ASSIGNMENT 4

Ultrasonic sensor simulation in Wokwi

Date	14 November 2022
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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(".");
}
```

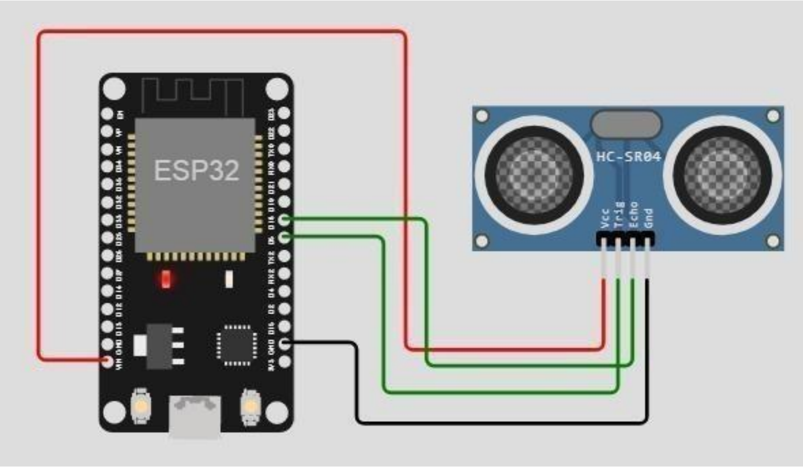
```
Serial.println(""); Serial.println("WiFi connected");
Serial.println("IP address: ");
Serial.println(WiFi.localIP());
}
void initManagedDevice() { if
(client.subscribe(subscribetopic))
{ Serial.println((subscribetopic)); Serial.println("subscribe to cmd
OK");
} else {
Serial.println("subscribe to 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":
   "srihariharasudhan",        "editor":
```

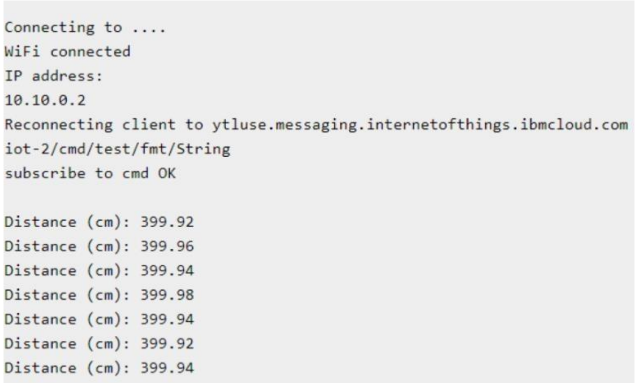
```
 "wokwi", "parts": [
   { "type": "wokwi-esp32-devkit-v1", "id": "esp", "top": -4.67, "left": -114.67, "attrs": {} },
   { "type": "wokwi-hc-sr04", "id": "ultrasonic1", "top": 15.96, "left": 89.17, "attrs": {} }
 ],
 "connections": [
   [ "esp:TX0", "$serialMonitor:RX", "", [] ],
   [ "esp:RX0", "$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:

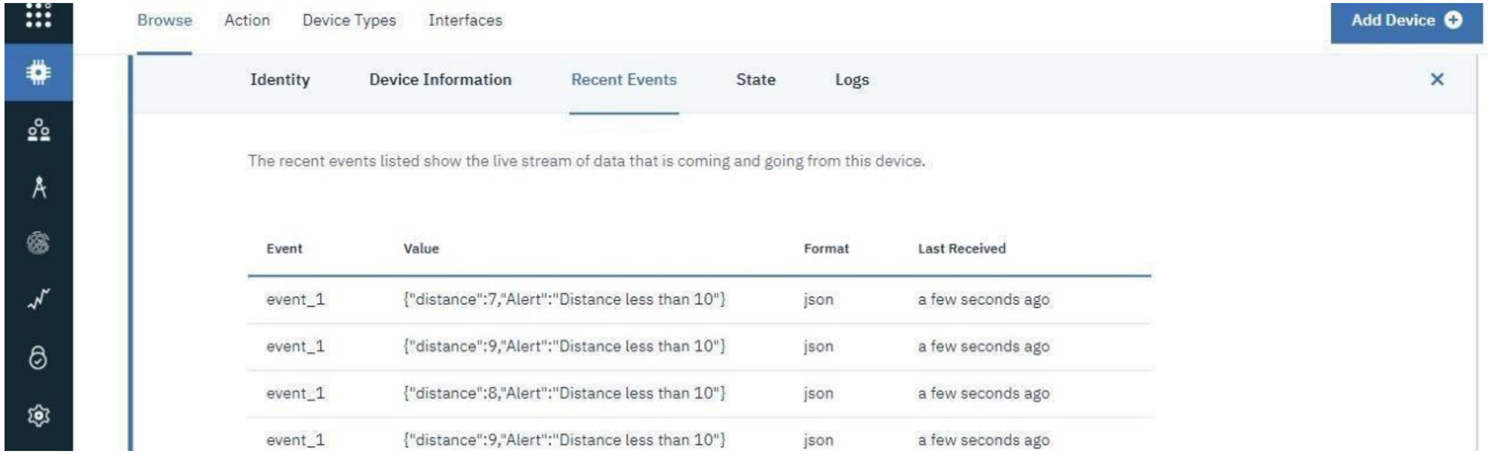
Wokwi output:



```
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:



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/348299375616721491