

# IOT Based Gas Leakage Based Automatic Regulator Control

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**Abstract:** With the increasing concern for safety and efficiency in gas utilization, there is a growing demand for innovative solutions to detect gas leaks and mitigate potential hazards. This paper presents an IoT-based Gas Leakage Detection and Automatic Regulator Control System aimed at enhancing safety and optimizing gas usage in residential and commercial settings. The proposed system integrates gas sensors, IoT devices, and a centralized control unit to continuously monitor gas leakage levels in realtime. Upon detecting any anomaly, the system triggers automatic actions to regulate gas flow, prevent further leakage, and alert the relevant stakeholders via SMS or email notifications. Furthermore, the system offers remote monitoring and control capabilities, allowing users to access real-time data and control the gas regulator settings through a smartphone application or web interface. Through the seamless integration of IoT technology, this system offers a proactive approach to gas safety management, ensuring prompt detection, and response to gas leaks, thereby minimizing risks and optimizing gas consumption.

**KeyWords:** ESP32 microcontroller, MQ-2 sensor, Servomotor, regulator valve, LED (light)

## INTRODUCTION

Many accidents occur in day to day life like explosion because of LPG leakage. Major harm is caused, if gas leakage is not detected early. But now we can detect the gas leakage using the MQ5 gas sensor. In this IOT gas leakage detector, device will get connected to WIFI, the minimum and maximum parameter can be set accordingly. Such IOT as well as Arduino based gas leakage detector systems can be installed in homes, hotels LPG gas storage areas. In this LPG gas detector system senses the LPG gas using MQ5 gas sensor. This device will continuously monitor the level of LPG gas present in the air. While monitoring, if the value of LPG gas in air is within the set limit then the

RGB LED on the circuit will glow green giving a safe sign. And whenever the gas exceeds above the predefined limit than the RGB LED will glow red and simultaneously solenoid valve will turn off and update it over IOT. This Arduino and IOT project will help in detecting gas leakage in the surrounding.

## OBJECTIVE

The main objective of the work is designing microcontroller based toxic gas detecting and alerting system. The hazardous gases like LPG and propane were sensed and displayed and notify each and every second in the LCD display. If these gases exceed the normal level then an alarm is generated immediately and also an alert message (Email) is sent to the authorized person through the INTERNET and used ARM development board.

Flow chart

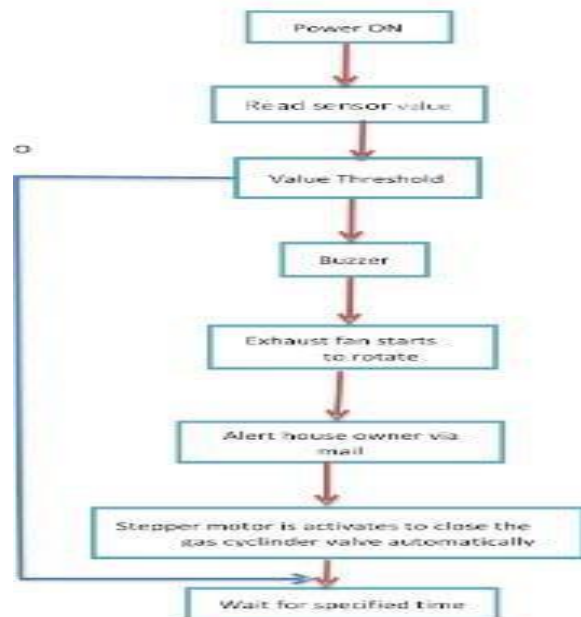


Fig.1 Flowchart of gas leakage system

Block Diagram

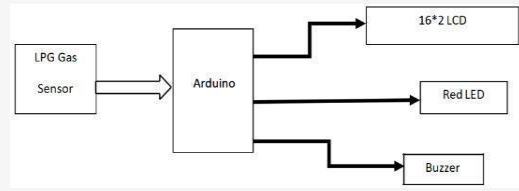


Fig.2 Block Diagram of Gas Leakage Detection Alert System

Circuit Diagram

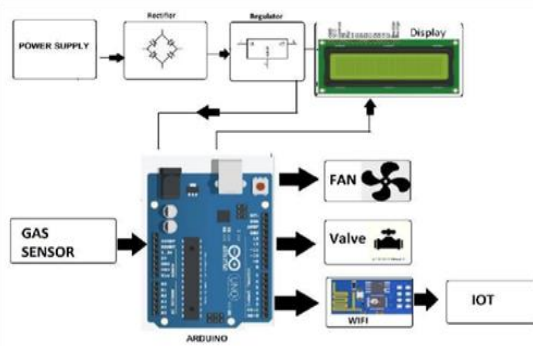


Fig. 3 LPG Leak Detection

Software Requirements Arduino IDE

The ATmega328p microcontroller IC with Arduino bootloader makes a lot of work easier in this project as Arduino code is written in C++ with an addition of special methods and functions, which we'll mention later on. C++ is a human-readable programming language. When you create 'sketch' (the name given to Arduino code files), it is processed and compiled to machine language.

The Arduino Integrated Development Environment (IDE) is the main text editing program used for Arduino programming. It is where you'll be typing up your code before uploading it to the board you want to program. Arduino code is referred to as sketches.



Fig 4 Arduino IDE

Transformer

Transformer are crucial electrical device used to transfer electrical energy between circuits through electro magnetic induction. They work On the principal of faradays law of electromagnetic induction, which states that a changing megnatic field induces a voltage in a conductor.

Experimental Results:

This system is based on the ESP32 Microcontroller and MQ-2 gas sensor. When the sensor detects gas within the atmosphere, it'll give digital output 1 and if gas in not detected the sensor will give digital output 0. ESP32 will receive the sensor output as digital input. If the sensor output is high, then the SERVOMOTOR will start rotating along with the LCD that will show that "Gas detected: Yes". If the sensor output is low then servo motor will not be turn, and the LCD will show that "Gas detected: No". Whenever the gas leakage value reaches the threshold value automatically the gas regulator vale is going to close and the value is displayed in LCD, SMS is sent to the user mobile. Along with this we can control the gas regulator automatically aswell as manually through webpage



Fig 5 Experimental Result

Advantages And Applications

The advantage of the Arduino uno based LPG detector system project is that it gives remote indications to the user about the LPG leakage with the help of sms This project has applications in our home. we can also use this gauge in industries, offices, and colleges where the LPG gas cylinder is used in the canteen. this project also has use in hotels and restaurants. to refine this project, we can add a GPS modem to this system. it is used in dangerous gas detection. it is used in fire hazard prevention. it is also used in oxygen level measurement.

The sensor has exquisite sensitivity combined with a precipitate response time. the system is highly authentic, tamperproof, and fixed. in the long run, the preservation cost is very less when compared to the present systems

#### Applications & Features:

The module is low-powered, and portable, hence, it is used in other applications such as smoke detector. ii. they are used in a household where the owner has to regulate and detect the gas leakage in the absence of the owner. iii. gas detectors can be used to detect gases that catch fire easily, that are flammable, and which exhaust the oxygen (oxygen depletion). iv. this module can be seen at various oil plant, manufacturing units to monitor the various process and where there is the constant use of oil takes place. This system can be used in firefighting in the fire extinguishing department. vi. ensure worker's health. get an immediate gas alert. prevent fire hazards about leakage

#### CONCLUSION

In conclusion, the IoT-based Gas Leakage Detection and Automatic Regulator Control System offers a proactive and efficient solution for enhancing safety and optimizing gas utilization in residential and commercial environments. By seamlessly integrating gas sensors, IoT devices, and centralized control units, the system enables real-time monitoring of gas leakage levels and automatic regulation of gas flow in case of anomalies. This proactive approach minimizes the risks associated with gas leaks, mitigates potential hazards, and ensures the safety of occupants and properties.

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