

# Alexander Loftus

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AI researcher & communicator with 7+ years of experience in deep learning & machine learning. Research in code interpretability, attribution, and evaluation for Large Language Models. Seeking pivot into a developer advocate / technical evangelist role where deep technical depth, communication and community-building, and teaching ability can combine.

## Career highlights:

**Textbook Authorship:** Authored a [524-page technical book](#) on statistical network ML (Cambridge University Press, November 2025)

**Community-building:** Organized the [New England Mechanistic Interpretability \(NEMI\)](#) conference; [Linear Algebra YouTube lecture series](#) creator; delivered 10+ invited talks to 20-300 attendees; taught hundreds of students through meetups, summer camps, and tutorials.

**Competitions:** Part of a 4-person team that won 1st place in the \$1,000,000 [Vesuvius Kaggle competition](#). (1,249 teams); [featured on the cover of Scientific American](#).

**Research:** Subliminal learning work featured in [YouTube video](#) with 1m+ subscribers; best poster award for a NeurIPS workshop paper; publications in top conferences. PyTorch

**Strategic Advisory:** EleutherAI funding strategy consultant; [CBAI mentor](#) for Harvard/MIT students; advisor for [cybersecurity/mechanistic interpretability](#) startup.

**Cloud & AI Infrastructure:** Light GCP/AWS background. First author on [ICLR paper](#) on scaling up AI systems for interpretability; Scaled up an AWS [AI pipeline](#) for computational neuroscience.

## EDUCATION

**Northeastern University** **Boston, MA**  
*PhD Student*, Computer Science | AI/ML 2024-Present  
*Advisor:* [Dr. David Bau](#)

Focus on mechanistic interpretability in code language models. Data attribution, representation learning, causality.

**Johns Hopkins University** **Baltimore, MD**  
*MSE Biomedical Engineering* | Machine Learning & Data Science Focus 2020-2022  
*Advisor:* [Dr. Joshua Vogelstein](#)  
*Thesis:* [Hands-On Network Machine Learning](#)

dean's list, highest honors, GPA 3.97/4.0.

**Western Washington University** **Bellingham, WA**  
*BS Behavioral Neuroscience* | *Minors:* Chemistry, Philosophy 2014-2018  
*Founder & President*, Computational Neuroscience Club

Built computational neuroscience club from scratch, taught weekly seminars.

## EXPERIENCE

**Data Scientist** **San Diego, CA**  
Creyon Bio 2023-2024

*Large Protein Models For Splice-Site Prediction:* Explored splice site prediction in LLMs trained on protein sequences. Pre-training, fine-tuning, and benchmarking+evals.

*ML for Toxicity Prediction:* Developed a novel contrastive learning pipeline to predict oligo toxicity from 3-D electrostatic maps; increased classification AUC from 0.73 to 0.88.

*Neuron Toxicity Detection:* Developed scalable neuron segmentation and toxicology classification pipeline.

**Machine Learning Research Engineer** **Rockville, MD**  
Blue Halo 2022-2023

*Conditional Image Generation with Generative Adversarial Networks:* Built diffusion-model synthetic data generator.

*Detecting Objects with Enhanced Yolo and Knowledge Graphs:* Led knowledge graph effort for object detection project. Delivered live demos to program officers.

*Geometric Multi-Resolution Analysis:* Led infra for document clustering & analysis method.

**Research Software Engineer** **Baltimore, MD**  
NeuroData Lab, Johns Hopkins University | [Dr. Joshua Vogelstein](#) 2018-2020

*MRI-to-Graphs*: Optimized a diffusion MRI pipeline with Kubernetes, Docker, and AWS Batch. Halved runtime and cut cloud costs by 40%.

*Graspologic*: Worked on an open-source graph statistics library. Later adopted by Microsoft Research for large-scale network analysis.

**Assistant Director**  
iD Tech Camps | University of Washington  
*Leader and Manager*: Managed 10+ instructors/week and 300+ students.  
*Curriculum Designer*: Authored game development curriculum deployed to 50+ locations, impacting 10k+ students nationwide.

**Seattle, WA**  
2014-2018 summers

SKILLS SUMMARY

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**Languages**: Python, Bash, R, Rust, SQL

**Tools & Frameworks**: docker, kubernetes, pytorch, pytorch-lightning, VLLM, AWS, google cloud (GCP), numpy, scipy, pandas, polars, scikit-learn, seaborn, matplotlib, photoshop, SQL, weights & biases, mlflow, linux, cursor, ray, claude code, codex-cli

**Areas of Expertise**: LLMs for code, interpretability, transformers, GPUs and CUDA, linear algebra, probability & statistics, deep learning, information theory, diffusion models, convolutional autoencoders, public speaking, leadership & management, teaching, natural language processing, computer vision

**Soft Skills**: Public speaking, technical writing, leadership, mentorship, community-building

TEXTBOOK

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**Hands-On Network Machine Learning with Python**: *Eric Bridgeford, Alexander R. Loftus, Joshua Vogelstein*. Cambridge University Press. Printed November 2025.

Statistics + spectral representation theory on networks. 524 pages, 147 figures.

SELECTED PUBLICATIONS

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\* indicates equal contribution.  
🏆 indicates best poster.

**Token Entanglement in Subliminal Learning**: *A. Zur, Z. Ying, A.R. Loftus, et al.* NeurIPS mechanistic interpretability workshop 2025.

Investigation on token entanglement in LLMs. Featured in [Welch Labs video](#) on YouTube.

**NNsight and NDIF: Democratizing Access to Open-Weight Foundation Model Internals**: *A.R. Loftus\*, J.Fiotto-Kaufman\*, et al.* ICLR 2025.

Opensource suite for probing & manipulating LLM weights without engineering overhead. Ray GCS Service backend with AWS object storage and VLLM for inference speed.

**🏆A Saliency-based Clustering Framework for Identifying Aberrant Predictions** : *A. Tersol Montserrat, A.R. Loftus, Y. Daihes*. Paper, **NeurIPS** LatinX AI Workshop, 2023.

Detects spurious feature reliance via saliency embeddings.

**A low-resource reliable pipeline to democratize multi-modal connectome estimation and analysis**: *J. Chung, R. Lawrence, A.R. Loftus, et al.* Paper, in review at Nature Methods, 2024

Transforms diffusion MRI scans into graphs; open-sourced ([code](#))

LEADERSHIP & COMMUNITY ENGAGEMENT

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<b>Philanthropic Consultant</b> Developing funding strategy for EleutherAI’s 2025 philanthropic effort	<b>EleutherAI</b> 2025
<b>Conference Organizer</b> Running 200+ person interpretability conference; Raised \$17,000 grant funding.	<b>NEMI</b> 2025
<b>Research Mentor</b> Mentoring Harvard/MIT students in Summer 2025	<b>CBAI</b> 2025
<b>Strategic Advisor</b> Advisor to cybersecurity-focused startup specializing in interpretability tooling for AI systems.	<b>Krnel.ai</b> 2025
<b>Meetup Speaker</b> Speaker & organizer for San Diego AI Meetups.	<b>SDML</b> 2023 - 2024
<b>Hackathon Organizer</b> Helped organize hackathon & workshop to explore statistics for high-dimensional testing.	<b>NeuroData Workshop</b> 2019

## TALKS & DEMOS

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**White-Box Techniques for Code LLMs: Influence Benchmarking, the Attendome, and Variable State Debugging:** *Lawrence Livermore National Laboratory, 2025*

Invited talk on interpretability for code LLMs.

**A Shared Infrastructure for Interpretability:** *FAR AI Tech. Innovations for AI Policy Conf., 2025*

Invited demo for DC policymakers; showcased live editing of GPT2 internals

**State of the Art in Knowledge Editing:** *A.R. Loftus, 2024*

Survey talk on LLM knowledge-editing methods.

**1st Place Solution - Vesuvius Ink Competition:** *R. Chesler, A.R. Loftus, A. Tersol Montserrat, T. Kyi, 2023*

Walkthrough of winning \$100,000 ink-detection model.

**ICML Conference Highlights:** *A.R. Loftus, 2023*

Selected breakthroughs from ICML. Presented to biotech execs and SDML meetup group.

**Working with LLMs:** *AI San Diego Conference, 2023.*

Invited talk: Introduction to LLM engineering. 300+ attendees

**Linear Algebra, from Dot Products to Neural Networks:** *A.R. Loftus, 2023.*

Created a YouTube tutorial series on the fundamentals of linear algebra for machine learning.

## FELLOWSHIPS & AWARDS

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**First Place Winner**

Kaggle Vesuvius Competition, \$100,000. 2023

**Khoury Distinguished Fellowship**

Northeastern University PhD fellowship. 2024

**GCP Research Grant**

\$5,000 grant for computational research. 2025

**Best Poster Award**

NeurIPS 2023 LatinX AI Workshop. 2023

**Harvard AI Safety Technical Fellowship**

Harvard fellowship for technical work in AI safety. 2025

**AWS Research Grant**

\$10,000 grant for computational research on cloud services. 2019

## TEACHING

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**Head Teaching Assistant**

Foundations of Computational Biology and Bioinformatics, *EN.BME.410/634* Johns Hopkins University

Spring 2021

**Teaching Assistant**

NeuroData Design II, *EN.BME.438/638* Johns Hopkins University

Spring 2020

**Teaching Assistant**

NeuroData Design I, *EN.BME.437/637* Johns Hopkins University

Fall 2019

**Teaching Assistant**

Introduction to Behavioral Neuroscience, *PSY.220* Western Washington University

Winter 2017

**Curriculum Designer**

Built curriculum used across 50 locations in the United States by tens of thousands of students. iD Tech Camps

Spring 2017

**Instructor**

Taught programming and game design to high school students. iD Tech Camps

2014-2018 summers

## FUN

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**Gaming:** Starcraft 2 grandmaster, local tournament winner; WoW 10-man server first ToGC (off-tank)

**Music:** Fingerstyle guitarist; performed at open mic nights.

**Dancing:** Partner dance instructor and competition winner (Fusion, West Coast Swing, Zouk)