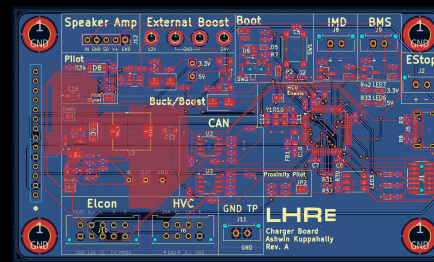# Ashwin Kuppahally

Engineering Portfolio

LHRE
Ashwin Kuppahally
Battery Management Board
Rev A.

Speaker Amp External Boost Boot IMD BMS
GND Pilot EStop
Buck/Boost CAN
Proximity Pilot
Elcon HVC GND TP LHRE
Charger Board
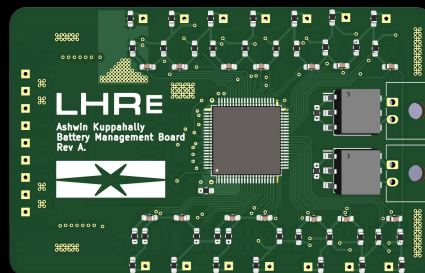Ashwin Kuppahally
Rev. A

Electrical and Biomedical Engineering
The University of Texas at Austin, May 2028

25kW Automotive Inverter

- Developed a custom 3 phase motor inverter for an electric car hub motor
- Designed custom gate drive, current sense, and isolated power circuitry to switch silicon carbide FETs
- Optimized HV electronics with DC link capacitors, bleeder resistor circuits, and interleaved power planes for stability
- Implemented HV safety through discharge circuit and physical isolation
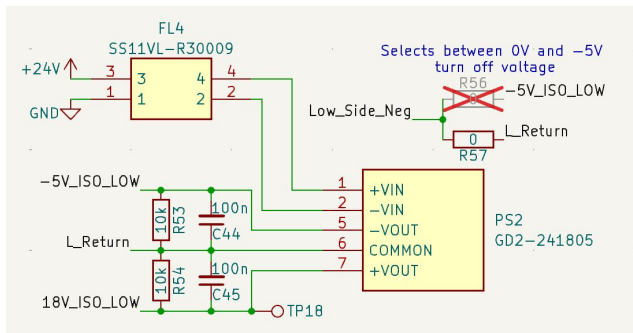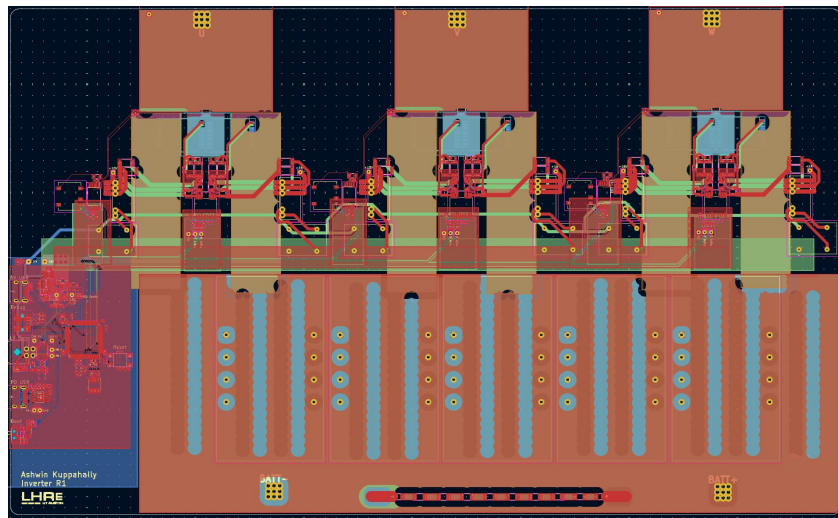

Isolated DC-DC Converter
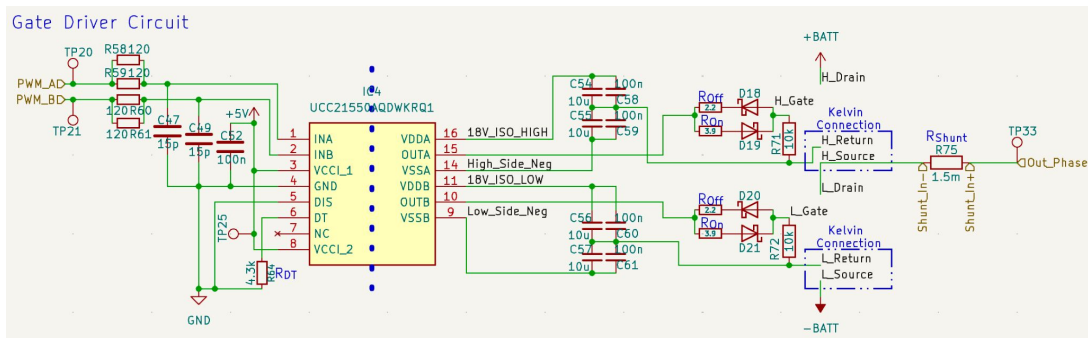
Low Pass Filter Circuit for Voltage Reading

Battery Management Board

- Developed circuitry for Tesla ADBMS chip
- Created low pass filtering circuits to accurately read lithium cell voltages
- Designed isolated communication system via IsoSPI, using transformers to ensure a physical isolation boundary
- Implemented temperature safety system with thermistors to monitor each cell
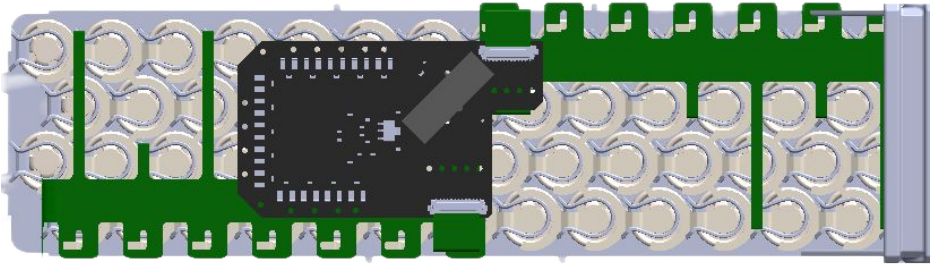

Board in Battery CAD Assembly
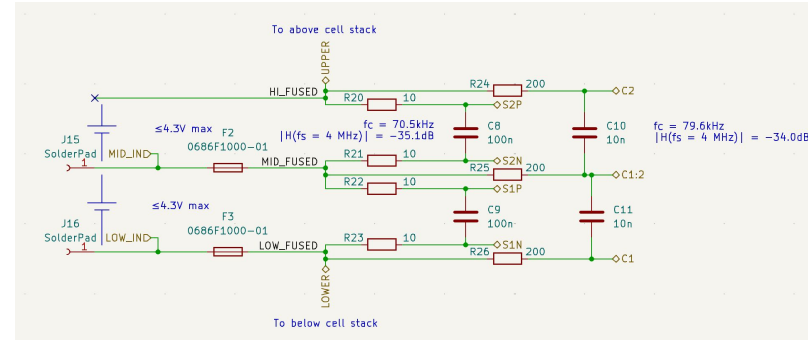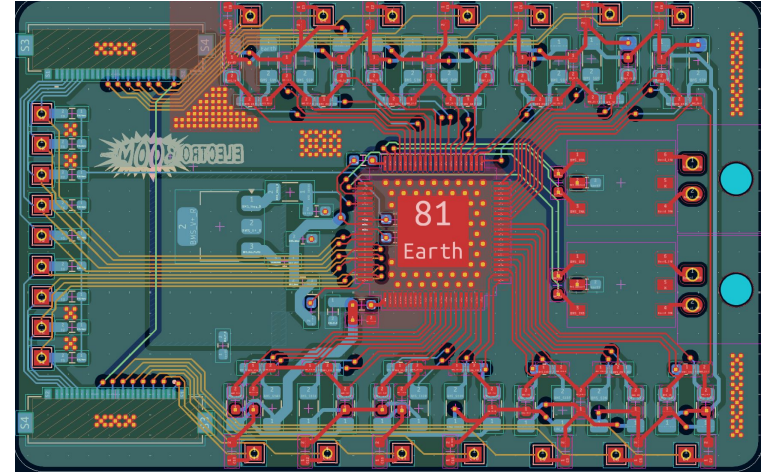
Low Pass Filter Circuit for Voltage Reading and Discharge
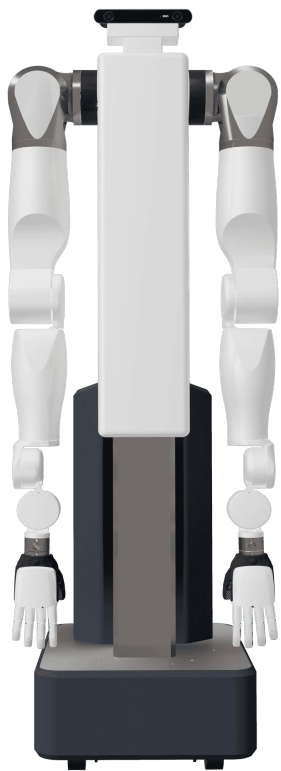
Feather Robotics

- Designed power control PCB in Altium
    - Consolidated power delivery electronics into centralized board
    - Monitored current and voltage of all subassemblies with TI chip, scanned for failures, reported data through CAN
   - Focused on efficiency of power electronics, signal integrity, and space constraints
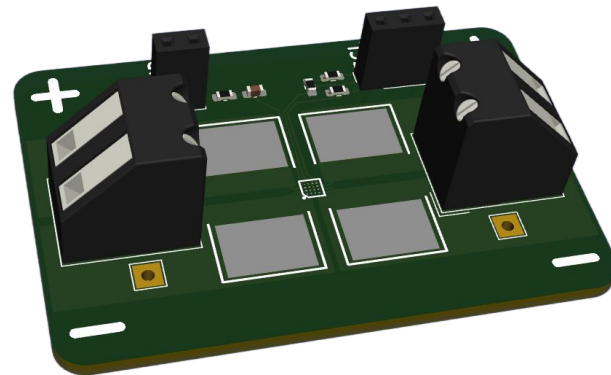
Simple tester board for current sense validation.
Not the main board I designed due to confidentiality.

Feather Robotics

- Created UL-compliant electrical safety architecture
    - Defined interconnects, shutdown system, breaker and shunt placement
    - Specced wire harnessing for current needs
    - Reduced wiring complexity by 30%
- Setup Turnkey PCB Production
    - Revised BOMs and reduced production cost by 50%
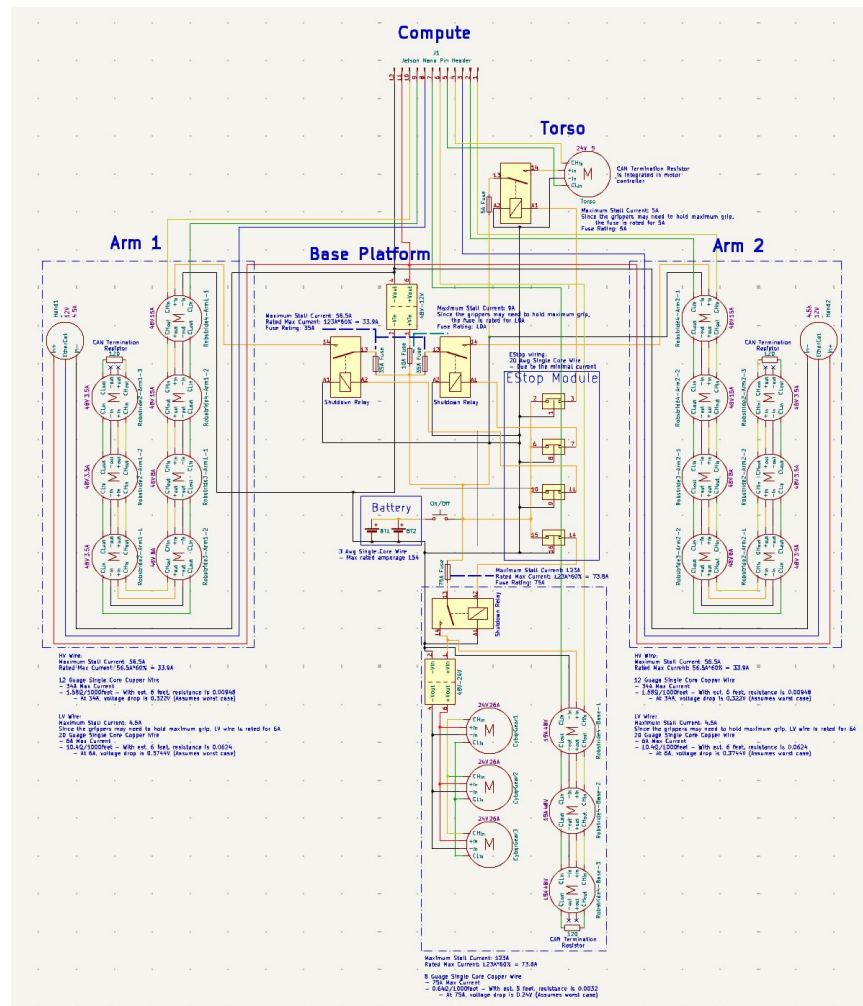
Longhorn Racing

- Designed PCB for charging 600V electric racecar battery
    - STM32 firmware for CAN/SPI communication with BMS
    - Custom boost/buck converters achieving 98% efficiency
    - Developed battery safety systems and shutdown loop
    - Implemented the J1772 charging standard
    - Tested prototypes with oscilloscopes and did PCB rework to fix issues
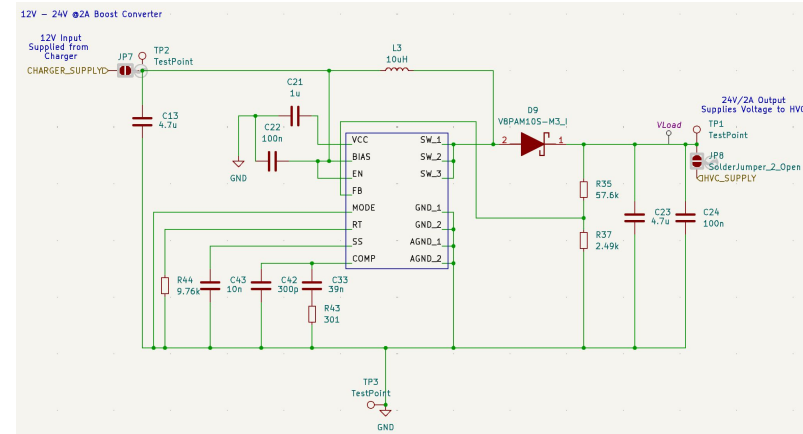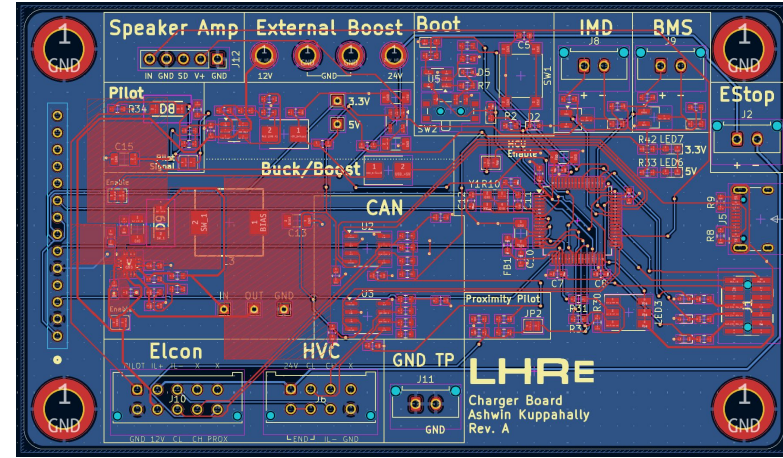
Custom Boost Converter Circuit

10X Genomics

- Designed PCB in Altium for optical sensor testing
    - Controlled optical motor assembly over CAN
    - Precisely controlled high-current LEDs with luminosity feedback sensors
- Diagnosed issue on production board affecting 10% of instruments
    - Conducted PCB rework to find and fix issue
    - Helped firmware and field engineering teams implement fixes

Resume:
ashwink.org/resume