

Design and Implementation of an IoT-Based Smoke Detection and Automated Ventilation System

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Abstract: *This paper presents the design and implementation of an IoT-based smoke detection and automated ventilation system aimed at improving indoor safety and air quality monitoring. Traditional fire and smoke detection systems often rely on standalone alarms that provide limited response capability and lack real-time monitoring features. To address these limitations, the proposed system integrates a gas/smoke sensor (MQ series) with a microcontroller-based platform to continuously monitor smoke concentration levels in the environment.*

The system is designed to detect abnormal smoke levels based on predefined threshold values and trigger immediate response mechanisms. Upon detection, a visual alert is generated using an LED indicator, and an exhaust fan is automatically activated to remove smoke and improve air circulation. This automated response minimizes human intervention and reduces potential risks in indoor environments.

The implementation focuses on low-cost hardware components and efficient real-time processing, making the system suitable for residential and small-scale industrial applications. The system performance was evaluated under different smoke conditions, demonstrating reliable detection and quick response time. The results indicate that the proposed solution provides an effective, scalable, and practical approach for enhancing safety through early smoke detection and automated environmental control.

Keywords: IoT-Based Smoke Detection, MQ Gas Sensor, Arduino Microcontroller, Automated Ventilation System, Real-Time Monitoring, Indoor Air Safety, LED Alert System.

