

# Vinam Arora

📍 Philadelphia, PA | 🌐 vinam.dev | ✉ vinam@seas.upenn.edu | 🎓 Google Scholar | 🔗 LinkedIn | ☎ +1-(470)-301-1348

**Bio:** Third-year Machine Learning PhD student at the University of Pennsylvania, developing deep learning methods for neuroscience, timeseries, and graphs. Background in chip-design and digital signal processing.

## Education

### University of Pennsylvania

Jul '25 - ongoing

PhD in Computer and Information Science, *advised by Dr. Eva Dyer*

### Georgia Institute of Technology

Aug '22 - Jun '25

Master of Science in Electrical and Computer Engineering

PhD in Electrical and Computer Engineering (*transferred to UPenn after 3rd semester*)

### Indian Institute of Technology, Roorkee

Jul '15 - May '19

Bachelor of Technology in Electronics and Communication Engineering

## Research Experience

### Graduate Researcher

Jan '23 - ongoing

NerDS Lab (University of Pennsylvania & Georgia Tech | *advised by Dr. Eva Dyer*)

- Developing *Self-Supervised Learning* methods and large-scale Transformer models for multi-modal data, with applications in neuroscience, timeseries, and graphs. (NeurIPS 2025, ICLR 2025, TMLR 2025, NeurIPS 2023)
- Co-creator and maintainer of `torch_brain`, an open-source Python library for deep-learning on brain data with highly efficient data and training pipelines.
- Working on improving positional embeddings for Graph Transformers. (NeurIPS Workshop 2025)

### Visiting Scientist

Jun - Jul '25

Allen Institute for Neural Dynamics (Seattle, WA | *advised by Dr. Josh Siegle*)

- Explored SSL methods for classifying neuron types in the mouse Striatum.

## Industry Experience

### Microarchitecture Intern

Jun - Aug '23

Rivos Inc. (Mountain View, CA)

- Designed interconnect-traffic and power management units for a machine learning accelerator.

### Digital Chip Design Engineer

Jul '19 - Jul '22

Texas Instruments (Bangalore, India)

- Led R&D efforts for digital signal processing in cellular ADCs; resulted in 3 production designs and 2 patents.

## Publications

**Vinam Arora**, Divyansha Lachi, Ian J. Knight, Mehdi Azabou, Cole L. Hurwitz, Blake A. Richards, Josh H. Siegle, Eva L. Dyer. "Know Thyself by Knowing Others: Learning Neuron Identity from Population Context" *NeurIPS* (2025)

**Vinam Arora\***, Divyansha Lachi\*, Shivashriganesh P. Mahato, Mehdi Azabou, Zihao Chen, Eva L. Dyer. "Exploiting All Laplacian Eigenvectors for Node Classification with Graph Transformers" *New Perspectives in Graph ML Workshop, NeurIPS* (2025)

Ian J. Knight, **Vinam Arora**, Mehdi Azabou, Eva L. Dyer. "Unified Pretraining on Mixed Optophysiology and Electrophysiology Data Across Brain Regions" *Foundation Models for the Brain and Body Workshop, NeurIPS* (2025)

Divyansha Lachi, Mehdi Azabou, **Vinam Arora**, Eva L. Dyer. "GraphFM: A generalist graph transformer that learns transferable representations across diverse domains" *TMLR* (2025)

Mehdi Azabou\*, Krystal X. Pan\*, **Vinam Arora**, Ian J. Knight, Eva L. Dyer, Blake A. Richards. "Multi-session, multi-task neural decoding from distinct cell-types and brain regions" *ICLR* (2025)

Divyansha Lachi, Mahmoud Mohammadi, Joe Meyer, **Vinam Arora**, Tom Palczewski, Eva L. Dyer. "RGP: A Cross-Attention based Graph Transformer for Relational Deep Learning" *Learning on Graphs* (2025)

Mehdi Azabou, **Vinam Arora**, Venkataramana Ganesh, Ximeng Mao, Santosh Nachimuthu, Michael Mendelson, Blake A. Richards, Matthew G. Perich, Guillaume Lajoie, Eva L. Dyer. "A Unified, Scalable Framework for Neural Population Decoding" *NeurIPS* (2023)

## Abstracts

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Mehdi Azabou, **Vinam Arora**, Milo Sobral, Laura Suarez, Nanda Krishna, Avery Ryoo, Ximeng Mao, Shivashriganesh P. Mahato, Alexandre Andre, Liam Paninski, Guillaume Lajoie, Blake Richards, Eva Dyer. "An Open-Source Ecosystem for Models of Multi-Modal Brain and Body Data" *Demo at BrainBodyFM Workshop, NeurIPS* (2025)

Anna Lakunina, **Vinam Arora**, Cole Hurwitz, Michelle Olsen, Eva L Dyer, Karel Svoboda, Josh H Siegle. "A ground truth dataset for electrophysiology-based cell type classification in the basal ganglia and midbrain" *Society for Neuroscience* (2025)

Divyansha Lachi, Mahmoud Mohammadi, Joe Meyer, **Vinam Arora**, Tom Palczewski, Eva L Dyer. "RGP: A Cross Attention based Graph Transformer for Relational Deep Learning" *Stanford Graph Learning Workshop* (2025)

**Vinam Arora\***, Divyansha Lachi\*, Mehdi Azabou, Eva L Dyer. "Leveraging Perceiver IO and Relative Position Encodings for Enhanced Node Classification" *SIAM Conference on Mathematics of Data Science (MDS24), Mini-symposium: New Frontiers of Graph Machine Learning* (2024)

Mehdi Azabou, **Vinam Arora**, Patrick Mineault, Venkataramana Ganesh, Ximeng Mao, Santosh Nachimuthu, Michael Mendelson, Blake A Richards, Matthew G Perich, Guillaume Lajoie, Eva L Dyer. "Large-scale pretraining on neural data allows for transfer across subjects, tasks and species" *COSYNE* (2024)

## Talks

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"Know Thyself by Knowing Others: Learning Neuron Identity from Population Context." Frontier Models for Neuroscience and Behavior Working Group, **ARNI, Columbia University** (Aug 27, 2025)

"Large-Scale Deep Learning in Neuroscience with torch\_brain, brainsets, and temporaldata." NeuroData25 Workshop, **Georgia Tech** (April 11, 2025)

"An Introduction to Self-Supervised Learning." Machine Learning in Biosciences, **Georgia Tech** (Oct 29, 2024)

"Introduction to ARM Cortex M4 Development Platform." Embedded Systems Design Workshop, **Indian Institute of Technology, Roorkee** (Nov, 2018)

## Awards and Achievements

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2025	<b>NeurIPS Scholar Award</b>	<i>NeurIPS</i>
2025	<b>Top Reviewer Award</b>	<i>NeurIPS</i>
2021	<b>Debugging Champion Award</b>	<i>Texas Instruments</i>
2020	<b>Budding Talent Award</b>	<i>Texas Instruments</i>

## Patents

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Nagarajan Viswanathan, Himanshu Varshney, **Vinam Arora**, Charls Babu, Srinivas Kumar Naru. "Auxiliary ADC based calibration for non-linearity correction of ADC" *US Patent 11784660B2* (2023)

**Vinam Arora**, Srinivas Naru. "Numerically-controlled oscillator with dithered coarse & fine splitter" *US Patent 11496124B1* (2022)

## Technical Skills

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**Advanced:** Python, PyTorch, Git, Jupyter, Matplotlib, Linux,  $\text{\LaTeX}$ , SystemVerilog, Adobe Illustrator.

**Intermediate:** C, CUDA, Javascript/Typescript, React, Matlab