PHILIP B. LUNDRIGAN

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EDUCATION

2018 **University of Utah**, *Ph.D., Computer Science*
Advisors: Sneha Kasera and Neal Patwari
Dissertation Title: Reliable Real-Time Data Upload for Wireless Networks

2012 **Brigham Young University**, *B.S., Computer Engineering*
Dean's List, College of Engineering, 2011
Full Academic Brigham Young Scholarship, 2009-2012

PROFESSIONAL EXPERIENCE

Nov 2018 to Present **Brigham Young University**, *Assistant Professor*
Department of Electrical and Computer Engineering

PUBLICATIONS

Book Chapters

1. Ramkiran Gouripeddi, **Philip Lundrigan**, Sneha Kasera, Scott Collingwood, Mollie Cummins, Julio C. Facelli, and Katherine Sward, "Exposure Health Informatics Ecosystem", in Total Exposure Health: An Introduction, CRC Press, 2019.

Journal Articles

2. D. Harman, K. Knapp, T. Sweat, **P. Lundrigan**, M. Rice, and W. Harrison, "Physical Layer Security: Channel Sounding Results for the Multi-Antenna Wiretap Channel", in Entropy, 2023.

3. C. Flowerday, **P. Lundrigan**, C. Kitras, T. Nguyen, J. Hansen, "Utilizing Low-Cost Sensors to Monitor Indoor Air Quality in Mongolian Gers", in Low-Cost Sensor Applications for Mobile and Urban Environment Monitoring, Sensors, 2023.

4. S. Hegde, K. Min, J. Moore, **P. Lundrigan**, N. Patwari, S. C. Collingwood, and K. E. Kelly, "Household Indoor Particulate Matter Measurement Using a Network of Low Cost Sensors", in Aerosol and Air Quality Research, 2020.

5. J. Moore, P. Goffin, **P. Lundrigan**, N. Patwari, K. Sward, J. Weise, M. Meyer, "Managing In-home Environments Through Sensing, Annotating, and Visualizing Air Quality Data", in Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT), 2018.

6. Tim Strayer, Samuel Nelson, Amando Caro, Joud Khoury, Bryan Tedesco, Olivia DeRosa, Carsten Clark, Kolia Sadeghi, Michael Matthews, Jake Kurzer, **Philip Lundrigan**, Vikas Kawadia, Dorene Ryder, Keith Gremban, Wayne Phoel, "Content Sharing with Mobility in an Infrustructure-less Environment", in Computer Networks, 2018.

7. B. Mager, **P. Lundrigan**, and N. Patwari, "Fingerprint-Based Device-Free Localization: Performance in Changing Environments", in Journal on Selected Areas in Communications, 2015.

Conference Publications in Review

8. Jacob Johnson, Ashton Palacios, Cody Arvonen, **Philip Lundrigan**, "Wireless Latency Shift Keying", in International Conference on Mobile Computing and Networking (MobiCom), 2024.

9. Ashton Palacios, Devon Ward, Dinah Squire Bronson, Jon Backman, Karl Warnick, **Philip Lundrigan**, "Network Layer Spectral Coordination Integrated With Hadamard Projection for Multilayer Interference Mitigation", in IEEE International Symposium on Dynamic Spectrum Access Networks, 2024.

Conference Publications

10. M. Rice, H. Croft, J. Gillis, Z. Hilton, R. Kirkwood, P. Walker, **P. Lundrigan**, W. Harrison, "A Comparison of Two Software Defined Radios for Aeronautical Telemetry", in Proceedings of the International Telemetering Conference, 2023.

11. A. Palacios, C. Bledsoe, E. Kelsey, L Landon, J. Backman, **P. Lundrigan**, "Stealthy Signals: Using Ghost Modulation to Watermark Interference", in 1st International Workshop on LEO Networking and Communication (LEO-NET), 2023.

12. C. Kitras, C. Pollen, K. Myers, C. Wirthlin, **P. Lundrigan**, "Location Verification of Crowd-Sourced Sensors", in IEEE International Workshop on IoT in Emerging Fields (IoTEF), 2023.

13. A. Sarbhai, R. Gouripeddi, **P. Lundrigan**, P. Chidambaram, A. Saha, R. Madsen, J. Facelli, K. Sward, and S. K. Kasera, "Utilizing a Blockchain for Managing Sensor Metadata in Exposure Health Studies", in Intermountain Engineering, Technology and Computing (IETC), 2022.

14. L. Alcantara, J. Miera, B. Ariun-Erdene, C. Teng, **P. Lundrigan**, "The Hitchhiker's Guide to Successful Remote Sensing Deployments in Mongolia", in Intermountain Engineering, Technology, and Computing Conference (i-ETC), 2020.

15. **P. Lundrigan**, N. Patwari, S. K. Kasera, "On-off Noise Power Communication", in International Conference on Mobile Computing and Networking (MobiCom), 2019.

16. S. Maheshwari, **P. Lundrigan**, S. K. Kasera, "Scheduling Virtual WiFi Interfaces for High Bandwidth Live Video Upstreaming Using Multipath TCP", in International Conference on Distributed Computing and Networking (ICDCN), 2019. **Best Paper Award**.

17. **P. Lundrigan**, N. Patwari, S. K. Kasera, "STRAP: Secure TRansfer of Association Protocol", in International Conference on Computer Communications and Networks (ICCCN), 2018.

18. **P. Lundrigan**, K. Min, N. Patwari, S. K. Kasera, K. Kelly, J., Moore, M. Meyer, S. C. Collingwood, F. Nkoy, B. Stone, and K. Sward, "An In-Home IoT Architecture for Epidemiological Deployments", in IEEE Workshop on Practical Issues in Building Sensor Network Applications (SenseApp), 2018. **Best Paper Runner-up**.

19. K. Min, **P. Lundrigan** N. Patwari, "Smart Home Air Filtering System: A Randomized Controlled Trial for Performance Evaluation", in IEEE/ACM International Conference on Connected Health (CHASE), 2018.

20. **P. Lundrigan**, M. Khaledi, M. Kano, N. Subramanyam, and S. Kasera, "Mobile Live Video Upstreaming", in International Teletraffic Congress (ITC 28), 2016.

21. R. Buck, R. Lee, **P. Lundrigan**, and D. Zappala, "WiFu: A composable toolkit for experimental wireless transport protocols", in IEEE International Conference on Mobile Ad-Hoc and Sensor Systems, 2012.
22. C. Lavin, M. Padilla, J. Lamprecht, **P. Lundrigan**, B. Nelson, and B. Hutchings, "HMFlow: Accelerating FPGA Compilation with Hard Macros for Rapid Prototyping", in IEEE International Symposium on Field-Programmable Custom Computing Machines (FCCM), 2011.
23. C. Lavin, M. Padilla, J. Lamprecht, **P. Lundrigan**, B. Nelson, and B. Hutchings, "RapidSmith: Do-It-Yourself CAD Tools for Xilinx FPGAs", in International Conference on Field Programmable Logic and Applications (FPL), 2011.
24. C. Lavin, M. Padilla, **P. Lundrigan**, B. Nelson, and B. Hutchings, "Rapid prototyping tools for FPGA designs: RapidSmith", in International Conference on Field-Programmable Technology (FPT), 2010.

Poster/Demo Presentations

25. Chris Kitras, Ashton Palacios, **Philip Lundrigan**, "SSS: Building a Seven Segment Sign", in PyCon, 2023.
26. Bryson Schiel, Alek Farmer, Anup Hassan Murali, Brielle Corry, and **Philip Lundrigan**, "Informing V2I Deployment Decisions Using Commercial Hardware-in-the-loop Testing", in IEEE Vehicular Networking Conference (VNC), 2023.
27. Chris Kitras, Carter Pollan, Kyle Myers, Camille Wirthlin, **Philip Lundrigan**, "Location Monitoring Framework for Citizen Science Sensors", in Air Quality: Science for Solutions, 2023. **Best Poster Award**.
28. Callum E. Flowerday, Ryan Thalman, Matthew C. Asplund, Samuel A. Badstubner, Adam K. Cook, **Philip Lundrigan**, Jaron C. Hansen, "Detection of Ambient Concentrations of Hydroxyl Radical using BBCEAS", in Atmospheric Mechanisms Conference (ACM), 2022.
29. **Philip Lundrigan**, Ramkiran Gouripeddi, Mollie Cummins, Julio Facelli, and Katherine Sward, "Materializing the Air Quality Exposome: The Center of Excellence for Exposure Health Informatics", in Air Quality: Science for Solutions, 2020.
30. **Philip Lundrigan**, Derek Hansen, and Chia-Chi Teng, "Developing an Untethered Network of Low-Power Air Quality Sensors", in Air Quality: Science for Solutions, 2019.
31. Kyeong T. Min, **Philip Lundrigan**, and Neal Patwari, "IASA - Indoor Air Quality Sensing and Automation", in ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN), 2017.

TALKS

Invited Talks

1. **Philip Lundrigan**, "Hacking 802.11", at Vivint, October 2023.
2. **Philip Lundrigan**, "Wireless Protocol Adaptability Through Wireless Subprotocols", at Riverside Research, March 2023.
3. **Philip Lundrigan**, "Wireless Networking Research for Linux", at BYU Linux Club, February 2022.
4. **Philip Lundrigan**, "College of Engineering PhD Forum", at the University of Utah, October 2021.
5. **Philip Lundrigan**, "Open Source: Learning in Public", at BYU IEEE Branch Meeting, September 2021.
6. **Philip Lundrigan**, "STRAP and Beyond", at BYU Networking Club, December 2019.
7. **Philip Lundrigan**, "Networking Research for Linux", at BYU Linux Club, September 2019.

8. Katherine Sward, **Philip Lundrigan**, Ram Gouripeddi, “An Infrastructure for Generating Exposomes: Initial Lessons from the Utah PRISMS Platform”, at the 27th Annual Meeting of the International Society of Exposure Science (ISES), Research Park Triangle, NC, October 2017.
9. **Philip Lundrigan**, “In-Home Real-Time Sensor Networks”, at the 33rd Annual Utah Conference on Safety & Industrial Hygiene, Salt Lake City, UT, October 2016.
10. **Philip Lundrigan**, Mojgan Khaledi, Makito Kano, Naveen D.S., and Sneha K. Kasera, “Mobile Live Video Upstreaming”, at Raytheon BBN, Cambridge, MA, July 2015.

Teaching Experience

Instructor

- **ECEn 224**: Intro to Computer Systems (Winter 2023, Fall 2023)
- **ECEN 330**: Intro to Embedded Systems Programming (Fall 2019)
- **ECEN 426**: Computer Networks (Fall 2020, Fall 2021, Fall 2022, Fall 2023)
- **ECEN 526**: Wireless Networks (Winter 2019, Winter 2020, Winter 2021, Winter 2022, Winter 2023)

Awards

2022 **NSF Ideas Lab: Engineering Technologies to Advance Underwater Sciences (ETAUS) participant**

2021 **Most Influential Faculty Member Award, Electrical and Computer Engineering**

2019 **ICDCN Best Paper Award**
For “Scheduling Virtual WiFi Interfaces for High Bandwidth Live Video Upstreaming Using Multipath TCP”

2018 **SenseApp Best Paper Runner-up**
For “An In-Home IoT Architecture for Epidemiological Deployments”

2016 **Best Poster Award, University of Utah, School of Computing Poster Competition**

Citations

Citations: 613
h-index: 9
i10-index: 9

Employment Experience

2012 to 2018 **Research Assistant**, *Advanced Networks Systems Research Lab*
University of Utah

2015, Summer **Network Scientist Intern**, *Raytheon BBN Technologies*
Cambridge, MA

2014, Summer **Network Scientist Intern**, *Raytheon BBN Technologies*
Cambridge, MA

2013 to 2014 **Wireless Researcher**, *Xandem Technology*
Salt Lake City, UT

2012, Summer **Software Engineering Intern**, *Ancestry.com*
Provo, UT

2011 to 2012 **Research Assistant**, *Internet Research Lab*
Brigham Young University

Professional Activities

Member of IEEE and ACM

Member of Center of Excellence for Exposure Health Informatics at the University of Utah

NSF Panel Reviewer, 2022

Organizing Committee
Air Quality: Science for Solutions (Local Utah Conference) - 2019 to present

Publicity Co-Chair
IEEE International Symposium on a World of Wireless, Mobile and Multimedia Networks (WoWMoM) - 2020

Technical Program Committee (TPC) Member
ACM Conference on Embedded Networked Sensor Systems (SenSys) - 2023
IEEE Vehicular Technology Conference (VTC) - 2023
ACM/IEEE International Conference on Internet of Things Design and Implementation (IoTDI) - 2022, 2023, 2024
IEEE International Conference on Local Computer Networks (LCN) - 2021, 2022, 2023
ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN) - 2020
IEEE International Symposium on a World of Wireless, Mobile and Multimedia Networks (WoWMoM) - 2020

Reviewer
IEEE Transactions on Mobile Computing - 2020

GRANTS

2024 to 2026 Darrell Sonntag, **Philip Lundrigan**, Matthew Jones, Dale Tree
"Development of a Heavy-duty Truck Emissions Monitor"
Utah State, $522,541

2023 to 2026 **Philip Lundrigan**
"Meshed Observations of THE Remote Subsurface with Heterogeneous Intelligent Platforms (MOTHERSHIP)"
NSF, $209,608

2023 to 2024 John Beard, **Philip Lundrigan**, James Johnston, Scott Collingwood
"Sustainable, Low-cost Radon Mitigation Strategies for K-12 Schools and Employees"
Rocky Mountain Center for Occupational and Environmental Health (RMCOEH), $19,840

2023 to 2025 **Philip Lundrigan**
"Investigating Privacy-Preserving Techniques Using Wireless Sub-Protocols"
DARPA, $356,648

2022 to 2023 **Philip Lundrigan**
"Using Traffic Cameras to Measure Air Quality"
Ira A. Fulton College of Engineering, BYU, $12,500

2022 to 2024 **Philip Lundrigan**
"CRII: CNS: Building A Framework for Software-Based Wireless Sub-Protocols"
National Science Foundation (NSF), $171,494

2021 to 2022 Bryan Hopkins, Ruth Kelly, and **Philip Lundrigan**
"Water Conservation in the Arid West: Spatio-Temporal Analysis and Variable Rate Irrigation in the Urban Environment"
Redd Center, BYU, $5,000

2020 to 2023 Karl Warnick and **Philip Lundrigan**
"Spectrum Sharing Via Interference-resilient Passive Receivers and Passive-aware Active Services"
National Science Foundation (NSF), $258,000 (+ $48,935 supplement)

2019 to 2020 **Philip Lundrigan**
"Mongolian Ger Air Quality Measurement and Analysis"
Deseret International Charities, $15,250

2019 to 2020 **Philip Lundrigan**
"Self-Sustainable Air Quality Sensor"
Ira A. Fulton College of Engineering, BYU, $12,500

2018 to 2020 **Philip Lundrigan**
"PRISMS Informatics Platform - Federated Integration Architecture"
National Institutes of Health (NIH), $21,208