



Development of Smart Gas Leakage Detection System

Dhammadip Kamble¹ Ranjit Bagade², Ashish Chakane³, Abhishek Baad⁴, Anup Tiwari⁵

Department of Mechanical, SKNCOE, SPPU, Pune

¹dhammadipkamble18@gmail.com

Abstract— The smart gas leakage detection system is designed to detect gas leaks and notify the appropriate authorities in real-time. The system uses sensors such as gas sensors, to detect the presence of gas. The data obtained from the sensors are then processed by a microcontroller and transmitted to a GSM module. The system uses machine learning algorithms to analyse the data and detect the occurrence of gas leakage. If the system detects a gas leak, it triggers an alarm and sends a notification to the authorized personnel through SMS, enabling authorities to take necessary actions to prevent any potential hazards.

The smart gas leakage detection system offers an efficient, reliable, and cost-effective solution to the problem of gas leaks. The system can be installed in homes, offices, industries, and other places where gas is used, ensuring the safety of people and property.

Keywords— Gas Leakage, Smart Technology, Detection System, Safety, GSM Module.

I. INTRODUCTION

Gas leaks are a serious safety concern, as they can lead to explosions, fires, and health hazards. Traditional gas detection systems have limitations, including the potential for false alarms and difficulty detecting low-level gas leaks. A smart gas leakage detection system addresses these limitations by using advanced technologies to improve accuracy and reliability. The development of smart gas leakage detection systems is a critical step towards ensuring the safety of both residential and industrial spaces. The smart gas leakage detection system is designed to detect the presence of harmful gases and alert the user before the situation escalates to dangerous levels. Over the years, gas leakages have led to numerous accidents and even deaths, making it crucial to have a reliable and efficient detection system. The advent of smart technology has made it possible to develop systems that are not only accurate but also easy to use and manage. The smart gas leakage detection system employs a range of sensors and advanced algorithms to monitor the gas levels in real-time. The system is capable of detecting various gases, including natural gas, propane, and carbon monoxide, among others. With the increasing demand for energy and the continued use of gas as a primary source, it is essential to invest in smart gas leakage detection systems that can guarantee safety in the long run. The systems are designed to provide early warning alerts, which can help prevent accidents and save lives. The development of the smart gas leakage detection system is a crucial step in ensuring the safety of homes, offices, and industrial spaces. The system offers an affordable, reliable, and easy-to-use solution to gas leakages, making it a must-have for any property owner or manager.

II. LITERATURE SURVEY

A smart gas leakage detection system is an important technology that can detect the presence of dangerous gases and alert the users to take necessary action. In recent years, there has been a significant increase in research and development of smart gas leakage detection systems. In this literature survey, we will review some of the important works related to smart gas leakage detection systems.

1. This paper proposes a smart gas leakage detection system using wireless sensor networks. The system uses ZigBee wireless communication technology to transmit gas sensor data to the main control unit. The proposed system has a low power consumption and high accuracy in detecting gas leaks.[1]
2. gas leakage detection system based on wireless sensor networks. The system consists of a gas sensor node, a wireless communication module, and a main control unit. The system can detect gas leaks and send alerts to the users through SMS or email.[2]
3. This paper proposes a smart gas leakage detection system using the Internet of Things (IoT) technology. The system consists of gas sensors, a microcontroller, a Wi-Fi module, and a mobile application. The system can detect gas leaks and send alerts to the users through the mobile application.[3]
4. This paper presents a smart gas leakage detection system based on machine learning and the Internet of Things (IoT). The system uses gas sensors and a machine learning algorithm to detect gas leaks. The system can send alerts to the users through a mobile application or email.[4]
5. "A wireless gas leakage monitoring system based on IoT and cloud computing" by T. Yang et al. (2019)
This paper proposes a wireless gas leakage monitoring system based on IoT and cloud computing. The system consists of a gas sensor, a microcontroller, and a wireless module. The data collected by the gas sensor is sent to the cloud for analysis and storage. The system also provides real-time alerts to users via a mobile app.[5]

6. This paper proposes a gas leakage monitoring system based on Zigbee wireless sensor network. The system consists of a gas sensor, a Zigbee wireless module, and a central monitoring unit. The data collected by the gas sensor is transmitted to the central monitoring unit for analysis and storage. The system also provides real-time alerts to users via SMS. [6]

7. This paper proposes a smart gas leakage detection system using machine learning algorithms. The system consists of a gas sensor, a microcontroller, and a machine learning algorithm. The data collected by the gas sensor is analyzed by the machine learning algorithm to detect gas leaks. The system also provides real-time alerts to users via a mobile app. [7]

8. This paper proposes a novel gas leakage detection system using wireless sensor networks and cloud computing. The system consists of a gas sensor, a wireless sensor network, and a cloud computing platform. The data collected by the gas sensor is sent to the cloud for analysis and storage. The system also provides real-time alerts to users via a mobile app. [8]

9. This paper proposes a gas leakage monitoring system based on low-power wide-area network. The system consists of a gas sensor, a low-power wide-area network module, and a central monitoring unit. The data collected by the gas sensor is transmitted to the central monitoring unit for analysis and storage. The system also provides real-time alerts to users via a mobile app. [9]

In conclusion, smart gas leakage detection systems have been researched and developed using wireless sensor networks, Arduino and gas sensors. These systems provide real-time alerts to users and help prevent catastrophic incidents.

III. PROPOSED SYSTEM

A smart gas leakage detection system is an important safety measure that can help prevent dangerous gas leaks in residential, commercial, and industrial settings. The proposed system would utilize a combination of hardware and software components to detect and alert users of gas leaks in real-time. Hardware components of the system could include gas sensors, which would be installed in key locations throughout the building to detect any gas leaks. These sensors could be wired or wireless, and would be connected to a central control unit, which trigger an alert if a gas leak is detected. Its alerts and notifications in the event of a gas leak. To ensure the system is reliable and effective, regular maintenance and testing should be conducted to ensure the sensors are functioning properly and the system is accurately detecting gas leaks. Proper installation and setup of the system should also be carried out by a qualified professional. Overall, a smart gas leakage detection system can provide an added layer of safety and security for buildings that use gas for heating, cooking, and other purposes.

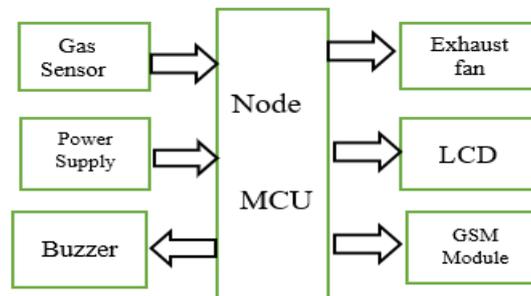


Fig. 1- System Architecture

The gas sensors are installed in the area where gas leaks may occur. The sensors can detect the presence of gas in the environment using various technologies such as electrochemical sensors, infrared sensors, or catalytic sensors. The gas sensors are connected to a microcontroller, which receives the data from the sensors and processes it. The microcontroller is programmed to analyze the data and trigger an alarm when gas is detected above a certain level. The microcontroller is connected to a communication device, which transmits the data from the sensors to the central control unit. The communication device can be a wired or wireless device, depending on the application requirements.

The central control unit receives the data from the sensors and analyzes it to determine if there is a gas leak. If a gas leak is detected, the central control unit sends a notification to the relevant parties, such as maintenance personnel, building management, or emergency services.

The system requires a reliable and stable power supply to ensure that the gas sensors and microcontroller are always operational. A backup power supply can also be included to ensure that the system continues to operate during power outages. Overall, a smart gas leakage detection system continuously monitors the environment for gas leaks and provides early warning of gas leaks. The system can prevent accidents and damage to property by detecting gas leaks early and alerting the relevant parties to take appropriate action. The GSM module can operate between -20°C to 70°C . The GSM module can support data transfer rates of up to 14.4 kbps.

IV. ACTUAL MODEL

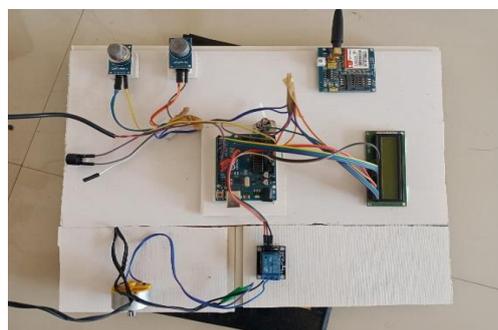


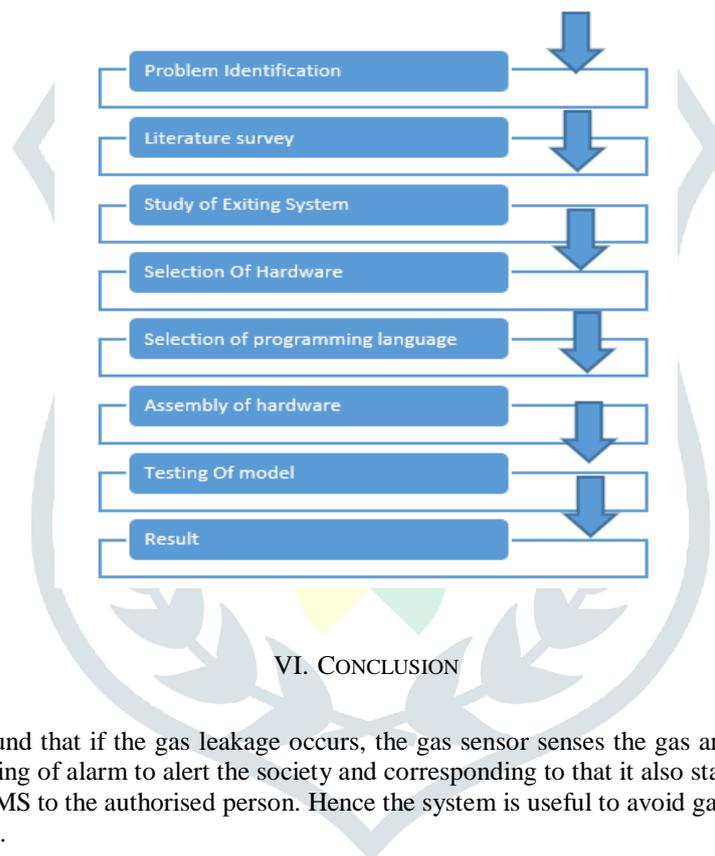
Fig. 2- Actual Model

A smart gas leakage detection system typically consists of MQ5 And MQ2 sensor, Arduino uno, Buzzer, a GSM module and Exhaust fan LCD. The MQ5 and MQ2 sensors are used to detect the presence of gas (propane and butane), while the microcontroller processes the sensor data and sends alerts in case of gas leakage. These sensors can detect different gases such as, propane, and butane. When gas is detected, the sensor sends an analog voltage signal to the microcontroller. The microcontroller then converts this analog signal into a digital signal and processes it to determine if there is a gas leakage. If gas leakage is detected, the microcontroller sends an alert to the user via a GSM module. and at a time it also on the exhaust fan which help to remove the gas inside home to outward. In addition to sending alerts, the smart gas leakage detection system may also be connected to other devices such an alarm system which help to alert the society.

Coding Used in the System-

Yes, C++ can be used in a gas leakage detection system. C++ is a powerful and efficient programming language that can be used for developing embedded systems, which are commonly used in gas leakage detection systems. In a gas leakage detection system, C++ can be used to read sensor data, process it, and control the system's alert and shutoff mechanisms. For example, the code could include functions for initializing gas sensors, reading their output, and comparing that output to a pre-defined threshold to determine if there is a gas leak. Additionally, C++ can be used to control other components in the system, such as alarms, notifications, and automatic shutoff valves. The code could include logic for triggering these components in response to a gas leak detection. In summary, C++ is a powerful language that can be used for developing robust and reliable gas leakage detection systems. Its features such as memory management, data structures, and classes make it an ideal choice for complex and performance-intensive applications.

V. METHODOLOGY



VI. CONCLUSION

While testing the model we found that if the gas leakage occurs, the gas sensor senses the gas and processes the signal towards the microcontroller. Result in starting of alarm to alert the society and corresponding to that it also starts the exhaust fan to remove the inside gas. And also send the SMS to the authorised person. Hence the system is useful to avoid gas leakage accidents and also save the life of human form accident.

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