EML 4501 Summer 2021 – Group 6

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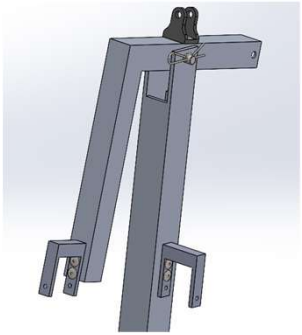
Sunflower Solar

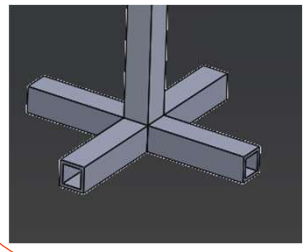
Abstract and summary of functionality

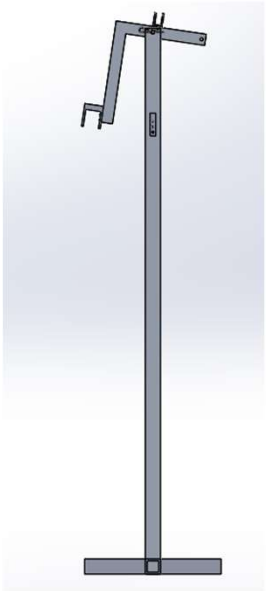
- Sunflower Solar is a single heliostat module featuring a dual axis motion system controlled by two DC motors driving two power screws suspended on a monopod structure. The monopod structure and dual axes of motion allows for all heliostats in the array to follow the path of the sun and redirect sunlight towards a central receiver throughout the day given their wide rotational range of motion. The heliostat is comprised of an anodized aluminum surface, aluminum honeycomb substructure and corrugated plastic substructure. This system has a reflectivity of 90% and allows for a lighter more durable alternative to other mirror finish surfaces.

Rendering of Support and implantation into ground system

- Buried monopod construction for the support system implanted into ground 1’ deep with 4x 4” long supports in a cross configuration.

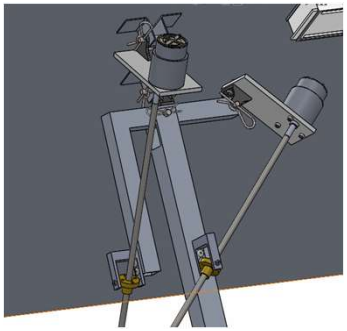






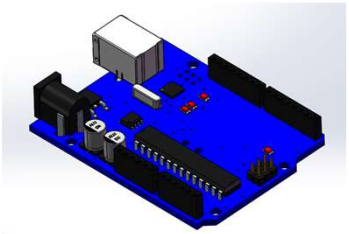
Motion System

- Two power screw assemblies driven by gear box DC motors to allow for two perpendicular axes of motion.



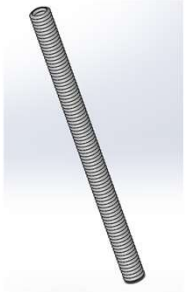
Computer system

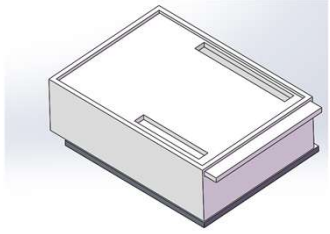
- Arduino Uno computer control system
- Max Operating Temp: 85°C > Actual Max Temp: 72.5 °C
- Signal Radius: 366m



Waterproofing system

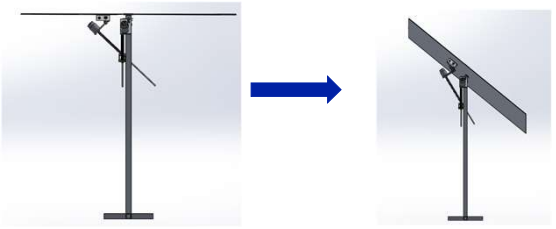
- Protective silicone bellows for the power screw assembly
- Protective ventilated case for the computer system





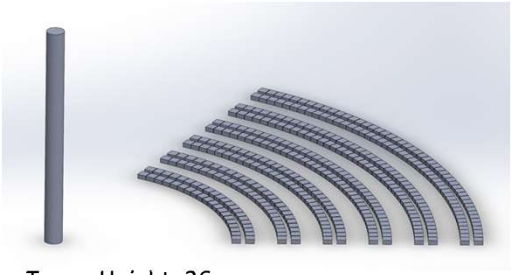
Protective Operating Configurations

- Failure in inoperable winds speeds of 118 mph
- Continued operability in windspeeds up to 56 mph
- Strongest gusts recorded at 90 mph for Las Vegas, NV



- Transition from operable to safety configuration

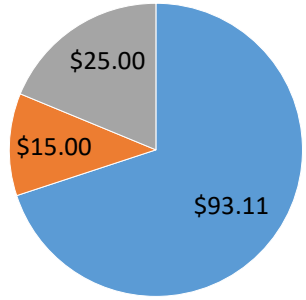
Solar Array Layout



- Tower Height: 26m
- Range of Rows: 20m to 46.5m radiating 60 degrees out and north of the central receiver
- Number of Heliostat Modules: 417
- Size of receiver: 0.136 m^2
- Solar Concentration ratio:2386.82
- Power Output: 1.036 MW

Cost Summary

- Total Cost: $133.11



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