Charles Paxson

Graduating Mechanical Engineer | Robotics | Mechatronics | Automation

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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, LaTeX

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.
- Boosted manufacturing throughput and reliability by refining a key step for a consumable cartridge, and designing a custom automated fixture.
- Independently designed and prototyped an automated reagent-preparation system for the Panther molecular diagnostics platform to demonstrate feasibility.
- 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.
- Contributed to development and testing 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.ismrm.org/2025/3310.html).
- Redesigning and fabricating 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

- Delivering lectures and revising curriculum for UC Berkeley's Hands-On PCB Engineering (HOPE) student-run DeCal course.
- Mentoring student teams through schematic design, layout, fabrication, assembly, and bring-up of production-ready PCBs.

TRITON ROBOSUB - *FishSense Mechanical Engineer* — Aug 2020 - Jul 2022

- Designed a new 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
- Led the design update, modeling, sourcing components, and fabricating the new prototype 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