CALIFORNIA SCIENCE & ENGINEERING FAIR
2018 PROJECT SUMMARY

Name(s)
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Project Number
J0907

Project Title
Shake! Shake! Shake!

Abstract

Objectives/Goals
I hypothesized that if I build a working seismograph that can measure seismic waves caused by ground movement, then the seismograph will be able to detect the nearby vibrations and measure their intensity. I chose this project because as a Southern California native, I was curious to understand the science behind earthquakes. With this project, I aimed to create a seismograph that could detect different intensities of seismic waves.

Methods/Materials
My seismograph was built with several wooden parts along with white paper rolls, an Aslong DC geared motor, Pixnor speed controller, and a binder clip. It was built using a hand drill, electric hand saw, a level, and sandpaper. The seismograph was built entirely from scratch. The science behind the seismograph is proven by Newton's first and second laws of motion, which I used as guidelines to understand seismic activity.

Results
First, I measured the differences in the seismic waves when balls of different weights were dropped from different heights. Overall, I noticed that balls with a larger mass dropped from a certain height produced larger seismic waves than a smaller ball dropped from the same height. In this project, I used weighted balls of 907.2g, 1814.4g, 2721.6g, and 3628.7g, and dropped each from heights of 33cm, 66cm, and 99cm. The largest amount of seismic activity was recorded when a ball of 3628.7g was dropped from 99cm, producing a surface wave of 5mm. While, the smallest amount of seismic activity was recorded when a ball of 907.2g was dropped from 33cm, producing a surface wave of 0.92mm. After gathering my data from my different tests, I proved that I built a successful seismograph with the ability to detect different intensities of seismic waves.

Conclusions/Discussion
This project proved that simple machines can be made to make understanding earthquake magnitudes simple and accessible. For future application, the technology of the seismograph can be further developed to identify earthquakes before the occur. In my results, heavier objects caused a greater amount of seismic activities than lighter ones. This information can be applied to the architecture of earthquake-heavy regions, such as the Ring of Fire. Earthquake simulations may be created in order to test the integrity of a building. Overall, my seismograph showed distinctions in seismic wave intensity, and proved that speed, mass, and height affect the magnitude of seismic waves.

Summary Statement
In this project, I built and tested a seismograph in order to understand ground movement by measuring seismic waves.

Help Received
Project built at home under supervision of a parent. Portion of project done at Amtrak/ Metrolink Moorpark and Simi Valley locations.