Patrick Fong

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EDUCATION

University of California, Riverside Graduation Date: June 2025

Bachelor of Science in Mechanical Engineering Riverside, CA

SKILLS

Tools & Fabrication: Fusion 360 CAM, CNC Mill, Manual Mill/Lathe, FDM, SLS, Multijet and Polyjet Printing
Design & Analysis: Generative Design, Finite Element Analysis (FEA) in Fusion
CAD Software: Onshape, Fusion 360 and Solidworks

PROJECTS

Robot Bartender January 2025 – Present

Mechanical Design Engineer University of California, Riverside

- Led the mechanical design, electronics planning, and manufacturing for a team project to develop a cross-functional 6-DoF robotic arm capable of preparing custom mixed drinks to order.
- Sized spur gearboxes for three arm joints by determining optimal reduction ratios from manufacturer motor curves, using static torque analysis and desired joint speed requirements.
- Architected the electronics system by balancing cost, complexity, features, and performance, selecting a Raspberry Pi 5 and FRC motor controllers to meet CAN and ROS 2 requirements.
- Modeled and optimized the arm, mounting structure, and integrated gearboxes in Fusion 360, applying DFM principles to reduce manufacturing time and complexity by selecting stock components and minimizing custom machining features.
- Machined the mounting structure out of rectangular and round aluminum tube stock using a CNC mill, manual mill and lathe, and fabricated gearbox components with SLS and SLA printers.
- Followed good modeling practices and maintained version control to ensure accurate models were used for simulation and part fabrication in a collaborative CAD environment.

Robotics and Medical Systems Laboratory June 2024 – July 2025

Undergraduate Researcher University of California, Riverside

- Developed a lightweight, compact end effector to mount on a continuum robot for grasping, twisting, and pulling fruit from within tree canopies.
- Devised four actuator concepts in Fusion 360 to perform twisting and pulling motions, selecting candidates based on weight, footprint, cost and feasibility.
- Created and tested 3D-printed test benches to evaluate materials and motion components, achieving a 10% weight reduction while maintaining functionality and structural integrity.
- Designed, 3D-printed, and assembled 8 actuator prototypes, Refined geometry with each iteration to balance ease of manufacturing, ease of assembly, and structural rigidity.
- Bench-tested 6 vacuum cup prototypes, evaluating grip strength, sealing ability, and durability; designed in Fusion 360 and fabricated using SLA printing and urethane casting.
- Utilized generative design to minimize the mass of the mounting structure from 60g to 20g.
- Employed good modeling and file management practices to ensure traceability of design decisions and enable future researchers to view past revisions and continue iterating.

WORK EXPERIENCE

Mechanical Engineering Design and Development Lab September 2023 – June 2025

Student Assistant University of California, Riverside

- Improved and maintained the mechanical engineering makerspace by training students on machine operation and DFM strategies, and developing demonstration projects to showcase lab capabilities.
- Designed and manufactured a mechanical keyboard using a CNC mill, a generatively designed quadcopter printed via SLS, and a robot arm fabricated using multiple manufacturing methods available in the makerspace.
- Produced parts to order using industrial 3D printers, laser cutters and various manual machines to specifications provided by research labs and student organizations.
- Trained students biweekly on CNC operations using the HAAS Desktop Mill as a hands-on training platform.