

Matthew Nance-Hall

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EDUCATION

- University of Oregon** Eugene, OR
Ph.D. in Computer Science March 2024
- Advisor: Prof. Ramakrishnan Durairajan
 - Thesis title: Optical Topology Programming: Foundations, Measurements, and Applications
 - This study proposes a framework for improving network performance and security by opportunistically changing the physical layer in light of dynamic traffic patterns.
- University of Oregon** Eugene, OR
M.S. in Computer Science 2022
- California State Polytechnic University, Humboldt** Arcata, CA
B.S. in Computer Science 2016
- Minor: Applied mathematics

EXPERIENCE

- University of Oregon** Eugene, OR
Graduate Employee - Researcher June 2019–March 2024
- Awarded the University of Oregon’s Doctoral Research Fellowship in 2022.
 - Wrote simulation software and numerical optimization models to designed and run experiments prototyping reconfigurable topology applications for DDoS defense and traffic engineering.
 - Wrote and published more than ten papers at top-tier journals, conferences, and workshops on network security and performance.
- Nokia Bell Labs** Murray Hill, NJ (Remote)
Intern - Smart Optical Fabric & Devices Lab Summer 2020
- Collaborated on research in stream processing optical network telemetry data with machine learning.
 - Designed and built an anomaly detection method using statistical methods in Python.
 - Awarded Bell Labs Summer Research Award for Distinguished Innovation. Co-authored a top-scoring paper for the European Conference on Optical Communications.
- University of Oregon** Eugene, OR
Graduate Employee - Teacher January 2018–June 2019
- Taught lab sessions in Computer Science courses: Python, Data Structure, Networking Fundamentals, and Operating Systems.
 - Designed hands-on exercises and projects for students in large classes (120 students).

SCHOLARSHIPS AND AWARDS

- University of Oregon Doctoral Research Fellowship 2022
- Bell Labs Summer Research Award for Distinguished Innovation 2020
- Ripple Cyber-security Fellowship 2019–2020
- Erwin & Gertrude Juilfs Scholarship in Computer and Information Science 2019

SKILLS

- **Languages:** Python, C/C++
- **Networking:** Optical networked systems, network prototyping and design, hands on experience with long-haul transmission: Infinera 100 Gbps OOK and coherent digital signal processing (DSP) QPSK transponders, erbium doped fiber amplifiers (EDFAs), dense wavelength division multiplexing (DWDM)
- **Data Science:** Scipy, Numpy, Pandas

TEACHING

Guest Lecturer

- University of Oregon — *Distributed Systems (CS 630)* Spring 2022
- University of Oregon — *Introduction to Data Structures (CS 313)* Fall 2018

Teaching Assistant

- University of Oregon — *Operating Systems (CS 415)* Spring 2019
- University of Oregon — *Introduction to Data Structures (CS 313)* Winter 2019
- University of Oregon — *Operating Systems (CS 415)* Fall 2018
- University of Oregon — *Networking Fundamentals (CIT 383)* Spring 2018
- University of Oregon — *Computer Science I (CIS 210)* Winter 2018

PUBLIC TALKS

2024

- University of Oregon — *Optical Topology Programming: Foundations, Measurements, and Applications*

2021

- SIGCOMM Workshop on Optical Systems — *Are WANs Ready of Optical Topology Programming?*

2020

- Nokia Bell Labs — *Stream Processing for Optical Network Monitoring with Streaming Telemetry and Video Analytics*
- University of Oregon — *Theory and Practice of Reconfigurable Optical Networks*
- SIGCOMM Workshop on Secure Programmable Network Infrastructure — *Fighting Fire with Light: Tackling Extreme Terabit DDoS Using Programmable Optics*
- SIGCOMM Workshop on Optical Systems — *Bridging the optical-packet network chasm via secure enclaves*
- Network Traffic Measurement and Analysis Conference — *Characteristics of Metro Fiber Deployments in the US*

2018

- University of Oregon — *vFiber: A System for Virtualizing Optical Fibers*

SERVICE

- Oregon Networking Research Group web administrator 2019–2022
- Internet Measurement Conference (IMC) Shadow PC 2018

PUBLICATIONS

- [1] **M. Nance-Hall**, L. Salamatian, and R. Durairajan, “From fibers to fortresses: Combating modern reconnaissance via optical topology programming”, (*in submission*), pp. 1–14, 2024.
- [2] **M. Nance-Hall**, Z. Liu, V. Sekar, and R. Durairajan, “Analyzing the benefits of optical topology programming for mitigating link-flood ddos attacks”, (*To appear*) *Transactions on Dependable and Secure Computing*, pp. 1–17, 2024.
- [3] **M. Nance-Hall**, K.-T. Foerster, P. Barford, and R. Durairajan, “Improving scalability in traffic engineering via optical topology programming”, in *Transactions on Network and Service Management (TNSM)*, IEEE, 2023, pp. 1–21.
- [4] J. E. Simsarian, G. Hosangadi, W. Van Raemdonck, J. Gripp, **M. Nance-Hall**, J. Yu, and T. Sizer, “Demonstration of cloud-based streaming telemetry processing for optical network monitoring”, in *2021 European Conference on Optical Communication (ECOC)*, 2021, pp. 1–4.
- [5] **M. Nance-Hall**, P. Barford, K.-T. Foerster, M. Ghobadi, W. Jensen, and R. Durairajan, “Are wans ready for optical topology programming?”, in *Proceedings of the ACM SIGCOMM 2021 Workshop on Optical Systems*, ser. OptSys ’21, Virtual Event, USA: Association for Computing Machinery, 2021, pp. 28–33, ISBN: 9781450386500.
- [6] **M. Nance-Hall**, K.-T. Foerster, S. Schmid, and R. Durairajan, “A Survey of Reconfigurable Optical Networks”, *Optical Switching and Networking*, vol. 41, 2021.
- [7] J. E. Simsarian, **M. Nance-Hall**, G. Hosangadi, J. Gripp, W. van Raemdonck, J. Yu, and T. Sizer, “Stream Processing for Optical Network Monitoring with Streaming Telemetry and Video Analytics”, in *European Conference on Optical Communications (ECOC)*, Virtual Event, Belgium: IEEE, Dec. 2020.
- [8] **M. Nance-Hall**, G. Liu, R. Durairajan, and V. Sekar, “Fighting Fire with Light: Tackling Extreme Terabit DDoS Using Programmable Optics”, in *Proceedings of the Workshop on Secure Programmable Network Infrastructure (SPIN)*, Virtual Event, New York, USA: ACM, Aug. 2020.
- [9] S. K. Mani, **M. Nance-Hall**, R. Durairajan, and P. Barford, “Characteristics of Metro Fiber Deployments in the US”, in *Proceedings of the Network Traffic Measurement and Analysis Conference (TMA)*, Virtual Event, Germany, Jun. 2020.
- [10] **M. Nance-Hall** and R. Durairajan, “Bridging the optical-packet network chasm via secure enclaves (extended abstract)”, in *Proceedings of the Workshop on Optical Systems Design*, ser. OptSys ’20, Virtual Event, USA: Association for Computing Machinery, 2020.
- [11] **M. Nance-Hall**, J. Sommers, and R. Durairajan, “A compressed sensing approach to taming the internet measurement data deluge (poster)”, in *ACM Internet Measurement Conference*, ser. IMC ’18, Boston, MA: Association for Computing Machinery, 2020.
- [12] **M. Nance-Hall**, V. Chidambaram, and R. Durairajan, “Vfiber: Virtualizing unused optical fibers (extended abstract)”, in *USENIX Networked Systems Design and Implementation*, ser. NSDI ’18, Renton, WA: USENIX, 2018.
- [13] **M. Nance-Hall**, C. Robins, K. Owens, J. Nowatzke, T. Lauck, and L. E. Smith, “High performance supercomputing on a budget”, *J. Comput. Sci. Coll.*, vol. 32, no. 4, pp. 86–92, Apr. 2017, ISSN: 1937-4771.