Senior Design / BS Project
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Solar Powered Glider

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Abstract

This project aims to provide a more enjoyable experience for the users of the University of Miami's gliders. To achieve this goal, overhead lights and USB outlets are integrated onto the glider. To stay on the forefront of green energy initiatives and avoid additional electricity costs, the outlets and lights are powered by solar energy.

Introduction

The University of Miami gliders are an iconic addition to campus seating. As pictured in Figure 1 below, the gliders consist of two wide benches with a table in between that can "glide" back and forth to provide an enjoyable and fun user experience.

As loved as the current gliders are, they are not as functional as they could be. There are two major issues that limit the capabilities of the gliders: devices run out of charge and users are unable to be productive at night without lighting. With the addition of lights and outlets to the current gliders, students could use the gliders more often and for longer periods of time.

Figure 1. Current On-Campus Gliders

Methods | Design | Analysis

Our design analysis consisted of selecting optimal parts and estimating the power consumption of each component in order to size the solar array, battery, and charge controller needed. Our glider was designed to run for 2 days without sunlight.

- Final Parts Selection:
  - 2 160W 12V Flexible Solar Panels
  - 12V 120 Ah Sealed, Lead Acid Battery
  - 40 Amp MPPT Charge Controller

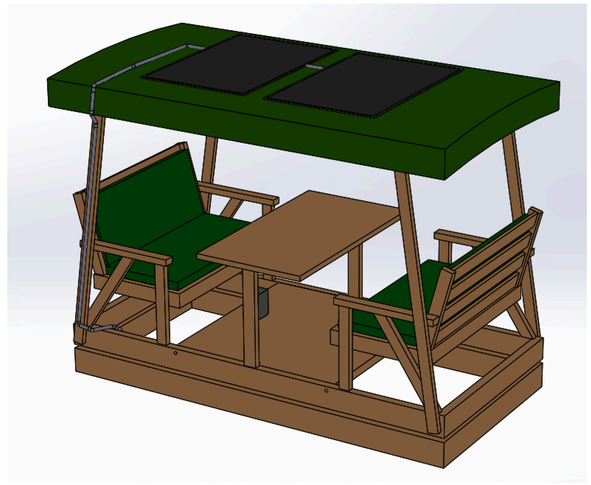

Figure 2. Final Glider Design

Results

Unfortunately, due to COVID-19, the construction of our prototype was suspended, however, if able we would have performed the following tests:

- Measurements of power output from the panels
- Measurements of power provided by the battery on a single charge
- Testing based on actual use by students and faculty

A final cost analysis was performed, and is provided in Table 1.

Part	Cost
Solar Panels	$647.15
Battery	$234.99
Accessories	$506.00
Total Cost	**$1,388.14**

Table 1. Cost Analysis

Conclusion

Although unable to prototype and collect data, we accomplished creating an innovative design that received approval from all necessary University personnel. Our design incorporated the desired components in an environmentally friendly way. The system has zero carbon emissions and does not add a cent to the University's monthly electric bill. Our design was also made to be 25% less costly than previous designs. Not only can this project be resumed in the future, it can also be the starting point to the development of a modern glider with integrated features. As a group, we learned the intricacies of combining multiple engineering disciplines as well as the difficulties presented when creating a product that will be used by the public.

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