Project Development Phase

Sprint - III

Date	14 November 2022
Team ID	PNT2022TMID54479
Project Name	Industry-Specific Intelligent Fire Management System

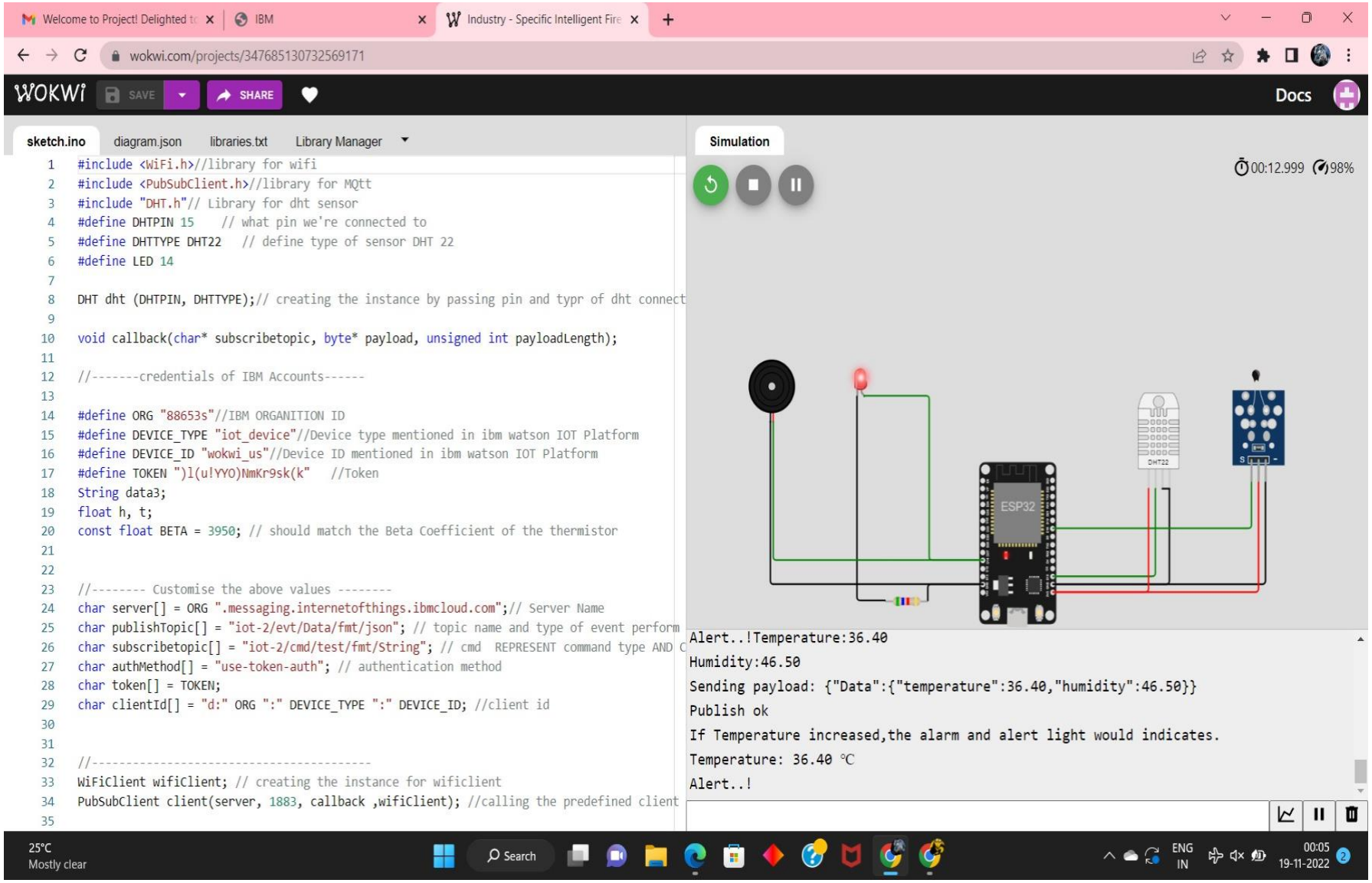
LINK: https://wokwi.com/projects/347685130732569171
LINK: https://wokwi.com/projects/348658884417684052

NODE-RED DASHBOARD UILINK:
https://node-red-iwivz-2022-11-13.eu-gb.mybluemix.net/ui/#!/0?socketid=RNNTsORzKbrlp-UqAAAu

WEB UI LINK : https://node-red-dashboard059.eu-gb.mybluemix.net/fire

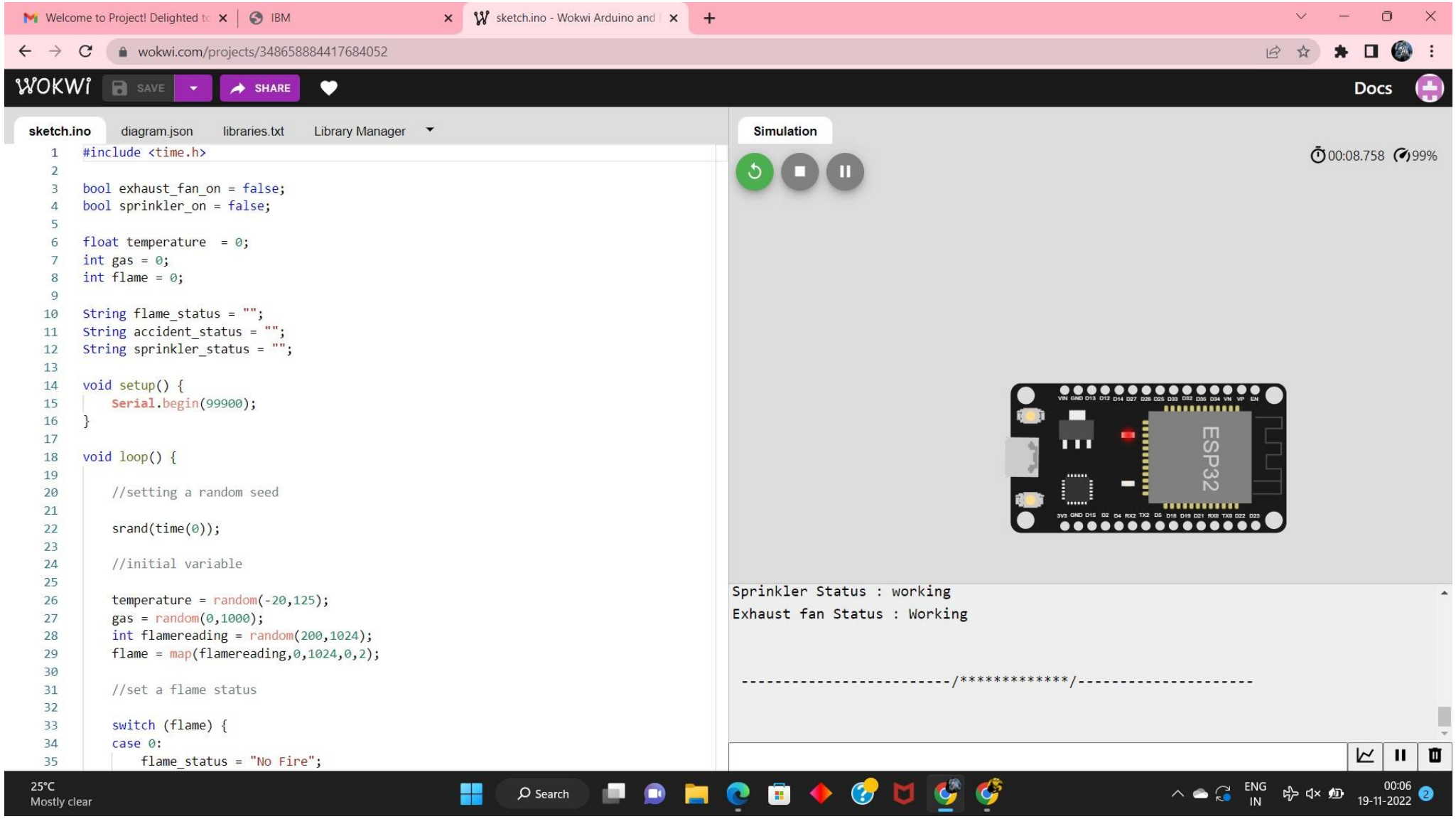
OUTPUT:

WOKWI SIMULATOR



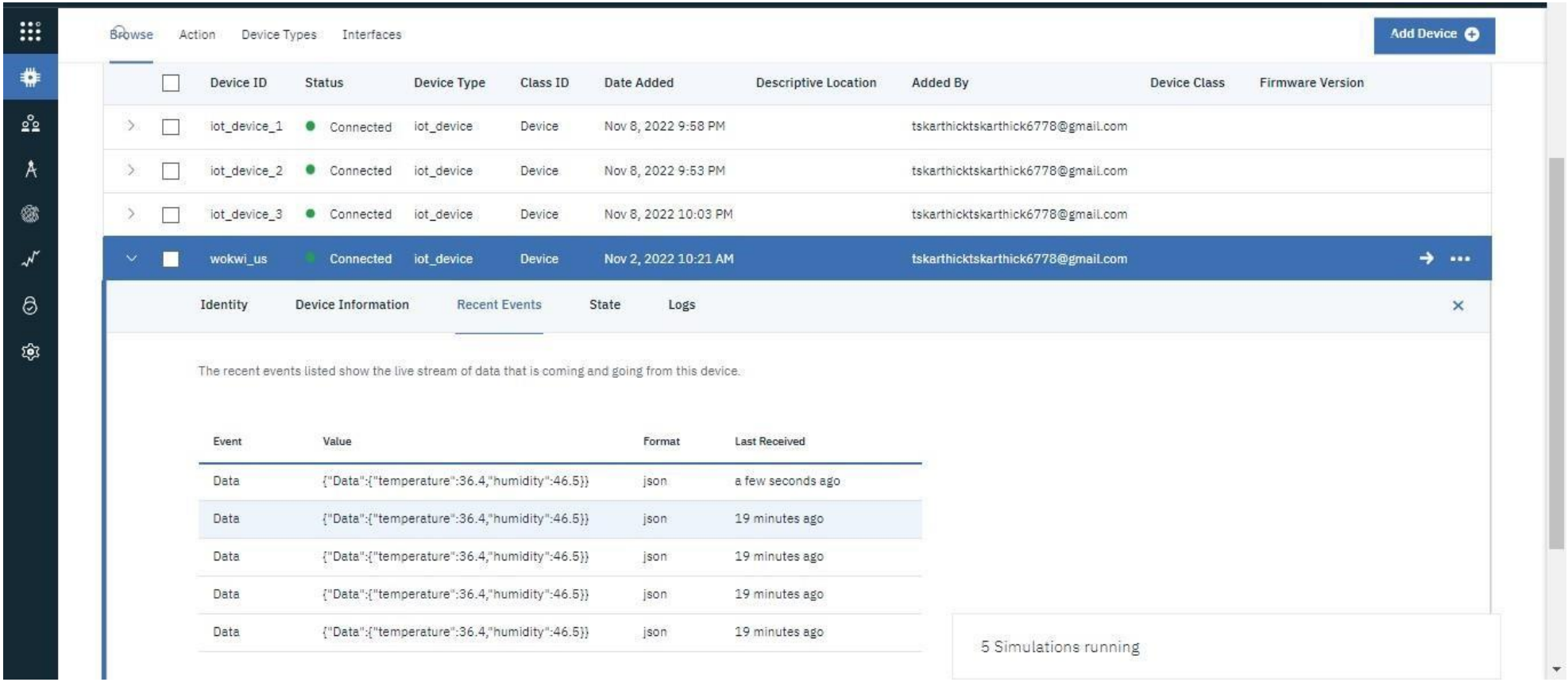
OUTPUT:

WOKWI SIMULATOR

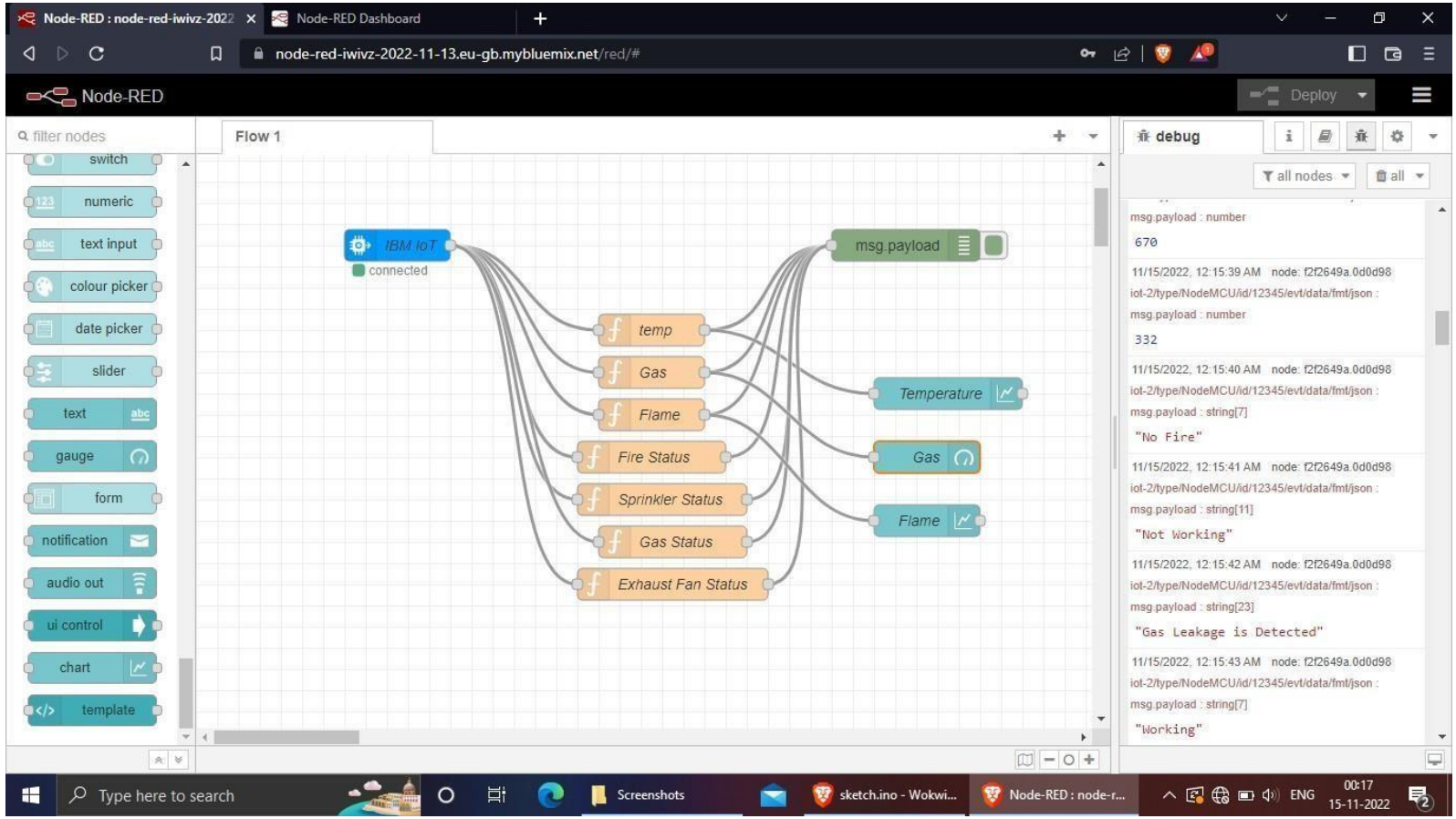


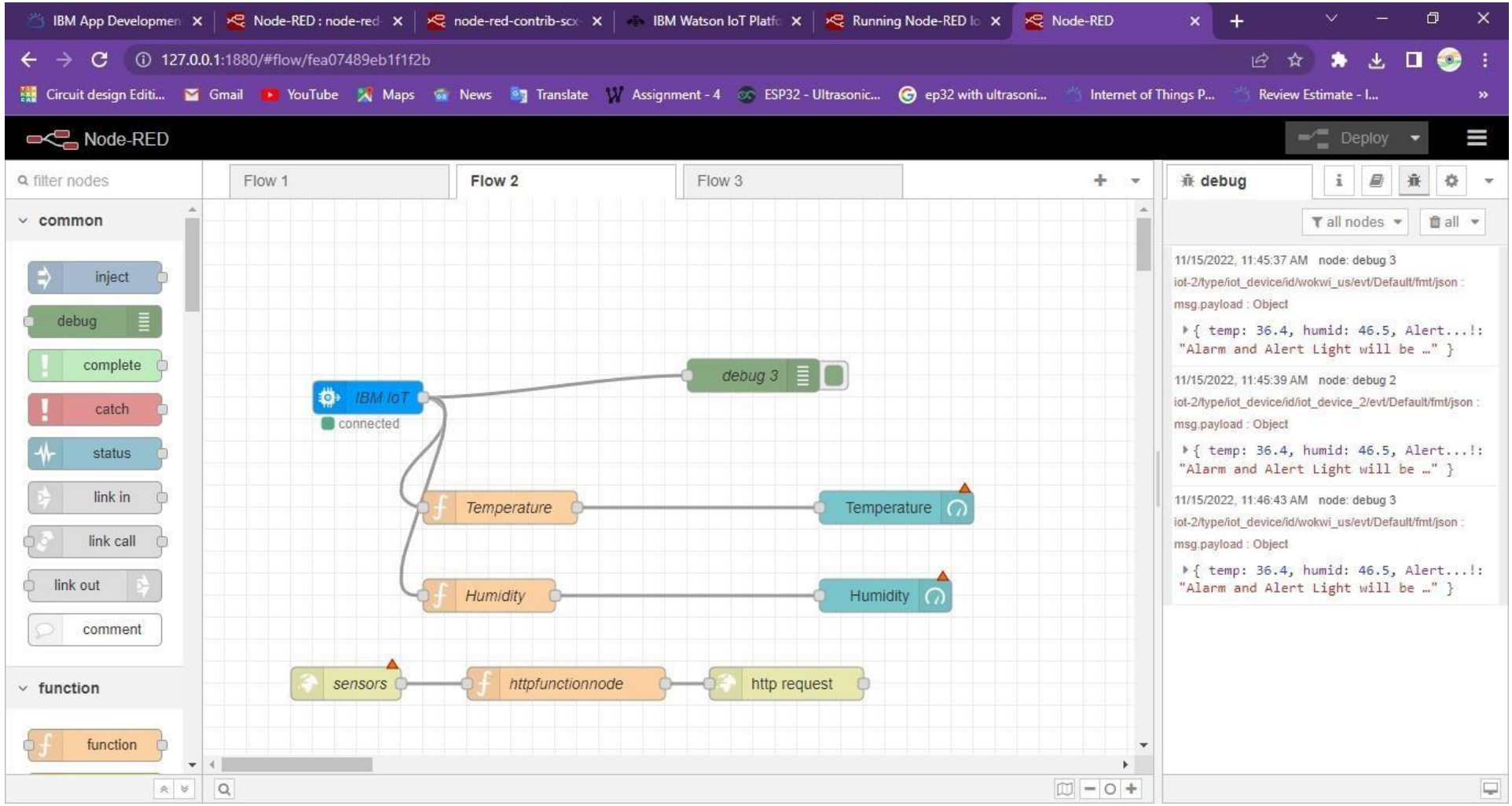

```
#include <time.h>

bool exhaust_fan_on = false;
bool sprinkler_on = false;

float temperature  = 0;
int gas = 0;
int flame = 0;

String flame_status = "";
String accident_status = "";
String sprinkler_status = "";

void setup() {
    Serial.begin(99900);
}

void loop() {

    //setting a random seed

    srand(time(0));

    //initial variable

    temperature = random(-20,125);
    gas = random(0,1000);
    int flamereading = random(200,1024);
    flame = map(flamereading,0,1024,0,2);

    //set a flame status

    switch (flame) {
    case 0:
        flame_status = "No Fire";
```

IBM WATSON OUTPUT

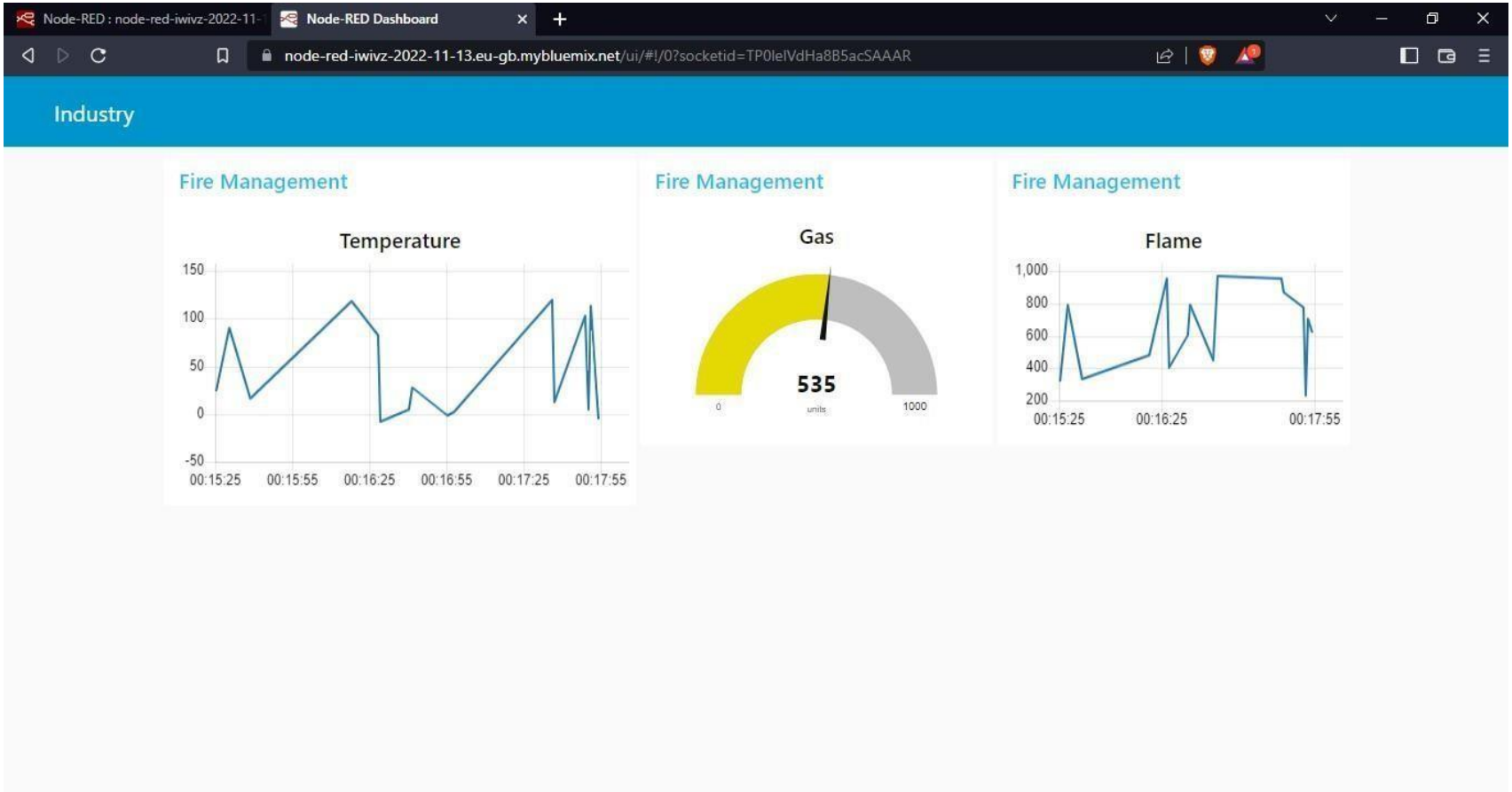


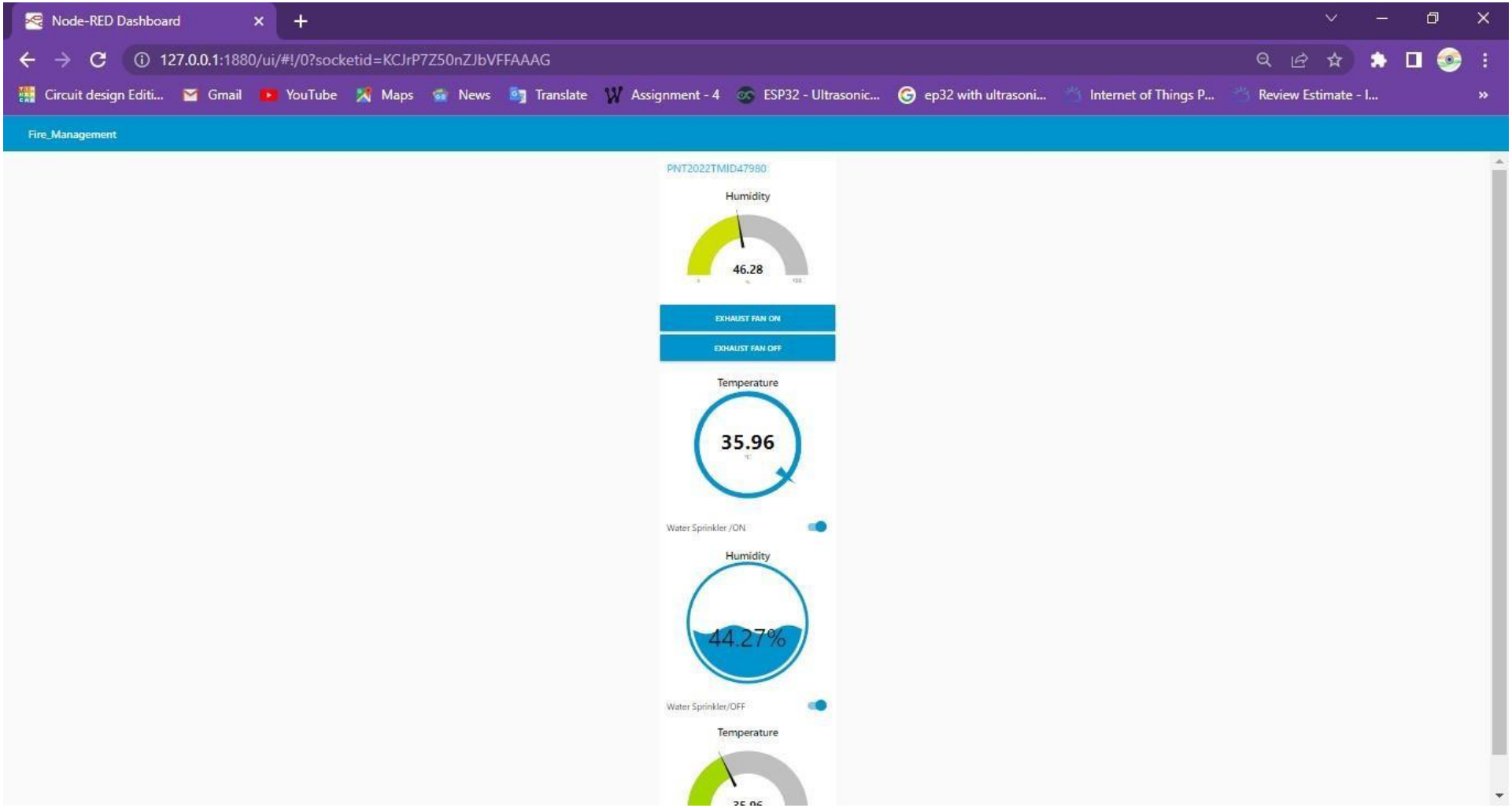
TRANSFERRING DATA FROM IBM WATSON INTO NODE-RED


Node-RED : node-red-iwivz-2022
Node-RED Dashboard
node-red-iwivz-2022-11-13.eu-gb.mybluemix.net/red/#
Node-RED
Deploy
filter nodes
switch
numeric
text input
colour picker
date picker
slider
text
gauge
form
notification
audio out
ui control
chart
template
Flow 1
IBM IoT
connected
temp
Gas
Flame
Fire Status
Sprinkler Status
Gas Status
Exhaust Fan Status
msg.payload
Temperature
Gas
Flame
debug
all nodes
all
msg.payload : number
670
11/15/2022, 12:15:39 AM node: f2f2649a.0d0d98
iot-2/type/NodeMCU/id/12345/evt/data/fmt/json :
msg.payload : number
332
11/15/2022, 12:15:40 AM node: f2f2649a.0d0d98
iot-2/type/NodeMCU/id/12345/evt/data/fmt/json :
msg.payload : string[7]
"No Fire"
11/15/2022, 12:15:41 AM node: f2f2649a.0d0d98
iot-2/type/NodeMCU/id/12345/evt/data/fmt/json :
msg.payload : string[11]
"Not Working"
11/15/2022, 12:15:42 AM node: f2f2649a.0d0d98
iot-2/type/NodeMCU/id/12345/evt/data/fmt/json :
msg.payload : string[23]
"Gas Leakage is Detected"
11/15/2022, 12:15:43 AM node: f2f2649a.0d0d98
iot-2/type/NodeMCU/id/12345/evt/data/fmt/json :
msg.payload : string[7]
"Working"
Type here to search
Screenshots
sketch.ino - Wokwi...
Node-RED : node-r...
ENG
00:17
15-11-2022

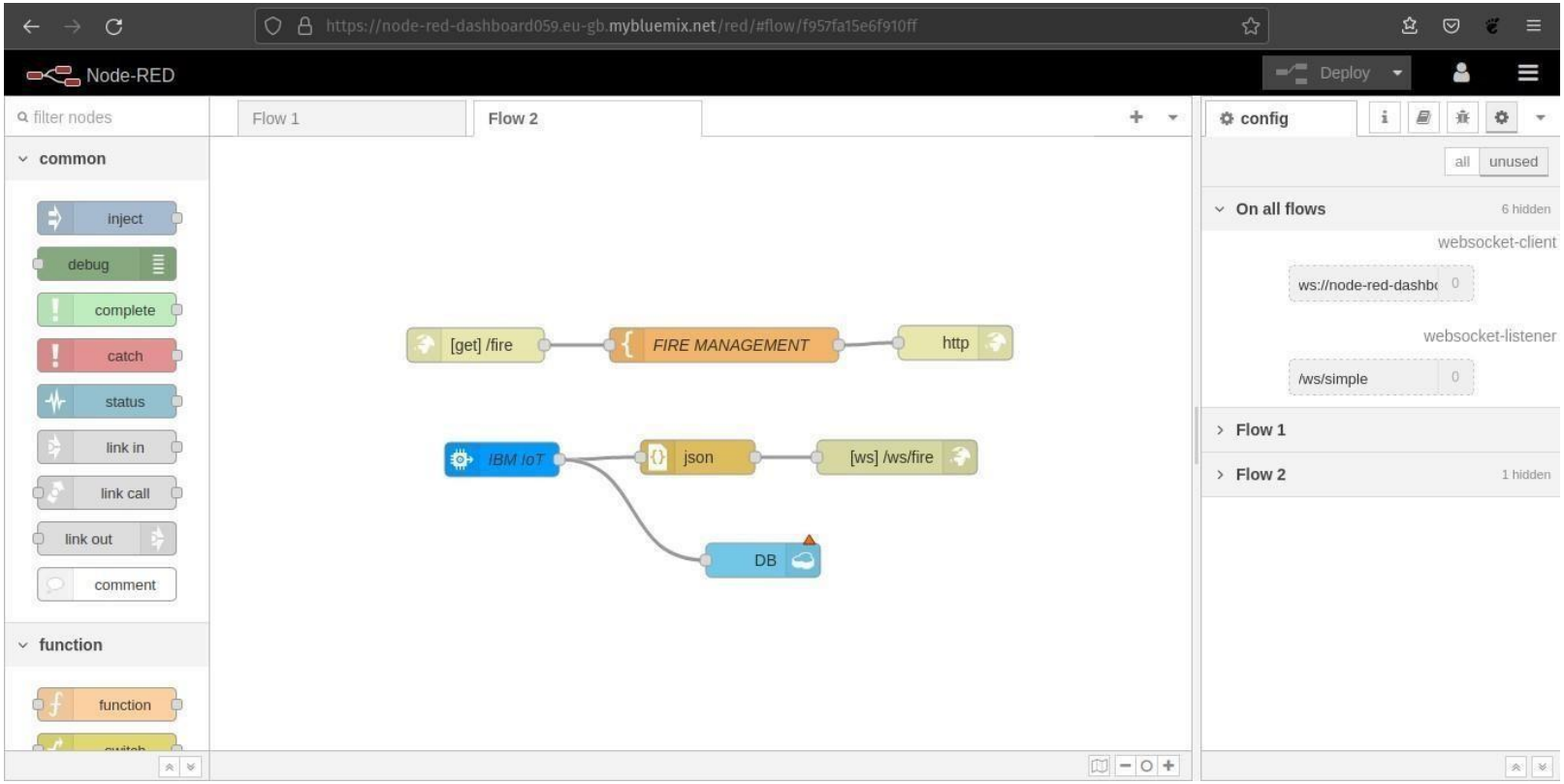


NODE DASHBOARD


Node-RED : node-red-iwivz-2022-11-
Node-RED Dashboard
node-red-iwivz-2022-11-13.eu-gb.mybluemix.net/ui/#!/0?socketid=TP0IeIVdHa8B5acSAAAR
Industry
Fire Management
Temperature
150
100
50
0
-50
00:15:25
00:15:55
00:16:25
00:16:55
00:17:25
00:17:55
Fire Management
Gas
535
0
units
1000
Fire Management
Flame
1,000
800
600
400
200
00:15:25
00:16:25
00:17:55



TRANSFERRING DATA FROM NODE-RED INTO WEB UI



WEB UI

DESKTOP VIEW


https://node-red-dashboard059.eu-gb.mybluemix.net/fire
FIRE MANAGEMENT SYSTEM
TEMPERATURE : 56
GAS : 721
FLAME : 299
FIRE STATUS : No Fire
SPRINKLER STATUS: Not Working
GAS STATUS : Gas Leakage is Detected
EXHAUST FAN STATUS : Working

MOBILE VIEW


).eu-gb.mybluemix.net
29
FIRE MANAGEMENT SYSTEM
TEMPERATURE : 121
GAS : 3
FLAME : 650
FIRE STATUS : Fire is Detected
SPRINKLER STATUS: Working
GAS STATUS : No Gas Leakage is Detected
EXHAUST FAN STATUS : Not Working

CLOUDANT:

db

Document ID | Options | { } JSON

All Documents
Query
Permissions
Changes
Design Documents

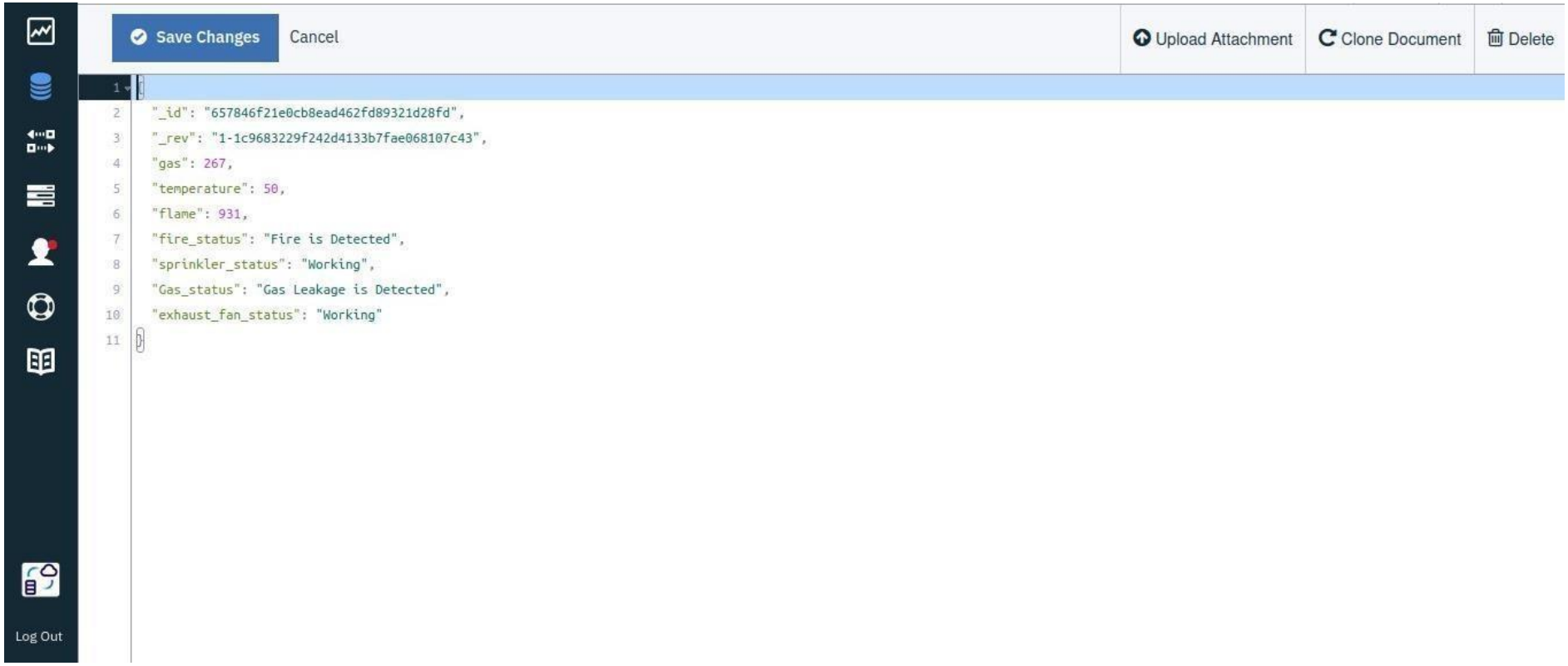
Table | Metadata | { } JSON

Create Document

id	key	value
657846f21e0cb8ead462fd89321d28...	657846f21e0cb8ead462fd89321d28...	{ "rev": "1-1c9683229f242d4133b7f...
657846f21e0cb8ead462fd89321dd3...	657846f21e0cb8ead462fd89321dd3...	{ "rev": "1-8aeee9d453a632f539ee9c...
657846f21e0cb8ead462fd8932201e...	657846f21e0cb8ead462fd8932201e...	{ "rev": "1-7b6df30912cf9fde43ca8b...
657846f21e0cb8ead462fd8932203d...	657846f21e0cb8ead462fd8932203d...	{ "rev": "1-a9bec25d7f94ccc71ce692...
70ea2e4bb2a9c635be3ce2603a25a...	70ea2e4bb2a9c635be3ce2603a25a...	{ "rev": "1-b567b4cce122c31e1666fc...
70ea2e4bb2a9c635be3ce2603a268...	70ea2e4bb2a9c635be3ce2603a268...	{ "rev": "1-217497b95c16c3d228800...
70ea2e4bb2a9c635be3ce2603a272...	70ea2e4bb2a9c635be3ce2603a272...	{ "rev": "1-a01738b27517a2bb4b93b...
70ea2e4bb2a9c635be3ce2603a273...	70ea2e4bb2a9c635be3ce2603a273...	{ "rev": "1-13230a9f364a021a02422...
7170def319e06e12e85b74c728897...	7170def319e06e12e85b74c728897...	{ "rev": "1-4bdfcbf4dbbf888784fc24d...
7170def319e06e12e85b74c7288b7...	7170def319e06e12e85b74c7288b7...	{ "rev": "1-5b1a46d23a6c259bd5b97...
7170def319e06e12e85b74c7288c2...	7170def319e06e12e85b74c7288c2...	{ "rev": "1-783ab5b4e98aed22641a1...

Showing document 1 - 20. Documents per page: 20

Log Out




```
{
  "_id": "657846f21e0cb8ead462fd89321d28fd",
  "_rev": "1-1c9683229f242d4133b7fae068107c43",
  "gas": 267,
  "temperature": 50,
  "flame": 931,
  "fire_status": "Fire is Detected",
  "sprinkler_status": "Working",
  "Gas_status": "Gas Leakage is Detected",
  "exhaust_fan_status": "Working"
}
```


CODE:

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

#define ORG "88653s"
#define DEVICE_TYPE "iot_device"
#define DEVICE_ID "wokwi_us"
#define TOKEN ")l(u!YYO)NmKr9sk(k"
```

```
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);

float temperature = 0; int
gas = 0; int flame
= 0;
String flame_status = "";


String Gas_status = "";
String exhaust_fan_status = "";
String sprinkler_status = "";


void setup() { Serial.begin(99900);
wifiConnect();      mqttConnect();
}
void loop() {

srand(time(0));

    //initial variables and random generated data

    temperature = random(-20,125);     gas =
random(0,1000);      int              flamereading              =
random(200,1024);  flame =
```

```
map(flamereading,200,1024,0,2);

   //set a flame status switch
(flame)      {      case      0:
flame_status  =  "No  Fire";
break;     case 1:
flame_status = "Fire is Detected"; break;
   }

   //send the sprinkler status

   if(flame==1){
      sprinkler_status = "Working";
   }
else{ sprinkler_status = "Not Working";

   }

   //toggle the fan according to gas reading

   if(gas > 100){
      Gas_status = "Gas Leakage is Detected"; exhaust_fan_status
= "Working";
   }
else{
      Gas_status    =    "No    Gas    Leakage    is    Detected";
exhaust_fan_status = "Not Working";

   }
```

//Wokwi Project

```
#include <WiFi.h>//library for wifi
#include <PubSubClient.h>//library for MQtt
#include "DHT.h"// Library for dht sensor
#define DHTPIN 15     // what pin we're connected to
#define DHTTYPE DHT22 // define type of sensor DHT 22
#define LED 14

DHT dht (DHTPIN, DHTTYPE);// creating the instance by passing pin and typr of dht
connected
 void callback(char* subscribetopic, byte* payload, unsigned int
payloadLength);

//-------credentials of IBM Accounts------

#define ORG "88653s"//IBM ORGANITION ID
#define DEVICE_TYPE "iot_device"//Device type mentioned in ibm watson IOT
Platform
#define DEVICE_ID "wokwi_us"//Device ID mentioned in ibm watson IOT Platform
#define TOKEN ")l(u!YYO)NmKr9sk(k" //Token
String data3; float
h,  t;  const  float
BETA  =  3950;  //
should  match  the
```

```
Beta Coefficient of
the thermistor

//-------- Customise the above values -------- char server[] = ORG
".messaging.internetofthings.ibmcloud.com";// Server Name char publishTopic[] =
"iot-2/evt/Data/fmt/json"; // topic name and type of event perform and format
in which data to be send
char subscribetopic[] = "iot-2/cmd/test/fmt/String"; // cmd REPRESENT command
type AND COMMAND IS TEST OF FORMAT STRING
char authMethod[] = "use-token-auth"; // authentication method
char token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID; //client id

//-----------------------------------
WiFiClient wifiClient; // creating the instance for wificlient
PubSubClient client(server, 1883, callback ,wifiClient); //calling the predefined
client id by passing parameter like server id,portand wificredential
 void setup() // configureing the ESP32

{
  Serial.begin(115200);
  dht.begin(); delay(10);
  Serial.println();
  wificonnect();
  mqttconnect();
  Serial.begin(9600);
```

```
  analogReadResolution(10
  ); pinMode(18,INPUT);
  pinMode(14,OUTPUT);
  pinMode(12,OUTPUT);
}
void loop() // Recursive
Function
{
h = dht.readHumidity(); t =
  dht.readTemperature();
  Serial.print("Temperature:")
  ;
  Serial.println(t);
  Serial.print("Humidity:");
  Serial.println(h);

  PublishData(t, h);
  delay(1000); if
  (!client.loop()) {
    mqttconnect();
  }

//...............Analog Temperature Sensor....................
int analogValue = analogRead(18);
  float celsius = 1 / (log(1 /
  (1023. / analogValue - 1)) /
  BETA + 1.0 / 298.15)
```

```
+ 36.4;
  Serial.print("Temperature: ");
  Serial.print(celsius);
  Serial.println(" ℃");
  Serial.print("Alert..!");
 if(celsius >= 35)
    digitalWrite(14, HIGH);
  else
    digitalWrite(14, LOW);
  delay(1000);

}

/*.................................retrieving to
Cloud. ........................... */
 void PublishData(float temp, float humid)
{
  mqttconnect(); //function call for connecting to ibm

  /* creating the String in in form JSon to update the data to ibm cloud
  */

  String payload = "{\"Data\":{\"temperature\":";
  payload += temp;
  payload += "," "\"humidity\":";
  payload += humid; payload
  += "}}";
```

```
  Serial.print("Sending payload: ");
  Serial.println(payload);

 if (client.publish(publishTopic, (char*) payload.c_str())) {
    Serial.println("Publish ok"); // if it sucessfully upload data on the cloud
then it will print publish ok in Serial monitor or else it will print publish
failed
    Serial.println("If Temperature increased,the alarm and alert light would
indicates. ");
  } 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() //function defination for wificonnect
```

```
{
  Serial.println();
  Serial.print("Connecting to ");

  WiFi.begin("Wokwi-GUEST", "", 6);//passing the wifi credentials to
establish the connection 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);
  if(data3=="lighton") {
Serial.println(data3); digitalWrite(LED,HIGH);

  }
 else
  {
Serial.println(data3); digitalWrite(LED,LOW);

  } data3="";
}
```

```
//json format for IBM Watson

String payload = "{";      payload+="\"gas\":";
payload+=gas;                          payload+=",";
payload+="\"temperature\":";
payload+=(int)temperature;             payload+=",";
payload+="\"flame\":";         payload+=flamereading;
payload+=",";
```

```
  payload+="\"fire_status\":\""+flame_status+"\",";
  payload+="\"sprinkler_status\":\""+sprinkler_status+"\
  ","; payload+="\"Gas_status\":\""+Gas_status+"\",";
      payload+="\"exhaust_fan_status\":\""+exhaust_fan_status+"\"}";

      if(client.publish(publishTopic, (char*) payload.c_str()))
      {
          Serial.println("Publish OK");
      }  else{
          Serial.println("Publish failed");
      }
      delay(1000);

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();
  }
}

//.........Project Data in json Format. ..... /
{
  "version": 1,
  "author": "T S Karthick",
  "editor": "wokwi",
  "parts": [
    { "type": "wokwi-esp32-devkit-v1", "id": "esp", "top": 10, "left": -60.67, "attrs": {} },
    {
```

"type": "wokwi-led",
"id": "led1", "top":
-109,
"left": -244.4,
"attrs": { "color": "red" } },
{
"type": "wokwi-dht22",
"id": "dht1",
"top": -70.9,
"left": 157.2,
"attrs": { "temperature": "36.4", "humidity": "46.5" }
},
{
"type": "wokwi-ntc-temperature-sensor",
"id": "ntc1",
"top": -69.55,
"left": 253.55,
"rotate": 90,
"attrs": {}
},
{
"type": "wokwi-resistor",
"id": "r1",
"top": 169.5,
"left": -190.59,
"attrs": { "value": "5600" }
},
{
"type": "wokwi-buzzer",
"id": "bz1",

```
      "top": -118.83,
      "left": -378.64,
      "attrs": { "volume": "0.1" }
    }
  ],
  "connections": [
    [ "esp:TX0", "$serialMonitor:RX", "", [] ],
    [ "esp:RX0", "$serialMonitor:TX", "", [] ],
    [ "dht1:GND", "esp:GND.1", "black", [ "v0" ] ],
    [ "dht1:SDA", "esp:D15", "green", [ "v0" ] ],
    [ "ntc1:GND", "esp:GND.1", "black", [ "v0" ] ],
    [ "ntc1:VCC", "esp:3V3", "red", [ "v0" ] ],
    [ "led1:C", "r1:1", "black", [ "v0" ] ],
    [ "r1:2", "esp:GND.2", "black", [ "v0" ] ],
    [ "led1:A", "esp:D14", "green", [ "v-0.86", "h89.56", "v199.46" ] ],
    [ "ntc1:OUT", "esp:D18", "green", [ "v0" ] ],
    [ "bz1:1", "esp:GND.2", "black", [ "v0" ] ],
    [ "bz1:2", "esp:D14", "green", [ "v0" ] ],
    [ "dht1:VCC", "esp:3V3", "red", [ "v0" ] ],
    [ "dht1:NC", "dht1:GND", "black", [ "v0" ] ]
  ]
}
```


//.....Python Script for Random Outputs of Temperature and Humidity.....

```
import  time  import  sys
import
```

```
ibmiotf.application
import ibmiotf.device
import random


#Provide your IBM Watson Device Credentials organization
= "bxobbs"
deviceType = "b5ibm"
deviceId = "b5device"
authMethod = "token"
authToken = "b55m1eibm"

# Initialize GPIO


def myCommandCallback(cmd): print("Command
    received: %s" % cmd.data['command'])
    status=cmd.data['command'] if status=="lighton":
        print ("led is on")
    else : print ("led is
        off")

    #print(cmd)




try:
        deviceOptions = {"org": organization, "type": deviceType, "id": deviceId, "auth-method": authMethod, "auth-
```

```
token":          authToken}          deviceCli          =
    ibmiotf.device.Client(deviceOptions)
    #..............................................

except Exception as e:
    print("Caught  exception  connecting  device:  %s"  %  str(e))
    sys.exit()


# Connect and send a datapoint "hello" with value "world" into the cloud as an event of type "greeting" 10 times
deviceCli.connect()

while True:
    #Get Sensor Data from DHT11

    temp=random.randint(0,100)
    Humid=random.randint(0,100)

    data = { 'temp' : temp, 'Humid': Humid }
    #print          data          def
    myOnPublishCallback():
        print ("Published Temperature = %s C" % temp, "Humidity = %s %%" % Humid, "to IBM Watson")

    success = deviceCli.publishEvent("IoTSensor", "json", data, qos=0, on_publish=myOnPublishCallback) if
    not success:
        print("Not connected to IoTF")
    time.sleep(1)

    deviceCli.commandCallback = myCommandCallback

#  Disconnect  the  device  and  application  from  the  cloud
deviceCli.disconnect()
```