

Max Ratcliff

max@ratcliff.cc | ratcliff.cc | linkedin.com/in/max-ratcliff | github.com/Max-Ratcliff

Summary

Applied Mathematics & Computer Engineering undergraduate at UC Santa Cruz with **research experience in AI/ML**, specifically in **Multimodal Deep Learning, Neuromorphic Computing, and JEPA**. Proficient in **PyTorch, Verilog, and systems-level programming**. Seeking a CS/ML internship to leverage mathematical foundations and modern deep learning frameworks to solve complex, large-scale problems.

Education

University of California, Santa Cruz, Santa Cruz, CA Expected June 2027
B.S Double Major: Applied Mathematics & Computer Engineering (Systems Concentration) 3.6/4.0

Relevant Coursework:

- **Math & ML:** Scientific ML, AI Research, ML & Data Mining, Linear Algebra, ODEs/PDEs, Vector Calculus.
- **Systems & CS:** Logic Design (Verilog), Computer Networking, Computer System Design, Operating Systems, Data Structures.

Skills

Programming: Python, C, C++, Verilog, RISC-V ASM, MATLAB, Java, JavaScript, Fortran 90, HTML/CSS, LaTeX
Libraries & Frameworks: PyTorch, JAX, NumPy, SciPy, Pandas, Matplotlib, FastAPI, React, Node.js, Docker
Tools & Platforms: Git, Unix/Linux, Google Cloud, Firebase, Supabase

Experience

Software Engineering Intern, AMI April 2026 — Present

- Developing an LLM orchestration platform (**LiteLLM** based) to unify prompt management, key privacy, and usage guardrails.
- Wrote API documentation for centralized prompt management endpoints, streamlining model integration across internal teams.

Undergraduate Researcher, UC Santa Cruz Jan 2026 — April 2026

- Researched aligning **Spiking Neural Networks (SNNs)** with biological manifolds using **Joint-Embedding Predictive Architectures (JEPA)**.
- Implemented cloud training pipelines using **snntorch** and **LeJEPA**, validating neural alignment via **Canonical Correlation Analysis (CCA)**, leveraging high-power GPUs via Google Colab.
- Developing interpretable neural circuit motifs by filtering noise through JEPA's predictive objectives, bridging deep learning and biological plausibility.

SciAI Pathways Scholar, UC Santa Cruz (ARO Lab) June 2024 — Present

- Developing a **multimodal wound healing model** combining wound images (**ResNet-50**) with RNA genomic data (**MLP**) in **PyTorch**.
- Mentoring first-year researchers on deep learning implementation and exploring embedding architectures for small-sample optimization.
- Engineered a fully automated data pipeline in **Python** using **CellPose** to process 5,000+ microscopy images with **99% accuracy** and **0.3ms latency**; awaiting experimental results for publication.

Resident Assistant, UC Santa Cruz Sept 2024 — Present

- Direct leadership resource for **60 residents** and 24/7 on-call emergency lead for a community of **2,500+ students**; managing conflict resolution and crisis intervention.
- Mentor new RAs on effective conflict resolution and community building strategies.

Senior Lifeguard & Instructor (Supervisor), City of Pasadena Summers 2020 — 2025

- Acted as third-in-command for daily pool operations, supervising staff and managing safety for **300+ daily swimmers**.
- Instructed 2,000+ students in Red Cross curriculum, teaching water safety and swimming skills at all levels.

Projects

Neural Network Chess Engine chess.ratcliff.cc

- Built a hybrid engine pairing **Minimax search** with a **dual-head ResNet** achieving a **1647 ELO rating**; trained on **160 Million** positions using A100 GPUs.
- Optimized **inference** via policy pruning, achieving **15,000 nodes/sec** on an M2 chip for 6-ply depth play.

Autoregressive Weather Model weather.ratcliff.cc

- Trained a **convolutional VAE** on 5 years of historical data for sparse sensor reconstruction (**0.00032 MSE loss**).
- Developed a **conditional autoregressive VAE** for 72h pattern prediction, achieving **0.0006 MSE** on 48h forecasting.

Calendarize — AI Media-to-Calendar calendarize.ratcliff.cc

- Co-developed a tool using **FastAPI** and **Gemini API** to convert unstructured media into calendar events; deployed via **Docker** on **Google Cloud**.