Amiri Hayes

Software Engineer & Undergraduate Mathematics Researcher

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Research Statement: I'm a student interested in developing mathematical models using ideas from machine learning, stochastic processes, and graph theory to analyze and address social, technical & environmental issues.

EDUCATION:

New Jersey Institute of Technology Honors College — **2023 - 2026 | GPA: 3.75/4**
B.S. Applied Mathematics & M.S. Artificial Intelligence — Expected Magna Cum Laude

Selected Coursework: Machine Learning, Stochastic Simulation, Reinforcement Learning, Deep Learning, Linear Algebra, Natural Language Processing, Multivariate Distributions, Mathematical Analysis, Mathematical Modeling, Advanced Calculus, Complex Variables, Partial Differential Equations, Numerical Methods, Math Capstone I & II

Rowan College of South Jersey - Gloucester — **2021 - 2023**
A.S. Physics, A.S. Mathematics, A.S. Computer Science [Triple Major] — Grade: 3.95/4

PUBLICATIONS & POSTERS:

[1] ABSTRACT: **Systematic Construction and Interpretability of Text-Attributed Graphs |** *Amiri Hayes*, Kristina Wicke, NJIT Math491 Independent Study Course Fall 2025, [link]

[2] POSTER: **Filtering Attention Heads through Automable Interpretability Experiments |** *Amiri Hayes*, Belinda Li, Jacob Andreas, MIT Summer Research Program 2025, [link]

[3] POSTER: **Deep Generative Approaches to Network Science for Social System Simulations |** Siying Ding, Mia Greene, *Amiri Hayes*, Mariia Sinkevich, Joint Mathematics Meeting 2025, [link]

[4] PUBLICATION: **ASPIRE: A Model for Quantitatively Rating Transportation Methods in U.S. Cities |** *Amiri Hayes*, IEEE XPlore 2024, [link]

[5] PUBLICATION: **Mechanical-Based Design for Airfoil Structural Morphing |** Mattia Butera, Amanda Butler, *Amiri Hayes*, Evan Schaffer, Niti Sinha, Jay Kapasiawala, Prosenjit Bagchi, IEEE XPlore 2022, [link]

RESEARCH PROJECTS:

LINGO | Language & Intelligence Group, MIT [REU] — **Cambridge, MA | MIT**
MACHINE LEARNING RESEARCHER, JUN 2025 - DEC 2025 — Poster Link, Report Link
Advisors: Jacob Andreas, Belinda Li

- Engineered Python interpretability library "ViewLLM" using program synthesis to classify LLM attention heads
- Built distributed Python & SLURM pipelines on CSAIL H100 clusters for scalable experiments and data flow
- Classified ~1/2 of BERT activations + automated over 300 hypothesis functions, advancing head interpretability
- Coordinated with MIT researchers to define research goals, synthesize findings, and delivered a poster and library
- Accepted for Fall Extension Program to automate experimental pipeline and begin developing preprint submission

IPAM | Institute for Pure & Applied Mathematics, UCLA [REU] — **Los Angeles, CA | UCLA**
APPLIED MATHEMATICS RESEARCHER, JUN 2024 - AUG 2024 — Poster Link, Report Link
Advisors: Susana Serna, Yuanzhou Adrian Chen, Raffaele Vardavas

- Led team of 3 undergrads as project manager developing generative models for epidemiological network simulation
- Implemented VAE, GAN, and score-based algorithms w/ parallel computing to generate large social graph datasets
- Generated synthetic 100-person social networks with vaccination statistics, developed a network fusion technique
- Managed contact with our sponsor RAND and IPAM, coordinating goals, delegation & presentation at JMM 2025

Center for Applied Mathematics & Statistics, NJIT **Newark, NJ | NJIT**
MACHINE LEARNING RESEARCHER, SEP 2022 - NOW Poster Link, Publication
Advisors: Eliza Michalopoulou, Kristina Wicke, Tufajjal Hossain

- Currently researching benefits of construction of Text-Attributed Graphs for downstream GNN prediction tasks
- Published and conducted independent research rating transportation mode viabilities for any U.S. city in Python
- Implemented data collection pipeline & custom graph-based model, educated myself on ML for frequency data
- Related Certifications: Stanford Deep Learning Specialization, Google Data Analytics, AWS Cloud Practitioner

Governor's School Of Engineering & Technology, Rutgers **New Brunswick, NJ | RUTGERS**
STUDENT RESEARCHER, JUN 2022 - AUG 2022 Publication
Advisors: Prosenjit Bagchi, Jay Kapasiawala

- Completed four-week research project at Rutgers University proving the efficiency of amorphous aircraft design
- Developed scripts in MATLAB for data collection and to calculate fuel efficiency and aerodynamic coefficients
- Accepted to MIT and Rutgers symposiums to present research and demonstrate our prototype and simulations

WORK EXPERIENCE:

UPS | United Parcel Service **Parsippany, NJ**
SOFTWARE ENGINEERING INTERN, NOV 2023 - APR 2024

- Collaborated with many developers in globally distributed team executing UPS business rules in Java and Eclipse
- Wrote code utilizing a decision governance framework to outline & test business rules before moving to production
- Introduced over fifty new business rules to the system & improved data integrity, reducing processing delays by 6%

LEADERSHIP EXPERIENCE:

TEAM LEAD & MENTOR: *NEW JERSEY GOVERNOR'S STEM SCHOLAR* | 2024 - 2025 | link | I mentored a group of 6 high school students to ideate & develop a prototype of a machine that utilizes computer vision to separate and sort garbage.

VICE PRESIDENT & COFOUNDER: *CFCIC INVESTMENT CLUB* | 2020 - Now | link | I help lead a 7 person club to manage an investment portfolio with over $10k pooled in assets. I continually analyze stock trends & direct all technological efforts.

TREASURER: *RCSJ BLACK STUDENT UNION* | 2022 - 2023 | I managed the organization's budget, meticulously tracking income and expenses to ensure we could successfully fund our cultural programming and community-building events.

PROGRAMMING SKILLS:

Languages	Python, Javascript, C++/C, SQL, R, Java, Bash
Machine Learning	PyTorch, TorchGeometric, TorchVision, Tensorflow, Pandas, Numpy, SciKit, Transformers, NLTK
Web Development	React, HTML/CSS, NodeJS, ExpressJS, Django, Flutter, Bootstrap, Matplotlib, Netlify
Data Engineering	AWS [S3, Lambda, RDS, EC2, DynamoDB], Apache [Hadoop, Spark], Google BigQuery, Docker, Git

AWARDS & HONORS:

Research:	-	NJIT Applied Math Kawhulia Award Recipient for Research in Mathematics (2024 - 2025)
	-	New Jersey Governor's STEM Scholar and Mentorship Lead (2024 - 2025)
Academic:	-	$192,000 Merit-Based Full Academic & Housing Scholarship, NJIT Honors College (2023-2027)
	-	STEM Department Representative at Class of 2023 RCSJ Commencement
	-	First student to receive 3 President Awards at RCSJ for A.S. degrees in Physics, Computer Science, Math
Hackathon:	-	Columbia DivHacks 2023, Best Beginner Project | PennApps Hackathon 2023, Top 20 Project

* Note of Graduate Fellowships Applied for: NSF Graduate Research Fellowship (GRFP) | DOE CSGF | GEM Fellowship

CONFERENCES:

FIELD OF DREAMS 2024, ATLANTA
MIT IEEE URTC 2022 & 2024, CAMBRIDGE
JOINT MATHEMATICS MEETING 2025, SEATTLE
NJIT DANA KNOX SHOWCASE 2024, NEWARK