

# Caden Roberts

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## Education

### University of California, Santa Cruz

Santa Cruz, CA

Computer Science and Engineering MS Sep. 2025 – Jun. 2026, Computer Engineering BS Aug. 2023 – Jun. 2025

### West Valley College

Saratoga, CA

Honors Program, Mathematics AS Aug. 2021 – Jun 2023, Liberal Arts: Math and Sci AA Aug. 2021 – Jun 2023

**Graduate Coursework:** Machine Learning, Neural Computation, Artificial Intelligence, Projects in Artificial Intelligence, Ind. Research, Analysis of Algorithms, Computer Architecture, Database Systems, Storage Systems, VLSI Digital System Design

**Relevant Undergraduate Coursework:** Data Structures and Algorithms, Computer Architecture, Embedded System Design, Computer System Design, Engineering Design Project I/II, Full Stack Web Development, Python Programming, C Programming, C++ Programming I/II, Computer Networks, Assembly Language, Logic Design, Electronic Circuits, Signals and Systems

## Experience

### Machine Learning Researcher

BioMed UCSC, Santa Cruz, CA, Jul. 2025 – Present

- Developing **HelixNet**, a Coarse-Grained DNA-protein SchNet model with Graph Neural Networks.
- Generated OpenMM Ground Truth dataset with WESTPA and the WESTPA CG model runs on NERSC A100 GPUs.
- Evaluated sampling efficiency, RMSD, and step speed of WESTPA/CG model runs against WESTPA/OpenMM baselines.

### Group Tutor and Grader

Baskin Engineering, UCSC, Santa Cruz, CA, Jan. 2025 – Present

- Tutoring 5-15 students / 5-hr session / 2x per week per class for Applied Discrete Mathematics and Python Programming.
- Grading exams of 200+ students for Python Programming.

### Undergraduate Research Assistant

Baskin Engineering, UCSC, Santa Cruz, CA, Jan. 2025 – Mar. 2025

- Implemented custom FIFO, LIFO, and Round-Robin schedulers in Linux using sched\_ext.
- Developed and evaluated custom scheduling policies for **Ecovisor**, an AI-driven framework leveraging cloud computing to select optimal software schedulers and improve energy efficiency at renewable energy plants.

## Projects

### ClinImCL | Google Cloud, PyTorch, MONAI, NIfTI, UMAP

Oct. 2025 – Present

- Developed a self-supervised contrastive learning framework for longitudinal MRI analysis on OASIS-3 (2800 MRIs, 1300 subjects).
- Implemented a MONAI-based preprocessing and training pipeline for NIfTI MRI standardization and lightweight 3D CNN contrastive learning (InfoNCE,  $\tau = 0.07$ ) on Colab A100 GPUs with mixed-precision GCS streaming.
- Observed convergence from 2.05  $\rightarrow$  1.94 loss over 10 epochs (25% dataset slices)
- Evaluated learned representations through UMAP visualizations and cosine-distance metrics, confirming temporally consistent, subject-specific embeddings suitable for downstream Alzheimer's progression modeling.

### CliniRepGen | Python, PostgreSQL, Tongyi DeepResearch, RAG, AWS Bedrock, Supabase, Git LFS

Sep. 2025 – Present

- Developing an automated pipeline to generate CONSORT/ICH E3-compliant drug clinical trial reports from structured and unstructured biomedical data.
- Using Tongyi DeepResearch via OpenRouter and data from AACT Postgres, Drugs@FDA, and PMC OA/Citation Explorer with Python scripts, pdfplumber/other libraries.
- Using Supabase to store and selectively query the AACT Postgres and Drugs@FDA data.

### TheraHand | Node.js, Express.js, React.js, PostgreSQL, ESP32C3, AWS EC2, OpenAPI, Swagger

Jan. 2025 – Jun. 2025

- Led full-stack development of a physical therapy hand rehabilitation device app deployed on AWS EC2.
- Built the Node.js-Express-React application with PostgreSQL to log and simulate progress and interface with ESP32C3.
- Messaging, 3D-Modeling and playback of device data, doctor/patient/admin roles with unique UI and privileges
- Defined and documented RESTful API endpoints through a complete OpenAPI specification.

## Technical Skills

**Languages:** Python, C++, C, SQL, Bash, JavaScript, R, HTML/CSS, Verilog, RISC-V, MATLAB

**Frameworks and Libraries:** PyTorch, TensorFlow, MONAI, NumPy, Pandas, Scikit-learn, OpenMM, WESTPA, React.js, Node.js, Express.js

**Tools and Platforms:** Google Cloud, AWS, HPC (NERSC Perlmutter), CUDA, Docker, Slurm, PostgreSQL, Supabase, Jupyter, Git, VS Code, Xcode, Tableau, SolidWorks

**APIs and Protocols:** RESTful API Design, OpenAPI/Swagger, JSON, YAML

## Certifications

[Google Data Analytics Professional Certificate](#) | R, SQL, Tableau

May 2024