

## Personal Information

Name Ambuj Varshney  
Nationality Sweden  
Date of Birth October 9, 1986  
Mobile +46 72 033 85 74  
Email ambujvarshney@acm.org

## Overview

I founded the WEISER group at the National University of Singapore.

- **Mentorship:** Currently advise **six** PhD students and **three** master's students. Graduated **one** PhD student, **two** postdoctoral researchers, **sixteen** master's students, and supervised over **twenty** undergraduate students.
- **Funding:** Secured over **1.2 million USD** across **seven** grants, including a Google Research Scholar Award and the ABB Research Award (300,000 USD)—the largest endowment by a commercial organization for early-career researchers.
- **Publications:** Published in flagship venues such as ACM MobiCom, MobiSys, SenSys, IEEE/ACM Transactions on Networking, and IMWUT. Received a Best Paper Award and multiple Best Demonstration Awards.
- **Industry Impact:** International Patent (Sole Inventor) cited as foundational prior art by **14+** patents from Nokia, Vivo Mobile, KAIST, and Oppo.
- **Teaching:** Courses in embedded systems and wireless networking.

## Academic Appointments and Experience

- 2022–Present **National University of Singapore**  
Assistant Professor  
Department of Computer Science  
School of Computing
- 2020–2022 **University of California, Berkeley**  
Postdoctoral Scholar  
Mentor: Prof. Prabal Dutta
- 2021 **Royal Institute of Technology (KTH)**  
Visiting Researcher (on leave from UC Berkeley)
- 2018–2020 **Uppsala University**  
Postdoctoral Scholar
- 2012 **NXP Semiconductors**  
Software Engineer  
Embedded Wireless Networks / Low-Power Wireless Group
- 2011–2012 **Dhirubhai Ambani Institute of ICT**  
Research Engineer

## Education

### 2012–2018 **Ph.D., Computer Science**

Uppsala University

Dissertation: *Enabling Sustainable Networked Embedded Systems*

Advisor: Prof. Thiemo Voigt (Uppsala University and RI.SE SICS, Sweden)

Co-advisor: Prof. Luca Mottola (Politecnico di Milano, Italy and RI.SE SICS, Sweden)

Opponent: Prof. Prabal Dutta (University of California, Berkeley, USA)

**Honors:** Dissertation awarded the ABB Research Award in Honor of Hubertus von Grünberg (2019).

Selection rate: approximately 1 in 60.

Endowment of 300,000 USD.

### 2007–2011 **B.Tech., Information and Communication Technology**

Dhirubhai Ambani Institute of Information and Communication Technology

## Research Grants

- 2024 **From Supply Chains to Personal Belongings: Designing Zero-Battery Trackers.**  
Google Research Scholar Award.  
Role: Principal Investigator (Sole PI).  
Amount: 35,000 USD (Unrestricted Gift).
- 2023–2026 **Tackling the Challenge of Energy-Efficient Reception to Enable the Next Billion IoT Devices.**  
Ministry of Education (Singapore) Tier 1 Grant.  
Role: Principal Investigator (Sole PI).  
Amount: 250,000 SGD.
- 2022–2025 **Enabling Continuous, Real-time Monitoring of Human Vitals through Battery-free Tunnel Diode Sensors.**  
NUS ARTIC Center.  
Role: Principal Investigator (Sole PI).  
Amount: 214,000 SGD.
- 2022–2024 **Enabling Non-Intrusive Monitoring of Internet of Things.**  
NUS-NCS Joint Center.  
Role: Principal Investigator (PI) with Co-PI Shantanu (NCS).  
Amount: 465,000 SGD.
- 2022–2026 **Enabling Sustainable and Large-Scale Wireless Networks of Embedded Systems.**  
NUS ODPRT (Start-up Grant).  
Role: Principal Investigator (Sole PI).  
Amount: 250,000 SGD.
- 2019–2022 **Towards Future Factories: Enabling Sustainable Sensing.**  
ABB Research Award in Honor of Hubertus von Grünberg.  
Role: Awardee (Hosted at UC Berkeley).  
Amount: 300,000 USD.
- 2018–2019 **Enabling Factories of the Future Using Sustainable Sensing.**  
VINNOVA (Swedish Innovation Agency).  
Role: Principal Investigator (Sole PI).  
Hosted at Uppsala University.  
Amount: 499,000 SEK (approx. 50,000 USD).

## Awards and Honors

### Research Awards

- 2024 **Google Research Scholar Award.**  
Proposal: *From Supply Chains to Personal Belongings: Designing Zero-Battery Trackers.*  
*The only faculty member outside North America awarded in the Systems and Networking category for this year.*
- 2024 **Best Demonstration Award (Runner-up).**  
ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN).
- 2023 **Best Demonstration Award.**  
ACM International Conference on Mobile Systems, Applications, and Services (MobiSys).
- 2021 **FORM+FUND Fellow.**  
University of California, Berkeley (Spring Cohort).
- 2019 **ABB Research Award in Honor of Hubertus von Grünberg.**  
Recipient of a 300,000 USD endowment.  
Awarded by Peter Voser (Chairman/CEO of ABB).  
*The largest endowment offered by a commercial organization for early-career researchers.*
- 2019 **Attractive Innovation Project.**  
Uppsala University Innovation (Selected as Top 15 Project).
- 2018 **Breakthrough Ideas Grant.**  
Swedish Innovation Agency (Vinnova).
- 2018 **Best Demonstration Award.**  
ACM Conference on Security and Privacy in Wireless and Mobile Networks (WiSec).
- 2017 **Best Paper Award.**  
ACM Workshop on Visible Light Communication Systems (VLCS), co-located with MobiCom.

## Honors to Mentored Students

- 2025 **Rising Star** (Awarded to mentee Rajashekar).  
ACM MobiSys 2025.
- 2024 **NUS Computing Innovation Prize** (Awarded to mentee Nobel Ng).  
For Best Undergraduate Thesis.  
Selected by NUS and Singapore Computer Society.
- 2023 **Winner, Undergraduate Category.**  
ACM Student Research Competition (SRC) at MobiCom.
- 2023 **Third Place, Undergraduate Category.**  
ACM Student Research Competition (SRC) at MobiCom.
- 2020–2021 **N<sup>2</sup>Women Young Researcher Fellowship.**  
Awarded to mentee Wenqing Yan (also Best Poster at SenSys 2020/2021).
- 2017 **Winner, Graduate Category.**  
ACM Student Research Competition (SRC) at MobiCom.

## Postdoctoral and Doctoral Supervision

### Doctoral Students (Current)

- 2023–2027 **Pramuka Sooriyapatabandige** (NUS).  
Role: Sole primary advisor.
- 2023–2027 **Chinthalapani Rajashekar Reddy** (NUS).  
Role: Sole primary advisor.
- 2023–2028 **Kandala Savitha Viswanadh** (NUS).  
Role: Sole primary advisor.
- 2024–2028 **Dhairya Shah** (NUS).  
Role: Sole primary advisor.
- 2026–2030 **Spanddhana Sara** (NUS).  
Role: Sole primary advisor.
- 2025–2030 **Anna Seiderer** (Uppsala University).  
Role: Co-supervisor (with Prof. Christian Rohner).
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### Postdoctoral Researchers (Alumni)

- 2025–2026 **Dr. Amalinda Gamage**.  
Background: Ph.D., Nanyang Technological University (with Prof. Mo Li).
- 2023–2024 **Dr. Manoj Gulati**.  
Background: Ph.D., IIIT Delhi.  
Visiting Scholar at University of Washington (with Prof. Shwetak Patel).  
*Placement: Principal Application Engineer, Western Digital.*
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### Doctoral Students (Alumni)

- 2018–2024 **Dr. Wenqing Yan** (Uppsala University).  
Co-supervised with Prof. Christian Rohner and Prof. Thiemo Voigt.  
*Design and Identification of Wireless Transmitters for a Low-Power and Secure IoT.*  
Opponent: Prof. Haitham Hassanieh (EPFL).  
Committee: Prof. Niki Trigoni (Oxford), Prof. Danny Hughes (KU Leuven).  
*Placement: Experienced Researcher, Ericsson Research, Sweden.*

## Master's Student Supervision (Thesis and Capstone)

### Current Students (National University of Singapore)

- 2025–Present **Tikyi Min Khant Naing.**  
Exploring machine learning (TinyML) on embedded devices.
- 2025–Present **Meng Xianyu.**  
Rethinking embedded cameras using image and language models.
- 2025–Present **Li Shuaixian.**  
Rethinking embedded cameras using image and language models.
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### Alumni (National University of Singapore)

- 2025 **Andre Teo Ser Yeong**
- 2025 **Huang Keyi**
- 2025 **Dennis Patrick Warfield**
- 2024 **Henrikus Theorizchy Cleven**
- 2024 **Hew Sock Fang**
- 2024 **Wu Zihao**
- 2024 **Chee Han Quan, Edison**
- 2023 **Qiao Yukai**
- 2023 **Yusril Izza**
- 2023 **Goh Sheen An**
- 2023 **Lim Soon Lee**

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## Alumni (Uppsala University)

- 2017–2019 **Andreas Soleiman.**  
Battery-free Visible Light Sensing.  
*Placement: Ph.D. Student at MIT (Prof. Fadel Adib).*
- 2018 **Sam Hilamia.**  
Battery-free Radio Tomographic Imaging.  
*Placement: Ph.D. Student at Uppsala University.*
- 2018 **Gustav Eriksson.**  
Towards Long-Range Backscatter Communication Using Tunnel Diode Amplifiers.  
*Placement: Engineer at Intertek Semko.*
- 2016–2017 **Oliver Harms.**  
Modulation Schemes in Ambient Backscatter Communication.  
*Placement: Ph.D. Student at Chalmers University.*
- 2016 **Elena Di Lascio.**  
A Battery-free Indoor Localization System.  
*Placement: Ph.D. Student at USI Lugano, Switzerland.*



## Undergraduate Supervision (UROP, Research)

2025 (Ongoing) **Koh Wei Long, Dylan.**

Backhauling Networks and Internet of Things.

2025 **Chai Jia Xuan.**

Networking mixed reality headsets through LiFi (visible light communication).

2024 **Zhang Lanyu.**

Tracking of everyday activities from voice to vision using large language and image models.

## Undergraduate Supervision (Final Year Projects)

### Academic Year 2024/2025

**Wang Minhong.**

Building an Embedded Operating System (Tiku).

**Fu Yiqiao.**

Building an Embedded Operating System (Tiku).

**Sean Wang.**

Earth Computers.

**Daniel Goh Chin Hao.**

Backhauling Networks and Internet of Things.

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### Academic Year 2023/2024

**Steven Antya Orvala Waskito.**

OTTER: Sensor Data Processing and Analysis Using Large Language Models.

**Leong Huen Weng.**

Tracking of Everyday Activities from Voice to Vision Using Large Language Models.

**Yang Jiacheng.**

Battery-free Sensing and Communication through Tunnel Diodes.

**Goh Jun Yi.**

Networking Mixed Reality Headsets through LiFi.

**Tan Guo Xuan, Marcus.**

Networking Mixed Reality Headsets through LiFi.

**Tang Ethan Yidong.**

Networking Internet of Things through Backhauling Networks.

**Kaemon Ng Chongyu.**

Networking Internet of Things through Backhauling Networks.

**Li Po Hsien.**

Language Models Distributed on Edge Devices.

## Academic Year 2022/2023

### **Lim Chang Quan Thaddeus.**

Heartbeat and Breathing Sensing Using Low-Power Wireless Signals.  
*Led to IEEE RFID 2024 publication.*

### **Marcus Tang Xin Kye.**

Making Internet of Things Devices Interact with ChatGPT.

### **Heng Chen Kai, Darren.**

Sustainable Internet of Things on Capacitors.

### **Hu Yuxin.**

Brain Machine Interface.

### **Nobel Ang.**

Connecting IoT Devices to Edge and Cloud Devices.

### **Wong Chee Hong.**

Computing on Internet of Things Devices.

### **Juliet Teoh Qian Ying.**

Computing on Internet of Things Devices.

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## Research Assistants and Other Alumni

### **Simon Olofsson.**

Role: Research Assistant.

Convergecast Using Directional Antennas.

Achievement: Co-authored EWSN 2019 paper.

*Placement: Ph.D. at Imperial College London; subsequently at Meta.*

### **David Hakansson.**

Role: Bachelor Thesis Student.

Energy Harvesting Environment Control.

## Academic Service

### Conference Organization and Leadership

- 2026 Special Session Co-Chair, Beyond Conventional Backscatter (with Prof. Gregory Durgin), IEEE International Conference on RFID.  
[IEEE RFID.](#)
- 2025 Posters and Demos Co-Chair, ACM International Conference on Embedded Wireless Systems and Networks (with Thomas Watteyne).  
[ACM EWSN.](#)
- 2023 Web Chair, ACM International Conference on Mobile Computing and Networking.  
[ACM MobiCom.](#)
- 2022 Session Chair, IEEE International Conference on Computer Communications.  
[IEEE INFOCOM.](#)
- 2020 Publicity Chair, IEEE International Conference on Sensing, Communication, and Networking.  
[IEEE SECON.](#)
- 2019 Posters Co-Chair, ACM/IEEE International Conference on Information Processing in Sensor Networks (with Nirupama Bulusu).  
[ACM/IEEE IPSN.](#)  
Panelist, Ph.D. Forum, ACM/IEEE International Conference on Information Processing in Sensor Networks (with Olga Saukh and Anthony Rowe).  
[ACM/IEEE IPSN.](#)
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### Technical Program Committee Membership

- 2026 ACM/IEEE Conference on Embedded Networked Sensor Systems.  
[ACM/IEEE SenSys.](#)  
ACM International Conference on Mobile Systems, Applications, and Services.  
[ACM MobiSys.](#)  
IEEE International Conference on Sensing, Communication, and Networking.  
[IEEE SECON.](#)
- 2025 ACM Conference on Embedded Networked Sensor Systems.  
[ACM SenSys.](#)  
IEEE International Conference on Computer Communications.  
[IEEE INFOCOM.](#)  
ACM Internet Measurement Conference.  
[ACM IMC.](#)
- 2024 ACM Internet Measurement Conference.  
[ACM IMC.](#)

- ACM Conference on Embedded Networked Sensor Systems.  
[ACM SenSys.](#)
- IEEE International Conference on Computer Communications.  
[IEEE INFOCOM.](#)
- ACM International Conference on Embedded Wireless Systems and Networks.  
[ACM EWSN.](#)
- 2023 IEEE International Conference on Computer Communications.  
[IEEE INFOCOM.](#)
- ACM/IEEE International Conference on Internet of Things Design and Implementation.  
[ACM/IEEE IoTDI.](#)
- 2022 IEEE International Conference on Computer Communications.  
[IEEE INFOCOM.](#)
- 2021 IEEE International Conference on Computer Communications.  
[IEEE INFOCOM.](#)
- IEEE International Conference on Distributed Computing Systems.  
[IEEE ICDCS.](#)
- IEEE International Conference on Distributed Computing in Smart Systems and the Internet of Things.  
[IEEE DCOSS-IoT.](#)
- 2020 ACM/IEEE International Conference on Internet of Things Design and Implementation.  
[ACM/IEEE IoTDI.](#)
- IEEE International Conference on Distributed Computing in Smart Systems and the Internet of Things.  
[IEEE DCOSS-IoT.](#)
- 2019 IEEE International Conference on Distributed Computing Systems.  
[IEEE ICDCS.](#)

## Invited and Conference Talks

- 2023 **Building Sticker Computers.**  
Nanyang Technological University, Singapore.
- 2022 **ABB Research Award Conclusion Presentation.**  
ABB Corporate Research Center, Switzerland.  
Invited Talk. Audience included: CEO of ABB.
- 2021 **Tackling the Energy Asymmetry between Sensing, Computation, and Communication in Wireless Embedded Systems.**  
Imperial College London, Held Virtually.
- 2021 **Tackling the Energy Asymmetry between Sensing, Computation, and Communication in Wireless Embedded Systems.**  
National University of Singapore, Held Virtually.
- 2021 **Tackling the Energy Asymmetry between Sensing, Computation, and Communication in Wireless Embedded Systems.**  
ETH Zurich, Held Virtually.
- 2021 **Tackling the Energy Asymmetry between Sensing, Computation, and Communication in Wireless Embedded Systems.**  
IMDEA Networks Institute, Spain, Held Virtually.
- 2021 **Towards Ubiquitous Sensing: Tackling the Energy Asymmetry between Sensing, Computation, and Communication in Wireless Embedded Systems.**  
Aalto University, Finland, Held Virtually.
- 2020 **Science and Innovation Week 2020: Green Light for the Earth.**  
Exhibition, Science and Innovation Week 2020, IMDEA Networks Institute, Spain.
- 2020 **Enabling Sustainable and Widespread Sensing.**  
ACM SigMobile India Chapter, Held Virtually.  
Invited Talk.
- 2020 **Tunnel Emitter: Tunnel Diode based Low - Power Carrier Emitters for Backscatter Tags.**  
ACM MobiCom 2020, London, UK, Held Virtually.  
Conference Talk.
- 2020 **Two to Tango: Hybrid Light and Backscatter Networks for Next Billion Devices.**  
ACM MobiSys 2020, Toronto, Canada, Held Virtually.  
Conference Talk.
- 2020 **Enabling Ubiquitous and Sustainable Sensing Systems.**  
ABB Corporate Research Center, Sweden.

Invited Talk. Host: Dr. Alf Isaksson.

2019 **ABB Research Award Presentation.**

ABB Corporate Research Center, Switzerland.

Invited Talk. Audience included: CEO of ABB – Peter Voser, and CTO of ABB – Bazmi Husain.

2019 **TunnelScatter: Low Power Communication for Sensor Tags using Tunnel Diodes.**

ACM MobiCom 2019, Los Cabos, Mexico.

Conference Talk.

2019 **Wearable Polymorphic Light Sensors.**

ACM WearSys 2019 (co-located with ACM MobiSys 2019), Seoul, South Korea.

Conference Talk.

2019 **Back to the Future: Enabling Sustainable and Ubiquitous Sensing Systems.**

IMDEA Networks Institute, Madrid, Spain.

Invited Talk. Host: Prof. Dr. Domenico Giustiniano.

2017 **LoRea: A Backscatter Architecture that Achieves a Long Communication Range.**

ACM SenSys 2017, Delft, Netherlands.

Conference Talk.

2017 **Towards Wide - Area Backscatter Networks.**

ACM HotWireless 2017 (co-located with ACM MobiCom 2017), Snowbird, Utah, USA.

Conference Talk.

2017 **Battery - free Visible Light Sensing.**

ACM VLCS 2017 (co-located with ACM MobiCom 2017), Snowbird, Utah, USA.

Conference Talk.

2017 **Networking Next Billion Devices Using Backscatter Communication.**

IoT Meetup, Stockholm, Sweden.

Invited Talk.

2015 **Directional Transmissions and Receptions for High - throughput Bulk Forwarding in Wireless Sensor Networks.**

IIIT Delhi, Delhi, India.

Invited Talk.

2015 **Directional Transmissions and Receptions for High - throughput Bulk Forwarding in Wireless Sensor Networks.**

ACM SenSys 2015, Seoul, South Korea.

Conference Talk.

2013 **Using Directional Transmissions and Receptions to Reduce Contention in Wireless Sensor Networks.**

REALWSN 2013, Como, Italy.

Conference Talk.



## Selected Publications

Symbols next to author names indicate the enrollment status of students: • postdoctoral scholar, ■ doctoral (Ph.D.) student, ■ master's student, and ■ undergraduate student. Only students and scholars directly mentored by me are marked.

1. *AudioCast: Enabling Ubiquitous Connectivity for Embedded Systems through Audio-Broadcasting Low-Power Tags*. Rajashekar Reddy Chinthalapani<sup>■</sup>, Dhairya Jigar Shah<sup>■</sup>, Nobel Ang<sup>■</sup>, and Ambuj Varshney. [ACM IMWUT 2025 / UbiComp 2025](#).
2. *Unraveling the Missing Link in Low-Power Communication: An Autodyning Receiver that Achieves a Long Range*. Sooriya Patabandige Pramuka Medaranga<sup>■</sup>, Rajashekar Reddy Chinthalapani<sup>■</sup>, Wenqing Yan<sup>■</sup>, Prabal Dutta, and Ambuj Varshney. [ACM MobiSys 2025](#).
3. *LiFi for Low-Power and Long-Range RF Backscatter*. Muhammad Sarmad Mir, Borja G. Guzman, Ambuj Varshney, and Domenico Giustiniano. [IEEE/ACM Transactions on Networking, Vol. 32, No. 3, 2024](#).
4. *TunnelSense: Low-Power, Non-Contact Sensing Using Tunnel Diodes*. L. C. Q. Thaddeus<sup>■</sup>, C. R. Reddy<sup>■</sup>, Y. S. Bhadauria<sup>■</sup>, Dhairya Jigar Shah<sup>■</sup>, M. Gulati<sup>•</sup>, and Ambuj Varshney. [IEEE RFID 2024](#).
5. *PixelGen: Rethinking Embedded Cameras for Mixed-Reality*. Kunjun Li<sup>■</sup>, Manoj Gulati<sup>•</sup>, Dhairya Jigar Shah<sup>■</sup>, Steven Waskito<sup>■</sup>, Shantanu Chakrabarty, and Ambuj Varshney. [ACM ImmerCom 2024 \(co-located with MobiCom\)](#). **Best Demonstration Runner-up, ACM/IEEE IPSN 2024**.
6. *Beyond Broadcasting: Revisiting FM Frequency-Band for Providing Connectivity to Next Billion Devices*. C. Rajashekar Reddy<sup>■</sup>, Manoj Gulati<sup>•</sup>, and Ambuj Varshney. [ACM ENSys 2023 \(co-located with ACM SenSys\)](#).
7. *TunnelLiFi: Bringing LiFi to Commodity Internet of Things Devices*. Muhammad Sarmad Mir, Wenqing Yan<sup>■</sup>, Prabal Dutta, Domenico Giustiniano, and Ambuj Varshney. [ACM HotMobile 2023](#).
8. *Radio Frequency Communication Device for Low-Power Communication*. Inventor: Ambuj Varshney (Sole Inventor). [International Patent Application \(PCT\): WO2021040594A1](#). **Industry Impact:** Cited as foundational prior art by 14+ patents from industry and academic leaders, including Nokia, Vivo Mobile, KAIST, and Oppo.
9. *Making Low-Power and Long-Range Wireless Backscatter Transmitters*. Ambuj Varshney. [ACM Get-Mobile 2022](#). **Invited Contribution**.
10. *Judo: Addressing the Energy Asymmetry of Wireless Embedded Systems through Tunnel Diode-Based Wireless Transmitters*. Ambuj Varshney, Wenqing Yan<sup>■</sup>, and Prabal Dutta. [ACM MobiSys 2022](#).
11. *Tunnel Emitter: Tunnel Diode-Based Low-Power Carrier Emitters for Backscatter Tags*. Ambuj Varshney and Lorenzo Corneo. [ACM MobiCom 2020](#).
12. *Two to Tango: Hybrid Light and Backscatter Networks for Next Billion Devices*. Ambuj Varshney<sup>\*</sup>, Ander Galisteo<sup>\*</sup>, and Domenico Giustiniano. [ACM MobiSys 2020](#).  
**\*Co-primary authors contributing equally.**
13. *TunnelScatter: Enabling Low-Power Communication for Sensor Tags Using Tunnel Diodes*. Ambuj Varshney, Andreas Soleiman<sup>■</sup>, and Thiemo Voigt. [ACM MobiCom 2019](#).

14. *Battery-Free Visible Light Sensing*. Ambuj Varshney, Andreas Soleiman<sup>■</sup>, Luca Mottola, and Thiemo Voigt. [ACM VLCS 2017 \(co-located with MobiCom\)](#).  
**Best Paper Award.**
15. *LoRea: A Backscatter Architecture that Achieves a Long Communication Range*. Ambuj Varshney, Oliver Harms<sup>■</sup>, Carlos Perez Penichet, Christian Rohner, Frederik Hermans, and Thiemo Voigt. [ACM SenSys 2017](#).
16. *Directional Transmissions and Receptions for High-Throughput Bulk Forwarding in Wireless Sensor Networks*. Ambuj Varshney, Luca Mottola, Mats Carlsson, and Thiemo Voigt. [ACM SenSys 2015](#).

## Full Publications in Journals, Conferences, and Workshops

Symbols next to author names indicate the enrollment status of students: ■ postdoctoral scholar, ■ doctoral (Ph.D.) student, ■ master's student, and ■ undergraduate student. Only students and scholars directly mentored by me are marked.

1. Sooriya Patabandige Pramuka Medaranga<sup>■</sup>, Rajashekar Reddy Chinthalapani<sup>■</sup>, Wenqing Yan<sup>■</sup>, Prabal Dutta, Ambuj Varshney. *Unraveling the Missing Link in Low-Power Communication: An Autodyning Receiver Architecture that Achieves a Long Range*. In Proceedings of the 23rd Annual International Conference on Mobile Systems, Applications, and Services (**ACM MOBISYS**), 2025.
2. C. Rajashekar Reddy<sup>■</sup>, Dhairya Shah<sup>■</sup>, Nobel Ang<sup>■</sup>, Ambuj Varshney. *AudioCast: Enabling Ubiquitous Connectivity for Embedded Systems through Audio-broadcasting Low-power Tags*. Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (**PACM IMWUT**), 2025.
3. Kunjun Li<sup>■</sup>, Manoj Gulati<sup>■</sup>, Dhairya Shah<sup>■</sup>, Steven Waskito<sup>■</sup>, Shantanu Chakrabarty, Ambuj Varshney. *PixelGen: Rethinking Embedded Cameras for Mixed-Reality*. In Proceedings of the 30th Annual International Conference on Mobile Computing and Networking (**ACM IMMERCOM 2024 co-located with MOBICOM**), 2024.
4. Lim Chang Quan Thaddeus<sup>■</sup>, C. Rajashekar Reddy<sup>■</sup>, Yuvraj Singh Bhadauria<sup>■</sup>, Dhairya Shah<sup>■</sup>, Manoj Gulati<sup>■</sup>, Ambuj Varshney. *TunnelSense: Low-Power, Non-Contact Sensing Using Tunnel Diodes*. In Proceedings of the IEEE International Conference on RFID (**IEEE RFID**), 2024.
5. Muhammad Mir, Borja Genoves Guzman, Ambuj Varshney, Domenico Giustiniano. *LiFi for Low-Power and Long-Range RF Backscatter*. IEEE/ACM Transactions on Networking (**IEEE/ACM TON**), 2024.
6. C. Rajashekar Reddy<sup>■</sup>, Manoj Gulati<sup>■</sup>, Ambuj Varshney. *Beyond Broadcasting: Revisiting FM Frequency-band for Providing Connectivity to Next Billion Devices*. In Proceedings of the 11th International Workshop on Energy Harvesting & Energy-Neutral Sensing Systems (ENSsys), co-located with **ACM SENSYS**, 2023.
7. Muhammad Sarmad Mir, Wenqing Yan<sup>■</sup>, Prabal Dutta, Domenico Giustiniano, Ambuj Varshney. *Tunnel-LiFi: Bringing LiFi to Commodity Internet of Things Devices*. In Proceedings of the 24th International Workshop on Mobile Computing Systems and Applications (**ACM HOTMOBILE**), 2023.
8. Ambuj Varshney, Wenqing Yan<sup>■</sup>, Prabal Dutta. *Judo: Addressing the Energy Asymmetry of Wireless Embedded Systems through Tunnel Diode-Based Wireless Transmitters*. In Proceedings of the 20th ACM International Conference on Mobile Systems, Applications, and Services (**ACM MOBISYS**), 2022.
9. Ambuj Varshney. *Making Low-Power and Long-Range Wireless Backscatter Transmitters*. GetMobile: Mobile Computing and Communications (**ACM GETMOBILE**), 2022.
10. Muhammad Sarmad, Borja Genoves, Ambuj Varshney, Domenico Giustiniano. *PassiveLiFi: Rethinking LiFi for Low-Power and Long-Range RF Backscatter*. In Proceedings of the 27th Annual International Conference on Mobile Computing and Networking (**ACM MOBICOM**), 2021.
11. Revathy Narayanan, Ambuj Varshney, Panos Papadimitratos. *Securing Battery-Free Backscatter Tags through Fingerprinting*. In Proceedings of the 20th ACM Workshop on Hot Topics in Networks (**ACM HOTNETS**), 2021.
12. Ambuj Varshney, Lorenzo Corneo. *Tunnel Emitter: Tunnel Diode-Based Low-Power Carrier Emitters for Backscatter Tags*. In Proceedings of the 26th Annual International Conference on Mobile Computing and Networking (**ACM MOBICOM**), 2020.
13. Ambuj Varshney<sup>\*</sup>, Ander Galisteo<sup>\*</sup>, Domenico Giustiniano. *Two to Tango: Hybrid Light and Backscatter Networks for Next Billion Devices*. In Proceedings of the 18th ACM International Conference on Mobile Systems, Applications, and Services (**ACM MOBISYS**), 2020.

**\*Co-primary authors contributing equally.**

14. Ambuj Varshney, Andreas Soleiman<sup>■</sup>, Thiemo Voigt. *TunnelScatter: Enabling Low-Power Communication for Sensor Tags Using Tunnel Diodes*. In Proceedings of the 25th Annual International Conference on Mobile Computing and Networking (**ACM MOBICOM**), 2019.
15. Ambuj Varshney. *Position: Wearable Polymorphic Light Sensors*. In Proceedings of the 5th ACM Workshop on Wearable Systems and Applications (**ACM WEARSYS**), co-located with **ACM MOBISYS**, 2019.
16. Domenico Giustiniano, Ambuj Varshney, Thiemo Voigt. *Connecting Battery-Free IoT Tags Using LED Bulbs*. In Proceedings of the 17th ACM Workshop on Hot Topics in Networks ( **HOTNETS**), 2018.
17. Carlos Perez Penichet, Claro Noda, Ambuj Varshney, Thiemo Voigt. *Battery-Free 802.15.4 Receiver*. In Proceedings of the 17th International Conference on Information Processing in Sensor Networks (**ACM/IEEE IPSN**), 2018.
18. Ambuj Varshney, Oliver Harms<sup>■</sup>, Carlos Perez Penichet, Christian Rohner, Frederik Hermans, Thiemo Voigt. *LoRea: A Backscatter Architecture that Achieves a Long Communication Range*. In Proceedings of the 15th ACM Conference on Embedded Networked Sensor Systems (**ACM SENSYS**), 2017.
19. Ambuj Varshney, Andreas Soleiman<sup>■</sup>, Luca Mottola, Thiemo Voigt. *Battery-Free Visible Light Sensing*. In Proceedings of the 4th ACM Workshop on Visible Light Communication Systems (**ACM VLCS**), co-located with **ACM MOBICOM**, 2017.
20. Ambuj Varshney, Carlos Perez Penichet, Christian Rohner, Thiemo Voigt. *Towards Wide-Area Backscatter Networks*. In Proceedings of the 4th ACM Workshop on Hot Topics in Wireless, co-located with **ACM MOBICOM**, 2017.
21. Kasun Hewage, Ambuj Varshney, Abdalah Hilaria<sup>■</sup>, Thiemo Voigt. *modBulb: A Modular Light Bulb for Visible Light Communication*. In Proceedings of the 3rd ACM Workshop on Visible Light Communication Systems (**ACM VLCS**), co-located with **ACM MOBICOM**, 2016.
22. Carlos Pérez-Penichet, Ambuj Varshney, Frederik Hermans, Christian Rohner, Thiemo Voigt. *Do Multiple Bits per Symbol Increase the Throughput of Ambient Backscatter Communications?* In Proceedings of the International Workshop on New Wireless Communication Paradigms for the Internet of Things (MadCom), co-located with EWSN, 2016.
23. Carlos Perez Penichet, Frederik Hermans, Ambuj Varshney, Thiemo Voigt. *Augmenting IoT Networks with Backscatter-Enabled Passive Sensor Tags*. In Proceedings of the 3rd ACM Workshop on Hot Topics in Wireless, co-located with **ACM MOBICOM**, 2016.
24. Ambuj Varshney, Luca Mottola, Mats Carlsson, Thiemo Voigt. *Directional Transmissions and Receptions for High-Throughput Bulk Forwarding in Wireless Sensor Networks*. In Proceedings of the 13th ACM Conference on Embedded Networked Sensor Systems (**ACM SENSYS**), 2015.
25. Bo Wei, Ambuj Varshney, Wen Hu, Neal Patwari, Thiemo Voigt, Chun Tung Chou. *dRTI: Directional Radio Tomographic Imaging*. In Proceedings of the 14th International Conference on Information Processing in Sensor Networks (**ACM/IEEE IPSN**), 2015.
26. Ambuj Varshney, Luca Mottola, Thiemo Voigt. *Using Directional Transmissions and Receptions to Reduce Contention in Wireless Sensor Networks*. In Proceedings of the 5th International Workshop on Real-World Wireless Sensor Networks (REALWSN), 2013.
27. Juan M. Alonso, Thiemo Voigt, Ambuj Varshney. *Bounds on the Lifetime of Wireless Sensor Networks*. In Proceedings of the 5th International Workshop on Performance Control in Wireless Sensor Networks, co-located with IEEE DCOSS, 2013.

## Posters, Demonstrations, and Short Publications

The following are peer-reviewed short publications (posters and demonstrations) published as part of conference proceedings.

Symbols next to author names indicate the enrollment status of students: ■ postdoctoral scholar, ■ doctoral (Ph.D.) student, ■ master's student, and ■ undergraduate student. Only students and scholars directly mentored by me are marked.

1. Dhairya Shah<sup>■</sup>, Rajashekar Reddy Chinthalapani<sup>■</sup>, Ambuj Varshney. *Poster: Enabling Low-power Ubiquitous Connectivity for Embedded Systems through Audio-Broadcasting Tags*. In Companion of the ACM International Joint Conference on Pervasive and Ubiquitous Computing (**ACM UBICOMP**), 2026.
2. Celes Chai Jia Xuan<sup>■</sup>, Dhairya Shah<sup>■</sup>, Ambuj Varshney. *Demo: VisibleBits: Illuminating Mixed Reality with Li-Fi Information Spotlights*. In Proceedings of the 31st Annual International Conference on Mobile Computing and Networking (**ACM MOBICOM**), 2025.
3. Rajashekar Reddy Chinthalapani, Dhairya Shah<sup>■</sup>, Ambuj Varshney. *Demo: Enabling Ubiquitous Connectivity for Embedded Systems through Audio-Broadcasting Low-power Tags*. In Proceedings of the 23rd Annual International Conference on Mobile Systems, Applications, and Services (**ACM MOBISYS**), 2025.
4. Moteen Shah<sup>■</sup>, Dhairya Shah<sup>■</sup>, Pramuka Medaranga<sup>■</sup>, Ambuj Varshney. *Poster: Li-FiAR: Networking Augmented-Reality Devices through Visible Light*. In Proceedings of the 30th Annual International Conference on Mobile Computing and Networking (**ACM MOBICOM**), 2024.
5. Savitha Viswanadh Kandala<sup>■</sup>, Ambuj Varshney. *Poster: A Framework for Training and Deploying Foundational Language Models for Embedded Sensing*. In Proceedings of the 30th Annual International Conference on Mobile Computing and Networking (**ACM MOBICOM**), 2024.
6. Sara Spanddhana<sup>■</sup>, Moteen Shah<sup>■</sup>, Dhairya Shah<sup>■</sup>, Rajashekar Reddy Chinthalapani, Ambuj Varshney. *Poster: GateHaul: A Gateway Architecture using Backhauling Networks to Address the Connectivity Challenges of Embedded Systems*. In Proceedings of the 30th Annual International Conference on Mobile Computing and Networking (**ACM MOBICOM**), 2024.
7. Pramuka Medaranga<sup>■</sup>, Dhairya Shah<sup>■</sup>, Savitha Viswanadh Kandala<sup>■</sup>, Ambuj Varshney. *Poster: Simplifying the Networking of Wireless Embedded Systems using a Large Language Model*. In Proceedings of the ACM SIGCOMM Conference: Posters and Demos (**ACM SIGCOMM**), 2024.
8. Kunjun Li, Manoj Gulati, Dhairya Shah<sup>■</sup>, Steven Waskito, Shantanu Chakrabarty, Ambuj Varshney. *Demo Abstract: PixelGen: Rethinking Embedded Camera Systems for Mixed-Reality*. In Proceedings of the 23rd ACM/IEEE International Conference on Information Processing in Sensor Networks (**ACM/IEEE IPSN**), 2024.
9. Steven Waskito<sup>■</sup>, Kai Jie Leow<sup>■</sup>, Pramuka Medaranga<sup>■</sup>, Tejas Gupta<sup>■</sup>, Shantanu Chakrabarty, Manoj Gulati<sup>■</sup>, Ambuj Varshney. *Demo Abstract: Light and Vibration Gesture Sensing with OTTER: Embedded Data Collection and Analysis Using LLMs*. In Proceedings of the 21st ACM Conference on Embedded Networked Sensor Systems (**ACM SENSYS**), 2023.
10. Steven Waskito<sup>■</sup>, Kai Jie Leow<sup>■</sup>, Pramuka Medaranga<sup>■</sup>, Tejas Gupta<sup>■</sup>, Shantanu Chakrabarty, Manoj Gulati<sup>■</sup>, Ambuj Varshney. *Poster: Otter: Simplifying Embedded Sensor Data Collection and Analysis using Large Language Models*. In Proceedings of the 29th Annual International Conference on Mobile Computing and Networking (**ACM MOBICOM**), 2023.
11. Dayrene Frometa Fonseca, Muhammad Sarmad Mir, Borja Genoves Guzman, Ambuj Varshney, Domenico Giustiniano. *Demo: PassiveLiFi Demonstration: Rethinking LiFi for Low-Power and Long Range RF Backscatter*. In Proceedings of the 29th Annual International Conference on Mobile Computing and Networking (**ACM MOBICOM**), 2023.
12. Moteen Amin Shah<sup>■</sup>, Adithya Bijoy<sup>■</sup>, Manoj Gulati<sup>■</sup>, Wenqing Yan<sup>■</sup>, Ambuj Varshney. *Poster: Going Beyond Backscatter: Rethinking Low-Power Wireless Transmitters using Tunnel Diodes*. In Proceedings



of the 29th Annual International Conference on Mobile Computing and Networking (**ACM MOBICOM**), 2023.

13. Goh Sheen An<sup>■</sup>, Ambuj Varshney. *Poster: VoCopilot: Enabling Voice-Activated Tracking for Every-day Interactions*. In Proceedings of the 21st Annual International Conference on Mobile Systems, Applications, and Services (**ACM MOBISYS**), 2023.
14. Pramuka Medaranga<sup>■</sup>, Steven Waskito<sup>■</sup>, Kunjun Li<sup>■</sup>, Kai Jie Leow<sup>■</sup>, Shantanu Chakrabarty, Ambuj Varshney. *Poster: Rethinking Embedded Sensor Data Processing and Analysis with Large Language Models*. In Proceedings of the 21st Annual International Conference on Mobile Systems, Applications, and Services (**ACM MOBISYS**), 2023.
15. Tobias Mages, Wenqing Yan<sup>■</sup>, Ambuj Varshney, Christian Rohner. *Demo: An Educational Platform to Learn Radio Frequency Wireless Communication*. In Proceedings of the 21st Annual International Conference on Mobile Systems, Applications, and Services (**ACM MOBISYS**), 2023.
16. Wenqing Yan<sup>■</sup>, Ambuj Varshney. *Poster: Enabling L3: Low Cost, Low Complexity and Low Power Radio Frequency Sensing Using Tunnel Diodes*. In Proceedings of the 28th Annual International Conference on Mobile Computing and Networking (**ACM MOBICOM**), 2022.
17. Andreas Soleiman<sup>■</sup>, Ambuj Varshney. *Poster: Towards Backscatter-enabled Networked Utensils*. In Proceedings of the 17th ACM International Conference on Mobile Systems, Applications, and Services (**ACM MOBISYS**), Seoul, Korea, 2019.
18. Abdullah Hylamia<sup>■</sup>, Ambuj Varshney, Andreas Soleiman<sup>■</sup>, Panagiotis Papadimitratos, Christian Rohner, Thiemo Voigt. *Demo: Towards Battery-free Radio Tomographic Imaging*. In Proceedings of the 11th ACM Conference on Security and Privacy in Wireless and Mobile Networks (**ACM WISEC**), 2018.  
**Best Demonstration Award.**
19. Abdullah Hylamia<sup>■</sup>, Marco Spanghero, Ambuj Varshney, Thiemo Voigt, Panagiotis Papadimitratos. *Demo: Security on Harvested Power*. In Proceedings of the 11th ACM Conference on Security and Privacy in Wireless and Mobile Networks (**ACM WISEC**), 2018.
20. Carlos-Perez Penichet, Claro Noda, Ambuj Varshney, Thiemo Voigt. *Demo: Battery-free 802.15.4 Receiver*. In Proceedings of the 17th International Conference on Information Processing in Sensor Networks (**ACM/IEEE IPSN**), 2018.
21. Andreas Soleiman<sup>■</sup>, Ambuj Varshney, Thiemo Voigt. *Poster: Battery-free Visible Light Sensing*. In Proceedings of the 23rd Annual International Conference on Mobile Computing and Networking (**ACM MOBICOM**), 2017.  
**Student under my supervision won the ACM SRC (Graduate) Winner.**
22. Andreas Soleiman<sup>■</sup>, Ambuj Varshney, Luca Mottola, Thiemo Voigt. *Demo: Battery-free Visible Light Sensing*. In Proceedings of the 4th ACM Workshop on Visible Light Communication Systems (**ACM VLCS**), co-located with **ACM MOBICOM** 2017.
23. Ambuj Varshney, Carlos Perez Penichet, Christian Rohner, Thiemo Voigt. *Demo: LoRea: A Backscatter Architecture that Achieves a Long Communication Range*. In Proceedings of the 15th ACM Conference on Embedded Networked Sensor Systems (**ACM SENSYS**), 2017.
24. Carlos Perez Penichet, Claro Noda, Ambuj Varshney, Thiemo Voigt. *Poster: Augmenting WSNs with Interoperable 802.15.4 Sensor Tags*. In Proceedings of the 15th ACM Conference on Embedded Networked Sensor Systems (**ACM SENSYS**), 2017.
25. Carlos Perez Penichet, Frederik Hermans, Ambuj Varshney, Thiemo Voigt. *Demo: Passive Sensor Tags*. In Proceedings of the 22nd Annual International Conference on Mobile Computing and Networking (**ACM MOBICOM**), 2016.
26. Kasun Hewage, Ambuj Varshney, Abdallah Hylamia<sup>■</sup>, Thiemo Voigt. *modBulb: A Modular Light Bulb for Visible Light Communication*. In Proceedings of the 3rd ACM Workshop on Visible Light Communication Systems (**ACM VLCS**), 2016.

27. Abdalah Hilmia<sup>■</sup>, Kasun Hewage, Ambuj Varshney, Christian Rohner, Thiemo Voigt. *BouKey: Location-based Key Sharing Using Visible Light Communication*. In Proceedings of the 15th International Conference on Information Processing in Sensor Networks (**ACM/IEEE IPSN**), 2016.
28. Elena Di Lascio<sup>■</sup>, Ambuj Varshney, Thiemo Voigt, Carlos Pérez-Penichet. *LocaLight: A Battery-free Passive Localization System Using Visible Light*. In Proceedings of the 15th International Conference on Information Processing in Sensor Networks (**ACM/IEEE IPSN**), 2016.
29. Ambuj Varshney, Luca Mottola, Thiemo Voigt. *Coordination of Wireless Sensor Networks Using Visible Light*. In Proceedings of the 13th ACM Conference on Embedded Networked Sensor Systems (**ACM SENSYS**), 2015.
30. Ambuj Varshney, Luca Mottola, Thiemo Voigt. *Directional Transmissions and Receptions for Burst Forwarding Using Disjoint Paths*. In Proceedings of the 13th ACM/IEEE International Conference on Information Processing in Sensor Networks (**ACM/IEEE IPSN**), 2014.
31. Ambuj Varshney, Luca Mottola, Thiemo Voigt. *Directional Transmissions and Receptions for High Throughput Burst Forwarding*. In Proceedings of the 11th ACM Conference on Embedded Networked Sensor Systems (**ACM SENSYS**), 2013.