

# Stone Tao

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## Education

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### PhD Student in Computer Science and Engineering

2023 –

University of California, San Diego. Advisor: Hao Su

Research Topics/Interests: Reinforcement Learning, Simulation, Embodied AI, Learning from Demonstrations

### B.S. Double Major in Computer Science and Cognitive Science, Math Minor

2019 – 2023

University of California, San Diego.

- **Graduate Courses:** Computer Vision (ML meets Geometry), ML for Robotics, Differentiable Programming, Recommender Systems, Embodied AI.
- **Undergraduate Courses** Decision-Making in the Brain, Parallel Computing, Statistical NLP, Advanced Optimization Methods for Data Science, Advanced Data Structures, Operating Systems, Multiple Probability and Stats Courses, Foundations of Real Analysis, Honors Calculus, and more.

## Selected Awards

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### National Science Foundation Graduate Research Fellowship

2023-2028

### UCSD CSE Award for Excellence in Leadership

2023

### UCSD CSE Alumni Advisory Board Leadership Excellence Scholarship

2021-2022

## Publications / Preprints

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### ManiSkill3: GPU Parallelized Robotics Simulation and Rendering for Generalizable Embodied AI

arXiv 2024.

**Stone Tao**, Fanbo Xiang, Arth Shukla, Yuzhe Qin, Xander Hinrichsen, Xiaodi Yuan, Chen Bao, Xinsong Lin, Yulin Liu, Tse-kai Chan, Yuan Gao, Xuanlin Li, Tongzhou Mu, Nan Xiao, Arnav Gurha, Zhiao Huang, Roberto Calandra, Rui Chen, Shan Luo, Hao Su.

[arXiv](#) | [project page](#)

### Lux AI Season 3: Multi-Agent Meta Learning at Scale

Neural Information and Processing Systems (**NeurIPS**) 2024 Competitions Track.

**Stone Tao**, Akarsh Kumar, Bovard Doerschuk-Tiberi, Isabelle Pan, Addison Howard, Hao Su.

### Reverse Forward Curriculum Learning for Extreme Sample and Demonstration Efficiency in RL

International Conference on Machine Learning (**ICLR**) 2024.

**Stone Tao**, Arth Shukla, Tse-kai Chan, Hao Su.

[arXiv](#) | [project page](#)

### MetaWriter: Exploring the Potential and Perils of AI Writing Support in Scientific Peer Review

26th ACM Conference on Computer-Supported Cooperative Work and Social Computing (**CSCW**) 2024.

Lu Sun, **Stone Tao**, Junjie Hu, Steven Dow.

[ACM Digital Library Link](#)

### Lux AI Season 2: NeurIPS Edition

Neural Information and Processing Systems (**NeurIPS**) 2023 Competitions Track.

**Stone Tao**, Qimai Li, Yuhao Jiang, Jiaxin Chen, Xiaolong Zhu, Bovard Doerschuk-Tiberi, Isabelle Pan, Addison Howard.

[competition page](#)

### Abstract-to-Executable Trajectory Translation for One-Shot Task Generalization

International Conference on Machine Learning (**ICML**) 2023.

**Stone Tao**, Xiaochen Li, Tongzhou Mu, Zhiao Huang, Yuzhe Qin, Hao Su.

[arXiv](#) | [project page](#)

### ManiSkill2: a Unified Benchmark for Generalizable Manipulation Skills

International Conference on Learning Representations (**ICLR**) 2023

Jiayuan Gu<sup>†</sup>, Fanbo Xiang<sup>†</sup>, Xuanlin Li<sup>\*</sup>, Zhan Ling<sup>\*</sup>, Xiqiang Liu<sup>\*</sup>, Tongzhou Mu<sup>\*</sup>, Yihe Tang<sup>\*</sup>, **Stone Tao<sup>\*</sup>**, Xinyue Wei<sup>\*</sup>, Yunchao Yao<sup>\*</sup>, Xiaodi Yuan, Pengwei Xie, Zhiao Huang, Rui Chen, Hao Su.

[arXiv](#) | [project page](#)

### **Maniskill: Generalizable manipulation skill benchmark with large-scale demonstrations**

Neural Information and Processing Systems (**NeurIPS**) 2021 Datasets and Benchmarks Track

Tongzhou Mu<sup>\*</sup>, Zhan Ling<sup>\*</sup>, Fanbo Xiang<sup>\*</sup>, Derek Cathera Yang<sup>\*</sup>, Xuanlin Li<sup>\*</sup>, **Stone Tao**, Zhiao Huang, Zhiwei Jia, Hao Su.

[arXiv](#) | [project page](#)

### **Emergent Collective Intelligence From Massive-Agent Cooperation and Competition**

Neural Information and Processing Systems (**NeurIPS**) 2022 Deep RL Workshop.

Hanmo Chen<sup>\*</sup>, **Stone Tao<sup>\*</sup>**, Jiaxin Chen, Weihao Shen, Xihui Li, Sikai Cheng, Xiaolong Zhu, Xiu Li.

[arXiv](#)

## **Experience**

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**Hillbot**, Research Scientist Intern, Advisor: Hao Su

2024

- Research on the intersection of simulation, reinforcement learning, imitation learning, and embodied AI
- Business Strategy

**UC San Diego: Hao Su Lab**, Undergraduate Researcher, Advisor: Hao Su

2020 – 2023

- Research on robotics and embodied AI, particularly tackling long-horizon problems. Leveraging reinforcement learning, few-shot learning, imitation learning, and transformers.
- Research and develop large-scale robotic manipulation benchmarks (ManiSkill2).

**UC San Diego: ProtoLab**, Undergraduate Researcher, Advisor: Steven Dow

2019 – 2023

- Research at the intersection of AI and HCI, particularly AI-assisted tools and using NLP in systems requiring in-depth synthesis of information such as peer-review systems.
- Developed the Design for San Diego competition's front and backend.

**Lux AI Challenge**, Co-Founder

2021 –

- Lead the research, development, and design of creative, accessible, and inclusive AI competitions.
- Past competitions have accumulated over 1,600+ teams, 1,000+ github stars, 30,000+ submissions, 10,000,000+ matches run, and had one of the most diverse group of participants ever. Enabled competitors to research novel deep RL and IL methods to a unique large-scale multi-agent problem.
- Currently working on a season 3 competition in collaboration with Kaggle.

**QuantCo**, ML Engineer Intern, Advisor: T. Ben Thompson

2021

- Researched high-precision and accurate function approximation using neural nets and decision trees. Help automatically migrate slow, complex, hand-built computations in old systems to new systems.
- Developed OCR+NLP tools for analysis of insurance documents.

**LaunchDarkly**, Software Engineer Intern

2020

- Worked full stack on feature workflows, semantic patches, and conflict handling to enable state independent scheduling of feature flagging, a feature requested by LaunchDarkly's largest business customers.

## **Selected Open Source Projects**

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**ManiSkill ★800+**

2021 –

GPU parallelized robotics simulation with state-of-the-art state simulation speed and the fastest visual simulation speeds (10-1000x faster compared to other simulators). Designed to be pythonic and abstract away most GPU memory management code to make building and training on robotics tasks a breeze.

[haosulab/ManiSkill](#)

**Lux AI Challenge ★1300+**

2021 –

Code for the Lux AI Challenge, including the AI environments and visualizers.

[Lux-AI-Challenge](#)

## Reinforcement Learning Gym and Library in Typescript ★20+

2021

Implements a gym interface and algorithms like PPO and DQN in Typescript for reinforcement learning on browsers and Node.js.

[stonet2000/rl-ts](https://stonet2000/rl-ts)

## Leadership

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### Co-Founder of the Lux AI Challenge

2021 –

Initiated the original project concept and invited others to co-found the non-profit organization and competition. Successfully some of the largest multi-agent AI competitions in collaboration with Kaggle. Raised over \$130,000 in funds for the competition.

### Founding President of ACM AI at UC San Diego

2020 – 2022

Founded the largest organization on AI at UC San Diego, seeking to cultivate a community of AI enthusiasts as well as lower the barriers for learning AI. Grew the organization from zero to 1000+ members in 2 years, working with my board to develop social events, workshops, seminars, and competitions.

## Current/Past Student Mentees

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**Xander Hinrichsen** (BS UC San Diego → MS UC San Diego)

2024 – now

**Sid Bharthulwar** (BS Harvard)

2024 – now

**Rebecca Chen** (BS UC San Diego)

2024 – now

**Nan Xiao** (MS UC San Diego)

2024 – now

**Arnav Gurha** (BS UC San Diego)

2024 – now

**Arth Shukla** (BS UC San Diego)

2023 – now

**Kevin Chan** (BS UC San Diego)

2022 – 2024

**Doris Zhang** (BS UC San Diego)

2022 – 2024

## Presentations / Talks

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### Lux AI Season 2 and Reinforcement Learning

2023

Joined the Kaggle Podcast to talk about the basics of reinforcement learning and discuss Lux AI Season 2.

[Youtube recording](#)

### AI Competition Design For Multi-Agent Environments / Games

2022

Presented at the Learning in Foundation Environments meeting organized by Joseph Suarez. I discussed insights from designing the Lux AI challenge and what made it a popular AI competition, addressing topics such as environment design as well as competition accessibility.

[Slides](#)

## Teaching

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### UC San Diego: CSE 276F Machine Learning for Robotics (Co-Instructor)

2024 Spring

Taught 4 lectures covering off policy RL, exploration in RL, learning from demonstrations, and model based RL. Wrote homework material covering robotics, robotics simulation, reinforcement learning, and robot learning. Held office hours.

### UC San Diego: CSE 291 Machine Learning for Robotics

2023 Winter

Wrote various course materials and Google Colab notebooks covering robotics, robotics environments, reinforcement learning, and imitation learning.

### UC San Diego: CSE 12 Basic Data Structures and Object-Oriented Design

2020 Spring

Held office hours and wrote unit tests for grading homework automatically in Java.

## Academic Service

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### Peer Review

AI/ML: ICLR, NeurIPS, CoLLas

Robotics: IROS, ICRA

Computer Vision: SIGGRAPH

## Other Awards

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**UCSD Provost Honors List (every year)** 2019-2023

**MIT Battlecode (AI Competition) Finalist** 2019-2021

Made finals 3 times in a row (2019-2021), placing 1st out of all soloists and 5th overall in 2020, competing against over 600 teams of high school to graduate students. Won the Five Rings adaptive strategy award for spearheading an influential strategy in 2021.

## Skills

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**Programming Languages:** Python, Typescript/Javascript, C/C++, Go, Java, SQL

**AI:** Reinforcement Learning, 2D/3D Computer Vision, Deep Learning, Tree Learners, Embodied AI

**Frameworks:** Jax, Pytorch, Tensorflow, Pandas, scikit-learn, Node.js, React, MongoDB, Express.js

**Tools:** Docker, Google Cloud, Jupyter Notebook/Lab, Git, Adobe Photoshop, Figma

## Interests

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**Languages:** English, Chinese

**Sports:** Fencing (Saber), Fencing Coaching

**Music:** Violin, Viola