

DESIGNING AND DEVELOPING AN IOT-CONNECTED FIRE EARLY WARNING SYSTEM FOR HOSPITALS WITH EVACUATION ROUTE INDICATOR LIGHTS AND FIRE SUPPRESSION FEATURES AS OUTPUTS

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ABSTRACT

Fires in hospital environments pose a serious threat that can result in significant losses, both in terms of material damage and human safety. This study aims to design and develop an early fire warning system integrated with the Internet of Things (IoT), equipped with evacuation route indicator lights and an automatic fire suppression system as outputs. The system uses a flame sensor, DHT22 temperature sensor, and MQ2 gas sensor to detect early signs of fire. An ESP32 microcontroller serves as the control center, connected to output devices such as buzzers, LED indicators, and a water pump controlled through a relay. Sensor data is transmitted in real time to a monitoring application using the MQTT protocol. Testing was conducted to evaluate each sensor's detection accuracy under varying conditions, including distance and temperature. Results indicate that the system can quickly issue warnings and activate evacuation guidance and automatic fire suppression when fire conditions are detected. This system is expected to enhance early fire response in hospitals and minimize casualties and damage.

Keywords: *Fire, IoT, flame sensor, DHT22, MQ2, ESP32, evacuation route, MQTT.*