



CALIFORNIA STATE SCIENCE FAIR 2013 PROJECT SUMMARY

Name(s) Allen K. Cheung; David N. Hoang	Project Number J0203
Project Title Small Tiles for Big Purposes	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Most public areas such as malls and convention centers use up a lot of energy invested into lighting, heating, and air circulation. These areas gain energy usually through sources such as fossil fuels(e.g. petroleum, natural gas, etc.) or nuclear power. Our objective is to come up with a green energy-generating method which harvests energy from footsteps. Our goal is to design a tile that can generate sufficient power, durable enough to withstand everyday usage, and simple to make.</p> <p>Methods/Materials We started by building a prototype of the tile using a 1 x 1 ft. wooden plank and 5 piezoelectric sensors. We wired up these sensors on the bottom side of the top tile using electrical wire. This prototype generated electricity by having the top tile (with the sensors) slightly bend down due to person's weight and therefore bending the sensors. This prototype did not work well, so we switched to hammer design instead, where the hammers would strike the sensors when a person stepped on the tile. This new tile would consist of nine piezoelectric sensors and have foam to cushion the top tile. The same electrical wire was used.</p> <p>Results The new tile that we created worked quite well, so we created another identical tile to test how the tile would work together. The tiles seemed to be quite durable as well. each tile costs about fifteen dollars; the highest costing material being the piezoelectric sensors at \$4.50 per tile. Each tile was tested to generate about five milliwatts, which is way below our design goal of 250 milliwatts(0.25 Watts). We found out it is due to the limited output of piezoelectric devices. A better piezoelectric device is needed to achieve a higher output power. This engineering project proves that it is indeed possible to harvest electrical energy simply from footsteps.</p> <p>Conclusions/Discussion From our experiment, we can conclude that these tiles have a potential to replace traditional energy sources in powering places with heavy foot traffics. They can be made at lower costs and higher durability using today's manufacturing technology. That means that deploying a mass amount of tiles would result in significant decrease in energy spending costs. One downside is that a few tiles don't create significant amount of energy, but when combined with hundreds and thousands of tiles, they could become the alternative energy sources of today.</p>	
Summary Statement Our project shows that it is possible to generate electricity from footstep as an alternative energy source.	
Help Received Adults helped cutting wood tiles using power tools. Adults helped training on how to solder wires using soldering iron.	