

## ***ABSTRACT***

*Liquefied Petroleum Gas (LPG) plays a crucial role in daily life, both in households and industries. However, LPG gas leaks pose serious risks such as fires and explosions, especially in densely populated areas. This study aims to design and develop a monitoring system for LPG gas leak detection based on a microcontroller using the MQ-2 sensor and ESP32. The system integrates the MQ-2 sensor to detect LPG gas concentrations in the air, the ESP32 microcontroller as the main processing unit, and an early warning mechanism consisting of a buzzer, LED indicators, and an automatic fan controlled by a relay. Additionally, the system is connected to an IoT-based notification service using Telegram and Blynk, enabling real-time monitoring and alerts for users when a gas leak is detected. Testing was conducted to evaluate the performance of the MQ-2 sensor in detecting gas leaks, the system's response speed, and the effectiveness of the early warning mechanisms. The results show that the system can detect gas leaks with high accuracy, provide early warnings in less than one second, and activate the fan to reduce gas concentration in the air. With this system, the risk of fires caused by LPG gas leaks can be minimized, enhancing user safety in household and small industrial environments.*

**Key Word:** *LPG, Gas Leak Detection, ESP32 Microcontroller, IoT, MQ-2 Sensor*