

The Seismolator Project

Introduction

Earthquakes are ravaging our world more than ever before and you just wonder where the next one is coming up. Just last week, 8th September 2017, a magnitude 8.1 quake took place in Mexico claiming over 80 lives apart from structures and properties worth billions of dollars either outrightly destroyed or their integrity seriously compromised and hundreds of families displaced.

The Seismolator project is an interdisciplinary research project aimed at providing a solution to the effect of quakes by tackling the harmful energy in the event through different engineering approaches. In its overall view, at least three engineering disciplines are encompassed namely: Civil, Electrical and Mechanical engineering.

Research Focus

Research activities targeted at providing safety for plants and structures during a seismic event has been on for decades. Such research is also alive at Howard University. Generally, two approaches are employed in tackling this problem namely:

- (a) Isolation of the base of structures from the short duration, but intense and damaging mechanical vibration accompanying seismic events.
- (b) Fast dissipation of the harmful mechanical vibration energy generated during seismic events.

The second approach which may be tackled using an energy conversion method may be achieved and prototyped using simple electrical engineering principles. This could form a good Senior Design Project.

Applicability of the law of conservation of energy

The law of conservation of energy states that: *"the total energy of an isolated system in a given frame of reference remains constant"* In other words, energy is neither created nor destroyed but can be changed from one form to another. Going by this reasoning, it is apparent that if a means of evacuating (dissipating) the harmful mechanical vibration in earthquakes in real time before it could impact the foundation of structures can be found, then there is a chance of saving/preserving such structures from damage or compromise.

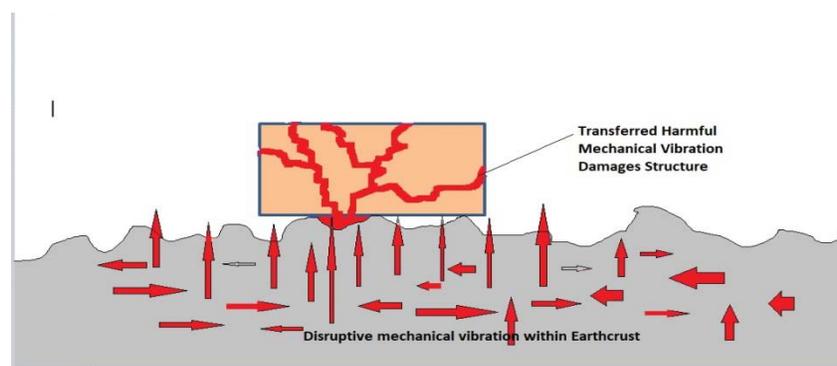


Figure 1: Without an Energy Dissipation Interface

The Task

The task, therefore, condenses to **Designing** and **constructing** an applicable **Energy Dissipation Interface** suitable for presentation as a Senior Design Project. The resulting project must be a suitable prototype device that is able to absorb and convert mechanical vibration to another form of useful and harmless energy.

Figures 1 and 2 show the application of such an interface and the scenario with or without it with respect to the safety of a plant or structure.

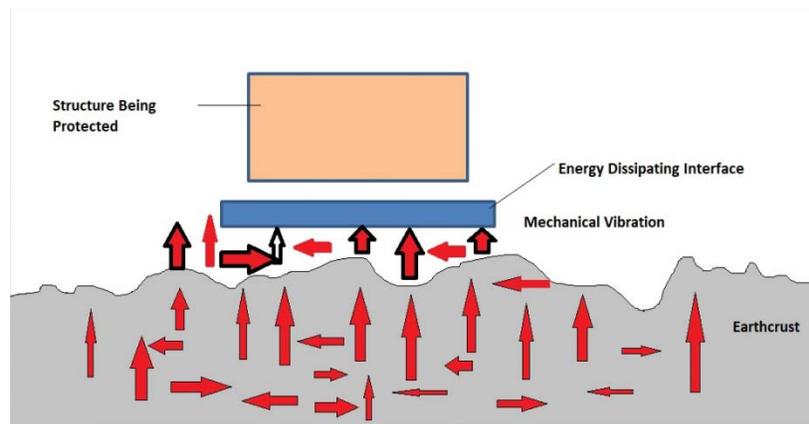


Figure 2: With an Energy Dissipation Interface

The Candidates

A team of two or three hard working and self-driven Seniors is needed to prosecute this project within the shortest time frame possible.

Technical Support

The following are available to provide technical support during the project

Dr. C. Marin (PI) - cmarin@howard.edu

Dr. C. Kim (Co-PI) - ckim@howard.edu

Sola Famakin (GA) - richielag@gmail.com

Equipment and Materials

These shall be provided by the PI and Co-PI as/when needed.