

ABSTRACT

SLBN Cicendo, as the oldest SLBN in Indonesia, still does not have an adequate disaster warning system. The existing disaster management system is still running manually, only in the form of a button that will light up when someone presses it. Therefore, we propose the development of a disaster early warning system with sensors, wireless technology, and the concept of Internet of Things (IoT) at the school. This solution aims to provide early warning for people with disabilities in SLBN Cicendo for earthquake and fire disasters, so as to increase their safety in emergency situations.

The disaster warning system for SLBN Cicendo is designed with three main sensors: accelerometer for earthquake detection, IR Flame sensor for fire light detection, and MQ-2 sensor for smoke intensity measurement to detect fire. DHT11 is added as an ambient temperature sensor. Integration with Google Firebase is used for database storage, while a red light serves as a disaster alarm. Additional features include a green light to signal a break, a yellow light to signal class entry, and a smartphone-based application with disaster alert notifications to monitor sensor data in real-time. The app can also remind class changes and provide an attendance system for students and teachers.

The disaster detection system was tested through simulation, with the IR Flame sensor having an average detection time span of about 3.8 seconds and the MQ-2 sensor about 3.6 seconds, as expected. The accelerometer sensor initially had a high error rate of 43.1%, but after adjustment, the average error was reduced to 14.41%. Quality of Services (QoS) testing showed an average throughput of 424.00 bits/s and a delay of about 18.878 milliseconds. Application testing using the System Usability Scale (SUS) resulted in a score of 70%, and the Black Box test was as expected.

Keywords: Disaster early warning system, Sensor, Internet of Things (IoT)