Gaseous Leakage Detection with Automatic Safety Warning and Alerting System Using IOT

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Abstract- **It proposes an IOT-assisted Gaseous Leakage Detection System which helps in leakage detection and its rectification in real time. The system consists of sensors and automation for risk assessment, early warning, and prevention measures of hazards. This system revolves around an ESP32 microcontroller that is interfaced with MQ2 gas sensor that detects combustible gases and a flame sensor that prevents fire disasters. The system employs safety measures such as turning on a DC fan and a pump to evacuate the room and diffuse the escaped gas. An L293D motor driver was used to power these components which included the fan and the pump that were employed to reduce the risk. If the flame sensor perceives fire, the system heightens the level of safety by using the pump to extinguish flames . Also, the system was connected to Blynk IOT for monitoring and notifications. In a situation whereby gas leakage or fire is identified notices are sent to the user through the Blynk application in the mobile device alerting them of the circumstances. This remote control and monitoring feature improves the safety aspect in addition to making it possible to monitor the status at all times and in all locations.**

Index Terms- IOT, ESP32, MQ2 SENSOR, FLAME SENSOR, DC FAN, PUMP, L293D MOTOR DRIVER, BLYNK IOT.

I. INTRODUCTION

The Interent of Things (IoT) is becoming more important in technology ,society and the economy .Common items like household products vehicles,industrial tools sensors, and utilities are now connected to the internet. These devices can collect and analyze data, which could change how we work, live, and have fun. Experts believe IoT will have a huge effect on the internet and the economy. Some estimate there could be as many as 100 billion connected devices worldwide by 2025. The economic impact could exceed $11 trillion. IoT is a key topic among tech companies, governments, and engineers. It involves a variety of connected systems and sensors that use better computers, smaller devices, and stronger networks. The widespread use of IoT gadgets will change many parts of daily life. For consumers, smart appliances, home automation tools, and energy monitors are making homes more secure and efficient. Connected cars, smart traffic lights, and sensors in infrastructure move us closer to building smart cities that reduce traffic and energy waste. IoT also has the potential to improve farming, industry, and energy systems by providing more data along the supply chain.

Gas leaks often cause serious problems for the environment and health. Gas from cylinders can escape as a liquid or a gas. When liquid leaks, it quickly evaporates and forms a cloud that sinks to the ground since it’s heavier than air. Vapor from gas cylinders can travel far and build up in drains or on floors. When near an ignition source, this gas can catch fire or explode. Burning gases release carbon dioxide, a greenhouse gas that warms the planet. They can also produce carbon monoxide, which is harmful to health. Greenhouse gases trap heat in the atmosphere, raising Earth's temperature. This increase is called global warming. Gas is essential in many homes, but leaks can cause disasters. Gas explosions kill and injure many people worldwide, especially in developing countries like Bangladesh. These accidents often happen when cylinders explode or leak. Such fires can destroy homes and take lives. Last year, about 350 people in Bangladesh died from gas explosions. The worst recent event was a blast in a mosque in Narayanganj, causing many deaths.

At least 24 people died from burns, and many others were hurt. If we could build a system to stop gas explosions, we could save lives. Our project aims to create an IoT-based system that detects gas and fire and sets off safety alerts. When a gas leak occurs in a room or kitchen, a sensor detects it. The system can then turn on alarms or shut off the gas supply to prevent accidents.

The system alerts the owner about an event by sending a notification. It then cuts off the gas supply and removes the leaked gas with an exhaust fan, which is installed in the kitchen or gas chamber of a hotel or other location. If a fire starts, the system can automatically release a fire extinguisher ball to put out the flames. It also notifies the owner about the incident. The rest of the paper is organized as follows. Section 2 reviews different existing IoT systems and explains why this project was created. Section 3 describes the system's requirements and gives an overview of how it works. Section 4 covers the design and building process of the system. Section 5 shares the system's performance, reliability, and survey results. Section 6 discusses some future work that can be done. Lastly, Section 7 concludes the paper.

II. DESIGN PROCEDURE

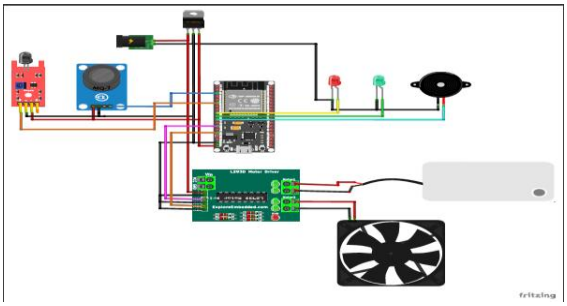


Fig 1: Schematic Diagram

This schematic diagram shows a microcontroller-based system with sensors, indicators, and output devices. Key components include an ultrasonic sensor, buzzer, LCD, LEDs, relay, and a cooling fan. The system is designed to monitor conditions and respond with alerts or fan activation.

III. IMPLEMENTED DESIGN

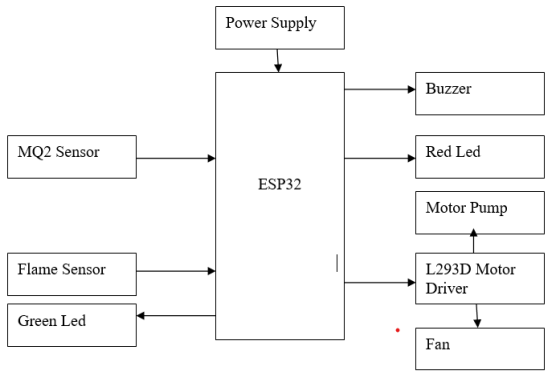
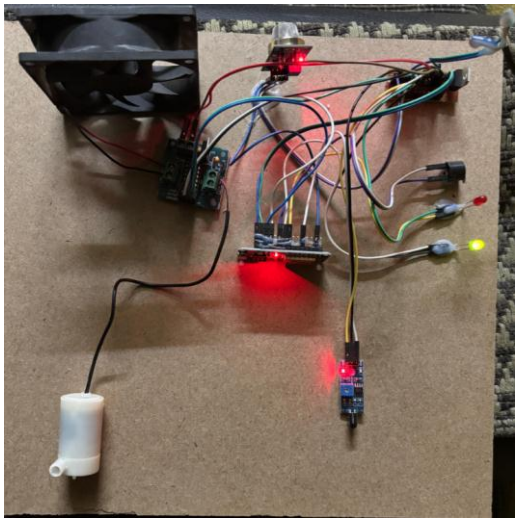


Fig 2: Flow Chart

This flowchart illustrates the implemented design of a fire and gas detection system using an ESP32 microcontroller. It receives input from an MQ2 gas sensor and a flame sensor, and controls outputs such as a buzzer, LEDs, motor pump, and fan via an L293D motor driver

IV.RESULTS AND DISCUSSIONS



This image shows the physical prototype of a fire and gas detection system, built using an ESP32 microcontroller and various sensors and modules. Visible components include the MQ2 gas sensor, flame sensor, LEDs, motor driver, fan, and connecting wires. The setup demonstrates the practical implementation of the system's schematic and flowchart design.

V. FUTURE SCOPE

Real-time implementation of the suggested model is to take place in the future. Keeping the equipment functional in all types of weather, effective data transmission, etc. are the challenges that must be tackled.

VI. ADVANTAGES

Real-Time Detection: Immediate response to gas leaks and fire.
Automatic Safety Mechanisms: Reduces human intervention.
Remote Alerts: Blynk IoT app provides real-time notifications.
Cost-Effective: Uses low-cost components like Node MCU and sensors.
Scalable: Can be implemented in homes, industries, and commercial spaces

VII. CONCLUSION

With the use of IOT technology enhances the process of monitoring various aspects of environment such as air quality monitoring issue proposed in this project. Here, using the flame and MQ2 sensors with the IOT , it gives the sense of different type of dangerous gas and NodeMCU ESP32 is the heart of this project.

VIII. ACKNOWLEDGMENT

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