

Anandghan Waghmare

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Research Focus

My research focuses on leveraging novel sensing and machine learning to develop affordable mobile healthcare tools and wearable devices to enable seamless input for spatial computing. During my Ph.D., I designed and built multiple full-stack, real-time integrated hardware and software systems for applications in healthcare and new interaction techniques for XR.

Education

University of Washington

Seattle, USA

Doctor of Philosophy (Ph.D.) in Computer Science and Engineering

Sept 2018 - March 2025

- **Advisor:** Dr. Shwetak Patel
- **Thesis title:** Extending the Senses of Ubiquitous Devices

Georgia Institute of Technology

Atlanta, USA

Master of Science (MS) in Computer Science

August 2016 – April 2018

- **Advisor:** Dr. Gregory Abowd

Indian Institute of Technology (IIT) Patna

Patna, India

Bachelor of Technology (B. Tech) in Computer Science and Engineering

July 2009 – May 2013

Research Experience

June 2025 – Present **Staff Researcher**, Samsung Research America

- Working on problems at the intersection of health and AI — focused on sensing systems, hardware–software integration, and scalable digital health solutions.
- Founding member of the Digital Health Biosensors Team.

March 2024 – Dec 2024 **Student Researcher**, Google

- Developed a new sensing technique to enable passive heart health monitoring using raw capacitive touchscreen data on smartphones.
- Designed and prototyped hardware for continuous, passive biometric authentication on smartphones leveraging radio frequency sensing.

May 2023 – Nov 2023 **Research Scientist (Part-Time)**, Meta Reality Labs

- Developed a wearable micro-gesture input device for spatial computing, leveraging time-series sensor data with a lightweight machine-learning model for on-device gesture inference.
- Manufactured and deployed 30 units to beta testers.

June 2022 – Sept 2022 **Research Scientist Intern**, Meta Reality Labs

- Created a ring-wearable device enabling subtle and continuous input using ultra-low-resolution optical sensing.

June 2021 – Sept 2021 **Research Intern**, Google

- Developed a low-cost ECG device tailored for developing communities.
- Developed a wearable leveraging millimeter-wave sensing for material identification and gestural input.

- May 2020 – Aug 2020 **Research Scientist Intern**, Facebook Reality Labs
 - Explored and built machine learning models for continuous input for Meta's EMG wristband.
- May 2019 – July 2019 **Research Intern**, Microsoft Research
 - Designed novel interaction paradigms for seamless cross-device interaction.

Professional Experience

- May 2017 – July 2017 **Software Developer Intern**, Amazon
 - Developed a computer vision-based image quality filtering tool for warehouse camera robots
- June 2015 – Aug 2016 **Software Development Engineer**, Flipkart
 - Developed tools and algorithms to improve Search Engine Marketing strategies and designed distributed systems as the team's technical lead.
- Aug 2013 – May 2015 **Software Development Engineer**, Cisco Systems
 - Developed edge device algorithms to enable seamless communication over mobile LTE networks.
- May 2012 – July 2012 **Software Developer Intern**, Belzabar Software Design
 - Created a hub to integrate multiple RESTful services into a single microservice endpoint.
- May 2011 – July 2011 **Research Assistant**, National Environmental Engineering Research Institute
 - Developed a Fuzzy Logic-based tool for the Indian government to identify the most sustainable waste processing facility site.

Publications

Anandghan Waghmare, Sanjay Varghese, Zhihan Zhang, Ishan Chatterjee, Ritesh Tekriwal, Shwetak Patel. 2025. Z-Band: On-World Interactions Using Wrist-Based Electrical Impedance Sensing. In Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT), Vol. 9, Issue 4

Ishan Chatterjee*, Jiexin Ding*, **Anandghan Waghmare***, Joseph Breda, Yuquan Deng, Bo Liu, Yuntao Wang, and Shwetak Patel. 2025. FlowRing: Integrated Microgesture and Surface Interaction Ring for Versatile XR Input. Proceedings of the ACM on Human-Computer Interaction (MobileHCI 2025) (*equal contribution)

Anandghan Waghmare. 2024. Extending the Senses of Ubiquitous Devices. In Adjunct Proceedings of the 37th Annual ACM Symposium on User Interface Software and Technology (UIST Adjunct '24)

Anandghan Waghmare, Ishan Chatterjee, Vikram Iyer, Shwetak Patel. 2024. WatchLink: Enhancing Smartwatches with Sensor Add-Ons via ECG Interface. In Proceedings of the 37th Annual ACM Symposium on User Interface Software and Technology (UIST '24)

Anandghan Waghmare, Roger Boldu, Eric Whitmire, Wolf Kienzle. 2023. OptiRing: Low-Resolution Optical Sensing for Subtle Thumb-to-Index Micro-Interactions. In Proceedings of the 2023 ACM Symposium on Spatial User Interaction (SUI '23)

Anandghan Waghmare, Ishan Chatterjee, Shwetak Patel. 2023. Z-Pose: Continuous 3D Hand Pose Tracking Using Single-Point Bio-Impedance Sensing on a Ring. In Proceedings of the 2nd ACM Workshop on Smart Wearable Systems and Applications (SmartWear '23)

Anandghan Waghmare, Youssef Ben Taleb, Ishan Chatterjee, Arjun Narendra, and Shwetak Patel. 2023. Z-Ring: Single-Point Bio-Impedance Sensing for Gesture, Touch, Object and User Recognition. In Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems (CHI '23)

Anandghan Waghmare, Farshid Salemi Parizi, Jason Hoffman, Yuntao Wang, Matthew Thompson, and Shwetak Patel. 2023. GlucoScreen: A Smartphone-based Readerless Glucose Test Strip for Prediabetes Screening. In Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT)

Frederik Brudy, David Ledo, Michel Pahud, Nathalie Henry Riche, Christian Holz, **Anand Waghmare**, Hemant Bhaskar Surale, Marcus Peinado, Xiaokuan Zhang, Shannon Joyner, Badrish Chandramouli, Umar Farooq Minhas, Jonathan Goldstein, William Buxton, and Ken Hinckley. 2020. SurfaceFleet: Exploring Distributed Interactions Unbounded from Device, Application, User, and Time. In Proceedings of the 33rd Annual ACM Symposium on User Interface Software and Technology (UIST '20).

Anandghan Waghmare, Qiuyue Xue, Dingtian Zhang, Yuhui Zhao, Shivan Mittal, Nivedita Arora, Ceara Byrne, Thad Starner, and Gregory D Abowd. 2020. UbiquiTouch: Self Sustaining Ubiquitous Touch Interfaces. In Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT)

Fereshteh Shahmiri, Chaoyu Chen, **Anandghan Waghmare**, Dingtian Zhang, Shivan Mittal, Steven L. Zhang, Yi-Cheng Wang, Zhong Lin Wang, Thad E. Starner, and Gregory D. Abowd. 2019. Serpentine: A Self-Powered Reversibly Deformable Cord Sensor for Human Input. In Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems (CHI '19)

Cheng Zhang, Qiuyue Xue, **Anandghan Waghmare**, Ruichen Meng, Sumeet Jain, Yizeng Han, Xinyu Li, Kenneth Cunefare, Thomas Ploetz, Thad Starner, Omer Inan, and Gregory D. Abowd. 2018. FingerPing: Recognizing Fine-grained Hand Poses using Active Acoustic On-body Sensing. In Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems (CHI '18)

Cheng Zhang, **Anandghan Waghmare**, Pranav Kundra, Yiming Pu, Scott Gilliland, Thomas Ploetz, Thad E. Starner, Omer T. Inan, and Gregory D. Abowd. 2017. FingerSound: Recognizing unistroke thumb gestures using a ring. In Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT)

Cheng Zhang, Qiuyue Xue, **Anandghan Waghmare**, Sumeet Jain, Yiming Pu, Sinan Hersek, Kent Lyons, Kenneth A. Cunefare, Omer T. Inan, and Gregory D. Abowd. 2017. SoundTrak: Continuous 3D Tracking of a Finger Using Active Acoustics. In Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT)

Cheng Zhang, Xiaoxuan Wang, **Anandghan Waghmare**, Sumeet Jain, Thomas Ploetz, Omer T. Inan, Thad E. Starner, and Gregory D. Abowd. 2017. FingOrbits: interaction with wearables using synchronized thumb movements. In Proceedings of the 2017 ACM International Symposium on Wearable Computers (ISWC '17)

A. Waghmare, A. P. Mazumdar and A. S. Sairam, "Time synchronization protocol for 6LoWPAN," 2013 International Conference on Advances in Computing, Communications and Informatics (ICACCI), Mysore, India, 2013

Arka Prokash Mazumdar, **Anandghan Waghmare**, and Ashok Singh Sairam. 2014. Modelling energy efficiency of OR protocols in wireless networks. Int. J. Ad Hoc Ubiquitous Comput.

A. Yadav, **A. Waghmare** and A. S. Sairam, "Exploiting node heterogeneity for time synchronization in low power sensor networks," 2014 International Conference on Contemporary Computing and Informatics (IC3I), Mysore, India, 2014

Barkha Rathi, **Anandghan Waghmare**, Aabha Sargoankar. 2014. Fuzzy Decision Making Model using MATLAB. National Conference on Statistics, Mathematics and their applications (COSMA), 2014

Academic Service

- 2026 **Workshop Organizer**, Health Centric Wearable Devices, UbiComp
- 2025 **Publication Co-Chair**, CHI
Video Previews Co-Chair, UIST
Registration Co-Chair, Ubicomp
- 2024 **Video Previews Co-Chair**, UIST
Web Co-Chair, ISMAR
Special Topic Session Chair, Spatial User Interaction (SUI)
Student volunteer, CHI
- 2019-present **Peer reviewer**, IMWUT, CHI, ISS, ISWC and UIST
- 2018 **Student volunteer**, Ubicomp

Teaching Experience

- Spring 2020 **CS3600 Introduction to Artificial Intelligence**, Graduate Teaching Assistant
- Fall 2019 **OMSCS**, Graduate Teaching Assistant
- Fall 2018 **CS4605/7470 Mobile and Ubiquitous Computing**, Graduate Teaching Assistant
- Spring 2018 **CS4605/7470 Mobile and Ubiquitous Computing**, Graduate Teaching Assistant
- Fall 2017 **CS4605/7470 Mobile and Ubiquitous Computing**, Graduate Teaching Assistant
- Spring 2017 **CS4605/7470 Mobile and Ubiquitous Computing**, Graduate Teaching Assistant

Mentoring

- 2024-2025 **Ritesh Tekriwal, Sanjay Varghese, Jimmy Liu, Tejashree Khedkar**, University of Washington
- 2023-2024 **Sushree Jena, Jiexin Ding**, University of Washington
- 2022-2023 **Ayden Tan**, Lakeside High School
- 2021-2023 **Bo Liu**, University of Washington
- 2020-2023 **Kent Zheng, Harvey Ko, Vincent Wilson, Isha Jodh, Youssef Ben Taleb, Arjun Narendra**, University of Washington
- 2016-2018 **Tyler Abney, Nathan Cheek, Ryan Gallaway, Hyder Hasnain, Taylor Stillman, Leonard Chen, Niandong Xu, Jonathan Hernandez, Robert Matthew Keezer, Akshay Gupta**, Georgia Institute of Technology

Awards and Achievements

- 2024 **Gaetano Borriello Outstanding Student Award**, Ubicomp '24
- 2023 **Meta PhD Fellowship Finalist**, Meta
Jury Best Demo Award, UIST '23
- 2017 **Distinguished GUV Master Student Finalist 2017**, Georgia Institute of Technology
- 2014 **Winner of AnthahPrerana**, Competition for early-stage startups, TiE Bangalore
- 2013 **Speaker**, Talk - Braille based phone for the blind, TEDxSushantLok
Winning Team, Doodle Competition, Cultural Week, Cisco Systems
Winning Team, Skit competition, Cisco Systems
- 2010-2013 **Top-ranked computer science bachelor's project**, IIT Patna
Winner: Disassemble, Assembly Language programming competition in Anwesha 2013 and also in Celesta 2012, IIT Patna
Winning team: Strategize, AI programming competition, Anwesha 2013, IIT Patna
Winning team: Wall Painting Competition, Reverberance 2012, IIT Patna
Winning team: Aura, 3D Structure Making Competition, Reverberance 2012, IIT Patna
'Best Director' and 'Best Film Maker' title, Film making competition, Anwesha 2013, IIT Patna
Head of Computer Science Team, Anwesha 2012, IIT Patna
Winning Team: Autonomous Robotics Competition, Techfest 2011, IIT Guwahati
Winner: BrainF, Programming competition, Anwesha 2010, IIT Patna
Winner: Snap & Grab, Photography competition 2010, Eco Club, IIT Patna
- 2005 **Youngest Cisco Certified Network Associate (Age 14)**, Limca Book of Records
Microsoft Certified Solution Developer Certification, Microsoft
Microsoft Certified Professional Certification, Microsoft

Select Press

- 2023 **Can we screen the world? How smartphones and watches are revolutionizing global health (and just getting started)**, zmescience.com
- 2023 **Prototype taps into the sensing capabilities of any smartphone to screen for prediabetes**, medicalxpress.com
- 2023 **Revolutionary GlucoScreen: Smartphone-Based System for Early Detection of Prediabetes**, techtimes.com
- 2023 **Easy, inexpensive smartphone prediabetes screening could save lives**, newatlas.com
- 2023 **Ring in the Future**, hackster.io