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Hunter Ellis

Electrical & Computer Engineer

ellishw.tech
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Electrical/Computer Engineer with interests in control systems and signal processing. Currently working on my master's thesis in an accelerated program at Virginia Tech.

Education

Master of Science in Computer Engineering — May 2025
Virginia Tech – Focused on Control Theory – GPA: 3.7/4.0 — *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 – GPA: 3.7/4.0 — *Blacksburg, Virginia*

Technical Experience

Control Theory (Reinforcement Learning) Research | M.S. Thesis — Aug 2023 – Present
Virginia Tech · Graduate Researcher — *Blacksburg, Virginia*
- Undergraduate and graduate research developing neuro-symbolic algorithms with The C.O.O.L Autonomy Lab at UT Austin.
- Developing hardware for a 6-axis robot arm and software for a ROS2 simulation environment used to test custom Reinforcement Learning algorithms.

Continuous and Discrete Systems · Graduate Teaching Assistant — Aug 2024 – Dec 2024 — *Blacksburg, Virginia*
- Taught fundamental concepts in linear systems theory and digital signal processing, including Laplace Transforms, Z-Transforms, system stability, and FIR & IIR filter design.
- Assisted with hands-on projects to illustrate and integrate analog and digital filter design and application on breadboards and TI MSP432 development boards.

Thrust Vector Control (TVC) | Mars Ascent Vehicle (MAV) — May 2024 – Aug 2024
Jacobs Space Exploration Group · TVC Intern — *Huntsville, Alabama (Merrit Island, Florida)*
- Developed thrust vector control testing hardware and software as part of NASA's Active Inertial Load Simulator at the Marshall Space Flight Center.
- Characterized and created a model of an electro-mechanical actuator including internal viscous and (non-linear) coulomb friction components.
- Derived control systems for a load simulating actuator, in Simulink – used to simulate external loads placed on the Mars Ascent Vehicle's thrust vector control actuators during flight.
- Designed and integrated a 3rd order IIR filter to remove high frequency noise from a load cell and linear variable differential transformer (LVDT).

Control Systems Research | Microgrid Inverters — June 2023 – Aug 2023
Grenoble Electrical Engineering Laboratory · Research Intern — *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 control methods using 4-leg inverters in Simulink. Tested PI control, PR control, Clarke and Park Transforms with HIL simulations.

Naval Concept Design Research | Hospital Sea Trains — June 2022 – Aug 2022
Naval Surface Warfare Center (Carderock Division) · Concept Research Intern — *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 concept sea-trains.

Skills

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

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

Projects

FOC Stepper Motor (github.com/hunterwellis) — Dec 2023 – Present
- Backdrivable stepper motor driver using FOC and a magnetic encoder for feedback.
- 4-layer PCB mounts to the back of the motor with CAN and power connections.

Computer Vision | OCR Capstone Project (capstone_brochure.pdf) — Aug 2023 – May 2024
- IOS application capable of detecting coins of interest/value.
- Trained OCR and ResNet-50 models on a dataset of real and augmented coin images.

Design Teams | Solar Car & Human Powered Submarine (solarcaratvt.org) — 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.