# Using Piezoelectricity to Create a Self-Powered Calculator

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The purpose of this study was to determine the feasibility of using piezoelectricity to create a self-powered calculator. A solar-powered scientific calculator was disassembled for this study. A piezoelectric disk was inserted under one of the calculator's keys and the solar panel was removed from the calculator. The voltage produced by the solar panel and by the piezoelectric disk were measured as keystrokes were being simulated on the disk by a mechanical actuator over the course of two minutes for each of five trials. The solar panel produced an average magnitude of 2.77 V while the piezoelectric disk produced an average magnitude of 5.21 V. The piezoelectric disk differed from the solar panel in that it produced intermittent and negative voltages. A two-sample t-test with an alpha value of .05 used to analyze this data produced a p-value of about 1.911x10-7, indicating that there was a statistically significant difference in the voltage produced by the solar panel and piezoelectric disk. The results of this study found that the piezoelectric disk produced enough energy to completely power the calculator, with limitations. These results partially supported the research hypothesis that the piezoelectric disk would be able to offset most of the energy required to power a calculator. In conclusion, it would be feasible to use piezoelectricity to design a calculator that is powered by the force used to press its keys. This application could further be extended to other push-button devices, effectively reducing our reliance on non-renewable sources of energy.

**Awards Won:**
Fourth Award of $500