Sun Tracking
Solar Panel
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Objective

Our project’s goal is to improve the efficiency of solar panels by allowing them to follow the sun using dual axis solar tracking.

Requirements:

- The panel must utilize the photoresistors to be perpendicular +/-10° to the sun at all hours of the day.
- The panel must generate and store power in a battery used to power its functions, while still producing at least 15% more net power than a stationary solar panel.
- A stream of data containing the power generation and efficiency of the panel must be generated and sent to a mobile app which will display live graphs and data.
Our Solution

- A solar panel which rotates to face the sun
- Detects the sun using photoresistors, not requiring any setup
- Sends solar panel voltage, current, and power production to a phone application
- Phone application can turn off sun tracking
Challenges faced

- MCU arrived extremely late
- First power chip showed up broken
- Voltage regulators burnt out
- Shorted the first MCU
  - Desoldered an MCU of of a RedBoard
- MCU would not program properly
  - Decided to use a RedBoard as our primary microcontroller
- Motor driver burnt out
- Tilt motor not strong enough
Changes made

- Redboard instead of MCU
- Photoresistors and wifi chip on separate breadboard
- Using Redboard instead of motor driver
- Used perfboard for voltage regulators
  - Voltage divider for 3.3
- Different power chip
- Phone application instead of web application
- Taped photoresistor shading flaps
Final Circuit Design
Sun Tracking Implementation

- Voltage across photoresistors decreases in low light levels and increases in high light levels
  - Can be measured with microcontroller
- Motors are moved in the direction that makes photoresistor voltages closer to each other
- At the optimal angle, voltage across photoresistors is close to equal
Mobile App

- Uses Blynk app and API
- TCP/IP protocol and AT commands to connect to WiFi network
- User connects to same WiFi network as the module
- Remote control and auto tracking button toggles
Results

- Can track light along the horizontal axis but not the vertical axis
- Theoretically it would increase power production
- Accurate graphs displaying power generated by the solar panel were able to be seen on the mobile app
Future Work

- Fix tilt motor
- Test over a whole day alongside a stationary panel
- Get everything on a singular PCB
- Optimize photoresistors’ shading flaps
- Implement Maximum Power Point Tracking
  - Our charge controller uses PWM
Thank you!