

Ray Tsai

+1 (858) 905-0735 · ray@himetsai.com · in/himetsai

EDUCATION

University of Oxford

Oxford, United Kingdom

M.Sc. in Mathematical Sciences, Grade: Distinction (75%), Rank: 13/77

Sep 2025 – Jun 2026

- **Dissertation:** *Induced Subgraphs in Ramsey Graphs*, advised by Prof. Alex Scott
- **Relevant coursework:** Probabilistic Combinatorics, Probability on Graphs and Lattices, Continuous Optimization, Networks, Combinatorics, Theories of Deep Learning

University of California San Diego

La Jolla, CA

B.Sc. in Mathematics-Computer Science (Honors with High Distinction), Math GPA: 3.98/4.0 *Sep 2021 – Jun 2025*

- **Honors Thesis:** *Double Turán Problems*, advised by Prof. Jacques Verstraete
- **Relevant coursework:** Extremal Combinatorics and Graph Theory (Honors), Algebraic Combinatorics (Graduate), Discrete Geometry (Graduate), Statistical Learning (Graduate)

AWARDS

Physical Sciences Dean's Undergraduate Award for Excellence

UC San Diego, 2025

- “Awarded to top undergraduates in Mathematics, Chemistry & Biochemistry, and Physics for academic excellence and research promise.” (\$1000)
- Given to < 1% of undergraduates in the physical sciences.

RESEARCH EXPERIENCE

UC San Diego, Department of Mathematics

La Jolla, CA

Undergraduate Research Assistant

Mar 2023 – Jun 2025

- Conducted independent research in extremal and probabilistic graph theory under Prof. Jacques Verstraete; proved new bounds on extremal problems involving Turán-type density conditions in graph families.
- Results constitute a manuscript in preparation for publication; earned high distinction among the ~12 students annually admitted to the UCSD Math Honors Program.

UC San Diego, Department of CSE

La Jolla, CA

Undergraduate Research Assistant

Apr 2024 – Jun 2025

- Studied graduate-level computational complexity and learning theory directly under Prof. Russell Impagliazzo; covered PAC learning, boosting algorithms, and complexity-theoretic lower bounds.

WORK EXPERIENCE

Instructional Assistant

La Jolla, CA

UC San Diego, Department of CSE

Jan 2025 – Mar 2025

- Supported Design & Analysis of Algorithms (CSE 101) with 200+ students.

MSI

New Taipei City, Taiwan

Software Engineer Intern

Jul 2023 – Aug 2023

- Fine-tuned generative model pipeline in PyTorch; engineered automated installation and optimisation backend, improving inference throughput by 80%.

Kook

San Diego, CA

Co-founder & Lead Software Engineer

Dec 2021 – Dec 2022

- Co-founded hardware-software startup; led 5-member engineering team, built full-stack mobile application in React-Native, Python, mySQL and embedded firmware in C++ for hardware control.

PROJECTS

Mathematical Analysis of Efficient Adversarial Robustness | *Python, PyTorch*

Oxford, 2026

- Derived a unified theoretical framework connecting FGSM-based training and Input Gradient Regularization via the Finlay-Oberman local robustness bound; formally characterised catastrophic overfitting as the model exploiting first-order approximation error.
- Designed and ran controlled experiments on CIFAR-10 varying activation function smoothness; confirmed theoretical predictions and demonstrated that smooth activations recover near-optimal robustness at a fraction of standard adversarial training cost.