

Esteban I. Figueroa

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Education

Yale University, New Haven, CT, Expected Graduation May 19th, 2025; 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

Experience

Soft Robotics Lab at Yale University (Amphibious Turtle-Inspired Robot)

June 2023 - Present

Research Assistant

- Implemented 3D printed waterproof shoulder joints onto an aluminum chassis, isolated 12 motors underwater
- Engineered, tested, and integrated a 4-layered protoboard circuit stack (90mm x 70mm x 50mm) for a pneumatic control system comprised of 2 miniature pumps and 4 miniature valves 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
- Streamlined a buoyancy control system with a dedicated circuit (70mm x 50mm) comprised of 1 miniature pump and 2 miniature valves which inflate and deflate 4 shoulder bellows in 2 minutes exerting a 2-newton buoyant force on the robot while resulting in an 20% decrease in size and 42% decrease in size from the original buoyancy system
- Using 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

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

May 2024 - July 2024

Electrical Engineering Intern

- 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
- 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 for payload customers to use Firefly board-level designs in their testing of payload integration
- Worked in cleanroom environments to test flight hardware, verify grounding impedances, and integrate avionics boxes
- Oversaw environmental and functional testing on flight hardware using a thermal chamber and vibration table

Yale Undergraduate Learning Assistant

January 2023 – December 2023

Introduction to Computer Science (CS50)

- 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)

- 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

Yale Project Liquid

September 2022 - Present

Avionics & Control Subteam Lead

- Designed and laid out a 2nd version of an ASI PCB containing 6 layers and close to 200 discrete components, containing constant voltage valve drivers, current sensors, voltage sensors, and instrumentation amplifiers for pressure transducers and thermocouples
- Simulated circuitry using LTSpice to be used on the 2nd version of the ASI PCB
- Designed and implemented a 5-inch by 5-inch PCB for an Augmented Spark Igniter with the capability of hosting a Teensy 4.1, driving 6 solenoid valves using relays, collecting data from 7 digital pressure transducers, and driving a spark plug
- Developed a spark plug ignition system using a zero-voltage switching driver, flyback transformer, a relay, and battery for ignition of an augmented spark igniter

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, ROS2

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

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