Caelan Dunlea

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EDUCATION

Bachelor of Science in Electrical Engineering, May 2029
The University of Alabama,Tuscaloosa, AL
Minor in Mathematics, Randall Research Scholars Program
GPA: 4.00/4.00

- National Merit Finalist & Scholarship Recipient
- Alabama–Esslingen Mercedes Exchange Cohort 1

WORK EXPERIENCE

Electrical Engineer, BDU Team, Battery Workforce Challenge, Tuscaloosa, Alabama, Aug 2025 - Present

- Design and document 12+ high-voltage electrical schematics for Battery Disconnect Unit using Altium Designer; modeled 2950 board and system components in Fusion 360
- Manage connector integration (Wago 236-600) on 2950 board and supporting design documentation for DOE competition Gates 1.1–1.2
- Collaborate with a 13-member multidisciplinary team to integrate the HV harness into full system architecture

Electrical & Software Team Member, Alabama Astrobotics, Tuscaloosa, Alabama, Aug 2025 - Present

- Develop wheel odometry algorithm in C++ for autonomous navigation on Linux/Ubuntu with GitLab version control
- Design and implement electrical network for competition robot, integrating LiDAR, IMU, stereo cameras, CAN bus, and VESC controllers
- Design electrical system with 10 person team for a 3×3 ft interactive LED board featuring 3,000 LEDs, 6 buttons, and 6 microcontrollers; safe power distribution, electrical dampening, and modular design

Research Intern, Vanderbilt University, Nashville, Tennessee, Oct 2023 - Jul 2025

- Applied Graph Neural Networks and Protein Language Models to predict post-translational modifications under Dr. Eric Bell
- Enhanced model accuracy 30% by engineering input features representing chemical bond order and molecular structure for Graph Neural Network
- Conducted data visualization and performance analysis using PyTorch, NumPy, and Jupyter Notebooks

Team Leader, VEX Robotics Club at Ravenwood High School, Brentwood, Tennessee, Aug 2022 - May 2025

- Led team of 7 and mentored 40 members across two seasons; won Tennessee State Championship and Create Award at VEX Robotics Worlds (top 10 judged awards globally)
- Authored 600-page Engineering Notebook detailing full design, build, and code documentation

SERVICE AND INVOLVEMENT

Volunteer and CR3W Member, Adventure Science Center Museum, Nashville, Tennessee, Nov 2023 - Jul 2025

- Completed 200+ hours of service; led a 15-member team utilizing a $2,000 grant to design an interactive sustainability exhibit with HTML, CSS, JavaScript, and Unity

SKILLS & QUALIFICATIONS

Electrical Design: Altium Designer, KiCAD, Fusion 360, SolidWorks
Programming: C++, Python, Java, FORTRAN, R, MATLAB, Bash, Linux/Ubuntu
Data & Simulation: PyTorch, NumPy, Jupyter Notebooks, Anaconda
Software Tools: Git, Microsoft Excel, HTML, JavaScript

AWARDS AND RECOGNITIONS

National Merit Scholarship Recipient (2025) · AP Scholar with Distinction (2024–2025) · CREATE Award at VEX Worlds (2025) · Tennessee State Champion (2025) · All-State Clarinet Player (2024)