

Maxwell DeFanti

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EDUCATION

University of California, Berkeley

Berkeley, CA

Bachelor of Arts in Applied Mathematics + Data Science

Aug. 2024 – May 2028

- Probability and Random Processes, Probability Theory, Data Structures and Algorithms, Differential Equations, Abstract Algebra, Linear Algebra, Discrete Mathematics, Calculus 1-3, Data Science Foundations, Quantum Information Theory, Statistical Measure Theory and Real Analysis, Chemistry 1, Kinematics,

EXPERIENCE

Deep Learning Researcher

September 2025 – Present

Berkeley Artificial Intelligence Research

Berkeley, CA

- Designed and built novel Continual Compress Refresh algorithm with **PyTorch** that **completely eliminates loss of plasticity** in standard Feed-Forward, Convolutional, and Residual **neural networks** while outperforming the state of the art in task recall
- Developed a **deep learning compression algorithm** to prune redundant activation signals in **neural networks** into single nodes with a projected increase in inference efficiency of over **1000%** for high dimensional neural networks

Software Engineering Intern

June 2025 – Present

The Materials Project

Lawrence Berkeley National Lab, Berkeley, CA

- Built critical **full-stack applications** for admin side **database management**, filtration, and modification using **dash.py** and the **MPContribs** api for a DOE funded research initiative with **30,000+ citations**
- Developed a novel web interface that enabled **600,000+** users of the **Materials Project** to upload and modify their research data, implementing custom **React** components, efficient information extraction across file types and flexible data formatting with **Pandas**, and seamless **API** integration

Chief Machine Learning Engineer

June 2025 – September 2025

GovernAIce

Hybrid

- Led the development of a **RAG** model capable of synthesizing complex AI regulation compliance requirements. Used **LangChain** for text chunking, built a multilingual textual **vector embedding** model adapted to legal documents. Engineered data pipelines in **MongoDB**, **Finetuned LLMs** for legal accuracy and relevancy

Machine Learning Developer

January 2025 – May 2025

TetraTokyo

Remote

- Fined tuned **Large Language Models** on multilingual data and Bridged LLM and Database functionality using a **Python** backend with **Notion API**, **OpenAI API**, and the **HTTP requests** package
- Employed **NLP** techniques and mathematical analysis of **financial markets** to determine and generate maximally effective region-specific marketing rhetoric

Full-stack Engineering Consultant

January 2025 – May 2025

Northeast Valley Health Corporation

Remote

- **Developed and deployed** a full-stack employee scheduling platform with **Node.js** and **TypeScript**, enabling 80+ healthcare providers to coordinate coverage; containerized and hosted on a **Linux** server with **Docker**.
- **Designed and optimized** automated scheduling interfaces (staff management, vacation tracking, availability dashboards) with **PostgreSQL-backed**, **query-driven views**, dramatically boosting data retrieval efficiency.

PROJECTS

Activation Probes for Synthetic Toxin Variant Detection | *Python, PyTorch, ESM-2, Scikit-Learn*

April 2026

- Trained a **two-layer MLP activation probe** on frozen **ESM-2 650M** mean-pooled embeddings of natural and synthetic toxins using weighted binary cross-entropy, **AdamW**, and **CUDA**-accelerated training and inference
- Achieved **86.7% recall** on synthetic toxin variants at ~40% sequence identity where BLAST collapsed to **46.7%**, with an overall **AUC-ROC of 0.983**

TECHNICAL SKILLS

Areas: Computer Vision, Data Science, Full-Stack Development, LLM Finetuning, Financial Markets, Machine Learning, Mathematical Modeling, Natural Language Processing, Optics, Software Engineering, Statistics, Deep Learning, CNN, ResNet

Languages: Python, Java, C, C++, JavaScript, TypeScript, HTML/CSS, MATLAB, SQL, Linux

Frameworks: React, Node.js, Flask, Plotly Dash

Developer Tools: Git, VS Code IDE, Visual Studio, Jupyter Notebook

Libraries: PyTorch, Scikit-learn, Cuda, Pandas, NumPy, Matplotlib, OpenCV, MATLAB Engine, NLTK, LangChain, MPContribs, PyMOL