

# Sirui Tao

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## EDUCATION

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### University of California, San Diego

2025 - 2030	Ph.D. Cognitive Science - HCI	(Advised by Prof. Steven Dow)
2023 - 2025	M.S. Computer Science and Engineering - HCI & Graphics Key Courses: HCI, AI, Computer Vision & Graphics, Collective Intelligence, User-centered Design Theory, UbiComp	(Advised by Prof. Steven Dow and Prof. Tzu-Mao Li)
2019 - 2023	B.S. Data Science & B.S. Probability and Statistics - minor in Economics Key Courses: 3D Machine Learning, Scalable Analytics, ML Systems, Probabilistic Reasoning, Robotics	(Advised by Prof. Judith Fan)

## PUBLICATIONS

[Google Scholar Stats](#) (up to 9/23/2025): Citation = 112, h-index = 2, i10-index = 1

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- [P4] ***DesignWeaver: Dimensional Scaffolding for Text-to-Image Product Design.***  
Sirui Tao, Ivan Liang, Cindy Peng, Zhiqing Wang, Srishti Palani, and Steven Dow.  
In Conference on Human Factors in Computing Systems 2025. [\[link\]](#)
- [P3] ***HotSpot: Screened Poisson Equation for Sign Distance Function Optimization.***  
Zimo Wang, Cheng Wang, Taiki Yoshino, Sirui Tao, Ziyang Fu, and Tzu-Mao Li.  
In Conference on Computer Vision and Pattern Recognition 2025 (Highlight). [\[link\]](#)
- [P2] ***Physion++: Evaluating Physical Scene Understanding with Objects Consisting of Different Physical Attributes in Humans and Machines.***  
Hsiao-Yu Tung, Mingyu Ding, Zhenfang Chen, Sirui Tao, Vedang Lad, Daniel Bear, Chuang Gan, Josh Tenenbaum, Daniel Yamins, Judith Fan, and Kevin Smith.  
In Proceedings of the Annual Meeting of the Cognitive Science Society 2023. [\[link\]](#)
- [P1] ***Physion: Evaluating Physical Prediction from Vision in Humans and Machines.***  
Daniel Bear, Elias Wang, Damian Mrowca, Felix Binder, Hsiao-Yu Tung, Pramod RT, Cameron Holdaway, Sirui Tao, Kevin Smith, Fan-Yun Sun, Fei-Fei Li, Nancy Kanwisher, Josh Tenenbaum, Dan Yamins, and Judith Fan.  
In Advances in Neural Information Processing Systems (NeurIPS Datasets & Benchmarks Track) 2021. [\[link\]](#)

## ACADEMIC EXPERIENCE

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2024 - Now	<b>UC San Diego Design Lab</b> - Graduate Researcher (Advised by Prof. Steven Dow) <ul style="list-style-type: none"><li>Led research projects on designing novel design-support interfaces to assist novice designers in idea divergence and convergence in individual and collaborative settings. The studies investigate how to enhance generative models using faceted meta-information structures to decompose design dimensions, thereby aiding designers' explorations. They also examine methods to encourage idea convergence in collaborative design environments [4, 5].</li></ul>	La Jolla, CA, USA
2023 - 2025	<b>UC San Diego Visual Computing Group</b> - Graduate Researcher (Advised by Prof. Tzu-Mao Li) <ul style="list-style-type: none"><li>Combined neural methods with traditional graphics pipelines to enable flexible and physically informed forward and backward physical interaction prediction. Leveraged diffusion-based models to study discontinuity-aware super-resolution and compression techniques. Assisted in running experiments involving novel neural heat-diffusion-based loss terms for signed distance functions (SDF), achieving state-of-the-art performance on multiple 2D and 3D SDF-related benchmarks, such as surface reconstruction [3].</li></ul>	La Jolla, CA, USA

- 2022 - 2023 **UC San Diego Halicioğlu Data Science Institute** - Undergraduate Researcher *La Jolla, CA, USA*  
(Advised by Prof. Yusu Wang)
- Contributed to developing and implementing a novel graph neural network architecture capable of capturing long-range interaction information in graph-structured data, exhibiting similar or superior performance compared to established models on selected datasets, with notably increased efficiency. Present the senior capstone and HDSI scholarship poster session - [GraphHSCN](#).
- 2021 - 2022 **UC San Diego CogTools Lab** - Undergraduate Researcher *La Jolla, CA, USA*  
(Advised by Prof. Judith Fan)
- Contributed to the design and generation of 3D stimuli illustrating both rigid and non-rigid physical interactions. Conducted data analysis to quantitatively compare the physical understanding of state-of-the-art vision models with human perception, aiming to identify key limitations, suggest promising future directions, and provide future vision ML model researchers with a comprehensive benchmark dataset for evaluations. Additionally, assisted in building the online evaluation website to collect human prediction data on the physical stimuli [1, 2].

## WORKING EXPERIENCE

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- 2023 **SchedGo** - Data Engineer *Remote*
- Built the data infrastructure for product analytics and ML algorithm using Firestore;
  - Conducted marketing data analytics to identify key user groups for promotion efforts;
  - Designed a survey model for the front end to gather more direct user feedback.
- 2022 - 2023 **San Diego Supercomputer Center** - Deep Learning Engineer Intern *La Jolla, CA, USA*
- Used Ray Tune to test scalable multi-GPU hyperparameter tuning on HPC infrastructure;
  - Investigated data-centric MLOps solutions to make experimentation more time and resource-efficient.
- 2022 **Tesla** - Data Scientist Intern *Fremont, California, USA*
- Investigated lossless image compression solutions, saving ~20% of annual image storage;
  - Built and deployed end-to-end process-agnostic advanced statistical process control and quality disposition tools with automatic alert systems; continuously monitored & improved based on user feedback from the process engineering team;
  - Conducted data analyses on various datasets to identify root causes & validate model performance.
- 2021 **Bühler Group** - Data Scientist Intern *Wuxi, Jiangsu, China*
- Researched and initiated the effort to build an Image-Labeling MLOps feature in our B2B product prototype to optimize the model adaptability for defect detection;
  - Prototyped an MVP using Figma & Angular and got praise from the Director of Innovation;
  - Crafted new IoT analytics to understand users' experience better when creating a digital twin.
- 2021 **J.D. Power** - Analyst Intern *Shanghai, China*
- Refined the quality analytics team's workflow by automating data processing and report pipelines, saving more than 200 analytics hours/ year;
  - Provided detailed documentation on Git to ensure continuous usage for non-technical teammates.
- 2020 **Bosch** - Data Analyst Intern *Wuxi, Jiangsu, China*
- Provided effective data analysis and visualization on Tableau for continuous monitoring of data and parameter tuning to gain valuable analytic insights based on the Bosch Industry 4.0 transformation roadmap;
  - Reduced manufacturing bottlenecks diagnosis and insight extraction time by 80% for manual inspection and analysis by algorithmically suggesting optimal parameters;
  - Presented dashboards to the Director of Manufacturing Analytics Solutions.

## RESEARCH MENTORSHIP

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2025	Domonick Marshall, B.S. UCSD	[P5]
2025-2024	Kiruthika Marikumaran, B.S. + M.S. UCSD	[P5]

## ACADEMIC SERVICE

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2026	CHI 2026 Full Paper Reviewer (8 papers) UCSD Design Lab Weekly Research Meeting 25-26 Annual Organizer
2025	CI 2025 Extended Abstract Reviewer (1 paper) + Student Volunteer CHI 2025 Late Breaking Work Reviewer (2 papers) DIS 2025 Work-in-Progress Reviewer (1 paper) UCSD Design Lab Weekly Research Meeting 24 Fall Quarter Co-host

## PERSONAL PROJECTS

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2023	Tree-of-thoughts Context-aware Encoding for LLMs	La Jolla, CA, USA
	<ul style="list-style-type: none"><li>Led the development of a context-aware encoding algorithm for Large Language Models (LLMs), improving knowledge retrieval accuracy and contextual understanding without requiring model fine-tuning.</li><li>Developed a hierarchical "context tree" structure to compress entire documents into a single prompt, enhancing LLMs' response relevance and creativity to user queries.</li></ul>	

## VOLUNTEERING

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2025 - Now	GradWIC @ UCSD - Mentor	La Jolla, CA, USA
	<ul style="list-style-type: none"><li>Mentored CSE master's &amp; undergrad students on research, careers, and grad-school preparation.</li></ul>	
2025 - Now	Colors of the Brain @ UCSD - Mentor	La Jolla, CA, USA
	<ul style="list-style-type: none"><li>Mentored underrepresented undergraduates into neuroscience research roles and PhD pathways.</li></ul>	
2021 -2022	Halicioğlu Data Science Institute @ UCSD - Data Science Student Representative	La Jolla, CA, USA
	<ul style="list-style-type: none"><li>Peer-advised undergraduate students; evaluated and improved the data science curriculum; promoted the program to external audiences.</li></ul>	
2021 - 2022	Mentor Collective @ UCSD - Mentor	La Jolla, CA, USA
	<ul style="list-style-type: none"><li>Mentored first-year and transfer students; provided guidance and support for adapting to university life; connected students to campus resources and communities.</li></ul>	

## SKILLS

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HCI	User-Centered Design, Interaction Design, Prototyping, Interview, Quantitative Methods, A/B Testing
Data Science	Scalable Analytics, Data Visualization, MLOps, Recommender System, Data Mining, Database
AI/ ML	LSTM, GAN, Diffusion Models, GNN, NeRF, 3D Gaussian Splatting, Reinforcement Learning, LLM
Software	Python, R, SQL, Angular, D3.js, PyTorch, Clickhouse, Firestore, DevOps, Agile, AV/ VR
Mathematics	Probabilistic Reasoning, Descriptive and Inferential Statistics, Stochastic Process

## TEACHING

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2025 Summer	COGS 187A <b>Usability &amp; Info. Architecture</b> - TA with Prof. Mary ET Boyle	UCSD
2025 Summer	COGS 186 <b>Genetic Algorithms</b> - TA with Prof. Anjum Gupta	UCSD
2025 Winter	DSGN 1 <b>Design of Everyday Things</b> - TA with Prof. Michael Meyer	UCSD
2024 Fall	DSGN 1 <b>Design of Everyday Things</b> - TA with Prof. Michael Meyer	UCSD
2024 Summer	CSE 175 <b>Entrepreneurship for Engineers</b> - TA with Prof. Rakesh Kumar	UCSD
2024 Spring	DSGN 1 <b>Design of Everyday Things</b> - TA with Prof. Scott Klemmer	UCSD
2024 Winter	COGS 9 <b>Introduction to Data Science</b> - TA with Prof. Meenakshi Khosla	UCSD

## HONORS & AWARDS

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2025 - 2031	SHORE Fellowship, UCSD (~\$70,000 in value & 3 recipients @ CogSci Department annually)
2023 - 2024	IGE Shah Fellowship, UCSD (\$5,000 & 2 recipients @ UCSD annually)
2023	The Cornell, Maryland, Max Planck Pre-doctoral Research School Fellowship (3,000\$ & ~60 global recipients annually)
20 Spr, 22 Win	TRELS Research Scholarship, AEP, UCSD (\$1,000 * 2 & ~75 recipients @ UCSD quarterly)
2021, 2022	HDSI Research Scholarship, HDSI, UCSD (\$2,500 * 2 & ~20 recipients @ HDSI Department annually)
2019 - 2023	Provost Honor, Warren College, UCSD (\$0, but it sounds cool 😊 & ~20% students @ Warren College annually)