

Assignment -4
Ultrasonic Sensor

Assignment Date	10 November 2022
Student Name	Mr. Danush Gupta V K
Student Roll Number	2019503012
Maximum Marks	2 Marks

Question-1:

Write code and connections in wokwi for the ultrasonic sensor. Whenever the distance is less than 100 cms send an "alert" to the IBM cloud and display in the device recent events.

Source Code:

```
#include <WiFi.h>
#include <PubSubClient.h>
void callback(char* subscribetopic, byte* payload, unsigned int payloadLength);
#define ORG "ir6i2l"
#define DEVICE_TYPE "node_assgn4"
#define DEVICE_ID "73585"
#define TOKEN "91766210"
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);
  delayMicroseconds(10);
  digitalWrite(trigPin, LOW);
  duration = pulseIn(echoPin, HIGH);
  distance = duration * SOUND_SPEED/2;
  Serial.print("Distance (cm): ");
```

```

Serial.println(distance);
if(distance<100)
{
Serial.println("ALERT!!");
delay(1000);
PublishData(distance);
delay(1000);
if (!client.loop()) {
mqttconnect();
}
}
delay(1000);
}
void PublishData(float dist) {
mqttconnect();
String payload = "{\"Distance\":\"";
payload += dist;
payload += "\",\"ALERT!!\":\"\"Distance less than 100cms\"";
payload += "\"}";
Serial.print("Sending payload: ");
Serial.println(payload);
if (client.publish(publishTopic, (char*) payload.c_str())) {
Serial.println("Publish ok");
} 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()
{
Serial.println();
Serial.print("Connecting to ");
WiFi.begin("Wokwi-GUEST", "", 6);
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++)
  {
    data3 += (char)payload[i];
  }
  Serial.println("data: "+ data3);
  data3="";
}

```

Output:

The screenshot displays the Wokwi IoT simulator interface. On the left, the 'sketch.ino' file is open in a code editor, showing the following code:

```

1 #include <WiFi.h>
2 #include <PubSubClient.h>
3 void callback(char* subscribetopic, byte* payload, unsigned int payloadLength);
4 #define ORG "ir6i2l"
5 #define DEVICE_TYPE "node_assgn4"
6 #define DEVICE_ID "73585"
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8 String data3;
9 char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
10 char publishTopic[] = "iot-2/evt/Data/fmt/json";
11 char subscribetopic[] = "iot-2/cmd/test/fmt/String";
12 char authMethod[] = "use-token-auth";
13 char token[] = TOKEN;
14 char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;
15 WiFiClient wificlient;
16 PubSubClient client(server, 1883, callback, wificlient);
17 const int trigPin = 5;
18 const int echoPin = 18;
19 #define SOUND_SPEED 0.034
20 long duration;
21 float distance;
22 void setup() {
23   Serial.begin(115200);
24   pinMode(trigPin, OUTPUT);
25   pinMode(echoPin, INPUT);
26   wificlient.connect();
27   mqttconnect();
28 }
29 void loop()
30 {
31   digitalWrite(trigPin, LOW);
32   delayMicroseconds(2);
33   digitalWrite(trigPin, HIGH);

```

On the right, the 'Simulation' window shows a visual representation of the hardware: an ESP32 microcontroller board connected to an HC-SR04 ultrasonic sensor. Below the simulation, the output console displays the following messages:

```

ALERT!!! ALERT!!! Object Detected
ALERT!!! ALERT!!! Object Detected
ALERT!!! ALERT!!! Object Detected
ALERT!!! ALERT!!! Object Detected

```

The top of the interface includes a 'WOKWI' logo, 'SAVE' and 'SHARE' buttons, and a 'Docs' link. The bottom right corner shows a status bar with a battery icon and '49%'.

IBM Watson IoT Platform

2019503559@smartinternz.com
ID: ir612l

Browse

Action

Device Types

Interfaces

Add Device

Search by Device ID

Device Simulator

Device ID	Status	Device Type	Class ID	Date Added	Descriptive Location
73585	Disconnected	DeviceNode	Device	Nov 22, 2022 10:35 PM	
73585	Disconnected	NodeMCU	Device	Nov 21, 2022 10:52 PM	
73585	Disconnected	node_assign4	Device	Nov 25, 2022 10:41 AM	

Identity

Device Information

Recent Events

State

Logs

Device ID

Device Type

Date Added

Added By

Connection Status

73585

node_assign4

Nov 25, 2022 10:41 AM

2019503559@smartinternz.com

Disconnected

2 Simulations running

IBM Watson IoT Platform

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Browse

Action

Device Types

Interfaces

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Device Simulator

Device ID	Status	Device Type	Class ID	Date Added	Descriptive Location
73585	Disconnected	DeviceNode	Device	Nov 22, 2022 10:35 PM	
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Identity

Device Information

Recent Events

State

Logs

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	["ALERT!!!ALERT!!!object Detected":38]	json	a few seconds ago
event_1	["ALERT!!!ALERT!!!object Detected":2]	json	a few seconds ago
event_1	["ALERT!!!ALERT!!!object Detected":100]	json	a few seconds ago
event_1	["ALERT!!!ALERT!!!object Detected":74]	json	a few seconds ago
event_1	["ALERT!!!ALERT!!!object Detected":82]	json	a few seconds ago