

ASSIGNMENT 4

Ultrasonic sensor simulation in Wokwi

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| Date | 25 October 2022 |
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| Project Name | Gas leakage monitoring and alerting system |

Question-1:

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

```
#include <WiFi.h> #include <PubSubClient.h> void callback (char*
subscribetopic, byte* payload, unsigned int payloadLength);
//-----credentials of IBM Accounts-----
#define ORG "kotoq5"//IBM ORGANITION ID
#define DEVICE_TYPE "ESP32"//Device type mentioned in IBM Watson IOT Platform
#define DEVICE_ID "12345"//Device ID mentioned in IBM Watson IOT Platform
#define TOKEN "12345678" //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); 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

```

```

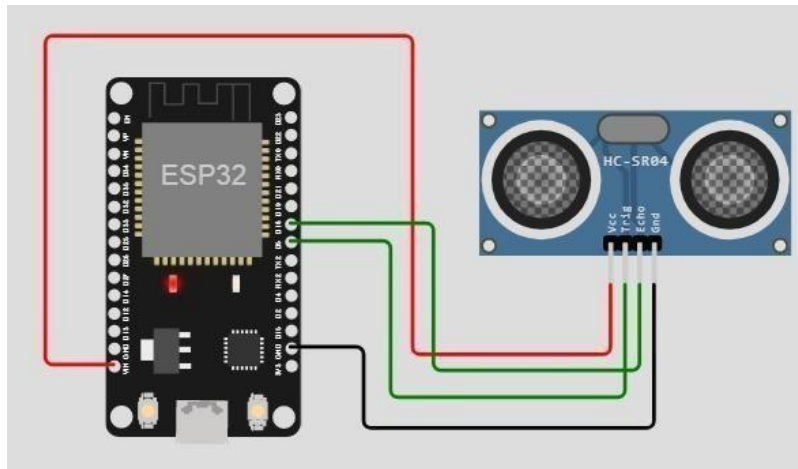
(!!!client.connect(clientId, authMethod, token)) {
  Serial.print("."); delay(500);
} initManagedDevice();
Serial.println(); }
} void
wificonnect() {
  Serial.println();
  Serial.print("Connecting to ");
  WiFi.begin("Wokwi-GUEST", "", 6); while
  (WiFi.status() != WL_CONNECTED) { delay(500);
  Serial.print(".");
  }
  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++) {
  //Serial.print((char)payload[i]); data3 +=
(char)payload[i];
  }
  Serial.println("data: "+ data3); data3="";
}

```

Diagram.json:

```
{
  "version": 1,
  "author": "sweetysharon",
  "editor": "wokwi",
  "parts": [
    { "type": "wokwi-esp32-devkit-v1", "id": "esp", "top": -4.67, "left": -114.67, "attrs": {} },
    { "type": "wokwi-hc-sr04", "id": "ultrasonic1", "top": 15.96, "left": 89.17, "attrs": {} }
  ],
  "connections": [
    [ "esp:TX0", "$serialMonitor:RX", "", [] ],
    [ "esp:RX0", "$serialMonitor:TX", "", [] ],
    [
      "esp:VIN",
      "ultrasonic1:VCC",
      "red",
      [ "h-37.16", "v-178.79", "h200", "v173.33", "h100.67" ]
    ],
    [ "esp:GND.1", "ultrasonic1:GND", "black", [ "h39.87", "v44.04", "h170" ] ],
    [ "esp:D5", "ultrasonic1:TRIG", "green", [ "h54.54", "v85.07", "h130.67" ] ],
    [ "esp:D18", "ultrasonic1:ECHO", "green", [ "h77.87", "v80.01", "h110" ] ]
  ]
}
```

Circuit Diagram:



Output:

Wokwi output:

```
Connecting to ....
WiFi connected
IP address:
10.10.0.2
Reconnecting client to ytluse.messaging.internetofthings.ibmcloud.com
iot-2/cmd/test/fmt/String
subscribe to cmd OK

Distance (cm): 399.92
Distance (cm): 399.96
Distance (cm): 399.94
Distance (cm): 399.98
Distance (cm): 399.94
Distance (cm): 399.92
Distance (cm): 399.94
```

IBM cloud output:

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 | {"distance":7,"Alert":"Distance less than 10"} | json | a few seconds ago |
| event_1 | {"distance":9,"Alert":"Distance less than 10"} | json | a few seconds ago |
| event_1 | {"distance":8,"Alert":"Distance less than 10"} | json | a few seconds ago |
| event_1 | {"distance":9,"Alert":"Distance less than 10"} | json | a few seconds ago |

Wokwi simulation link:

<https://wokwi.com/projects/346404308518961748>