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

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.