

Assignment -4

Distance Detection Using Ultrasonic Sensor

Assignment Date	25 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/346502216516895315>

CODE:

```

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

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

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

#define ORG "f59trs"//IBM ORGANITION ID
#define DEVICE_TYPE "ultrasonicsensor"//Device type mentioned inibm watson IOT
Platform
#define DEVICE_ID "distancedetection"//Device ID mentioned in ibmwatson IOT
Platform
#define TOKEN "AlGMGaaF01nawa1QA3" //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 andtype 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 methodchar token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;//clientid

//
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 successfully 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 Arduino IDE interface with a simulation. The left pane shows the sketch code, and the right pane shows the simulation of the hardware and the serial monitor output.

Sketch Code:

```

1 #include <Wifi.h>//library for wifi
2 #include <PubSubClient.h>//library for MQTT
3
4
5 void callback(char* subscribetopic, byte* payload, unsigned int payloadLength);
6
7 //-----credentials of IBM Accounts-----
8
9 #define ORG "f59trs"//IBM ORGANITION ID
10 #define DEVICE_TYPE "ultrasonicsensor"//Device type mentioned in ibm watson IOT Platform
11 #define DEVICE_ID "distancedetection"//Device ID mentioned in ibm watson IOT Platform
12 #define TOKEN "ALGMGaaF0Inawa1QA3" //Token
13 String data3;
14 float dist;
15
16
17 //----- Customise the above values -----
18 char server[] = ORG ".messaging.internetofthings.ibmcloud.com";// Server Name
19 char publishTopic[] = "iot-2/evt/Data/fmt/json";// topic name and type of event perform and
20 char subscribetopic[] = "iot-2/cmd/test/fmt/String";// cmd REPRESENT command type AND COMM
21 char authMethod[] = "use-token-auth";// authentication method
22 char token[] = TOKEN;
23 char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;//client id
24
25
26 //-----
27 Wificlient wificlient; // creating the instance for wificlient
28 PubSubClient client(server, 1883, callback ,wificlient); //calling the predefined client id
29
30 int LED = 4;
31 int trig = 5;
32 int echo = 18;
33 void setup()

```

Simulation: The simulation shows an ESP32 microcontroller connected to an HC-SR04 ultrasonic sensor and an LED. The sensor is connected to the ESP32's VCC, GND, Trig, and Echo pins. The LED is connected to the ESP32's VCC and GND.

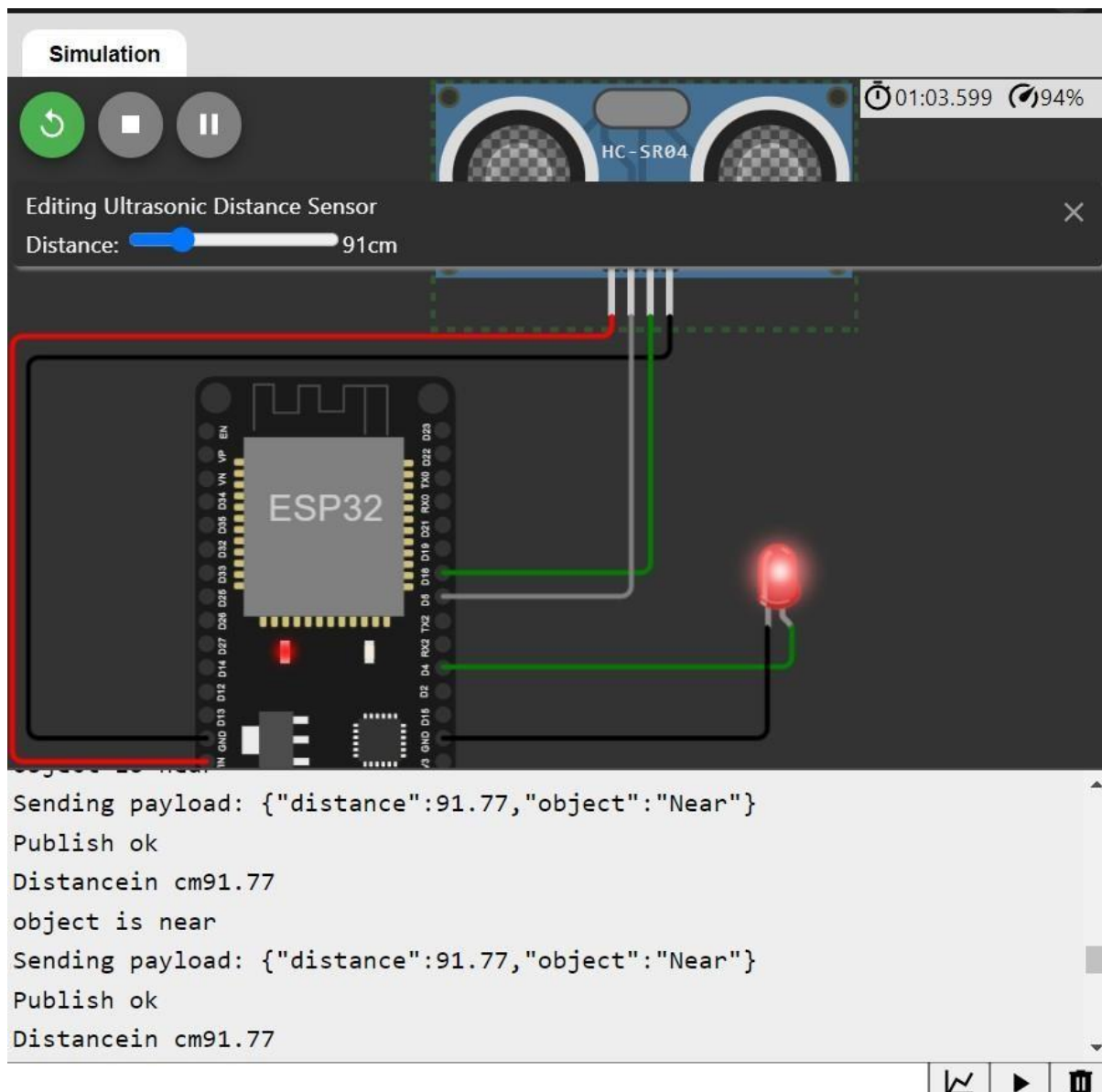
Serial Monitor Output:

```

no object found
Sending payload: {"distance":403.45,"object":"No"}
Publish ok
Distancein cm233.00
no object found
Sending payload: {"distance":233.00,"object":"No"}
Publish ok

```

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



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

Browse Action Device Types Interfaces

Add Device +

Device Details

	Device ID	Status	Device Type	Class ID	Date Added	Descriptive Location
	distancedetection	Connected	ultrasonicsensor	Device	Oct 19, 2022 11:56 AM	...

Identity Device Information Recent Events State Logs X

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":91.77,"object":"Near"}	json	a few seconds ago
Data	{"distance":91.75,"object":"Near"}	json	a few seconds ago
Data	{"distance":91.77,"object":"Near"}	json	a few seconds ago
Data	{"distance":91.79,"object":"Near"}	json	a few seconds ago
Data	{"distance":91.8,"object":"Near"}	json	a few seconds ago

0 Simulations running