

# NICHOLAS JONES

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## EDUCATION

### Massachusetts Institute of Technology

Doctor of Philosophy in Electrical Engineering and Computer Science

Advisor: Eytan Modiano

September 2022 - May 2026 (expected)

### Massachusetts Institute of Technology

Master of Science in Electrical Engineering and Computer Science

Thesis: *Optimizing random access for information freshness in spatially distributed wireless networks*

Advisor: Eytan Modiano

September 2020 - August 2022

GPA: 4.90/5.00

### University of Notre Dame

Bachelor of Science in Electrical Engineering, *magna cum laude*

August 2015 - May 2019

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: *Accepted to WiOpt 2024. Technical report available*. 2024. arXiv: 2408.16120.
- [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

- My research includes modeling and analyzing problems in communication networks, with a focus on optimizing performance for real-time applications and emerging technologies.
- Currently researching the use of network slicing to provide strict service guarantees over multi-hop wireless and heterogeneous networks.

### 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

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**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

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**Languages:** Python, C/C++, MATLAB, L<sup>A</sup>T<sub>E</sub>X | **Libraries:** CVXPY, Gurobi, PyTorch

## RELEVANT COURSEWORK

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**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

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**Peer Reviewer**

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

**Undergraduate Research Mentor**

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

**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

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**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.