Carolyn Ruan

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EDUCATION

Caltech, Pasadena, CA — Expected Graduation: 2027
B.S. Major in Computer Science, Minor in Data Science — GPA: 4.0
Coursework: *Data Structures, Software Design, Decidability and Tractability, Discrete Math, Linear Algebra, Multivariable Calculus, Computational Science and Engineering, Pedagogy in Computer Science*
Activities: *NCAA Women's Basketball, Student IT Rep, Caltech AI Alignment, First-Year Orientation Leader, Lloyd House*

SKILLS

Technical Skills: *Java, Python, C, C++, HTML/CSS, Matlab*
Technologies/Frameworks: *Git, Bash, Conda, React*, *pandas/NumPy/scikit-learn/Matplotlib*

PROJECTS

Axe-throwing Video Game (C, Git, Makefile, SDL2) — June 2025

- Two-player axe throwing game with intelligent in-game obstacles. Led team of 3. Awarded A+.
- Developed 2D discrete physics engine with support for multi-object kinematics and collision detection.
- Designed generalized, memory-compliant C-libraries using AddressSanitizer for vector math, image rendering, animation, keyboard handler, and music and sound effects handler.

Light-Painting Robot Arm (Python, OpenCV/Matplotlib) — Mar 2025
hackaday.io/project/202243-light-painting-robot

- 3-DOF robot arm that light paints with LEDs in a vertical 2D plane, using a Raspberry Pi Pico.
- Implemented Holistically-Nested Edge Detection (HED) deep-learning model to translate user-inputted images into vector paths for the robot to follow.
- Presented at Los Angeles Maker Faire and City of STEM.

EXPERIENCE

Machine Learning Researcher (Python, Bash, pandas/NumPy/scikit-learn/Matplotlib) — Jan 2025 - Present
Reisman Lab at Caltech

- Developed model evaluation framework, stopping criterion for Random Forest acquisition functions to predict regioselectivity in C–H oxidation reactions.
- Ideated and implemented RNNs (Long Short-Term Memory, Gated Recurrent Units) for sequential modelling as a stopping property.
- Deployed rerunning of regressor models using GPU parallelization, reducing model evaluation time by 93%.
- Awarded Caltech's 2025 Summer Undergraduate Research Fellowship.

D.E. Shaw Connect — Sept 2025
Jane Street WiSE Program — July 2024 - Aug 2024

- Highly selective 4-day program in game theory, strategic trading, and quantitative finance.

Hampshire College Summer Studies in Mathematics (Mathematica, LaTeX) — Jun 2023 - Aug 2023

- 1 of 49 selected internationally (~7% acceptance rate) for an intensive 6-week math program.
- Studied proof-based number, group, and graph theory; with concentrations in probabilistic modeling, Dirac delta function, and harmonic series; conducted research in random walk problems and Markov matrices.
- Covered guest lectures and events in the program newspaper.

Software Engineer Intern, Blueprint (HTML/CSS, React) — Jan 2022 - Apr 2022

- Collaborated with a team of UC Berkeley CS graduates and interns to develop a user interface framework with React components for a Y-Combinator health tech startup.

HONORS AND AWARDS

- Caltech Women in STEM Weekend Student Panelist
- Philip Laipis in Memory of Professor Jerome Vinograd Research Fellow
- US Presidential Scholar Candidate
- 2x AIME (American Invitational Mathematics Examination) Qualifier
- Berkeley Math Tournament Honorable Mention
- USACO (USA Computing Olympiad) Silver
- National Merit Scholarship Finalist
- Presidential Volunteer Service Award