

PHILIP B. LUNDRIGAN

Assistant Professor
Department of Electrical and Computer Engineering
Brigham Young University
450J Engineering Building
Provo, UT 84602

lundrigan@byu.edu
github.com/philipbl
801-422-0734

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 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. Daniel Harman, Karl Knapp, Tyler Sweat, **Philip Lundrigan**, Michael Rice, and Willie Harrison, "Physical Layer Security: Channel Sounding Results for the Multi-Antenna Wiretap Channel", in *Entropy*, 2023. <https://doi.org/10.3390/e25101397>
3. Callum E. Flowerday, **Philip Lundrigan**, Christopher Kitras, Tu Nguyen, Jaron C. 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. <https://doi.org/10.3390/s23187721>
4. Shruti Hegde, Kyeong T. Min, James Moore, **Philip Lundrigan**, Neal Patwari, Scott Collingwood, and Kerry E. Kelly, "Household Indoor Particulate Matter Measurement Using a Network of Low-Cost Sensors", in *Aerosol and Air Quality Research*, 2020. <https://doi.org/10.4209/aaqr.2019.01.0046>
5. James Moore, Pascal Goffin, **Philip Lundrigan**, Neal 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. <https://doi.org/10.1145/3264938>
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 Infrastructure-less Environment", in Computer Networks, 2018. <https://doi.org/10.1016/j.comnet.2018.07.021>
 7. Brad Mager, **Philip Lundrigan**, and Neal Patwari, "Fingerprint-Based Device-Free Localization: Performance in Changing Environments", in Journal on Selected Areas in Communications, 2015. <https://doi.org/10.1109/jsac.2015.2430515>

Conference Publications

8. Bryson Schiel, Joshua Montierth, Eli Blattner, Corey E. Dobbs, Tracianne B. Nielsen, **Philip Lundrigan**, "Using Orthogonal Chirps Underwater for In-Band, Full-Duplex Communication with Minimal Self-Interference Cancellation", in ACM International Conference on Underwater Networks & Systems (WUWNet), 2024. <https://netlab.byu.edu/assets/WUWNet-2024.pdf>
9. Derek Benham, Ashton Palacios, **Philip Lundrigan**, Joshua Mangelson, "Low-Cost Urban Localization with Magnetometer and LoRa Technology", in IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2024.
10. Bryson Schiel, Sam Swindler, Alek Farmer, Daniel Sharp, Anup Hassan Murali, Brielle Corry, **Philip Lundrigan**, "A Multi-Layered Framework for Informing V2I Deployment Decisions Using Commercial Hardware-In-The-Loop Testing of RSUs", in IEEE Vehicular Networking Conference (VNC), 2024. https://netlab.byu.edu/assets/V2X_Testing_Framework.pdf
11. Ashton Palacios, Devon Ward, Dinah Bronson, Jon Backman, Deukhyoun Heo, 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 (DySPAN), 2024. <https://doi.org/10.1109/DySPAN60163.2024.10632837>
12. J. Johnson, Ashton Palacios, Cody Arvonen, **Philip Lundrigan**, "Wireless Latency Shift Keying", in International Conference on Mobile Computing and Networking (MobiCom), 2024. <https://doi.org/10.1145/3636534.3649373>
13. Michael Rice, Hyrum Croft, Joshua Gillis, Zach Hilton, Riley Kirkwood, Preston Walker, **Philip Lundrigan**, Willie Harrison, "A Comparison of Two Software Defined Radios for Aeronautical Telemetry", in Proceedings of the International Telemetering Conference, 2023. <http://hdl.handle.net/10150/670459>
14. Ashton Palacios, Chase Bledsoe, Elle Kelsey, Laura Landon, Jon Backman, **Philip Lundrigan**, "Stealthy Signals: Using Ghost Modulation to Watermark Interference", in 1st International Workshop on LEO Networking and Communication (LEO-NET), 2023. <https://doi.org/10.1145/3614204.3616105>
15. Christopher Kitras, Carter Pollen, Kyle Myers, Camille Wirthlin, **Philip Lundrigan**, "Location Verification of Crowd-Sourced Sensors", in International Conference on Computer Communications and Networks (ICCCN), 2023. <https://doi.org/10.1109/icccn58024.2023.10230111>
16. Aarushi Sarbhai, Ramkiran Gouripeddi, **Philip Lundrigan**, Pavithra Chidambaram, Aakanksha Saha, Randy Madsen, Julio Facelli, Katherine Sward, and Sneha K. Kasera, "Utilizing a Blockchain for Managing Sensor Metadata in Exposure Health Studies", in Intermountain Engineering, Technology and Computing (IETC), 2022. <https://doi.org/10.1109/ietc54973.2022.9796689>
17. Lehi Alcantara, Joseph Miera, Batsaikhan Ariun-Erdene, Chia-Chi Teng, **Philip Lundrigan**, "The Hitchhiker's Guide to Successful Remote Sensing Deployments in Mongolia", in Intermountain Engineering, Technology, and Computing Conference (I-ETC), 2020. <https://doi.org/10.1109/ietc47856.2020.9249214>

18. **Philip Lundrigan**, Neal Patwari, Sneha K. Kasera, “On-off Noise Power Communication”, in International Conference on Mobile Computing and Networking (MobiCom), 2019. <https://doi.org/10.1145/3300061.3345436>
19. Shobhi Maheshwari, **Philip Lundrigan**, Sneha 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. <https://doi.org/10.1145/3288599.3288620> **Best Paper Award**.
20. **Philip Lundrigan**, Neal Patwari, Sneha K. Kasera, “STRAP: Secure TRansfer of Association Protocol”, in International Conference on Computer Communications and Networks (ICCCN), 2018. <https://doi.org/10.1109/icccn.2018.8487333>
21. **Philip Lundrigan**, Kyeong T. Min, Neal Patwari, Sneha K. Kasera, Kerry Kelly, James Moore, Miriah Meyer, Scott Collingwood, Flory Nkoy, Bryan Stone, and Katherine Sward, “EpiFi: An In-Home IoT Architecture for Epidemiological Deployments”, in IEEE Workshop on Practical Issues in Building Sensor Network Applications (SenseApp), 2018. <https://doi.org/10.1109/icnw.2018.8628482> **Best Paper Runner-up**.
22. Kyeong T. Min, **Philip Lundrigan** Neal Patwari, “Smart Home Air Filtering System: A Randomized Controlled Trial for Performance Evaluation”, in IEEE/ACM International Conference on Connected Health (CHASE), 2018. <https://doi.org/10.1016/j.smhl.2018.07.009>
23. **Philip Lundrigan**, Mojgan Khaledi, Makito Kano, Naveen Dasa Subramanyam, and Sneha K. Kasera, “Mobile Live Video Upstreaming”, in International Teletraffic Congress (ITC 28), 2016. <https://doi.org/10.1109/itc-28.2016.124>
24. Randy Buck, Rich Lee, **Philip Lundrigan**, and Daniel Zappala, “WiFu: A composable toolkit for experimental wireless transport protocols”, in IEEE International Conference on Mobile Ad-Hoc and Sensor Systems, 2012. <https://doi.org/10.1109/mass.2012.6502529>
25. Christopher Lavin, Marc Padilla, Jaren Lamprecht, **Philip Lundrigan**, Brent Nelson, and Brad Hutchings, “HMFlow: Accelerating FPGA Compilation with Hard Macros for Rapid Prototyping”, in IEEE International Symposium on Field-Programmable Custom Computing Machines (FCCM), 2011. <https://doi.org/10.1109/fccm.2011.17>
26. Christopher Lavin, Marc Padilla, Jaren Lamprecht, **Philip Lundrigan**, Brent Nelson, and Brad Hutchings, “RapidSmith: Do-It-Yourself CAD Tools for Xilinx FPGAs”, in International Conference on Field Programmable Logic and Applications (FPL), 2011. <https://doi.org/10.1109/fpl.2011.69>
27. Christopher Lavin, Marc Padilla, **Philip Lundrigan**, Brent Nelson, and Brad Hutchings, “Rapid prototyping tools for FPGA designs: RapidSmith”, in International Conference on Field-Programmable Technology (FPT), 2010. <https://doi.org/10.1109/fpt.2010.5681429>

Poster/Demo Presentations

28. Bryson Schiel, **Philip Lundrigan**, “Role-Based Network Addressing for Fleets of Autonomous Underwater Vehicles”, in ACM International Conference on Underwater Networks & Systems (WUWNet), 2024.
29. Christopher Kitras, Ashton Palacios, **Philip Lundrigan**, “SSS: Building a Seven Segment Sign”, in PyCon, 2023.
30. 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. <https://doi.org/10.1109/VNC57357.2023.10136347>
31. Christopher 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**.

32. 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.
33. **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.
34. **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.
35. 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. <https://doi.org/10.1145/3055031.3055043>

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, Fall 2024)
- **ECEN 330**: Intro to Embedded Systems Programming (Fall 2019)
- **ECEN 426**: Computer Networks (Fall 2020, Fall 2021, Fall 2022, Fall 2023, Fall 2024)
- **ECEN 526**: Wireless Networks (Winter 2019, Winter 2020, Winter 2021, Winter 2022, Winter 2023, Winter 2024)

COURSE DEVELOPMENT

CpE Course Website Template (BYU) - https://github.com/byu-cpe/student_website_template

- Created easy-to-customize template for Computer Engineering course websites.
- Used in ECEn 224, 320, 330, 423, 426, and 427.

ECEN 224: Computer Systems (BYU) - <https://byu-cpe.github.io/ecen224/>

- Created the course and all curriculum (slides, homework, tests, labs). This class is required for all department majors and has been taught since 2023.
- Created new hands-on labs for students to build a smart doorbell system. Sourced all materials, including Raspberry Pis, during the electronics shortage caused by COVID-19.
- Piloted class with select students to receive feedback on course material.
- Developed recitations to help students learn material outside of lectures and labs.

ECEN 426: Computer Networks (BYU) - <https://ecenetworking.byu.edu/426/>

- Created course and all curriculum (slides, homework, tests, labs).
- The computer labs teach students practical skills in building networked applications
- Class covers broad range of topics including data communication reliability, network fairness, security, and privacy.

ECEN 526: Wireless Networking (BYU) - <https://ecenetworking.byu.edu/526/>

- Created course and all curriculum (slides, homework, tests, labs).
- Students get a combination of exposure to wireless networking research through reading research papers and hands-on experience through labs.

Light The Y (BYU STEM Camp) - <https://y-board.github.io/light-the-y/>

- Created an interactive circuit board and set of lessons to teach high school students how to program.
- Developed a second version Y-Board circuit board and accompanying software libraries.
- The curriculum has been used in BYU's STEM Camp in 2023 and 2024.

ECEn 192: Student Project (BYU) - <https://byu-cpe.github.io/ecen192/>

- Worked with students to help develop Y-Board portion of ECEn 192 programming labs.

AWARDS

2024 WUWNet 2024 Best Poster Award

For "Role-Based Network Addressing for Fleets of Autonomous Underwater Vehicles"

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: 705

h-index: 10

i10-index: 10

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, ACM, and ACM SIGMOBILE

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

NSF Panel Reviewer - 2022, 2024

University of Utah Sensor Expert Panel - 2024

DARPA ISAT Study Group Participant - 2024

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

MobiCom Artifact Committee - 2024

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, 2024

ACM Conference on Embedded Networked Sensor Systems (SenSys) - 2023, 2024, 2025

IEEE Vehicular Technology Conference (VTC) - 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

Session Chair

ACM/IEEE International Conference on Internet of Things Design and Implementation (IoTDI) - 2023

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

Reviewer

IEEE Transactions on Mobile Computing - 2020

College of Engineering CAEDM Manger Hiring Committee (2022)

Represented department in interviewing a new CAEDM manager for the college.

BYU ECEn Department Scheduler (2019 to Present)

In charge of finding times and classrooms for all courses and labs in department. Work with college scheduler and university schedulers to determine availability classrooms. Work with faculty to account for teaching needs and preferences.

BYU ECEn Undergraduate Committee (2018 to Present)

Meet every other week as a committee to discuss needs of undergraduates in department. Helped with merging IT&C major into our department.

College of Engineering Teaching Committee (2021)

Helped develop tools and best practices for remote teaching during COVID-19. Helped to organize a virtual lunch and learn meeting for college faculty members.

GRANTS

- 2024 to 2026** Darrell Sonntag (PI), **Philip Lundrigan** (Co-PI), Matthew Jones (Co-PI), Dale Tree (Co-PI)
 “Development of a Heavy-duty Truck Emissions Monitor”
Utah State, \$522,541
- 2023 to 2026** **Philip Lundrigan** (PI)
 “Meshed Observations of THE Remote Subsurface with Heterogeneous Intelligent Platforms (MOTHERSHIP)”
National Science Foundation (NSF), \$209,608
- 2023 to 2024** John Beard (PI), **Philip Lundrigan** (Co-PI), James Johnston (Co-PI), Scott Collingwood (Co-PI)
 “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** (PI)
 “Investigating Privacy-Preserving Techniques Using Wireless Sub-Protocols”
DARPA (through Riverside Research), \$356,648
- 2022 to 2023** **Philip Lundrigan** (PI)
 “RSE Performance, Interoperability, and ITS Device Integration”
Panasonic Corporation of North America (Smart Mobility Office), \$20,000
- 2022 to 2023** **Philip Lundrigan** (PI)
 “Using Traffic Cameras to Measure Air Quality”
Ira A. Fulton College of Engineering, BYU, \$12,500
- 2022 to 2024** **Philip Lundrigan** (PI)
 “CRII: CNS: Building A Framework for Software-Based Wireless Sub-Protocols”
National Science Foundation (NSF), \$171,494
- 2021 to 2022** Bryan Hopkins (PI), Ruth Kelly (Co-PI), and **Philip Lundrigan** (Co-PI)
 “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 (PI) and **Philip Lundrigan** (Co-PI)
 “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”
Donation from Shipps, \$35,775
- 2019 to 2020** **Philip Lundrigan** (PI)
 “Mongolian Ger Air Quality Measurement and Analysis”
Deseret International Charities, \$15,250
- 2019 to 2020** **Philip Lundrigan** (PI)
 “Self-Sustainable Air Quality Sensor”

Ira A. Fulton College of Engineering, BYU, \$12,500

2018 to Philip Lundrigan (PI)

2020 “PRISMS Informatics Platform - Federated Integration Architecture”
National Institutes of Health (NIH), \$21,208