

DESIGN AND CONSTRUCTION OF AN EARLY EARTHQUAKE DETECTION SYSTEM BASED ON THE INTERNET OF THINGS (IOT)

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ABSTRACT

Earthquakes are serious threats that occur suddenly, meaning delays in early warning information often hinder the community evacuation process. Current conventional warning systems have limitations in integration and real-time data transmission speed. Therefore, this study aims to design an Internet of Things (IoT)-based earthquake early detection system. This system is implemented in the form of a scaled mockup prototype using a NodeMCU ESP8266 microcontroller and an MPU6050 accelerometer sensor. Vibration data is converted into Peak Ground Acceleration (PGA) parameters to determine the classification status of Safe (Aman), Alert (Siaga), or Danger (Bahaya) based on the BMKG Earthquake Intensity Scale (SIG) guidelines. If the vibration exceeds the threshold, the system automatically triggers a local warning in the form of a buzzer and an LCD, while simultaneously sending remote notifications via a Telegram Bot. All vibration activity records are stored in a MySQL database to be visualized on the "Gempa Monitoring" website. The test results prove that the entire system operates accurately and is well-integrated. Although there is latency in IoT data transmission, the system's response time remains within a safe tolerance limit, thus remaining effective as a disaster mitigation solution.

Keyword : Earthquake, IoT, ESP8266, MPU6050, Telegram, Website.