NICHOLAS JONES

32-D671, 77 Massachusetts Ave, Cambridge, MA 02139
jonesn@mit.edu | 419-420-5596 | nickjones.info

EDUCATION

Massachusetts Institute of Technology September 2022 - December 2025 (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* (2023).
[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. "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.
[2] 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.

Preprints

[1] Nicholas Jones and Eytan Modiano. *Optimal Slicing and Scheduling with Service Guarantees in Multi-Hop Wireless Networks*. 2024. arXiv: 2404.08637.

RESEARCH AND WORK EXPERIENCE

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

· Research includes modeling and analyzing complex problems in communication networks, with a focus on optimizing performance for real-time applications and emerging technologies.
· Derived a novel random-access scheduling policy for optimizing information freshness in wireless networks. Proved performance bounds showing a significant improvement over traditional policies. Implemented this policy on a software-defined radio testbed and measured performance gains of up to 10x compared to Wi-Fi.
· Currently researching the use of network slicing to provide strict service guarantees over multi-hop wireless and heterogeneous networks.

MIT Lincoln Laboratory: Research Intern June 2023 - August 2023

· Developed theoretical 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 semi-realistic 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.

Notre Dame Wireless Institute: Undergraduate Researcher August 2018 - December 2018

- Used software defined radios and GNU Radio to build a reliable link for real-time HD video in the presence of jamming.

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 and a very large state space.

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, 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

Reviewer for IEEE Transactions on Parallel and Distributed Systems

Undergraduate Research Mentor

- Mentoring an undergraduate student at MIT through the implementation and testing of a novel wireless scheduling protocol on a software-defined radio testbed.

MIT 16.36 (Communication Systems and Networks) Course TA

- Taught the lab section of a digital communications course using software-defined radios over two 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 Alumni Hall 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.