



CALIFORNIA STATE SCIENCE FAIR

2015 PROJECT SUMMARY

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Project Title U Power: Harnessing Body Heat for Safety	
<div><div>Objectives/Goals The goal was to understand thermoelectric/seebeck effect and apply the learnings in our daily lives by the creating a prototype that harnesses body heat to power a belt that lights up.</div><div>Methods/Materials We first conducted some background information learn about body heat conversion and the materials needed to conduct experiments. Afterwards, we experimented first with hot and cold water (using a couple of Peltier tiles) to record the voltage produced with temperature differences, then proceeded to attempt building a working prototype. In order to do this, we also had to build a joule thief circuit to amplify the voltage produced. We connected 6 Peltier tiles to a joule thief circuit, inserted it into a belt, and tested it on one of our group members to see if it would light up the LED. After our county science fair, we decided to experiment with different voltage amplifiers, capacitors, and a strip of LED's to see if we could make our prototype more efficient.</div><div>Results We found that using multiple Peltier tiles along with a joule thief circuit significantly amplifies the voltage being produced. After experimenting with hot and cold water, we found that the larger the temperature difference, the more electricity is being produced. When testing our first prototype, we found that the LED lit up when the voltage reached 1.06 V and stayed lit until finally fading out until the voltage reached 0.77 V. This happened after 1-2 minutes of exercising.</div><div>Conclusions/Discussion In conclusion, our engineering goal was met as we understood how body heat conversion works and applied that concept to our daily lives. Learning about the whole process of thermoelectric energy, we came to a conclusion that body heat can be harnessed to power many small low voltage electronic devices and wearables, and that it is very beneficial as the energy source is consistently available anywhere and at all times. We believe that this technology is very promising as we move to a world of devices such as health monitoring, hearing aids, activity trackers, etc. that contribute to the well being of society.</div></div>	
Summary Statement To create a prototype of a device that provides safety for people who exercise at night using body heat.	
Help Received Ang Shih helped us understand the engineering principles behind seebeck/thermoelectric effect.	