GAS LEKAGE MONITERING AND ALERTING SYSTEM

A PROJECT REPORT

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BONAFIED CERTIFCATE

This is to certify that the mini project entitled “GAS LEAKAGE MONTIORING AND ALERTING SYSTEM FOR INDUSTRIES is a bonafide record of Nalaiya thiran project done by the students **JOSHUA KARABANNAVAR (950419104017) BOOMINATHAN A (950419104006) JAMES J (950419104015) SANJAY K (950419104035)** under my guidance and supervision

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1 . INTRODUCTION

Gas leakage is a major problem with industrialsector, residential premises and gas powered vehicles like CNG(compressed natural gas) buses and cars. Homes and Industrial fires have taken a growing toll in lives and property in recent years. Most gasses used for industrial activities are highlyinflammable and can burn even at some distance from thesource of leakage. Most fire accidents are caused becauseof a poor-quality rubber tube or when the regulator is notturned off. The supply of gas from the regulator to theburner is on even after the regulator is switched off. Byaccident, if the knob is turned on, it results in the gas leaks. Safety plays a major role in today's world and it is necessary that good safety systems are implemented in places of education and work. This project modifies the existing safety model

installed inindustries and this system also can be used in homes and offices. The main objective of this project is designingmicrocontroller based gas leakage detecting system. Some hazardous gases like Liquefied petroleum gas (LPG) andpropane can be sensed using this device. One of the preventivemethods to stop accident associated with the gas leakage is to install gas leakage detection kit at vulnerable places. The aim ofthis project is to present such a design that can automaticallydetect gas leakage in vulnerable premises. In particulargas sensor has been used which has high sensitivity. This project was based on liquefied petroleum gas. If these gases exceed thenormal level then an alarm is generated immediately. The advantage of this detection and alerting systemover the manual method is that it offers quick response time and accurate detection of an emergency andin turn leading faster diffusion of the critical situation.

1.1 PROJECT OVERVEIW

We design and develop an propose system which include some safety factors. A safety has been a major issue in today's day to day life. LPG and CNG i.e. petroleum gas and compressed natural gas are most commonly used in residential and commercial places for cooking purpose and in various vehicles as a replacement for costly fuels like diesel, petrol [7]. These gases are filled in cylinders which are easily un-damageable. But leakage can take place through pipes or regulators or knobs which may cause accidents like suffocation, uneasiness or sometimes may catch fire and short circuit as well. The main aim of this project is developing a system that can detect gas leakage [8]. On detection it will send an alert SMS and the gas supply knob of cylinder will be switched off automatically.

1.2 PURPOSE

The increase in the development of technology and the human race, we failed to take care about the surroundings in which we live in. Thus we polluted the environment and thereby reducing the quality of the place we live. Even though there are several aspects of pollution such as soil, air and water pollution, out of these air pollution acts as the serious aspect as the other can detected visually and by taste, but the polluted air cannot be detected as it can be odorless, tasteless and colorless. Hence there is a growing demand for the environmental pollution monitoring and control systems. In the view of the ever-increasing pollution sources with toxic chemicals, these systems should have the facilities to detect and quantify the sources rapidly.

Gas leakage detection is not only important but also alerting the people involved is equally essential. This project provides a cost effective and highly accurate system, which not only detect gas leakage but also alert (Beep) the necessary people.

2 . LITERATURE SERVEY

In this studies, fueloline leak detection structures were displayed. This gadget will stumble on the lifestyles of gases together with liquefied petroleum fueloline (LPG) and methane in our environments, industries, schools, and hospitals. If they're a fueloline leakage of any ACORS type and it could be a hazard or damage to the society or humans dwelling in that surroundings, this sensor MQ-five used withinside the circuit layout will robotically stumble on it, the GSM modem used withinside the layout will ship a caution sign to the customers whose numbers are registered to the gadget or to the tracking employer this is tracking or looking after the constructing or the employer. This gadget additionally includes a buzzer so that it will sound an alarm if they're leakage of the fueloline withinside the surroundings. This gadget may be utilized in diverse different locations together with oil and fueloline pipelines, kitchens, and fueloline garage facilities [1] . This studies goals to layout a fueloline detection gadget so that it will robotically stumble on and alert fueloline leakage. This tool is anticipated for use in family protection wherein warmers and devices that employ herbal fueloline and LPG can be a purpose of danger. This fueloline detector gadget can likewise be used for different features withinside the enterprise or plant that relies upon on LPG and herbal fueloline for his or her operation. The fueloline leakage detector gadget will ship a notification message to the registered cell phones. An Arduino microcontroller is used because the mind of the entire studies. This fueloline detector gadget is managed and monitored via the internet software ADAFRUIT. Once notified energy deliver is robotically reduce off and the buzzer is grew to become on. Using this internet software gadget may be managed with the aid of using the person together with switching at

the fan and water pump [5]. This clever fueloline detection gadget is proposed to be used at diverse hospitals. If they're a unexpected leakage of fueloline, the fueloline sensor used withinside the layout will ship a signal to the Arduino. The Arduino will then approaches the sign after which ship a notification to different outside devices concerned withinside the layout together with liquid crystal show, the magnetic buzzer, and the GSM module which heretofore stowed telecellsmartphone numbers of the people which can be accountable for preventing the fires withinside the hospital, the alarm will ship it repetitively till an acquiescent respond message received [6]. The system became designed and carried out for ceilings, and wall mounting. If the gadget is mount in any appropriate vicinity or at the wall and that they is a deliver of electrical energy, this detection gadget can be equipped for robotically sending of quick message service (SMS) or calling the residence proprietors if they're a leakage of fueloline. The detection gadget incorporates of an Arduino microcontroller, MQ-five fueloline sensor, with ATmega328 microcontroller established on it, an energetic buzzer for alarming, SIM900A GSM/GPRS module to create the cell message, solenoid valve to shut or open the fueloline provision and relay module, that's activated with the aid of using the assist of the virtual sign, despatched from the Arduino [7]. Design of a low-price modern fueloline leakage sensor-primarily based totally detection gadget, to inform and control. The fueloline detection gadget may be very proficient, portable, person-friendly, price-effective, and small in size [8]. An analog to virtual conversion (ADC) technique primarily based totally on digital devices, that's utilized in detecting leakage of fueloline the use of mechanical gadgets at industries, households, fueloline stations, and vehicles. Places wherein detection of this gases leakage is an crucial challenge to steer clear of any form of insecurity. This system incorporates the processing phase, which receipts the inputs information, approaches the information, after which produces an output. Analogous to this output records, it then begins offevolved to expend fan and the light-emitting diode is on, if the attention of the fueloline surpasses a positive stage, it then begins offevolved or set the buzzer on, it additionally switches off the fueloline energy deliver devices and informs the residence proprietors or patron with the aid of using sending an alert message through the tracking laptop gadget. The fueloline attention stage for a specific operational region can be saved withinside the Mat lab “Database Explorer Tool” to get a precis of the fueloline eminence of this surroundings or region for approaching scrutiny together with chance to take coincidence and so on [9]. LPG break out detection and alert gadget. This gadget triggers the buzzer and suggests the rigorousness of the break out to inform men and women as soon as the LPG break out is detected. The gadget is exceedingly forthright but dependable [10]. Design of fueloline detector the use of the Internet of Things. The fueloline detector sensor used withinside the layout will recognize the information and submit it into an records cloud. If they're a leakage of fueloline the sensor will now stumble on it and sound an alarm with the assist of a buzzer. They are LCD to show the leakage, notify the observer, and cause the exhaust fan withinside the precise region or phase that they're leakage of the fueloline, it then extracts the leaked fueloline

2.1 EXISTING PROBLEM

Internet of Things aim towards making life simpler by automating every small task around us. As much is IoT helping in automating tasks, the benefits of IoT can also be extended for enhancing the existing safety standards. Safety has always been an important criterion while designing home, buildings, industries as well as cities. The increased concentration of certain gases in the atmosphere can prove to be extremely dangerous. These gases might be flammable at certain temperature and humidity conditions, toxic after exceeding the specified concentrations limits or even a contributing factor in the air pollution of an area leading to problems such as smog and reduced visibility which can in turn cause severe accidents and also have adverse effect on the health of people.

2.2 REFERENCES

https://www.uptodate.com/contents/gas-leakage-monitoring-and-alerting-system-for-industries

https://www.webmd.com/a-to-z-guides/gas-leakage-detector-information

[1] Kumar Keshamoni and Sabbani Hemanth. "Smart Gas Level Monitoring, Booking & Gas Leakage Detector over IoT " International Advance Computing Conference

[2] Petros Spachos , Liang Song and Dimitrios Hatzinakos. "Gas Leak Detection and Localization System Through Wireless Sensor Networks" The 11th Annual IEEE Consumer Communications and Networking Conference - Demos

[3] Babuprasanth.V. “Cloud Connected Smart Gas Leakage Detection And Safety Precaution System" International Journal of MC Square Scientific Research Vol.6,

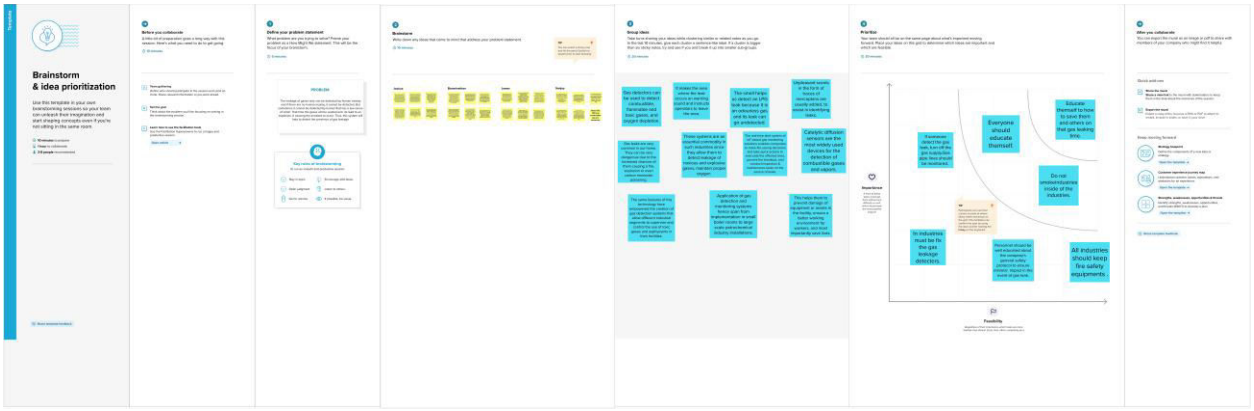
2.3 PROBLEM STATEMENT DEFINITION

Gas leakage leads to various accidents resulting into both financial loss as well as human injuries. In human’s daily life, environment gives the most significant impact to their health issues. The risk of fires, explosion, suffocation, all are based on their physical properties such flammability, toxicity etc. The number of deaths due to the explosion of gas cylinders has been increasing in recent years. The reason for such explosion is due to sub- standard cylinders, old valves, worn out regulators and lack of awareness using gas cylinders add to risks. Inspections by oil companies found that many LPG consumers are unaware of safety checks of gas cylinders. In other to minimize or eliminate the hazard of gas leakage there is a need for a system to detect and alert on such incidence leading to the development of this project.

3 . IDEATION AND PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS

3.2 IDEATION AND BRAINSTROMING



3.3 PROPOSED SOLUTION

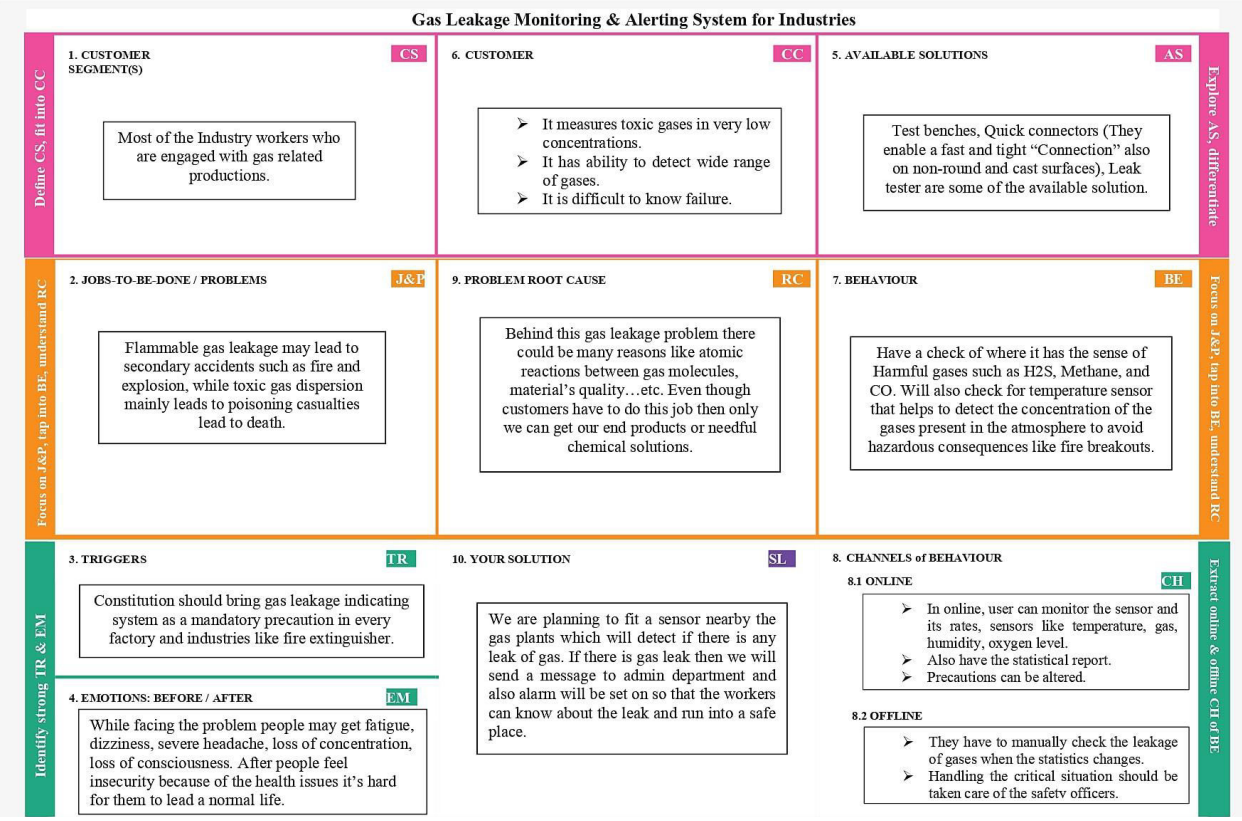
PROJECT DESIGN PHASE 1

GAS LEAKAGE MONITERING AND ALERTING SYSTEM

S.No	PARAMETER	DESCRIPTION
1.	Problem Statement	Liquid Petroleum Gas (LPG) is a highly flammable chemical that consists of mixture of propane and butane. LPG is used for cooking at home, restaurant, and certain use for industry. They have certain weaknesses that make the gas leakage occur. The leakage of gases only can be detected by human nearby and if there are no human nearby, it cannot be detected. But sometimes it cannot be detected by human that has a low sense of smell. Thus, this system will help to detect the presence of gas leakage.
2.	Idea	The sensor-enabled solution helps prevent the high risk of gas explosions and affecting any casualties within and outside the premises. The gas sensors help detect the concentration of the gases present in the atmosphere to avoid hazardous consequences like fire breakouts. Natural gas detectors can alert you and your family of odorless and dangerous leaks. Natural gas detectors may not be as common on the list of must haves for the home such as a smoke detector or fire extinguisher, but these devices are worth serious consideration and can detect potentially serious situations.
3.	Novelty	The novelty of this project is to predict whether, the person who not able to smell the leakage of the gas. By their careless they can take their lives to death. Hence by this project they can come to know that the gas is leaking and they may off that.
4.	Social Impact	By implementing real-time gas leak detection, industries can monitor their environmental performance, ensure better occupational health, and eliminate potential hazards for optimum safety. Also, early detection of gas leaks can trigger concerned engineers to curtail the spread and keep a safe environment for better health and safety.
5.	Business model	Will make a innovation this and will give to the big industries By this they can work easily without any fear in the industries
6.	Scalability and Solution	In this proposed system that sensors which we fix in the detectors that makes a warning. which they indicate the gas leakage area so easily they can fix that by off the regulators of the gas pipes…

3.4 PROBLEM SOLUTION FIT

PROBLEM SOLUTION FIT



4 . REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENTS

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)

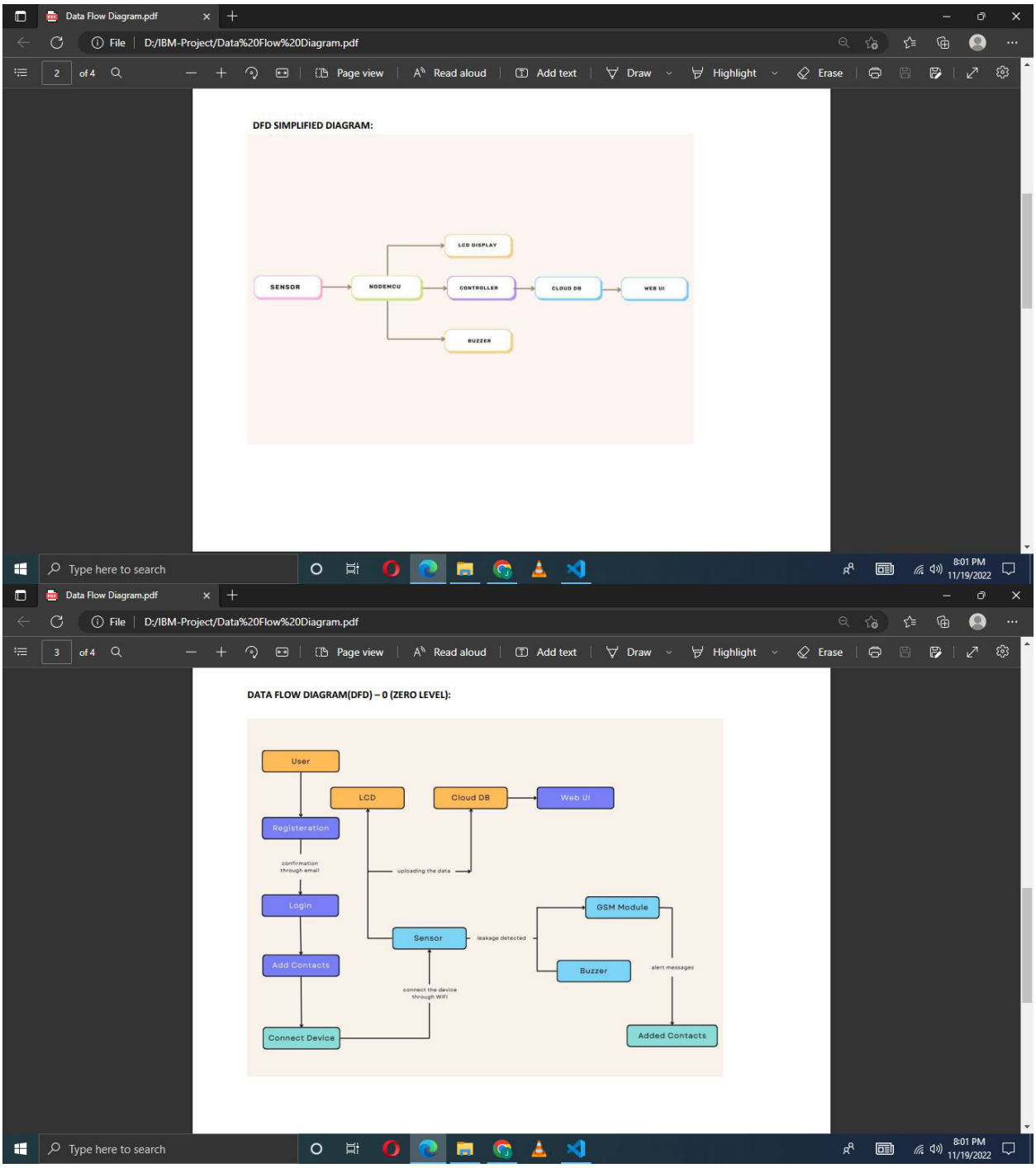
FR-1	User Registration	1. Registration through Form 2.Registration through Gmail
FR-2	User Confirmation	1 .Confirmation via Email 2. Confirmation via OTP
FR-3	User SIGN IN	1.User can sign in with username and password
FR-4	Connect the NODEMCU device	Connect the NODEMCU device with application through Wifi.
FR-5	Update contact details	Update the emergency contact number.
FR-6	REALTIME MONITORING	It display the temperature level in pictorial representation using flow chart.
FR-7	Output	1. In Emergency situation, it sends alert message to emergency contact number. 2.It sends message to fire service.
FR-8	Review and Feedback	1.User can share their experience about the app usage. 2.Provide feedback

4.2 NON-FUNCTIONAL REQUIREMENTS

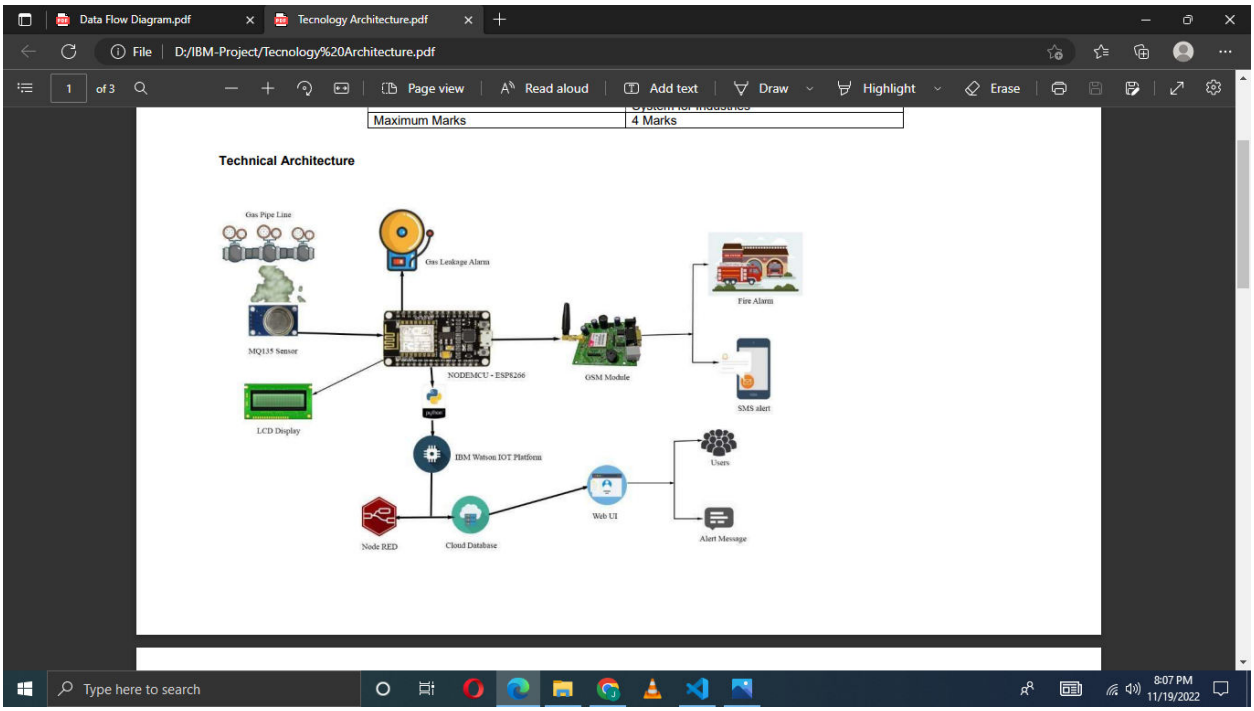
FR No.	Non-Functional Requirement	Description
NFR-1	Usability	1. In Industries, we use this device to avoid the fire accidents. 2.The device can be accessed through Wifi.
NFR-2	Security	Only authorised person can access the important details.
NFR-3	Reliability	1.Prevent from accidents. 2.Avoid false Alarm. 3.It Should avoid the delay alert message

5 . PROJECT DESIGN

5.1 DATA FLOW DIAGRAM



5.2 SOLUTION AND TECHNICAL ARCHITECTURE



5.3 USER STORIES

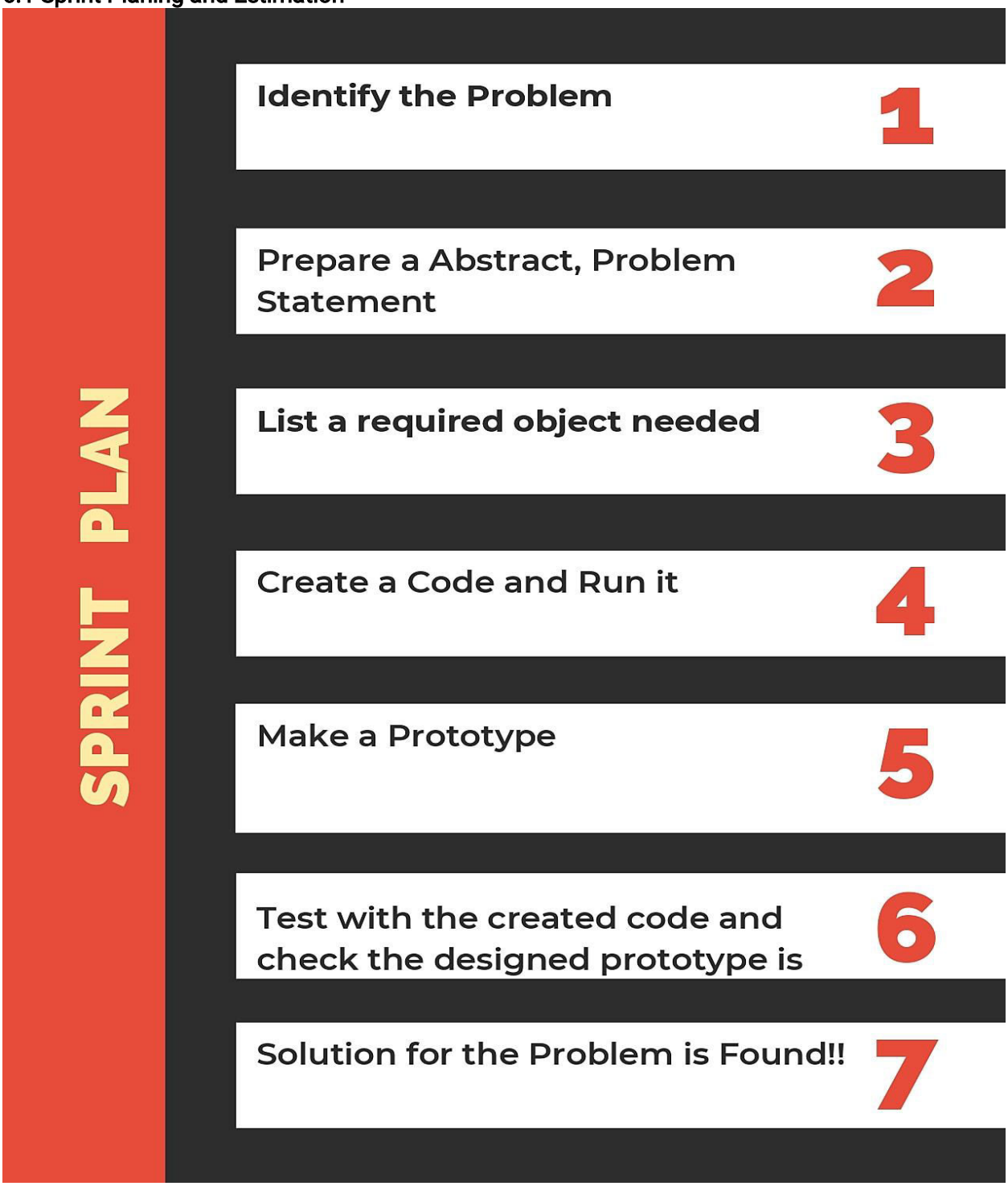
User Stories

Use the below template to list all the user stories for the product.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Industry owner)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
Customer (Industry Owner)	Confirmation	USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1
Customer (Industry Owner)	Authorize	USN-3	As a user, I will enable the supervisor to monitor the gas leakage system status.	I can provide access to supervisor.	High	Sprint-1
Customer (Supervisor)	Login	USN-4	As a user, I can log into the application by entering email & password.	I can get access to dashboard.	High	Sprint-1
Customer (Supervisor)	Monitor	USN-5	As a user, I can monitor the status of the gas leakage system.	I can view the status of gas leakage system.	High	Sprint-1
Customer (Line Workers)	Notification	USN-6	As a user, I can get (alarm system) alert about gas leakage.	I can get alert about gas leak.	Medium	Sprint-2
Customer (Supervisor)	Notification	USN-7	As a user, I can get SMS notification & alarming alert about gas leakage.	I can get alert about gas leakage.	Medium	Sprint-2
Customer (Industry Owner)	Notification	USN-8	As a user, I can get SMS notification about gas leakage.	I can get alert about gas leakage.	Medium	Sprint-2
Customer (Industry Owner)	Sign-Up	USN-9	As a user, I can sign-up using Facebook login.	I can sign-up with the application using Facebook.	Low	Sprint-3
Customer (Supervisor)	Sign-Up	USN-10	As a user, I can sign-up using Facebook login.	I can sign-up with the application using Facebook.	Low	Sprint-3
Administrator	Service Request	USN-11	As a user, I can request for service in case of any issue with gas leakage monitoring system	I can get service from provider	Low	Sprint-3
Administrator	Increased service	USN-12	As a user, I can request for scaling up the gas leakage monitoring system.	I can get service from the provider.	Low	Sprint-4

6 . PROJECT PLANNING AND SCHEDULING

6.1 Sprint Planing and Estimation



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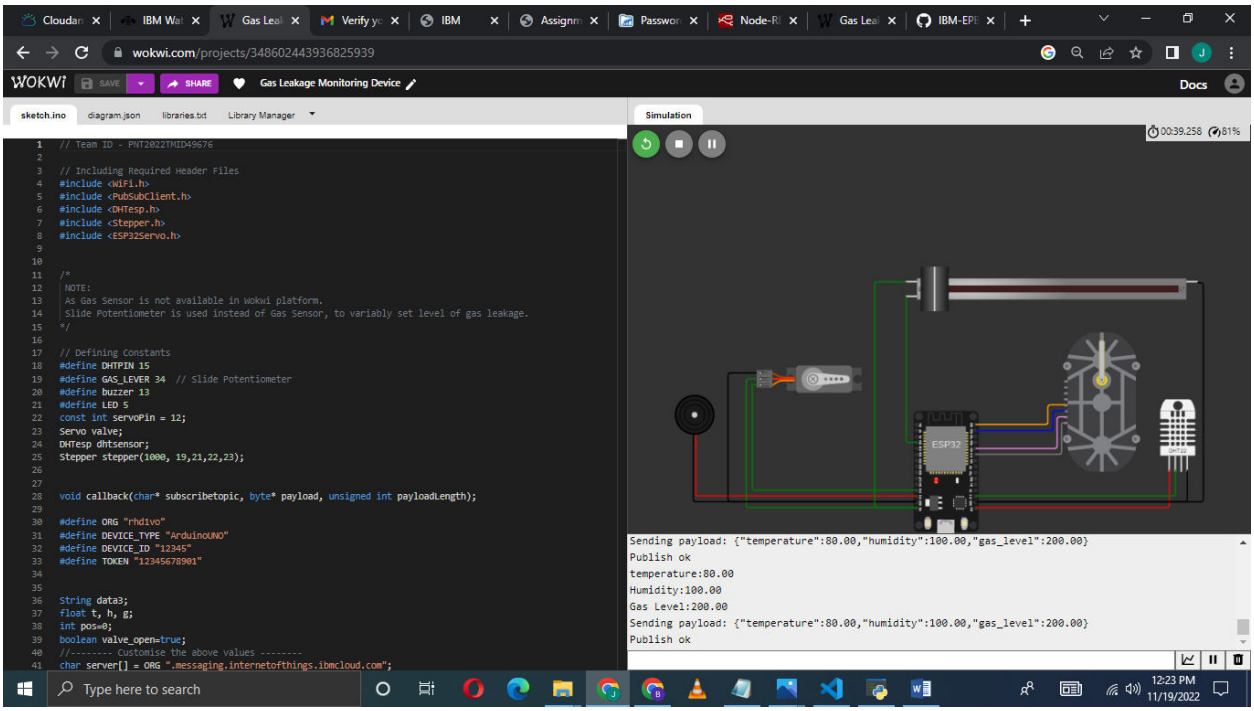

CONCLUSION

By developing a smart gas leakage monitoring and alerting system that actively monitors for gas leaks, & alerts the workers of the industry in case of detection of any gas leakage & also sends SMS notifications to administrators and also takes precautionary measures like turning ON exhaust fans so, we can therefore conclude that our problem premise is solved utilizing IoT devices.

github link
https://github.com/IBM-EPBL/IBM-Project-45118-1660728353.git

demo link