Focused Wireless Recharging System

Authors: Brandt Anhorn, Ryan Bedard, Weston Colemon, Michael Daguro, Prathiksha Shetty, Peter Siemens
Schulich School of Engineering, University of Calgary

SCHULICH School of Engineering
UNIVERSITY OF CALGARY

Abstract

- The focused wireless recharging system is a novel technology that uses the power provided by the light of a focused laser to wirelessly recharge batteries or electronic devices.
- This project aims to enhance the efficiency and convenience of recharging small batteries or electronic devices using solar energy and eliminate the need for wired connections.
- Our final design can successfully recharge a 1.2V battery, which can then be used as a power source for a wide variety of small electronic devices.
- This design is an eco-friendly solution that can recharge small batteries and has the added benefits of being able to be applied at long distances, in indoor environments, and virtually any angle.

Introduction

- With the growing popularity in portable electronic devices and the need for sustainable energy solutions occurring simultaneously, this has sparked an interest in wireless charging.
- Traditional solar panels have the downside of relying on the sun, which causes energy capture to drop, in times of low light, especially if placed indoors.
- A focused laser beam can be precisely directed towards a photovoltaic cell, delivering a powerful source of energy that is also very versatile and predictable.
- This form of charging can be applied to a wide range of applications such as powering sensors in industrial processes, while also having the potential to eventually increase the power output and revolutionize how we charge our electronics.

Discussion

- During our testing phase, we decided to use multiple smaller solar panels in parallel instead of using one larger solar panel, as this allows us to achieve a higher current and therefore allow us to charge a battery faster.
- While testing different designs, we found that using red lasers was much more beneficial than other colors, such as green or blue. The red lasers were much more efficient and much safer, which were big factors when choosing our final design.

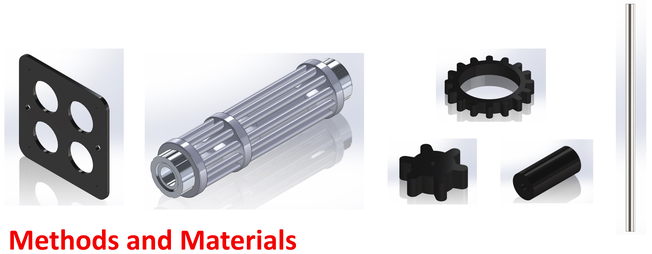
Conclusions

- We have successfully designed a focused wireless recharging system that can power small electronic devices and can be applied to many real-world applications.
- This design provides an eco-friendly solution to powering electronic devices, eliminates the need for wired connections, and could unlock a new way of thinking when it comes to charging our electronics.

Results

During our final stages of testing, we recorded the output from the solar panels with a multimeter and found that we were able to produce 1.5V at 20mA.

- With this power output from the solar panels, we are able to fully recharge a 1.2V, 700mA, AA battery, in ~37 hours. This battery can then be used to power a wide variety of electronic devices, from LED light bulbs to small household electronics.
- We are also able to power a small motor with this power output. By placing a small propeller on the motor, we can then use this as a fan to cool down small devices.



Methods and Materials

Our final design consists of four 0.66W red lasers, held together in a square shape to evenly spread the light of the laser beams over four 1.5V, 150mA solar panels, that are 45mm x 45mm each, which have also been placed in a square shape.

- The four lasers are held together in the square shape with two 3D printed plates, each with four holes in them, so that the lasers can be placed within the plates. These plates are then held together with four metal rods, which are tightened with metal nuts on each side.
- Each laser has its own adjustable lens, which can increase or decrease the size of the lens as needed, depending on the distance between the solar panel and the lasers.
- The assembly of lasers is placed on top of a tripod, which gives the design the flexibility of being able to be used at any angle, while also remaining very stable, which is key when trying to target the solar panel at long distances.

CONTACT
Ryan Bedard
Email: ryan.bedard@ucalgary.ca