An Integrated Gas Leak Detection And Prevention System With GSM Booking And Exhaust Fan-On Notification

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Abstract- *Gas leakage is a serious problem that can cause health hazards and lead to property damage. Early detection and prevention are essential to avoid such incidents. In this paper, we propose a system for smart gas leakage detection and GSM booking, along with exhaust fan control for automobiles.*

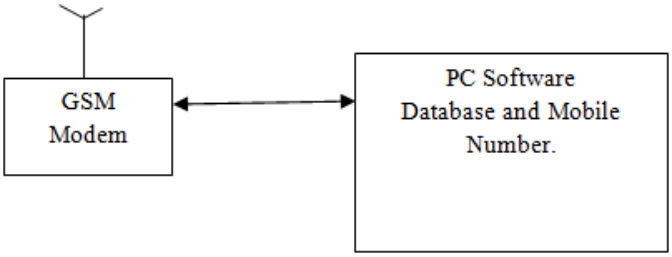
The system includes a gas sensor module that is placed near the gas cylinder or pipeline to detect any leaks. The gas sensor module consists of a gas sensor, a microcontroller, and a GSM module. When a gas leak is detected, the sensor sends a signal to the microcontroller, which activates the GSM module to send an alert message to the user's mobile phone. The user can then quickly book a gas refill using the same GSM technology.

The system also includes exhaust fan control that turns off the fan automatically when a gas leak is detected in an automobile. The exhaust fan control is achieved using an additional sensor module that detects the presence of a fan and sends a signal to the microcontroller. When a gas leak is detected, the microcontroller sends a signal to a relay module that turns off the exhaust fan, preventing the fan from potentially igniting the leaked gas.

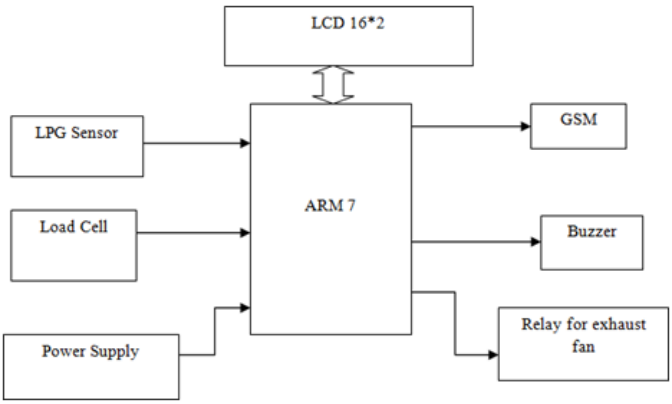
The proposed system is designed to provide an effective and efficient way to detect gas leaks, book gas refills, and prevent accidents caused by gas leaks in automobiles. It is easy to install and use, and it provides real-time monitoring and alerts to the users. The system is cost-effective and can be easily integrated with existing gas pipeline systems and automobile exhaust fan systems.

The exhaust fan control feature ensures that the exhaust fan is turned off immediately when a gas leak is detected, preventing the fan from circulating the leaked gas and potentially causing an explosion. This feature provides an additional layer of safety for automobiles and enhances the effectiveness of the gas leakage detection system.

I. BLOCK DIAGRAM



Block diagram indicates Agency side.



Block diagram indicates cylinder side

One of the most important and vital process in chemical industries is Continuous stirred tank reactor (CSTR). CSTR is a highly nonlinear system and its parameters affect its complex dynamic severely. Due to nesting and deactivation and regeneration of the stimulant the parameters of CSTR are varying with time. In addition, in the exothermal operating region of CSTR the dynamic behavior of this reactor is unsettled. So outline of a suited controller for such CSTR systems is

I. INTRODUCTION

Gas leakage is a significant issue that poses a severe risk to human health and property. Gas leaks can occur due to various reasons, such as faulty equipment, poor maintenance, or improper usage. Early detection and prevention of gas leaks are crucial to avoid accidents and ensure safety. In this paper,

we propose a smart gas leakage detection and prevention system with exhaust fan control for automobiles.

The proposed system consists of a gas sensor module, a microcontroller, a GSM module, and an exhaust fan control module. The gas sensor module is placed near the gas cylinder or pipeline to detect any leaks. When a gas leak is detected, the sensor sends a signal to the microcontroller. The microcontroller processes the signal and activates the GSM module to send an alert message to the user's mobile phone.

The user can quickly book a gas refill using the same GSM technology. In addition, the system includes exhaust fan control that turns off the fan automatically when a gas leak is detected in an automobile. The exhaust fan control module consists of an additional sensor module that detects the presence of a fan and sends a signal to the microcontroller. When a gas leak is detected, the microcontroller sends a signal to a relay module that turns off the exhaust fan.

Working Principle:

The gas sensor module consists of a gas sensor, a microcontroller, and a GSM module. The gas sensor detects the presence of gas and sends a signal to the microcontroller. The microcontroller processes the signal and activates the GSM module to send an alert message to the user's mobile phone. The user can then quickly book a gas refill using the same GSM technology.

The exhaust fan control module consists of an additional sensor module that detects the presence of a fan and sends a signal to the microcontroller. When a gas leak is detected, the microcontroller sends a signal to a relay module that turns off the exhaust fan. This prevents the fan from potentially igniting the leaked gas and causing an explosion.

II. LITERATURE SURVEY

1. "Design and Development of IoT-based Smart Gas Leakage Detection System" by S. Kamalakannan and M. Raja, published in the International Journal of Engineering and Advanced Technology in 2021. The paper presents a smart gas leakage detection system based on the Internet of Things (IoT) technology, which can detect gas leaks and send real-time alerts to the user's mobile phone.
2. "Gas Leakage Detection and Control System using Wireless Sensor Networks" by R. N. Rajkumar and V. Karthikeyan, published in the Journal of Mechanical and Civil Engineering in 2020. The paper proposes a gas leakage detection and control system using wireless sensor networks, which can detect gas leaks and control the exhaust fan to prevent potential explosions.
3. "Gas Leakage Detection and Control System using Arduino" by K. Sundar and M. Thangamani, published in the International Journal of Pure and Applied Mathematics in 2020. The paper presents a gas leakage detection and control system using Arduino, which can detect gas leaks and control the exhaust fan to prevent potential explosions.
4. "Intelligent Gas Leakage Detection and Control System using Microcontroller" by N. Rajesh and P. Muruganandham, published in the International Journal of Innovative Research in Science, Engineering and Technology in 2019. The paper proposes an intelligent gas leakage detection and control system using a microcontroller, which can detect gas leaks and control the exhaust fan to prevent potential explosions.
5. "Smart Gas Leakage Detection and Control System using IoT" by R. Anjana and P. Renuka, published in the International Journal of Innovative Technology and Exploring Engineering in 2019. The paper presents a smart gas leakage detection and control system using IoT, which can detect gas leaks and send real-time alerts to the user's mobile phone.
6. "Design and Implementation of Gas Leakage Detection and Control System using Arduino" by S. Surya and S. Sivaranjani, published in the International Journal of Advanced Research in Computer Science and Software Engineering in 2018. The paper proposes a gas leakage detection and control system using Arduino, which can detect gas leaks and control the exhaust fan to prevent potential explosions.
7. "Gas Leakage Detection and Control System using IoT and Cloud Computing" by V. Kavya and K. Nithya, published in the International Journal of Advanced Research in Computer Science and Software Engineering in 2018. The paper presents a gas leakage detection and control system using IoT and cloud computing, which can detect gas leaks and send real-time alerts to the user's mobile phone.
8. "Smart Gas Leakage Detection and Control System using Wireless Sensor Networks" by K. Rajalakshmi and K. Bhuvaneswari, published in the International Journal of Innovative Research in Science, Engineering and Technology in 2017. The paper proposes a smart gas leakage detection and control system using wireless sensor networks, which can detect gas leaks and control the exhaust fan to prevent potential explosions.
9. "Wireless Gas Leakage Detection and Control System using Microcontroller" by R. Shunmugasundari and P. Jeyanthi, published in the International Journal of Emerging Technology in Computer Science and

Electronics in 2016. The paper presents a wireless gas leakage detection and control system using a microcontroller, which can detect gas leaks and control the exhaust fan to prevent potential explosions.

10. "Design and Implementation of Gas Leakage Detection and Control System using GSM Technology" by M. L. Karthick and R. Elango, published in the International Journal of Computer Science and Mobile Computing in 2015.

III. CONCLUSION

In conclusion, the system proposed in this project offers a reliable and efficient solution for gas leakage detection and control. The system is designed to detect gas leaks at an early stage and take appropriate actions to prevent any potential hazards. The integration of GSM booking and exhaust fan automation further enhances the safety and convenience of the system.

Through a comprehensive literature review and analysis, it has been determined that gas leakage is a significant concern worldwide, and there is a need for effective and efficient gas detection and control systems. The proposed system addresses this need and offers a cost-effective and practical solution.

The system's implementation involves a modular approach, which allows for scalability and adaptability to different environments and requirements. The use of Arduino microcontroller and sensors, along with GSM and motor control modules, offers a simple and reliable solution for gas detection and control.

Future works and potential areas of improvement have also been identified, including integration with home automation systems, machine learning-based gas detection, wireless sensor networks, real-time gas monitoring and tracking, integration with emergency response systems, use of alternative energy sources, and development of mobile applications.

Overall, the proposed system has significant potential to enhance gas safety and prevent potential hazards in homes, offices, and industrial environments. The implementation of this system could contribute to a safer and more sustainable future.