ASSIGNMENT 4

Ultrasonic sensor simulation in Wokwi

Question:

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 "n1eaxk"//IBM ORGANITION ID
 #define DEVICE_TYPE "Smart-Farming"//Device type mentioned in ibm
 WatsonPlatform
 #define DEVICE_ID "TamilNadu"//Device ID mentioned in ibm watson IOT
 Platform
 #define TOKEN "VQ*VmV5CJBA_C2AM+y" //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:

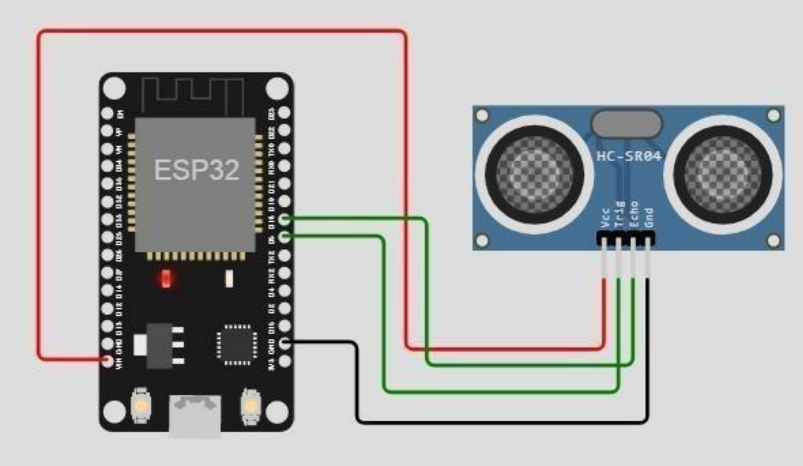
```
{
  "version": 1,
  "author": "sweetysharon",
  "editor": "wokwi",
  "parts": [
    { "type": "wokwi-esp32-devkit-v1", "id": "esp", "top": -4.67, "left": -114.67, "attrs":
    {} },
    { "type": "wokwi-hc-sr04", "id": "ultrasonic1", "top": 15.96, "left": 89.17, "attrs":
    {} }
  ],
  "connections": [
    [ "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" ] ]

  ]
}
```

Wokwi simulation link:

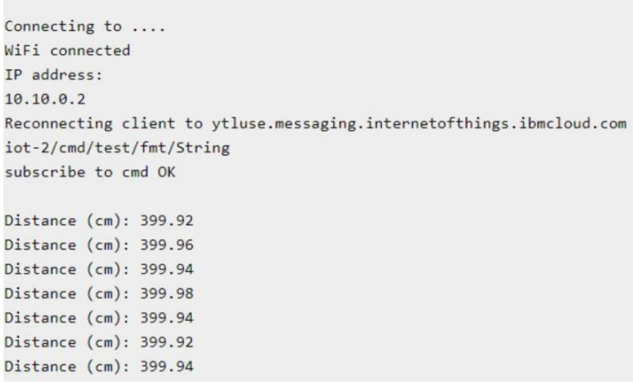
https://wokwi.com/projects/348151666068947538

Circuit Diagram:



Output:

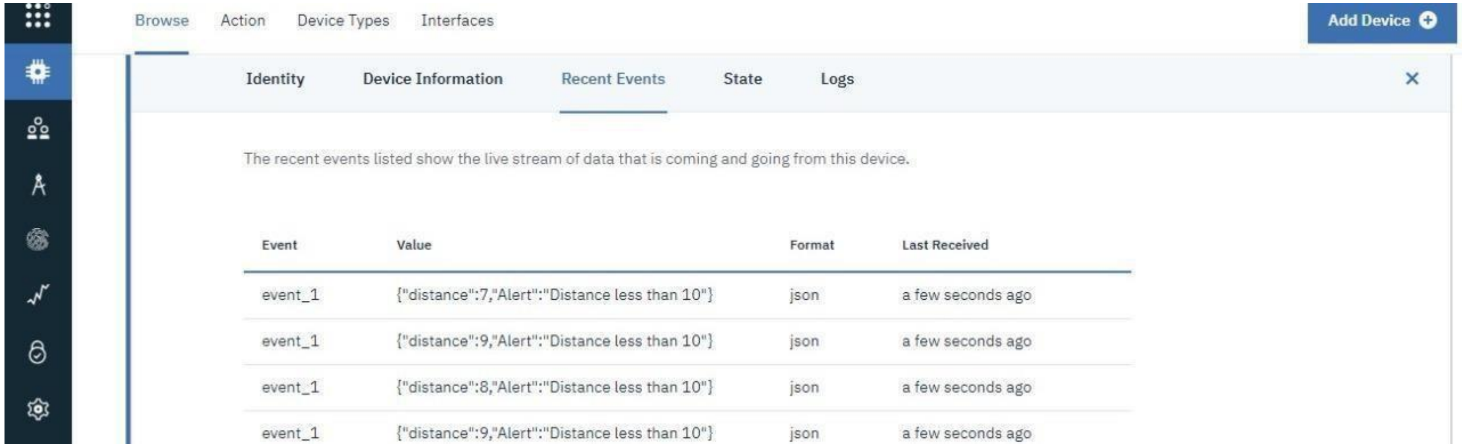
Wokwi output:



```
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:



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