

Ray Tsai

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EDUCATION

University of California San Diego

B.Sc. in Mathematics-Computer Science (Math GPA: 4.0/4.0)

La Jolla, CA

Sep 2021 – Jun 2025

- **Honors Thesis Supervisor:** Jacques Verstraete
- **Relevant coursework:** Abstract Algebra, Real Analysis, Extremal Combinatorics and Graph Theory, Algebraic Combinatorics, Graduate Combinatorics, Graduate Complex Analysis, Graduate Statistical Learning, Design and Algorithm Analysis, Theory of Computation, Advanced Data Structure

RESEARCH EXPERIENCE

UC San Diego, Department of Mathematics

Undergraduate Research Assistant

La Jolla, CA

Mar 2023 – Present

- Solving open problems and studying related literature in extremal combinatorics under the guidance of Prof. Jacques Verstraete.
- Writing an honors thesis on the Double Turán problems
- Wrote code in SageMath to look for counterexamples for conjectures.

UC San Diego, Department of CSE

Undergraduate Research Assistant

La Jolla, CA

Apr 2024 – Present

- Conducting research on the Algorithm Fairness and Multicalibration in learning models under Prof. Russell Impagliazzo.
- Read literature on the topic of smooth boosting and its applications to combinatorics and multicalibration.
- Worked through graduate level complexity theory textbook prior to research.

WORK EXPERIENCE

Software Engineer

MSI

New Taipei City, Taiwan

Jul 2023 – Aug 2023, Full-time

- Collaborated with a 5-member team to develop a Windows-based application for local AI image generation and model training.
- Pioneered a custom model using Stable Diffusion, effectively generating images of MSI laptops.
- Architected and implemented an installation process for multiple optimizers, boosting image generation speeds by 80%.

Co-founder & Lead Software Engineer

Kook

San Diego, CA

Dec 2021 – Dec 2022, Start-up

- Led a 5-member team in the creation of an automated surfboard rental station, incubated by UCSD Basement Blackstone LaunchPad and ECE Makerspace.
- Operated as a full-stack engineer, independently learning app development to architect the company's application, facilitating access to the surfboard station, and documenting the rental history.
- Innovated the station's unlock system by leveraging NFC technology, significantly enhancing the user experience.

TEACHING EXPERIENCE

Instructional Assistant

UC San Diego, Department of CSE

La Jolla, CA

Jan 2025 – Mar 2025, Part-time

- Tutored students in the Design & Analysis of Algorithms course.
- Held weekly office hours to address student questions and provide additional support.
- Graded homework assignments, midterms, and final exams.

Private Tutoring

Self-employed

San Diego, CA

Aug 2024 – Present, Part-time

- Designed individualized 10th-grade geometry lessons that address student's needs.

ADDITIONAL EXPERIENCE

William Lowell Putnam Mathematical Competition Scored 20 out of 120 possible points on the most prestigious undergraduate level math competition.

Combinatorics Seminar Participates in weekly seminar on various topics on modern combinatorics research held by the UCSD Math Department

UCSD Theory Group Attended various seminars and weekly meetings on theoretical computer science.

SKILLS

LaTeX, TypeScript(React Native, Next.js), Python(Pytorch, SageMath, Flask, Selenium), C/C++, Java, Git