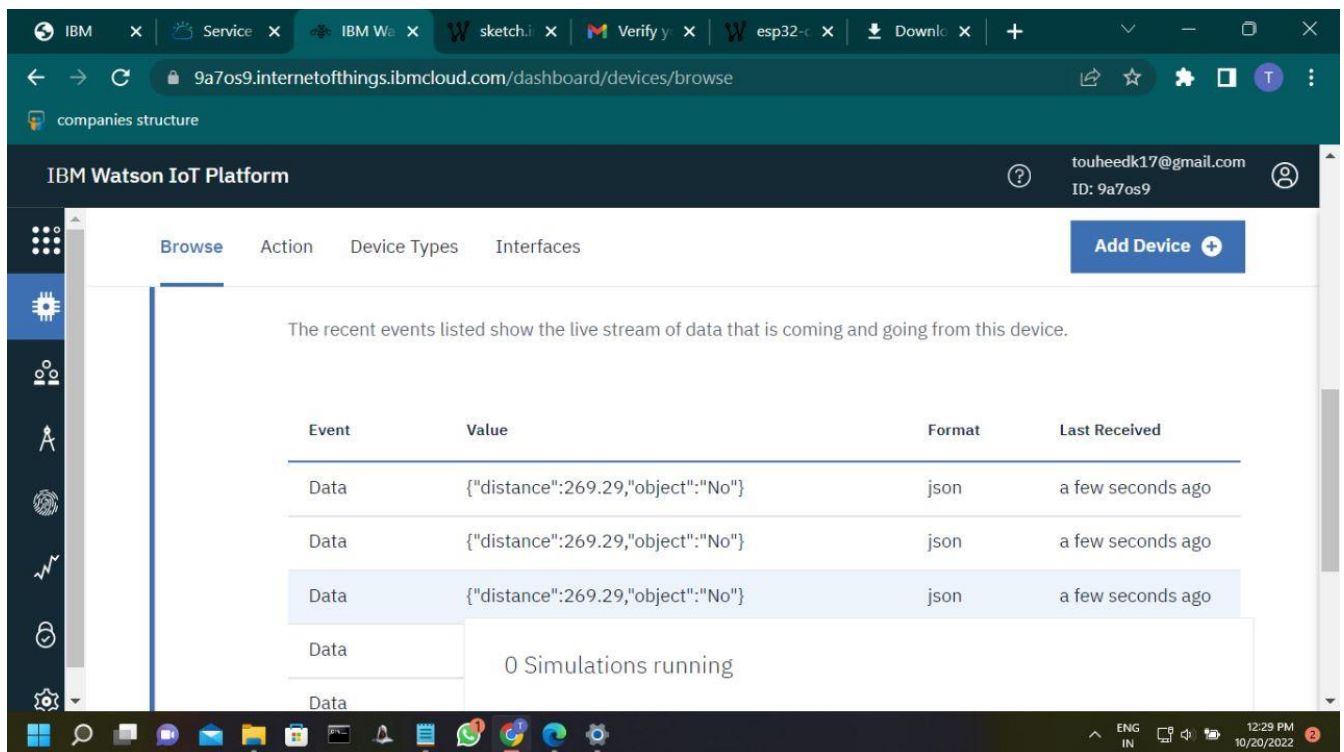
The screenshot displays the Wokwi online IDE interface. The left pane shows the code for `esp32-dht22.ino`, which includes a setup function for an ESP32 microcontroller connected to an ultrasonic sensor. The right pane shows the simulation window with a visual representation of the hardware. The output log in the simulation window indicates that no object was found and a distance of 269.29 cm was measured.

```
22 char token[] = TOKEN;  
23 char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_I  
24  
25  
26 //-----  
27 WiFiClient wifiClient; // creating the instance for wif  
28 PubSubClient client(server, 1883, callback ,wifiClient)  
29  
30 int LED = 4;  
31 int trig = 5;  
32 int echo = 18;  
33 void setup()  
34 {  
35   Serial.begin(115200);  
36   pinMode(trig,OUTPUT);  
37   pinMode(echo,INPUT);  
38   pinMode(LED, OUTPUT);  
39   delay(10);  
40 }
```

Simulation window output:

```
no object found  
Sending payload: {"distance":269.29,"object":"No"}  
Publish ok
```

Data sent to the IBM cloud device when the object is far

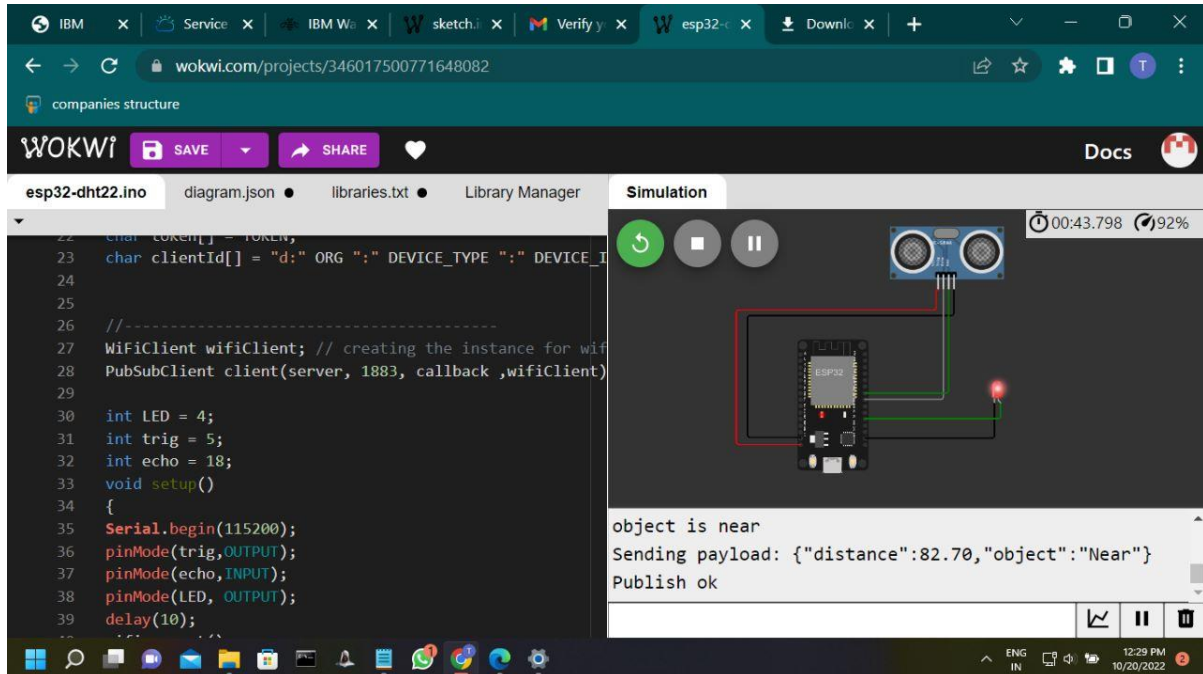


The screenshot displays the IBM Watson IoT Platform dashboard. The browser address bar shows the URL `9a7os9.internetofthings.ibmcloud.com/dashboard/devices/browse`. The dashboard header includes the IBM Watson IoT Platform logo and the user's email `touheedk17@gmail.com` with ID `9a7os9`. The main navigation bar has tabs for **Browse**, **Action**, **Device Types**, and **Interfaces**, along with an **Add Device** button. The **Browse** tab is active, showing a message: "The recent events listed show the live stream of data that is coming and going from this device." Below this message is a table with the following data:

Event	Value	Format	Last Received
Data	<code>{"distance":269.29,"object":"No"}</code>	json	a few seconds ago
Data	<code>{"distance":269.29,"object":"No"}</code>	json	a few seconds ago
Data	<code>{"distance":269.29,"object":"No"}</code>	json	a few seconds ago
Data			
Data			

A tooltip or overlay message "0 Simulations running" is visible over the bottom row of the table. The Windows taskbar at the bottom shows the time as 12:29 PM on 10/20/2022.

When object is nearer to the ultrasonic sensor



The screenshot displays the Wokwi IDE interface for a project named "esp32-dht22.ino". The code on the left defines the following variables and functions:

```
22 char token[] = "TOKEN",
23 char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_I
24
25
26 //-----
27 WiFiClient wifiClient; // creating the instance for wifi
28 PubSubClient client(server, 1883, callback ,wifiClient)
29
30 int LED = 4;
31 int trig = 5;
32 int echo = 18;
33 void setup()
34 {
35   Serial.begin(115200);
36   pinMode(trig, OUTPUT);
37   pinMode(echo, INPUT);
38   pinMode(LED, OUTPUT);
39   delay(10);

```

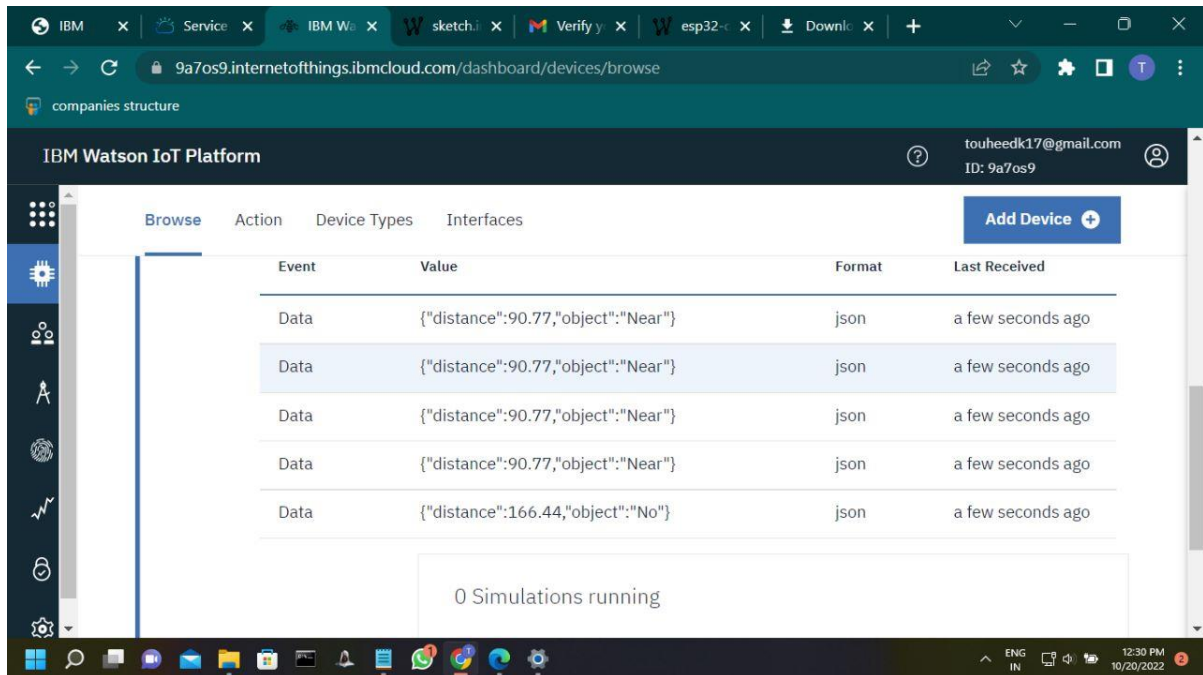
The simulation on the right shows an ESP32 microcontroller connected to an ultrasonic sensor (HC-SR04) and a red LED. The LED is currently lit, indicating that the object is near. The console output shows the following messages:

```
object is near
Sending payload: {"distance":82.70,"object":"Near"}
Publish ok

```

The simulation window also displays a timer at 00:43.798 and a battery level at 92%.

Data sent to the IBM cloud device when the object is near



The screenshot shows the IBM Watson IoT Platform dashboard. The top navigation bar includes the IBM logo and several tabs: Service, IBM Watson IoT Platform, sketch, Verify, esp32, and Download. The main header displays the user's email (touheedk17@gmail.com) and ID (9a7os9). The dashboard is divided into four sections: Browse, Action, Device Types, and Interfaces. The 'Browse' section is active, showing a table of data events. The table has four columns: Event, Value, Format, and Last Received. The data shows five events, all with the format 'json' and 'a few seconds ago' as the last received time. The first four events have a value of '{"distance":90.77,"object":"Near"}', while the fifth event has a value of '{"distance":166.44,"object":"No"}'. A status box at the bottom of the table indicates '0 Simulations running'.

Event	Value	Format	Last Received
Data	{"distance":90.77,"object":"Near"}	json	a few seconds ago
Data	{"distance":90.77,"object":"Near"}	json	a few seconds ago
Data	{"distance":90.77,"object":"Near"}	json	a few seconds ago
Data	{"distance":90.77,"object":"Near"}	json	a few seconds ago
Data	{"distance":166.44,"object":"No"}	json	a few seconds ago

0 Simulations running

<https://wokwi.com/projects/346017500771648082>

