



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

Name(s) Marcus Yoo	Project Number J0216
Project Title Gravity Battery	
<p style="text-align: center;">Abstract</p> <p>Objectives In our society, there are still those who don't have access to electricity and light. I saw a need for a device that would be able to provide light and energy to those who needed it. I wanted to utilize the power of gravity to fuel my device, which would allow the device to be used by anyone, anywhere. I hypothesized that I would be able to use Computer Aided Design software to calculate and design a planetary gearbox, that would be able to translate the kinetic energy stored in weights into electricity. Despite encountering difficulties related to the low-melting point of the plastic used by the 3-dimensional printer, I found that I was able to use weights to produce energy and successfully power a Light Emitting Diode.</p> <p>Methods Calculate gear reduction weight ratio, please see explanation below of the mathematics required. Design and adapt 3D parts with Computer Aided Design software Print 3D parts Assemble prototype and make necessary adaptations Make final print File parts Lubricate parts Add weights Attach LED Affix to framing material to secure device Conduct tests to find the weight at which the LED would light up.</p> <p>Results During my experiment I discovered that it is indeed possible to produce energy using gravity. I experimented with different weights and the output they produced. The smallest weight that I could get to produce energy was at 16 pounds. I was able to produce 1.2 volts consistently. That is a small amount considering that an average battery has an output with a constant current of 1.5 volts. When scaling the weight up to 19 pounds I was able to attain 2.45 volts of electricity. The Light Emitting Diode that I am using requires a minimum of 3 volts to light up. When I raised the weight to 21 pounds I was able to produce 3.1 volts at a constant rate thus powering the LED. One problem that I encountered is that the plastic was melting due to the high friction. I am assuming that this was a result of the PLA plastic that was used to print the parts, being able to melt at such low temperatures.</p>	
Summary Statement My project converts gravitational potential into electricity that can be used to power a light.	
Help Received Bing Liu was my teacher who supported me with my research, Terri Rodriguez is the Maker-space Teacher that provided me with 3d printing utilities Adella Pyo Mom that helped me put my board together.	