

Health Centric Wearable Devices in the Age of Physical AI Workshop

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Abstract

Wearable fitness trackers have been available to consumers for decades with early step counters serving to inform users on basic daily activity levels. In more recent years with advancements in hardware technology, we have seen personalized health devices grow drastically as devices such as smart watches, rings, and glasses become more ubiquitous. Now with Physical AI extending artificial intelligence into real time physical signals, personal health insight and treatment is about to become more of a reality. In this workshop, we aim to bring together the community working on and around wearable hardware to discuss the current state of the landscape as well as foster new ideas, and discuss possible challenges around developing these devices to better help consumers understand and address their health.

CCS Concepts

• **Hardware** → **Emerging technologies**; • **Human-centered computing** → **Ubiquitous and mobile computing**; • **Applied computing** → **Consumer health**; • **Security and privacy** → *Human and societal aspects of security and privacy*; • **Computing methodologies** → **Artificial intelligence**.

Keywords

Health, Wellness, Hardware, Physical AI, Embedded Systems, Wearable Devices

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1 Introduction

Wearable and ubiquitous computing has facilitated the widespread aggregation and analysis of health data for individuals. The growing availability of health information enables the use of artificial intelligence to process, interpret, and act on the data [3]. While companies and researchers continue to explore new hardware options for wearables like watches [6] [2] [5], rings [4], necklaces [7], and even footwear research [1], there will be more opportunities to explore how AI can be embedded into wearable hardware. In this workshop, we aim to reframe the conversation around "Physical AI" beyond robotics to include wearable devices that can aggregate, analyze, and act on physiological users health data. Devices designed to capture biomarkers and other signals used in inferring a person's health are becoming more and more common and we propose this workshop as a way to discuss the current landscape, how AI will influence research, and challenges we see ahead. There have been no recent review papers describing building of health wearable devices and UbiComp will be a good venue to bring the research community together for a more updated group discussion. This is especially important as this space changes very quickly with new sensors and AI architectures coming out yearly.

2 Workshop

The overarching objective of this workshop is to bring together researchers who work on physical hardware in the health and wellness space for a presentation and discussion of the most recent trends, techniques, and challenges. We will use this workshop to work towards a potential review paper of the existing ecosystem of health sensing devices to discuss opportunities and the challenges towards developing higher accuracy, more trust, and different levels of home to clinical deployments.

We hope to keep the call for papers relatively broad to ensure there is participation across many domains, and use the workshop



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as a way of aggregating topics that the community feels are of the most importance. The main constrain is we are seeking submissions that have more direct connection to the physical world rather than work that is more purely algorithms or dataset based. In recent years a lot of health sensing devices have been used as ways to generate more data which has allowed for training AI models. Another aspect of health devices has been devices that close the loop of treatment such as hearing aids, insulin patches with sensors for diabetes, or sleep aids addressing snoring actively. We also want to hear about advances in that domain as consumers start to trust these devices to enact treatment. Overall we wish to foster a discussion between those who work on the aspects of health sensing wearables that is closer to the person rather than discussions of how to interpret the data.

The UbiComp community has many who would be experts in this field as it brings together hardware, applied AI, and HCI. There are many papers in our community that relate to wearable devices including many related specifically to health. While there has been a large focus on building devices for data collection we feel consumers are quickly using more sophisticated personal electronics to both track and address their health concerns. This workshop would give the community an opportunity to discuss the current state of research and hopefully inspire a new wave of research that addresses the new challenges in this field, helping to close the loop so that end users have a better understanding of their personal health and wellness.

We will solicit three kinds of submissions.

- **A Demo Submission** that focuses on a physical prototype which can be used by other attendees. The goal is to foster discussion and also allow researchers to get feedback on their work.
- **A Lessons Learned Report** describing an experience or challenge while working on these kinds of devices. Physical construction of prototypes is always varied in research and we often find challenges and solutions to those challenges which can be useful for the community.
- **Posters** describing ongoing work or early prototypes. Posters can be a great way to showcase work that is still ongoing or present the progress of a work before it is finalized. This will help to foster discussions even if a working prototyping is not complete.

The workshop will be open to allow for more participation. Because we want to highlight physical devices, we want those who are not already working in this space to be able to use and interact with demo devices brought by those already entrenched in this work. It also offers different perspectives as to what will be important research avenues to pursue at a time where artificial intelligence is quickly dominating the discourse.

3 Organizers

We organizers have experience developing novel systems for health and sensing in both research and industry. Our background and network allow us to reach many students, researchers, professors, engineers, etc who would be interested in attending this workshop. All of us have attended academic conferences including UbiComp

and know the value of getting our communities together to discuss research and explore collaborations.

Alexander Ching is a PhD student at the University of Washington working on sensing for applications in health and interaction. He has previously worked as an hardware and research engineer in industry labs and groups.

Daniel Campos Zamora is a PhD student at the University of Washington combining robotics and digital fabrication to embed signals and interaction for sensing and interaction.

Richard Li is a Postdoctoral fellow in the Ubiquitous Computing Lab at the University of Washington. He is a human-computer interaction and ubiquitous computing researcher with an interest in interactive systems that use sensors and machine learning to solve real-world problems.

Qiuyue (Shirley) Xue is an Assistant Professor in the Department of Computer Science at Purdue University. She received her Ph.D. in Computer Science and Engineering from the University of Washington. Her research advances the field of wearable computing by transforming everyday accessories into low-power, intelligent systems that enable applications previously difficult or impossible to achieve. These applications span health, well-being, and human-computer interaction.

Paul Dietz holds faculty appointments at the University of Toronto and the University of Washington. He is best known for his work on fundamental HCI hardware technologies. He was the keynote speaker for UBICOMP 2017 where he revealed Parallel Reality Displays.

Jake Garrison is a research engineer at Google Health. He builds consumer health products that leverage on-device sensing and intelligence. His background bridges software engineering and AI research, training machine learning models that scale from microcontrollers to data centers.

Anandghan Waghmare is a researcher at Samsung Research America, where he focuses on advancing next-generation healthcare technologies through novel sensing and tightly integrated hardware–software systems. He holds a Ph.D. in Computer Science and Engineering from the University of Washington, where he developed new sensing technologies for healthcare and human–computer interaction.

4 Participation

We expect to have 30-40 participants attend the actual workshop. Because UbiComp is a joint conference with ISWC, we expect there to be a good amount of interest. Apart from the many academic institutions who do research on sensing, health, and AI, we expect there to be many industry researchers who will have interest in this topic and would want to see demos of the latest research.

Physical hardware demos will be encouraged and prioritized when reviewing papers. Demos often draw more participants because of the concrete nature of the device. We can hold prototypes rather than just discuss new algorithms and architectures. These will still include demos that want to highlight an algorithm or software innovation, but adhere to the spirit of the workshop which is centered around the physical.

We expect conference attendees who do mostly software and AI work on health data to have an interest in how their datasets

are created, and if there are new sensors or paradigms that would increase accuracy and efficiency of health inferences.

5 Workshop Plan

5.1 Pre Workshop Organizing

Organization for the workshop with broadcasting a call for papers. All of the organizers have worked with researchers, engineers, and students who are directly in the health space and will likely reach a fair number of potential participants.

As submissions come in for review, we will be able to infer what potential attendees will be interested in discussing as what research topics are being actively worked on today. With this information we will begin to formalize potential subtopics for the workshop itself. Examples of this could be fabrication of entirely new sensors, at home treatments, or difficulties with clinical deployments of devices. We list potential topics in the CFP below.

Based on the submissions we will form some subtopics that encompass the major themes. A keynote speaker will be found by the organizers.

5.2 Workshop Activities - Half Day

We have planned this workshop to be a 4 hour half-day workshop. A schedule with time allocations can be found in Table 1.

5.3 Introduction and Keynote

The organizers will present the overview of the workshop, its activities, and the goals before introducing a keynote speaker who will give a brief talk. We will plan on finding a keynote speaker who can speak with authority on the topic of health devices and ideally present a talk that helps ties together the themes of the accepted papers.

5.4 Presentation of Accepted Papers

We will have paper presentations from the accepted paper authors. Each person will be given 10-15 minutes to present their work. This timing may change depending on how many participants are accepted. If the paper acceptance is low we will put more time into the demo and discussion portions of the workshop.

5.5 Demos

The demo portion of the workshop will be setup to allow presenters to showcase physical prototypes which will be highly encouraged for all submissions. The purpose is to showcase how different prototypes can be created for different health related applications. We expect demos to be dynamic and engaging. Depending on the venue space we will opt to have demos setup beforehand. Otherwise we will use the scheduled break to move the demos into place.

During this time, most participants will be walking around the venue. We will have a space for an Affinity Diagram with topic seeds based on the submitted papers. This will help form the subgroups in the Discussion portion of the workshop. We will limit the number of groups based on the range of topics seen, likely no more than 6.

5.6 Discussion

We schedule discussions to be last in order to allow for the participants to gain a sense of the recent work in this space through the keynote, presentations, and demos. We will have pre-defined topics based on the paper submissions, but will also organize to allow for open groupings should there be high interest in a topic or demo. We will have a representative from each of the discussion groups give organizers major themes towards the end of the hour highlighting where they see future research trends and challenges within that subtopic.

Logistically, we will plan on having a shared space where groups can put notes and discussion ideas. We will finalize what this system is, but will likely be something similar to a Google Doc that is shared among the workshop participants. This will further help facilitate the creation of a review paper from the workshop.

5.7 Concluding Statements

The organizers will give concluding statements and show a word cloud created from the comments made during the discussion groups. We will share a group workspace to be determined that will allow us to coordinate with interested parties for framing and writing a review paper on the topics the workshop found to be most important within this research space. We hope that this paper will help to aggregate the most recent advances in wearable health hardware and present the challenges that need to be addressed to improve the usage of these devices in improving our health.

5.8 Post-Workshop Follow Up

The organizers will consolidate the workshop outcome and summarize it on the workshop website as well as contact those who wish to work on a review paper. We will discuss what type of paper is appropriate, possible venues, and timeline once the workshop has concluded.

References

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A Call for Papers

Workshop on Health Centric Wearable Devices in the Age of Physical AI

We invite submissions by the community from those working on or with physical wearable devices for health and wellness related

Time Allocation	Activity	Type
5 mins	Introduction by Organizers	Presentation
25 mins	Keynote Speaker - TBD	Lecture
40 mins	Presentation of Accepted Papers	Talks - Approx 10 mins each
20 mins	Demos, Discussion, and Socialization	Networking
5 mins	Concluding Statements	

Table 1: Workshop schedule.

purposes. You may submit any of these contributions for consideration.

- **A Demo Submission** which can be presented on during the talks and displayed during our Demo session. Up to a 2 page submission including diagrams. We highly encourage demo submissions with fully working prototypes so attendees can use them in real time.
- **A Lessons Learned Report** describing an experience or challenge while working on or deploying health related wearable devices. You will be able to present your work during the talks session. Up to a 4 page submission including diagrams and references.
- **Posters** describing ongoing work or early prototypes. The work can be presented during the talks session and displayed during the demo session. Up to a 4 page submission including diagrams and references.

The workshop will be open to any and all attendees.

Some Topics of Interest (Not extensive)

- Advances in wearable sensing (novel applications of existing sensors, new sensing modalities, new physical sensors)
- Physical AI Systems utilizing wearable health data
- Reports of sensing challenges for health diagnosis

- Reports of challenges and lessons learned when developing or deploying clinical wearable systems
- Embedded AI for health inference or data processing
- Devices that do more than collect data, but also act on it (e.g. Insulin Patches, Pacemakers, Snoring Mitigation Pillows, etc)
- Low power architectures (circuits and algorithms)
- Devices built for clinical deployment or data collections (e.g. Sensing in clinical settings, robust designs, etc)
- Health sensor reading privacy protection schemes, insights, and architectures
- Cost effective solutions for resource constrained environments

Submission Guidelines: All submissions should use the Standard ACM Two Column Format, templates can be found on the ACM Website. Please submit your papers to healthcentricwearables@gmail.com with the subject line [Workshop Submission]. For any questions, please include a subject line [Question].

Review Process: Each submission will undergo single-blind review by two of the organizers.

Important Dates:

- Submission Deadline: July 17, 2026 AoE
- Notification of Acceptance: July 31, 2026
- Workshop Date: October 11, 2026