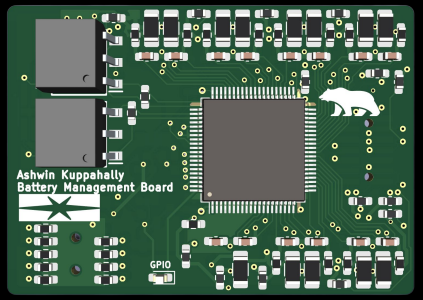
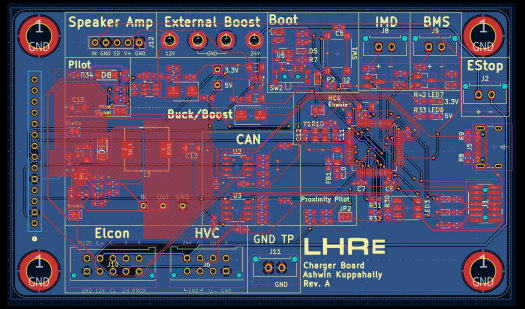


Ashwin Kuppahally

Engineering Portfolio

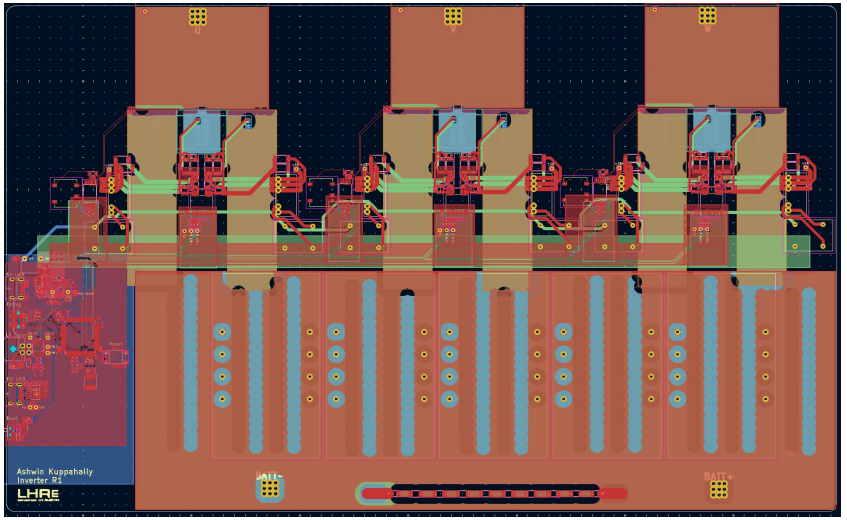


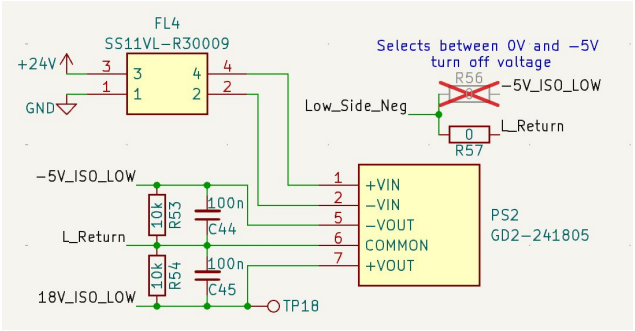


Electrical and Biomedical Engineering
The University of Texas at Austin, May 2028

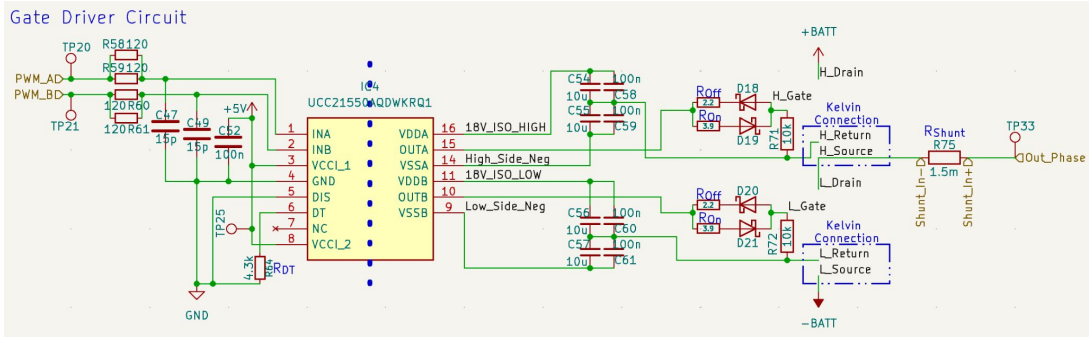
25kW Automotive Inverter

- 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





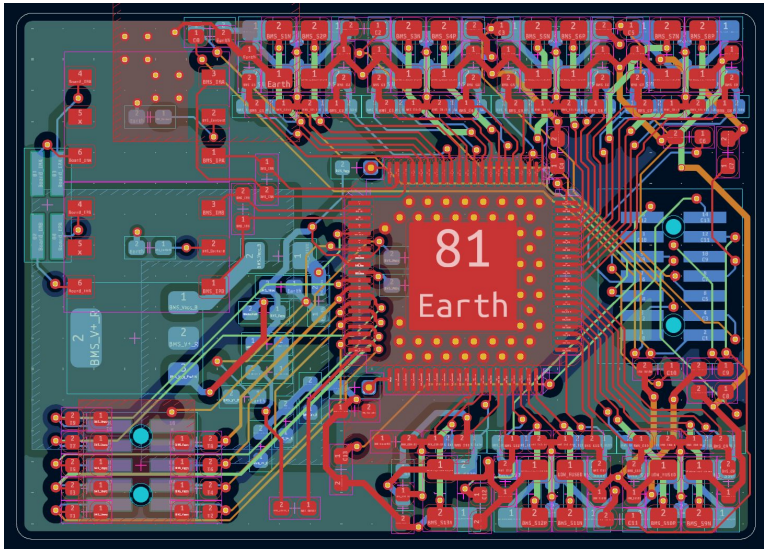
Isolated DC-DC Converter

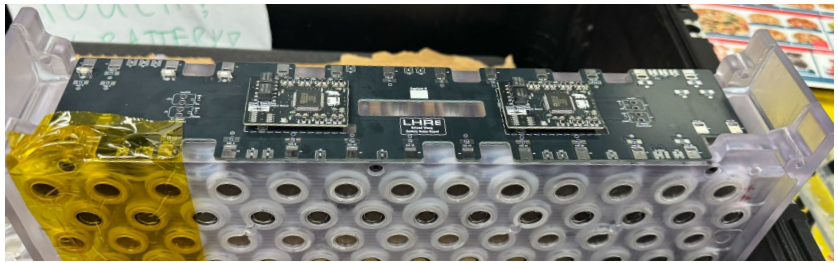


Gate Drive Circuit

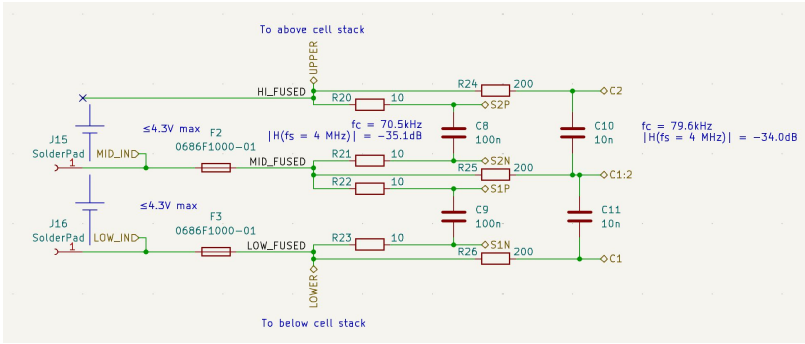
Battery Management Board

- 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
- Decreased board footprint by ~50% (compared to COTS)

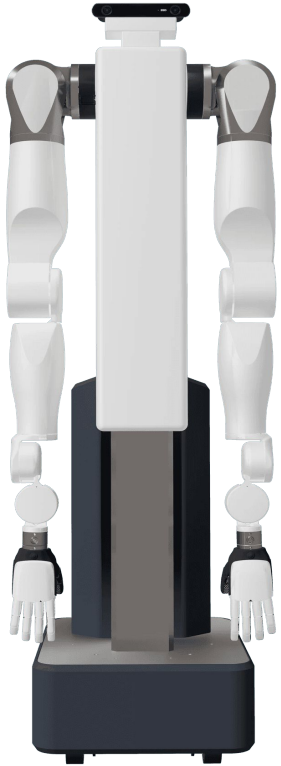




Board in Battery Segment

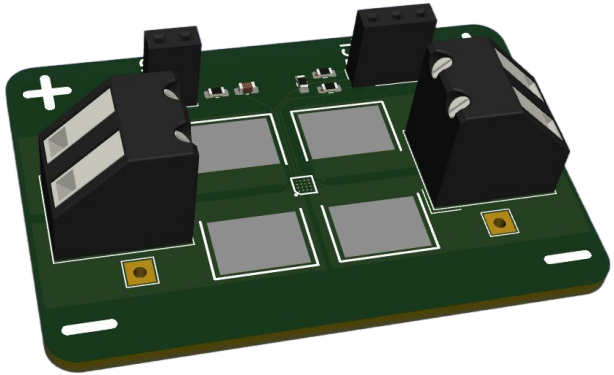


Low Pass Filter Circuit for Voltage Reading and Discharge



Feather Robotics

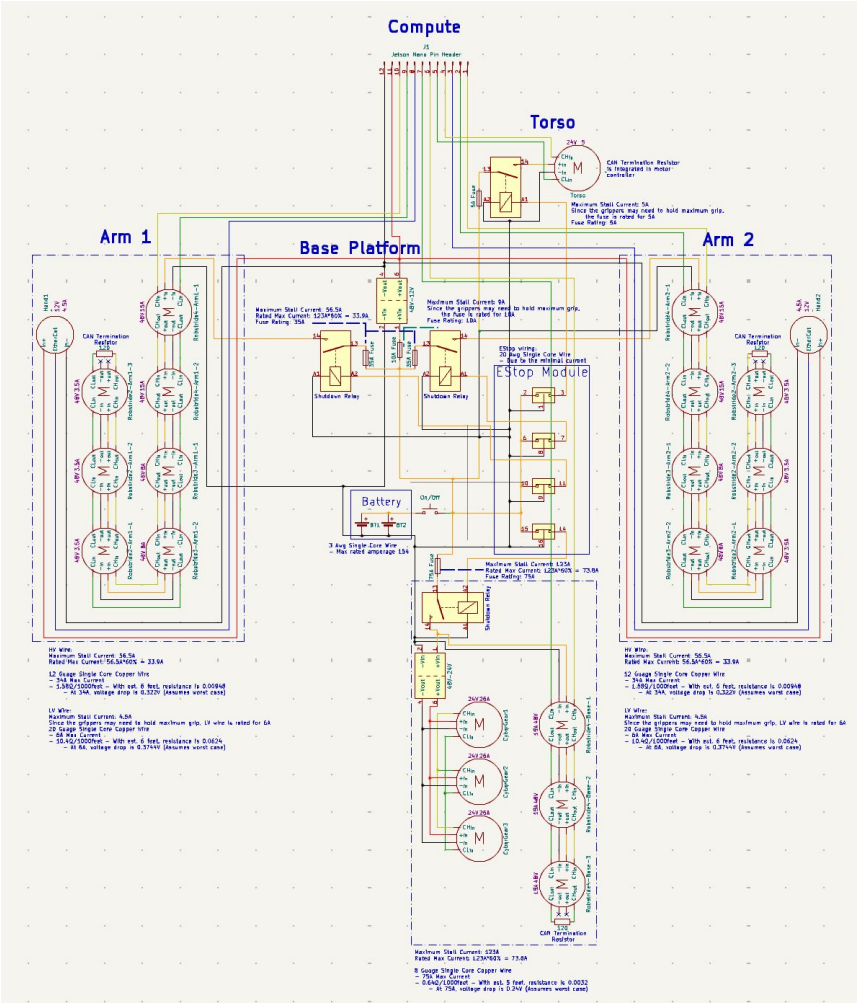
- Designed power control PCB in Altium
  - Consolidated power delivery electronics into centralized board
  - Monitored current and voltage of all subassemblies with TI chip, scanned for failures, reported data through CAN
  - Focused on efficiency of power electronics, signal integrity, and space constraints



Simple tester board for current sense validation.
Not the main board I designed due to confidentiality.

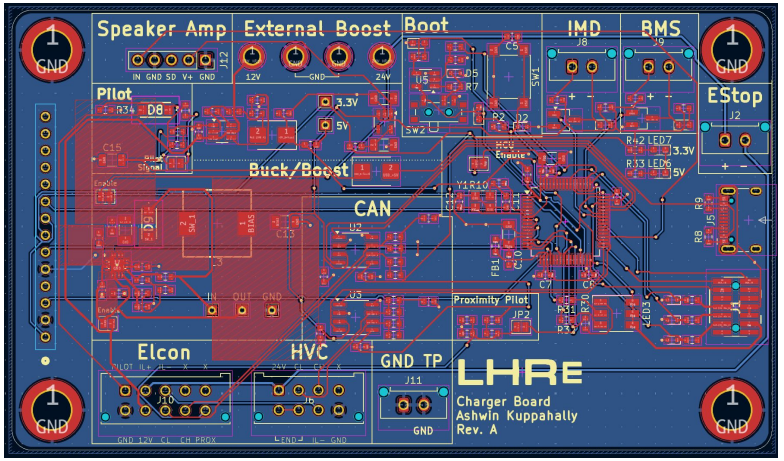
Feather Robotics

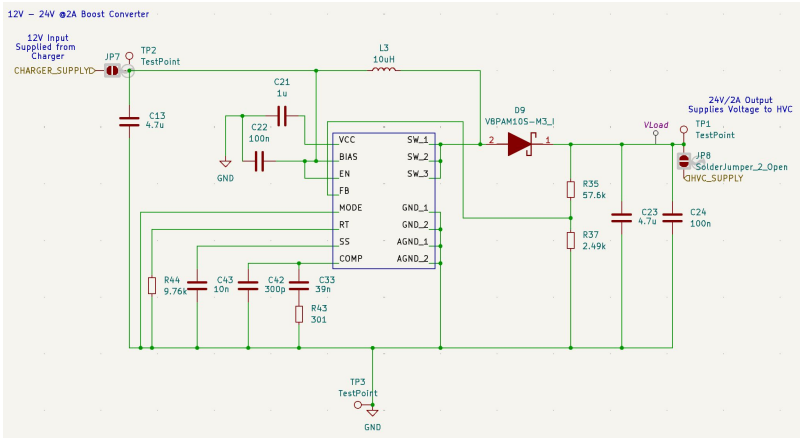
- Created UL-compliant electrical safety architecture
  - Defined interconnects, shutdown system, breaker and shunt placement
  - Specced wire harnessing for current needs
  - Reduced wiring complexity by 30%
- Setup Turnkey PCB Production
  - Revised BOMs and reduced production cost by 50%



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