New Trends in HCI and Sports

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ABSTRACT

Over the last 15 years, we have witnessed a digitalization of the sports experience, i.e., many sports have been enhanced by digital and wearable devices. The centrality of the human body and the different contexts where sports can be practiced have led HCI research to explore how mobile and wearable devices could support the physical, social, and environmental aspects of sports disciplines. Yet, the field of HCI & sports continues to evolve under the push of new technological developments and events affecting people worldwide, such as the Covid-19 pandemic and climate change. Technological advancements like the metaverse, inbodied technologies, and AI have paved the way for augmented humans, esports, new forms of sociality, and new ways to engage the audience. Likewise, contextual factors push sports trends in two opposite directions simultaneously: on the one hand, they foster the indoorisation and individualization of sports; on the other hand, they encourage practicing sports outdoors and taking advantage of the "restorative environment" of nature. With this workshop, we would like to invite the MobileHCI community to discuss the current trends in portable technologies for sports and trace future directions for HCI research in this field.

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CCS CONCEPTS

• **Human-centered computing**; • **Applied computing**; • **Computing in other domains**;

KEYWORDS

Sports, E-sports, Exergames, Superhuman sports

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1 BACKGROUND

In the last 15 years, the use of technology has spread in all aspects of sports practice: the contextual ones, such as indoor or outdoor environments; the social ones, such as team sports or how to share the sports experience with friends far away from us; personal ones, like physical performance, emotions, and cognitive states. The focus on the human body and the different contexts where sports are practiced have led HCI research, and in particular the MobileHCI community, to explore how mobile and wearable devices could support sports disciplines.

Typically, technological investigations and interventions in these areas have focused on:

- Fostering motivation to do sports [16, 23]
- Facilitating the learning of new motor skills or the improvement of physical performance through augmented feedback [4, 12, 14, 15, 17, 21]

- Helping to understand and reflect on the data extrapolated from the body through personal informatics/quantified-self data visualizations [25, 26, 29]
- Augmenting the communication between partners performing a sport together to facilitate their coordination [6, 19, 28]
- Understanding the key characteristics of outdoor sports, which lie in both the pleasantness and the challenges of the environment [1, 3, 8, 11, 20, 22, 27].

More recently, the field of HCI & sports has further evolved under the push of new technological developments and events that affected people worldwide, such as the Covid-19 pandemic and climate change. Technological advancements have widened the HCI and sports domain, opening it up to augmented humans [18], inbodied interactions [2], esports [9], new forms of sociality thanks to virtual reality and the metaverse, and new ways for audience engagement thanks to AI [10]. Whereas the contextual factors, such as the Covid-19 pandemic and climate change, seem to push the sports trends in two opposite directions simultaneously.
On the one hand, they foster the indoorisation and individualization of sports, as we can induce by the spread of home training systems, such as bike rollers and the Zwift app, or the building of indoor skiing facilities to face the lack of snow in the mountains; on the other hand, they encourage practicing sports outdoors and taking advantage of the 'restorative environment' of nature [13]. This workshop places itself within the established tradition of workshops on HCI & Sports. The first workshop addressing this topic was presented at CHI in 2014 [24] with the "HCI and Sport" workshop, then followed by workshops focused on outdoor/mountain sports, i.e., Ubimount 2016 [7] and 2017 [5].
With this new workshop, we would like to map the current trends for portable technologies for sports and trace future directions for HCI research in this field. Possible topics for submissions may include (but are not limited to):

- Mobile technologies for sports
- Wearables for supporting outdoor sports practices
- Interactive systems for practicing outdoor sports indoors
- The sensory and material aspects of sports
- Phenomenology of sports (how to report the sports experience)
- Augmented feedback for sports
- Augmenting human capabilities in sports
- Immersive technologies for sports
- Exergames
- Gamification techniques for sports
- Super-human sports

The workshop will be advertised on all the major international HCI mailing lists (e.g., CHI announcements, BSC-HCI Digest, EUSSET) and social media channels (e.g., ACM SIGCHI and EUSSET groups on Facebook). Furthermore, we will leverage our personal networks and affiliations to advertise the workshop to targeted groups.

2 PRE-WORKSHOP PLANS

The workshop website is available at https://mobilehci22-hci-and-sports.dfki.de/ where interested HCI academics and practitioners can find information about the event. The workshop will be advertised on all the major international HCI mailing lists (e.g., CHI announcements, BSC-HCI Digest, EUSSET) and social media channels (e.g., ACM SIGCHI and EUSSET groups on Facebook). Furthermore, we will leverage our personal networks and affiliations to advertise the workshop to targeted groups.

Participants will be invited to send a paper (minimum 12.500 characters long) in the form of a research, reflection, pictorial, provocation, or design fiction using the 1 column CEURART format via Easy Chair. The program committee will assess the submissions based on their potential to spark an interesting discussion.

Upon acceptance, participants will be asked to produce a 2-minute-long video presentation. The videos and the papers will be shared with the participant before the workshop date so that they can start reading and reflecting on each other's materials in advance. This preliminary work aims to support participants in developing ideas on the themes proposed by the others and overcome possible connection problems during the workshop. By making participants aware of the themes the others are willing to bring to their attention, we aim to have a cross-pollination of ideas and a longer and richer discussion during the workshop.

DIVERSITY AND INCLUSION

By organizing a half-day online-only workshop, we aim to include all the people who might be interested in the topic and willing to take part in the discussion despite travel costs and pandemics limitations. Nevertheless, we are aware that virtual participation might be hampered by different time zones and unstable internet connections.

To overcome these barriers, we will set the workshop schedule to accommodate as much as possible the different time zones from where participants will attend and give them the possibility to carry out activities before and after the actual workshop. To do so, we will leverage several digital supports for remote interactions, such as:

- A repository of short videos summarizing participants' submissions (pre-workshop activity).
- A Miro board (www.miro.com), organized into multiple sections, where participants can present themselves (pre-workshop activity) and take notes during the brainstorming sessions (workshop activity). The board will remain accessible also after the workshop conclusion for all the MobileHCI conference duration and work like an interactive poster where asynchronous participants can leave comments (post-workshop activity).
- The transcription of the workshop discussion obtained through the Otter.ai software (post-workshop activity).

By organizing these asynchronous interactions, we aim to create a close-knit workgroup.

Diversity and inclusion will be encouraged through the paper selection process, i.e., if papers will be judged equal in terms of ability to generate a discussion, priority will be given to the ones bringing a diverse set of perspectives and cultures to the workshop. Moreover, for the papers with multiple authors, we will encourage the youngest author to present the paper at the workshop, also

trying to balance the presenters with reference to gender and minorities. All the participants will be asked to choose their preferred pronoun. Finally, to organize the workshop as accessible as possible, we will collect suggestions from the participants (through a short online questionnaire) on what they think we could do to facilitate their full participation.

3 WORKSHOP STRUCTURE

We expect to host between 10 and 15 participants. The overall workshop duration will be 4 hours, with a break every hour to allow participants to take a pause from sitting at the desk and watching the screen.

- Welcome greetings (15 minutes). An informal chat will take place while waiting for all the participants to connect. Then, the organizers will introduce themselves and the workshop goal.
- Madness session (45 minutes). After the welcome greetings, participants will have 3 minutes to present their submission in a madness session. Since papers and videos will be shared before the workshop, the focus of this madness session will be for participants to express the commonalities they have found in each other's work, find common challenges and topics to discuss, and establish connections. This activity will facilitate the formation of working groups during the next workshop phase.
- SCREEN BREAK (20 minutes)
- Group organization (10 minutes). During the madness session, workshop organizers will take note of the thematic areas that emerged, and then participants will be asked to pick their preferred theme. Participants will be divided into small groups of 3-4 people, and each group will define together a design challenge formulated as a "What if. . .?" question.
- Design challenges (35 minutes). Participants will envision new solutions to the design challenges through brainstorming. They will be asked to push forward their imagination and produce thought-provoking and "critical" ideas. Each participant will generate multiple design ideas and note them down on a dedicated section of the Miro board. Then, they will present them to the rest of the group, and the group will distill the most thought-provoking solution that they would like to develop in a future scenario.
- Future scenarios (35 minutes). Next, each group will have to develop a future scenario (50 years forward in the future) where the imagined technology could become completely effective and pervasive among individuals and society. The scenarios can be either utopistic or dystopic according to whether participants prefer to lead a reflection on the desired or undesired consequences of the spread of the newly conceived technology. Scenarios will be realized through storytelling techniques (e.g., concept description, envisioning scenarios, etc.) that will be recorded in dedicated Miro sections.
- SCREEN BREAK (20 minutes)
- Concepts presentation and feedback (45 min). The workshop will conclude with the presentation of the scenarios produced (a 3-minute presentation for each group, followed by a 5-minute discussion).
- Wrap up and goodbye greetings (15 minutes). The workshop organizers will wrap up the workshop by highlighting its results and presenting participants with a few options for the future to continue nurturing the network.

4 EXPECTED OUTCOMES

After the workshop, we plan to i) submit an article to ACM Interactions reporting the insights that emerged during the workshop; ii) include participants and organizers in a mailing list where they can share and discuss new ideas. We plan for the accepted manuscripts to be included in the proceedings of the workshop and be published by CEUR.

5 ORGANIZERS

Eleonora Mencarini (main contact) is a researcher at the i3 research unit of Fondazione Bruno Kessler (Italy). She holds a PhD in Computer Science from the University of Trento (Italy). Her main research interests are ethnography, co-design, embodied interaction, and interaction design in natural environments. Since 2013, she has been doing research in the field of HCI and outdoor sports. In 2021, she led the organization of the hybrid workshop NatureHCI co-located with the CHItaly'21 conference.

Amon Rapp is an assistant professor at the Department of Computer Science of the University of Torino (Italy). His research interests include wearable and self-tracking devices for health and sports, behavior change technologies, and video games. He organized several workshops in prestigious international conferences like UbiComp/ISWC '15, '16, '17, '18, Academic Mindtrek '17, Hypertext '14, CHI Play '16, and UMAP '17, '18, '19, '20, '21.

Ashley Colley is an adjunct professor in creative technologies at the University of Lapland, Finland. His research interests center around tangible and wearable interaction applied in a wide variety of domains, among which winter sports and health technology.

Florian Daiber is a senior researcher at the German Research Center for Artificial Intelligence (DFKI). His work involves 3D user interfaces and ubiquitous sports technologies particularly in the context of running and rock climbing. He recently co-organized the EPO4VR workshop, the UbiMount workshops and the HCI Outdoors Workshop.

Michael Jones is a professor of computer science at Brigham Young University. His research interests include human-computer interaction in outdoor recreation in wilderness settings and interactive systems for sports training. He has co-organized workshops on HCI Outdoors and UbiMount. He co-edited a book based on the HCI outdoors workshop.

Felix Kosmalla is a researcher at the German Research Center for Artificial Intelligence (DFKI). His primary interests lie in human-computer research and revolve around interactive systems for sports. With those systems, he aims at elevating the joy and performance of athletes during their exercise using different sensing and feedback channels. He has co-organized the 2nd NatureCHI and the UbiMount workshops.

Stephan Lukosch is a professor at the HIT Lab NZ of the University of Canterbury in Christchurch, New Zealand. Before

joining the HIT Lab NZ, he was an associate professor at the Delft University of Technology in the Netherlands. In 2018, he organized the first Superhuman Sports Design Challenge. His current research focuses on human augmentation in domains such as sports, health, or safety & security to enhance our capabilities and engagement.

Jasmin Niess is a senior researcher at the School of Computer Science at the University of St. Gallen, Switzerland. She has an interdisciplinary background situated at the intersection of Psychology and HCI. Her research focuses on the design and evaluation of inclusive technologies for health and sports, such as equestrian sports, dancing, and skiing. She is particularly interested in understanding psychological needs and how those might be considered in designing technologies for sports and health.

Evangelos Niforatos is an Assistant Professor on Human-AI Synergism at the Faculty of Industrial Design Engineering (IDE), TU Delft, The Netherlands, and holds a Ph.D. in Informatics from Università della Svizzera italiana (USI), Lugano, Switzerland. Evangelos has also gained R&D experience in the industry by joining North Inc. (now Google), Kitchener, Canada where he worked as an HCI Research Scientist on shaping the future of head-mounted displays. He is an avid skier, and he enjoys testing novel prototypes on the slopes.

PawełW. Woźniak is Associate Professor in Interaction Design at Chalmers University, Sweden. His interests lie at the intersection of technologies, sport, and wellbeing. He focuses on understanding physical activity experiences to design technologies that better support amateur athletes. In his past work, he designed for runners, swimmers, cyclists, and golfers.

Massimo Zancanaro is a Full Professor in Computer Science at the Department of Psychology and Cognitive Science of the University of Trento (Italy) and Head of the i3 research unit at Fondazione Bruno Kessler in Trento (Italy). His research interests are in Human-Computer Interaction and Intelligent User Interfaces.

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