Project Development Phase

Sprint - III

Date	11 November 2022
Team ID	PNT2022TMID15234
Project Name	Industry-Specific Intelligent Fire Management System

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

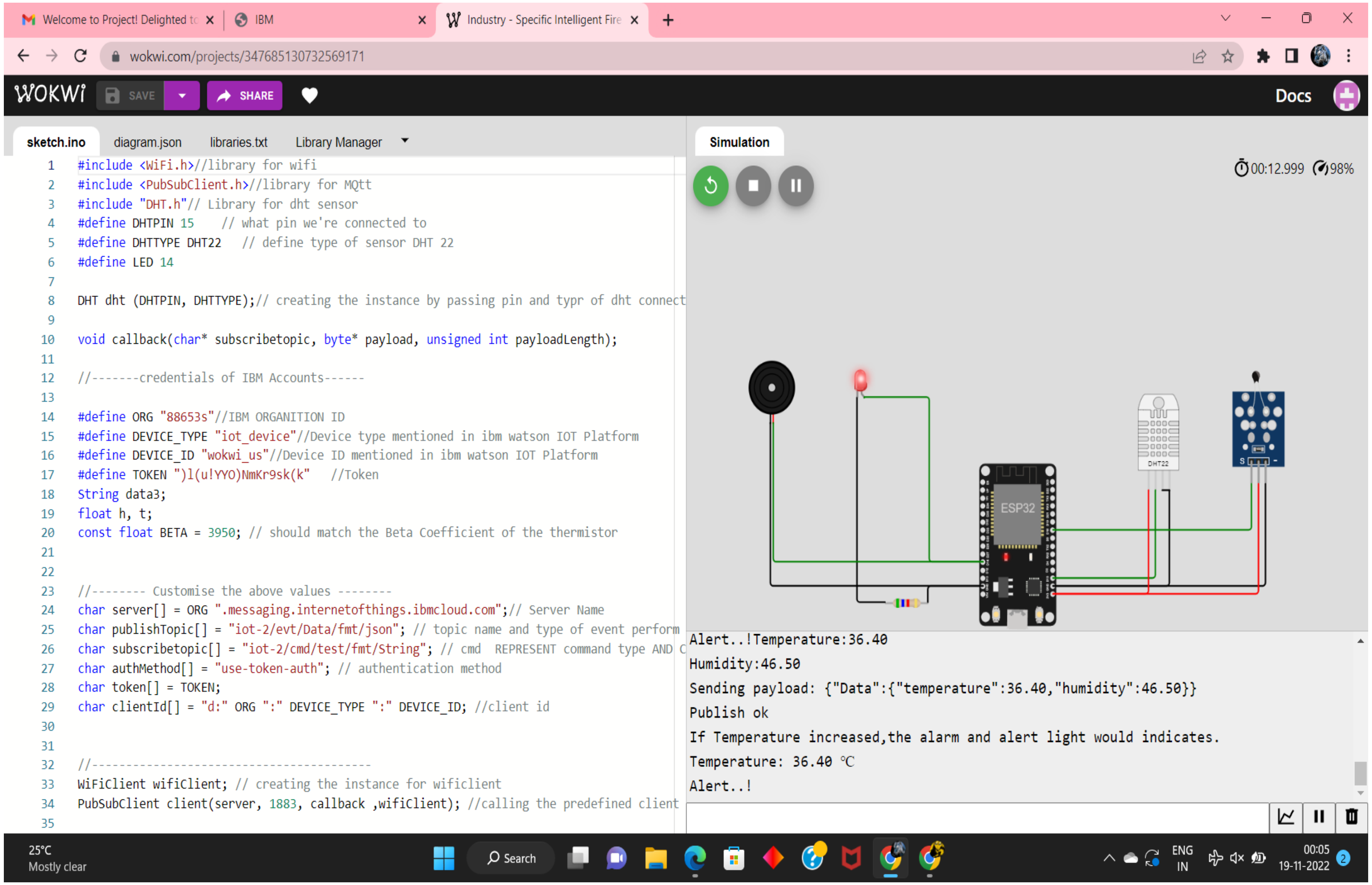
LINK: https://wokwi.com/projects/348658884417684052

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

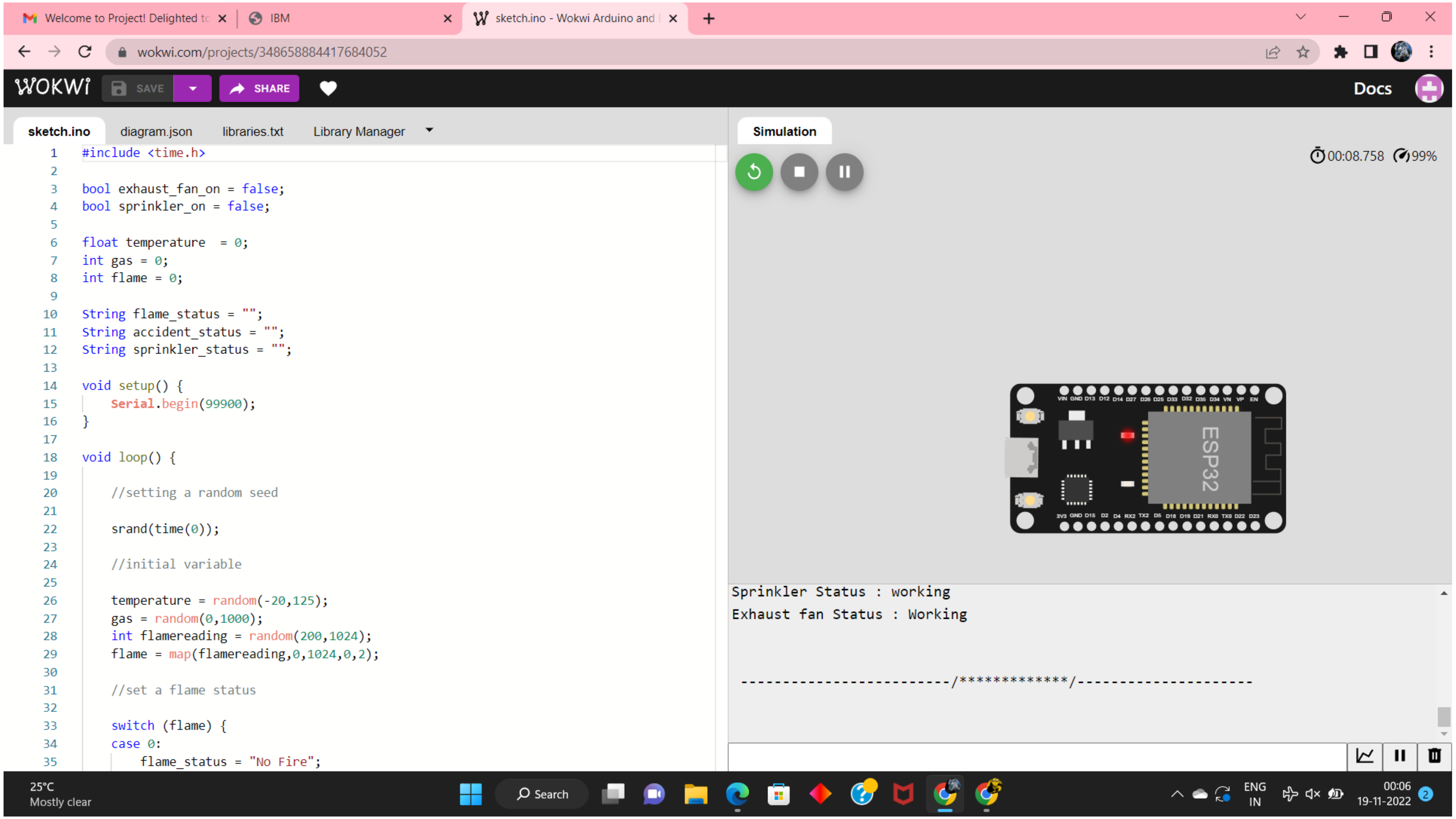


```
#include <WiFi.h>//library for wifi
#include <PubSubClient.h>//library for MQtt
#include "DHT.h"// Library for dht sensor
#define DHTPIN 15    // what pin we're connected to
#define DHTTYPE DHT22   // define type of sensor DHT 22
#define LED 14

DHT dht (DHTPIN, DHTTYPE);// creating the instance by passing pin and typr of dht connect

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
char subscribetopic[] = "iot-2/cmd/test/fmt/String"; // cmd  REPRESENT command type AND C
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
```

```
Alert..!Temperature:36.40
Humidity:46.50
Sending payload: {"Data":{"temperature":36.40,"humidity":46.50}}
Publish ok
If Temperature increased,the alarm and alert light would indicates.
Temperature: 36.40 ℃
Alert..!
```

OUTPUT:

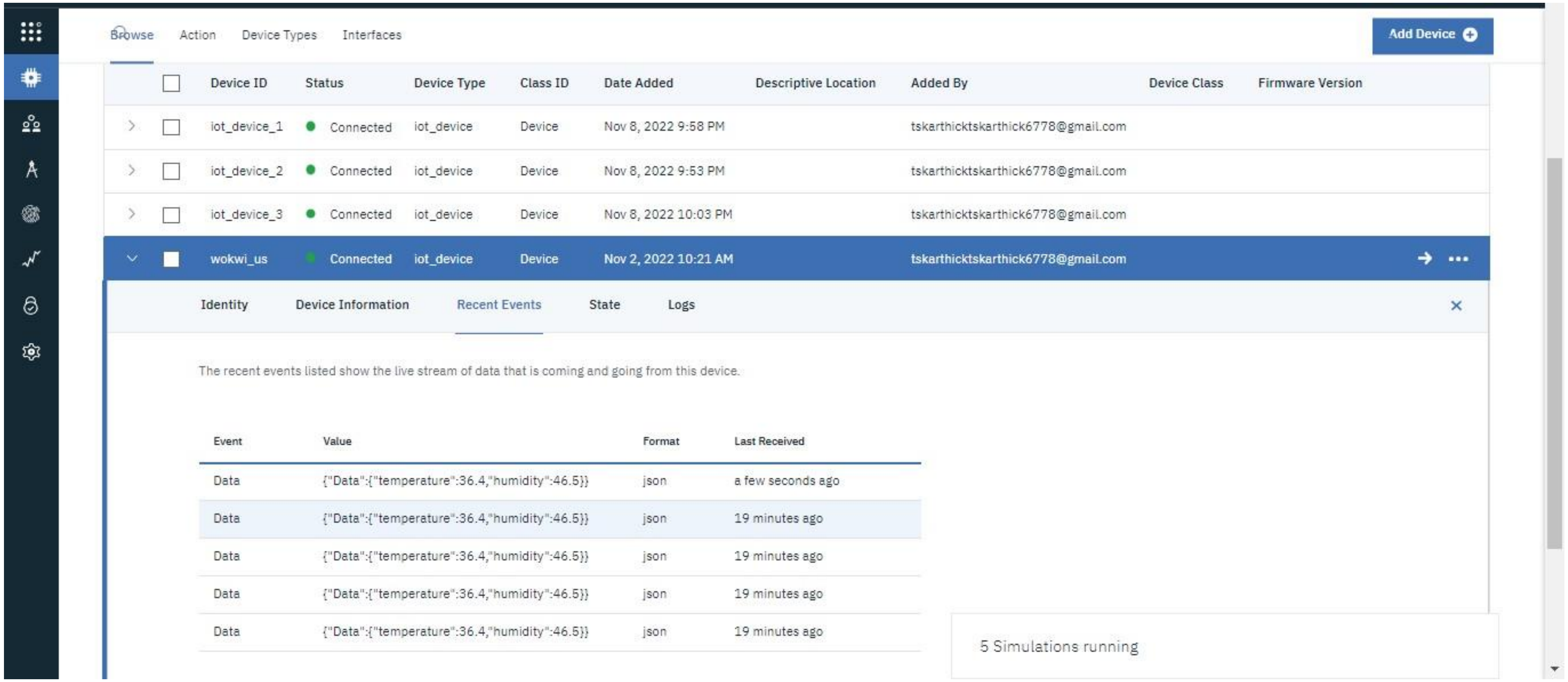
WOKWI SIMULATOR



```
#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";
```

```
Sprinkler Status : working
Exhaust fan Status : Working


 -----------------------------/*************/-------------------------
```

IBM WATSON OUTPUT



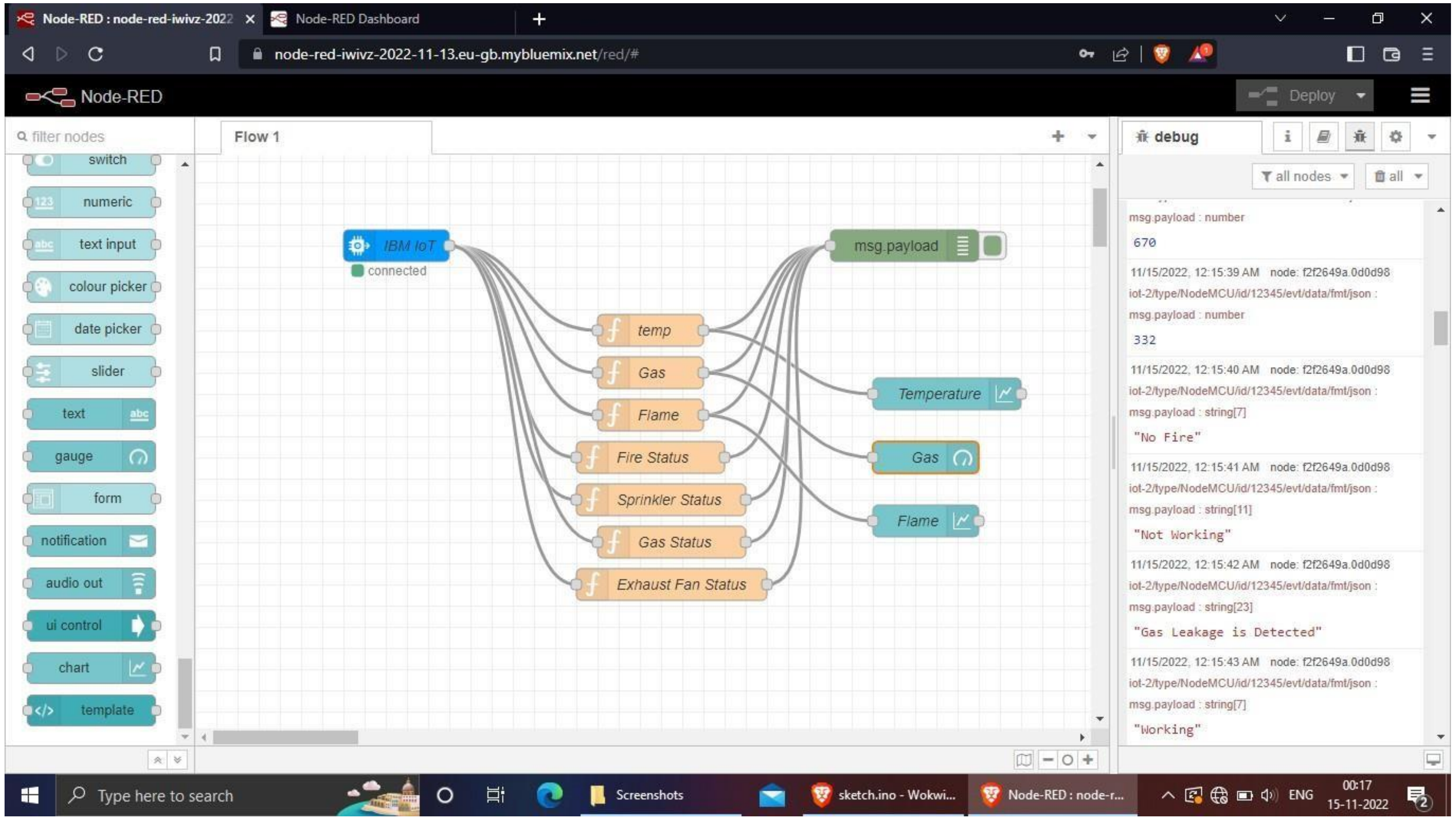
	Device ID	Status	Device Type	Class ID	Date Added	Descriptive Location	Added By	Device Class	Firmware Version
	iot_device_1	● Connected	iot_device	Device	Nov 8, 2022 9:58 PM		tskarthicktskarthick6778@gmail.com		
	iot_device_2	● Connected	iot_device	Device	Nov 8, 2022 9:53 PM		tskarthicktskarthick6778@gmail.com		
	iot_device_3	● Connected	iot_device	Device	Nov 8, 2022 10:03 PM		tskarthicktskarthick6778@gmail.com		
	wokwi_us	● Connected	iot_device	Device	Nov 2, 2022 10:21 AM		tskarthicktskarthick6778@gmail.com		

The recent events listed show the live stream of data that is coming and going from this device.

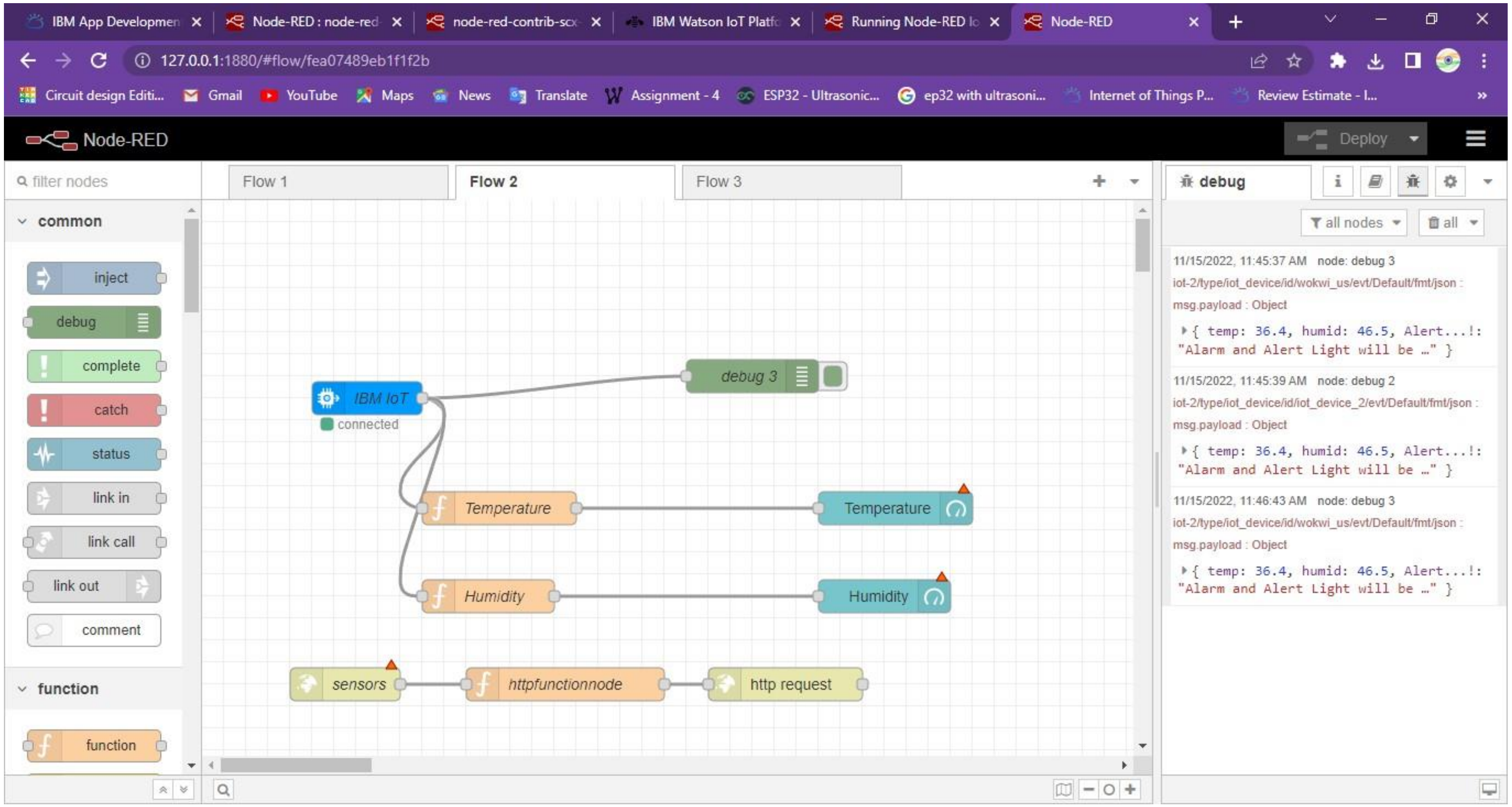
Event	Value	Format	Last Received
Data	{"Data":{"temperature":36.4,"humidity":46.5}}	json	a few seconds ago
Data	{"Data":{"temperature":36.4,"humidity":46.5}}	json	19 minutes ago
Data	{"Data":{"temperature":36.4,"humidity":46.5}}	json	19 minutes ago
Data	{"Data":{"temperature":36.4,"humidity":46.5}}	json	19 minutes ago
Data	{"Data":{"temperature":36.4,"humidity":46.5}}	json	19 minutes ago

5 Simulations running

TRANSFERRING DATA FROM IBM WATSON INTO NODE-RED

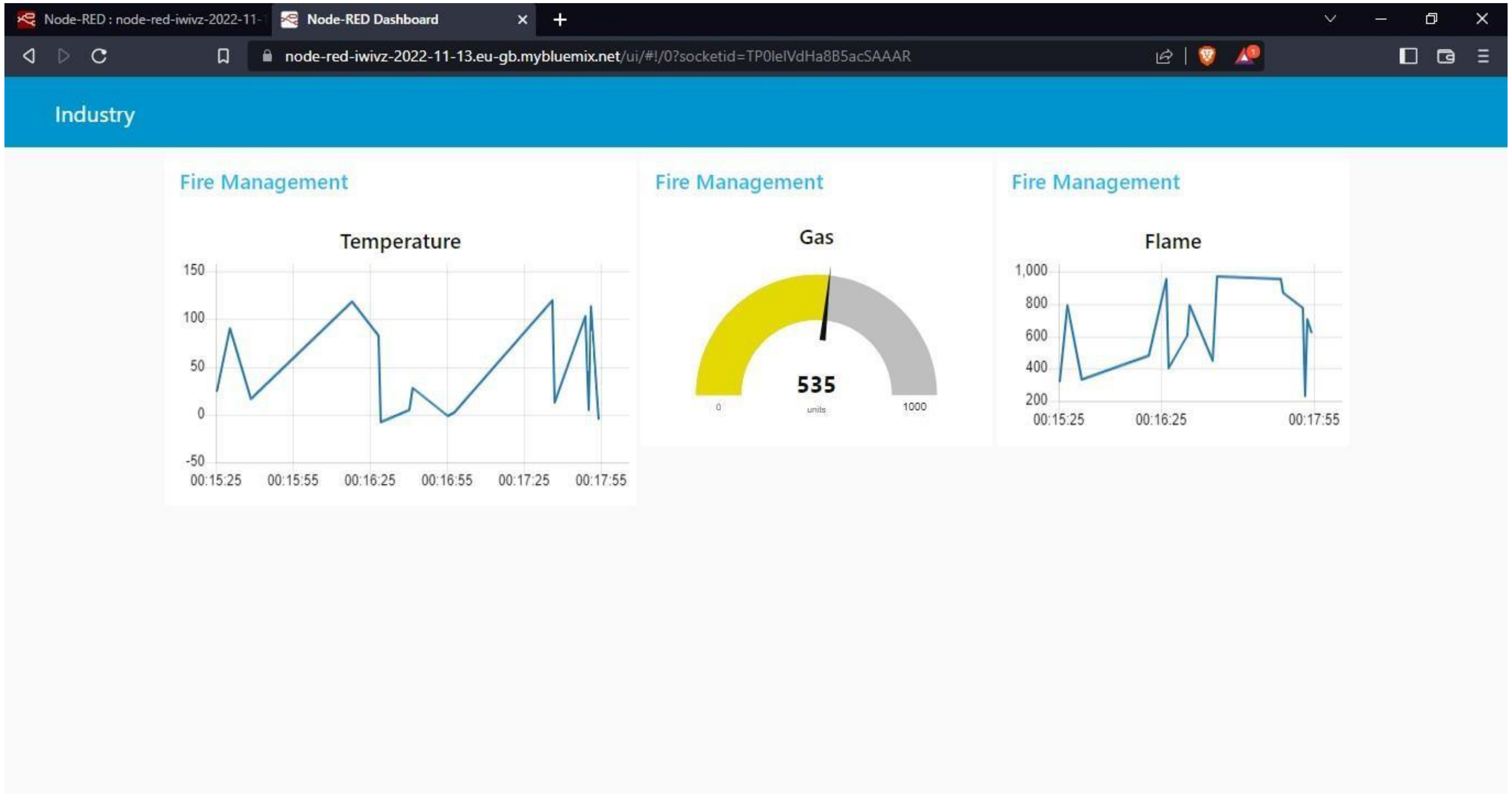


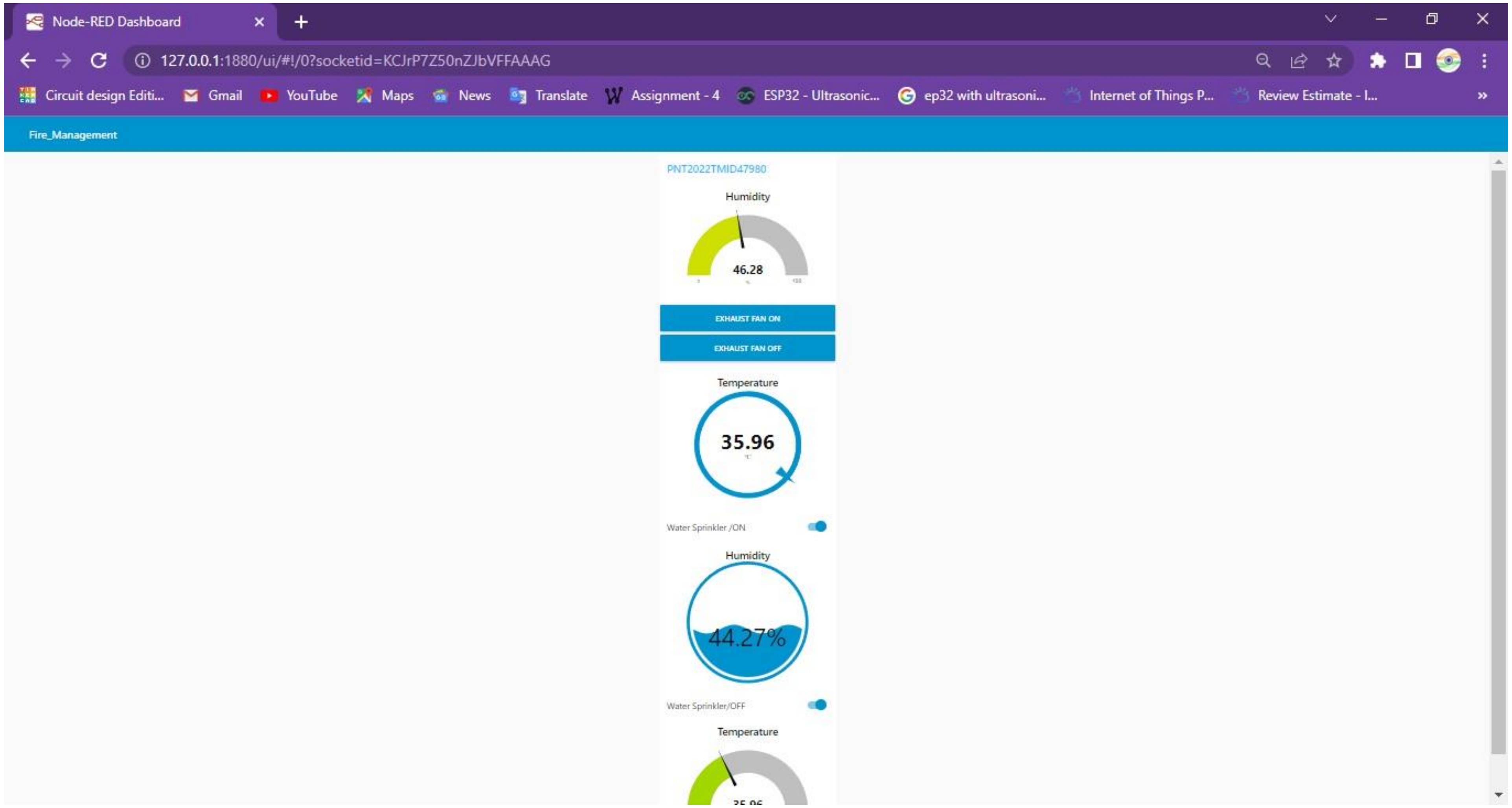
```
msg.payload : number
670
11/15/2022, 12:15:39 AM   node: f2f2649a.0d0d98
iot-2/type/NodeMCU/id/12345/evt/data/fmt/json :
msg.payload : number
332
11/15/2022, 12:15:40 AM   node: f2f2649a.0d0d98
iot-2/type/NodeMCU/id/12345/evt/data/fmt/json :
msg.payload : string[7]
"No Fire"
11/15/2022, 12:15:41 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"
```



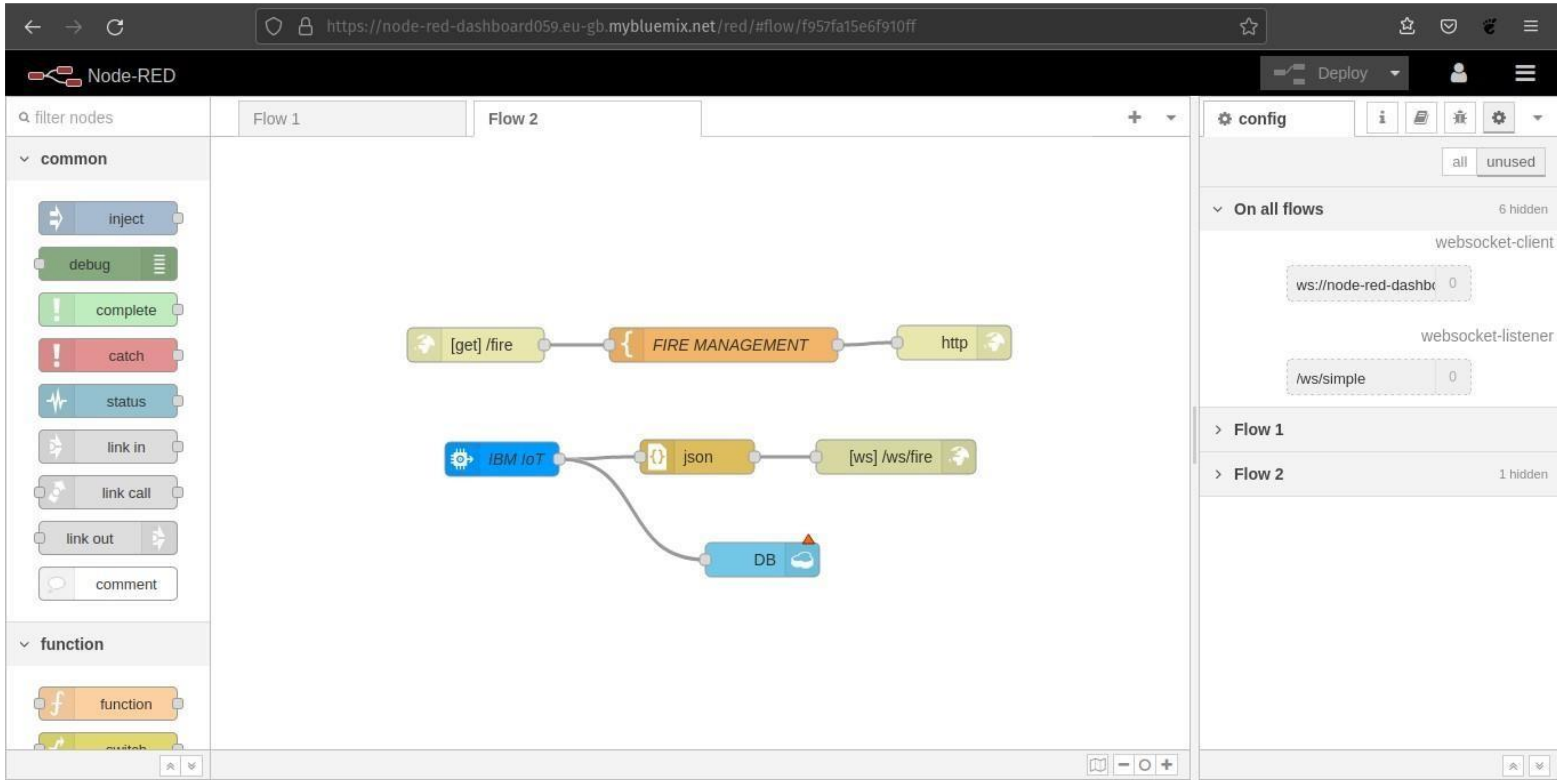
```
11/15/2022, 11:45:37 AM  node: debug 3
iot-2/type/iot_device/id/wokwi_us/evt/Default/fmt/json :
msg.payload : Object
▸{ temp: 36.4, humid: 46.5, Alert...!:
"Alarm and Alert Light will be …" }

11/15/2022, 11:45:39 AM  node: debug 2
iot-2/type/iot_device/id/iot_device_2/evt/Default/fmt/json :
msg.payload : Object
▸{ temp: 36.4, humid: 46.5, Alert...!:
"Alarm and Alert Light will be …" }

11/15/2022, 11:46:43 AM  node: debug 3
iot-2/type/iot_device/id/wokwi_us/evt/Default/fmt/json :
msg.payload : Object
▸{ temp: 36.4, humid: 46.5, Alert...!:
"Alarm and Alert Light will be …" }
```

NODE DASHBOARD



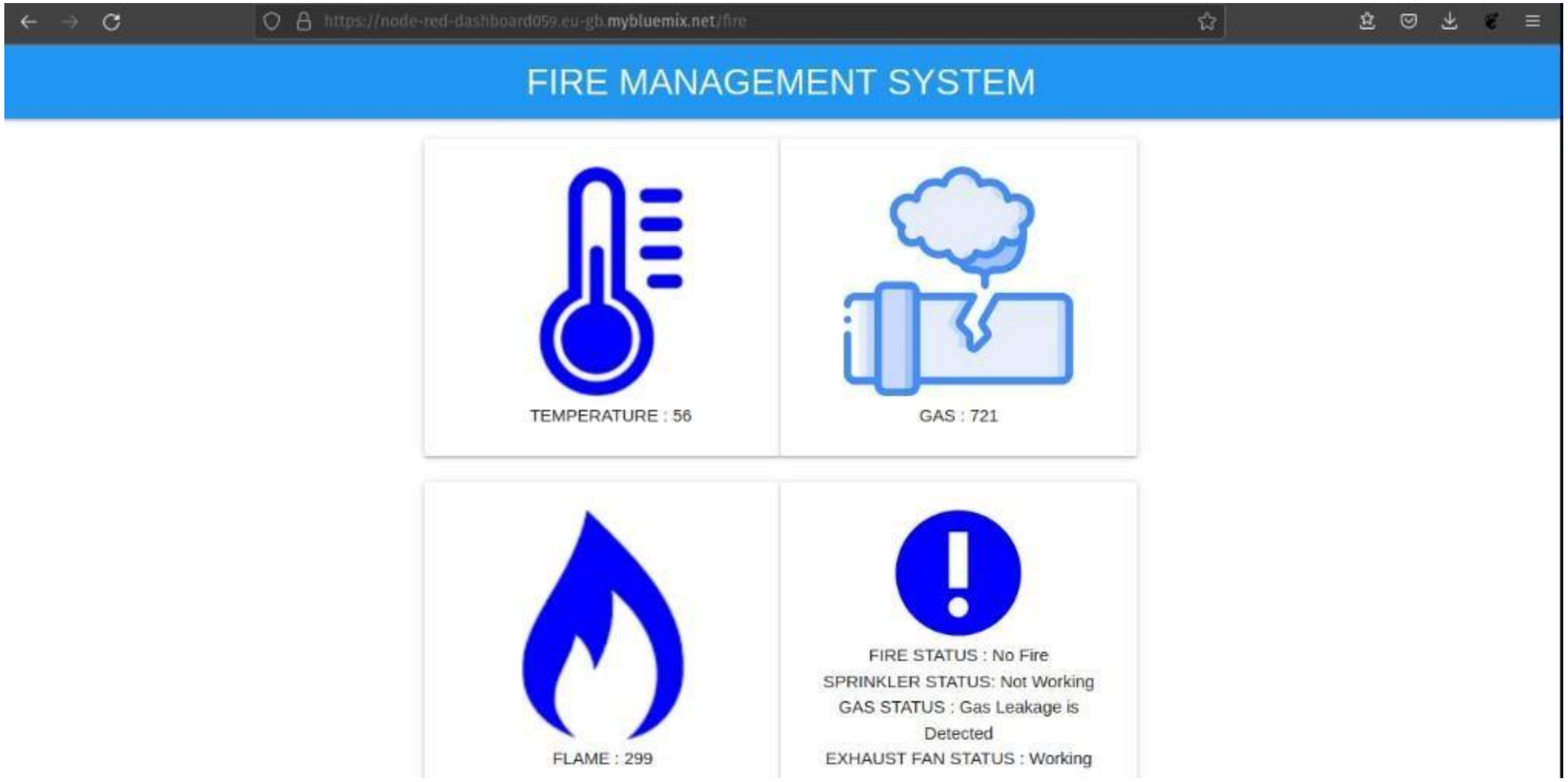

Node-RED Dashboard
127.0.0.1:1880/ui/#!/0?socketid=KCJrP7Z50nZJbVFFAAAG
Circuit design Editi...
Gmail
YouTube
Maps
News
Translate
Assignment - 4
ESP32 - Ultrasonic...
ep32 with ultrasoni...
Internet of Things P...
Review Estimate - I...
Fire_Management
PNT2022TMID47980
Humidity
46.28
EXHAUST FAN ON
EXHAUST FAN OFF
Temperature
35.96
Water Sprinkler /ON
Humidity
44.27%
Water Sprinkler/OFF
Temperature

TRANSFERRING DATA FROM NODE-RED INTO WEB UI



WEB UI

DESKTOP VIEW



FIRE MANAGEMENT SYSTEM

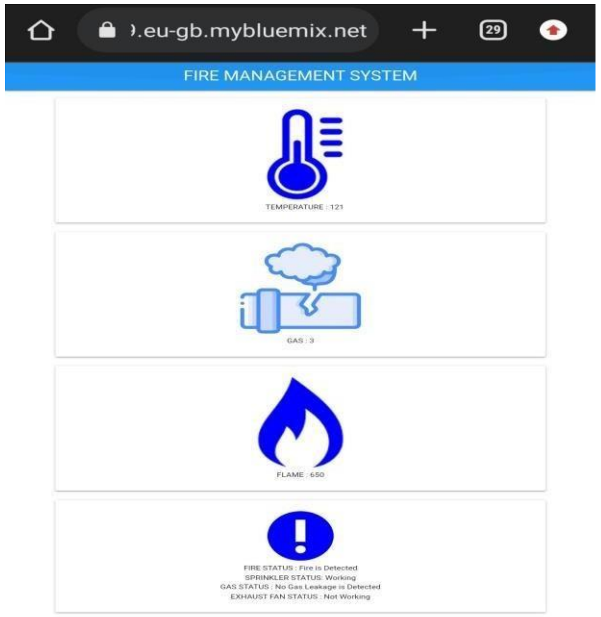
TEMPERATURE : 56

GAS : 721

FLAME : 299

FIRE STATUS : No Fire
SPRINKLER STATUS: Not Working
GAS STATUS : Gas Leakage is Detected
EXHAUST FAN STATUS : Working

<u>MOBILE VIEW</u>



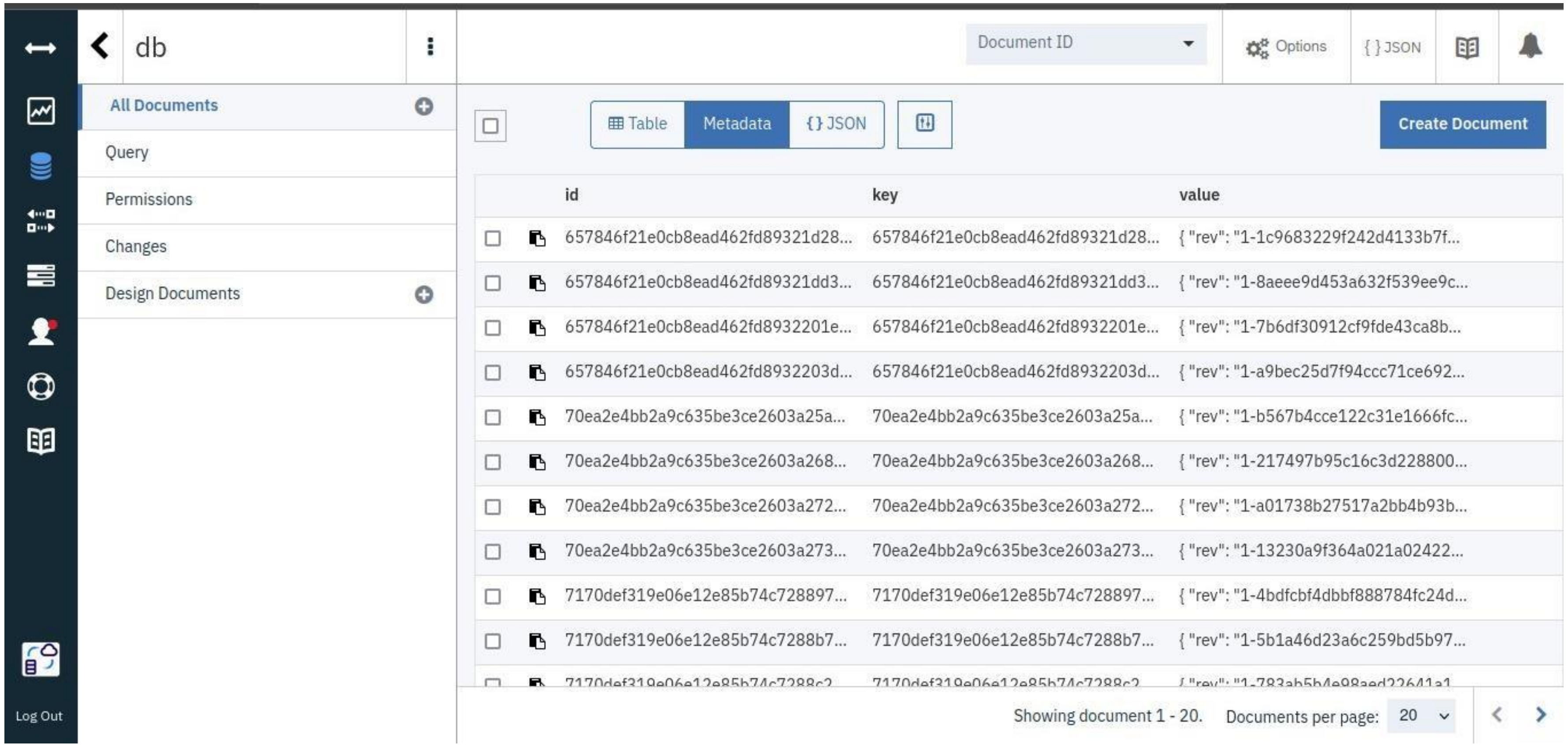
TEMPERATURE : 121

GAS : 3

FLAME : 650

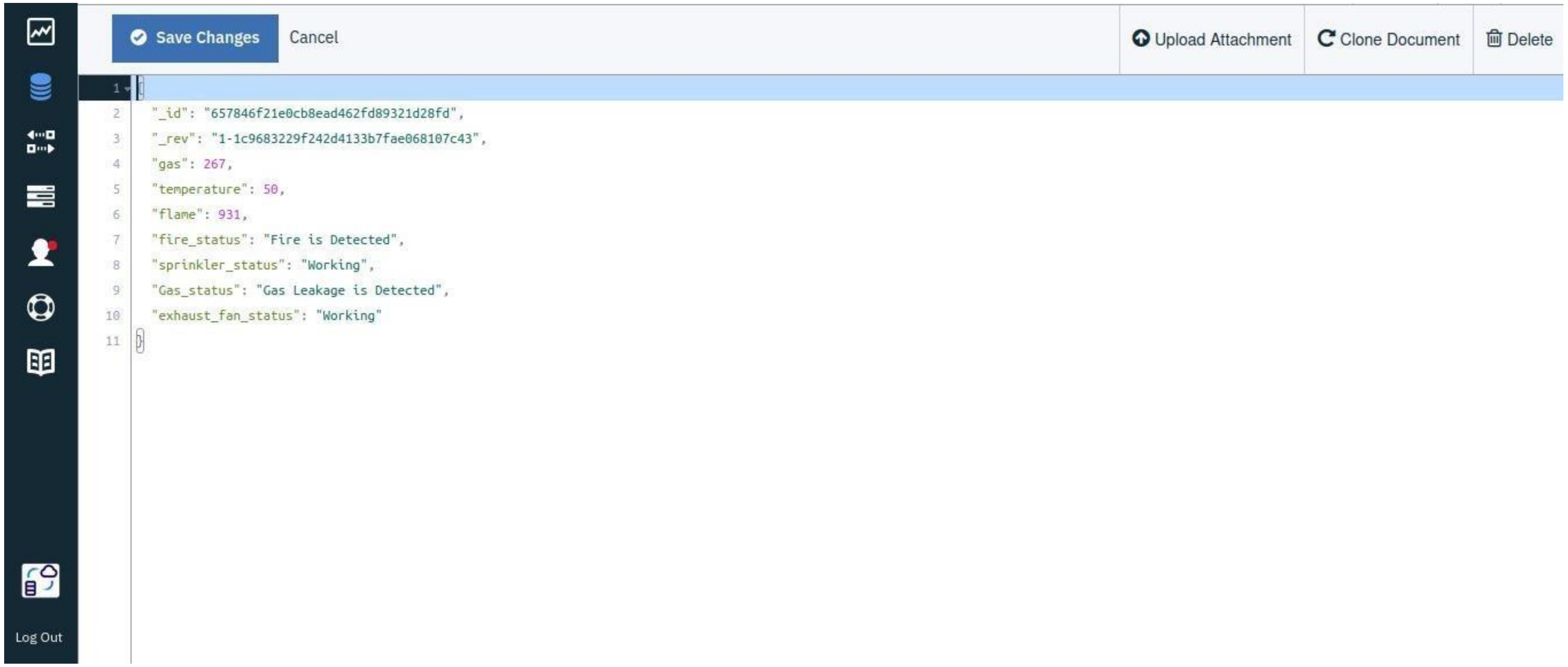
FIRE STATUS : Fire is Detected
SPRINKLER STATUS: Working
GAS STATUS : No Gas Leakage is Detected
EXHAUST FAN STATUS : Not Working

CLOUDANT:



	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



```
{
  "_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()
```