Vin Shin

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Education

University of California, Santa Barbara – BS in Electrical Engineering June 2028

- **GPA:** 3.63/4.00 **Awards:** Dean's List (2024–2025)

Experience

Electrical Technical Director – UCSB Gaucho Racing (Formula SAE Electric) June 2026 – Present

- Direct 4-subteam electrical organization (Electronic Controls, Powertrain Electronics, LV Power & Harness, Driverless) delivering the complete HV/LV stack for a 588V, 140s2p FSAE Electric vehicle.
- Restructured the electrical org for the GR27 cycle: defined subteam charters and interfaces, ran design reviews, and built the recruitment and onboarding pipeline for incoming members.

Low Voltage Electrical Lead – UCSB Gaucho Racing (Formula SAE Electric) June 2025 – June 2026

- Delivered LV and DAQ systems through FSAE Michigan 2026: passed electrical technical inspection and completed all dynamic events; first in team history; scored 9/10 on the LV & DAQ portion of the Design event.
- Architected system-level LV electrical design including enclosures, wire routing, and CAN network topology; reduced connector count 60% (52 to 21) while improving serviceability.
- Managed LV subteam across PCB design, power distribution, driver interface, and sensor integration; coordinated with mechanical, HV, and software teams to meet competition deadlines and FSAE regulations.

Projects

GR27 Power Unit (Integrated SiC Traction Inverter) – UCSB Gaucho Racing June 2026 – Present

- Designing SiC traction inverter co-packaged within the drivetrain manifold, sharing the powertrain coolant loop and minimizing DC bus and phase lead lengths to cut parasitic inductance, HV cabling, and enclosure mass.
- Architecting power stage with 1200V SiC MOSFETs driven by UCC21750 isolated gate drivers; designing to meet FSAE EV HV–LV isolation requirements.

GR27 Tractive Battery Module – UCSB Gaucho Racing June 2026 – Present

- Leading mechanical and electrical design of tractive battery module segments: FR4 structural module walls validated through SES analysis, busbar and interconnect layout, and base-cooled coldplate thermal interface.
- Conducted 21700 cell trade study (Molicel RS60/RS50, Linkdata INR21700S-60P) across energy density, DCIR, discharge/thermal limits, and cost – driving segment sizing, cooling requirements, and pack energy budget.

1.5kW FOC Motor Controller – Personal Project Jan. 2026

- Architected high-performance FOC inverter for BLDC motors: 30kHz switching at 25A peak AC current from 60V bus using Infineon OptiMOS MOSFETs and UCC27211A gate drivers on a 4-layer power/signal PCB.
- Implemented STM32G4-based FOC firmware with synchronized dual-ADC 3-phase current sampling, SVPWM generation, and SPI magnetic encoder feedback; achieved commutated motor spin-up.

Battery Management System – UCSB Gaucho Racing Sept. 2025

- Designed schematic and 4-layer PCB for GR26 battery segment modules using NXP MC33771C AFE managing 2p140s configuration; achieved 39% board area reduction versus GR25 design.
- Implemented STM32G474-based thermistor measurement with 10-sample moving average filtering for $<0.5°C$ noise rejection across 14 temperature points per segment; daisy-chained TPL communication across 10 modules for real-time monitoring and balancing.

Additional Projects: GR26 Wire Harness (RapidHarness, shielded CAN, Deutsch connectors), GR26 Attic Enclosure (IP-rated power distribution packaging), GR26 Driver Interface PCB (STM32, WS2812b), Distributed CAN Sensor Network (IP67 DAQ nodes)

Technical Skills

Power Electronics: SiC/Si inverters, isolated gate drive & bias supplies, BMS/accumulators, FOC/SVPWM

Electrical Design: Altium Designer, KiCad, LTspice, Keysight ADS | 4-layer mixed-signal & power PCB

Embedded: C/C++, Python, MATLAB | STM32 HAL/LL, CAN bus, SPI/I2C, real-time control

Mechanical & Lab: SolidWorks, Fusion 360, RapidHarness | Oscilloscope, logic analyzer, SMD/THT soldering