Hot Topics in Wireless Sensing for Health (HotDx)

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1. Motivation and rationale

Wireless sensing technologies have emerged as a transformative paradigm for health monitoring. Researchers across mobile computing, ubiquitous computing and adjacent fields have demonstrated increasingly ambitious capabilities: capturing vital signs using acoustics on smart speakers as well as desktop mmWave radars[1–4], non-periodic biosignals like eye movements using miniature radars on smart glasses[5], and non-linear muscle vibrations[6]. The Cambrian explosion of diverse wearables, smart rings[7–10], hearables[11–14], mouthguards[15,16], computational jewelry[17–20], enriches the sensing ecosystem by enabling novel forms of sensing on the body, with unique vantage points for measurement and intervention delivery. Commercial interest is accelerating in tandem, with startups[21,22] leveraging radar to sense sleep, vital signs, and behavior, and acoustics to detect respiration rate and ear infections.

This momentum extends beyond individual devices. At the standards level, integrated sensing and communication (ISAC) is a key pillar of 6G, where ambient cellular signals, part of existing public infrastructure, are envisioned for ubiquitous sensing of human movements such as gait and breathing, which has significant implications for population-scale public health monitoring.[23,24]

At the same time, the field is shifting beyond sensing and towards closed-loop agentic systems[25,26] that fuse sensing, learning, and actuation that can autonomously leverage sensor data and machine learning to intelligently deliver interventions such as drug dosing and nerve stimulation.

Naturally, this space is becoming an intense interdisciplinary area spanning computer science, electrical engineering, clinical medicine, public health policy, human factors, and ethics. However, there is no dedicated academic forum that brings together researchers, clinicians, and practitioners across these disciplines to discuss and shape the future of wireless sensing for health.

2. Workshop objectives

Here, we propose the *First Workshop on Hot Topics in Wireless Sensing for Health (HotDx)*, with the hope that it will serve as a catalyst for cross-disciplinary collaboration and present a clear research agenda for scalable and clinically impactful wireless health sensing systems.

This workshop will bring together researchers, clinical practitioners, and industry professionals with both technical and clinical backgrounds. Our goals are:
(1) Surface grand challenges in wireless health sensing that require coordinated community effort
(2) Foster serendipitous connections across diverse expertise that will serve attendees in unexpected ways many years into their careers
(3) Produce a community whitepaper synthesizing strategies for innovation and practical blockers for deployment

(4) Seed a recurring community with a distinct identity around wireless sensing for health.

We prioritize bold, risky, and visionary ideas that will spur thought-provoking discussion and long-term research directions. This workshop will bring together researchers, clinical practitioners, and industry professionals to discuss, debate, and shape the future of this space.

3. Related workshops positioning

Several adjacent workshops have been established including EarComp (earable computing)[27], the UbiComp Workshop on Mental Health and Well-being[28] (mobile sensing for mental health), Beyond Sound[29] (acoustic sensing on wearables), Intelligent Soft Wearables[30] (textile-based sensing), DigiBiom[31] (digital biomarkers), and MobiCom4AgeTech (Wireless and Mobile Computing for AgeTech)[32].

However, none of these are organized around wireless sensing for health as a unifying theme. A dedicated forum would enable researchers to discuss shared technical challenges and brainstorm how to translate wireless health sensing into practical, clinical impact. HotDx aims to fill this gap.

4. Workshop plan

4.1. Pre-workshop publicity plan

The organizers and their students will promote the workshop CFP via social media channels and mailing lists including the SIGMOBILE mailing list and university mailing lists of our colleagues at other universities. We will advertise the workshop and recruit authors, speakers, panelists, and mentors for participation.

We will recruit multiple publicity chairs for this workshop in order to disseminate the CFP widely particularly to various adjacent research communities that might be interested in having visibility to the SIGMOBILE mobile health community.

4.2. Workshop format

This will be a full-day workshop.

Keynote. We will feature two keynote speakers who will be selected with the goal of attracting attendees based on their track record of impactful work and technical contributions to the community.

Paper presentations. Each accepted paper will be provided with a 10 minute speaking slot and a 5 minute Q&A. The workshop organizers will be present to ask stimulating questions to fill up the time slot in the event that this is not organically possible. The organizers will prepare for potential questions beforehand.

Panel discussion. We will have a panel of hand-picked experts that represent different sub/disciplines such as engineering and clinical, but also public health policy, behavioral science, human factors design, regulatory. This is inspired by the growing movement of Team Science that emphasizes the essential need for cross-disciplinary collaboration particularly in mobile health research which often demands collaboration across skillsets in order to have translational impact on human lives. This is critical given the need to pool together expertise to tackle major problems in health. This panel will be moderated by the organizers.

Group discussions. We will borrow from the format of the *Dagstuhl Seminars*[33] where participants are split into groups and assigned a Grand Challenge facing the wireless health sensing community, scoped to be in line with international/national priorities and at the scale of the National Academy of Engineering Grand Challenges[34].

- *Population-scale health surveillance.* How can ambient infrastructure be repurposed to passively detect human health signals and motion across entire communities?
- *Agentic closed-loop intervention.* How can agentic systems safely and accurately fuse sensor data with clinical knowledge to deliver personalized interventions without clinician-in-the-loop oversight?
- *Equitable health sensing.* How do we design wireless health technologies that work effectively for underserved, rural, and low-resource populations?
- *In-silico clinical trials.* Can digital twins and physiological models enable virtual clinical trials that accelerate validation of health sensing technologies while reducing the cost and burden of traditional human studies?
- *Bridging the valley of death.* Are the current regulatory frameworks (e.g. AI/ML Software as a Medical Device Action Plan[35]) sufficient to move health sensing prototypes to FDA-cleared clinical tools?
- *Aging in place through ambient intelligence.* How can instrumented home environments detect physiological and cognitive decline early enough to intervene?

Groups will synthesize a brief one-page executive summary of the discussion articulating strategies for innovation, practical blockers for deployment, and frameworks for how to think of solutions. This will be presented back to the group at the end of the conference.

4.3. Post-workshop plans

Grand challenges whitepaper. The one-page executive summaries produced during the group discussions will be compiled and edited by the organizers into a community whitepaper and posted as an arXiv technical report with all attendees as authors. It will articulate research priorities, and strategies for innovation in wireless health sensing. This document will be disseminated via relevant mailing lists.

Slack community. The ability to organize a research community on a centralized internet platform can have significant advantages in terms of knowledge dissemination and community building. History has shown this to be useful particularly during the peak of Facebook where the SIGCHI, SIGMOBILE, SIGCOMM Facebook groups boasted 6300, 1000, 1500 members respectively. However, with the decline of Facebook use and the lack of analogous groups forming on LinkedIn, X, BlueSky or Discord, a natural option is Slack which has served as a platform for vibrant collaboration within departments, class management, and conferences which has been adopted for instance by SIGMOBILE and SIGCOMM. We will create a Slack community, which we hope can serve as a meeting point for interested researchers and intellectual allies who align with the mission and interests of the community.

Long-term vision. Our goal is to establish this workshop as a recurring annual event that, like HotMobile, HotNets, EarComp, and the UbiComp Mental Health workshops, develops a distinct identity and dedicated community beyond the main conference it is co-located with. A five-year

measure of success is one where researchers proactively target their submissions to our workshop because of its selectivity, reputation and ability to gain visibility to a community, rather than as a convenient outlet for in-progress work. We envision that the workshop will become a recognized venue that shapes the research agenda in this space, attracts repeat participation, and fosters lasting collaborations across disciplines.

5. Expected number of submissions and participants

We expect 10 submissions. This estimate is based on statistics from prior workshops:
DigiBiom[36]: 9-10
HotWireless[37]: 10-16
Intelligent Acoustic Systems and Applications[37]: 6

We expect around 20-30 attendees, this is based on attendee count from prior workshops. However, the upper limit could go up to 50 attendees, consistent with a prior UbiComp workshop on mental health[38]. We do not plan to limit attendance and will accommodate as many attendees as the assigned room allows.

6. Call for papers

In addition to Section 1 and 2 of this proposal, the CFP will include the following information:

Submission guidelines

We invite original research papers that have not been previously published and are not currently under review for publication elsewhere. We accept the following papers:

- Research papers (up to 6 pages): Original scientific contributions
- Challenge papers (up to 4 pages): Innovative ideas that spark lively discussion
- Demos (2 pages): Live demonstrations of working systems or prototypes

Papers are to be submitted at: **https://hotdx2026.hotcrp.com**

A peer review process will be conducted by a dedicated program committee, and each submission will undergo single-blind review by at least 3 committee members.

All accepted papers will be published as part of the ACM proceedings.
Your submission must use a 10pt font (or larger) and be correctly formatted for printing on Letter-sized (8.5" by 11") paper. Paper text blocks must follow ACM guidelines: double-column, with each column 9.25" by 3.33", 0.33" space between columns and single-spaced. The title of challenge papers must bear a "Challenge:" prefix.

Topics of interest

- Contactless physiological sensing (e.g. radar, acoustic, cellular ISAC, vision)
- Backscatter and tag-based sensing (e.g. RFID, NFC, Van Atta Array, Luneburg Lens, metamaterials)
- Emerging wearables and smart everyday objects (e.g. smart rings, smart glasses, computational jewelry, pins, mouthguard, toothbrushes)
- On-body and in-body networks (e.g. body area networks and implants)

- Digital twins and personalized physiological monitoring
- Agentic physiological sensing and autonomous health monitoring
- Closed-loop sensing and interventions (e.g. muscle stimulation, drug delivery, vagus nerve stimulation)
- Privacy-preserving and on-device intelligent systems
- Generalizable sensing for in-the-wild deployment
- Interpretable, physiologically-informed, and bio-inspired algorithms
- Energy-efficient algorithms for resource-constrained devices
- Self-supervised and few-shot learning for biosignal applications
- LLMs and multimodal foundation models for biosignals
- Datasets, testbeds and frameworks
- Clinical translation, regulatory pathways, and deployment challenges
- Physiological sensing in extreme and underserved environments
- Sensing for aging, accessibility, and assistive health
- Human factors and usability of health sensing systems
- Ethical, equity, and fairness considerations in biosignal systems

Best Paper Awards
All accepted regular papers by the workshop will be considered for the Best Paper Awards.

Camera Ready Instructions

- Camera-ready papers should adhere to the ACM templates that can be found here: http://www.acm.org/publications/proceedings-template. Templates are provided for formatting papers in MS Word and LaTeX. In LaTeX, you should use \documentclass[sigconf, 10pt]{acmart}.
- Font size no smaller than 10 points.
- Please do NOT number the pages of your camera-ready paper (by default page numbers are disabled in the ACM template).
- You should provide proper indexing information in the final version according to the ACM Computing Classification System (CCS). More information about the ACM CCS is available on the ACM CCS website.
- Avoid using any special characters or non-standard fonts. We must be able to display and print your submission exactly as we receive it using only standard tools and printers, so we strongly suggest that you use only standard fonts embedded in the PDF file.

Important Dates (AoE)

Submission deadline for workshop papers	July 10, 2026
Notification of acceptance	July 31, 2026
Deadline for camera-ready version of workshop papers	August 21, 2026

Workshop date	October 30, 2026

7. Organizers

Justin Chan is an assistant professor in CS and ECE at Carnegie Mellon, where he directs the Semantic Signals Lab. His lab's mission is to create scalable mobile systems for *physiological intelligence:* embedded systems that decode hidden signals from the body and environment to enable new sensory capabilities for humans and machines, using wireless sensing, signal processing, and AI. His lab's innovations include using smartphone sensors for blood clot testing, training smart speakers to detect cardiac arrests, wireless earbuds that screen for newborn hearing loss, and detection of middle ear fluid using active sonar on smartphones and a paper cone. His work has been recognized by CACM and SIGMOBILE Research Highlights, SIGMOBILE Doctoral Dissertation Award Runner Up, and a IEEE Pervasive Computing Emerging Rockstar feature. He earned his PhD from the University of Washington and his Bachelors degree with high honors from Dartmouth.

Rajalakshmi Nandakumar is an assistant professor of information science at Cornell Tech, the Cornell Ann S. Bowers College of Computing and Information Science, and the Jacobs Technion-Cornell Institute. Nandakumar received her Ph.D. in computer science from the University of Washington in 2020. Her research focuses on developing and deploying computing technologies that can have a real-world impact and improve quality of life. She develops wireless sensing technologies that enable novel applications in various domains, including mobile health, user interfaces, precision agriculture, and Internet of Things (IoT) networks. She developed the first contactless smartphone-based sleep apnea diagnosis system, which was licensed by ResMed Inc. and is now used by millions of users for sleep staging. She was recognized with the University of Washington Medicine Judy Su Clinical Research award, with the Paul Baran Young Scholar award by the Marconi Society, and as a Rising Star in EECS by the Massachusetts Institute of Technology.

Xiyuxing Zhang is a PhD candidate in the Department of Computer Science and Technology at Tsinghua University. He was also a visiting scholar at Carnegie Mellon University. His research focuses on ubiquitous computing and health sensing using wearable and earable devices, with expertise in on-device machine learning and sensing-supported healthcare delivery. His work has been published at top venues including CHI, IMWUT, and NeurIPS, and he has received multiple recognitions including China's Young Elite Scientists Sponsorship Program, and Special Recognitions for Outstanding Reviews at CHI and IMWUT. He received his BS from Tsinghua University in 2022.

Publication chair. Jiangyifei Zhu is a PhD student at Carnegie Mellon University.

Web chair. Siqi Zhang is a PhD student at Carnegie Mellon University.

8. Potential PC members

1. Alanson Sample, University of Michigan
2. Alex Mariakakis, University of Toronto

3. Alexander Adams, Georgia Tech
4. Anind Dey, University of Washington
5. Andrew Campbell, Dartmouth College
6. Anthony Rowe, Carnegie Mellon University
7. Aruna Balasubramanian, Stonybrook University
8. Ashutosh Sabharwal, Rice University
9. Cecilia Mascolo, University of Cambridge
10. Cheng Zhang, Cornell University
11. David Kotz, Dartmouth College
12. Deepak Ganesan, University of Massachusetts, Amherst
13. Dong Li, University of Maryland, Baltimore County
14. Dong Ma, Cambridge University
15. Edison Thomaz, University of Texas at Austin
16. Edward Knightley, Rice University
17. Edward Wang, University of California, San Diego
18. Fadel Adib, MIT
19. Flora Salim, University of New South Wales
20. Huining Li, North Carolina State University
21. Jeremy Gummeson, University of Massachusetts at Amherst
22. Jie Xiong, Nanyang Technological University
23. Josiah Hester, Georgia Institute of Technology
24. Karan Ahuja, Northwestern University
25. Karthik Sundaresan, Georgia Tech
26. Kyle Jamieson, Princeton University
27. Lili Qiu, University of Texas at Austin
28. Lin Zhong, Yale University
29. Longfei Shangguan, University of Pittsburgh
30. Mayank Goel, Carnegie Mellon University
31. Mingmin Zhao, University of Pennsylvania
32. Nabil Alshurafa, Northwestern University
33. Nic Lane, University of Cambridge
34. Nirupam Roy, University of Maryland, College Park
35. Qian Zhang, Hong Kong University of Science and Technology
36. Romit Choudhury, University of Illinois at Urbana Champaign
37. Shirley Xue, Purdue University
38. Shyam Gollakota, University of Washington
39. Suman Banerjee, University of Wisconsin at Madison
40. Swarun Kumar, Carnegie Mellon University
41. Tam Vu, Dartmouth College
42. Tanzeem Choudhury, Cornell University
43. Tauhidur Rahman, University of California, San Diego
44. Vikram Iyer, University of Washington
45. VP Nguyen, University of Massachusetts, Amherst
46. Xia Zhou, Columbia University
47. Xinyu Zhang, University of California, San Diego
48. Yincheng Jin, Binghamton University

49. Yiyue Luo, University of Washington
50. Yuanchun Shi, Tsinghua University
51. Yuntao Wang, Tsinghua University
52. Yuzhe Yang, University of California, Los Angeles
53. Zhenyu Yan, Chinese University of Hong Kong

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