PROJECT REPORT

1. INTRODUCTION:

    1.1 PROJECT OVERVIEW:

          Gas leakage and fire explosion are the major problems in the industrial like a chemical warehouse,LPG gas cylinder storage, and combustible material store house also in the residential zone.Sometimes abnormal temperature and humidity variation may cause accident in these store houses of combustible chemicals,liquids and gases.So the most efficient and preventive procedure is to setup such a device that can detect all these situations which causes fire exlposion.

    1.2 PURPOSE :

         Industrial used examined brilliant conditions by IOT. Brilliant items will plan, control and advance their own creation procedure with negeligble human intercession by tackling progressing improvements in sensor invations , machine to machine correspondance ,enormous information examination and AI. Whenever from any area application framed a novel architecture of a smart health care system with cloud and IOT.

2. LITERATURE SURVEY:

    2.1 EXISTING PROBLEM:

The main challenges of urban environmental monitoring are the deployment simplicity and flexibility in terms of the mesh network reconfiguration as well as resistance to the malicious sensor connection.The main problems include:

(i) the difficulty of initializing a network with a large number of devices.

(ii)connecting a new sensor to an existing network.

(iii)networks scalability

(iv)the ability to use a trusted sensor in a network location other than the illegal installation place.

2.2 REFERENCES:

IOLA and Ole Laursan. Attractive Java Script Plotting for jQuery. 2014. Avaliable online :https://www.flotcharts.org

Yandex. Maps API-Javascript API. 2019. Available online: https://tech.yandex.com/maps/jsapi/

2.3 PROBLEM STATEMENT DEFINITION:

The system is designed to operate in three different modes:

1. Simplex mode:The operation of the system is executed according to the star topology,and the transmission of the messages to access points directly

using a controlled sleep mode.

2.Duplex mode:The operation of the system is executed according the mesh network node with relaying via the closest network nodes using a controlled sleep mode.

3.Half Duplex mode:The operation of the system is executed via the star topology but using a predefined sleep mode.

3.IDEATION AND PROPOSED SOLUTION:

3.1 EMPATHY MAP CANVAS:

An empathy map is a simple, easy -to-digest visual that capture knowledge about a users behaviours and attitudes .

It is a useful tool to helps teams better understand their users.Creating an effective solution requires understanding the true problem and the person who is experiencing it .The exercise of creating the map helps participants considered thing from the user perspective along with his or her goals and challenges.
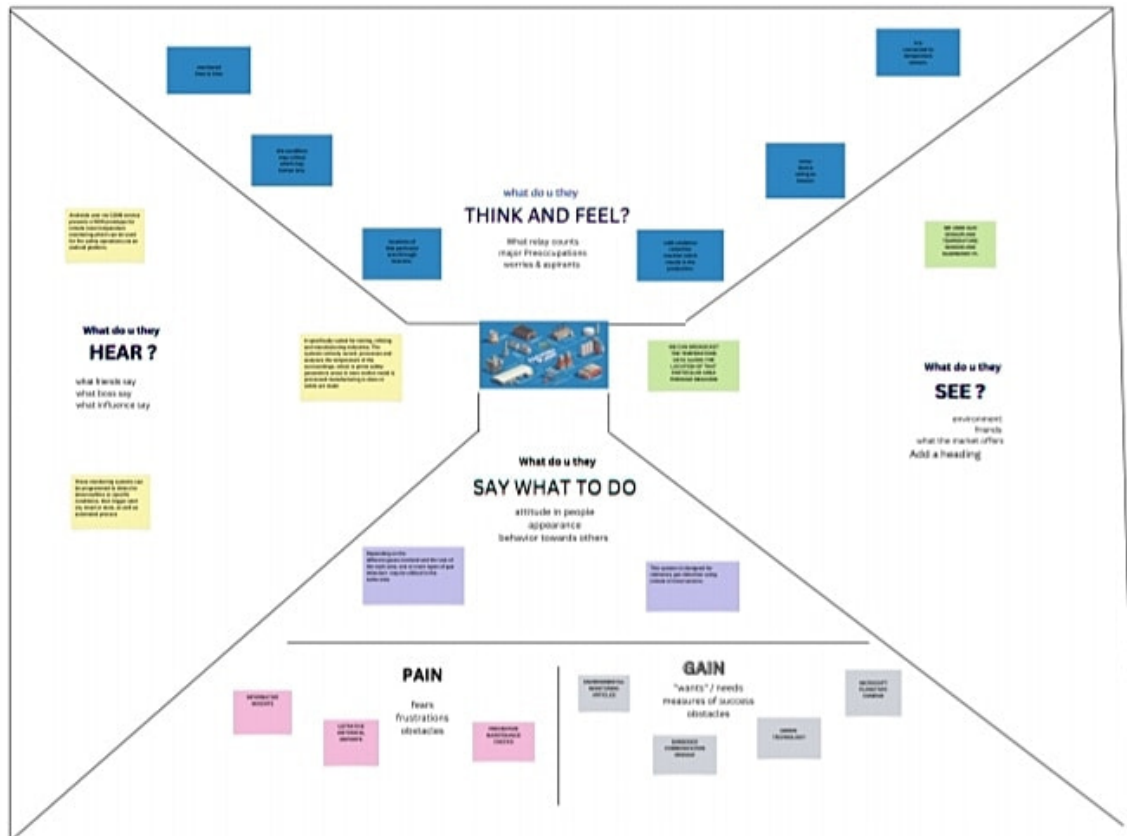
3.2 IDEATION AND BRAINSTORMING:

Brainstroming is a group problem solving session where ideas are shared,discussed and organized among the team members.

In the simplest scenario , we may analyze the system from the network node density perspective. In a particular , we focus on the scenario when the goal is to minimize the number of nodes while maintaining a high level of mesh reliability we assume that the network segment has around one public transport stop equiped with the city public network AP per four hundred meter.

3.3 PROPOSED SOLUTION:

S.NO	PARAMETER	DESCRIPTION
1	Problem statement	Hazardous area montioring for industrial plants powered by IOT.
2	Idea/solution description	For an industry the hazard due to the high temperature so here we are montioring temperature using sensor like thermocouples and broadcasting the temperature of the particular area by integrating the area with beacon

		devices.
3	Novelty/uniqueness	1.Temperature parameters measurement 2.Smart wearable device
4	Social impact/ customer satisfication	In our project, IOT is used to collect data and communicate through the internet.
5	Business model	This software platform is in the terms of virtual instrument developed under lab VIEW programming.
6	Scalability of the solution	Including sensors to monitor pressure and gas leakage provide more safety.

3.4 PROBLEM SOLUTION FIT:

Before:

Industries may loss their reputation when safety of workers is not concerned and this also causes lot of lives incase of emergency.

After:

The employee will be protected and industies can maintain its reputation.

4.REQUIREMENT ANALYSIS:

4.1 FUNCTIONAL REQUIREMENT:

4.2 NON FUNCTIONAL EQUIREMENT:

FUNCTIONAL vs NONFUNCTIONAL REQUIREMENTS

|	Functional requirements	Nonfunctional requirements
Objective	Describe what the product does	Describe how the product works
End result	Define product features	Define product properties
Focus	Focus on user requirements	Focus on user expectations
Documentation	Captured in use case	Captured as a quality attribute
Essentiality	They are mandatory	They are not mandatory, but desirable
Origin type	Usually defined by user	Usually defined by developers or other tech experts
Testing	Component, API, UI testing, etc. Tested before nonfunctional testing	Performance, usability, security testing, etc. Tested after functional testing
Types	External interface, authentication, authorization levels, business rules, etc.	Usability, reliability, scalability, performance, etc.

5.PROJECT DESIGN:

5.1.DATA FLOW DIAGRAMS:
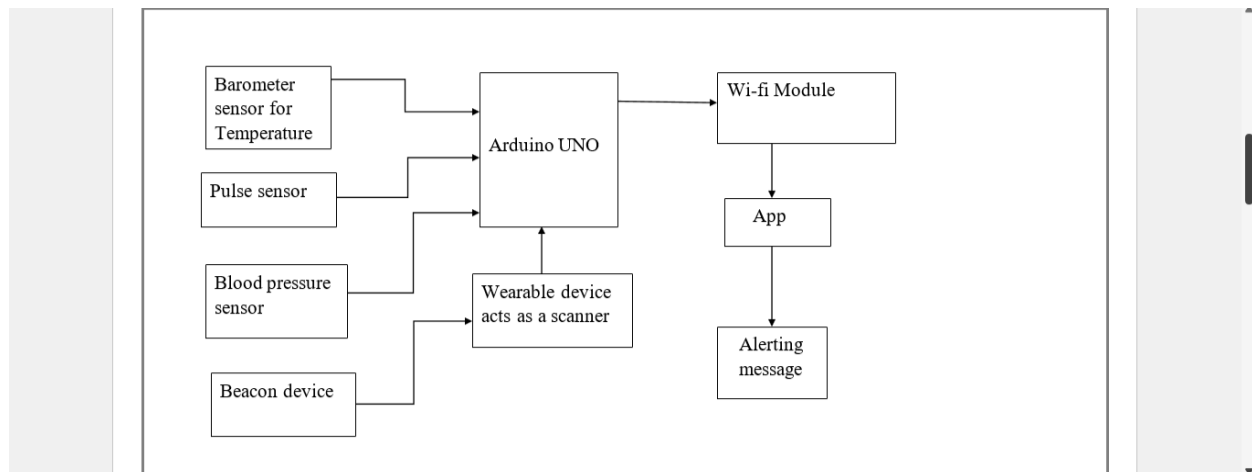
5.2 SOLUTION AND TECHNICAL ARCHITECTURE:
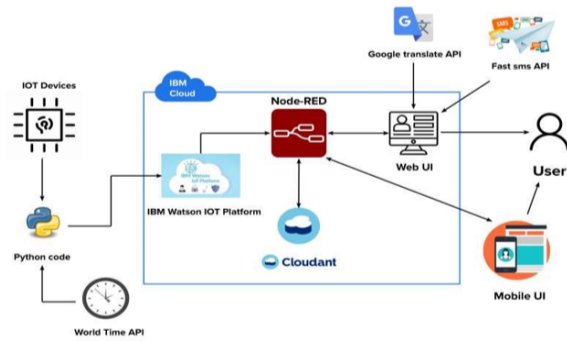
5.3 USERS STORIES:
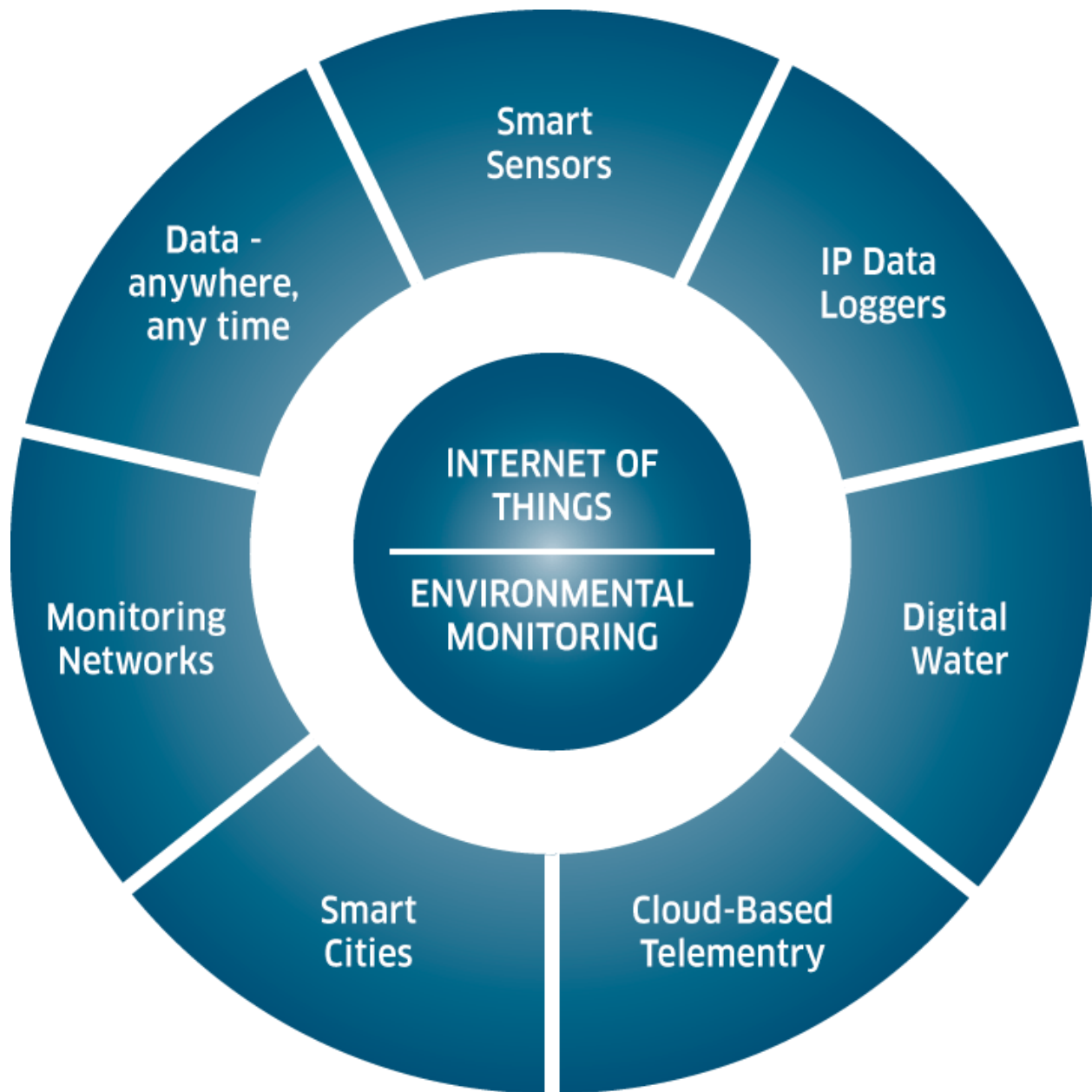
6. PROJECT PLANNING AND SCHEDULING:

6.1 SPRINT PLANNING AND ESTIMATION:

Worker in mining industry	Login	USN-1	As a user, I can view the temperature through wearable device though there is no proper signal.			
Administrator	Login	USN-1	As a user, I can take necessary precautions once the alerts are received according to the problem.	I can access my account through application.	High	Sprint-1
		USN-2	I can check the temperature conditions through app and wearable device.		Medium	Sprint-2

6.2 SPRINT DELIVERY SCHEDULE:

SPRINT	WORKING DATE	DELIVERY DATE
sprint 1	23 oct - 28 oct	28 oct
sprint 2	30 oct - 4 nov	5 nov
sprint 3	7 nov- 12 nov	12 nov
sprint 4	13 nov- 18 nov	19 nov

6.3 REPORTS FROM JIRA:
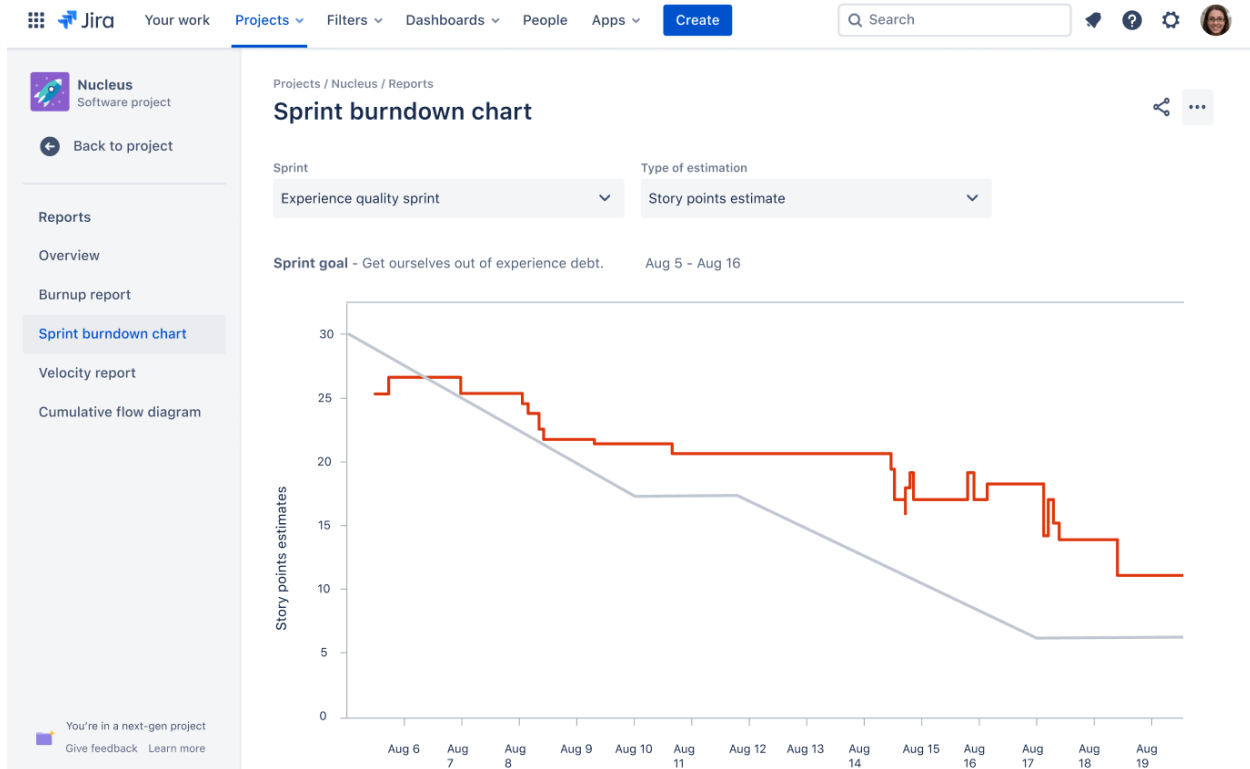
7.   CODING AND SOLUTIONING:
7.1. FEATURE 1:

```
//Send Temperature status to Python Code
Serial.print("temperature = ");
Serial.print(DHT.temperature);
Serial.println("C ");


//Send AirQuality sensor value to Python code
Serial.print("AirQua=");
Serial.print(sensorValue, DEC);
Serial.println(" PPM");


//Send signals to the Wearable
Serial1.println("H T A");
Serial1.println(DHT.humidity);
Serial1.println(DHT.temperature);
Serial1.println(sensorValue, DEC);


delay(100);                    // wait 100 milliseconds for next reading  }
```
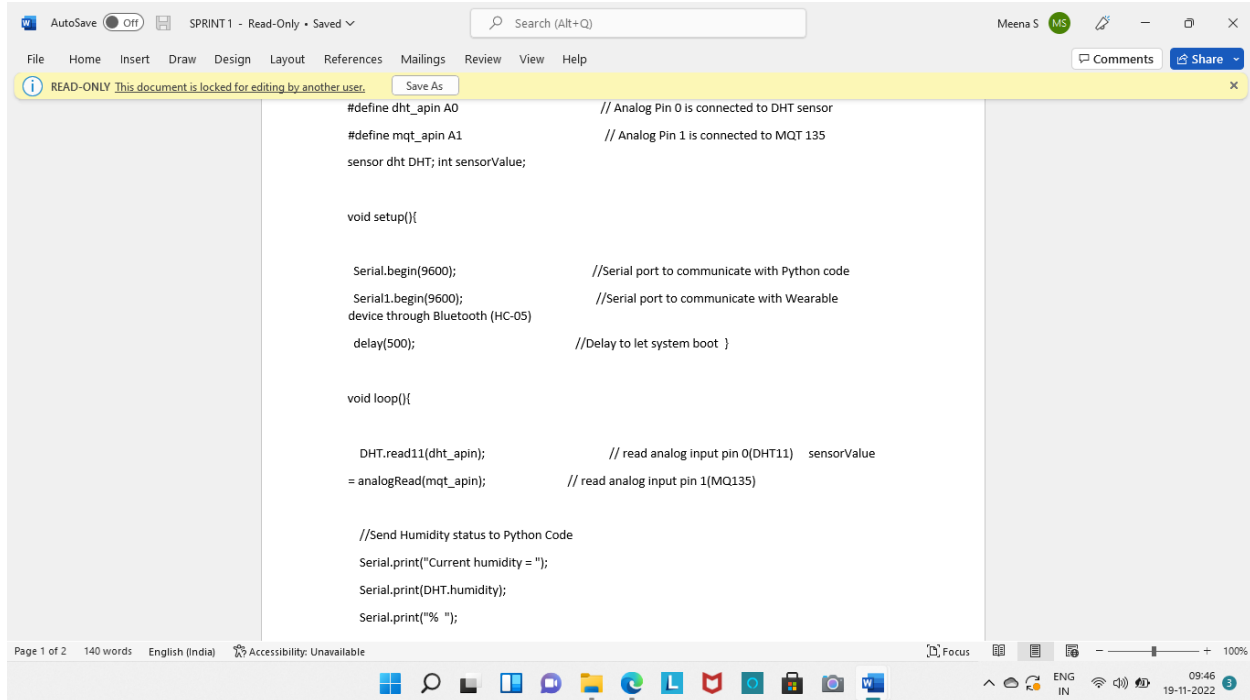
The program include the advanced coding sections of python. The sensors to detect the temperature variation in the atmosphere for protecting the surroundings of the industrial environment.

To maintain the safety of the workers in the environment .

7.2. FEATURE 2:

T

```
#define dht_apin A0                    // Analog Pin 0 is connected to DHT sensor
#define mqt_apin A1                    // Analog Pin 1 is connected to MQT 135
sensor dht DHT; int sensorValue;


void setup(){

  Serial.begin(9600);                //Serial port to communicate with Python code
  Serial1.begin(9600);               //Serial port to communicate with Wearable
device through Bluetooth (HC-05)
  delay(500);                        //Delay to let system boot  }


void loop(){

  DHT.read11(dht_apin);              // read analog input pin 0(DHT11)    sensorValue
= analogRead(mqt_apin);              // read analog input pin 1(MQ135)

  //Send Humidity status to Python Code
  Serial.print("Current humidity = ");
  Serial.print(DHT.humidity);
  Serial.print("% ");
```

This program includes the humidity and air pressure in the environment to protect the workers in the industrial .

This includes the safety and giving the good environment for workers .

7.3. DATABASE SCHEMA:

Regions
RegionID {PK}
RegionName
RegionTitle
NorthExtent
EastExtent
SouthExtent
WestExtent
RegionDescription
RegionMapCSSURL

RegionMetadata
RegionID {FK}
MetadataTitle
MetadataContent
DisplayOrder

RegionMapServices
RegionID {FK}
MapServiceID {FK}
DisplayOrder
DisplayName
TransparencyPercent
IsVisible
IsTOC
IsBaseMapService

RegionDatabases
RegionID {FK}
DatabaseID {FK}
DisplayOrder
DisplayName

MapServices
MapServiceID {PK}
Title
MapConnection
MapServerID {FK}
ReferenceDate
NorthExtent
EastExtent
SouthExtent
WestExtent
TopicCategory
Abstract
MetaDataContactID {FK}
DatasetContactID {FK}
SpatialResolution
DistributionFormat
SpatialRepresentationType
SpatialReferenceSystem
LineageStatement
OnlineResource

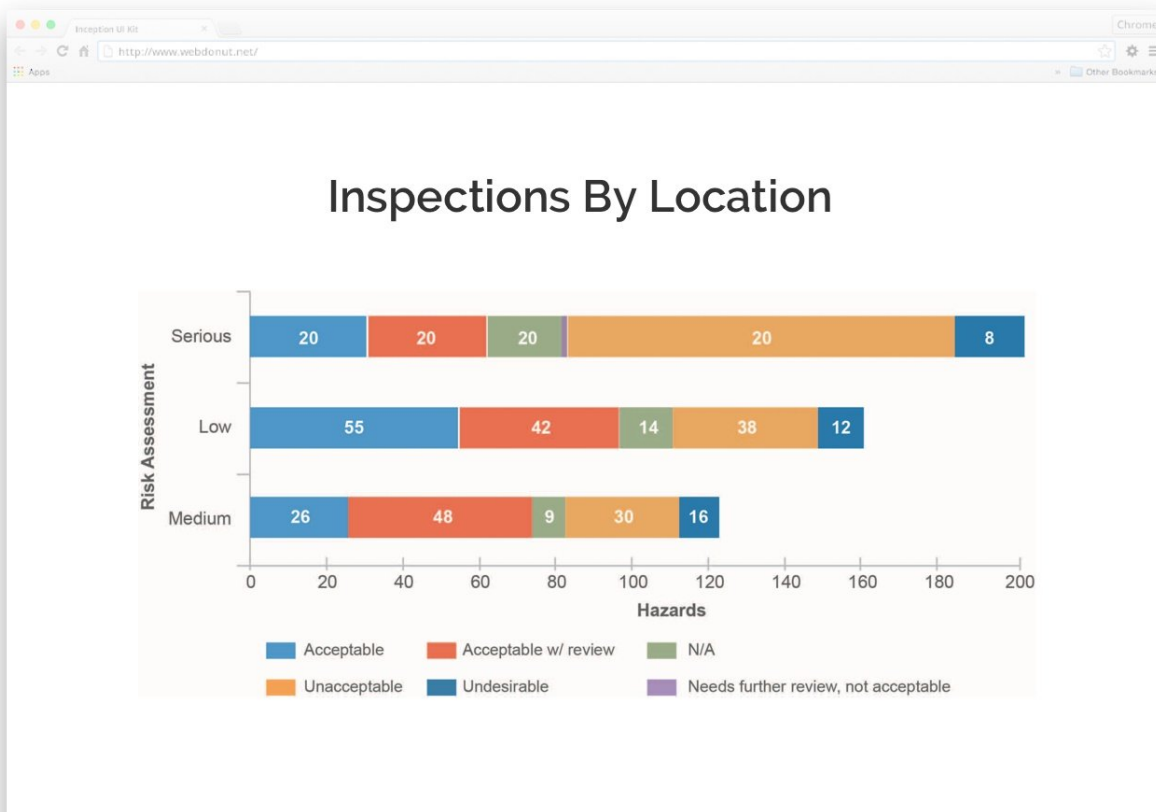**Contacts**
ContactID {PK}
FirstName
LastName
OrganizationName
MailingAddress
City
Area
Country
PostalCode
FaxNumber
PhoneNumber
Email

ODMDatabases
DatabaseID {PK}
Title
ServerAddress
DatabaseName
ODMUser
ODMPassword
MapMarkerURL
ReferenceDate
NorthExtent
EastExtent
SouthExtent
WestExtent
SpatialReferenceSystem
TopicCategory
Abstract
Citation
MetadataContactID {FK}
DatasetContactID {FK}
LineageStatement
WaterOneFlowWSDL

MapServiceMetadata
MapServiceID {FK}
MetadataTitle
MetadataContent
DisplayOrder

MapServerMetadata
MapServerID {FK}
MetadataTitle
MetadataContent
DisplayOrder

MapServers
MapServerID {PK}
MapServerName
ConnectionURL
MapServerType
Domain
Username
Password

MapServerTypeCV
MapServerType
Description
SampleServerConnection
SampleMapConnection
HasDomain
HasUsername

ODMDatabaseMetadata
DatabaseID {FK}
MetadataTitle
MetadataContent
DisplayOrder

8.TESTING:

8.1.TEST CASES:

No.	Test Case	Expected Results	Pass/Fail
1	Hotspot and bootup scripts	Hotspot and system scripts start automatically	Pass
2	Automatic restarting in case of hardware failure	The hardware scripts should return if hardware is reconnected	Pass
3	Storage of sensor data in the database	The sensor readings should appear on the database	Pass
4	Real time sensor reading on the mobile app	The sensor readings should be received through MQTT on the mobile app and be displayed accordingly	Pass
5	CO_2 sensor reading	Test on different environmental conditions	Pass
6	VOC sensor reading	Test on different environmental conditions	Pass
7	Humidity sensor reading	Test on different environmental conditions	Pass
8	Temperature sensor reading	Test on different environmental conditions	Pass
9	Fan actuation	Fan should turn on with the correct speed from the actuation function (tested for all	Pass

8.2.USER ACCEPTANCE TESTING:

No.	Acceptance Requirements	Test Result (Number of people)	
		Accept	Reject
1	The system must execute to end of job.	5	0
2	The system is user friendly and not confusing.	5	0
3	The intruder is captured in the image.	5	0
4	SMS notifications are received.	5	0
5	Email notifications are received.	5	0
6	Live video feed is accessible.	5	0
7	Dropbox storage only stores captured images trigged by motion.	5	0
8	Live video feed is accessible on any browser.	5	0

9.   RESULTS :

9.1. PERFORMANCE METRICS:

10. ADVANTAGES AND DISADVANTAGES:

Technique	Advantages	Disadvantages
AE	• Suitable for low speed • Early stage detection • Frequency range far from mechanical noise • Non-intrusive	• Expensive • High sampling rate which generates large amount of data • High attenuation of the AE signal, particularly in joints
Vibration analysis	• Standardised • Reliable	• Poor performance in low speed machinery • Not for early stage defect detection

11.CONCLUSION:

Currently IOT is preseent and gaining more traction in a lot of fields , and one of the most important field is industrial applications . There are a large number of ways in which industries can make use of IOT to improve worrking conditions , efficiency , cutting costs and improving the overall growth of the sector . However hazard monitoring and mitigation is often overlooked in industrial areas.

Therefore , this project specifically aims to make use of IOT to actively monitor and analyse various factors in a typical heavy industrial zone like temperature and levels of gases in the environment . If the above parameteers exceed the rrecommended safe values, the syystem can

tracck the same and issue alerts.

This system can be deployeed in many industrial areas like mining, underground factories, metal refineries, automatic welding factories and even heavy parts production lines.

12. FUTURE SCOPE:

In our present concept we are only using the GSM technology for gas, temperature and human detection .

so we extend the scope of this concept in other way for centralize data recording . For that purpose we can use the IR courting at the entry gate which is followed by the camera which will be continously capturing the images of the persons entering into the dangerous places.

Now gas sensors are limited to certain gases only, so we can extend to different type of gases in future.

13. APPENDIX:

SOURCE CODE:

```
GLDD continuously monitors the volume of gas
if (reading of gas sensor  <= 200ppm)
    {
        Gas value is Low
        Arduino does not detect any signal
        Does not send any message to the registered mobile number


    }
if (reading of gas sensor  >= 200ppm)
    {
        Gas value is High
        Arduino detects the signal
        Send the alert  message
        "LEAKAGE OF GAS IS DETEDTED......PLEASE SWITCH
        OF THE APPLIANCE" to the registered mobile number

    }
```

GITHUB AND PROJECT DEMO LINK:

IBM-EPBL/IBM-Project-47426-1660799255.