# Project Development Phase

## Sprint - III

| | |
|---|---|
| Date | 11 November 2022 |
| Team ID | PNT2022TMID47980 |
| Project Name | Industry-Specific Intelligent Fire Management System |

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

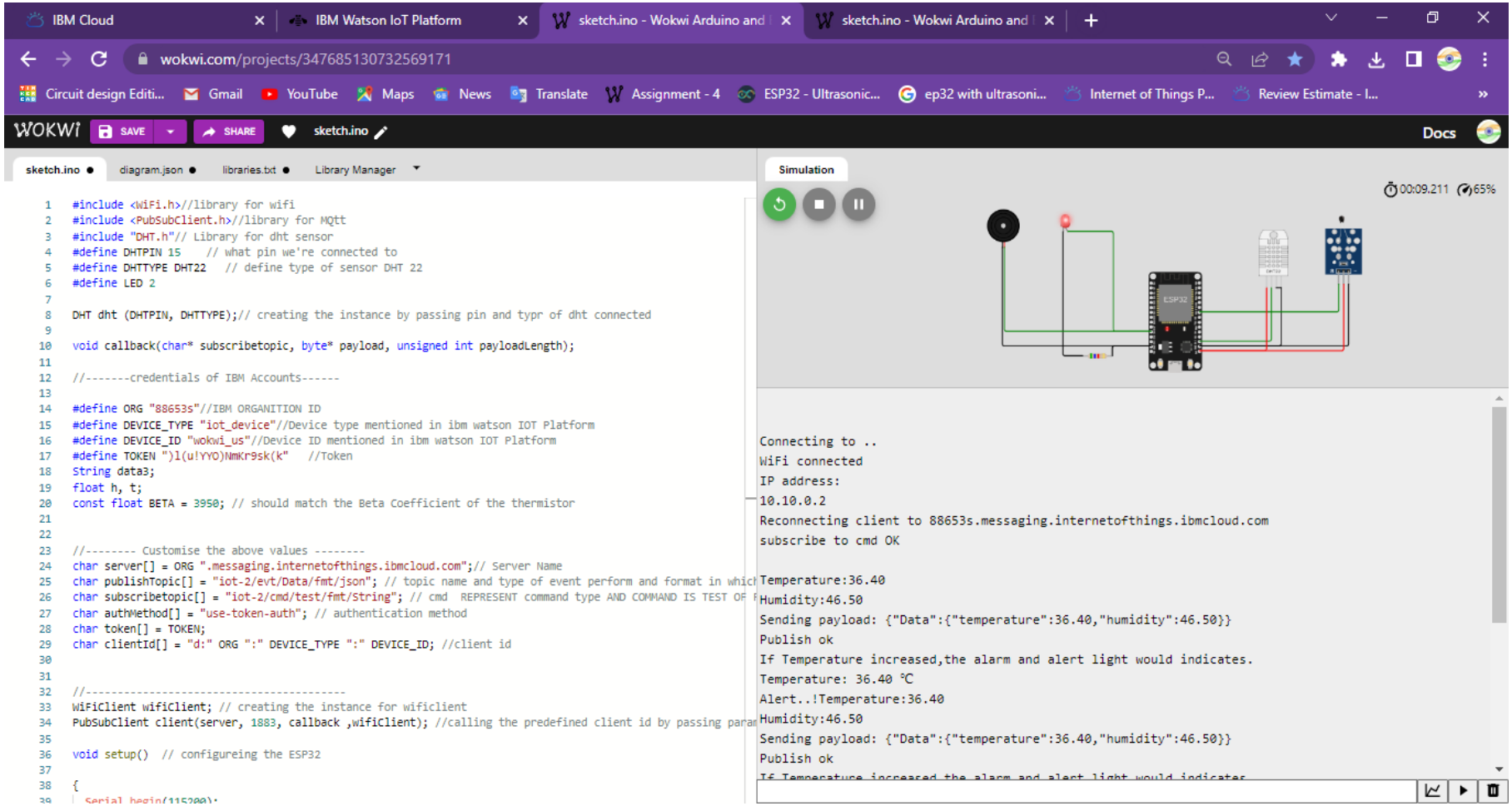
**LINK:** https://wokwi.com/projects/348658884417684052

**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

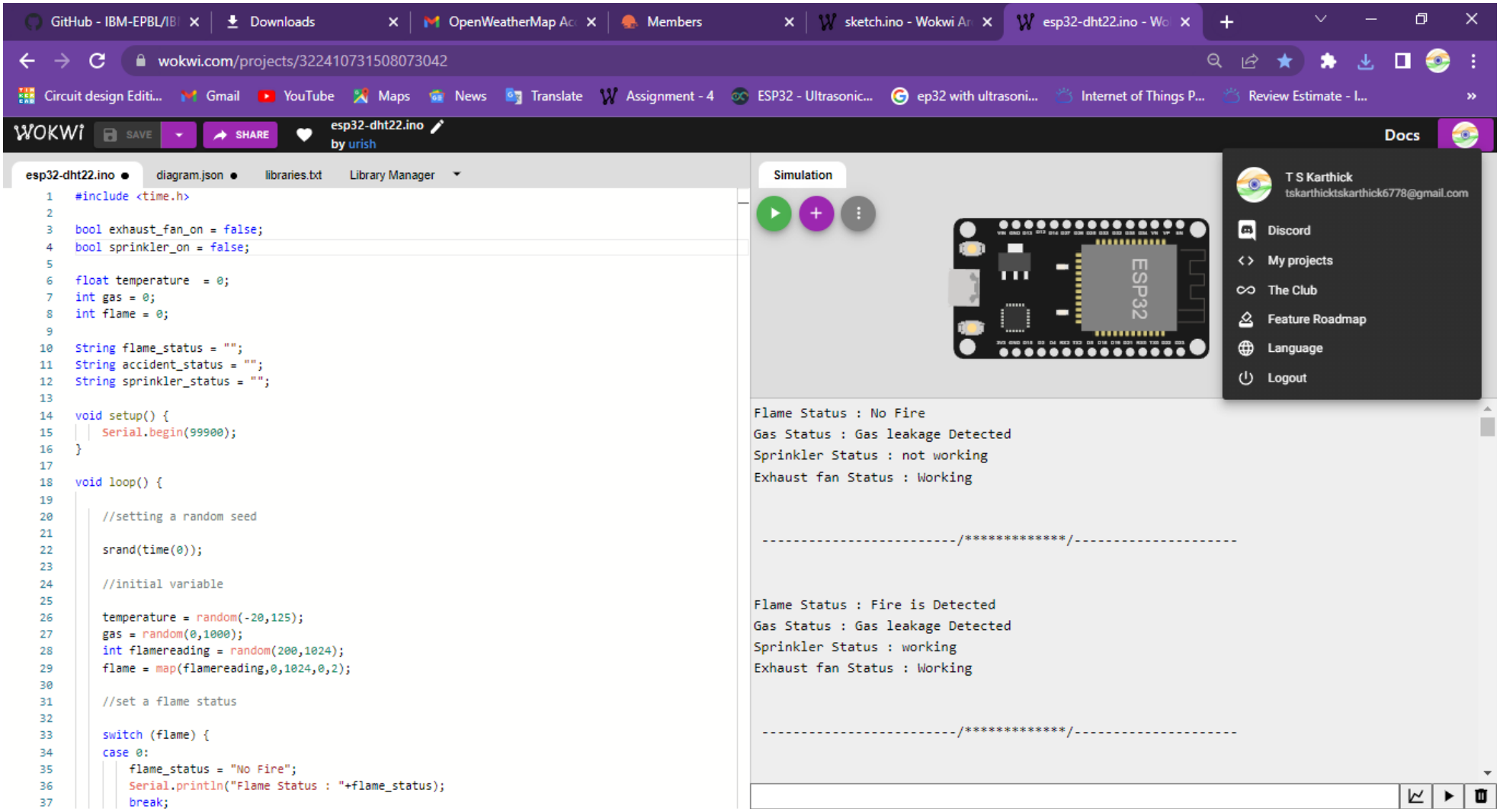
# OUTPUT:

## WOKWI SIMULATOR



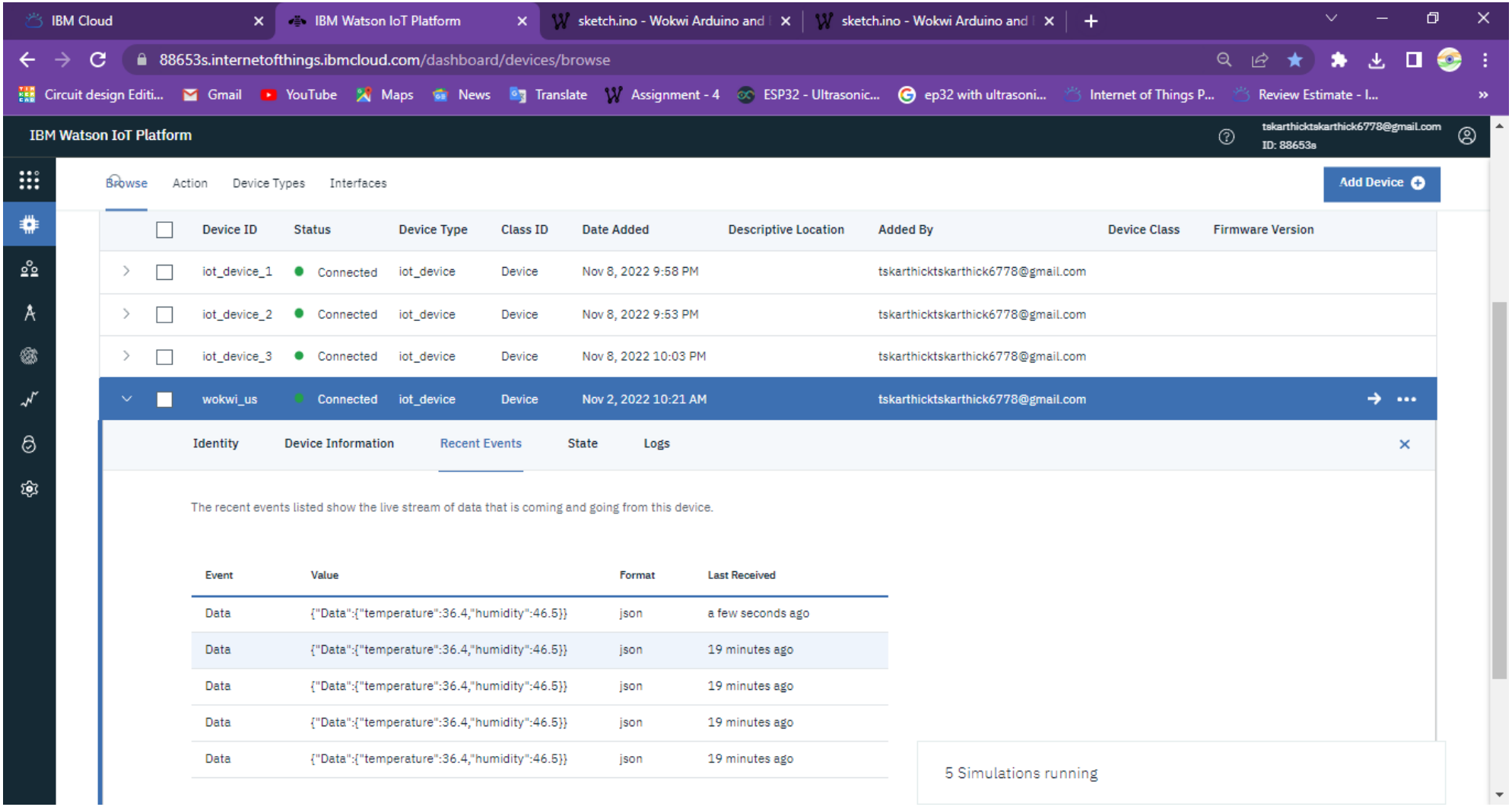
# OUTPUT:

## WOKWI SIMULATOR

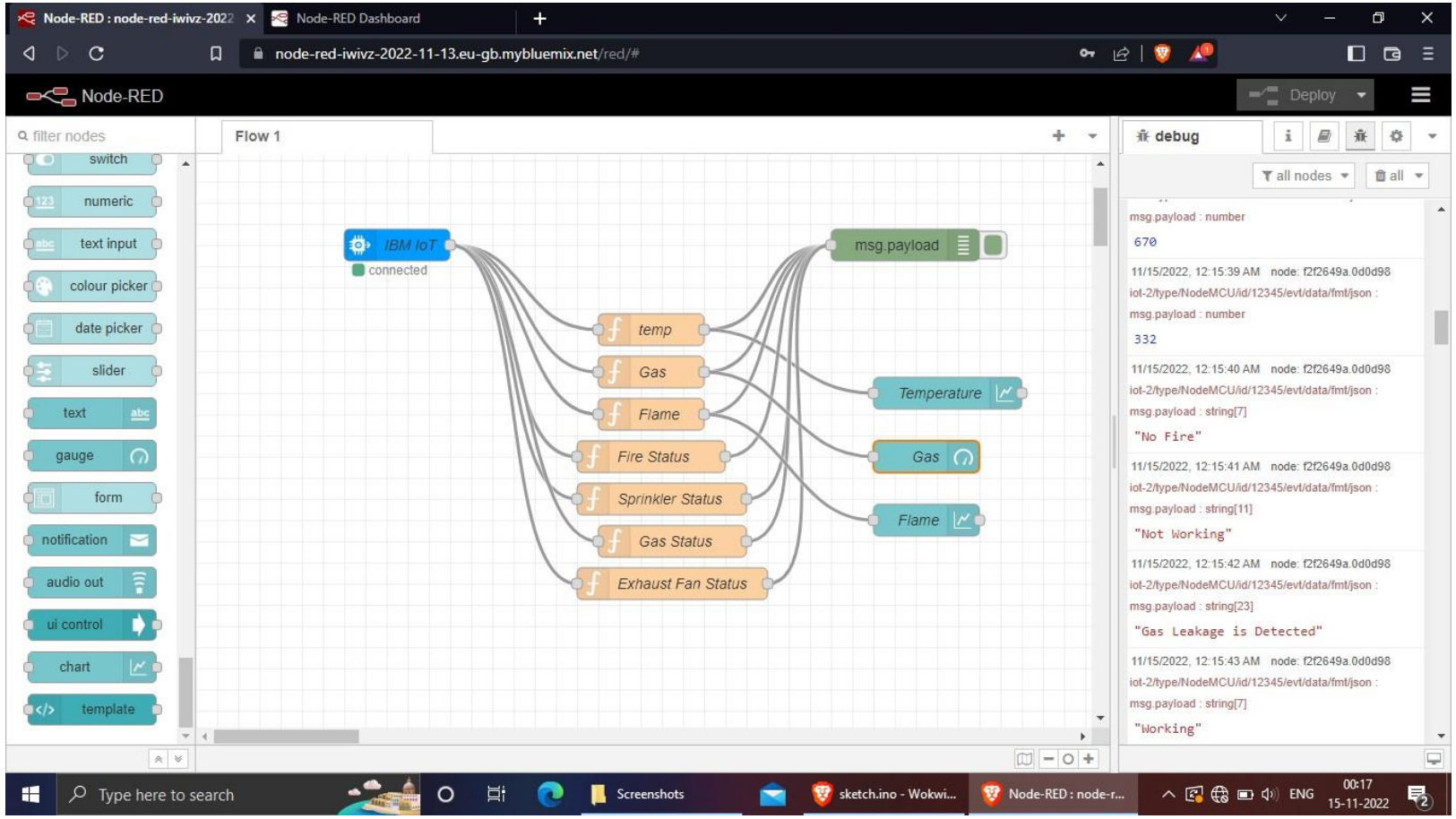


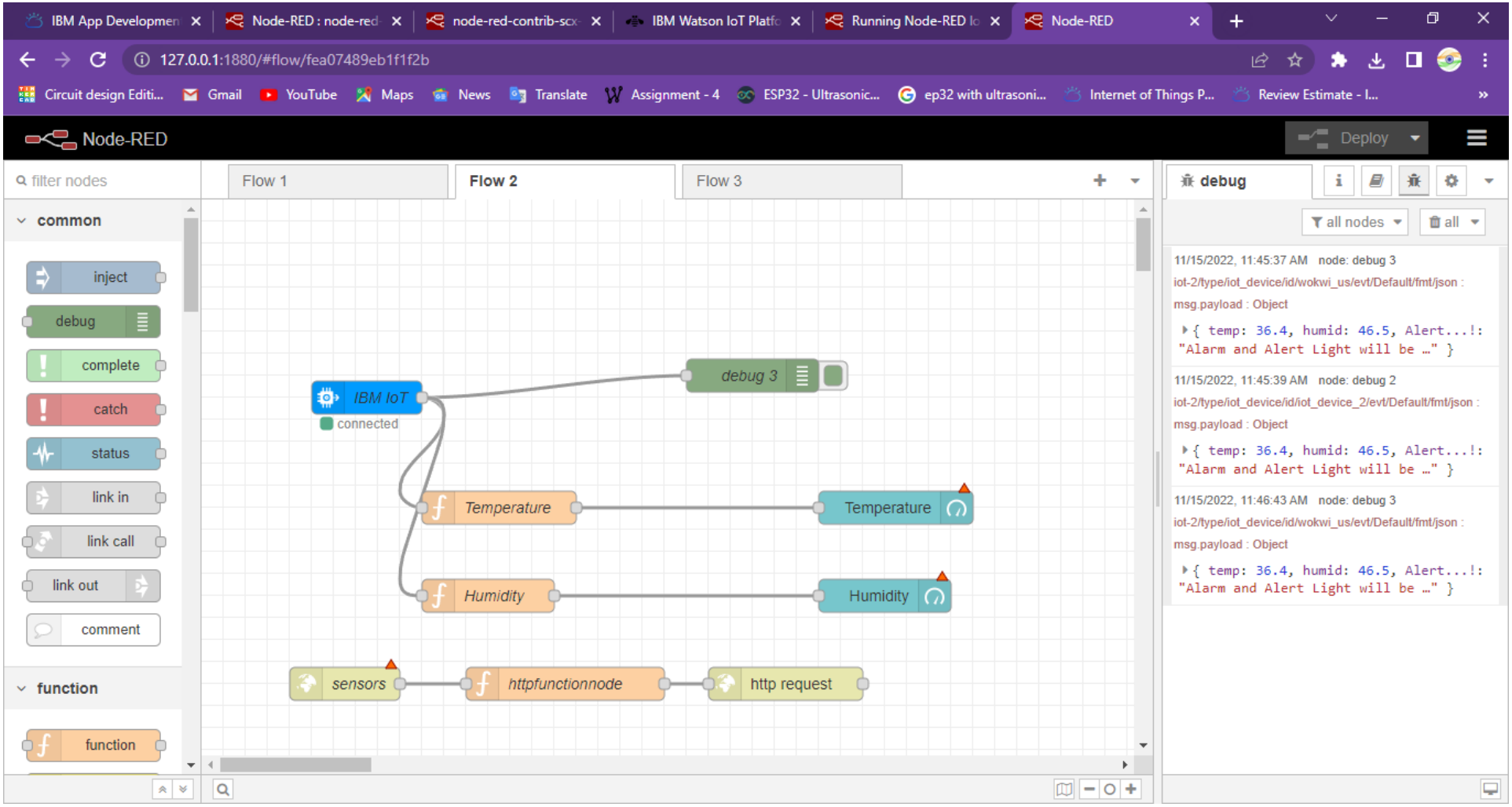

```
#include <time.h>

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";
        Serial.println("Flame Status : "+flame_status);
        break;
```

# IBM WATSON OUTPUT

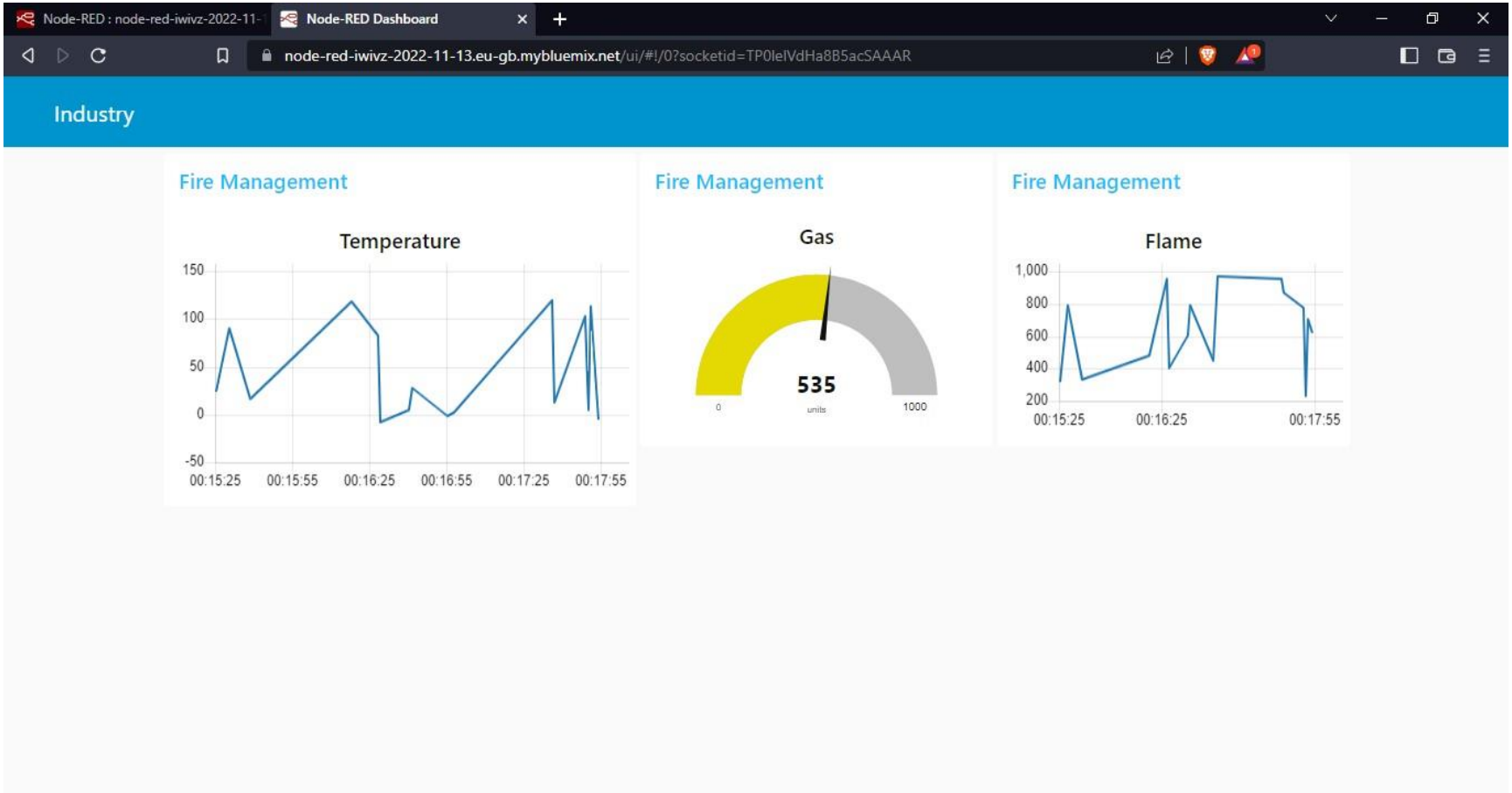


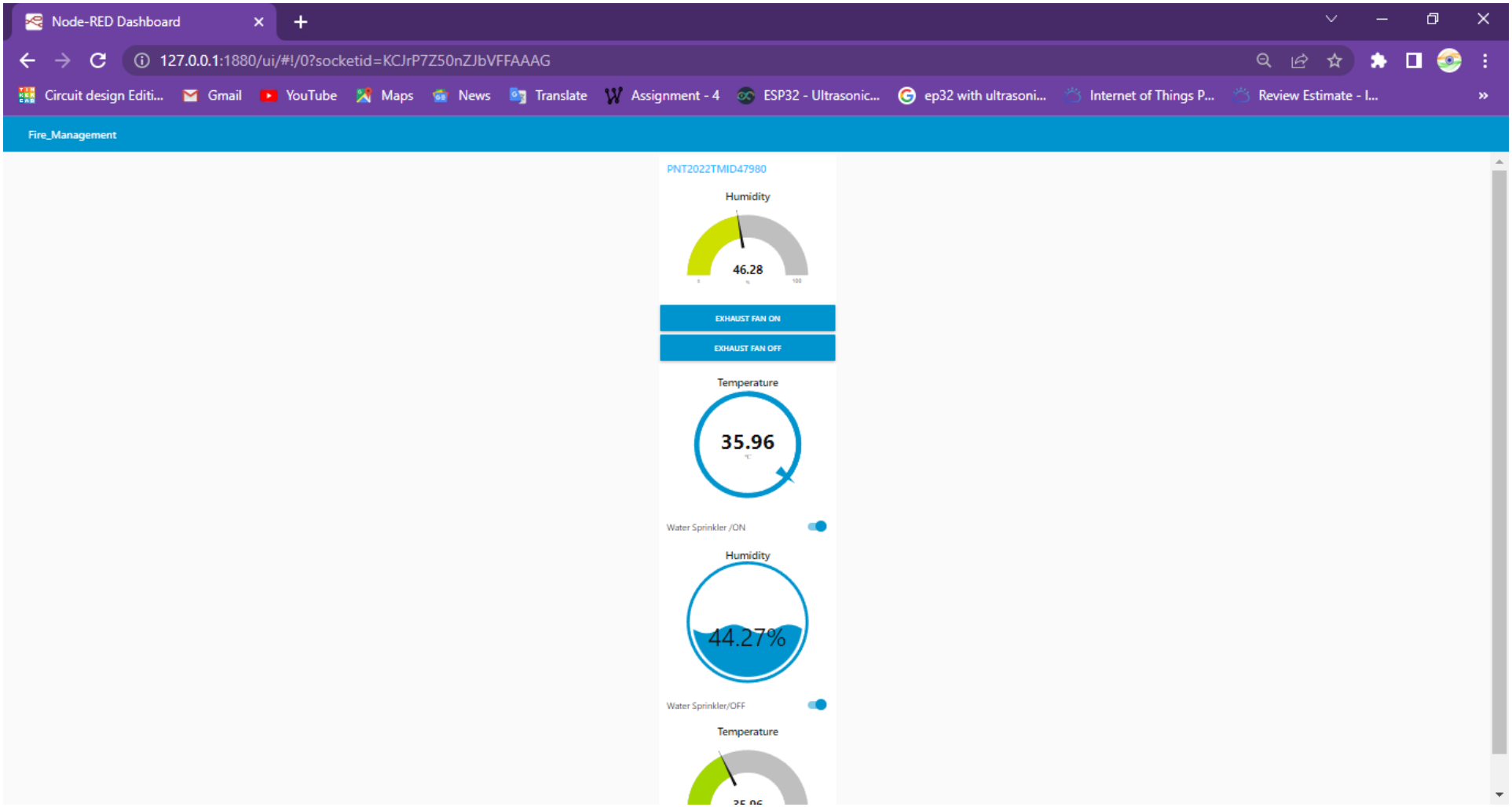
# TRANSFERRING DATA FROM IBM WATSON INTO NODE-RED



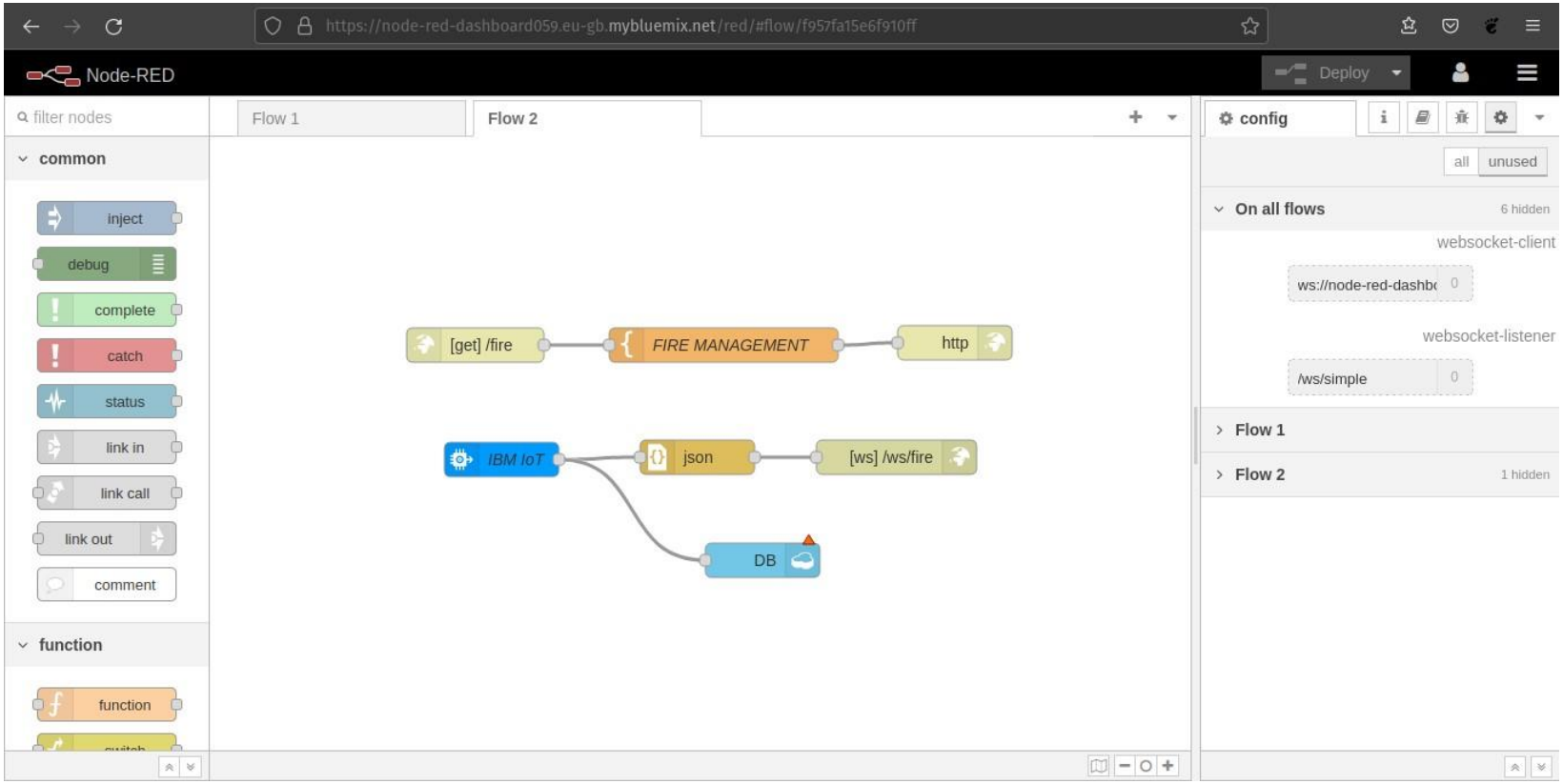

IBM App Developmen
Node-RED : node-red
node-red-contrib-sox
IBM Watson IoT Platfo
Running Node-RED lo
Node-RED
127.0.0.1:1880/#flow/fea07489eb1f1f2b
Circuit design Editi...
Gmail
YouTube
Maps
News
Translate
Assignment - 4
ESP32 - Ultrasonic...
ep32 with ultrasoni...
Internet of Things P...
Review Estimate - I...
Node-RED
Deploy
filter nodes
Flow 1
Flow 2
Flow 3
common
inject
debug
complete
catch
status
link in
link call
link out
comment
function
function
IBM IoT
connected
debug 3
Temperature
Temperature
Humidity
Humidity
sensors
httpfunctionnode
http request
debug
all nodes
all
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

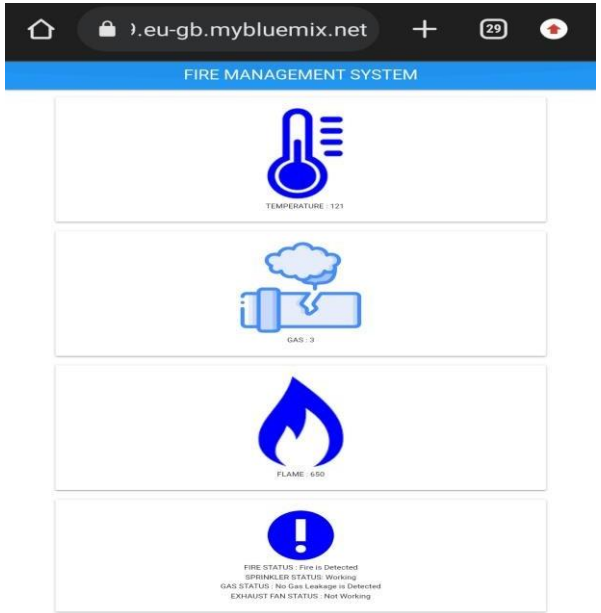
# TRANSFERRING DATA FROM NODE-RED INTO WEB UI



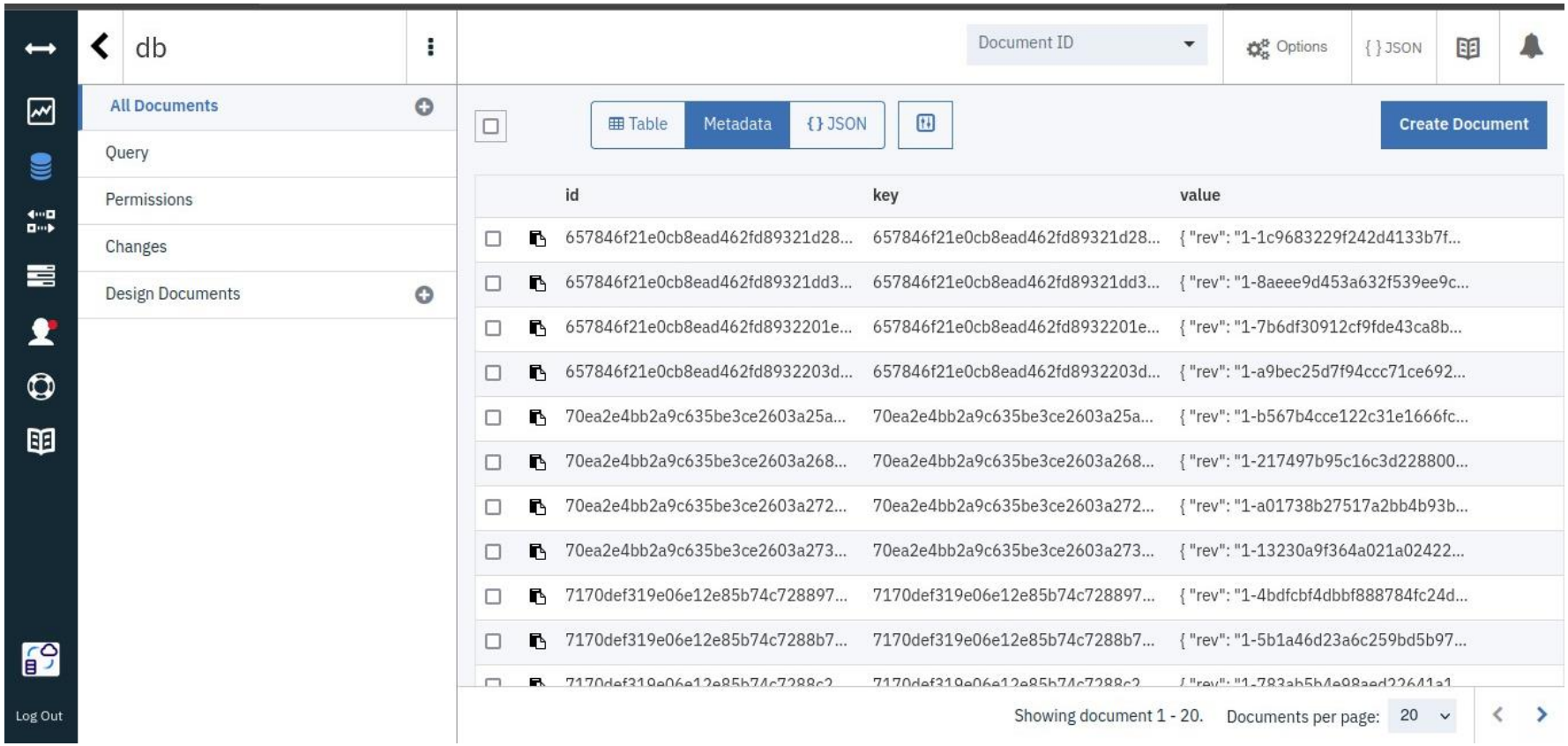
# WEB UI

## DESKTOP VIEW

**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...
Showing document 1 - 20.
Documents per page:
20
Log Out

Save Changes Cancel Upload Attachment Clone Document Delete


```
{
  "_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"
}
```


Log Out

## 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()
```