UNIVERSITI TEKNOLOGI MARA JOHOR

CAWANGAN PASR GUDANG

AUTOMATED EARTHQUAKE DETECTOR WITH SEISMIC GRAPH

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DIPLOMA IN ELECTRICAL ENGINEERING (POWER)

JANUARY 2024

CHAPTER 1

INTRODUCTION

1.1 Introduction

The places that are vulnerable to seismic activity and where earthquake monitoring and preparedness are crucial are the focus of the Earthquake Detector utilising Arduino's study area. Understanding the size and frequency of earthquakes in the research region depends heavily on statistical data. Every day, hundreds of earthquakes occur across the world, most of which are small and invisible to people. Understanding the trends and features of seismic activity may be gained by examining historical seismic data. Through a thorough examination of earthquake data that include dates, magnitudes, epicentres, and depths, researchers can discern patterns and trends unique to the region under investigation.

This project uses Arduino microcontroller boards and accelerometer sensors to provide a dependable and reasonably priced seismic activity detection system. The broad deployment of traditional seismic detection technologies is hindered by their high cost and limited accessibility. By creating an inexpensive solution that is simple to use for communities, educational organisations, and people, our initiative aims to remove these obstacles.Through the utilisation of accelerometer sensors and Arduino capabilities, the system will process and analyse seismic data in order to distinguish between typical vibrations and seismic activity.

The goal of this research is to create an earthquake detection system that is both dependable and affordable. First and foremost, the project seeks to develop an inexpensive method of earthquake detection by utilising the capabilities of Arduino microcontroller boards. The goal is to increase the availability and accessibility of earthquake detection technologies for communities, educational organisations, and people by leveraging Arduino's capabilities.Second, the project intends to use Arduino and an accelerometer sensor to precisely record and analyse ground motion.To ensure that the system can reliably identify earthquakes, the goal is to create algorithms and data processing techniques that can distinguish between typical vibrations and seismic occurrences.

The government, society, and ecology all gain a great deal from the earthquake detector that uses Arduino. By providing real-time monitoring and earthquake detection, it improves public safety and disaster preparedness measures implemented by the government. It provides early warning capabilities to society, raising awareness and enabling communities to take the appropriate safety precautions. By lessening the effects of seismic occurrences on the ecosystem and preserving resources, the system also helps to preserve the environment. In general, it strengthens society's resistance to earthquakes and promotes a safer and better-prepared community.

1.2 Abstract

The creation of an automated seismic detector with a seismic graph display is the focus of this research. An Arduino Uno microcontroller, an LCD screen, a buzzer, an LED, and an ADXL335 accelerometer are all used in the system. Seismic waves are detected by the ADXL335 accelerometer and processed by the Arduino Uno to calculate the magnitude of the earthquake. Users may see the amount and frequency of seismic activity by using the LCD screen's real-time graph visualisation of seismic data. When major earthquake occurrences are detected, the device also includes a siren and an LED to deliver instantaneous notifications. The Arduino Uno serves as the central processing unit, gathering, analysing, and directing the output devices based on data collected from the accelerometer. In general,this automated seismic detector offers a practical and economical way to keep an eye on seismic activity and improve seismic readiness in areas that are susceptible to earthquakes.

1.3 Project Overview

An excellent example of the practical use of electronic components and microcontroller technology for real-time earthquake monitoring is the "Automated Earthquake Detector with Seismic Graph" project. The project builds a complete earthquake detection system by combining an Arduino Uno microcontroller, LCD screen, buzzer, LED indicators, and ADXL335 accelerometer. Its real-time seismic data visualisation via the LCD screen, which shows seismic activity in graph form for simple monitoring, is one of its standout features. The addition of LED indicators and a buzzer for instant notifications improves the system's emergency response. Furthermore, the project makes use of open-source technologies and easily available components to provide a cost-effective solution. However, in order to further develop the system, factors like power efficiency, user interface improvements, data logging and analysis, and sensitivity calibration should be taken into account. The system may become an even more useful resource for earthquake study and disaster preparedness with these enhancements.

1.4 Problem Statement

The project is to solve the demand for an affordable, effective system for monitoring and detecting earthquakes that can deliver real-time data visualisation and prompt alarms in areas that are susceptible to them. Numerous communities and organisations are unable to utilise the current seismic monitoring systems because they frequently depend on costly and sophisticated technology. Furthermore, it's possible that these systems don't have intuitive user interfaces that make seismic data easier to comprehend. To build an automated earthquake detector with a seismic graph display, a solution integrating reasonably priced parts such the ADXL335 accelerometer, LCD screen, buzzer, LED indicators, and Arduino Uno microcontroller is required. To improve earthquake readiness and response activities, this system should be able to precisely detect seismic vibrations, visualise the data in real-time, and send out prompt notifications. In light of these difficulties, the project aims to support the creation of affordable and practical seismic monitoring devices for a variety of uses.