HELIOWATCHER

Automatic Solar Panel Control & Data Analytics

Jeremy Blum · Jason Wright · ECE 4760 · Spring 2012

Project Goal

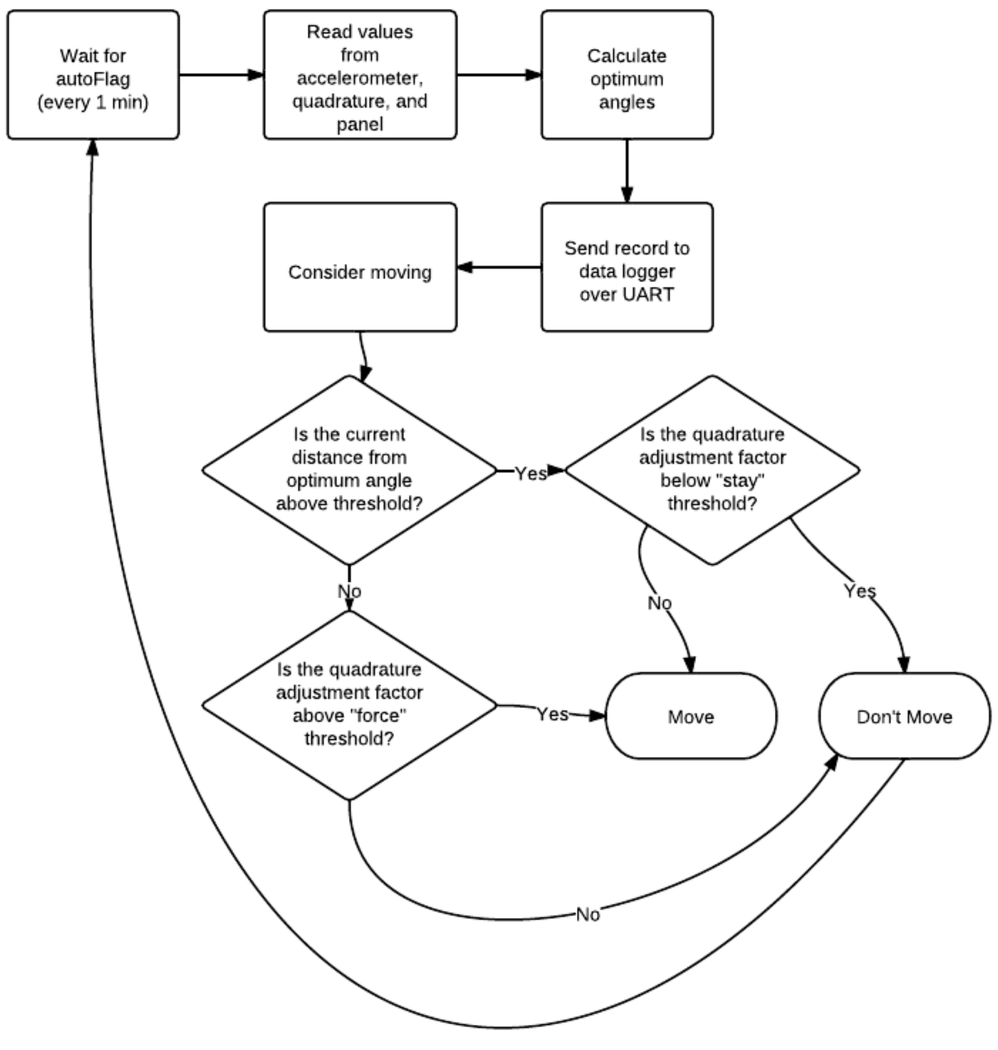
The **HelioWatcher** is a platform for performing advanced and adaptive solar power tracking to facilitate the development of improved geo-specific solar panel positioning.

HelioWatcher Features

- Algorithmic determination of optimal solar positioning using GPS
- Real-time shading response & long term shading tracking using light-sensing quadrature
- Data logging & real-time display
- Automatic rotation & tilt mechanisms
- Extensible User interface for interacting with 3rd party applications

Embedded Software

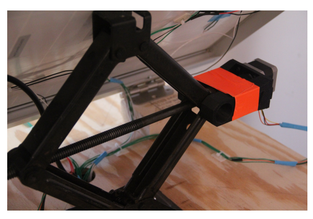
- Calculates optimum positioning in real time
- Sends commands to stepper motors for positioning
- Communicates with external data logger
- UART shell interface allows easy user control for testing, debugging, and analysis, with over 30 available functions



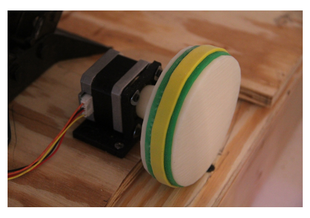
Program operation in real-time data logging mode

Hardware

40W Solar Panel



Actuated Car Jack



3D-Printed Wheel

Mechanical

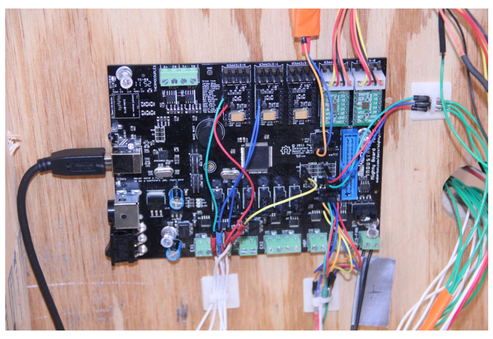
Tilt: Stepper Motor, 3D-Printed Collar/Brackets, Car Jack

Rotation: Stepper Motor, 3D-Printed Wheel/Bracket, Lazy Susan

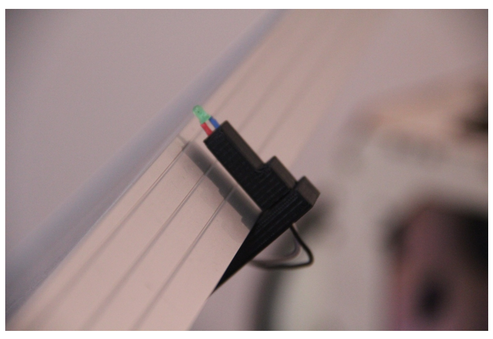
Electrical

GPS, 3D Magnetometer, 3D Accelerometer, LED Light Sensors, 3D-Printed Brackets & Covers

System Control: "MightyBoard" Motherboard (ATMega1280 + 8U2) and Stepper Driver Daughter Boards

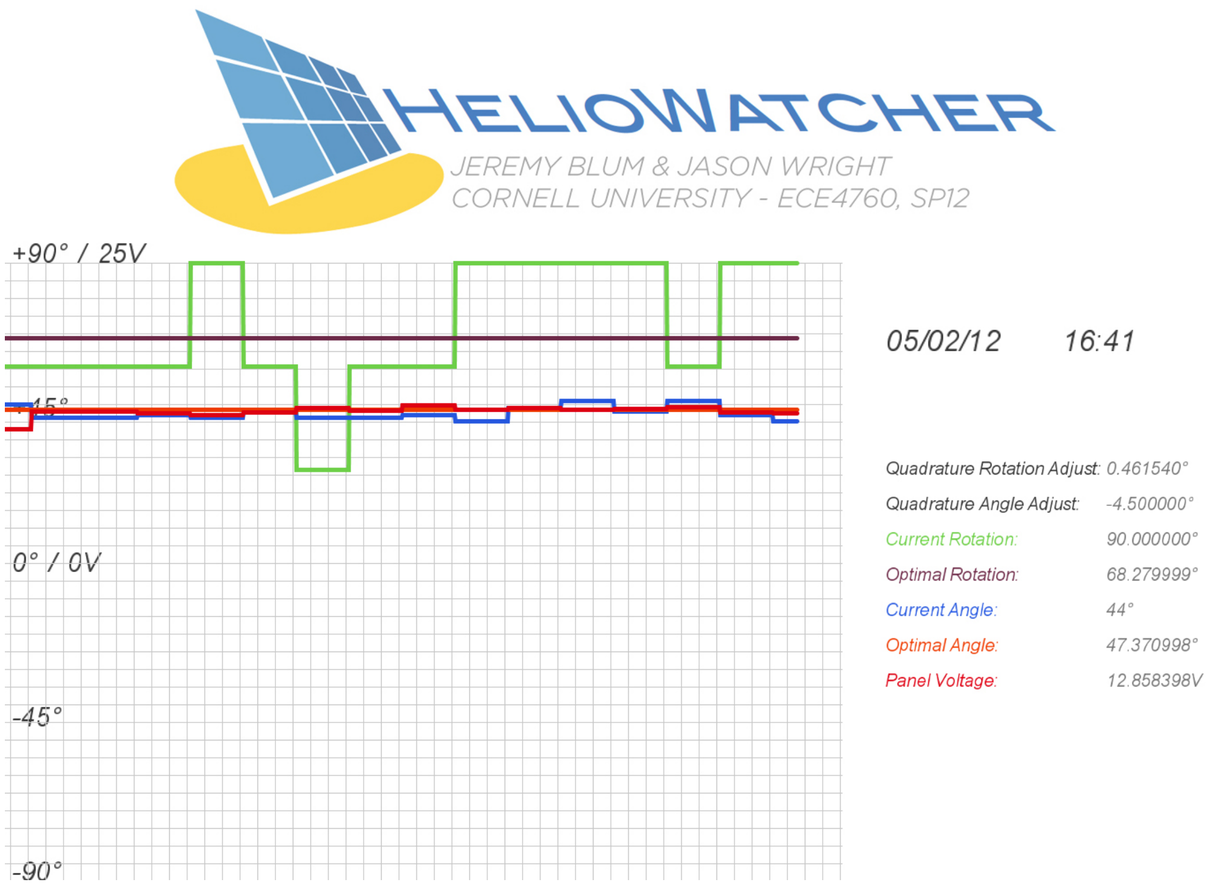


MightyBoard



LED Light Sensor

Data Logging & Desktop Software



Desktop software displays real-time data and logs stats to a CSV file for later analysis

Acknowledgements & Resources

- Bruce Land & the ECE 4760 Staff
- AVRLib by Pascal Stang
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- Libelium for their GPS Module & Tutorial
- Astronomical Coordinate Calculation Info from Case Western University
- David Howard for his GPS Parsing NMEAP Library
- Professor Goldstein of Providence College's Sun Position Approximation Script
- Allie Riggs for logo design

More Info… *www.heliowatcher.com*