VIT – IOT

(Industry Certificate Internship Program)

A

Project Report on

Hazardous Area Monitoring System in Industrial Plant

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1. Introduction

Today, developing industrial hazardous safety monitoring for the application of gas leaks, fire, smoke, radiation, and other hazards is a significant difficulty. The necessity for flexible and practical virtual instruments, a technique to expose multi easily-sensors to dangerous levels in risk concentrations, is a key matter in all linked domains of inquiry. To take measures for safety requirements there are lot of things that need to be monitored continuously but continuous monitoring is not feasible and not much accurate. Because most of the operational circumstances, chemicals, and end products are hazardous, safety and health management are an important component of industrial activity. Industrial production is well-known for posing health risk. Workers' safety and health are at grave jeopardy environment. Hence to overcome this project new advanced technologies can help a lot. Internet of Things i.e., IoT is also one of them & plays an important role to all over the field. As its name suggests IoT is complete use of internet facilities. In recent years, keeping pace with most of the industrialized accident that occur in hazardous environment due to which the consequences may be very serious and generally cause damage to life, property and environment. Hazardous environmental safety and security can be most important for moral, legal, and financial reasons. All organizations have the duty to care and ensure the safety and security of the employees and the environment. This project has also enlisted several short-term and long term measures which if implemented by Government and other organization will help in improving safety & security of industrial & commercial environment. Internet of Things has developed and achieved a lot of success in technological world.

a. OVERVIEW:

The main purpose of this project is safety of workers. Majority of researchers and experts have confirmed that IoT system is one of the most capable to take challenges that stand in the way to solve the problem. The IoT and Cloud Computing complement one another, often being branded together when discussing technical services and working together to provide an overall better IoT service. However, there are crucial differences between them, making each of them an effective technical solution separately and togetherThe proposed IoT system is designed using IBM cloud system, Node-Red, MIT app

inventor. Cloud computing delivers computing services including servers, databases, networking, software, and data analytics over the internet to provide faster deployment, flexible resources, and economies of scale.

b. Purpose

The main purpose of the hazardous area monitoring system is for safety of the workers and indirectly the safety of the industrial plant. As technologies is changing rapidly the industry structure is also changing. There is always a possibility of an accident in industry which can harm the workers badly and can cause the damage to the other devices. Hence it becomes important and needed to design and implement a system that can give alert before an accident so that it can be prevented so save the lives.

2. Literature Survey

Nowadays, due to change in environment conditions, the temperature of environments is also increasing a lot. This high temperature causes different effect on different things. This affect the industrial plants & this is a problem. Several real-world projects are in the works. These systems use the Internet of Things (IoT) as a source of data. Their backbone of communication in, an IoT-based weather monitoring system is built. For the sake of agriculture as a result, temperature, air pressure, and the indices that are used are humidity, light intensity, and dew point were under constant surveillance. Only humidity and temperature are mentioned in. Temperatures are recorded. An environmental monitoring system has been implemented. Temperature, humidity, and precipitation data are recorded.

S. Fang, Li Da Xu, Y. Zhu, J. Ahati, H Pei, J. Yan, and Z. Liu developed a using for monitoring the environment factors like Temperature, Humidity, geological changes by using cloud computing, Big Data, IoT.

Rohini Shete and Sushma Agrawal has developed an IoT system for monitoring hazardous conditions occurred due to environment change. This is a system developed for entire city for monitoring the temperature and humidity using hardware with LAN connected. This was for an experiment purpose.

a. Existing Problems
    1. Initially in industries safety measures were less as a result the number of accidents in industries were more and the casualties were also in large amount of quantity.
    2. In industries, initially the continuous monitoring was not possible.
    3. As human interference was involved in monitoring the plant, there the systems greater the possibility of false or inaccurate measurements.
    4. Many times the developed systems can not be used for larger scale.

b. Proposed Solutions

The main purpose of this project hazardous area monitoring system is for safety of the workers and indirectly the affecting safety of the industrial plant.

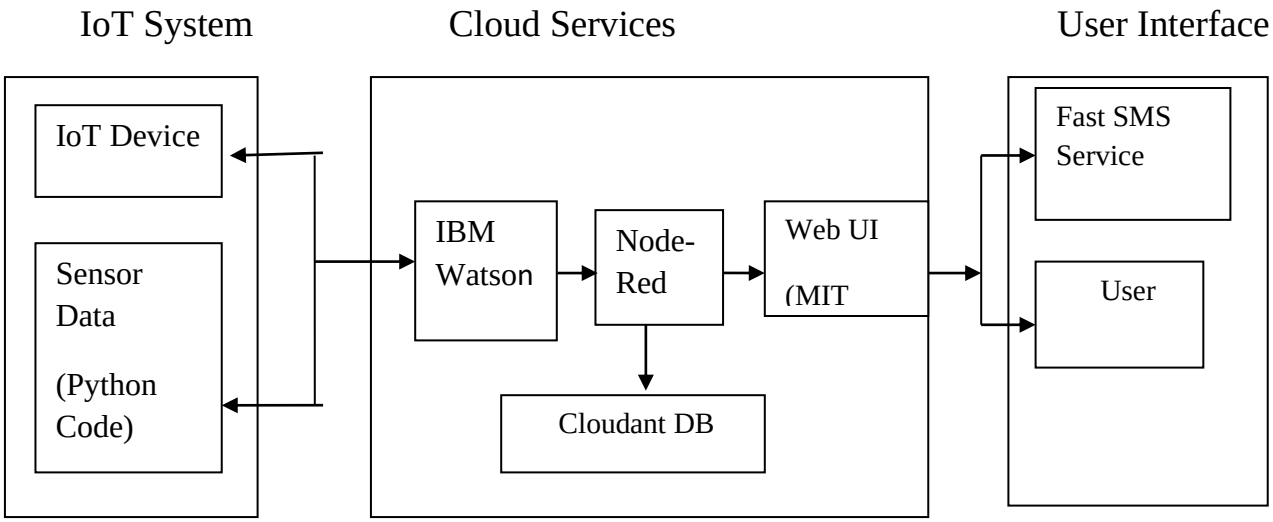
We have developed a cloud based automated solution which not only reduces manual labor but also increases accuracy in fault detection for better safety purposes.

3. Theoretical Analysis

In this proposed work, monitoring industry plant for higher temperature values and sends the alarm if hazardous condition occurred in that particular area. This system is completely IoT based using different cloud services like IBM Watson, Cloudant storage.

Initially the temperature values are given as sensor data by running a python script. The provided temperature values are then sent to the IBM cloud by creating device in cloud and giving the access the script to send the data. For authentication purpose API key, device Id, Authentication token etc. are used.

a. Block Diagram



c. hardware/ Software Designing:

Hardware:

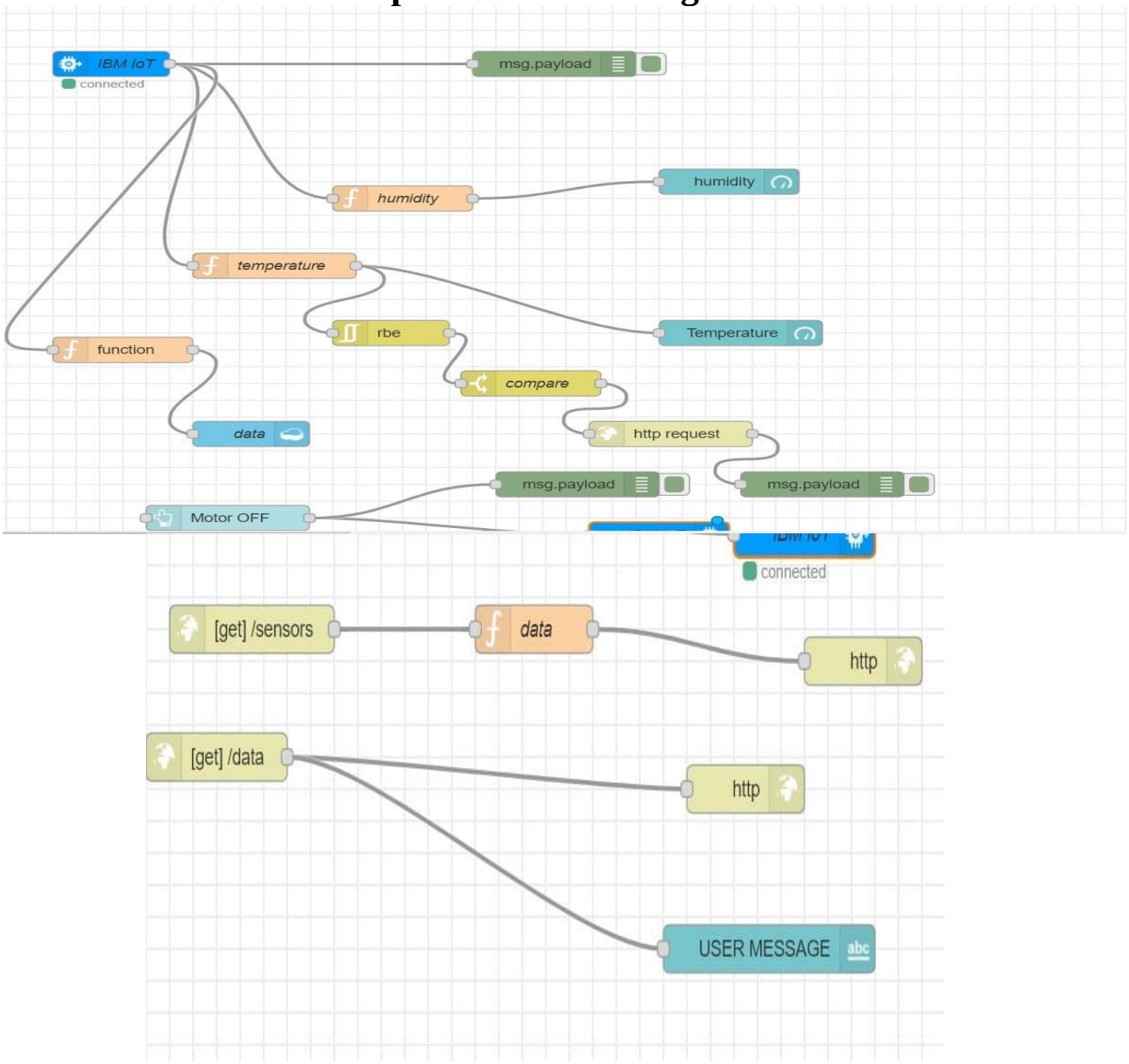
As currently hardware is not present for taking sensor data, the python code is written to send the data for IoT device.

Software:

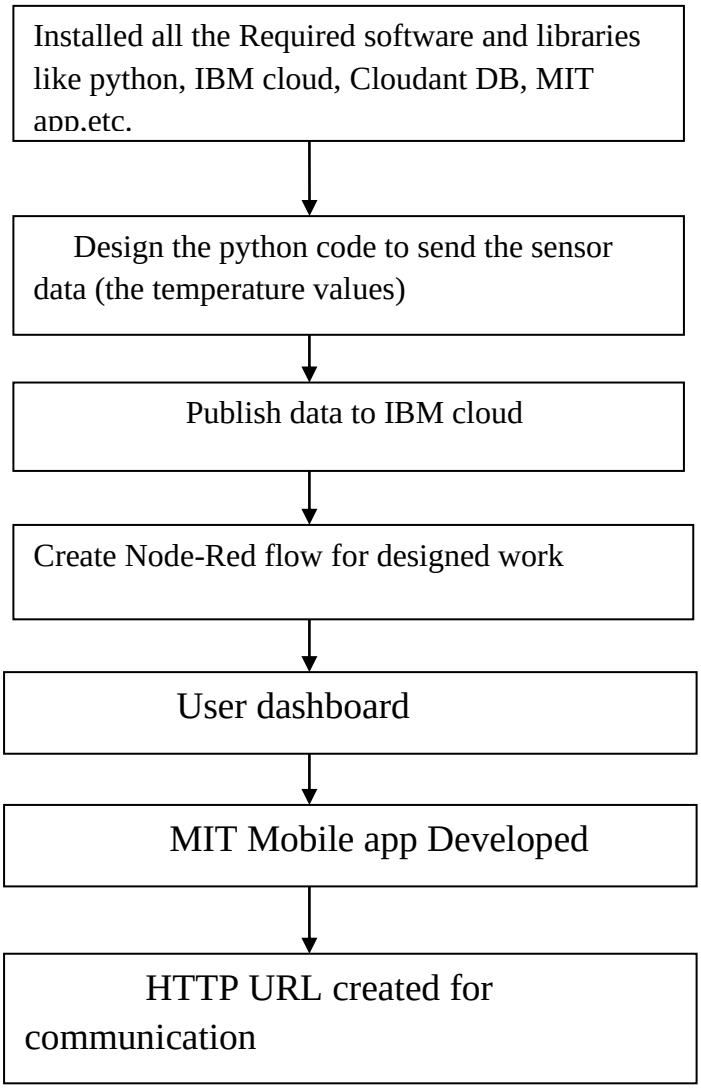
1. Python IDE
2. MIT app inventor

3. IBM Cloud Services

4. Experimental Investigation



5. Flow Chart


Installed all the Required software and libraries like python, IBM cloud, Cloudant DB, MIT app,etc.
Design the python code to send the sensor data (the temperature values)
Publish data to IBM cloud
Create Node-Red flow for designed work
User dashboard
MIT Mobile app Developed
HTTP URL created for communication

6. Result

1. When the flow is debugged for temperature and Humidity Values

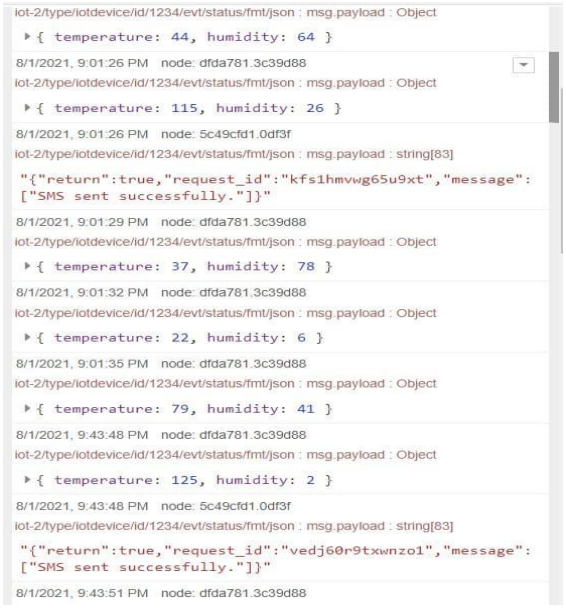
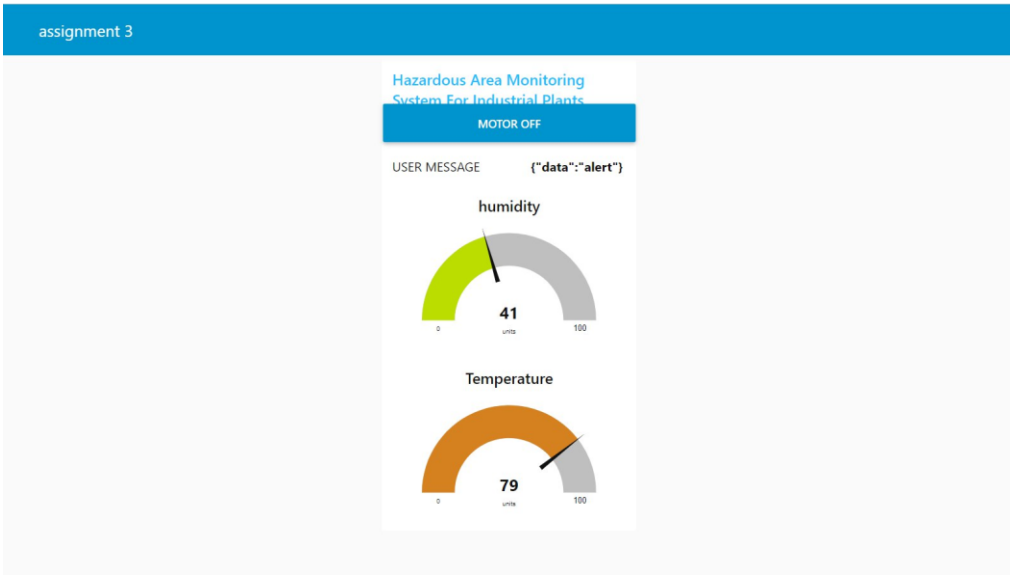


Fig.1 Node-Red Flow Output

2. MIT App developed the mobile screen

Fig. 2 Mobile screen Output

3. UI output (ADMIN will be controlling the UI):



4. An alert message is sent to user when temperature exceed its limit range (100).

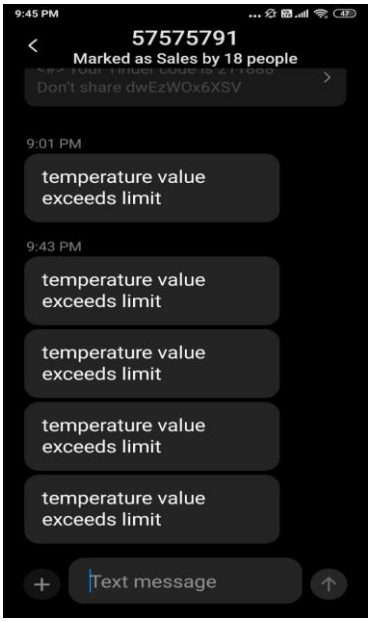
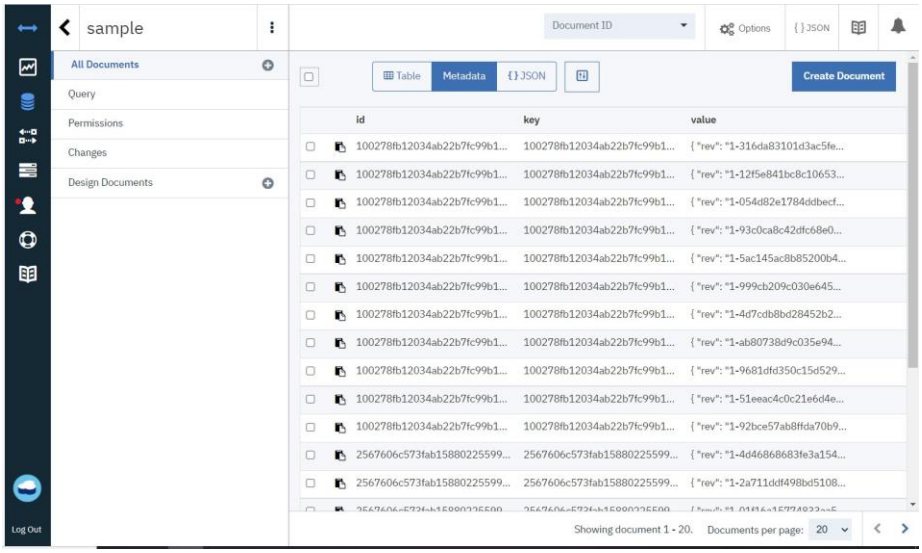
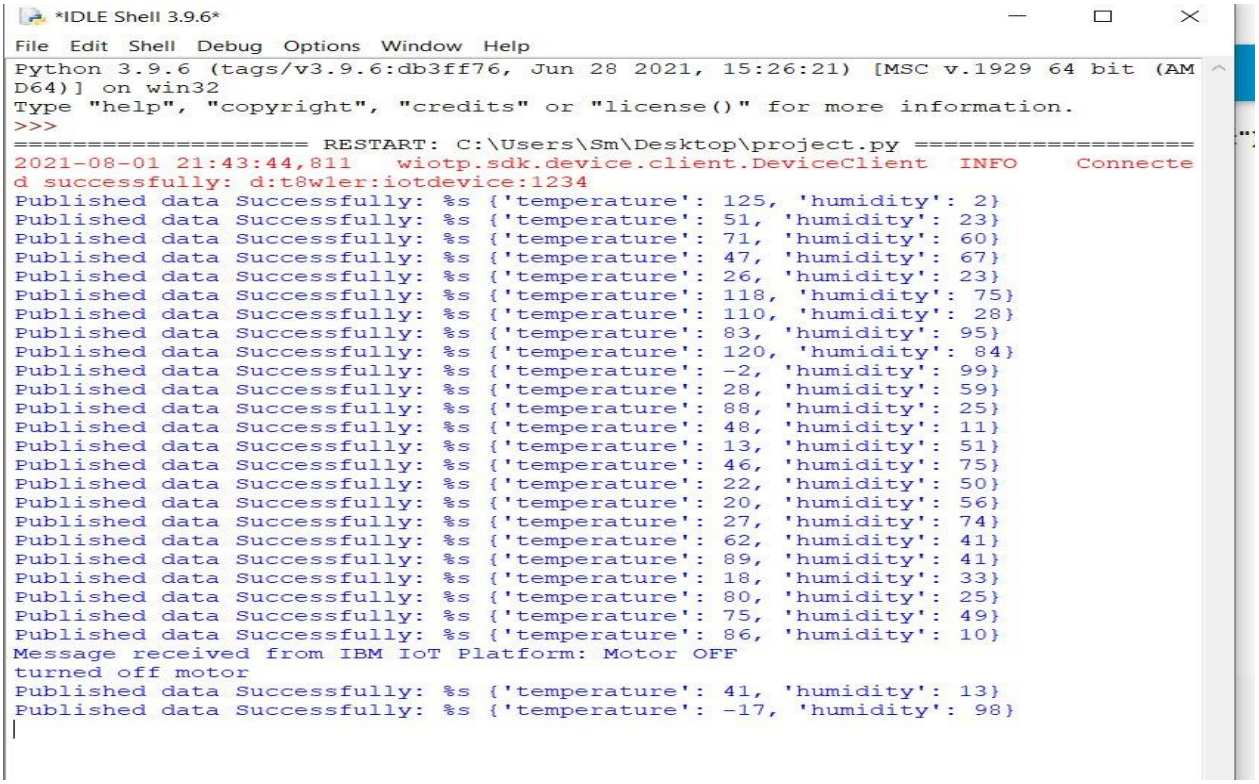


Fig.3 Alarm Screen

5. Cloudant DB:
   All the temperature and humidity values are stored in this database.



6. When the Admin receives message from the user about the temperature value and clicks on the Motor Off button on the UI:



7. Advantages and Disadvantages

Advantages:

1.It is useful for safety because it senses any potential danger and warns users

2. It minimizes human effort because IoT devices connect and communicate with one another and perform a variety of tasks

3. Asset tracking, traffic or transportation tracking, inventory control, delivery, surveillance, individual order tracking, and customer management can all be made more cost-effective with the right tracking system.

4. Continuous tracking of and monitoring of the industry

5. Helps to get accurate and significant output the end the production

6.Ensures Safety

Disadvantages:

1. In some cases, it is cost effective
2. It can give wrong information and false alarm on device fault
3. Fault device can cause defects in IoT system

8. Applications

1. In Mining areas, to detect hazardous area location and give warning to workers such IoT applications can be used.

9. Conclusion

From this project, it is concluded that the monitoring the temperature conditions in particular areas is possible with less expense. This is possible by using IoT devices & cloud services. This technology can help to save many lives and many casualties in the industry plants.

10.Future scope

This work can be taken to the next level where actual hardware components can be used for taking the actual sensor data. This can increase the accuracy of work and can be implemented in required areas for monitoring purpose. This will become cost effective as compared to others.

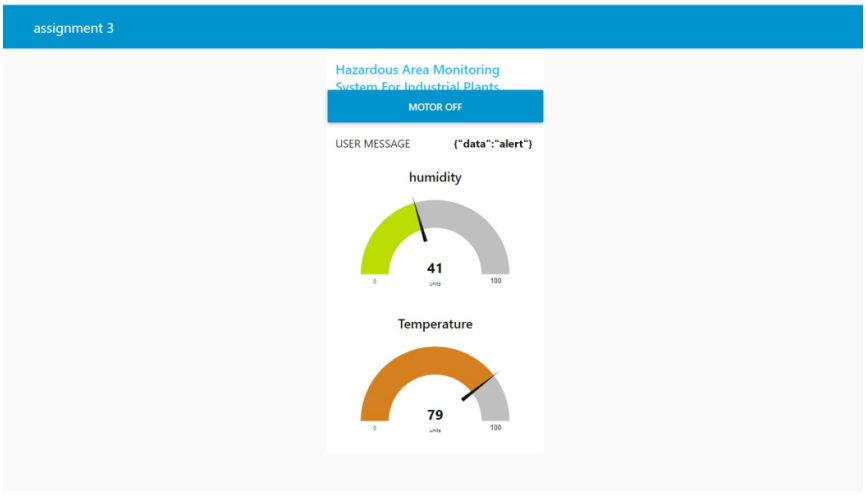
11. Appendix

a. Source Code

```
import wiotp.sdk.device
import time
import random
myConfig = {
    "identity": {
        "orgId": "t8w1er",
        "typeId": "iotdevice",
        "deviceId":"1234"
    },
    "auth": {
        "token": "12345678"
}
    }


def myCommandCallback(cmd):
    print("Message received from IBM IoT Platform: %s" % cmd.data['command'])
    m=cmd.data['command']
    if m=="Motor OFF":
        print("turned off motor")



client = wiotp.sdk.device.DeviceClient(config=myConfig, logHandlers=None)
client.connect()

while True:
    temp=random.randint(-20,125)
```

```
    hum=random.randint(0,100)
    myData={'temperature':temp, 'humidity':hum}
    time.sleep(3)
    client.publishEvent(eventId="status", msgFormat="json", data=myData, qos=0,
onPublish=None)
    print("Published data Successfully: %s", myData)
    client.commandCallback = myCommandCallback
client.disconnect()
```

b.WEB/ UI Output Screenshot:



Mobile App Screenshot: