International Journal of Research in Computer & Information Technology (IJRCIT),
Vol.8, Issue 3, June 2023
E-ISSN: 2455-3743
Available online at www.ijrcit.co.in

Self-Opening Window Using LPG Detection Based on IoT

[1]Jeevan Mangrulkar, [2]Neha Barsagade, [3]Ayasha Tirpude, [4]Rutuja Birole, [5]Pallavi Sawwalakhe

Abstract— The Proposed System helps to detect leakage and the presence of hazardous gases such as LPG (Liquefied Petroleum Gas), carbon dioxide, carbon monoxide in an enclosed facility. The air quality is monitored with the data that is collected from the sensor. The sensor can communicate data with each other with the help of internet connectivity. This system focuses on safe kitchens in smart homes using IoT. In terms of safety in the household gas connection, a regulator and LPG stove are provided in which knobs control the flow. In these cases, a safety system with high leakage detection ability is required. In this system, an IoT-based safety system is proposed which may reduce accident cause by electricity during LPG leakage which will automatically open the window and switch on the exhaust fan, play the siren and send alert message to the user. This system not only ensures the safety of the people but also makes life comfortable.

Keywords— Gas Leakage, Internet of Things, Gas Sensor, Gas Monitoring System

I. INTRODUCTION

In recent years household accidents due to leakages of hazardous gases have increased. The major causes of these accidents are due to leakage of Liquified Petroleum Gas (LPG). There are various projects based on sensors and this is a low-cost microcontroller-based project. Microcontroller-based LPG leakage detector with buzzer indication using MQ6 (LPG gas) sensor, has Application in various areas including Industrial applications and domestic applications. This system is very useful in hotels, homes and LPG agencies. This System has advanced safety standards. The most important feature is that it helps to prevent accidents caused due to fire. It is also useful in protecting human life, wealth and property.

MQ6 (LPG gas) sensor is used to detect LPG leakage this sensor has a quick response time. It responds very short period of time. The output of the MQ6 sensor is given to the comparator and the output of the comparator IC is given to the microcontroller. Buzzer is turned on to give an alert indication. We have provided a potentiometer which is used to vary the threshold level of the comparator which decides the threshold level of leakage condition. If someone forgets to off the burner any leakage happened from the gas pipe. So MQ6 sensor alarm can easily identify and make too aware of the leakage. So basically, this project is useful when you are planning to secure your place from any type of gas leakage.

Contribution of Paper

- To build a system that can detect liquid petroleum gas leakage.
- To detect the changes of temperature caused by fire.
- The scope of this project had been performed in order to achieve the objectives of this project. Design and build a prototype of an LPG leakage detector controlled by Arduino Uno using MQ-2 gas sensor to detect the presence of gas leakage and DHT-11 temperature sensor. To give the real time response, Espresso lite V2.0 was used as Wi-Fi module and Blynk act as software that use to display all the reading.

II. Prospective Application

Authors	Component used	Feature Extraction Technique
D. DivyaSree and G.Abu Bakar	Gas Monitoring System using Arduino Surveyors Wheel	Based On Using Arduino
Pravalika, V., & Rajendra Prasad,	.Internet of things based home monitoring and device control using Esp32	Digital controller Digital Monitoring
A. M. Anika, M. N. Akter, M. N. Hasan, J. F. Shoma and A. Sattar,	Gas Leakage with Auto Ventilation and Smart Management System Using IoT"	Smart Management technology

III. METHODOLOGY

Automatic Window Opening using LPG Detection based on IoT is a system that uses Internet of Things (IoT) technology to detect the presence of LPG gas and automatically open windows for ventilation to prevent gas buildup and potential hazards. The system consists of an LPG gas sensor, a microcontroller, a motor, and a Wi-Fi module. The LPG gas sensor is used to detect the presence of LPG gas in the environment. When the sensor detects LPG gas, it sends a signal to the microcontroller. The microcontroller then processes this

Manuscript Received April 5, 2023; Revised 25 April, 2023 and Published on June 02, 2023

Prof. Jeevan Mangrulkar, Neha Barsagade, Ayasha Tirpude, Rutuja Birole, Pallavi Sawwalakhe, Department of Computer Engineering Suryodaya College of Engineering and Technology, Nagpur, Maharashtra, India.
Mail Id: *jeevanswamimangrulkar@gmail.com, barsagaden2000@gmail.com, ayashatirpude@gmail.com, rutujabirole@gmail.com, sawwalakhepallavi@gmail.com*

International Journal of Research in Computer & Information Technology (IJRCIT),
Vol. 8, Issue 3, June 2023
E-ISSN: 2455-3743
Available online at www.ijrcit.co.in

signal and sends a command to the motor to open the windows for ventilation. The system is also equipped with a Wi-Fi module that allows it to be connected to the internet. This enables the user to remotely monitor the LPG gas levels and the status of the windows using a mobile application or a web interface. The system can be installed in homes, offices, and other spaces where LPG gas is used. The automatic window opening feature ensures that the gas is quickly and safely vented out of the room, reducing the risk of fire or explosion.

LPG Sensor: A gas sensor that can detect the presence of LPG gas. MQ-6 LPG Gas Sensor is one such sensor that can be used for this purpose.

Microcontroller: A microcontroller such as Arduino Uno can be used to process the sensor data and control the window opening mechanism.

Motor: A motor can be used to control the opening and closing of the window.

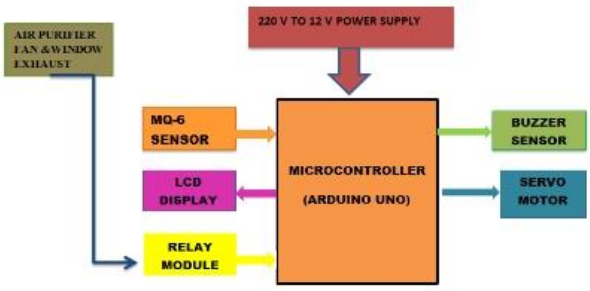


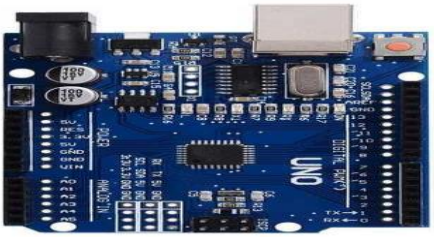
Figure 1: Block Diagram of LPG detection

A. Components Description

1. Gas sensor (MQ-6)

Gas sensors are commonly used to detect LPG leakage. These sensors detect the presence of LPG gas and send a signal to the controller, which can trigger an alarm or shut off the gas supply. The sensors can be installed in different locations depending on the requirements.

2. **ARDUINO UNO**



The working of Arduino in an automatic window opening system based on LPG detection involves the following steps:
1. Sensing: The LPG gas sensor is connected to the Arduino board. The sensor continuously monitors the air quality and detects the presence of LPG gas in the environment.
2. Processing: The Arduino board receives the sensor data and processes it using a program written in the Arduino Integrated Development Environment (IDE).

3. **BUZZER**

A buzzer can be used as an alarm system to alert the occupants of a gas leak. The working of the buzzer in this system involves the following steps:
1. Detection: The LPG gas sensor continuously monitors the air quality and detects the presence of LPG gas in the environment.
2. Alert: The sensound generated by the buzzer alerts the occupants of the building to the presence of LPG gas in the environment. The occupants can take appropriate action to evacuate the building and call for help.

4. **JUMPER WIRED**

A jumper wire is associate electrical wire, or cluster of them forming a cable, with a connecter or pin at every finish.
Individual jump wires are fitted by inserting their "end connectors" into the slots provided during a board, the header connecter of a printed circuit, or a chunk of equipment.

International Journal of Research in Computer & Information Technology (IJRCIT),
Vol. 8, Issue 3, June 2023
E-ISSN: 2455-3743
Available online at www.ijrcit.co.in

B. *Level Of Description*

This proposed method consists of gas leakage detection system, weight measurement module, microcontroller, IoT module and alert system. The main basic Arduino Mega2560 micro controller requires the power supply ranging from 7-12 volts which can be build by using different components like step down transformer, rectifier, filter and regulator which are readily available as adapters these days.

Supply can be either from an ac to dc adapter or battery. The board can operate on at 7-12 volts. If voltage < 7V then board becomes unstable. If voltage > 12V then board get damaged. The Main platform we are using to build the project is Arduino Mega 2560 which provides us the flexibility to write the code effectively in convenient way and also it will provides us features like Inexpensive, cross platform, simpler and clear programming environment, open source and extensible software, easy for beginners, the Arduino Mega 2560 is a microcontroller board based on the AT mega 2560 (datasheet)It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC to-DC adapter or battery to get started. With the above features it force us to use in our project design. The other main component we are using in our project is use of Load cell. A load cell is a transducer that is used to convert a force into electrical signal, which is used to measure of a LPG gas cylinder weight so that we can expect and alert the user with in how many days the cylinder is about to empty. There are different Load cells available in the market with different weight measurement capabilities. The Gas Sensor is also one of the components used to detect the leakage of the LPG Gas (Methane & Propane) which converts one form of the signal into other form.

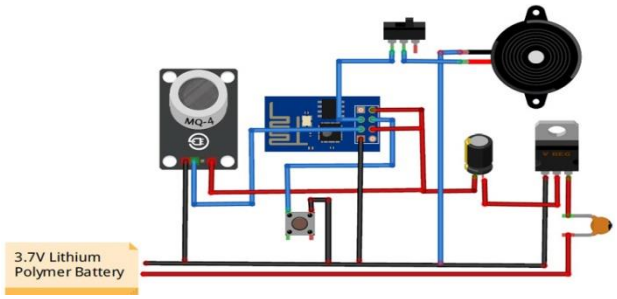


Figure 2: Circuit Diagram of LPG Detector

III. Final Result Analysis

The Automatic Window Opening Using LPG Detection Based on IoT is a useful and innovative system that can enhance safety in homes and buildings. Here is a final result analysis of this system:

Accuracy: The LPG gas sensor used in the system is highly accurate in detecting the presence of LPG gas in the environment. The threshold value for LPG detection can be adjusted to suit the specific needs of the user.

Efficiency: The system is efficient in automatically opening the window when the LPG concentration exceeds the threshold value. The use of Arduino and IoT technology allows for fast and reliable communication between the sensor, microcontroller, and window motor.

Safety: The system provides a safe and reliable way to detect gas leaks and automatically open windows to prevent the buildup of LPG gas in the environment. The buzzer alarm feature provides an additional safety measure to alert the occupants of the building to the presence of gas.

Conclusion

In conclusion, Automatic Window Opening Using LPG Detection Based on IoT is a promising technology for improving indoor air quality and energy efficiency in homes and buildings. The system detects LPG gas leaks and opens windows automatically for ventilation, thus reducing the risk of health hazards and energy waste. The system is based on IoT technology and requires an LPG gas sensor, an Arduino microcontroller, a Wi-Fi module, and a motor. The system architecture, hardware and software design, and testing results have been discussed in various research papers.

However, there are challenges to be addressed, such as false alarms, reliability and maintenance, privacy and security, energy efficiency, and user experience. These challenges can be overcome with careful design, calibration, and integration with other IoT systems.

Overall, Automatic Window Opening Using LPG Detection Based on IoT has the potential to make homes and buildings safer, healthier, and more energy-efficient. With further research and development, this technology could become an essential part of smart homes and buildings of the future.

References

[1] Madhura Ghule, Komal Hole, Sayali Pathak, Nishigandha Patil and Prof. B. D. Shendkar, “LPG Level Monitoring, Booking, and Gas Leakage Detector”, International Journal on Innovative Research in Computer and Communication Engineering, Vol. 6, issue 3, PP. 2533–2534, (2018).

[2] T. Alex Stanley Raja, R. Senthil Kumar, A. Nandha Kumar and K. V. Santhosh Kumar, “LPG Leakage Detection and Autorefilling Using Arduino”, Vol. 8, issue-2S, p. 85, (2018).

[3] D. DivyaSree and G.Abu Bakar, “Gas Monitoring System using Arduino”, International Journal for Research In Applied Science & Engineering Technology (IJRASET), Vol. 7, issue 4, PP. 1803–1804, (2019).

[4] Sony Shrestha, V. P. Krishna Anne, R. Chaitanya, “Iot Based Smart Gas Management System”, Proceedings of Third International Conference on Trends in Electronics and Informatics(ICOEI), PP. 550–552, (2019)

[5] P. Kanaka Maha Lakshmi, P. S. G Aruna Sri and P. Gopi Krishna, “An IOT Based LPG Leakage Sensing and Alerting System”, International Journal of Innovative Technology and Exploring Engineering(IJITEE), Vol. 8, issue 6, PP. 1157–1158, (2019)

[6] A. M. Anika, M. N. Akter, M. N. Hasan, J. F. Shoma and A. Sattar, “Gas Leakage with Auto Ventilation and Smart Management System Using IoT”, In the 2021 International Conference on Artificial Intelligence and Smart Systems (ICAIS), pp. 1411–1415, (2021), IEEE.

[7] D. Srivastava and A. Varshini, “LPG Gas Monitoring and Cylinder Booking Alert System”, International Journal of Progressive Research in Science and Engineering, Vol. 2, No. 5, PP. 12–17, (2021)

[8] K. Krishnadas, N. P. Prajith, Pooja Sidharthan, Safa Mariyam and V. H. Arul, "Automatic Gas Controller", International Journal of Engineering Research &Technology(IJERT), Vol. 8, issue 05, PP. 858–859, (2019).

[9] Priya, P. D., & Rao, C. T. Hazardous Gas Pipeline Leakage Detection Based on Wireless Technology. International Journal of Professional Engineering Studies, India, 2014; 2(1).

[10] Pravalika, V., & Rajendra Prasad, C. Internet of things based home monitoring and device control using Esp32. International Journal of Recent Technology and Engineering, 2019; 8(1 Special Issue 4):58–62.

[11] Sanjay Kumar, S., Ramchandar Rao, P., & Rajendra Prasad, C. Internet of things based pollution tracking and alerting system. International Journal of Innovative Technology and Exploring Engineering, 2019; 8(8):2242–2245

[12] Deepak, N., Rajendra Prasad, C., & Sanjay Kumar, S. Patient health monitoring using IOT. International Journal of Innovative Technology and Exploring Engineering, 2018; 8(2):454–457. https://doi.org/10.4018/978-1-5225-8021-8.ch002.