

Charles Paxson

Graduating Mechanical Engineer | Robotics | Mechatronics | Automation

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chpaxson.github.io

Education

University of California, Berkeley

- M.S. Mechanical Engineering (expected) Dec 2025
- B.S. Mechanical Engineering (GPA 3.75/4.0), *Minor in Electrical Engineering and Computer Sciences* Dec 2024

Skills

- Mechanical Design:** SOLIDWORKS (CSWP), Fusion 360, Onshape **Prototyping:** 3D printing, basic machining, laser cutting
Analysis: SOLIDWORKS Simulation, ANSYS, COMSOL, MATLAB **Programming:** Python, C++, Java, MATLAB, JavaScript
Electronics: PCB design (KiCad, Altium), embedded systems **Documentation:** Microsoft Office, Typst, L^AT_EX

Experience

- Hologic - R&D Engineering Intern** May 2023 - Aug 2025
- Identified and resolved a reliability issue in a new workflow for a sample-preparation instrument using data-driven testing.
 - Co-developed a hardware solution to address reliability issues in deployed Novodiag instruments.
 - Improved throughput and reliability by refining a key manufacturing step for a consumable cartridge and designing an automated fixture.
 - Independently designed and prototyped an automated reagent-preparation system for the Panther molecular diagnostics platform.
 - Completed three consecutive summer internships, continuing part-time remote work during academic terms.

- Biomimetic Millisystems Lab - Student Researcher** Jan 2023 - Dec 2025
- Designed components of a 7-axis non-ferromagnetic robot arm for transcranial magnetic stimulation (TMS) experiments inside an MRI scanner.
 - Supported the development of a compact series-elastic actuator (SEA) with an integrated planetary or cycloidal gearbox, enabling active compliance in a non-backdrivable ultrasonic motor ([arXiv:2406.07670](https://arxiv.org/abs/2406.07670)).
 - Assisted in fabrication and assembly of a full 7-axis arm prototype.
 - Designed a 3-axis parallel robot arm to test the feasibility of closed-loop MRI-based position control using a miniature marker coil (archive.isrmr.org/2025/3310.html).
 - Redesigned and fabricated an improved elbow joint module with enhanced strength and reduced backlash.
 - Designed a 3D-printed low-cost cable-actuated micromanipulator for Berkeley's SWARM Lab.

- UC Berkeley - HOPE DeCal Instructor** Aug 2024 - Dec 2025
- Lectured and helped revise curriculum for UC Berkeley's Hands-On PCB Engineering (HOPE) student-run DeCal course.
 - Mentored student teams through schematic design, layout, fabrication, assembly, and bring-up of production-ready PCBs.

- TRITON ROBOSUB - Mechanical Engineer** Aug 2020 - Jul 2022
- Designed a waterproof camera module for the Fishsense project to contain a depth camera and processor to assist in cataloguing fish with AI .
 - Updated the initial prototype described here: ieeexplore.ieee.org/document/9705929
 - Sourced components, developed a bill of materials, and assembled prototypes for field testing and preliminary research.

- Art of Problem Solving - Teacher's Assistant** Jul 2021 - Jul 2022
- Helped teach 3rd grade and 7-9th grade students in summer math classes.
 - Worked one-on-one with students in tutoring sessions.

Projects

Project gallery at chpaxson.github.io/projects

- **LYRA Robot Arm:** Designed and built custom cycloidal drives for a 6-axis stepper-driven robot arm (1m reach, 2kg payload).
- **FOC Stepper Motor Controller:** Designed a field-oriented control (FOC) driver for NEMA17 stepper motors using an RP2040 microcontroller with current sensing, a magnetic encoder, and CAN bus communication.
- **Kiwi Robot:** Designed a WiFi-controlled 3-wheel holonomic robot with on-board vision for autonomous navigation.
- **Mechanical 7-Segment Display:** Designed and built a large-format cam-driven mechanical 7-segment display
- **CNC and 3D Printer Builds:** Built a Voron 0.2, Voron 2.4 and Milo V1.5 CNC systems from scratch; integrated toolchanger and "AWD" quad-motor X/Y motion system on the Voron 2.4