

ALEX CABRAL (SHE/HER)

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EDUCATION

- 2024 **PhD in Computer Science, Harvard University**
Dissertation: Rethinking Quality Metrics for Low-Cost Urban Environmental Sensor Networks
Advisors: Amy V. Mueller and Jim Waldo
- 2017 **MS in Computational Linguistics, University of Washington**
- 2012 **BS in Computer Science, Columbia University**

RESEARCH INTERESTS

Low-Cost Sensor Networks, Environmental Sensing, Smart Cities, Urban Informatics, Sustainable Computing, Community Engagement

PUBLICATIONS

Alex Cabral, et al. Eclipse Dataset: Empowering Urban Sensor Network Research with Hyperlocal Environmental Data from Chicago. *SenSys '25*. (In Review)

Eric Greenlee, Ellen Zegura, Josiah Hester, **Alex Cabral**. Sustaining Workers Who Sustain the World: Asset-Based Design for Conservation Technologies in Madagascar. *CSCW '25*. (In Review)

Blaine Rothrock, Eric Greenlee, Yaman Sangar, Josiah Hester, **Alex Cabral**. Makak: Co-designing Environmental Sensors to Protect Manoomin (Wild Rice). *ACM CHI Conference on Human Factors in Computing Systems*, ACM CHI '25, Yokohama, Japan, 2025.

Ayina Anyachebelu, **Alex Cabral**, Marah I. Abdin, Pallavi Choudhury, Madeleine I.G. Daepf. Characterizing The Effects of Structural Fires on Fine Particulate Matter with a Dense Sensing Network. *Scientific Reports* 13, 2023.

Alex Cabral*, Madeleine I.G. Daepf*, Tiffany Werner, Raed Mansour, Charlie Catlett, Asta Roseway, Chuck Needham, Nneka Udeagbala, Scott Counts. The "Three-Legged Stool": Designing for Equitable City, Community, and Research Partnerships in Urban Environmental Sensing. *ACM CHI Conference on Human Factors in Computing Systems*, ACM CHI '23, Hamburg, Germany, 2023.

Madeleine I.G. Daepf, **Alex Cabral**, Vaishnavi Ranganathan, Vikram Iyer, Scott Counts, Paul Johns, Asta Roseway, Charlie Catlett, Gavin Jancke, Darren Gehring, Chuck Needham, Curtis Von Veh, Tracy Tran, Lex Story, Gabriele D'Amone, Bichlien H Nguyen. Eclipse: An End-to-End Platform for Low-Cost, Hyperlocal Environmental Sensing in Cities. *ACM/IEEE International Conference on Information Processing in Sensor Networks*, IPSN '22.

Alex Cabral, Asta Roseway, Paul Johns. Design and Implementation of A Mobile Urban Low-Cost Environmental Sensor Network. *IEEE Sensors*, 2021.

POSTERS AND ABSTRACTS

Alex Cabral, Jim Waldo, Amy V. Mueller. Poster: Low-Cost Sensor Correlation based on Urban Form. ACM EWSN'24, Abu Dhabi, UAE, 2024.

Alex Cabral, Jim Waldo, Amy V. Mueller. Towards a Predictive Model for Improved Placement of Solar-Powered Urban Sensing Nodes. IEEE/ACM IoTDI '24, Hong Kong, 2024.

Alex Cabral. Rethinking Quality Metrics for Low-Cost Urban Environmental Sensor Networks. IEEE PerCom '24, Biarritz, France, 2024. (**Runner Up Best PhD Forum Presentation**)

Alex Cabral and Jim Waldo. Power Analysis of a Large-Scale Solar-Powered Urban Sensor Network. ACM COMPASS '23, Cape Town, South Africa, 2023.

Alex Cabral. PhD Forum Abstract: Designing Large-Scale Wireless Urban Environmental Sensor Networks. *Proceedings of the 22nd International Conference on Information Processing in Sensor Networks*, IPSN '23, San Antonio, USA, 2023.

Alex Cabral, Vaishnavi Ranganathan, Jim Waldo. Connectivity Analysis of a Large-Scale 4G LTE-M Urban Sensor Network. *USENIX Symposium on Networked Systems Design and Implementation*, NSDI '23.

Alex Cabral. Analyzing Data to Identify Factors that Affect the Collection of Free Food Items. *Proceedings of the Conference on Computing & Sustainable Societies*, ACM COMPASS '19, Accra, Ghana, 2019. (**Spotlight Poster**)

Alex Cabral and Quinten Steenhuis. A Web Tool for Negotiating Negative Housing Conditions. *Proceedings of the Conference on Computing & Sustainable Societies*, ACM COMPASS '19, Accra, Ghana, 2019.

AWARDS AND HONORS

April 2024	CPS Rising Star
March 2024	Runner-Up Best PhD Forum Presentation at IEEE PerCom 2024
Sept 2023	Siebel Scholar Class of 2024
June 2023	NSF Travel Grant Recipient for MobiSys 2023
May 2023	NSF Travel Grant Recipient for CPS-IoT Week 2023
March 2023	CRA-WP Grad Cohort Workshop for Inclusion, Diversity, Equity, Accessibility, and Leadership Skills Selected Attendee
Sept 2022	NextProf Nexus Selected Attendee
May 2020 & 2021	Certificate of Special Distinction in Teaching
2018 – 2023	Harvard Graduate School Prize Fellowship

INVITED TALKS

- 2024 Air Sensors International Conference
Principal Presenter for the "Air sensor network design and evaluation through an equity lens" session
- 2024 UR2PhD Bridge Workshop
Panelist for an undergraduate to PhD mentoring workshop titled "How will my research change the world?"
- 2023 CSforAllPA Summit
Panelist for a panel focused on the experiences of people with disabilities in Computer Science programs
- 2022 Harvard Cities and Tech Online Course
I provided expertise on low-cost urban sensor networks and the future of smart cities for the upcoming Harvard Online *Cities and Digital* course.

PATENT

- 2014 Predictable Organic Tile Layout
Each of a plurality of ordered tiles is sequentially fit into a first open location within a scrollable two-dimensional matrix. The open locations into which any particular tile may be fit are limited by a non-zero, positive offset value that specifies how far from an immediately previous tile that tile may be backfilled.

VOLUNTEERING AND SERVICE

- October 2024 CSCW Program Committee Area Chair
- October 2024 PerCom Works in Progress Program Committee Member
- June 2024 NSF Panelist
- October 2023 CSCW Workshop Co-Organizer
Co-organizer for the Data-Enabled Sustainability workshop at CSCW 2023.
- June 2023 ACM COMPASS Shadow PC Member
Served as a member of the shadow program committee for ACM COMPASS, writing three paper reviews.
- October 2022 SenSys Workshop Organizer
Formed and organized the first Urban Sensor Networks workshop at the ACM SenSys 2022 conference. The workshop brought together an international group of researchers to discuss the future of urban sensor network research.
- 2021 – 2022 Harvard GSAS Graduate Student Council Representative
- 2019 – 2020 Harvard PhD CS New Student Mentor
- 2018 – 2020 Harvard CS Graduate Council Member

TEACHING AND COURSE DEVELOPMENT

- 2021 HarvardX Course Content Developer
Worked with two Computer Science professors to create content for an online course titled Data Privacy and Technology. Led the creation of multiple case studies including biomedical research ethics via the story of Henrietta Lacks, genetic data rights as told by the discovery of the Golden State Killer, and the future of privacy with an examination of deepfakes.
- 2016 – 2018 CodeCombat Curriculum Developer
Designed and wrote Computer Science curriculum guides for middle and high school teachers with no former Computer Science education. Incorporated a variety of activities to introduce Computer Science concepts and developed an approved curriculum for AP Computer Science Principles.
- 2015 – 2018 Middle and High School Computer Science, Robotics, and Math Teacher
Developed lessons, assignments, and assessments for AP and Introductory Computer Science, Precalculus, and Robotics courses. Worked with a colleague to design a makerspace and corresponding interdisciplinary lesson plans. Mentored a club for female students interested in Computer Science and Electrical Engineering and coached a competitive high school robotics team.

INDUSTRY EXPERIENCE

- Mar 2021 – Sep 2022 Part-Time Researcher – Microsoft Research
Led and contributed to research for a distributed, low-cost air quality sensing network in Chicago. Projects included an exploration of cellular signal and solar power for the future of IoT and the design and development of spatio-temporal algorithms to improve sensor calibration.
- Summer 2020 Research Intern – Microsoft Research
Worked with the Urban Innovation Initiative to conduct studies using low-cost air quality sensors in the Boston metro area. Evaluated the potential to crowdsource urban air quality via mobile sensors, and deployed a set of stationary sensors to measure the impact of a new bus lane in Chelsea, MA.
- 2013 – 2016 Software Engineer – Microsoft
Wrote, implemented, and analyzed tests for the Xbox One Subscriptions service. Built internal development and testing tools; developed an automated reporting system that collected, analyzed, and created visualizations for large datasets; and planned, designed, implemented, and analyzed tests for a number of features and services on the Xbox 360.