



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) R Rik Bose	Project Number J0203
Project Title Power Beneath Your Feet: Energy from Piezoelectric Elements	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of my Science Fair Project is to design and build an energy harvesting system that will provide a source of energy. This project involves the use of piezoelectric transducers for harvesting energy that is produced from stepping on a tile. When the tile is engineered with piezoelectric technology, the charge produced by the kinetic force is captured and converted into an electrical charge by piezo materials and electronic components, which can then be stored and used as a power source.</p> <p>Methods/Materials A piezoelectric transducer was connected to a breadboard with diodes in a bridge rectifier formation. A capacitor was connected to the board to store the DC voltage. A LED was used as a load to check if the energy that was being stored in the capacitor could be used. Multiple variables were used to test the hypothesis.</p> <p>Results When a mechanical stress is applied to a piezoelectric element by adding pressure or by bending, it generates voltage. There is a direct relationship between the mechanical stress and voltage output. The output of the piezoelectric element can be increased by connecting them in series. The capacitance (ability to store an electrical charge) of the capacitor is also a factor for storing the charge. The increase in load requirement (adding more LED bulbs) drained the capacitors much faster.</p> <p>Conclusions/Discussion Based on my experiments, and results, my hypothesis was proved correct. In my experimental circuit, deformation of piezoelectric element creates alternating current, which is then converted into direct current by using a bridge rectifier and can be stored for future use. I calculated the energy in joules, which would be generated by each tap/step on a piezoelectric element. I also researched the energy requirement in joules to light a LED bulb and captured sufficient voltage in the capacitors to provide DC voltage to the light bulb.</p>	
Summary Statement My experiment showed, with the circuit I constructed, that kinetic force can be converted into an electrical charge by piezo materials, which can then be stored and used as a power source.	
Help Received My father helped me with design of the circuit and soldering. My mother helped me with the printouts and display of the science board.	