

# 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

GPA: 3.95/4

## PUBLICATIONS & POSTERS:

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

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

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

[4] 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 - AUG 2025

[Poster Link](#), [Report Link](#)

Advisors: Jacob Andreas, Belinda Li

- Collaborated with MIT researchers to design weekly research goals, resulting in research report and Python library
- Engineered an interpretability library for filtering attention heads by functionality in large language models (LLM)
- Deployed & validated experiments on a computer cluster to ensure robust, reproducible analysis on linguistic tasks
- 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

- Directed group of undergrads as project manager on nine-week research project for industry sponsor RAND
- Investigated generative machine learning models to create large-scale graph datasets for epidemiological simulations
- Designed network fusion techniques to impute missing vaccination data by integrating & aligning social networks

**Center for Applied Mathematics & Statistics, NJIT**

Newark, NJ | NJIT

MACHINE LEARNING RESEARCHER, SEP 2022 - JAN 2024

[Poster Link](#), [Publication Link](#)

Advisors: Eliza Michalopoulou, Tufajjal Hossain

- Conducted and published independent research rating transportation mode viabilities for any U.S. city in Python

- Implemented data collection pipeline & custom mathematical 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 Link](#)

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:	<ul style="list-style-type: none"><li>- NJIT Applied Math Kawhulia Award Recipient for Research in Mathematics (2024 - 2025)</li><li>- New Jersey Governor's STEM Scholar and Mentorship Lead (2024 - 2025)</li></ul>
Academic:	<ul style="list-style-type: none"><li>- \$192,000 Merit-Based Full Academic &amp; Housing Scholarship, NJIT Honors College (2023-2027)</li><li>- STEM Department Representative at Class of 2023 RCSJ Commencement</li><li>- First student to receive 3 President Awards at RCSJ for A.S. degrees in Physics, Computer Science, Math</li></ul>
Hackathon:	<ul style="list-style-type: none"><li>- Columbia DivHacks 2023, Best Beginner Project   PennApps Hackathon 2023, Top 20 Project</li></ul>

\* 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