Portfolio

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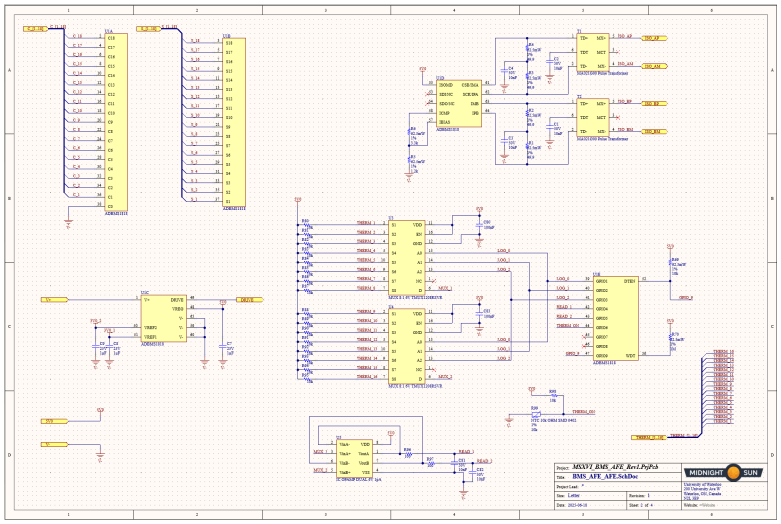
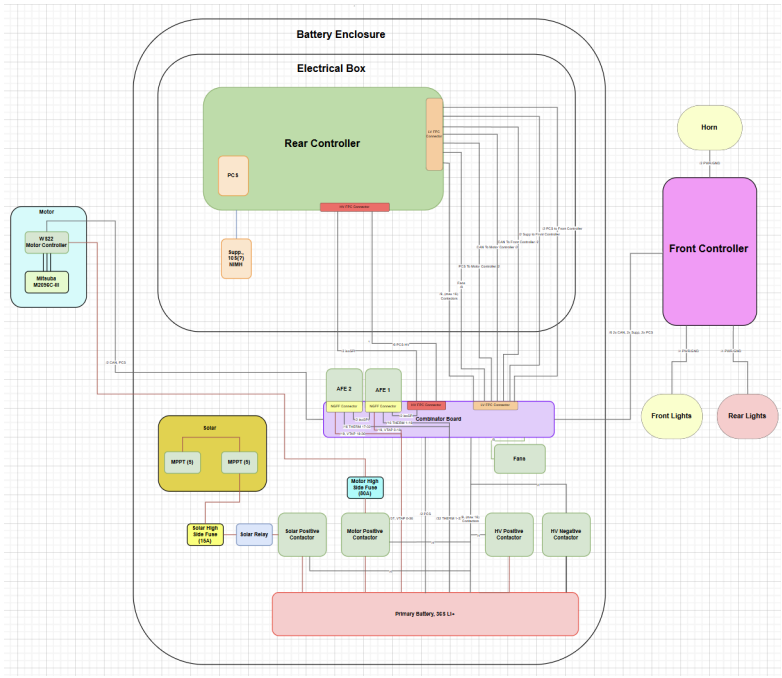
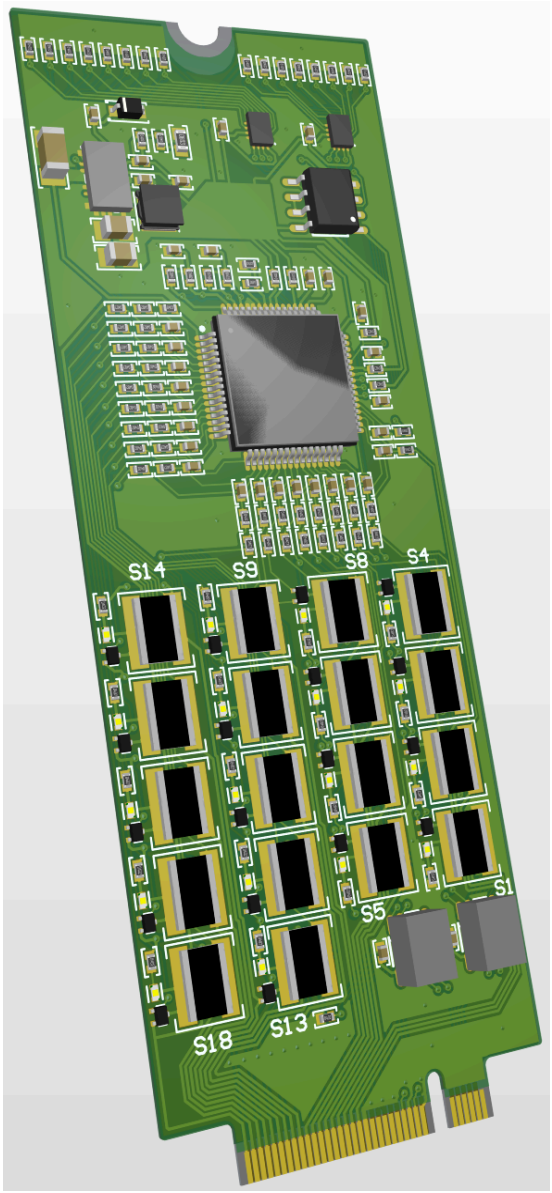
Analog Front End PCB



ADBMS1818 IC Schematic



MS16 High Level Electrical Architecture



3D Model

- Designed the Analog Front End (AFE) board for the new custom Battery Management System of MS16, Midnight Sun's future 2026 solar vehicle, responsible for measuring voltage/temperature and balancing battery cells
- Imposed strict limitations of a 2 layer, 30mm x 80mm x 0.8mm board to optimize cost for factory assembly
- Optimized the previous (MS15) AFE design, increasing balance discharge current from under 30mA to 200mA
- Expanded the amount of cells managed per board from 12 to 18, decreasing the number of AFE boards from 3 to 2
- Used an edge connector (M.2) to eliminate the reliance on wires/harnesses which cause frequent issues in MS15
- Reduced board size by 60%, allowing for better space management within the battery box of the vehicle
- **Full Design Documentation, Schematic and PCB files available here**

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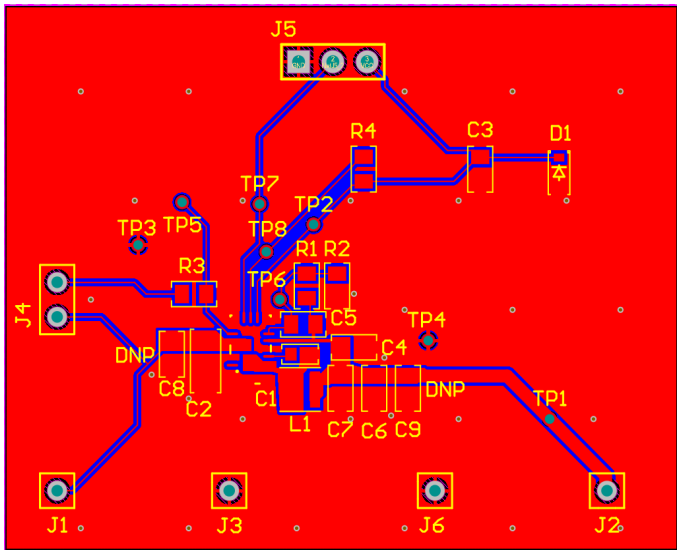
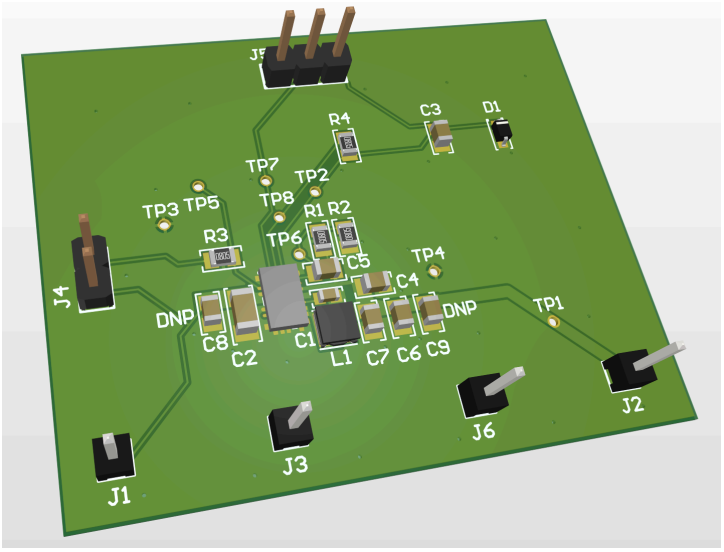
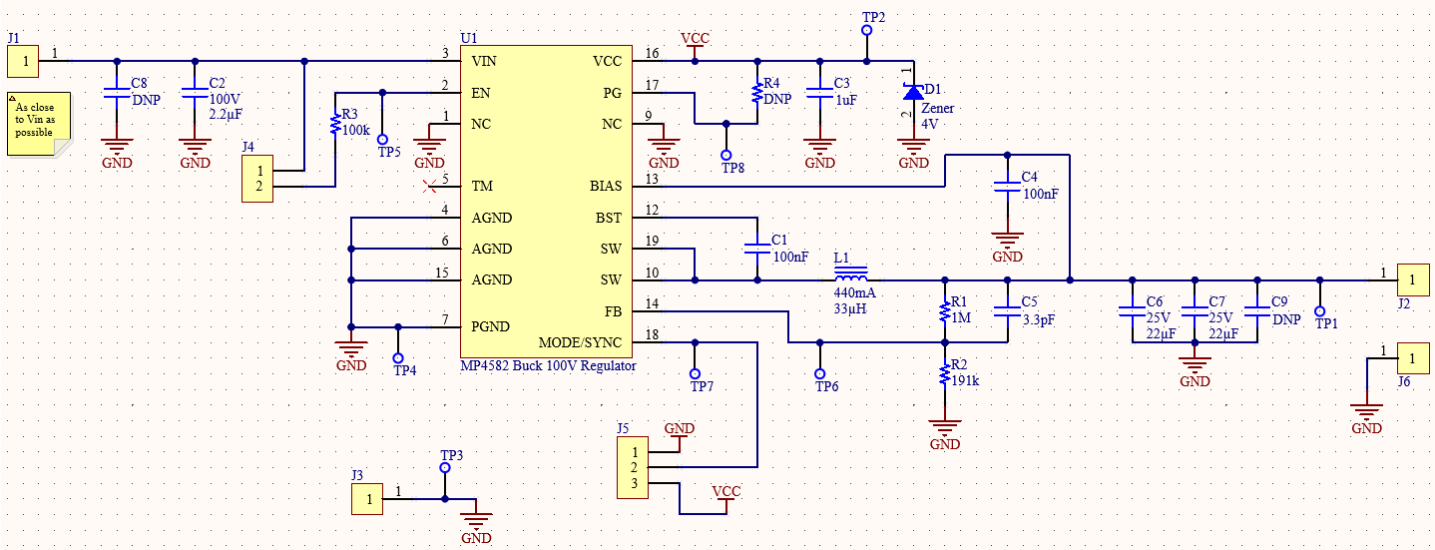
Buck Regulator Test PCB



PCB Layout



3D Model



Schematic

- Designed a test board for the Buck Regulator IC circuit used in my MS16 Analog Front End PCB design
- Implemented 5 external connectors to allow for the simulation of different application environments the component will face when implemented in the solar car
- Placed additional “DNP” footprints to allow for testing with different values of input and output capacitance
- Fully assembled the board and ran pre-planned tests to ensure the component was performing optimally for it’s planned implementation within the Analog Front End
- **Design Document, Schematic and PCB files available** here

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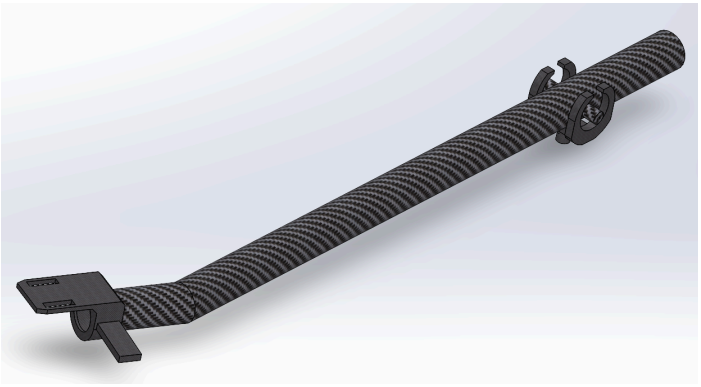
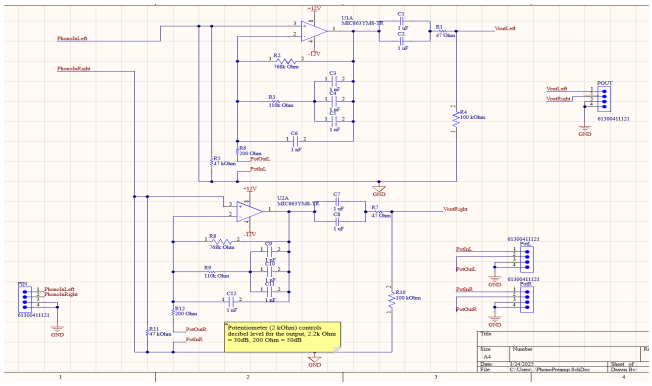
Turntable Design - In Progress



Tonearm 3D Model



Phono Preamp Schematic

- Engineering a functional, affordable and open-source turntable from scratch to increase the hobby's accessibility
- Designing Phono Preamp, Motor Driver and Power Supply PCBs with the ability to interface with a common microcontroller, enabling full control of motor rpm and preamp signal output level through rotary encoders
- Modeling the Tonearm and external casing, ensuring vinyl protection through an adjustable force balance system and enhancing sound quality through minimizing signal interference within the electronic components and isolating/encasing sources of vibration
- **Design Document available here and project files available here**

FPV Drone Design

Photo of the drone mid-assembly

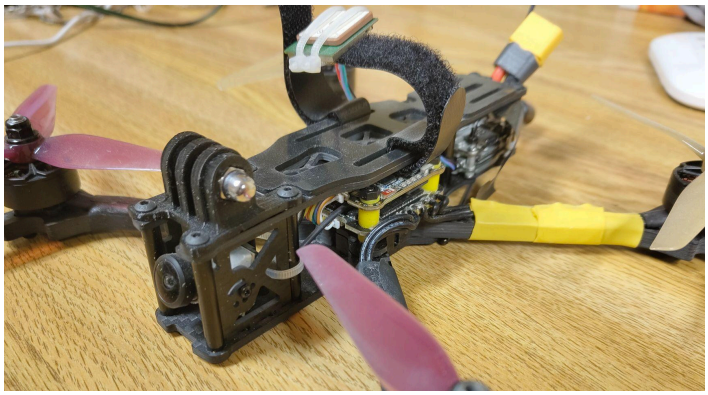


Photo of the completed product

- Designed a custom FPV drone from components to improve my knowledge of electrical systems and assembly, as well as provide an affordable and repairable alternative to the monopolized consumer UAV market
- Researched components to ensure compatibility with one another and tuned the drone to be able to achieve acrobatic goals and speeds of over 100km/h during the first flight test
- Learned electrical skills such as soldering, harnessing and multimeter use in order to safely assemble the final product and test vital connections to prevent against dangerous faults such as short circuits
- **Project documentation available here and flight video available here.**