PROJECT DOCUMENTATION

IOT BASED GAS LEAKAGE MONITORING AND ALERTING SYSTEM

TEAM ID: PNT2022TMID11664

TEAM MEMBERS:

SANJURIYA V

SHREEMATHI R N

SANJHEY HARIRAM SA

PRATHEEP RAJ A

ABSTRACT

IoT is an expanding network of physical devices that are linked with different types of sensors and with the help of connectivity to the internet, they are able to exchange data. Through IoT, internet has now extended its roots to almost every possible thing presents around us and is no more limited to our personal computers and mobile phones. Safety, the elementary concern of any project, has not been left untouched by IoT. Gas Leakages in open or closed areas can prove to be dangerous and lethal. The traditional Gas Leakage Detector Systems though have great precision, fail to acknowledge a few factors in the field of alerting the people about the leakage. Therefore, we have used the IoT technology to make a Gas Leakage monitoring and altering involving calling, sending text message and an e-mail to the concerned authority and an ability to predict hazardous situation so that people could be made aware in advance by performing data analytics on sensor readings. Leakage of any kind of gas has been a concern in recent years, whether it is in a residential setting, a business, a cafe, or a canteen. In this paper development of an IoT based gas wastage monitoring, leakage detecting and alerting system is proposed. This paper elaborates design such an intelligent system that will help save gas and smartly prevent accidents.

TABLE OF CONTENTS

1. INTRODUCTION

1.1 PROJECT OVERVIEW

We design and develop an propose system which include some safety factors. A safety has been a major issue today's day to day life. LPG is a petroleum gas are the most commonly used in residential and commercial places. For industrial plants it has been used fuels like petrol, diesel. 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. On detection it will send an alert SMS and the gas supply knob of cylinder will be switched off automatically. The system can be taken as a small attempt in connecting the existing primary gas detection methods to a mobile platform integrated with IoT platforms. The gases are sensed in an area of 1m radius of the rover and the sensor output data are continuously transferred to the local server. The accuracy of sensors is not up to the mark thus stray gases are also detected which creates an amount of error in the outputs of the sensors, especially in case of methane. Further the availability and storage of toxic gases like hydrogen sulphide also creates problems for testing the assembled hardware. As the system operates outside the pipeline, the complication of system maintenance and material selection of the system in case of corrosive gases is reduced. Thus, the system at this stage can only be used as a primary indicator of leakage inside a plant.

1.2 PURPOSE

The design of a sensor-based automatic gas leakage detector with an alert and control system has been proposed. This is an affordable, less power using, lightweight, portable, safe, user friendly, efficient, multi featured and simple system device for detecting gas. Gas leakage detection will not only provide us with significance in the health department but it will also lead to raise our economy, because when gas leaks it not only contaminates the atmosphere, but also wastage of gases will hurt our economy. The need for ensuring safety in workplaces is expected to be the key driving force for the market over the coming years

2. LITERATURE SURVEY

1. **Internet of Things (IOT) Based Gas Leakage Monitoring and Alerting System with MQ-2 Sensor**

   Author: Rohan Chandra Pandey, Manish Verma, Lumesh Kumar Sahu

   "Intelligent Residential Security Alarm and Remote fire alarm, toxic gas leakage remote automatic sound alarm and remote-control system, which is based on 89c51 single chip computer. The system can perform an automatic alarm, which calls the police hotline number automatically. It can also be a voice alarm and shows alarm occurred address. This intelligent security system can be used control the electrical power remotely through telephone. applications a remote monitoring system based on SMS through GSM IOT Based Gas Leakage Detection System with Database Logging, Prediction and Smart Alerting

2. **Internet of Things (IoT) Based Gas Leakage Monitoring and Alerting System with Mq-6 Sensor**

   Author: Rohan Chandra Pandey, Manish Verma, Lumesh Kumar Sahu, Saurabh Deshmukh

   Intelligent residential burglar alarm, emergency alarm, fire alarm, toxic gas leakage remote automatic sound alarm and remote control system, which is based on 89c51 single chip computer. The system can perform an automatic alarm, which calls the police hotline number automatically. It can also be a voice alarm and shows alarm occurred address. This intelligent security system can be used control the electrical power remotely through mobile phone

3. **Gas Leakage Detection and Smart Alerting System**

   Author: Shital Imade, Priyanka Rajmanes, Aishwarya Gavali, Prof. V. N. Nayak wadi

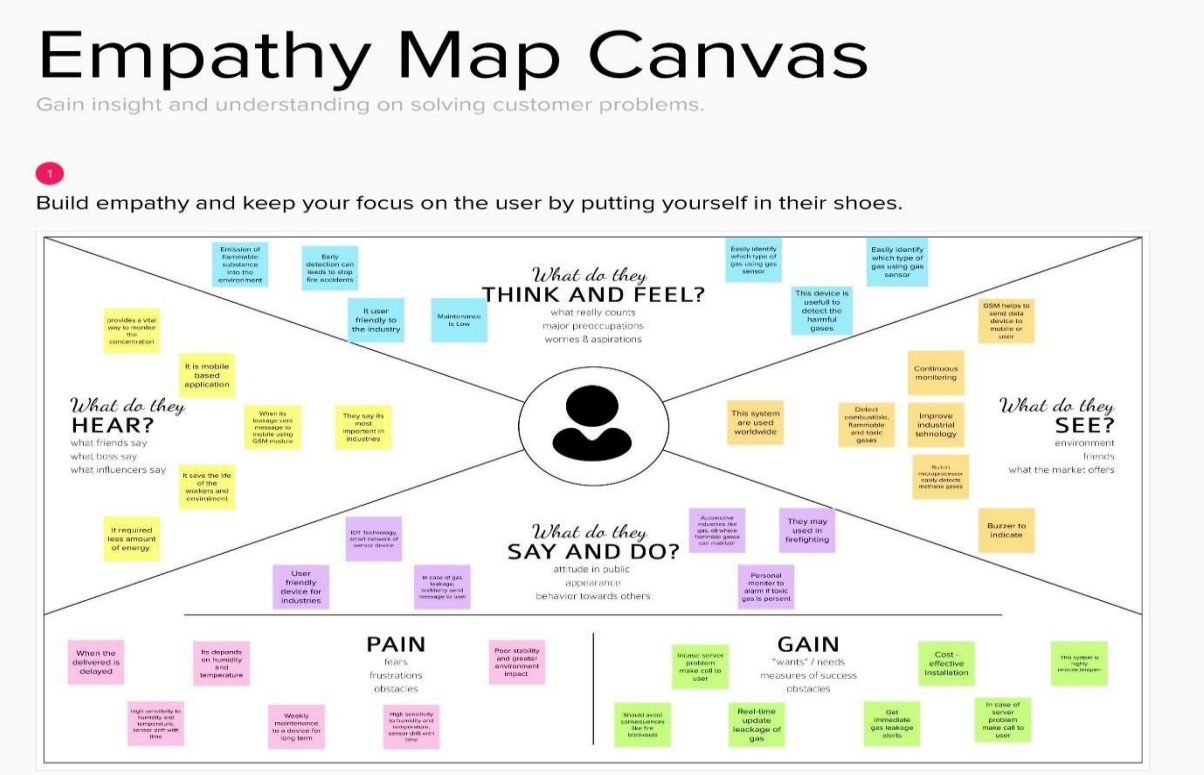
   Internet of Things (IoT) is the networking of 'things' by which physical things can communicate with the help of sensors, electronics, software, and connectivity. These systems do not require any human interaction. Internet of Things aim towards making life simpler by automating every small task around us. As much is IoT helping in automating tasks, the benefits of IoT can also be extended for enhancing the existing safety standards. Safety plays a major role in today's world and it is necessary that good safety systems are

to be implemented in places of education and work. This work modifies the existing safety model installed in industries and this system can also be used in homes and offices. The traditional Gas Leakage Detector Systems though have great precision, fail to acknowledge a few factors in the field of alerting the people about the leakage. Therefore, we have used the IoT technology to make a Gas Leakage Detector for society which having Smart Alerting techniques involving sending text message to the concerned authority and an ability performing data analytics on sensor readings

3. IDEATION PHASE

3.1 EMPATHY MAP CANVAS

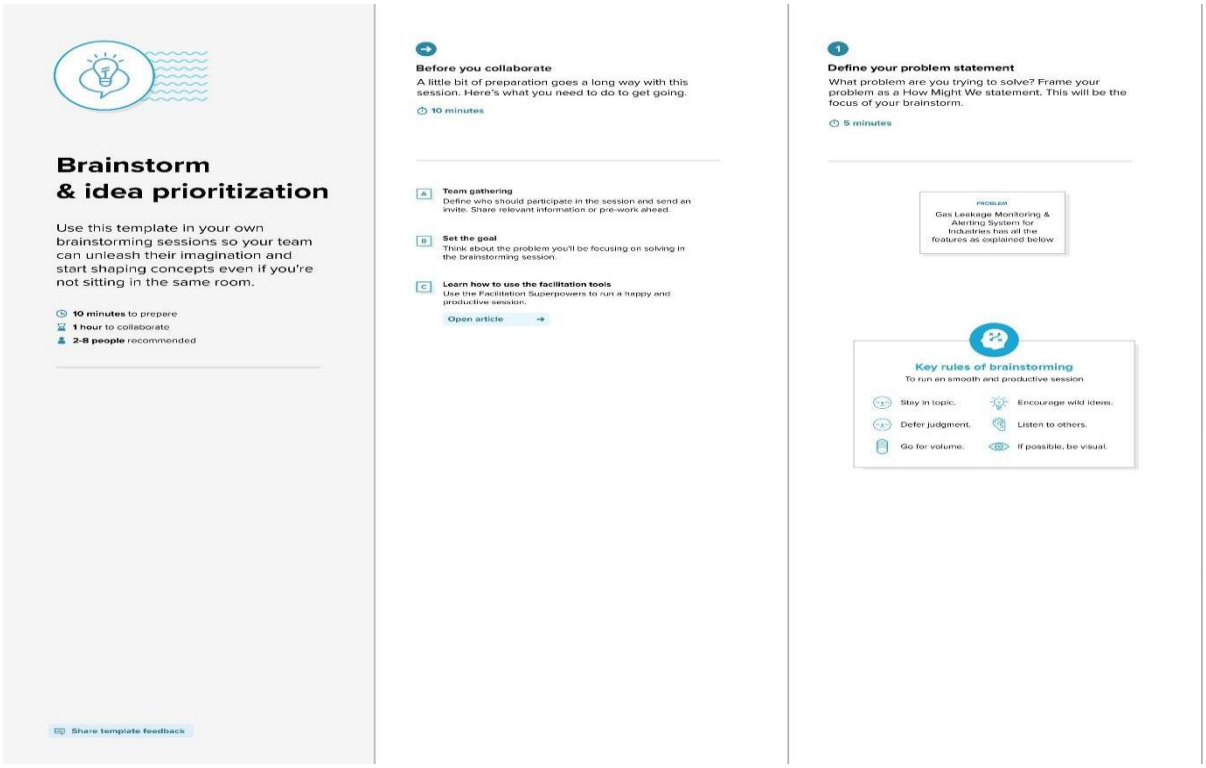
Empathy Map Canvas: An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviours and attitudes. It is a useful tool to helps teams better understand their users. Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.



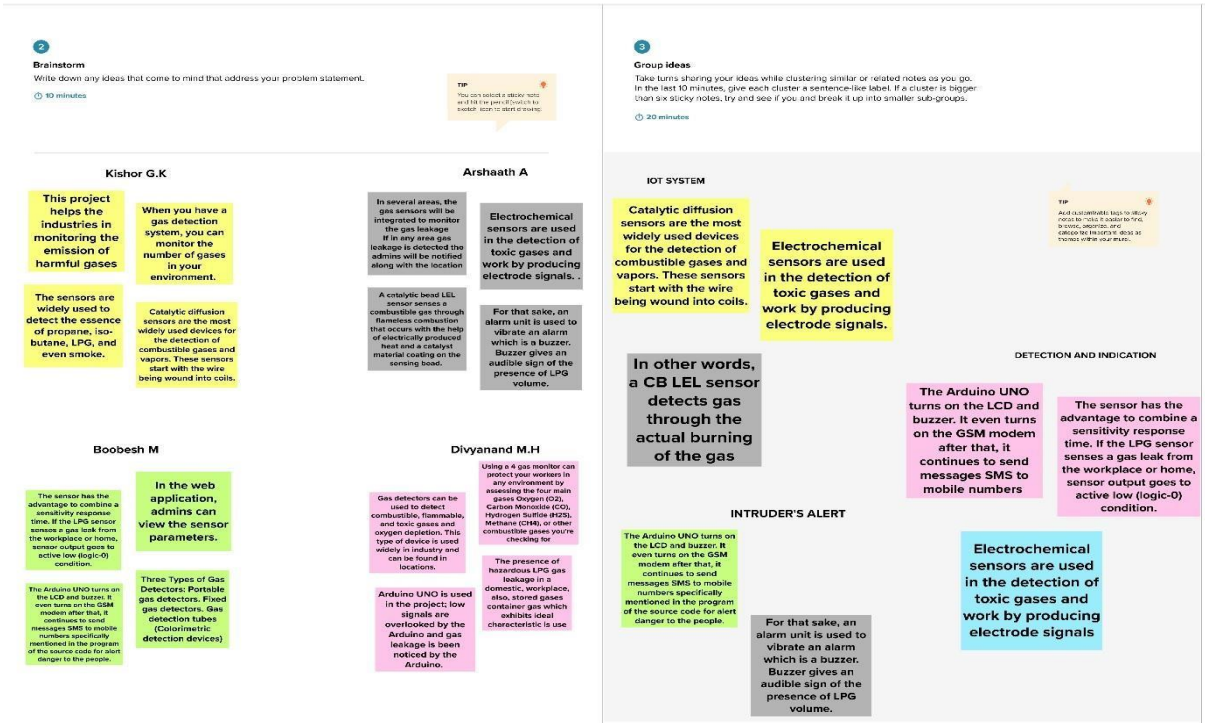
3.2 Brainstorm & Idea Prioritization Template:

Brainstorming provides a free and open environment that encourages everyone within a team to participate in the creative thinking process that leads to problem-solving. Prioritizing volume over value, out-of-the-box ideas are welcome and built upon, and all participants are encouraged to collaborate, helping each other develop a rich amount of creative solutions.

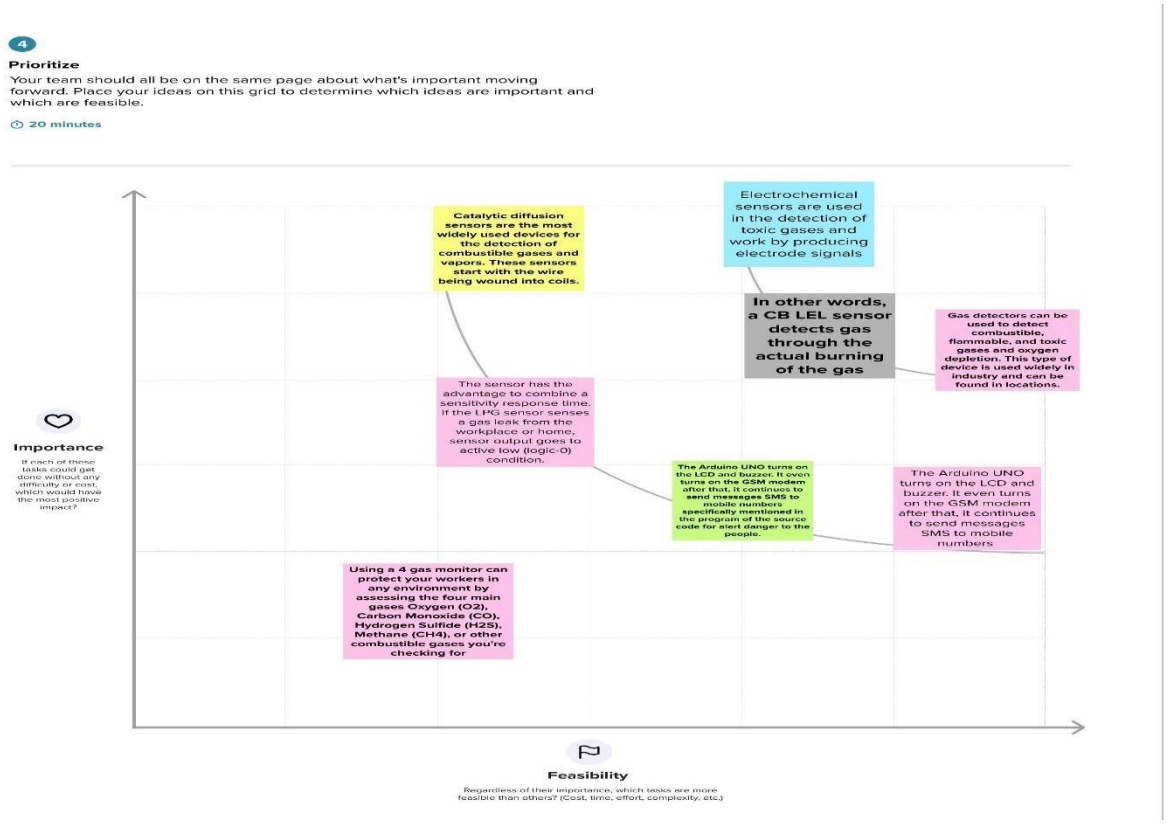
Step-1: Team Gathering, Collaboration and Select the Problem Statement



Step-2: Brainstorm, Idea Listing and Grouping:

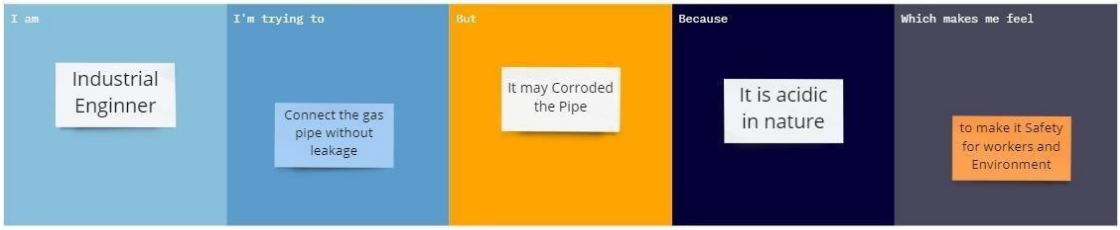


Step-3: Idea Prioritization:



3.3 PROBLEM STATEMENT:

PROBLEM -1:



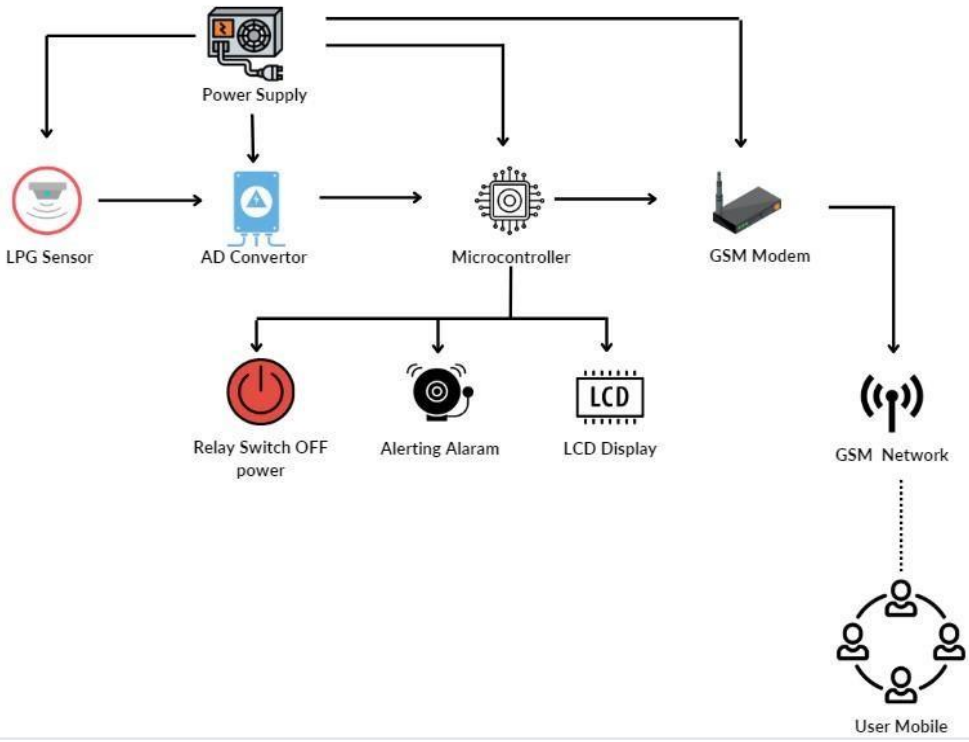
PROBLEM -2:

PROBLEM -3:

PROBLEM -4:

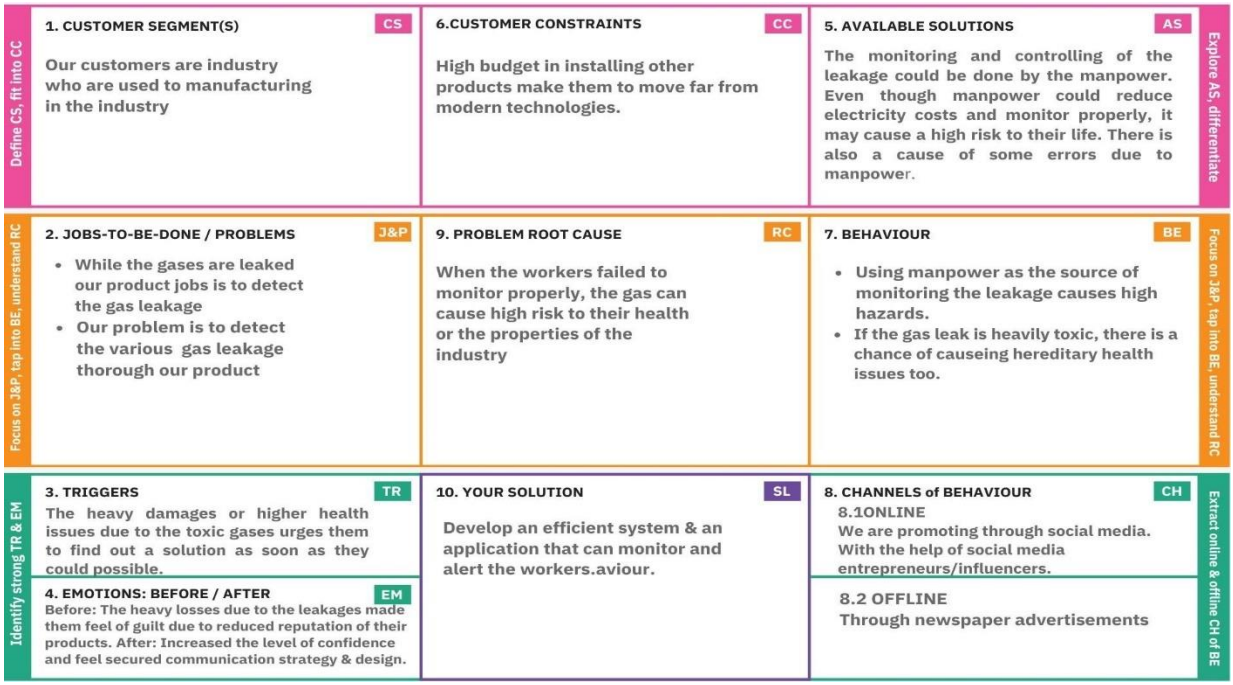
4. PROJECT DESIGN

4.1 SOLUTION ARCHITECTURE



5. PROJECT PLANNING AND SCHEDULING

5.1 PROBLEM SOLUTION FIT



5.2 PROPOSED SOLUTION

The system can be taken as a small attempt in connecting the existing primary gas detection methods to a mobile platform integrated with IoT platforms. The gases are sensed in an area of 1m radius of the rover and the sensor output datas are continuously transferred to the local server. The accuracy of sensors are not upto the mark thus stray gases are also detected which creates an amount of error in the outputs of the sensors, especially in case of methane. Further the availability and storage of toxic gases like hydrogen sulphide also creates problems for testing the assembled hardware. As the system operates outside the pipeline, the complication of system maintenance and material selection of the system in case of corrosive gases is reduced. Thus the system at this stage can only be used as a primary indicator of leakage inside a plant.

6. TESTING

6.1 DEFECT ANALYSIS

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	7	0	0	7
Client Application	51	0	0	51

Security	2	0	0	2
Outsource Shipping	3	0	0	3

This report shows the number of resolved or closed bugs at each severity level, and how they were resolved

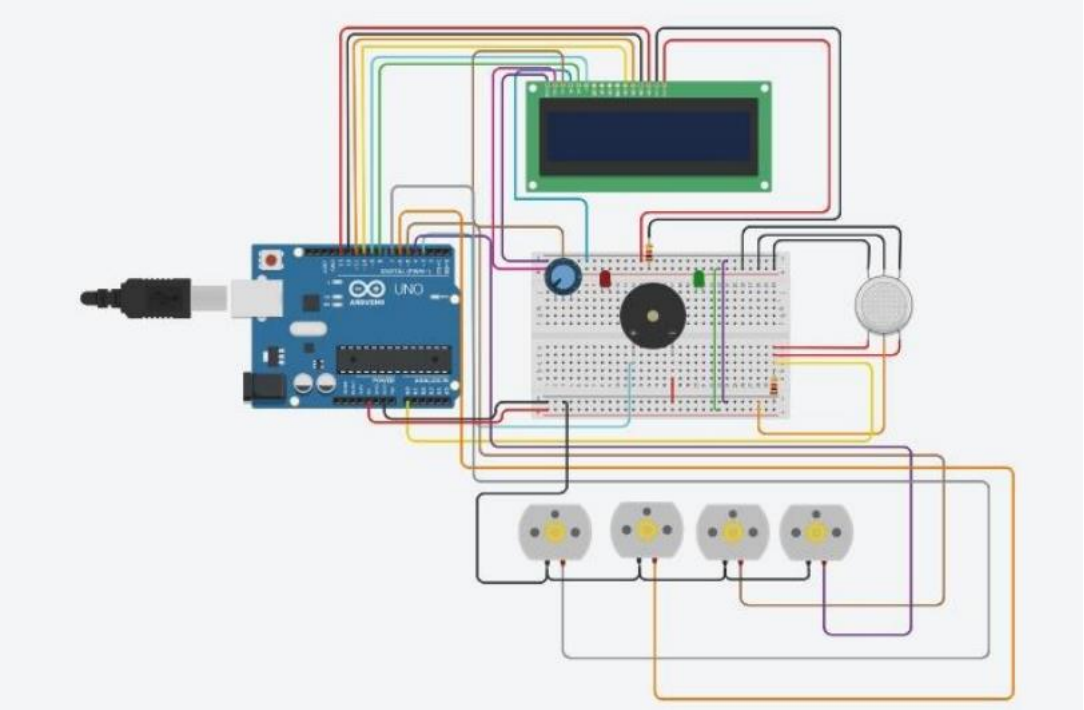
Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	10	4	2	3	20
Duplicate	1	0	3	0	4
External	2	3	0	1	6
Fixed	11	2	4	20	37
Not Reproduced	0	0	1	0	1
Skipped	0	0	1	1	2
Won't Fix	0	5	2	1	8
Totals	24	14	13	26	77

6.3 TEST CASE ANALYSIS

This report shows the number of test cases that have passed, failed, and untested

Exception Reporting	9	0	0	9
Final Report Output	4	0	0	4
Version Control	2	0	0	2

7.RESULTS



8. FUNCTIONAL REQUIREMENTS AND NON-FUNCTIONAL REQUIREMENTS

FUNCTIONAL REQIREMENTS

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Requirements	Set up the device in necessary Place
FR-2	User Registration	Manual Registration
FR-3	User Confirmation	Confirmation of receiving the calls & message
FR-4	User Alert	Gets alert as an SMS message Gets alert alarm in working area.

NON-FUNCTIONAL REQUIREMENTS

Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	The Device must be usable by customer anywhere
NFR-2	**Security**	Data from the sensor are stored securely and away from other data
NFR-3	**Reliability**	Data can be retrieved anytime and no data is discarded without customer knowledge
NFR-4	**Performance**	No performance delay in case of large number of data or parameters
NFR-5	**Availability**	It works for 24/7 without rest it can be monitor with durability

9. CONCLUSION

An advantage of this simple gas leak detector is its simplicity and its ability to warn about the leakage of the LPG gas. This system uses GSM technique to send alert massage to respective person if no one is there in the house and then gas leaks occurs, GSM module is there to send immediate messages to the respective person regarding the gas leak. The main advantage of this system is that it off the regulator knob of the cylinder automatically when gas leakage detected. It can conclude that detection of the LPG gas leakage is incredible in the project system. Applicable usefully in the industrial and domestic purpose.

10. FUTURE SCOPE

Leakage of any kind of gas has been a concern in recent years, whether it is in a residential setting, a business, a cafe, or a canteen. In this paper development of an IoT based gas wastage monitoring, leakage detecting and alerting system is proposed. This paper elaborates design such an intelligent system that will help save gas and smartly prevent accidents.

11. Appendix :

11.1 Source code link:

https://github.com/IBM-EPBL/IBM-Project-30560-1660148882

11.2 GitHub and Project demo link

GitHublink:

https://github.com/IBM-EPBL/IBM-Project-30560-1660148882