

Esteban I. Figueroa

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Education

Yale University, New Haven, CT; ABET Bachelor of Science - Electrical Engineering

Relevant Coursework: Information Theory; Computer Engineering; Circuits and System Design; Computing for Engineers and Scientists; Microelectronic Circuits; Introduction to Semiconductors, Differential Equations, Linear Algebra, Electromagnetic Waves & Devices, Probability Theory, Digital Systems, Mechatronics Laboratory, Signals and Systems, Electronic Devices, Neural Networks, Computational Vision and Biological Perception, Introduction to Embedded Robotic Systems

Experience and Research

The Laboratory at Yale University (Amphibious Robotic Turtle)

Undergraduate Researcher (June 2023 - May 2025), **Postgraduate Associate** (June 2025 - Present)

- Designed, tested, and integrated a 2-layered thru-holed PCB for a Pneumatic Control Unit comprised of 2 miniature pumps and 4 miniature valves which apply positive and negative pressure to leg components in the span of 1.5 minutes while resulting in an 85% decrease of overall size from the original external air compressor and gas generator
- Published a paper and documentation on the design, integration, and standard operation of a Pneumatic Control Unit, computer vision module, Jetson Orin Nano development kit, motor control, and power management system within the context of an Amphibious Robotic Turtle
- Utilized ROS2 to close the loop on the robotic turtle and inform the system on its complete motor state (12) at any time to optimize cost of transport of the robot on different terrains
- Created physics-based model simulations using MuJoCo to experiment with different locomotion trajectories and created a python pipeline to derive a Fourier Series for arbitrary curves to be applied as motor trajectories

Firefly Aerospace (Blue Ghost Lunar Lander, Elytra Space Utility Vehicle)

Electrical Engineering Intern (May 2024 - August 2024)

- Designed and built a water-cooling solution to reliably actuate 16 high-power output solenoid valve coils while not overheating, allowing for mission phase simulation and power draw characterizations on Blue Ghost, a decrease from 360 degrees celsius to 100 degrees
- Designed and built a component simulation box which modeled 12 valves, 8 temperature sensors, and 4 heaters of the reaction control system on Elytra, which would allow for mission phase simulations and power draw characterization
- Implemented a new schematic naming convention to be consistent between electronic net names and component net names which facilitates firmware debugging
- Soldered and debugged 3 power switch emulators with SMD components for payload customers to use Firefly board-level designs in their testing of payload integration
- Oversaw environmental and functional testing on flight hardware using a thermal chamber and vibration table

Yale Undergraduate Learning Assistant

Mechatronics Laboratory (MENG 390) (January 2025 - May 2025)

- Taught students about control theory and applications of differential equations, linear algebra, and dynamics when modeling systems.
- Hosted 1-hour office hours to teach and assist in problem sets and laboratory write-ups
- Assisted teaching assistants run 3-hour lab sessions centered around learning MATLAB simulations, building a self-balancing motorcycle, and teaching how to design a control system

Introduction to Computer Science (Yale - CPSC100/Harvard - CS50) (September 2023 - December 2023)

- Taught students the basics of abstraction, algorithms, data structures, encapsulation, resource management, security, software engineering, and web development in various programming languages such as C, Python, SQL, JavaScript, CSS, HTML, and Flask.
- Explained programming applications in biology, cryptography, finance, forensics, and gaming
- Led 120-minute sections of 15 people as a supplement to lecture

Introduction to Programming (CPSC 112) (January 2023 - May 2023)

- Taught students the basics of functional programming, object-oriented programming, control structures, data types, program analysis, and libraries in Java
- Led 50-minute sections of 15 people as a supplement to lecture

Skills

CAD: Inventor, Fusion360, Solidworks, EAGLE, Altium, Siemens NX

Simulation: Solidworks Simulation, Multisim, MATLAB/Simulink, OpenRocket, RocketPy, LTSpice

Programming: VSCode, C/C++, Java, Python, Arduino, HDL (Verilog), ROS2

Lab Tools: Oscilloscope, Network Analyzer, DC Power Supply, Signal Generator, Electronic Load, NI CDAQ

Hardware: Soldering (Thru-Hole + Surface Mount), Protoboard/Perfboard Prototyping