Solar Powered System for Community Garden

Team Members: Adam Acosta, Ariel Herrera, Chandler Lopez-Galindo, David Almanza, Geovanni Reynoso, Ivan Fuentes-Ramirez, Jack Visger, Jacqueline German, Jadyn Ruedas
Faculty Advisor: Ted Nye
Liaison: Nancy Lemargie
Department(s) of Electrical Engineering and Engineering Technology
College of Engineering, Computer Science, and Technology
California State University, Los Angeles

Project Background



Nancy Lemargie

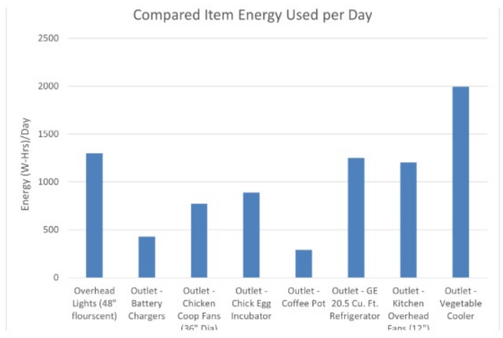
- Valmonte Farm and Garden teaches gardening to those with learning disabilities
- The farm and garden outgrew its old 800W system
- The project had good community impact, hands-on opportunities, and a focus on renewable energy

Objective

- Upgrade the garden's power system to reliably supply power through the winter solstice
- Design a power system that is easily accessible for ease of maintenance
- Power system should have barriers to prevent rodent damage

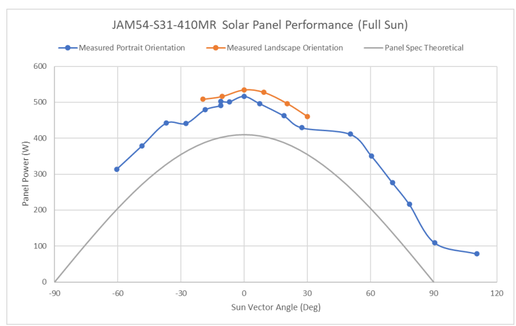

Old System

System Engineering

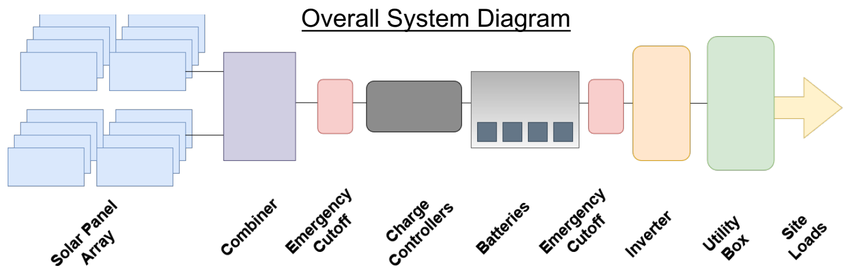


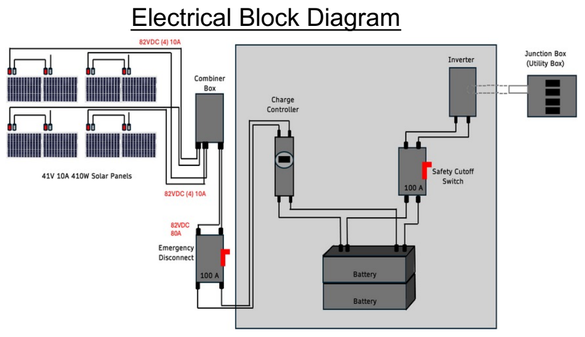
No.	Name	Requirement	Capabilities
1	Power (Instantaneous)	> 1.867 kW	3.75 kW
2	Energy Total	> 9.75 kW-Hr	11.0 kW-Hr
3	Energy Stored	>7.4 kW-hr	10.6 kW-hr
4	Electrical Enclosure	< 23" D x 48" W x 90" H, & Rodent Resistant	18.5" D x 57" W x 83" H
5	Rooftop Area	<26' x 31' Roof	13' x 24'
6	Voltage	120 +0-15 V AC	123.1 V AC
7	Circuit Protection	20 A circuits, 12 gauge wiring	Complies
8	Electrical Standards	LA County Fire Code, NEC 690	Complies
9	Life Expectancy	> 15 years	15 years (batteries), 25 years (panels)
10	Temperature	120 degrees F max --> 35 degrees F min	Complies
11	Wind	98.9 mph	191 mph (frame), 140 mph (panels)
12	Moisture	100% Relative Humidity (RH)	Complies

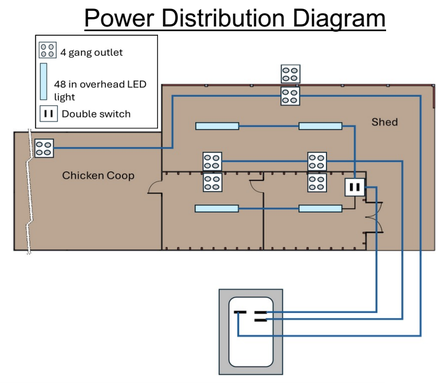




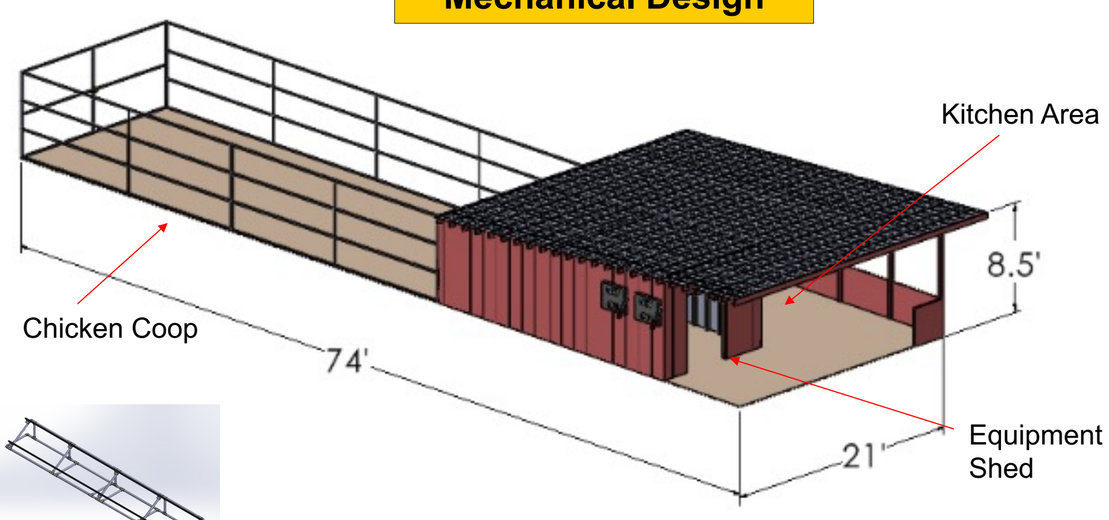
Electrical Design

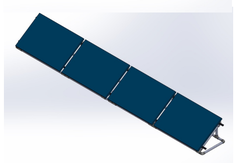


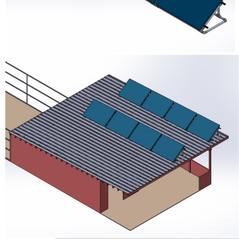


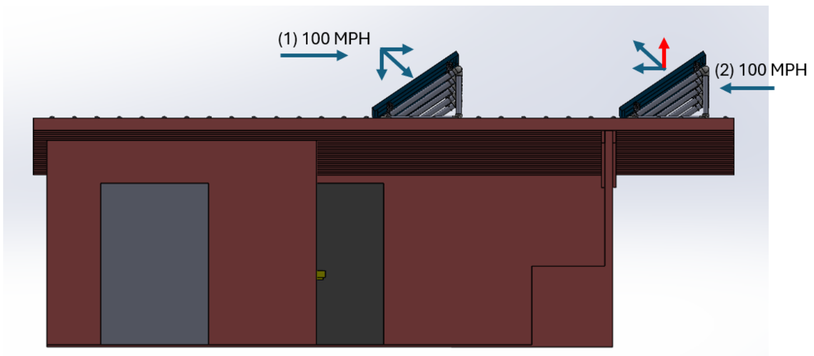


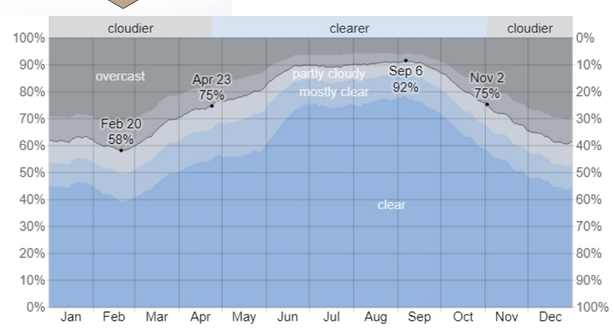
Mechanical Design

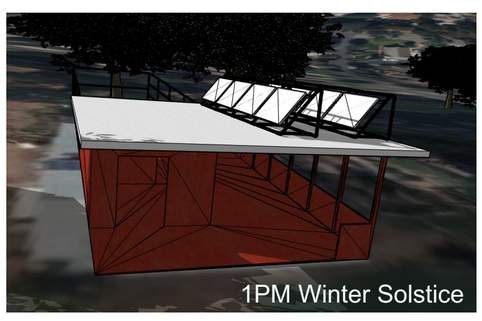




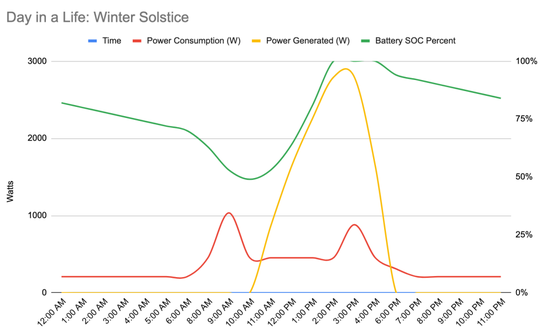


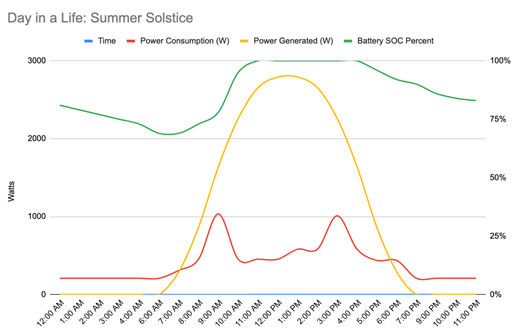





1PM Winter Solstice

Power Analysis

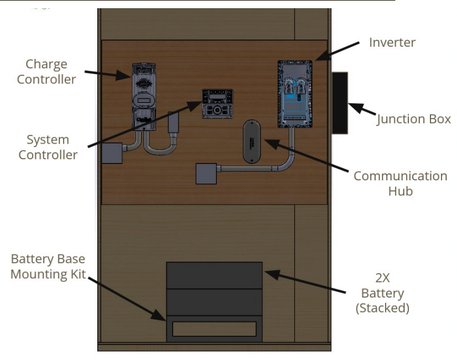




Fabrication & Assembly

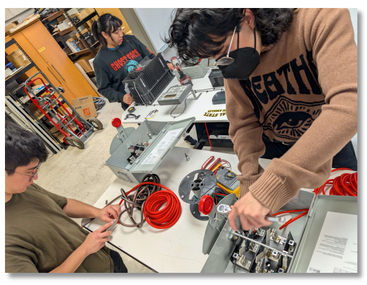

Electrical Cabinet





Power Panel



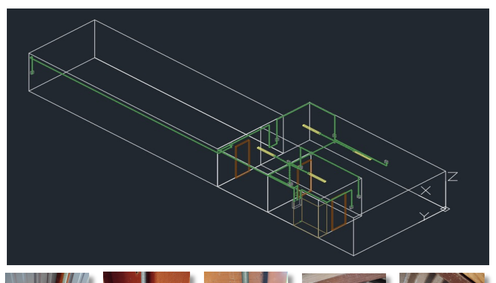







Combiner box


Emergency Cutoff Switches

















Conclusions

1. Design meets requirements
2. Learned to work together and built electrical system
3. Garden has a functioning 3kW solar power system