NICHOLAS JONES

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EDUCATION

Massachusetts Institute of Technology September 2022 - May 2026 (expected)
Doctor of Philosophy in Electrical Engineering and Computer Science
Advisor: Eytan Modiano

Massachusetts Institute of Technology September 2020 - August 2022
Master of Science in Electrical Engineering and Computer Science GPA: 4.90/5.00
Thesis: Optimizing random access for information freshness in spatially distributed wireless networks
Advisor: Eytan Modiano

University of Notre Dame August 2015 - May 2019
Bachelor of Science in Electrical Engineering, *magna cum laude* GPA: 3.89/4.00

RESEARCH INTERESTS

Communication networks, wireless, optimization, learning, information theory

ACADEMIC PUBLICATIONS

Journal Papers

[1] Nicholas Jones and Eytan Modiano. "Minimizing age of information in spatially distributed random access wireless networks". In: *Under review at IEEE/ACM Transactions on Networking* (2024).
[2] Vishrant Tripathi, Nicholas Jones, and Eytan Modiano. "Fresh-CSMA: A distributed protocol for minimizing age of information". In: *Journal of Communications and Networks* 25.5 (2023), pp. 556–569.

Conference Papers

[1] Nicholas Jones and Eytan Modiano. "Optimal slicing and scheduling with service guarantees in multi-hop wireless networks". In: *Proceedings of the Twenty-Fifth International Symposium on Theory, Algorithmic Foundations, and Protocol Design for Mobile Networks and Mobile Computing*. MOBIHOC '24. 2024, pp. 181–190.
[2] Nicholas Jones, Joshua Wornell, Chao Li, and Eytan Modiano. "Achieving AoI Fairness in Spatially Distributed Wireless Networks: From Theory to Implementation". In: *2024 22nd International Symposium on Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks (WiOpt)*. 2024, pp. 154–161.
[3] Nicholas Jones and Eytan Modiano. "Minimizing age of information in spatially distributed random access wireless networks". In: *IEEE INFOCOM 2023-IEEE Conference on Computer Communications*. IEEE. 2023, pp. 1–10.
[4] Vishrant Tripathi, Nicholas Jones, and Eytan Modiano. "Fresh-CSMA: A distributed protocol for minimizing age of information". In: *IEEE INFOCOM 2023-IEEE Conference on Computer Communications*. IEEE. 2023, pp. 1–10.

RESEARCH AND WORK EXPERIENCE

MIT Laboratory for Information and Decision Systems: Research Assistant September 2020 - Present

· Conduct academic research that involves modeling and analyzing problems in communication networks, using tools from optimization, probability theory, and learning.
· Develop scheduling algorithms with provable performance guarantees for real-time network traffic. Examples of guarantees include throughput, end-to-end latency, and information freshness.
· Implement theoretical algorithms in functional real-world protocols using software-defined radios.

DOCOMO Innovations: Research Intern June 2024 - August 2024

· Researched client selection policies for federated learning to minimize the communication cost over wireless networks. Developed both online learning and heuristic based approaches.

MIT Lincoln Laboratory: Research Intern June 2023 - August 2023

· Developed routing and scheduling algorithms to provide service guarantees in unreliable multi-hop wireless networks.
· Worked with the Tactical Networks group to simulate algorithm performance and show capabilities in tactical network scenarios.

Dirac Solutions: Consultant June 2021 - May 2023

· Developed synthetic aperture radar (SAR) algorithms to improve radar imaging resolution for object tracking.

Marathon Petroleum Corporation: Project Engineer June 2019 - August 2020

- Managed electrical projects at petroleum terminals from project design through completion. Responsibilities included technical design, cost and schedule management, and contractor oversight.
- Communicated project details effectively with a wide variety of people including business partners, subject matter experts, field operators, and contractors.

ADDITIONAL EXPERIENCE

Reinforcement Learning Course: Solo Project Member

- Used reinforcement learning techniques from Alpha Zero, including a neural network architecture and Monte Carlo Tree Search lookahead, to train a bot to play the card game Euchre, a complex team-based game with uncertainty.

Computer Vision Course: Solo Project Member

- Trained a neural network using PyTorch and a publicly available image dataset to diagnose Ulcerative Colitis (UC) in patients and to classify its severity from medical imaging. Achieved better results than the state of the art work published on automated UC diagnosis.

PROGRAMMING SKILLS

Languages: Python, C/C++, MATLAB, LaTeX | **Libraries:** CVXPY, Gurobi, PyTorch

RELEVANT COURSEWORK

Networks: Data Communication Networks (theory), Computer Networks (systems)

Probability: Fundamentals of Probability, Discrete Probability & Stochastic Processes

Optimization: Optimization Methods, Dynamic Programming & Reinforcement Learning, Statistical RL & Decision Making

Information Theory: Information Theory, Inference and Information

SERVICE AND LEADERSHIP

Peer Reviewer

- IEEE Transactions on Communications
- IEEE Transactions on Networking
- IEEE Transactions on Parallel and Distributed Systems
- IEEE Transactions on Wireless Communications

Undergraduate Research Mentor

- Mentored an undergraduate student at MIT through a research project, resulting in a conference paper.

MIT 16.36 (Communication Systems and Networks) Course TA

- Taught the lab section of a digital communications course using software-defined radios over three semesters. Worked closely with students to answer questions and to deepen their understanding of the course material.

MIT EECS Graduation Application Assistance Program

- Mentored a PhD applicant from an underrepresented group and helped guide them through graduate school applications.

Notre Dame Resident Assistant

- Oversaw a residence hall section of fifty undergraduate students, working with other hall staff members to maintain a safe and healthy environment.

Notre Dame Social Concerns Seminars

- Learned about systemic issues that bring about poverty in both rural and urban areas.
- Spent a week in the Appalachian region helping flood victims with home repair and several days in low-income neighborhoods working with the homeless and formerly incarcerated.

HONORS AND AWARDS

Tau Beta Pi Engineering Honor Society

- Inducted November 15, 2017.

Eta Kappa Nu Electrical Engineering Honor Society

- Inducted October 5, 2017. Served as Delta Sigma chapter president.