

ABSTRAK

RANCANG BANGUN ALAT JALUR EVAKUASI BENCANA BERBASIS IOT

(Kharina Kailara: 2025: 102 halaman)

Penanganan bencana seperti kebakaran, banjir, dan gempa bumi membutuhkan sistem respons yang cepat dan akurat demi meminimalisir risiko terhadap keselamatan manusia. Oleh karena itu, laporan ini mengusulkan rancangan dan implementasi sistem jalur evakuasi bencana berbasis Internet of Things (IoT) yang menggunakan mikrokontroler ESP32 sebagai unit kendali utama. Sistem ini dirancang untuk mendeteksi tiga jenis bencana melalui *flame sensor*, *water level sensor*, dan *vibration sensor*. Metode penelitian terdiri atas beberapa langkah yaitu identifikasi masalah, perancangan hardware, perancangan program, dan perancangan mekanik serta pengukuran dan pengujian alat. Ketika sensor mendeteksi kondisi darurat, ESP32 akan secara otomatis mengaktifkan LED strip sebagai penunjuk jalur evakuasi, *buzzer* sebagai alarm peringatan, serta mengirimkan gambar denah evakuasi melalui telegram bot secara *real-time*.

Sistem juga dilengkapi dengan *relay* untuk mengendalikan perangkat output dan mampu beroperasi menggunakan aki sebagai sumber daya cadangan saat listrik padam. Hasil pengujian menunjukkan bahwa seluruh komponen dapat bekerja secara terintegrasi dan memberikan respons setelah kondisi bahaya terdeteksi. Sistem ini dinilai efektif dan responsif sebagai solusi evakuasi otomatis dalam menghadapi bencana, serta dapat diterapkan di berbagai jenis bangunan.

Kata Kunci: Jalur Evakuasi, IoT, ESP32, *Flame Sensor* dan *Water Level Sensor*, *Vibration Sensor*

ABSTRACT

DESIGN OF AN IOT-BASED DISASTER EVACUATION PATH TOOL

(Kharina Kailara: 2025: 102 pages)

Handling disasters such as fires, floods, and earthquakes requires a fast and accurate response system to minimize the risk to human safety. Therefore, this report proposes the design and implementation of an Internet of Things (IoT)-based disaster evacuation route system that uses an ESP32 microcontroller as the main control unit. The system is designed to detect three types of disasters through flame sensor, water level sensor, and vibration sensor. The research method consists of several steps, namely problem identification, hardware design, program design, and mechanical design as well as measurement and testing of tools. When the sensors detect an emergency condition, the ESP32 will automatically activate the LED strip as an evacuation route pointer, buzzer as a warning alarm, and send an evacuation plan image via telegram bot in real-time.

The system is also equipped with relays to control output devices and is able to operate using batteries as a backup power source during power outages. The test results show that all components can work in an integrated manner and respond once a hazardous condition is detected. This system is considered effective and responsive as an automatic evacuation solution in the face of disaster, and can be applied in various types of buildings.

Keywords: *Evacuation Route, IoT, ESP32, Flame Sensor and Water Level Sensor, Vibration Sensor*