

ABSTRACT

Indonesia is one of the most earthquake-prone countries in the world due to its location at the convergence of three major tectonic plates. The city of Bandung, including the Telkom University campus, is particularly vulnerable due to its proximity to active fault lines. Currently, the campus lacks a real-time earthquake detection system capable of providing early warnings, especially in high-rise buildings where oscillation varies between floors.

This study proposes the design and development of an earthquake detection system based on the Internet of Things (IoT), utilizing the ADXL345 accelerometer sensor to detect tremors, with data processed by an ESP32 microcontroller and transmitted via Wi-Fi to a mobile application. The system also integrates a PIR sensor for detecting the number of people inside the building to assist evacuation procedures. Data is sent to the Firebase and displayed in an application featuring real-time monitoring, evacuation guidance, and notification alerts.

The design results demonstrate that the earthquake detection system is capable of detecting vibrations along the x, y, and z axes with a threshold >0.05 g. The people counting system can detect individuals passing through a doorway using image-based algorithms YOLOv5, and the overall system is able to respond with a latency of <500 milidetik via mobile application and audio alerts. This system is expected to enhance the safety of the Telkom University of an earthquake.

Keywords : Earthquake, Internet of Things (IoT), vibration detection, early warning system, people counter.