Nathan Tsao

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Applied **Machine Learning Engineer** with experience in **generative AI**, **reinforcement learning**, and **scalable machine learning**. Published researcher experienced in translating cutting-edge methods into real-world AI applications. Project portfolio available at nathantsao.com.

Education

University of Texas at Austin Aug 2023 – May 2025
Masters of Science: Mechanical Engineering (ML-focused) GPA: 3.74
Thesis: Neural Port-Hamiltonian Differential Algebraic Equations

University of Illinois Urbana-Champaign Aug 2019 – May 2022
Bachelors of Science: Mechanical Engineering GPA: 3.87

Work Experience

NASA Ames Research Center June 2025 – Aug 2025
Autonomous Aircraft Operations Research Intern Mountain View, CA

- Developed a multi-agent hierarchical path-planning framework for autonomous aircraft using reinforcement learning (RLlib), enhancing safety and efficiency.
- Developed RL algorithms that balanced safe traffic-following with minimized travel times.

Berkeley Lights June 2022 – Sep 2022
Hardware Engineering Intern Berkeley, CA

- Automated data-acquisition and calibration pipelines in Python, improving reproducibility and efficiency.
- Designed hardware and software integration for temperature calibration sensors.

Research Experience

Autonomous Systems Group: UT Austin Dec 2023 – May 2025
Graduate Research Assistant Austin, TX

- Designed compositional machine learning frameworks for differential-algebraic systems, enabling scalable modeling of electrical networks.
- Developed a low-power, low-latency human activity recognition model optimized for batteryless sensors, resulting in 15-50% relative improvement over baselines.

Hybrid Robotics Group: UC Berkeley May 2022 – Jan 2023
Visiting Research Assistant Berkeley, CA

- Implemented a reinforcement learning-based locomotion balancing controller for tailed quadruped robots.
- Integrated hardware with custom actuators and motor controllers for robust RL deployment.

RoboDesign Lab: UIUC Jan 2022 – May 2022
Undergraduate Research Assistant Urbana, IL

- Prototyped a low-cost force-sensing humanoid robot foot using elastomers and Hall sensors.
- Applied Gaussian processes to estimate force signals in humanoid robot feet.

Publications

Cyrus Neary*, Nathan Tsao*, and Ufuk Topcu. Neural Port-Hamiltonian Differential Algebraic Equations for Compositional Learning of Electrical Networks. *Accepted to CDC 2025.*

Geffen Cooper*, Nathan Tsao*, Filippos Fotiadis, Ufuk Topcu, Radu Marculescu. Learning from Sparse and Asynchronous Data Streams for Batteryless Sensors. *Under review at NeurIPS 2025.*

Selected Projects

Causal Diffusion Guidance May 2025

Statistical Machine Learning Final Project

- Built a diffusion-based framework for generating causally consistent counterfactuals, demonstrating reasoning capabilities in generative models.

Murcanti – Global eCommerce Mobile Application May 2025

Co-Founder murcanti.com

- Leading development for an iOS/Android mobile application (Flutter, Supabase, SQL) and custom API services (TypeScript, FastAPI) for product search and transactions (Stripe).
- Exploring LLM-powered semantic search using Hugging Face and Qdrant to improve product discoverability and user experience.

Teaching Experience

ASE 370C Feedback Control Systems: UT Austin Jan 2025 – May 2025

Graduate Teaching Assistant Austin, TX

ME 314D Dynamics: UT Austin Sep 2023 – Dec 2023

Graduate Teaching Assistant Austin, TX

Honors and Awards

Dr. J. Parker Lamb Endowed Presidential Fellowship: UT Austin 2023

Nominated by the Walker Department of Mechanical Engineering.

Highest Honors: UIUC 2022

Awarded to students with at least a 3.8 Illinois GPA and continual commitment to service and education.

Dean's List: UIUC 2019-22

Awarded to undergraduate students in the top 20 percent of their college class.

Outreach

Del Valle High School Visit Mar 2025

Presented machine learning academic research to engineering and robotics high school students. Austin, TX

UT Austin Girls Day Feb 2024

Guided K-8th graders to program remote-controlled cars in Python. Austin, TX

Skills

Skills: Deep Learning | Generative AI | Large Language Models | Scientific ML | Linux
Programming Languages: Python | SQL | Dart | C++
Tooling: Git | Docker | Supabase
Frameworks: PyTorch | JAX | Flax | Hugging Face | FastAPI | Pandas | Ray (RLlib) | Stable-Baselines3 | TensorFlow
Languages: English | Mandarin
Relevant Coursework: Reinforcement Learning | Statistical Machine Learning | Theoretical Statistics | Convex Optimization