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Gas Leakage Detection and Alert System using IoT

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ABSTRACT

The primary goal of this project is to create an advanced gas leakage detection system that utilizes Internet of Things (IoT) technology in order to enhance safety in both residential homes and industrial settings. Through this we have achieved proposed gas leakage detection system, based on IoT technology, offers a dependable and intelligent solution for early identification of leaks. This system not only promotes safety but also has the potential to prevent catastrophic accidents from occurring.

Keywords: Gas Leakage Detector, Arduino, Gas Sensors, Safety System, IoT, GSM networks.

INTRODUCTION

1.1 Project Review

The GSM 800L module facilitates communication through SMS, enabling the system to promptly notify users about the gas leak in real-time. The Arduino processes the data received from the sensors and formulates an SMS alert that contains vital information, including the type of gas detected, the levels of gas concentration, and optionally, the location of the detection through GPS integration. This SMS alert is then sent to pre-defined phone numbers, allowing for swift response and necessary action to mitigate the gas leak.

1.2 Aim

The primary goal of this project is to create an advanced gas leakage detection system that utilizes Internet of Things (IoT) technology in order to enhance safety in both residential homes and industrial settings.

1.3 Objective

The objective of this initiative is to tackle these obstacles by creating a gas leakage detector utilizing Arduino and GSM 800L that is cost-efficient, simple to set up, and capable of delivering real-time alerts through SMS. Through the integration of sensors with Arduino and the utilization of GSM communication, the system will empower users to remotely monitor gas levels and receive immediate notifications on their mobile devices, facilitating swift responses to gas leak incidents and enhancing overall safety.

1.4 Problem Statement

Present gas detection systems frequently encounter high expenses, limited expandability, and intricate setups, rendering them inaccessible to numerous users, particularly in residential and small-scale commercial environments. Furthermore, the lack of remote alert mechanisms impedes users' capacity to react promptly to gas leaks, especially when they are not present on the premises.

II. METHODS AND MATERIAL

System: Input, Output, Function, Success, Failure
Input: Sensor data signal which is not regular or
Output: End User get informed with alert and via

Notification/Call

Functions:

1. Access ():- In this module we are going to access the feature provided by the module which Will include Sensor data access.

2. Control ():- In this module we are controlling the Alert System by using System which is connected to hardware or sensor data.

3. Broadcast ():- In this module we are going to of broadcast the alert Notification to Mobile

4. Success Conditions:- If such data which is received through sensors are not stable or are more than threshold it will predict that there is leakage situation

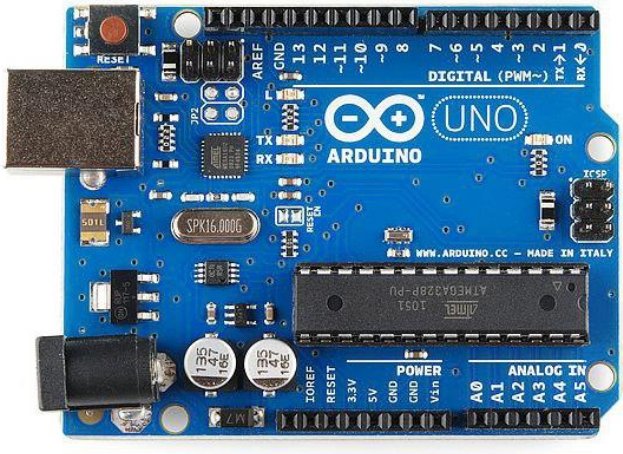
5. Failure Conditions: Desired output is not generated due to following failures.

1. Software Failure
2. Hardware Failure
3. Network Connection Failure

HARDWARE INFORMATION:

1. Arduino Uno

This compact microcontroller board, similar to a miniature computer, opens doors to a world of creative electronic projects. With built-in input and output pins, it connects to various components like sensors, lights, and motors. It's a fantastic platform for beginners to delve into electronics and programming.

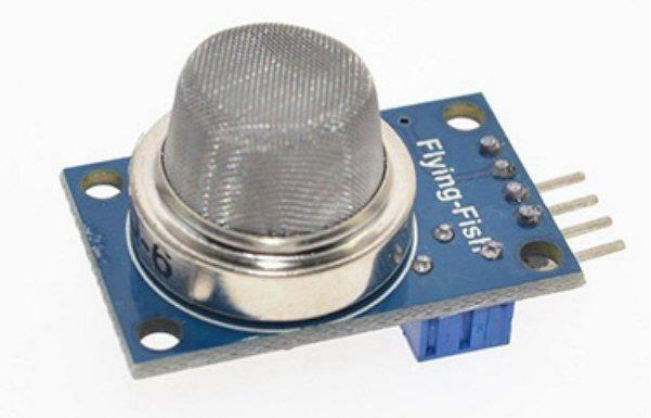


2. GSM SIM800L

This tiny GSM SIM800L module unlocks wireless communication capabilities for your projects using GSM technology. Imagine a miniature cell phone minus the screen and keypad. This versatile tool allows you to send and receive text messages, make calls, and even connect to the internet in areas with cellular coverage. Its applications range from remote monitoring systems to security alarms, making it a popular choice for a variety of projects**.**

3. MQ-6 Sensor

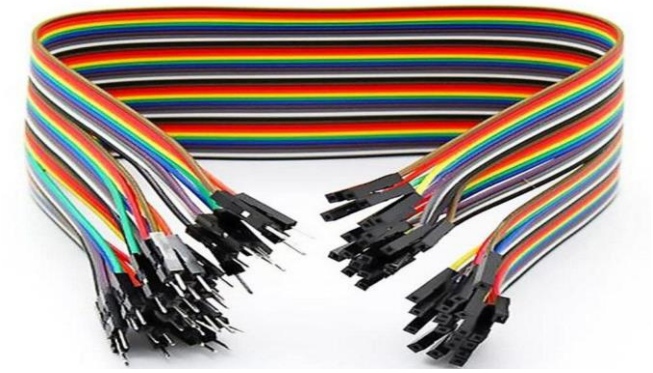
This MQ-6 sensor acts as a chemical watchdog, sniffing out the presence of LPG, propane, methane, and even alcohol and smoke in the air. Its keen sense of smell makes it a valuable component in gas leak detectors, alarms, and safety systems, promoting a safer environment.



4. Jumper Wire

Imagine tiny electrical bridges! That's what jumper wires are - handy tools for creating temporary

connections on circuit boards or between electronic components. They're perfect for prototyping circuits during development or troubleshooting electronics by quickly testing different configurations.



LITERATURE SURVEY

Gas Leakage Detection using IoT Proposed a two-way safety stove featuring a gas leak detection feature and a kid lock mechanism. Our main concern is that a child wouldn't understand how to turn on the burner. Our gear consists of a Raspberry Pi and a buzzer-equipped gas detecting module. Additionally, for system execution, we use a Haar Cascade object detection method and a deep learning architecture (CNN) [1]. The purpose of this system is to find the leak and provide an alert so that building occupants may maintain appropriate ventilation and stop the leak. The system was built utilizing an integrated circuit and a MQ-9 chemical sensor, and during testing it gave accurate visual information as well as an audible and timely notice [2]. In this article, an IoT-based model for gas detections is presented utilizing an Arduino UNO (internet of things). Gas leaking odour is discovered using the fuel sensor. The LCD comes on when there is a gas leak. In the case of a gas leak, both the LCD and GSM modem will turn ON. By using a GSM modem, the customer will get SMS messages alerting them to gas leaks [3]. The primary goal of this study is to review the research on gas alarm systems, the difficulties they encounter, and the effects of installing them in people's homes or workplaces for security reasons. Installing a gas alarm detection system is anticipated to aid in preventing such incidents, especially with the Recent technological advancements will help to secure people's homes, businesses, hospitals, industries, and institutions. Our homes can be controlled and watched for fires and explosions with the aid of gas detection systems [4]. The MQ-6 sensor and a solenoid valve are used in a detection system to locate gas leaks and shut off the gas supply. The investigation involved utilizing a preset programmer to evaluate the sensor's voltage. Based on tests conducted by narrowing the gas escape path to give a faster rate effect so that the sensor can detect gas [5].Liquid petroleum gas (LPG), which is extremely flammable, can burn even a ways from the site of the leak. The key contributing element in the majority of fire incidents is poor construction. Therefore, developing a system to alert of gas leakage is essential. As a consequence, the technique for identifying gas leaks and warning passengers is offered in this paper. The MQ-6 gas sensor is used to find LPG [6]. The purpose of this article is to raise awareness of the dwindling gas weight in the compartment and to implement an IOT gas request. The booking and arrangement for the gas are complete, and support IOT and that a heap cell connected to a microcontroller is used to complete the consistent weight estimation (to contrast and a perfect esteem). In order to ensure the safety of the pack and gas holder, we have a MQ-6 (gas sensor) and LM 35 (temperature sensor) that will identify the local environment in the event of an error [7]. A gas warning device can warn nearby operators of a potential gas leak and give them time to flee using sensors to locate potentially hazardous gas leaks To warn individuals when harmful gas has been identified, these sensors frequently emit an audible alarm. In this work, a design for an Internet of Things based gas leak detection system that can automatically identify and alert users to gas leaks is proposed. The suggested system also has a warning mechanism for users [8]. The suggested model is made up of sensor devices that detect environmental values like Voltage, as well as the current characteristics

of the many household appliances are used to calculate power usage. The IoT platform Xively gives channel utility to deploy the prototype into an integrated solution and provides the framework for connecting the smart sensor to the internet [9]. This project aimed to prevent industrial mishaps, monitor hazardous chemicals, and communicate alert messages to the industry's safety control board. The central board is an Ardunio Uno R3 board. a microcontroller that is linked to a sensor Including sensors that can continuously monitor their respective environmental conditions, such temperature, gas sensors, and alcohol sensors. Data from the sensor is stored online so that it can be processed further and evaluated to increase safety [10].Throughout this study, a wireless gas leak detection and localization method is proposed. 60 propane Releases occur using a wireless monitoring network of 20 devices covering 200 m2. The methodology is assessed once the detection and localization methods mentioned here are used on the concentration data that have been gathered. With seven false alarms logged over a three-day period and an average detection latency of 108 seconds, a detection rate of 91% is reached. The localization results indicate a 5 m accuracy [11]. Using the Sim900 SMS Gateway, Arduino Uno R3 Microcontroller, and MQ2 gas sensor as its core components, the gas leak detecting system's technological improvement is discussed in this article [12].

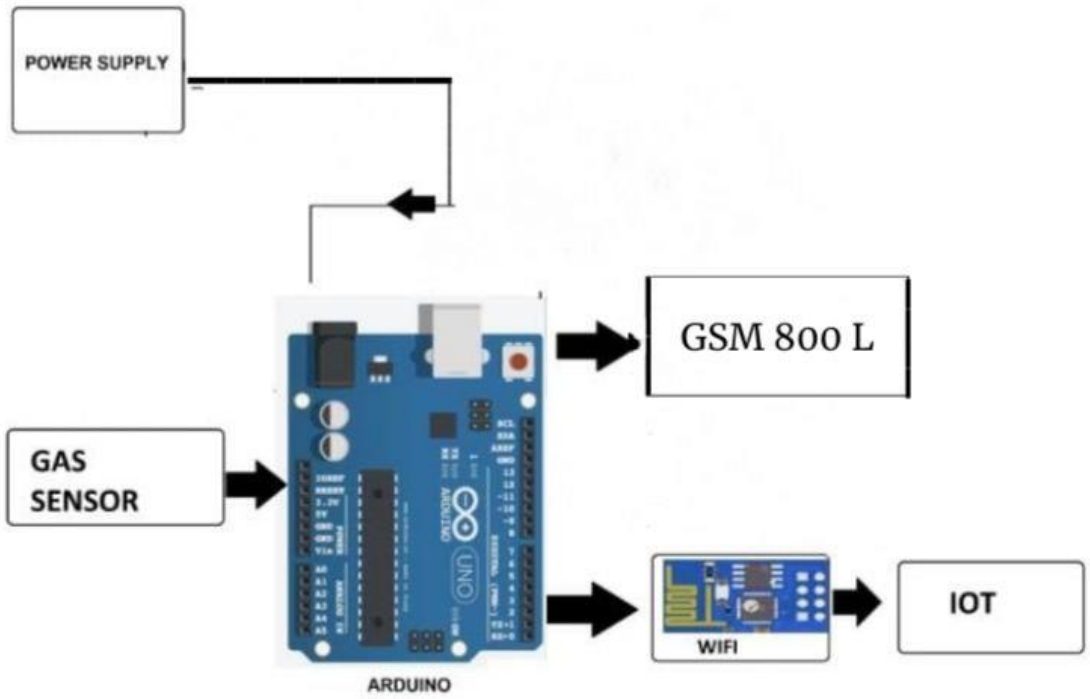


Fig. 1 System Architecture

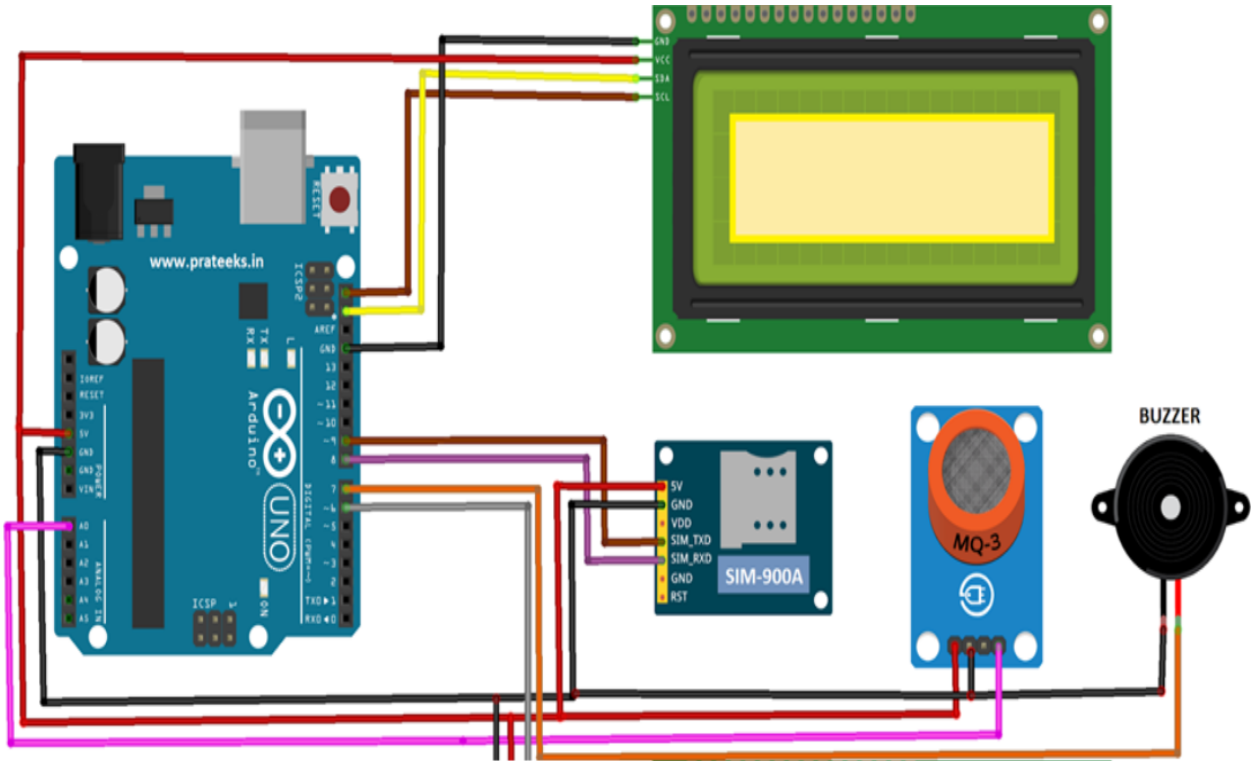


Fig 2. Circuit Diagram

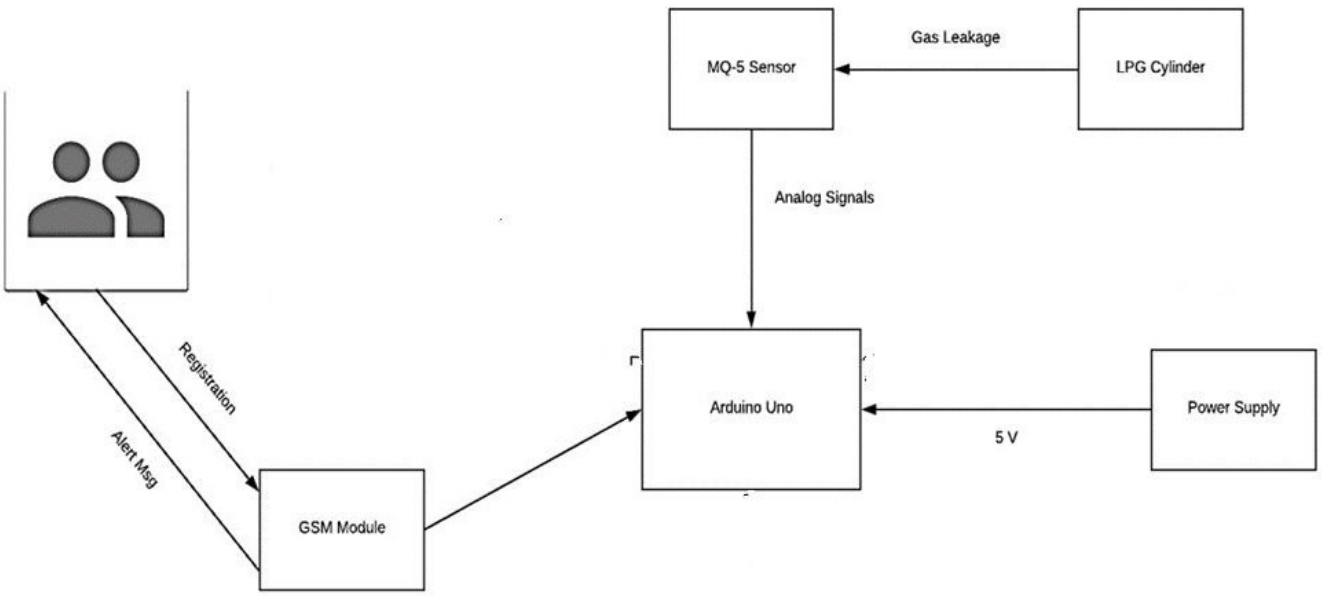


Fig 3. Block Diagram

V. CONCLUSION

This ingenious gas leak detector stands out for its simplicity and effectiveness in alerting you to LPG leaks. It utilizes GSM technology to send instant notifications to a designated contact whenever a leak is detected, ensuring you're informed even when away from home. But this system goes a step further by featuring an automatic shut-off mechanism that disengages the regulator knob on the gas cylinder itself, taking immediate action to stop the leak at the source.

VI. REFERENCES

[1] Chandran, Ananya, and S. Kavitha. "A Smart Gas Stove with Gas Leakage Detection and Multistage Prevention System Using IoT." International Journal of Modern Developments in Engineering and Science 1.9 (2022)

[2] Falohun, A. S., et al. "Dangerous gas detection using an integrated circuit and MQ9." International Journal of Computer Applications 135.7 (2016).

[3] Ravisankar, B., et al. "Smart Detection System for LPG Gas Leakage using IoT." 2022 6th International Conference on Computing Methodologies and Communication (ICCMC). IEEE, 2022.

[4] Baballe, Muhammad Ahmad, and Mukhtar Ibrahim Bello. "Gas leakage detection system with alarming system." Review of Computer Engineering Research 9.1 (2022)

[5] Tommy,Alexander. "Implementation of a Gas Leakage Detection System Using the MQ-6 Sensor." Brilliance: Research of Artificial Intelligence 2.1 (2022).

[6] Leavline, E. Jebamalar, et al. "LPG gas leakage detection and alert system." International Journal of Electronics Engineering Research 9.7 (2017): 1095- 1097.

[7] Rajan, B., et al. "IoT Based Smart Gas Cylinder Platform Senses LPG Gas Leakage and Reorder Booking System.

[8] Woishe, Methila Farzana, et al. "A Secured Model of IoT-based Smart Gas Detecting and Automatic Alarm System." International Journal of Computer and Information System (IJCIS) 3.2 (2022)

[9] Sinha, Nitin, Korrapati Eswari Pujitha, and John Sahaya Rani Alex. "Xively based sensing and monitoring system for IoT." 2015 International Conference on Computer Communication and Informatics (ICCCI). IEEE, 2015.

[10] Srinivas, Chalasani, and Ch Mohan Kumar. "Toxic gas detection and monitoring utilizing internet of things." International Journal of Civil Engineering and Technology 8.12 (2017)

[11] Chraim, Fabien, Yusuf Bugra Erol, and Kris Pister. "Wireless gas leak detection and localization." IEEE Transactions on Industrial Informatics (2015)