UNIVERSITI TEKNOLOGI MARA

EARTHQUAKE ALARM DETECTOR

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ABSTRACT

An earthquake is an inherently unpredictable natural occurrence that is impossible to prevent but can be forecasted. Constructing reliable early warning systems is crucial since earthquakes pose a significant threat to both infrastructure and human life. An earthquake alarm detector is crucial in Malaysian contexts due to the nation's location in a seismically active area of Southeast Asia. The primary objective of this study is to create and implement a comprehensive early warning system that is specifically tailored to the distinct seismic characteristics of Malaysia. The proposed Earthquake Alarm Detector would utilize advanced seismic sensors, real-time data processing algorithms, and communication technologies to deliver prompt and accurate warnings, therefore mitigating the impact of earthquakes. This methodology utilizes information regarding the geological attributes of Malaysia, taking into consideration the likely sources and magnitudes of seismic events in the region. The Earthquake Alarm Detector comprises a network of seismic sensors strategically positioned to monitor high-risk regions, a central processing unit for instantaneous data analysis, and a communication interface for prompt notification of relevant authorities and the public. The Earthquake Alarm Detector has the potential to revolutionize catastrophe prevention and response strategies in Malaysia. The primary objective of the system is to safeguard critical infrastructure, minimize casualties, and enhance the ability of the community to withstand seismic hazards through the issuance of timely warnings. Besides, this project's objective is also to decrease reaction times, since this facilitates the process of evacuation and emergency preparedness. This project contributes to the expanding field of earthquake early warning systems by providing an appropriate solution for a specific location with distinct geological characteristics. The ADXL335 accelerometer sensor detects pre-earthquake tremors. The accelerometer detects vibrations and converts them into corresponding ADC data. Subsequently, the Arduino microcontroller processes the aforementioned digital data. Subsequently, Arduino evaluates these numbers about the predetermined threshold value. If the sample value exceeds the threshold value, Arduino will activate an LED, activate the buzzer, and display a message on the 16x2 LCD regarding the status of the alarm. A call alert is initiated to the registered mobile phone using the GSM module. Whenever a violation is detected, the registered mobile phones receive a call alert.

Keywords—Earthquake, Seismic sensors, Communication Technologies, Arduino

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INTRODUCTION

1.1 Research Background

In order to enhance community safety, Malaysia has opted to utilize Internet of Things (IoT) technology for the development of an earthquake detection system. The Internet of Things (IoT) is an advanced device that can provide real-time seismic data, enabling prompt detection and alerting of earthquakes. The objective of this strategy is to mitigate the impact of earthquakes on buildings and individuals.

IoT-based earthquake detection involves the deployment of sensors capable of monitoring seismic activity. These sensors will be strategically placed in areas prone to earthquakes to gather relevant data. Subsequently, a centralized control system will promptly scrutinize the data, assessing the seismic patterns and issuing an alert if there is a potential danger. Employing Internet of Things (IoT) technology for the construction of an earthquake alarm detector ensures timely notifications to both the general public and relevant authorities. This system facilitates the prompt dissemination of notifications to residents and emergency services, enabling them to promptly undertake preventive measures such as evacuation and resource mobilization for disaster response.

The system can be enhanced by incorporating features such as automated emergency response protocols, geolocation services, and integration with mobile applications to facilitate widespread dissemination of warnings, in addition to its fundamental function of earthquake detection. The objective of this comprehensive strategy is to establish a robust and effective earthquake early warning system for Malaysia, thereby improving public safety and mitigating the impact of seismic disasters on the nation.[1]

1.2 Problem Statement

Earthquakes can be attributed to two potential causes: natural occurrences and human activities. The construction and clearing of the green belt are responsible for numerous calamities. The trees mitigate earthquakes and landslides by stabilizing the soil. The