

# 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

Others and **Alex Cabral**. Makak: Co-designing Environmental Sensors to Protect Manoomin (Wild Rice). *ACM SIGCAS/SIGCHI Conference on Computing and Sustainable Societies*, ACM COMPASS '25, Toronto, Canada. (In Review)

Yiyang Wang\*, Rishabh Goel\*, Sheraz Hassan, Taegen J Doscher, Shilin Wang, Lexington Allen Whalen, Aditya S Gandhi, Yaman S Sangar, **Alex Cabral**, Xuhai Xu, Josiah Hester, Alexander T Adams. PuffEM: An E-cigarette Sleeve for Estimating User Nicotine Intake. *IEEE/ACM CHASE '25*. (Accepted)

**Alex Cabral**, Deeksha Punachithaya, Jim Waldo, Josiah Hester. Eclipse Dataset: Empowering Urban Sensor Network Research with Hyperlocal Environmental Data from Chicago. *SenSys '25*. (Accepted)

Others and **Alex Cabral**. Sustaining Workers Who Sustain the World: Asset-Based Design for Conservation Technologies in Madagascar. *CSCW '25*. (In Review)

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. (**Best Poster Award**)

**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

Dec 2024	Best Poster Award at ACM EWSN 2024
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

2025	Climate Solutions Summit NYC Invited to give flash talk on Community Directed and Managed AI-Cyberinfrastructure for Environmental and Climate Action
2025	ICT TropMed Workshop Presented talk on Hyperlocal Environmental Sensing for Multimodal TinyML at the Workshop of the Network of Excellence in Advanced Information Technology for Tropical Medicine
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 <i>Cities and Digital</i> 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.
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## VOLUNTEERING AND SERVICE

Feb 2025	ACM COMPASS Program Committee
Feb 2025	SenSys Posters Program Committee
Feb 2025	SenSys '25 Sensors S&P Workshop Program Committee
Dec 2024	CSCW '25 Program Committee Area Chair
Dec 2024	PerCom Works in Progress Program Committee Member
Jun 2024	NSF Panelist
Apr 2024	MobiSys '24 EnvSys Workshop Program Committee
Oct 2023	CSCW Data-Enabled Sustainability Workshop Co-Organizer
June 2023	ACM COMPASS Shadow PC Member
October 2022	SenSys '23 Urban Sensor Networks Workshop Organizer
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	<p>HarvardX Course Content Developer</p> <p>Worked with two Computer Science professors to create content for an online course title 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.</p>
2016 – 2018	<p>CodeCombat Curriculum Developer</p> <p>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.</p>
2015 – 2018	<p>Middle and High School Computer Science, Robotics, and Math Teacher</p> <p>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.</p>

## INDUSTRY EXPERIENCE

Mar 2021 – Sep 2022	<p>Part-Time Researcher – Microsoft Research</p> <p>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.</p>
Summer 2020	<p>Research Intern – Microsoft Research</p> <p>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.</p>
2013 – 2016	<p>Software Engineer – Microsoft</p> <p>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.</p>