Self Sustaining Child Transportation System

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Goal

To charge and deliver power to mobile electronic devices through multiple options of sustainable energy sources (photovoltaic solar cells, DC generators) while maintaining the freedom and convenience of mobility and flexibility

Motivations and Objectives

❑ Motivations

- Current methods of powering devices is not moving with the same direction with the portable computing market (e.g. traditional plug-and-sit outlet method)
- Stationary powering options essentially turns these mobile devices into their desktop like predecessors, with range limited to length of charging paraphernalia

❑ Objectives

- Retrofit an already existing commonplace, everyday object onto its own portable power state(Instead of Internet Of Things, think Things that Power), using silicon based photovoltaic solar panels and DC generators to “trickle-charge’ an onboard Lithium Ion battery
- Recreate the efficient and existing model of a green energy “SMART GRID” power system and implement as small scale mobile application

Research Challenges

❑ Finding the best solar panel configuration to produce the best possible voltage/current output

❑ To discover if the theory of DC motor could be used as a DC generator in practical application

❑ Finding a battery that would help us optimize between good storage capacity and low charging power

Methodology

Step 1: SIMULATION

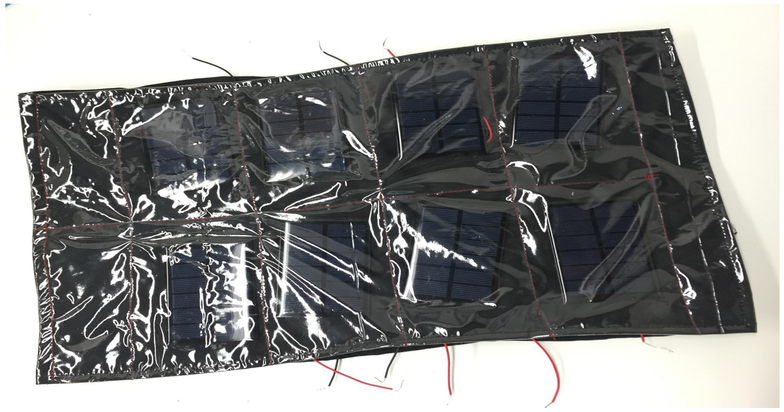
- Used PSPICE to test different configurations and in using PSPICE, our group discovered the speed of motor shaft rotation was more influential than assumed
- Research of components optimal for our final circuit design

Step 2: IMPLEMENTATION

- Solar panel electrical and physical configuration
- Finding the best generators and using a gear system to help shaft spin fast at low pushing speeds
- Using these two implementations to charge a Lithium Ion Battery

STEP 3: TESTING/DEBUGGING

- Tested configuration of solar panels in ambient lighting
- Measuring outputs of both solar panels and generators

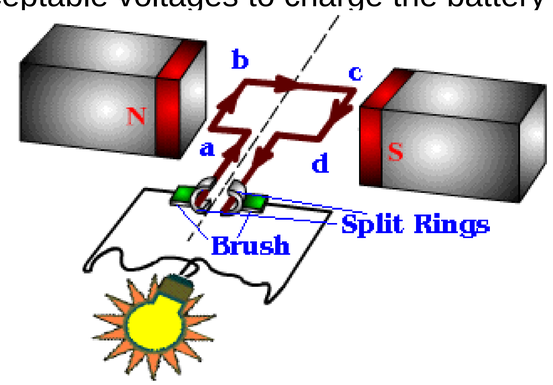


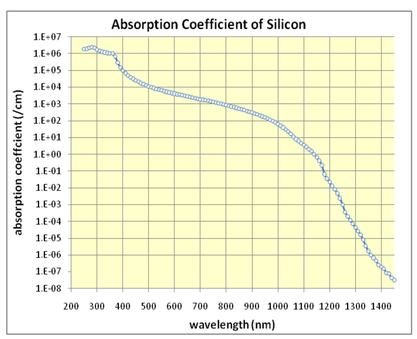
Results

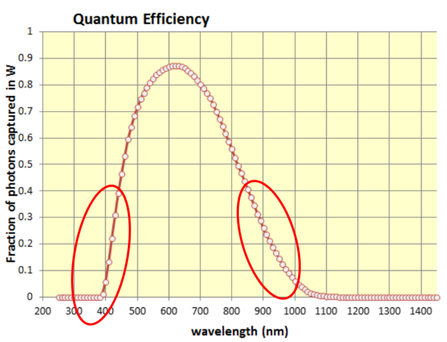
Solar Panels: In ambient lighting, the panels produce the expected voltage output however the current was much smaller than the rated short circuit current

Generators: Under low turning speeds, we expect the output voltage to be within the range of acceptable voltages to charge the battery

Discussion: Some improvements that can be made upon our design is detachability, increase the numbers of generators, replacing the canopy with Thin Film with great efficiency in the coming years, use the concept of the solar sheet application and implement with other gadgets.







Acknowledgement

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References

[1] S. J. Chapman, "Electric Machinery Fundamentals", 4th edition, 2005
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