

PRINCIPAL RESEARCHER

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Principal Researcher leading applied research in trusted ubiquitous physical AI, multimodal sensing, wearable and ambient computing, and responsible AI systems. I enjoy connecting the dots across projects and people to work towards broader impact.

- Research on Sensing Systems: Remote sensing, wearables and mobile, implantable, city-scale and AR. Multiple patents, open-sourced projects and publications.
- Devices experience: Device design, deployment, user testing and data analytics.
- Leadership experience: Project Inception, establish KPIs, architecture development, deployment, evaluation and enable product-partner-research conversation.
- Lead cross-organization collaborations and mentor researchers across sensing, systems, security, HCI, machine learning, hardware, and robotics.
- Research Mentorship: I have mentored over 25 graduate students and interns, many of whom are now academic faculty or applied researchers.

EXPERIENCE

2019 – present

MICROSOFT RESEARCH, REDMOND, WA

Principal Researcher (2024 – present)

- **Applied research** at the intersection of multimodal sensing, AI devices, and product incubation.
- Define and lead the vision and research efforts on **responsible ubiquitous physical AI**, connecting scoped memory, persistent identity, environmental trust, and embodied safety across devices, shared spaces, and robots.
- Lead the cross-org efforts to architect and develop privacy-preserving ways to continuously establish and share user Identity, and multi-modal low-power sensing for user context recognition on wearable devices ([Microsoft Project Solara](#)).
- Filing **7 patents** focused on Trusted Ubiquitous Physical AI.

Senior Researcher (2019 – 2024):

Project [FoodVibes & FarmVibes](#) — Sensing + Traceability for Global Supply Chains (2020 – 2024)

- Led applied research on **agri-food sensing systems** and **end-to-end traceability solutions**.
- Delivered **6 peer-reviewed publications** (including in *Nature Communications*), **5 open-source GitHub projects**, and **10 patents**.
- Directed multiple research thrusts by mentoring PhD students, two MS in Technology and Innovation teams, seven cross-disciplinary interns and two visiting faculty researchers.
- Executed field deployments with [Nelson Farms](#) and [Loftus Farms](#), in east Washington, to validate sensing and traceability systems.
- Drove Microsoft's **traceability technology strategy** for multinational food supply-chain partners in collaboration with the **Dynamics 365 Supply Chain Management team** to support **EUDR** and **FSMA** regulatory compliance.
- Represented Microsoft in [UN-affiliated working groups](#) shaping global policy for tech-enabled regulatory compliance in Agri-Food.
- Delivered [keynotes](#) and talks at leading universities and conference workshops to inspire the next generation of researchers

Project [Eclipse](#) — Urban Innovation Initiative (2019 – 2022)

- Co-developed and deployed a **hyperlocal air-quality sensing network** across Chicago.

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- Partnered with [JCDecaux](#) and local community groups to instrument **100+ transit shelters** with air-quality sensors.
 - Drove citizen science by spotlighting data-driven environmental monitoring.
 - This data and analytics are now hosted as a part of Microsoft [Planetary Computers](#).
- Project RF Banaid — Battery-Free & Low-Power Sensing (2019 – Present)**
- Created the **world's first analog Radio Frequency Sensing Platform**, the [RF Banaid](#).
 - Delivered a **technology vision review** on low-power and battery-free sensing to **Microsoft Leadership and the CEO**.
 - Established a **globally recognized research direction**, enabling multiple follow-on academic collaborations.
 - Produced **6 peer-reviewed publications, 5 patents, and open-sourced hardware and system designs** to academic researchers worldwide.

2022 – present

UNIVERSITY OF WASHINGTON, ECE

Affiliate Asst. Professor

- I mentor undergraduate and graduate students conducting research at the UW.
- I am also a launch project mentor for MSTI Student teams from the UW Global Innovation Exchange (GIX) program.
- Served on the graduate committee for PhD students at top tier universities worldwide, including University of Washington, CMU, UIUC, University of Wisconsin and Upsala.

EDUCATION

2013 – 2018

UNIVERSITY OF WASHINGTON, SEATTLE, WA

PhD. In Electrical Engineering

Dissertation: Wireless Biomedical Sensing

2011 – 2013

CASE WESTERN RESERVE UNIVERSITY, CLEVELAND, OH

MS. in Electrical Engineering and Computer Science

Thesis: Silicon Carbide NEMS Logic and Memory for Computation at Extreme: Device Design and Analysis

2007 – 2011

AMRITA UNIVERSITY, COIMBATORE, INDIA

B.Tech. in Electronics and Instrumentation Engineering

RESEARCH SUMMARY

Publications and Patents: [Google Scholar](#), [Google Patents](#)

Microsoft Research: (Redmond,WA)

- **Project Persistence:** Personalization, Trust & Responsibility for Ubiquitous Physical AI
 - Led a research portfolio for AI systems that persist across devices, shared spaces, and robots while remaining contextual, authorized, privacy-preserving, and safe.
 - Develop privacy-aware wearable-agent systems combining selective sensing and multimodal identity verification; documented evaluations reduced camera use by about 64% with about 3% lower task accuracy in the evaluated settings. Submitted to CHI 2027
 - Co-developed an independent edge-based robot-guardrail layer that predicts trajectory collisions and stops unsafe robot motion; to be presented as a part of ACM MobiCom 2026.
 - Created scoped personal and shared memory for collaborative AI assistants, producing a working prototype and asker-dependent benchmark. To appear as a part of EMNLP 2026.
- **Project Food Vibes & FarmVibes:** Traceability and Sensing for Global Food Supply Chain
 - Led a team of researchers, developers and interns towards technological innovations that can enable a transparent and sustainable food supply chain. Our team identified technical gaps and addressed them through innovation in remote, hyperlocal and wireless sensing.

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- Worked with customers & partners to establish the KPIs and address gaps in food supply chain traceability and management. This includes tracking produce post-harvest along with quality, sustainability and other geospatial metrics while meeting global regulatory compliance.
 - Represented Microsoft at UN and ISO affiliated standards workgroups: White papers
 - Forest Monitoring and Remote Sensing Guidelines: [Whitepaper link](#)
 - Farmer Income and Production Cost Tracking: [Whitepaper link](#)
 - **Project Eclipse: Hyperlocal Air Quality Sensing:**
 - Enabled Hyperlocal and low-cost air quality sensing for cities. Support equitable environmental sensing through a publicly accessible city-wide deployment.
 - Enabled citizen science that identifies Chicago's air pollution hotspots. [Media link](#)
 - The [Project Eclipse](#) team operated with the aim to spotlight environmental sensing, esp. urban air quality, and empower local communities with knowledge-driven decision making.

Graduate PhD. Research: (University of Washington, Seattle)

- **Brain-Computer-Spinal-Interface (BCSI): A Fully Wireless Neural Interface**
 - Research to restore motor function in patients with paralysis caused by spinal cord injury. I developed a closed-loop BCSI implant to enable neural recording and stimulation. This device featured wireless energy harvesting and low-power communication & computation.
 - The fully wireless, miniature printed circuit device with neural recording/stimulation capability has been used by neural engineering collaborators for [rehabilitation study in mice](#).
 - The work featured an approximate computing core, Wireless Power Transfer and low-power Backscatter Communication to make it wire-free and fully implantable.
 - This work was awarded the Washington Research Foundation fellowship and was the Madrona Prize runner up in 2018.
- **RF Bandid: Fully-Analog Battery-Free Wireless Interface for Wearable Sensors**
 - Developed an **ultra-low-power wearable sensor** operating at **40–160 μ W**, powered entirely via RF energy harvesting.
 - Built **modular, plug-and-play platform** demonstrated for **heart rate, breathing rate, temperature, and audio/sound sensing**.
 - I continue to support research in low-power analog sensing.

Graduate MS. Research: (Case Western Reserve University, Cleveland)

- **Nano Electromechanical Switches for Extreme Condition Operation**
- Designed and fabricated low power SiC NEMS switches for high temperature (>600°C) logic.
- **Miniaturized Ultrasonic Device for Detection and Monitoring of Cancer Recurrence**
 - Co-developed and tested the electronics for an implantable ultrasonic assembly for early detection and monitoring of cancer and subsequent treatment planning.
- **Undergraduate Research: (Indian Institute of Technology, Bombay)**
 - **Bio-MEMS based Instrumentation for Glucose and Urea Sensing**
 - I implemented optical sensing circuits and micro-electromechanical systems for enzyme-based glucose and urea sensors.

PROFESSIONAL LEADERSHIP AND SERVICE

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- **Conference & Journal Program Committee:** I continue to serve on the technical program committee for top ACM and IEEE conferences in mobile and sensing systems (like MobiSys, CHI, RFID and Sensys) and have served as a project reviewer the NSF RINGS program and as review for Nature Communications.
 - **Associate Editor:** IMWUT Journal 2019–current.
 - I am also a strong proponent of **STEM and Women in Engineering**. I believe that education is one of the best ways to empower a person. Towards this, I frequently volunteer with early education non-profits (like [GoLaadli](#)) and academic groups, through programs like [WAFER](#) at the University of Washington.
 - I continue to serve as a mentor to women in undergraduate and graduate programs worldwide.