ECE 4901 Fall 2020
Designing of Solar Picnic Tables at the Historic Keney Park

Members:

Jacob Conde (Electrical Engineering)
Tommy De La Cruz (Electrical Engineering)
Rob Jacobson (Electrical Engineering)

Sponsor:
Herb Virgo of the Keney Park Sustainability Project
keneyparksustainability@gmail.com

Advisor:
Professor Sung-Yeul Park
Statement of Need

The Keney Park Sustainability Project (KPSP) is an urban farming, preservation, community outreach program based in Keney Park Hartford, Connecticut. Keney Park is a 693 acre urban forest designed by Federick Law Olmstead, architect of Central Park in New York. The KPSP works to educate communities on environmentally conscious farming, natural resource conservation, landscaping, and forest management skills. This would foster the growth of new park preservation workers and environmentally conscious community members that promote a healthy relationship between the people and the environment.

The KPSP has come to ask the University of Connecticut in finding a solution to make the park more accessible by implementing solar panels onto ADA compliant picnic tables. These tables would provide electricity through the use of photovoltaic panels when not in use while also being converted to a regular table when not charging. This would take advantage of the daily resource of light being emitted from the Sun which falls in line with the project’s sustainability efforts. Locally milled lumber and modern technology would marry into a symbiotic relationship of environment and human ingenuity.

Preliminary Requirements

The requirements of this project will include choosing LEDs and charging outlets that we want to use for our design. Implementing a solar panel that will be able to power the LEDs while the charging outlets are in use. A sizable capacity battery with the potential of multiple loads but be considered. A user interface will provide information on the current battery level, the power provided by the solar panel, and controlling the LEDs. All electrical components must be weatherproofed in order to protect components and ensure electrical safety to its users. Switching between having the solar panels active or stored, a flipping mechanism that is easy for the user to use must be designed. The panels and components must also be resistant to being vandalized.

Basic Limitations

Limitations of our design include the size of the solar panel being dependent on the size of the table. The geometry of the table will have to be integrated with the design to ensure that the solar panels, batteries, and controllers will not get in the way during normal use. Although there is no initial allotted budget, it is important to design the table so that it stays within a reasonable price.
Technical Specifications

The tables dimensions are to be 3 foot by 8 foot and would follow ADA compliance for handicapped users. The tables charging ports and LED lights need to be able to be used at any time, which means the battery must have enough capacity to last long enough for its next charging period. The table materials should be durable enough to withstand day to day use and should weigh between 350-450 pounds. Every electrical aspect should be weather resistant and well insulated. The charging ports should be supplied around 5V and remain at a constant current and voltage levels while charging multiple devices.

Questions

How much will the necessary materials cost?
What other features can be implemented to improve the table?
Is it possible to make solar panels and its components portable and be stored?
How could we scale the design to production standards?
What wattage produced by the solar panel will be best for charging the battery?
How much capacity will the battery require?
How many LEDs and Ports will be used?