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# HCI and Sports

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**Abstract**

Sport is an area in which the number of available

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computing devices is growing rapidly. However, HCI has so far devoted rather little attention to the sports domain. This workshop aims to form a community around sports by gathering existing activity in the HCI domain, thus starting a discussion on what HCI can contribute to the sports domain, as well as what HCI can gain from studying sports.

**Author Keywords**

Sports; HCI; UX; bodily awareness; motivation; pain.

**ACM Classification Keywords**

H.5.m. Information interfaces and presentation (e.g., HCI): User Interfaces.

**Introduction**

Sports and recreational fitness activities are rapidly growing areas of personal and consumer-oriented cloud computing-based technologies with a turnover of \$200 billion in the US alone [18]. This can be seen in mobile sensor-based end-user products such as the Nike+, sensor equipped sports watches, mobile apps like Runkeeper, and the connections between these systems and social and broadcasting media. The area is still in an early phase of development based on first generation technologies and infrastructure, but is constantly refined and improved due to rapid market expectations and new technical opportunities. Emerging products, such as smart watches, glasses and sensing

textiles will also pose new requirements on interaction design as well as providing novel design opportunities.

Recently, we have started to see dedicated light-weight interactive technologies that can be used during the real time performance of a sporting activity. This has led the CHI community to address interactive technology in sports as an emerging area. Following the overall trend of research in exercise, motivation, and well-being [2, 7], we now start to see work that deals with actual sports and their performance e.g. [17] and first attempt to form a community with the 2013 SIG *HCI with Sports* [13].

Our goal for this workshop is to start forming a community of HCI and sports by gathering the existing people for discussions and sharing. We also intend to explore how HCI can be pushed forward by the characteristics of the sports domain.

### **Background**

Our survey of existing work in interaction design reveals that sports is a mostly unexplored domain within interaction design and provides a set of challenges and opportunities that will push the field forward. We classify the existing work into four broad categories: technical exploration, bodily interaction, new forms of play, and socio-motivational systems.

**Technical exploration** work is mainly devoted to exploring the technical potential of sensors in the context of, e.g., wearable computing. Work in this category, e.g. [6], is related to sports in the sense of enabling technologies and has been successful in many areas in the wild.

**Bodily interaction** refers to work where the aim is to create innovative interaction techniques. This category of work, sometimes uses sports as a related application domain among many. Illustrative examples include using heart rate or breathing patterns to play games [15] and music [16].

**New forms of play** is perhaps the most common type of sports-related work in recent interaction design. The literature offers a wide range of examples where the playful, competitive and motion-based character of sports has inspired new, ICT-enabled forms of play such as exertion games [12], and a similarly varied range of examples using ICT-enhanced sports equipment as props for new forms of play, e.g. [8, 10].

**Socio-motivational systems** refer to the use of ICT to motivate people to move or exercise, for example by providing social support [3, 14], or through gamification [7]. Social consumer services for planning sports (biketastic) and managing exercise (adidas micoach), as well as general activities and achievements (lifekraze) also belong in this category, which is largely distinguished by focusing on creating social and/or competitive layers for motivation rather than engaging deeply with augmenting the sports activity as such.

When it comes to supporting, enhancing or augmenting actual sports through deep engagement with the details of their execution, it turns out that very little work has been reported. Isolated examples include [11, 19, 20]. They are, however, all limited to a single sport and rather few users. We believe that a broader effort is needed in the HCI community to learn how to

successfully design for sports. This workshop is one step towards such an effort.

## **Themes**

We have chosen four main themes for the workshop to cover a broad spectrum of work while still keep a certain focus.

### *Theme 1: Bodily Control and Awareness*

A key skill for athletes to develop is the perception and awareness of how they are moving and how that links to their performance. Coaching aims to support athletes to develop a 'feeling' of the desired movement. Many sports use training devices and methods such as golf clubs with whippy shafts, cross country skiing without ski poles, and tools such as mirrors & video capture, along with performance measures such as time, speed and distance. We believe widely available sensor-based mobile technology can also play a role in supporting athletes in the process of developing awareness of their technique in sports.

### *Theme 2 – Sports Motivation and Fun*

Sports motivation research suggests that regular participants are primarily motivated by enjoyment of sport, as opposed to fitness, health or bodily shape motivations [9]. Successful social sports measurement systems such as Strava (strava.com) have shown the potential of networked technology to create new ways of enjoying sports and new forms of competition. We believe technologies such as mobile sensing and computer vision systems such as Kinect may also enable a range of exciting and fun new sports experiences in the future.

### *Theme 3 – Pain and Discomfort*

Sport involve an inherent level of pain and discomfort, which can play a positive role in the enjoyment of sport [1]. In some 'extreme' sports, even the serious risk of pain or death is key to the thrill of taking part [5]. Technology can enable new and interesting variations on such 'uncomfortable' experiences [4]; further, we believe that the study of discomfort in sport can be inspirational to those wishing to explore pain within other interactive domains. There is also a negative side to pain in sport, that of injury [1] ; technology offers a potential to help athletes both rehabilitate from injury and avoid injuries in the first place.

### *Theme 4 – Current use and UX of existing sports tech*

A wide range of consumer products target sports and physical activity, including specialized hardware such as GPS watches and heart rate monitors, as well as apps such as Runkeeper or Endomondo. Many people are using these products and associated online forums in their regular exercise. The use practices as well as user experience of these products have received little attention in the HCI community.

We believe these themes provide complementing perspectives on HCI and sports. *Bodily control and awareness* concerns the physical aspect of sports while *sports motivation and fun* concerns social aspects, both being important drivers for all categories of athletes. *Pain and discomfort* provide an interesting counter perspective to fun, motivation, and social aspects of sports, and *current use and UX of existing sports tech* gives us a baseline of where the commercial domain is today.

## Conclusion

Sports is a domain in which HCI can make contributions but also learn and be challenged by the characteristics of sports settings and activities. We believe that it is important for HCI to engage with sports for both these reasons. This workshop, with its combination of experiencing technology, sharing of ongoing work, and discussions of future research challenges, aims to start the discussion on how the sports engagement in HCI should work and strengthen the emerging community of researchers in sports and HCI.

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