Esteban I. Figueroa

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Education

Yale University, New Haven, CT **Cumulative GPA**: 3.1/4.0

Electrical Engineering, B.S.

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

Research Experience

The Faboratory – Postgraduate Research Associate **June 2025-Present**
Yale University, New Haven, CT
Research Advisor: Rebecca Kramer-Bottiglio

- Leading a project in studying hydrodynamic efficiency and energy efficiency of the four-flipper and two-flipper swimming method using an Amphibious Robotic Turtle
- Developing chassis and electronics for robotic granular particles in an effort to study minimum energy requirements to achieve goal bulk properties of metamaterials
- Designing and implementing wearable electronics to be used on a Motion Capture (MoCap) Suit which implements capacitance sensors to represent the wearer's body-state

The Faboratory – Undergraduate Researcher **June 2023-May 2025**
Yale University, New Haven, CT
Research Advisor: Rebecca Kramer-Bottiglio

- Design and implemented a PCB which untethered an Autonomous Robotic Turtle original connected to a off-board gas power generator and pneumatic pump (Pneumatic Control Unit, PCU)
- Presented a poster at a RoboSoft 2024 Workshop summarizing the research and tests done to reduce energy consumption in morphing soft robotic flippers as a result of PCU implementation
- Conducted experiments which characterized energy consumption (Cost of Morphing) of a morphing limb robot with PCU implementation compared against off-board morphing solutions
- 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
- 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
- Conducted experiments in water-to-land and land-to-water Amphibious Robotic Turtle

Publications

J. Wang, M. Jiang, L. A. Ramirez, B. Yang, M. Zhang, **E. Figueroa**, W. Yan, and R. Kramer-Bottiglio, "Surrogate compliance modeling enables reinforcement learned locomotion gaits for soft robots," arXiv, Dec. 2025. [Online]. Available: https://arxiv.org/abs/2512.07114 (Submitted, Science Robotics, December 2025)

B. Yang, J. Sun, **E. Figueroa**, L. Ramirez, B. Lin, M. Jiang, E. Marroquin, and R. Kramer-Bottiglio, Energy-Aware Locomotion Across Amphibious Environments (in preparation).

J. Sun, B. Lin, L. Ramirez, **E. Figueroa**, R. Baines, B. Yang, E. Marroquin, R. Kramer-Bottiglio. "Performance enhancement of a morphing limb for an amphibious robotic turtle." IEEE International Conference on Soft Robotics (RoboSoft), San Diego, CA, USA, 2024.

Caitlin L. Le, Filippo Fonseca Cagnazzo, Nico Ramos, **Esteban I. Figueroa**, Colin Creager, Rebecca Kramer-Bottiglio, Common Ground: Standardizing Granular Media Characteristics for Burrowing Robots. IEEE International Conference on Soft Robotics (RoboSoft), Kanazawa, Japan, 2026. (Submitted, November 2025)

Luis A Ramirez, Jue Wang, Gustavo Zotin Gomes de Oliveira, **Esteban Figueroa**, Evan Zhang, Mingsong Jiang, Rebecca Kramer-Bottiglio, Towards a deep water amphibious robotic turtle. IEEE International Conference on Soft Robotics (RoboSoft), Kanazawa, Japan, 2026. (Submitted, November 2025)

Internship and Work Experience

Yale College Dean's Office — **May 2024-May 2025**

First-Year Counselor

- Mentor a group of 13 first-years to transition from high-school into college, this includes building a schedule, 4-year plans, finding extracurriculars, and making them feel comfortable at Yale
- Host "Duty Nights" every Wednesday, Friday, and Saturday, for students who want a safe space in which we have themes, food, and other activities so students don't feel pressure to party on those nights

Undergraduate Learning Assistant — **Jan. 2025-May 2025**

Mechatronics Laboratory (MENG 390)

- Lead office hours helping students with PSETS and Lab Reports on circuits, C++ programming, control systems, and differential equations
- Help run lab hours where I help students understand lab requirements, troubleshoot and debug circuits, and teach students how to use electrical engineering lab equipment

Firefly Aerospace – Electrical Engineering Intern — **June 2024 - August 2024**

Austin, TX

- Designed and built a water-cooling solution to viably and reliably actuate high-power output solenoid valve coils while not overheating, allowing for mission phase simulation and power draw characterizations on Blue Ghost
- Designed and built a component simulation box which modeled valves, temperature sensors, and 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 power switch emulators for payload customers to use Firefly board-level designs in their testing of payload integration

Student Technology Collaborative – Student Technician — **Oct. 2021 - May 2023**

New Haven, CT

- Communicate with clients and discuss issues with their personal devices
- Troubleshoot and diagnose software issues communicated by the client
- Disassemble laptops to troubleshoot and diagnose hardware issues, reassemble afterwards

Undergraduate Learning Assistant — **Sept. 2023 - Dec. 2023**

Introduction to Computing and Programming (Yale - CPSC 100 / Harvard - 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
- Hosted office hours 10 hours a week to teach and assist in problem sets and address lecture questions
- Led 120-minute discussion sections of 15 people as a supplement to virtual lecture

Undergraduate Learning Assistant **Jan. 2023 - May 2023**

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
- Hosted office hours 8 hours a week to teach and assist in problem sets and address lecture questions
- Led 50-minute sections of 15 people as a supplement to lecture

Yale Young Global Scholars **July 2022 - August 2022**

Instructor

- Designed four sets of digestible curricula to teach high school students on STEM topics of interest (astrophysics, quantum physics, robotics and AI, and sustainable energy)
- Taught curricula to students, 2 sets of 90-minute seminars and 2 sets of 180-minute seminars
- Lead simulation projects where groups of students design a product, presentation, or media to address relevant world problems

ACADEMIC AWARDS, SCHOLARSHIPS, and GRANTS

2024 IEEE-RAS International Conference on Soft Robotics, Shape Morphing Workshop Best Presentation **April 2024**

Science, Technology, and Research Scholars (STARS) II Fellowship **Nov. 2023**

National Science Foundation Research Experiences for Undergraduates (NSF REU) **June 2023**

The Gates Scholarship **March 2021**

QuestBridge National College Match Scholarship **Dec. 2020**

TECHNICAL SKILLS

Simulation	SolidWorks Simulation, Multisim, MATLAB, OpenRocket, RocketPy, MuJoCo, LTSpice
CAD Software	SolidWorks, AutoDesk Inventor, Fusion 360, Altium, Siemens NX
Lab Tools	Oscilloscope, Network Analyzer, DC Power Supply, Signal Generator, Electronic Load, NI CDAQ
Programming	VSCode, C/C++, Java, Python, Arduino, HDL (Verilog), ROS2
Hardware	Soldering (Thru-Hole + Surface Mount), Protoboard/Perfboard/Breadboard Prototyping, FPGA

LEADERSHIP POSITIONS

Yale Project Liquid - Liquid Propulsion Rocket Team **May 2022- May 2025**

Avionics & Control Subteam Lead

- Created improved designs for a rocket avionics suite, including data acquisition, engine control, and flight computation PCB
- Designed, implemented, and test a 5” x 5x” PCB for an Augmented Spark Igniter with the capability of hosting a Teensy 4.1, driving 6 solenoid valves, 7 digital pressure transducers, and a driving a spark plug
- Developed a spark plug ignition system using a zero-voltage switching driver and flyback transformer
- Presented multiple presentations outlining designs, requirements fulfillment, and testing plans for an avionics system for a rocket engine torch igniter.
- Mentored a group of 5 students on programming and electrical engineering design concepts not covered in traditional curriculum
- Assigned projects based on practical applications of theoretical concepts taught in classes

Yale Undergraduate Aerospace Association (YUAA) **May 2022-May 2023**

Project Manager

- Managed four teams within the club, CubeSat, Liquid Rocket Engine Team, Intercollegiate Rocket Engineering Competition, and Space Policy Research Collaborative
- Advised projects on timeline and goal creation for the following year
- Wrote grant proposals for the YUAA as a whole organization for workshop and social funding
- Reviewed grant proposals written by the project leads to ensure projects received individual funding
- Allocated and sourced resources such as manpower, programmers, and funding to ensure projects ran smoothly throughout the semester
- Collaborated to create outreach opportunities with Pathways at Yale to teach high school students about aerospace and learn CAD and programming skills
- Organized technical and professional development workshops to heighten the skill sets of students in the engineering community

FIRST at Yale **Sept. 2021 - May 2022**

President

- Designed curriculum to train students who never participated FIRST and increased accessibility to mentorship opportunity

OUTREACH AND VOLUNTEERING

FIRST at Yale **Sept. 2021 - May 2025**

Mentor

- Mentored students at Amistad High School with electrical engineering concepts using their robot for the FRST Robotics Competition as a platform to teach
- Taught C++, Java, and Python programming to help enhance robotic performance and teach different frameworks
- Worked in a team of other collegiate mentors to teach and mentor engineering design concepts and practices
- Volunteered at FIRST Global Corp at Switzerland in 2022 to mentor students and conduct outreach to prospective students for Yale Engineering
- Conducted outreach and mentored students at the FIRST Worlds Championship at Houston, Texas in 2022 to reach out to prospective Yale Engineering students.

Matriculate **May 2022 - May 2023**

Advising Fellow

- Completed trainings on how to mentor high school students in the college application process
- Mentored 3 students from the start to finish of the college application process
- Conducted outreach to raise awareness of Matriculate’s services commitment to helping high schools from underrepresented and underfunded backgrounds apply and get into college