System Specifications

Our philosophy is that we would like to under promise and over deliver. The faculty are the ones grading us, so we have thought about and refined our desired specifications.

# Budget

* $500 maximum. This most certainly will not cover a full system. However, because we agreed that a prototype will be our minimum deliverable, this should be sufficient based on preliminary research.
* The department allots us a maximum of $100/person. If we get funded through the school, they keep everything that we purchase. However, we can still deliver all of our documentation and source code.

# System

* We fear that we will not have time to develop the full-up system with a full-sized panels along with full system integration testing. While we may make it there, we do not want to agree to this is a specification as our faculty will expect this come next December.
* We propose that we will design, test, and implement a scaled model for the full system. This system will abide by all system specifications and be self-sufficient. I.e., we will design a system that will power itself to prove that our design is feasible.

# Tracking Accuracy:

* For tracking accuracy, it will be tremendously difficult (we think) to determine how accurate we are. E.g. “tracking accuracy of 3°”. We would probably have a hard time with setting up a reference/truth to compare against to determine how accurate we actually are.
* We propose that our system will have 2° of resolution (both azimuth/elevation). This is essentially tracking “accuracy”, however we will be able to measure this much more readily by affixing a laser pointer and measuring a single step of a stepper motor to determine absolute Δθ.

# Maximum Power Draw

* We propose that our prototype will have a maximum power draw of 10W during peak operation.

# Position Update Period

* It is not practical or power efficient for our system to continuously update throughout the day as the sun will not be moving across the sky very fast.
* We propose that we will put the system to sleep, and periodically update the panels orientation every 5 minutes. (We are considering OpenCV, as well as testing other methods, so we may change this if we gain same/similar performance out of longer/shorter sleep times)

# Energy Storage

* We will find an “optimal” method for storing energy and proving that our system can re-orient itself while it is not producing power from the cell array. This will consist of 12v marine/car/motorcycle battery, or possibly something cheaper if this is over-kill.

# Tracking Axes

* We will test single-axis tracking as comparison for our grade. But, we will be delivering a dual-axis tracking system.

# System

* We will provide a full system on a single platform. This will be for command/control, however we may need to design a PCB/peripherals to connect to this development board.

# Wired User Interface

* We will utilize Ethernet for all communication to any interface you have in mind.

# Configurability

* It will be possible to reconfigure the system with a laptop. However, considering it will be connected to your network, this will probably be possible through SSH as well.

# Open-Source

* This system will be developed and maintained through GIT

# Mechanical Locking

* The locking system will be passive, thus there will be no power required.

# Power Source

* This system will be fully self-contained. While we may use convenient power source for testing, the final system will power itself.

# Data Logging

* The position/power will be logged in a database. We are considering local logs as well as sending them to wherever you prefer.
* Data can be gathered via REST
* Format: Time, Day, Power, Heading, Azimuth, Elevation
* Let us know if you would like a different format as well as anything you would like to make a requirement/stretch goal.

# Mount

* Pole mount

# Scalability/Documentation

* We will provide full documentation so that the system is easily up-scaled

Stretch Goals

# Wind Load

* Wind sensor for safely orienting panel. 70mph continuous, 120mph 3 second gust.

# Full Scale System

* Integrating and testing a full-scale system