

ASSIGNMENT-- 4

Industry-specific intelligent fire management system

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Question :

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.

❖ Code :

```
#include <WiFi.h>
#include <PubSubClient.h>

#define ORG "0bm892"
#define DEVICE_TYPE "ESP32_Controller"
#define DEVICE_ID "Sensor"
#define TOKEN "1234567890"
#define trigpin 5
#define echopin 18
char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
char publishTopic[] = "iot-2/evt/data/fmt/json";
char authMethod[] = "use-token-auth";
char token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;
WiFiClient wifiClient;
PubSubClient client(server, 1883, wifiClient);
long duration;
float dist;
void setup()
{
    Serial.begin(9900);

    pinMode(trigpin, OUTPUT);
    pinMode(echopin, INPUT);
    wifiConnect();
    mqttConnect();
}
void loop() {

    publishData();
    delay(500);
    if (!client.loop())
    {
        mqttConnect();
    }
}
```

```

}
void wifiConnect()
{
    Serial.print("Connecting to ");
    Serial.print("Wifi");
    WiFi.begin("Wokwi-GUEST", "", 6);
    while (WiFi.status() != WL_CONNECTED)
    {
        delay(500);
        Serial.print(".");
    }
    Serial.print("WiFi connected, IP address: ");
    Serial.println(WiFi.localIP());
}

void mqttConnect()
{
    if (!client.connected())
    {
        Serial.print("Reconnecting MQTT client to ");
        Serial.println(server);
        while (!client.connect(clientId, authMethod, token))
        {
            Serial.print(".");
            delay(500);
        }
        Serial.println();
    }
}

void publishData()
{
    digitalWrite(trigpin, LOW);
    digitalWrite(trigpin, HIGH);
    delayMicroseconds(10);
    digitalWrite(trigpin, LOW);
    duration=pulseIn(echopin, HIGH);
    dist=(duration*0.034) /2;
    if(dist<100)
    {
        String payload = "{\"Distance\":";
        payload += dist;
        payload += ",";
        payload += "\"Status\":";
        payload += "\"Alert\":";
        Serial.print("\n");
        Serial.print("Sending payload: ");
        Serial.println(payload);
        if (client.publish(publishTopic, (char*) payload.c_str()))
    }
}

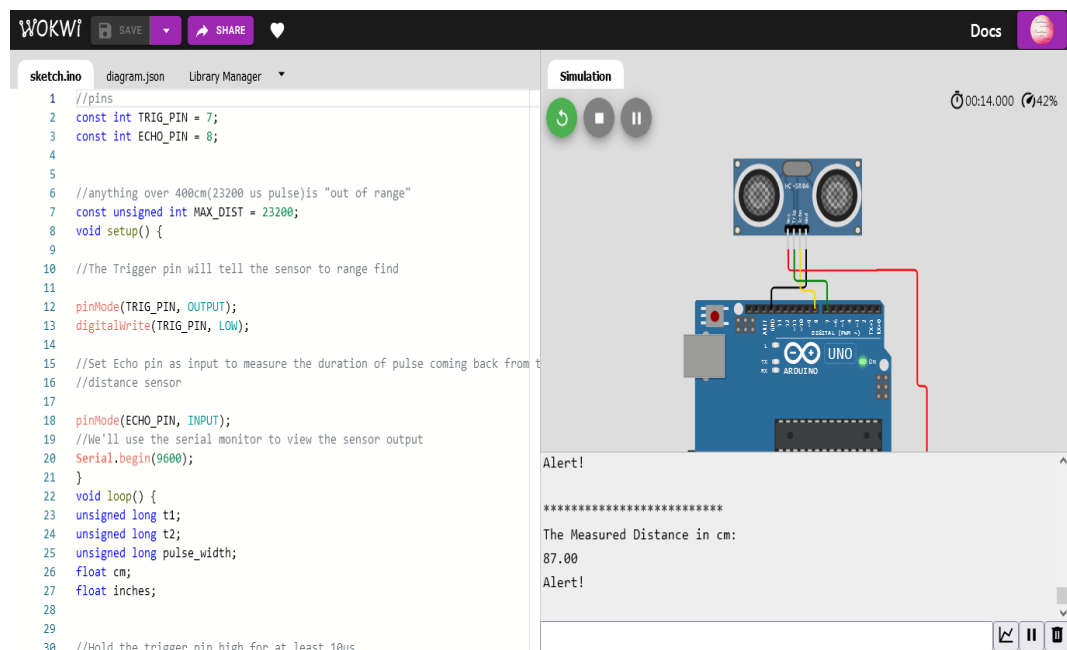
```

```

{
  Serial.println("Publish OK");
}
}
if(dist>100)
{
  String payload = "{\"Distance\":\"";
  payload += dist;
  payload += ",";
  payload += "\"Status\":\"";
  payload += "\"Normal\"}";
  Serial.print("\n");
  Serial.print("Sending payload: ");
  Serial.println(payload);
  if(client.publish(publishTopic, (char*) payload.c_str()))
  {
    Serial.println("Publish OK");
  }
  else
  {
    Serial.println("Publish FAILED");
  }
}
}
}

```

❖ Execution :



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diagram.json

Library Manager

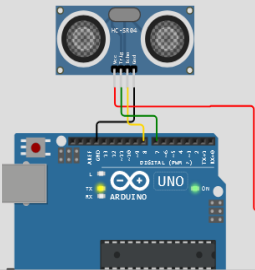
```

27 float inches;
28
29
30 //Hold the trigger pin high for at least 10us
31
32 digitalWrite(TRIG_PIN, HIGH);
33 delayMicroseconds(10);
34 digitalWrite(TRIG_PIN, LOW);
35
36 //wait for pulse on echo pin
37
38 while (digitalRead(ECHO_PIN) == 0);
39
40 //Measure how long the echo pin was held high (pulse width)
41 //note the micros() counter will overflow after ~70min
42
43 t1 = micros();
44 while (digitalRead(ECHO_PIN) == 1);
45 t2 = micros();
46 pulse_width = t2 - t1;
47
48
49
50 //calculate distance in centimeters and inches. The constants are found in the
51 //datasheet, and calculated from the assumed speed of sound in air at sea level
52
53 cm = pulse_width / 58;
54 inches = pulse_width / 148.0;
55
56 //print out results

```

Simulation

00:43.783 20%



The Measured Distance in cm:
87.00
Alert!

The Measured Distance in cm:
87.00

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Library Manager

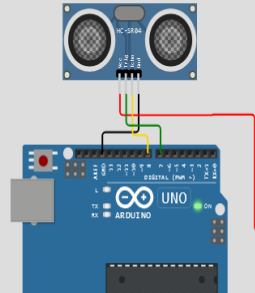
```

56 //print out results
57 if (pulse_width > MAX_DIST) {
58   Serial.println("Out of range");
59 }
60 else
61 {
62   Serial.println("*****");
63   Serial.println("The Measured Distance in cm:");
64   Serial.println(cm);
65   if (cm < 100)
66   {
67     //while (true)
68     {
69       Serial.println("Alert!");
70     }
71   }
72   Serial.println("");
73 }
74 //wait at least 1000ms before next measurement
75 delay(1000);
76 }
77
78

```

Simulation

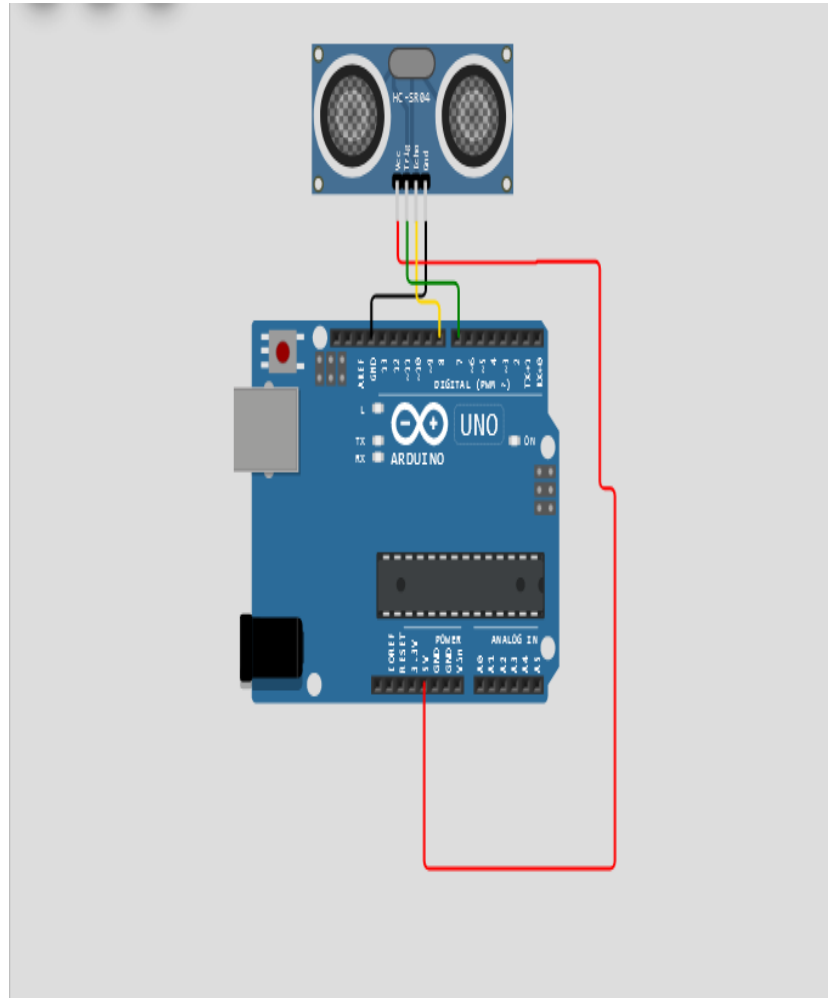
00:52.350 42%



The Measured Distance in cm:
87.00
Alert!

The Measured Distance in cm:
87.00

❖ circuit diagram :



IBM cloud output :

The screenshot displays the IBM Cloud IoT Platform interface. The top navigation bar includes 'Browse', 'Action', 'Device Types', and 'Interfaces'. A sidebar on the left contains various icons for navigation. The main content area shows the details for a device named 'ESP32_Controller', which is a 'Sensor' and is 'Connected'. The 'Recent Events' tab is selected, showing a table of events. The table has four columns: 'Event', 'Value', 'Format', and 'Last Received'. The events are listed as follows:

Event	Value	Format	Last Received
data	{"Distance":1.99,"Status":"Alert"}	json	a few seconds ago
data	{"Distance":125.95,"Status":"Normal"}	json	a few seconds ago
data	{"Distance":125.95,"Status":"Normal"}	json	a few seconds ago
data	{"Distance":34.97,"Status":"Alert"}	json	a few seconds ago
data	{"Distance":34.97,"Status":"Alert"}	json	a few seconds ago

Below the table, it indicates '0 Simulations running'.

❖ Wokwi URL : <https://wokwi.com/projects/346948920308400723>