

ALEX SPAETH

Versatile data scientist and software engineer experienced in leading interdisciplinary teams. Expert in communicating complex technical concepts to diverse stakeholders.

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Professional Experience

Graduate Student Researcher at U.C. Santa Cruz Genomics Institute

September 2017–present

- Provided key research insights and technical solutions that led to 10+ peer-reviewed papers, including work in high-impact journals such as *Nature Neuroscience*; regularly consulted by colleagues on writing and figure design.
- Led architecture and implementation of a neuroscience analysis library now foundational to multiple publications.
- Scaled computational simulations and machine learning models to hundreds of distributed compute nodes.
- Developed framework for running Jupyter notebooks via Kubernetes and persisting results to S3.
- Contributed to grant proposals collectively worth over \$10M.
- Led regular discussion and practice sections for 20–30 students across multiple engineering and math courses, adapting teaching methods to diverse student backgrounds.
- Created the first neuromorphic feedback control platform to directly interface spiking neurons with DC motors.
- Developed kinematic models of flexible voxel- and origami-based robots.
- Corrected a more than 50% error in published computational chemistry work by analyzing polymerization dynamics.
- Optimized algorithmic complexity and memory usage to vastly expand the scale of feasible simulations.

Cofounder at Buyer Buddy

August 2023–December 2023

- Designed product and UX flow based on market research and 20+ user interviews.
- Built and soft launched “virtual consultant” LLM web app with collaborative features for project management.
- Explored RAG and fine-tuning methods to improve conversation quality in response to user testing.

Senior Data Scientist at Hargrave & Associates

October 2021–July 2023

- Led client interactions, synthesizing complex technical requirements into clear deliverables to land a major contract.
- Reduced analyst workloads 40% by classifying potentially fraudulent insurance claims.
- Engineered AWS infrastructure for automatic model updates, ensuring seamless operation for nontechnical users.
- Predicted substance use disorder from medical history with 80% accuracy, using explainable AI to translate thousands of medical record fields into a simple survey for clinical use.
- Designed ML data pipelines including transformations and feature selection, paring down huge and inconsistent healthcare datasets to meet challenging performance targets on a limited computational budget.
- Directed and presented detailed market research, advising clients on strategic business decisions.

Education

Ph.D. in Computer Engineering, University of California, Santa Cruz (October 2024)

Computational Modeling of In Vitro Neuronal Dynamics

B.S. in Electrical Engineering and Computer Science, University of California, Berkeley (May 2017)

Skills

Programming	Python, JS/TS, Embedded C, C++, Go, HTML/CSS, Bash, SQL
Technologies	Linux, Git, Postgres, ROS, PyTorch, CUDA, AWS, Kubernetes, Docker, Next.js
Data Science	Deep learning, signal processing, statistical testing, clustering, data visualization
Other	Teaching, technical writing, scientific computing, physics modeling, control systems

Selected Publications

Spaeth et al. (2024) “Model-agnostic neural mean field with a data-driven transfer function” in *Neuromorphic Computing and Engineering*.

Andrews et al. (2024) “Optogenetic modulation of epileptiform activity in human brain tissue” in press at *Nature Neuroscience*.

Hargrave, Spaeth, et al. (2024) “Benchmarking reinforcement learning in healthcare” in review at NeurIPS.

van der Molen, Spaeth, et al. (2024) “Protosequences in human cortical organoids model intrinsic states in the developing cortex” in review at *Nature Neuroscience* ([preprint](#)).

Zare, Spaeth, et al. (2023) “Modular self-lock origami” in *Proceedings of the IME, Part K: Journal of Multi-Body Dynamics*.

Tebyani, Spaeth, et al. (2022) “A geometric kinematic model for flexible voxel-based robots” in *Soft Robotics*.

Spaeth & Hargrave (2020) “A polyaddition model for the prebiotic polymerization of RNA and RNA-like polymers” in *Life*.

Spaeth et al. (2020) “Neuromorphic closed-loop control of a flexible modular robot by a simulated spiking central pattern generator” in *Proceedings of the 3rd IEEE International Conference on Soft Robotics*.