iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 **Issue:** IV **Month of publication:** April 2023

DOI: https://doi.org/10.22214/ijraset.2023.50964

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue IV Apr 2023- Available at www.ijraset.com

LPG Gas Leakage Detection and Alert System

Bhagyashree Dharaskar[1], Alkesh Gaigawali[2], Sahil Meshram[3], Ayush Tembhurne[4], Abhishek Gautam[5], Aman Nanhe[6]
Department: CSE, Institute: Priyadarshini College of Engineering, Nagpur, India

Abstract: This project proposes designing and implementing an LPG gas leakage detection and alert system for households and industries. The increase in deaths caused by LPG explosions has highlighted the need for a gas leak detection system to identify potential hazards. Various gas sensors are used in this process, including wireless and GSM technology. The gas sensor detects the presence of LPG gas in the environment, and the microcontroller processes the sensor data to trigger an alarm or shut off the gas supply. The system can also send an SMS alert to a designated phone number in case of gas leakage. The proposed system is intended to prevent accidents, fires, and explosions by providing an early warning and taking necessary actions to minimize the damage caused by gas leakage. The proposed LPG Gas Leak Detection Smart Tool effectively addresses the growing concern about LPG explosions and their catastrophic consequences.
Keywords: LPG gas, GSM Technology, SMS Alert, Microcontroller

I. INTRODUCTION

The use of liquefied petroleum gas (LPG) as a fuel source has become increasingly popular in households and industries due to its affordability and efficiency. However, the risk associated with LPG gas leakage cannot be overstated. LPG is highly flammable and explosive, and its leakage can lead to accidents, fires, and explosions that can cause fatalities and significant damage to property. Therefore, there is a growing need for an effective gas leak detection system that can identify potential hazards and provide early warning to prevent catastrophic consequences. To address this concern, this project proposes designing and implementing an LPG gas leakage detection and alert system for households and industries. The system is designed to detect the presence of LPG gas using various gas sensors, including wireless and GSM technology. These sensors can detect the concentration of LPG gas in the environment and send the data to a microcontroller for processing. The microcontroller processes the sensor data and triggers an alarm or shuts off the gas supply in case of a gas leak. Additionally, the system is designed to send an SMS alert to a designated phone number in case of gas leakage, providing an early warning to prevent accidents, fires, and explosions.

The proposed LPG Gas Leak Detection Smart Tool offers a reliable and effective solution to address the growing concern about LPG explosions and their catastrophic consequences. By incorporating gas sensors, wireless and GSM technology, microcontrollers, and an alarm system, the system provides enhanced house safety and industrial safety, preventing potential hazards and minimizing the damage caused by gas leakage.

Overall, this project aims to develop a gas leak detection system that offers an effective solution to the increasing concerns of LPG gas leakage, providing an early warning to prevent accidents, fires, and explosions, and enhancing the safety of households and industries.

II. AIM AND OBJECTIVE

A. Aim

To design and implement an LPG gas leakage detection and alert system that enhances the safety of households and industries by detecting potential gas hazards and providing an early warning to prevent accidents, fires, and explosions.

B. Objective

1) To research and identify the appropriate gas sensors, wireless and GSM technology, and microcontrollers needed to detect LPG gas leakage.
2) To design and develop a gas leak detection system that can detect the presence of LPG gas and trigger an alarm or shut off the gas supply in case of a gas leak.
3) To integrate the gas leak detection system with wireless and GSM technology to send an SMS alert to a designated phone number in case of gas leakage.
4) To provide an effective solution to address the growing concerns of LPG explosions and their catastrophic consequences, enhancing the safety of households and industries.

©IJRASET: All Rights are Reserved

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue IV Apr 2023- Available at www.ijraset.com

III. LITERATURE SURVEY

Title: Gas Leak Detector,
Design and Implementation of an Economic Gas Leakage Detector, published in 2012.
Author: Mahalingam B. T.H.Mujawar, M.S.Kasbe
The objective of this work is to present the design of a cost-effective automatic alarming system, which can detect liquefied petroleum gas leakage in various premises.

Title: GSM Module, Published in 2014
Author: K.Padma Priya, Ratnesh Prabhaker
The GSM module is used to send a short message about the possibility of gas leaks and as an added feature indicates that it may book a refill cylinder or can program the device to automatically book the cylinder via SMS.

Title: MQ2 gas sensor Board Arduino Duemilanove.
Published in the year 2013
Author: Christan and N. Komar
Mq-2 sensor is for the detection of LPG Gas, LPG gas consists of propane gas and butane. The sensitive material used in the MQ-2 gas sensor is tin oxide (SnO2).

IV. PROPOSED METHODOLOGY

In this study it can be described how the tool can work to capture the gas received by the sensor, then the sensor is processed in an Arduino program that can display data in the LCD, emit sound, and send a short message to the registered mobile number. The scheme can be seen in the block diagram

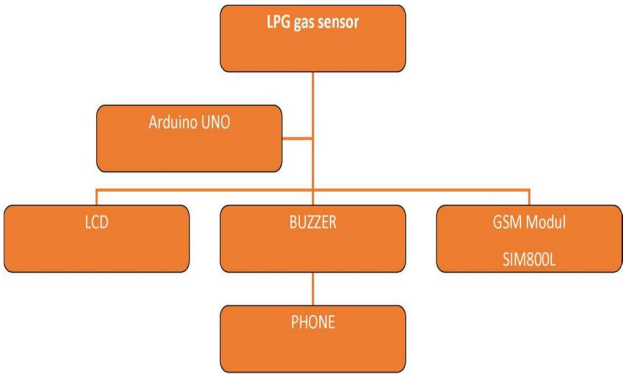


Fig. Block Diagram

1) *Selection of Components:* The first step is to identify and select the required components for the system. This includes an LPG gas sensor, Arduino Uno microcontroller, LCD screen, buzzer, GSM module, and a mobile phone.
2) *Circuit Design:* The next step involves designing the circuit for the system. The gas sensor is connected to the Arduino Uno microcontroller, which processes the sensor data and triggers an alarm through the buzzer and LCD screen in case of gas leakage. The GSM module is also connected to the microcontroller to send an SMS alert to a designated phone number.

Fig. Circuit Design

3) *Programming:* The third step involves programming the microcontroller. The code is written in the Arduino IDE, which controls the gas sensor, LCD screen, buzzer, and GSM module. The code also includes the SMS alert system, which sends a text message to the designated phone number in case of gas leakage.
4) *System Integration:* The fourth step involves integrating all the components of the system. The gas sensor, microcontroller, LCD screen, buzzer, and GSM module are connected according to the circuit design. The mobile phone is also configured to receive SMS alerts.
5) *Testing:* The final step involves testing the system to ensure that it is accurate and reliable. The system is tested in a controlled environment using LPG gas to simulate real-world conditions. The system's performance is evaluated, and any necessary modifications are made to ensure that it meets the specified requirements and objectives.

©IJRASET: All Rights are Reserved | SJ Impact Factor 7.538 | ISRA Journal Impact Factor 7.894 |

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue IV Apr 2023- Available at www.ijraset.com

Overall, the methodology for designing and implementing an LPG gas leakage detection and alert system involves a systematic approach that involves component selection, circuit design, programming, system integration, and testing to ensure that the system is accurate, reliable, and effective in detecting LPG gas leakage and providing an early warning to prevent catastrophic consequences.

V. FLOW CHART

The flowchart represents the working of an LPG gas leakage detection and alert system.

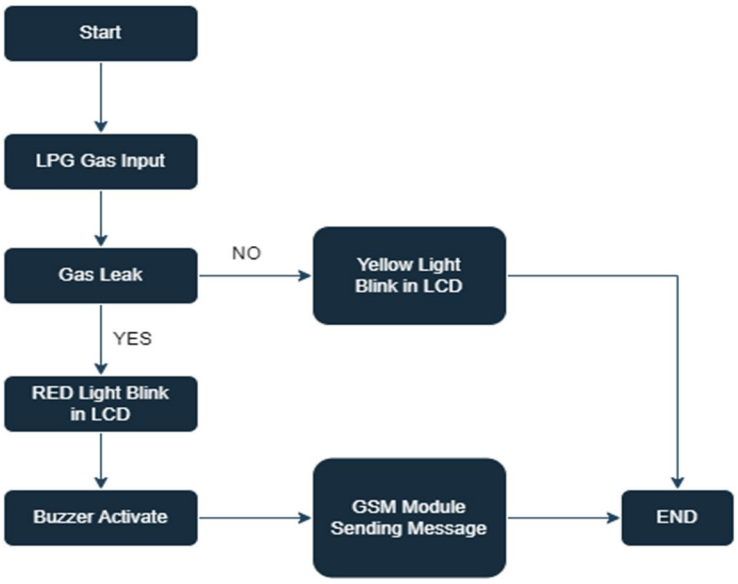


Fig. Flow Chart

At the starting point of the system. The gas sensor detects the presence of LPG gas in the environment. If there is no gas leak, the system does not take any action. However, a yellow light blinks on the LCD to indicate that the system is functioning correctly. This is the end of the system's working when no gas leak is detected.

If the gas sensor detects a gas leak, the system takes necessary actions to prevent accidents, fires, and explosions. A red light blinks on the LCD to indicate that there is a gas leak. The buzzer is activated to provide an audible warning to the people in the vicinity. The system sends an SMS alert to a designated phone number to inform about the gas leak. This is the end of the system's working when a gas leak is detected, and necessary actions are taken to minimize the damage caused by gas leakage.

Overall, the flowchart represents the simple and effective working of the LPG gas leakage detection and alert system

VI. REQUIREMENT

A. *Hardware Used*

1) Arduino Uno Microcontroller
2) MQ2 sensor
3) GSM Module SIM800L
4) 16*2 LCD module
5) Power supply
6) Buzzer
7) LED light red and yellow
8) Handphone

B. *Software Used*

1) Arduino Compiler IDE
2) Coding language- JAVA
3) GOS- LINUX, WINDOWS

©IJRASET: All Rights are Reserved

VII. EXPERIMENTAL RESULTS

The results of this case study on the system and this tool can help humans to increase proven LPG gas reserves and provide assistance to their owners that they have an LPG gas leak in the form of an alarm is also sent a message in the form of an SMS to the owner. This system and tool work as expected, and are able to detect LPG gas leaks that occur within the detection radius of the MQ-2 gas sensor which is attached to the system and the device, which is between 50 cm - 80 cm and placed in a relatively closed.
With this system and tool, the people or people who use it feel safe and comfortable. In other words, do not worry about the danger if there is an LPG gas leak that is unknown to the owner. Because the system and tool are able to work in accordance with the objective this system and tools can send information to the owner if an unknown LPG gas leak occurs through an SMS message sent to the owner's handphone. Overall, the experimental results of an LPG gas leakage detection and the alert system should demonstrate its ability to detect gas leakage, provide an early warning to prevent accidents and minimize damage, and enhance the house and industrial safety.

Fig. Proposed System Model

VIII. CONCLUSION

The LPG gas leakage detection and alert system is an essential tool for enhancing safety in households and industries. LPG gas leakage can cause serious accidents, fires, and explosions, leading to fatalities and significant damage to property. The proposed system offers a reliable and effective solution to detect potential hazards and provide an early warning to prevent catastrophic consequences. Various gas sensors, wireless and GSM technology, microcontrollers, and an alarm system are used to detect the presence of LPG gas and trigger an alarm, shut off the gas supply, and send an SMS alert in case of gas leakage. The experimental results of the system should demonstrate its ability to accurately detect gas leakage, provide an early warning, and minimize damage caused by gas leakage. Hence, the proposed LPG Gas Leak Detection Smart Tool can significantly improve house safety and industrial safety, prevent accidents, and minimize damage caused by gas leakage. Therefore, it is a valuable and necessary investment for anyone using LPG gas as a fuel source.

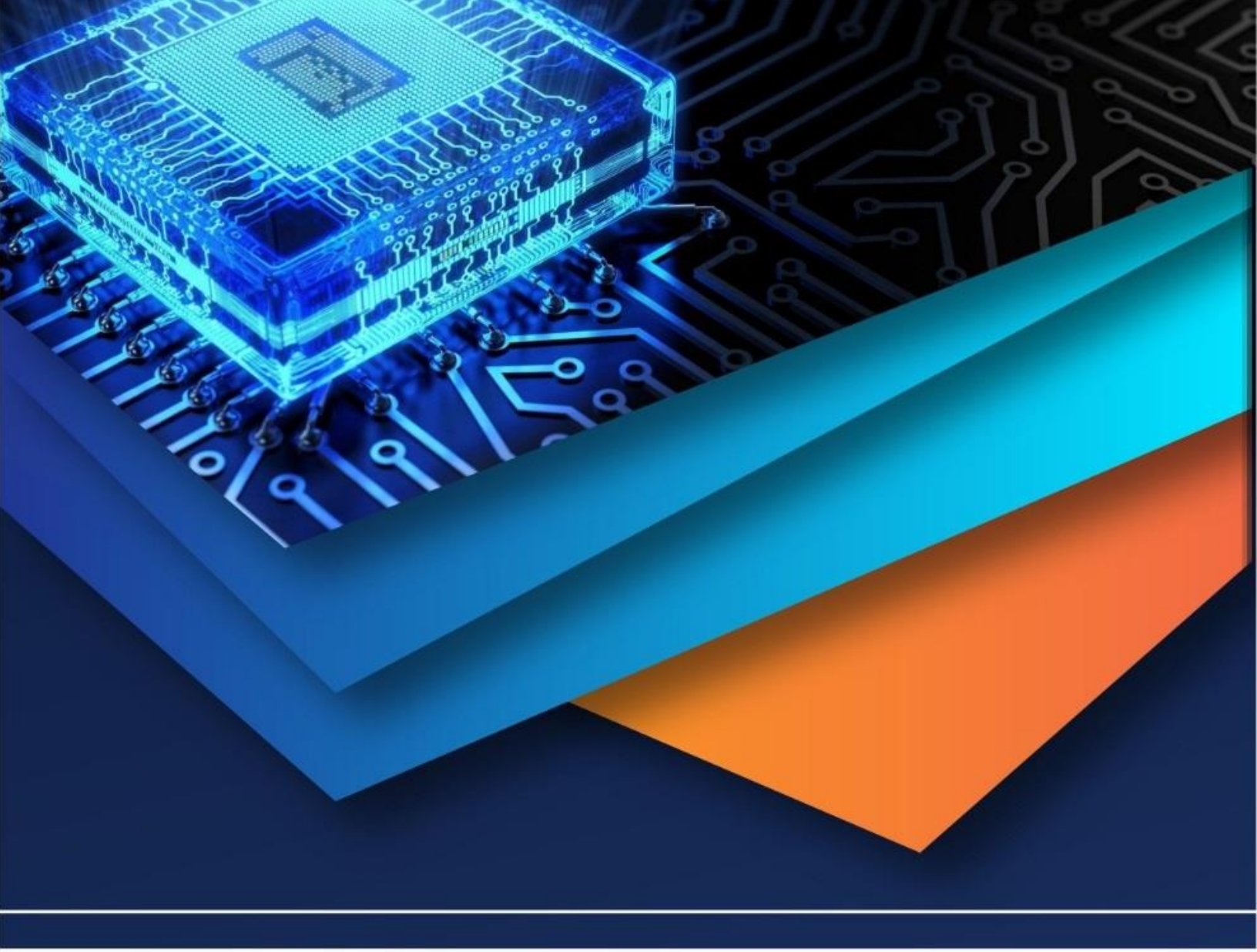
IX. FUTURE SCOPE

The LPG gas leakage detection and the alert system have a significant future in improving safety and preventing accidents in households and industries. With advancements in technology, the system can be further enhanced to provide more accurate and efficient detection of gas leakage. The integration of artificial intelligence and machine learning algorithms can improve the system's ability to identify potential hazards and trigger appropriate responses. Additionally, the system can be connected to a central monitoring system, enabling remote monitoring and management of gas leakage in real time. Overall, the future scope of the LPG gas leakage detection and alert system is promising, and continuous research and development can further enhance its capabilities.

REFERENCES

[1] J. Christian and N. Komar, "Prototipe Sistem Pendeteksi Kebocoran Gas LPG Menggunakan Sensor Gas MQ2, Board Arduino Duemilanove, Buzzer, dan Arduino GSM Shield pada PT. Alfa Retailindo (Carrefour Pasar Minggu)," Jurnal TICOM, pp. 1-7, 2013
https://en.wikipedia.org/wiki/Tilburg_Institute_of_Comparative_and_Transnational_Law
[2] T. H. Mujawar, V. D. Bachuwar, M. S. Kasbe, A. D. Shaligram, and L. P. Deshmukh, "Development of wireless sensor network system for LPG gas leakage detection system," International Journal of Scientific & Engineering Research, vol. 6, pp. 1-6, 2015.
[3] K. Padma Priya and Ratnesh Prabhakar GSM Based Gas Leakage Detection System, published in 2013.
[4] Attia, Hussain A., and Halah Y. Ali. "Electronic Design of Liquefied Petroleum Gas Leakage Monitoring, Alarm, and Protection System Based on Discrete Components." International Journal of Applied Engineering Research, vol. 11, no. 19, pp. 9721-9726, 2016.
[5] Apeh, S. T., K. B. Erameh, and U. Iruansi. "Design and Development of Kitchen Gas Leakage Detection and Automatic Gas Shut off System." Journal of Emerging Trends in Engineering and Applied Sciences, vol. 5, no. 3, pp. 222-228, 2014.

©IJRASET: All Rights are Reserved | SJ Impact Factor 7.538 | ISRA Journal Impact Factor 7.894 |



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)