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Hunter Ellis

Electrical & Computer Engineer

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Electrical/Computer Engineer interested in the intersection of control systems, signal processing, and embedded systems. Currently working on my master's thesis in an accelerated program at Virginia Tech.

Education

Master of Science in Computer Engineering (Accelerated Master's Program) — May 2025
Virginia Tech – Focusing on Control Systems and Signal Processing — *Blacksburg, Virginia*
Advisers: Dr.Thinh Doan (UT Austin) and *Dr.Michael Hsiao (Virginia Tech)*

Bachelor of Science in Electrical & Computer Engineering (double major) — May 2024
Virginia Tech – Control Systems and Machine Learning — *Blacksburg, Virginia*

Technical Experience

Virginia Tech · Robotics Research

Graduate Teaching Assistant — Aug 2024 – Present, *Blacksburg, Virginia*

- Teaching fundamental concepts in linear systems theory and digital signal processing, including Laplace Transforms, Z-Transforms, system stability, and FIR & IIR filter design.
- Assisting with hands-on projects to illustrate and integrate analog and digital filter design and application on breadboards and TI MSP432 development boards.

Graduate Researcher — Aug 2023 – Present, *Blacksburg, Virginia*

- Developing a 6-axis robotic manipulator and an accompanying ROS2–Gazebo & MuJoCo simulation using Gymnasium for deploying custom reinforcement learning algorithms.
- Undergraduate and graduate research applying "neuro-symbolic" reinforcement learning algorithms with The Control, Optimization, and Online Learning for Autonomy Lab (C.O.O.L.) at UT Austin.

Jacobs Space Exploration Group · Mars Ascent Vehicle (MAV)

Thrust Vector Control Intern — May 2024 – Aug 2024, *Huntsville, Alabama (Merrit Island, Florida)*

- Developed thrust vector control testing hardware and software for NASA's Active Inertial Load Simulator at the Marshall Space Flight Center.
- Created and ran tests to develop a mathematical model of an electro-mechanical actuator – used Python, MATLAB, and LabView.
- Derived control algorithms for a load-simulating actuator, in Simulink, to simulate external loads placed on the Mars Ascent Vehicle's thrust vector control actuators during flight.
- Designed and integrated a 8^{th} order IIR filter to remove high frequency noise from a load cell and linear variable differential transformer (LVDT).

Grenoble Electrical Engineering Laboratory · Microgrid Inverters

Control Systems Research Intern — Jun 2023 – Aug 2023, *Grenoble, France*

- Researched inverter control systems – designed to be robust to islanding events and avoid future infrastructure problems on the French power grid.
- Simulated neutral point capacitive and balancing topologies using 4-leg inverters in Simulink. Tested PI control, PR control, Clarke and Park Transforms with HIL simulations.

Naval Surface Warfare Center (Carderock Division) · Hospital Sea Trains

Concept Research Intern — Jun 2022 – Aug 2022, *West Bethesda, Maryland*

- Developed concept hospital sea-train designs at the Center for Innovation in Ship Design and estimated fuel consumption and electrical power loads of the concept sea-trains.

Skills

Software: C/C++, Python, MATLAB, Simulink, GNU/Linux, Git, ROS2, Gazebo, Make, CMake, Labview, Qt, PyTorch, OpenCV, LaTeX, Verilog, FreeRTOS, Autodesk Inventor (Certified), SolidWorks, Rhino

Hardware: PCB Design and Assembly, Breadboarding, Computer Architecture, Oscilloscope, Multimeter, 3D-Printing

Projects

6-Axis Robotic Arm — Aug 2024 – Present

- 3D printed robot arm, built using stepper motors and pulleys.
- ROS2 Jazzy control and Gazebo Harmonic simulation.

LQI Rocket Landing Simulation — Aug 2023 – May 2024

- Landing a *very simplified* simulated rocket in MATLAB using optimal control.
- Designed a LQI controller for full-state feedback and setpoint tracking of a landing trajectory.

Closed Loop Stepper Motor — Dec 2023 – May 2024

- Backdrivable stepper motor driver using closed loop control and a magnetic encoder for feedback.
- 4-layer PCB mounts to the back of the motor with CAN and power connections.

Design Teams | Solar Car & Human Powered Submarine — Oct 2020 – Mar 2023

- Overall E/E architecture of the Solar Car.
- Single board computer and LCD to display relevant data to the submarine pilot.