

ABSTRACT

Gas leakage in enclosed spaces poses serious risks such as carbon monoxide poisoning and explosions, particularly in household environments. The increasing use of natural gas and other flammable chemicals has heightened these dangers, necessitating the development of effective and affordable safety systems. This study aims to design a prototype security system by integrating various sensors and actuators based on the Internet of Things (IoT) to automatically detect and address gas leaks. The system combines gas, temperature, and humidity sensors, along with actuators such as exhaust fans and water pumps, to efficiently mitigate the risks of gas leaks.

The prototype system utilizes an MQ-2 gas sensor and a DHT22 temperature and humidity sensor, connected to an ESP32 microcontroller for real-time monitoring. Actuators are controlled through a MOSFET driver to expel harmful gases and reduce their concentration by spraying water. The system's effectiveness was tested, and the results show that it can detect hazardous gases with 95% accuracy and reduce gas concentration by up to 90% within less than 10 minutes. This solution provides a cost-effective and efficient way to enhance household safety with an automated response to gas leaks.

Keywords: *Gas leakage, Internet of Things (IoT), gas sensor, exhaust fan, automated control, environmental safety, ESP32, security system.*