ANVITA BHAGAVATHULA

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EDUCATION

Massachusetts Institute of Technology, Cambridge, MA

Sep 2024 - Present

PhD in Electrical Engineering and Computer Science (Advisor: Dr. Priya Donti) Research: Physics-informed machine learning for climate, energy, and power systems

Cornell University (Cornell Tech), New York City, NY

Sep 2023 - May 2024

M.Eng. in Electrical and Computer Engineering

GPA: 3.92

Relevant Coursework: Machine Learning Hardware, Algorithms and Data Structures for Applications, Modern Computer Systems and Architecture, Machine Learning Engineering

Brown University, Providence, RI

Sep 2019 - May 2023

Sc.B. Physics with Honors, A.B. Applied Math

GPA: 3.95

Relevant Coursework: Deep Learning, Solid State Physics (graduate-level), Data Structures and Program Organization, Computational Probability and Statistics, Intro to Computational Chemistry, Quantum Mechanics I and II, Thermodynamics and Statistical Mechanics, Partial Differential Equations, Complex Analysis, Honors Statistics, Linear Algebra

PUBLICATIONS

- Rivera, A.*, **Bhagavathula, A.***, Carbonero, A.*, and Donti, P. PFΔ: A Benchmark Dataset for Power Flow with Load, Generator, and Topology Variations. *Advances in Neural Information Processing Systems (NeurIPS) Datasets & Benchmarks Track.* 2025 (to appear).
- Bhagavathula, A., Han, L., and Gupta, U. Understanding the Implications of Uncertainty in Embodied Carbon Models for Sustainable Computing. *HotCarbon*, 2024.

RESEARCH EXPERIENCE

Massachusetts Institute of Technology, Donti Group

Cambridge, MA

Graduate Research Assistant (Advisor: Dr. Priya Donti)

Sep 2024 - Present

- Developing physics-informed machine learning models for solving partial differential equations (PDEs), with applications to accelerating computational fluid dynamics simulations of wind farms (Co-advised by Dr. Mike Howland).
- Designing graph-based learning methods that generalize across networks of different sizes, applied to power flow calculations and meshed PDE simulations; evaluating their efficiency relative to traditional iterative solvers.

Cornell University S4AI Lab

New York City, NY

Research Assistant (Advisor: Dr. Udit Gupta)

Sep 2023 - May 2024

 Led project on quantifying uncertainty of operational and embodied carbon emissions of AI inference hardware using probabilistic modeling.

Brown University Li Lab and Rubenstein Lab

Providence, RI

Research Assistant (Advisors: Dr. Jia Li and Dr. Brenda Rubenstein)

June 2021 - May 2023

- Honors Senior Thesis: Proposed a computational and experimental approach to understand origin of the superconducting phase in 2D graphene systems using Density Functional Theory (DFT) and transport measurements.
- Developed code to generate twisted tri-layer graphene cells and perform band structure and Fermi surface calculations on these structures. Proposed a cluster-based approach to model large unit cells.
- Built a twisted tri-layer graphene device using unique fabrication techniques and electron beam lithography.
- Thesis laid groundwork for a collaborative effort by PIs to further study these systems using this approach; this is being supported by a DEPSCoR grant.

Brown University Crunch Group

Providence, RI

Research Assistant (Advisor: Dr. Somdatta Goswami)

Sep 2022 - March 2023

- Researched physics-informed neural networks (PINNs) that leverage underlying physical laws or governing equations to solve differential equations. Implemented a self-adaptive PINN to solve the one-dimensional heat equation by learning separate weights on boundary condition and residual errors during training.
- Explored low-rank decomposition and forward-mode auto-differentiation on a per-axis basis to scale to multidimensional problems.

Microsoft Research

Seattle, WA

Research Assistant (Advisors: Dr. Ranveer Chandra and Dr. Sara Malvar)

Jun 2022 - Aug 2022

- Designed an interpretable ML-based approach to predict protein digestibility coefficients and accelerate the production of sustainable alternative proteins. Filed a provisional patent for this methodology.
- Created two ground-truth food protein property datasets by combining nutritional composition and protein structure information using embeddings extracted from a pre-trained transformer model.

WORK EXPERIENCE

Aqemia Paris, FR

Deep Learning Intern

Jun 2023 - Aug 2023

• Created a graph neural network model to predict reaction synthesis feasibility of drug candidates. Implemented an attention-based architecture using reactant and product graphs with encoded reaction sites. Encodings were generated using substructure matching that addressed distribution shift between training and testing data.

• The model performed with a false positive rate < 0.1 on in-house testing data and accelerated the rate at which promising molecules are filtered, optimized, and synthesized within a drug-discovery startup. Supervised by Dr. Jacques Boitreaud and Dr. Antoine Brochard.

Transcelestial Technologies

Singapore

Software Engineering Intern

Jan 2021 - Apr 2021

- Created Streamlit based client facing web-tool that halved time taken to qualify equipment installations for a laser communications startup.
- Designed and implemented a processing algorithm using Fourier analysis, Euler angle integration, and signal processing to analyze time-series vibration data and evaluate installation structures.
- This web-tool led to faster deployment of devices that facilitated internet connectivity in Southeast Asia during the COVID-19 pandemic. Supervised by Dr. Jan Smisek.

LEADERSHIP AND TEACHING EXPERIENCE

Graduate Women in Course 6 (GW6), Board Member

Cambridge, MA (Jan 2025 - Present)

• Organizing several community-building initiatives for women in the graduate program in the EECS (Electrical Engineering & Computer Science) department.

Break Through Tech AI, Teaching Assistant

New York City, NY (Aug 2023 - Jan 2024)

• Supporting 20 students who belong to underrepresented identities in STEM in their endeavor to develop machine learning solutions to industry-issued challenges. Responsibilities include holding meetings for students, providing debugging support, and evaluating coursework.

Brown University Women in Physics, Lead Coordinator

Providence, RI (Jan 2021 - May 2023)

• Organized several community-building initiatives such as group study sessions, lunches, and peer mentoring.

Physics Department Diversity Action Plan Committee, Member

Providence, RI (Jan 2020 - May 2023)

- Addressed issues within the Physics department in a committee of undergraduates, doctoral students, and faculty.
- Designed climate survey to collect data on the state of inclusion in the department which received over 100 responses.

ACADEMIC PROJECTS

- Minitorch: Implemented selected back end Pytorch functionality from scratch as part of a Machine Learning Engineering class (Python).
- CNN Kernel: Implemented CNN kernel and optimized the matrix multiplication operation via tiling, sparsity, and multithreading (C).
- 2D Ising: Modeled behavior of a magnetic dipole lattice at different temperatures using Markov Chain Monte Carlo algorithm (MATLAB).
- Keras From Scratch: Rebuilt the deep neural network functionality of Keras from scratch (Python).

AWARDS

Siddartha Banerjee First-Year Fellowship, MIT Merit-Based Scholarship, Cornell Tech Sep 2024 - Sep 2025

Sep2023 - Sep2024

SKILLS

- Coding Languages: Python, MATLAB, C
- Packages: PyTorch, TensorFlow, JAX, Pandas, Scikit-learn, RDKit, Numba (CUDA), PyMC
- Other Tools: Git, Bash scripting, Quantum Espresso, AWS, LaTeX
- Languages: English, Telugu, Hindi, Spanish