Lunar ROADSTER

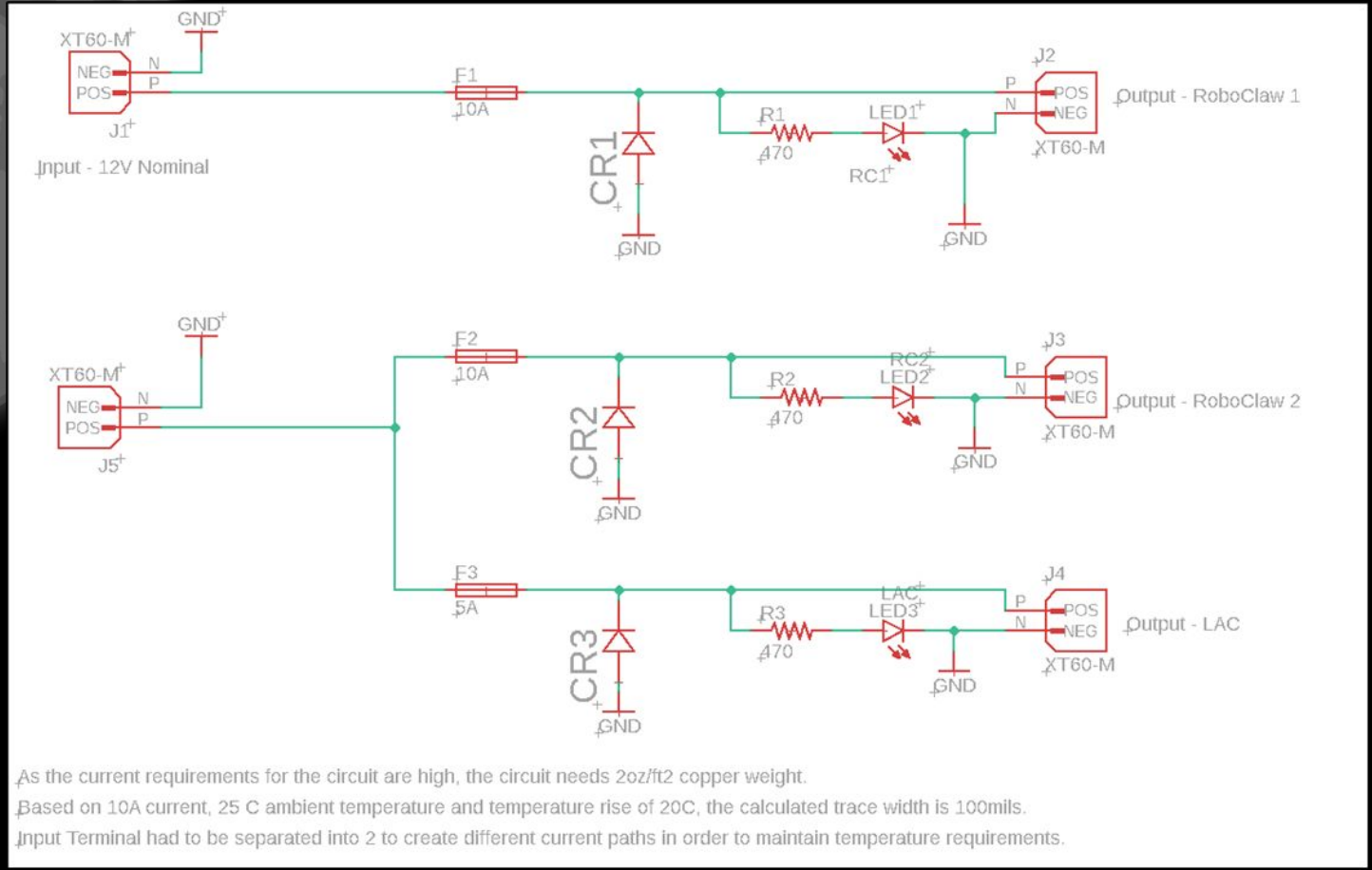
(Robotic Operator for Autonomous Development of Surface Trails and Exploration Routes)

"Starting with a foothold on the Moon, we pave the way to the cosmos"

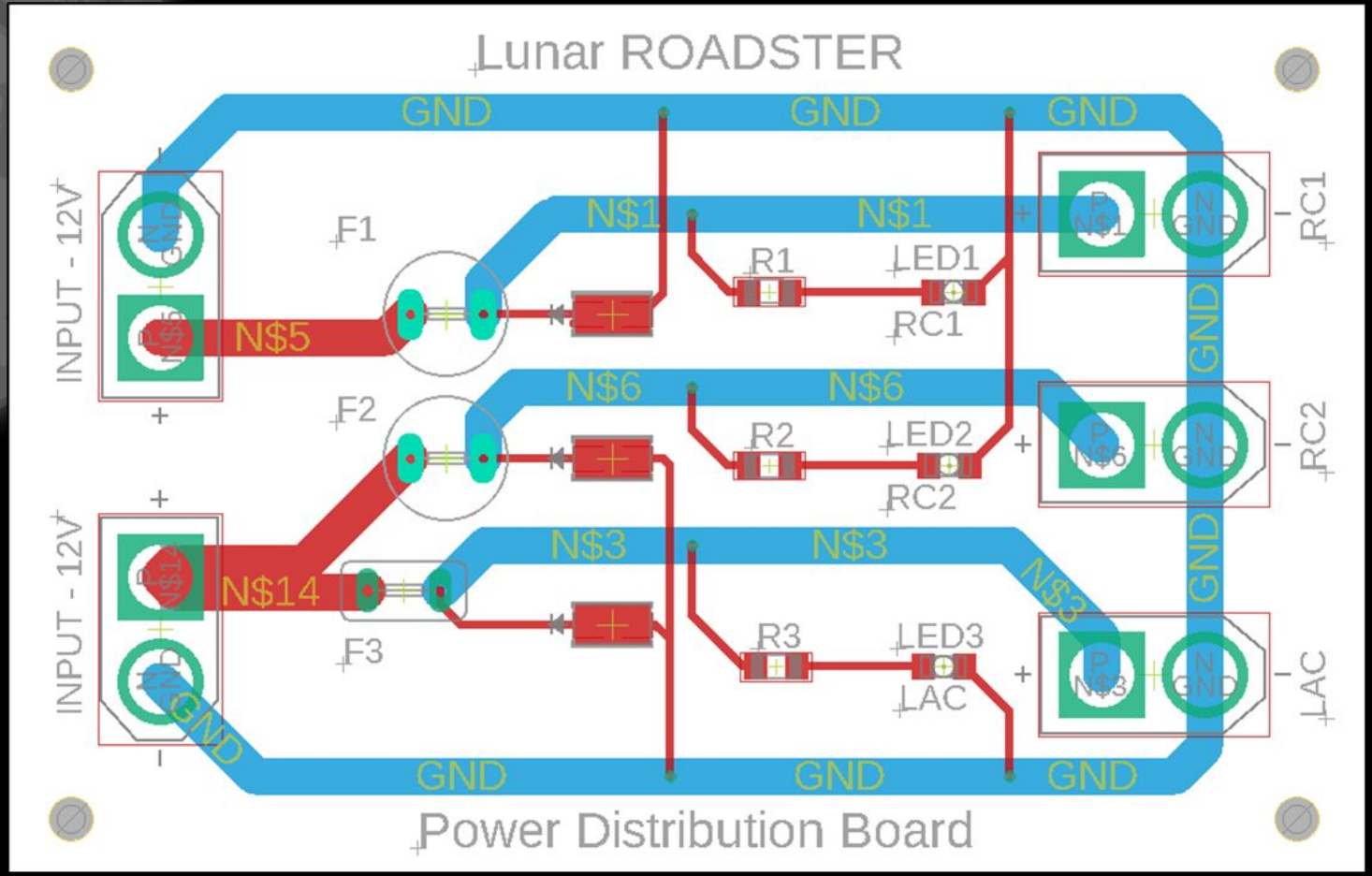
Board Purpose

- Power Distribution Board for Lunar ROADSTER
- **Primary Purpose:** Supply electrical power to all actuator drivers onboard the rover from the batteries and step-down converter
- **Secondary Purposes**
  - **Over-current protection:** Protect the actuator drivers from high currents caused by stalling actuations – implemented using fuses.
  - **Reverse-voltage protection:** Protect the system against reverse voltages that could cause component damage - implemented using diodes
  - **Power indication:** Indicate whether each actuator driver is getting power - implemented using LEDs.

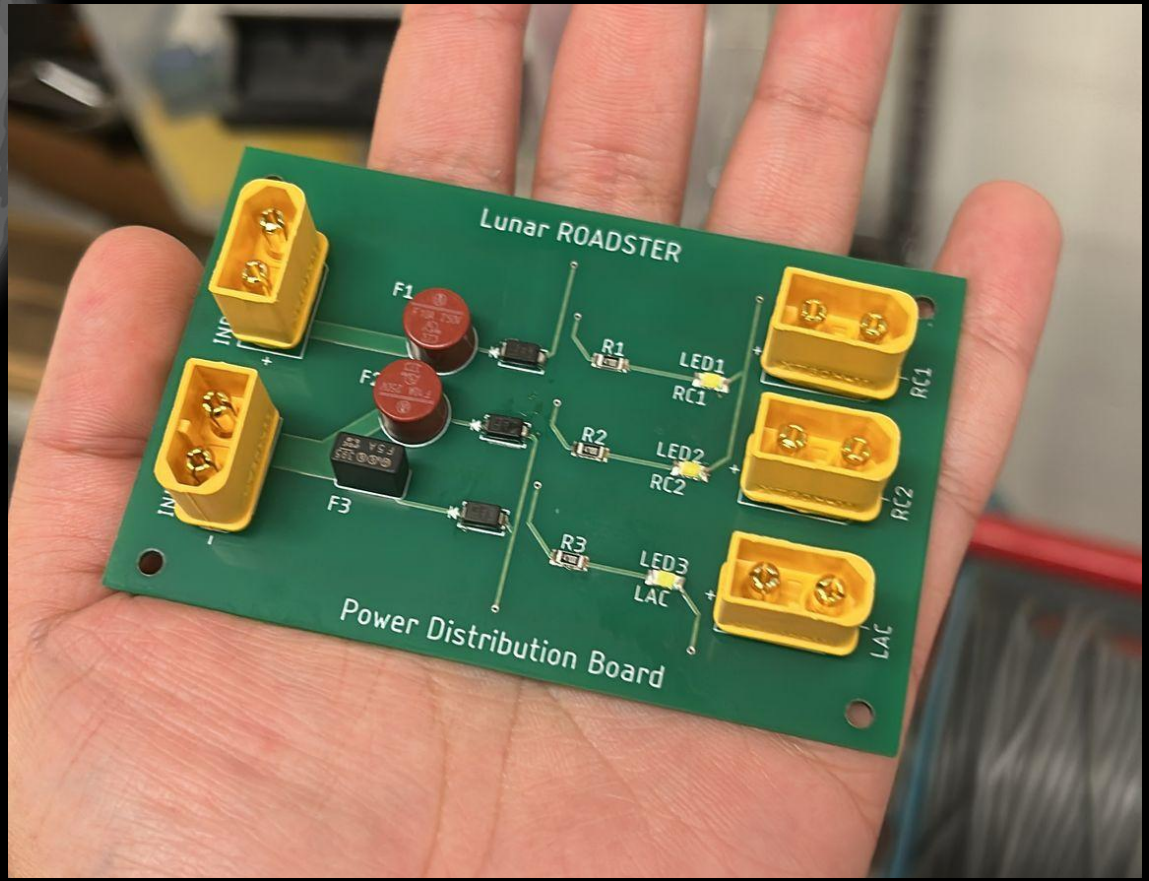
Board Schematic



Board Layout



Manufactured Board



Challenges Faced

- **High Current Requirements**
  - System requires up to 30A of current from the batteries.
  - **Problem:** High currents cause extensive heat generation that could melt the traces on the PDB. No on-board DC-DC converter available for such high current requirements
  - **Solution:** Dissipate enough heat from the board to facilitate the current requirements and use an off-board DC-DC converter
  - **Implementations:**
    - Used a *VHK200W-Q24-S12-DIN* DC-DC converter (integrated heat sink)
    - Used 2 oz/ft^2 for the high current trace widths
    - Created 2 inputs to PDB from the batteries to split the current into multiple traces
    - Left ample space between the high current traces to eliminate heat concentration at any location