



**CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY**

Name(s) Ryan M. Ramsey	Project Number S1016
Project Title Stepping into the Future	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Determine the relationship between walking and the energy produced to charge a cell phone. The goal of this experiment is to charge the cell phone's battery up to 50% from 3 hours of walking.</p> <p>Methods/Materials Tested the percentage of cell phone battery charged from walking using a piezoelectric energy harvester. The energy harvester converted the mechanical energy of walking into electrical energy. The produced electrical energy from the piezoelectric actuator was stored in an external storage battery to charge the cell phone later.</p> <p>Results The large piezoelectric actuator produced 1.10mA and 80v. The smaller actuator used produced 0.58mA and 60v. The relationship between the amount of time walked and phone battery percentage charged was linear. For every hour walked, a percentage of the phone was charged.</p> <p>Conclusions/Discussion Many people own a hand held device(cell phone). With this in mind, providing an alternative to the standard, stationary way of charging a cell phone would provide more convenience. I built a shoe capable of charging a cell phone using piezoelectric actuator to convert the mechanical energy of walking into electrical energy. This is possible due to the molecular structure of the piezoelectric material.</p>	
Summary Statement I built a shoe that can charge a cell phone.	
Help Received I designed, built, and tested the shoe. My biology and physics science teacher reviewed my results. A professor from California State University San Bernardino provided me with piezoelectric actuators.	