

HEALTHI: Workshop on Intelligent Healthy Interfaces

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ABSTRACT

The second workshop on intelligent healthy interfaces (HEALTHI), collocated with the 2022 ACM Intelligent User Interfaces (IUI) conference, offers a forum that brings academics and industry researchers together and seeks submissions broadly related to the design of healthy user interfaces. The workshop will discuss intelligent user interfaces such as screens, wearables, voices assistants, and chatbots in the context of accessibly supporting health, health behavior, and wellbeing.

CCS CONCEPTS

• **Human-centered computing**; • **Computing methodologies** → **Artificial intelligence**; • **Applied computing** → **Life and medical sciences**;

KEYWORDS

health, wellbeing, behavior change

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1 INTRODUCTION

Now, and more than ever, behavior is mediated by or accompanied by smart devices and intelligent user interfaces. Smartphones, wearable devices, and intelligent voice assistants are examples of increasingly ubiquitous technologies in our daily lives. And these interactions are ever growing; in recent years, the design of technology moved away from merely professional devices, i.e., the first mainframe computers, towards advancing into our personal lives in form of, e.g., mobile phones and personal computers. Our contact with technology becomes inevitable on a daily basis. The capabilities of these smart devices could and should be leveraged to improve human health [3, 13] and make health technologies more accessible.

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Moreover, psychological needs of users need to be considered more holistically throughout the design of digital experience to ensure engagement, wellbeing, and support positive behaviors [11]. We argue that all technologies should support or at least not hinder personal wellbeing and health through thoughtful and smart design. User interfaces can be designed to improve positive aspects of human life such as motivation, self-awareness and resilience [2].

In recent years, research in human-centered computing increasingly focused on the use of various modalities of intelligent user interfaces to support physical and mental health [1, 4, 5, 7, 9, 10]. The basis for smart applications are grounded in ubiquitous sensing accompanied by the use of machine learning and artificial intelligence (AI) to model and predict behavior, engagement, or outcomes. Therefore, designing smart user interfaces for promoting wellbeing and health poses great potential in combining both human-computer interaction (HCI), affective computing, and AI [12].

However as has been observed by the workshop chairs, despite several years of digital health research, there is still the gap of a broader research and technology accessibility. Most commonly, rather motivated individuals with a higher socio-economic status and better health condition engage in research studies, e.g., [6, 15]. This results in an important selection bias which might lead to a design of healthy interfaces that will most likely not reach and engage individuals that would benefit most from those efforts. Thus, it is of utmost importance to reach and engage the most vulnerable individuals when designing healthy user interfaces. Those individuals, in general, have a lower socio-economic status, lower digital and health literacy and are quite hard to reach and motivate in health-promoting behaviors resulting in lower levels of physical and psychological health [8, 16]. We, therefore, seek also submissions that consider socioeconomic inequalities, cultural diversity, and involve individuals with a lower digital and health literacy. The delivery of health literacy episodes by the mindfulness company Headspace via Netflix is only a first step into this direction¹. However, more efforts on the design of healthy interfaces in comfort zones are required to reach and engage the most vulnerable individuals.

In summary, the premise of this workshop is that the design of healthy interfaces can help tackle major health problems such as stress, sleep, health behavior change, digital addiction and cognitive health with consideration of cultural, socio-economic, and

¹<https://www.headspace.com/netflix>, accessed 09/20/2021

health/technology literacy. Accordingly, the topics of interest include:

- Design and evaluation of personalized and adaptive interfaces
- Designing autonomous interfaces for human autonomy
- Ethical design of intelligent health systems
- Cultural issues in tech design of health systems
- Accessibility of intelligent health systems for vulnerable and marginalized groups
- Considering socioeconomic inequalities in the design of healthy user interfaces
- Behavior change and persuasive technologies for health
- Digital wellbeing, screen time, and digital addiction
- Intelligent voices assistants (IVA) and voice-based interfaces for health
- Conversational user interfaces (CUI) to support mental health
- Virtual and augmented reality interfaces
- Wearable devices to measure and change health outcomes
- Recommender systems for healthy eating and physical activity
- Stress reduction using adaptive interfaces and just-in-time feedback
- Digital nudging and choice architecture for health behavior change and healthy habits
- Design of interfaces to enhance sleep quality
- Enhancing cognitive functioning and decreasing cognitive load
- Games and gamification for health and wellbeing

2 PREVIOUS WORKSHOPS

The first HEALTHI workshop [14] on the design of healthy user interfaces was co-located with ACM IUI 2020 and was organized by Michael Sobolev, Katrin Hänsel, and Tanzeem Choudhury. The workshop was successful and resulted in 12 position and full papers.² Around 20 to 30 participants joined us in discussing the future of the design health promoting smart user interfaces.

3 WORKSHOP ORGANIZERS

*Katrin Hänsel*³ is a postdoctoral research associate at Yale University - School of Medicine. In the past she was a postdoctoral fellow at Northwell Health and Cornell Tech. Her research is focused on the use of smart technologies to improve health and well-being of individuals by using ubiquitous technologies like smartphones and wearables to detect stress and behaviour in everyday life settings. In the past, she worked with social mediating technologies in the workplace, ambient presence, gesture and posture recognition, cognitively enhancing usage of virtual reality visualizations, and biophysiological signals for emotion and stress recognition. Previously a co-organized a workshop on "Understanding the Interdependency between Stress and Digital Technologies" at PervasiveHealth.

*Michael Sobolev*⁴ is a postdoctoral research fellow at Northwell Health and Cornell Tech. His expertise is in behavioral science and human-centered computing. Specific research areas include include

behavior change technologies for productivity and health, digital nudging for digital wellbeing, and recommender systems.

Tobias Kowatsch is the Scientific Director of the Centre for Digital Health Interventions⁵, a joint initiative of the Department of Management, Technology and Economics at ETH Zurich and the Institute of Technology Management at the University of St.Gallen, Switzerland. He is also Assistant Professor for Digital Health at the University of St.Gallen, Advisor of the Center for Technology and Behavioral Health at Dartmouth College, USA, and Principal Investigator of the Future Health Technologies program at the Singapore-ETH Centre. In close collaboration with his interdisciplinary team and research partners, Tobias designs digital health interventions ("digital pills") at the intersection of computer science, behavioral medicine and storytelling. He helped initiate MobileCoach⁶, an open-source platform for digital biomarker and chatbot research. Tobias is also co-founder of the spin-off company Pathmate Technologies⁷ that creates and delivers digital clinical pathways.

*Rafael A. Calvo*⁸ is Professor at the Dyson School of Design Engineering, Imperial College London. He is also co-lead at the Leverhulme Centre for the Future of Intelligence, and co-editor of the IEEE Transactions on Technology and Society. His research focuses on the design of systems that support wellbeing in areas of mental health, medicine and education. He has published 4 books and over 250 papers in these topics.

3.1 Workshop Program Committee

The Technical Program Committee will be finalized upon acceptance of the workshop. Last year, the following researchers were on our Program Committee:

- Alain Starke, TU Eindhoven
- Alexander T. Adams, Cornell Tech
- Caterina Bérubé, ETH Zürich
- Chang Siang Lim, Singapore-ETH Centre
- Emily Tseng, Cornell Tech
- Felix Wortmann, University of St. Gallen
- Filipe Barata, ETH Zürich
- Julio Vega, Pittsburgh University
- Marios Constantinides, Bell Labs
- Varun Mishra, Northeastern University

4 EXPECTED PARTICIPATION

Due to the success of the first HEALTHI workshop, we anticipate to get around 10 submissions in the form of position and full papers. Advertisement of the workshop will be done through mailing lists of appropriate research communities, word of mouth, invited submissions, and social media. We also expect a similar turnout of participants for this hybrid workshop.

5 WORKSHOP FORMAT AND SCHEDULE

The second HEALTHI full-day workshop will follow a virtual format with invited keynote speakers, paper presentations, and interactive, participatory sessions. To keep engagement high, passive and

²<http://ceur-ws.org/Vol-2903/#HEALTHI>

³<https://mizelkat.github.io/>

⁴<https://www.michaelsobolev.com/>

⁵www.c4dhi.org

⁶www.mobile-coach.eu

⁷www.pathmate-technologies.com

⁸<https://rafael-calvo.com/>

interactive sessions will be alternated, so that papers and keynote talks can be intensively discussed. Shared digital whiteboard and note taking tools will be used throughout the workshop to invite participants to share their thoughts and ideas to foster fruitful discussions. During the interactive sessions, we will focus on creative thinking and problem-solving method to facilitate novel ideas and directions for future research in the areas of healthy user interfaces. Our proposed program includes:

- Short introduction by organizers and participants
- Keynote
- Panel with the keynote speaker, organizers, and other invited panelists
- Research paper presentations
- Position paper presentations
- Interactive brainstorming and design session for the future of healthy interfaces

6 WORKSHOP OUTPUTS

The workshop proceedings with the accepted peer-reviewed position and full papers will be published online. Further, we plan to write-up outcomes from the discussions and brainstorming sessions into a blog article or white paper on the future of designing intelligent health promoting user interfaces.

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