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 on the grid; 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 Sep 2024 - Sep 2025
Merit-Based Scholarship, Cornell Tech Sep 2023 - Sep 2024

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