

Martha Cash

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EDUCATION

Worcester Polytechnic Institute

Doctor of Philosophy in Electrical and Computer Engineering

Worcester, MA

Aug. 2022 – May 2026

Louisiana State University

Master of Science in Electrical Engineering

Baton Rouge, LA

Aug. 2020 – Aug. 2022

RESEARCH INTERESTS

Communication networks, machine learning, wireless, predictive networking, time-series forecasting

RESEARCH & WORK EXPERIENCE

Graduate Research Assistant

Worcester Polytechnic Institute

Aug. 2022 – Present

Worcester, MA

- Conducting research to develop predictive models for internet traffic matrices and leveraging machine learning and time series analysis to forecast network load and optimize resource allocation for large scale backbone networks
- Presenting research ideas in weekly lab meeting and monthly sponsor meetings

Graduate Teaching Assistant–Intro to Circuits

Worcester Polytechnic Institute

Aug. 2024 – Present

Worcester, MA

- Leading multiple lab sections, delivering hands-on instruction in circuit theory and practical applications to over 140 students, fostering a strong understanding of fundamental electrical engineering concepts
- Managing test grading and feedback for a large student cohort, providing constructive insights to enhance student comprehension and performance.
- Guiding students through circuit construction, troubleshooting, and analysis, and reinforcing theoretical principles through practical application.

Graduate Research Assistant

Louisiana State University

Aug. 2020 – May 2022

Baton Rouge, LA

- Performed research using neural networks to compensate for nonlinearities from active RF components in DVBS2X waveforms using Simulink, MATLAB, and TensorFlow
- Designed a neural network that outperformed standard distortion mitigation techniques
- Presented results weekly in lab meeting and produced a thesis

Graduate Teaching Assistant–Senior Design Capstone

Louisiana State University

Aug. 2020 – May 2022

Baton Rouge, LA

- Mentored undergraduate students to help them excel in Electrical and Computer Engineering Capstone course
- Evaluated student performance, provided feedback on reports and notebook entries, and assigned grades for 50+ students
- Held office hours with students to review reports and answer general questions or concerns

Summer Research Program Intern

MIT Lincoln Laboratory

May 2023 – Aug. 2023 & May 2024 – Aug. 2024

Lexington, MA

- Researched and developed predictive routing techniques to enhance network efficiency and reduce latency, leveraging machine learning models to dynamically optimize routing paths
- Implemented and tested prediction methods for predictive networking, focusing on forecasting traffic matrices to proactively manage network congestion and resource allocation
- Presented research findings and project outcomes to technical team at the conclusion of each internship

RF Power Amplifier Design Intern

Cree | Wolfspeed

May 2021 – Aug. 2021

Mesa, AZ

- Designed a DC test program to decrease screening time for validating customer specifications of GaN power amplifiers
- Wrote a Standard Operating Procedure to help product engineers use DC test program and equipment
- Presented testing protocol to senior product engineering team, which was ultimately implemented in prototype testing phases

ACADEMIC PUBLICATIONS, TALKS, & POSTERS

1. M. Cash, J. Murphy and A. Wyglinski, "WIP: Federated Learning for Routing in Swarm Based Distributed Multi-Hop Networks," 2023 IEEE 24th International Symposium on a World of Wireless, Mobile and Multimedia Networks (WoWMoM), Boston, MA, USA, 2023, pp. 316-319, doi: 10.1109/WoWMoM57956.2023.00049.
2. M. Cash, A. Wyglinski, (2023, November 13th). Supervised Learning vs. Reinforcement Learning: A Comparative Analysis for Designing Intelligent FutureG Networks. IEEE Future Networks World Forum. Baltimore, MD, USA. <https://fnwf2023.ieee.org/program/tutorials/supervised-learning-vs-reinforcement-learning-comparative-analysis-designing>
3. M.Cash, A. Wyglinski, (2023, June 2nd). Federated Learning for Routing in Swarm Based Distributed Multi-Hop Networks. NewsDR, Worcester, MA, USA. <https://newsdr.org/workshops/newsdr2023/poster14>

TECHNICAL SKILLS

Languages & Software: Python, MATLAB

Hardware: Oscilloscope, Network Analyzer, Signal Generator

Course Work: Deep Learning Systems, Data Networks, Advanced Topics in Signal Processing, Information Theory