Sirui Tao

La Jolla, CA, USA | s1tao@ucsd.edu | dylantao.github.io | LinkedIn | Google Scholar

Education

University of California San Diego

2023 - 2025 M.S. Computer Science and Engineering - HCI & Graphics (Advised by Prof. Steven Dow and Prof. Tzu-Mao Li)

2019 - 2023 B.S. Data Science & B.S. Probability and Statistics - minor in Economics (Advised by Prof. Judith Fan)

Publication

2025 ***Tao, S.**, Liang, I., Peng, C., Wang, Z., **Palani, S., and **Dow, S. (2025). DesignWeaver: Dimensional Scaffolding for Text-to-Image Product Design. Revise & Resubmit by ACM CHI 2025. [link]

2025 *Wang, Z., *Wang, C., Yoshino, T., **Tao, S.**, Fu Z., **Li, T.-M. (2025). HotSpot: Screened Poisson Equation for Sign Distance Function Optimization. Under Review by CVPR 2025. [link]

2023 *Tung, H.-Y., *Ding, M., *Chen, Z., **Tao, S.**, Lad, V., Bear, D., Gan, C., Tenenbaum, J., Yamins, D., Fan, J. and Smith, K. (2023). Physion++: Evaluating Physical Scene Understanding with Objects Consisting of Different Physical Attributes in Humans and Machines. In Proceedings of the Annual Meeting of the Cognitive Science Society 2023. [link]

2021 *Bear, D., *Wang, E., *Mrowca, D., *Binder, F., Tung, H.-Y., RT, P, Holdaway, C., **Tao, S.**, Smith, K., Sun, F.-Y., Li, F.-F., Kanwisher, N., Tenenbaum, J., **Yamins, D., and **Fan, J. (2021). Physion: Evaluating physical prediction from vision in humans and machines. In Advances in Neural Information Processing Systems (NeurIPS Datasets & Benchmarks Track) 2021. [link]

Academic Experience

2024 - Present **UCSD, ProtoLab - Graduate Researcher** La Jolla, CA, USA

(Advised by Steven Dow)

- Investigate how to improve generative models with faceted meta-information structures to decompose design dimensions to aid designers' explorations and study how to encourage idea convergence in collaborative design settings better.

2023 - Present **UCSD, Visual Computing Group - Graduate Researcher** La Jolla, CA, USA

(Advised by Tzu-Mao Li)

- Combine neural methods and traditional graphics pipelines to enable flexible and physically informed forward and backward physical interaction prediction; study discontinuity-aware superresolution and compression technique while leveraging diffusion-based models.

2022 - 2023 **UCSD, Halıcıoğlu Data Science Institute - Undergrad Researcher** La Jolla, CA, USA

(Advised by Yusu Wang)

- Develop and implement GraphHSCN, 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 **UCSD, CogTools Lab - Undergraduate Researcher** La Jolla, CA, USA

(Advised by Judith Fan)

- Designed and generated 3D stimuli for non-rigid physical interactions and conducted data analysis to evaluate vision models' physical understanding compared to human perception.

Working Experience

2023 **SchedGo - Data Engineer** Remote

- Build the data infrastructure for product analytics and ML algorithm using Firestore;
- Conduct marketing data analytics to identify key user groups for future promotion efforts;
- Design 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

- Use Ray Tune to test scalable multi-GPU hyperparameter tuning on HPC infrastructure;
- Investigate data-centric MLOps solutions to make experimentation more time and resource-efficient.

2022 **Tesla - Data Scientist Intern** Fremont, California, USA

- Investigate lossless image compression solutions, saving ~20% of annual image storage;
- Build and deploy end-to-end process-agnostic advanced statistical process control and quality disposition tools with automatic alert systems; continuously monitor & improve based on user feedback from the process engineering team;
- Conduct data analyses on various datasets to identify root causes & validate model performance.

2021 **Bühler Group - Data Scientist Intern** Wuxi, Jiangsu, China

- Research and initiate the effort to build an Image-Labeling MLOps feature in our B2B product prototype to optimize the model adaptability for defects detection;
- Prototype an MVP using Figma & Angular within a cross-functional innovation team;
- Showcase the proposal to the division and get praise from the Director of Innovation;
- Refine and participate in reviewing new analytics features on our IoT platforms to help our customers with their digital twin adaptation journey with better business insight extraction with descriptive & predictive modeling.

2021 **J.D. Power - Analyst Intern** Shanghai, China

- Optimize workflow of the quality analytics team by refining the analytics processes via automating data processing and report pipelines, saving more than 200 working hours/ year for the team;
- Provide detailed documentation on Git to ensure continuous usage for teammates from non-technical backgrounds.

2020 **Bosch - Data Analyst Intern** Wuxi, Jiangsu, China

- Provide 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;
- Cut down manual inspection and analysis time by providing crucial insight on key bottlenecks and reducing critical bottlenecks diagnosing time by 80% in manufacturing lines with insights on potential optimal parameters;
- Present dashboards to the MAS (Manufacturing Analytics Solution) Director at the monthly briefing.

Project Experience

2023 **Tree-of-thoughts Context-aware Encoding for LLMs** La Jolla, CA, USA

- Lead 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.
- Develop a hierarchical "context tree" structure to compress entire documents into a single prompt, enhancing LLMs' response relevance and creativity to user queries.

Teaching Experience

2024 Summer	**UCSD CSE 175 - Entrepreneurship for Engineers - Teaching Assistant**	La Jolla, CA, USA
2024 Spring, Fall	**UCSD DSGN 1 - Design of Everyday Things - Teaching Assistant**	La Jolla, CA, USA
2024 Winter	**UCSD COGS 9 - Introduction to Data Science - Teaching Assistant**	La Jolla, CA, USA

Other Skills

HCI	User-Centered Design, Interaction Design, Prototyping, Qualitative & 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

Honors & Awards

2023 - 2024	IGE Shah Fellowship, UCSD
20 Spr, 22 Win	TRELS Research Scholarship, AEP, UCSD
2021 - 2022	Data Science Student Representative, HDSI, UCSD
2021, 2022	HDSI Research Scholarship, HDSI, UCSD
2019 - 2023	Provost Honor, Warren College, UCSD