Mobile Collocated Interactions with Wearables

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ABSTRACT

Research on *mobile collocated interactions* has been looking at situations in which collocated users engage in collaborative activities using their mobile devices, thus going from *personal/individual* toward *shared/multiuser* experiences and interactions. However, computers are getting smaller, more powerful, and closer to our bodies. Therefore, *mobile collocated interactions* research, which originally looked at smartphones and tablets, will inevitably move towards fully integrated wearable technologies. The focus of this workshop is to bring together a community of researchers, designers and practitioners to explore the potential of extending *mobile collocated interactions* from, through and around the body using wearable technologies.

Author Keywords

Collaboration; embodied interaction; wearables; multi-user; jewelry

ACM Classification Keywords

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

INTRODUCTION

Mobile Collocated Interactions

Research on mobile collocated interactions [6][10] has been focused on situations in which collocated users engage in collaborative activities using their mobile devices, going from personal/individual toward shared/multiuser experiences and interactions.

A variety of means have been explored to encourage people to share devices, to create a collective experience or reach a common goal. Various physical and social contexts of use have been taken into account: at the office [6], at home [6], outdoors [4], in a theme park [5], in a pub [6], and in rural developing-world contexts [11]. Most of this research has

Figure 1. Cute Circuit's *Hug Shirt* lets pairs of wearers share hugs over a distance.

been focused on smartphones and tablets.

The resulting mobile collocated interactions seem device-centric rather than experience-centric. An exception is Blast theory's Can You See Me Now? (CYSMN) [2] (Figure 2), a multi-player mixed reality game that combines online players with a group of collocated street-based runners. CYSMN engages critically with the ubiquity of mobile devices, and engages people in the act of gaming and connection in unique ways, extending user and audience affect through visceral gameplay. As a framework for mobile interaction, CYSMN places devices at the service of enriched experiences.

At the other extreme, hipDisk [12] (Figure 3) leverages the powerful social possibilities of collocation and embodied engagement, yet overlooks the technological possibilities. Collocated users of hipDisk may play music together, and thereby enjoy a heightened experience of its use. Yet no change in the functioning of the technology occurs to support or extend this shift. Similarly, Hug Shirt[1] (Figure 1) captures temperature, heart rate, pressure and location of touch when capturing a hug, to recreate this 'hug' in the paired shirt. When used in demos, it collocates a pair of shirts to demonstrate the valence of 'sharing' hugs from a distance. What might be possible if Hug Shirt leveraged what can be afforded by technological collocation?

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[1] Hug Shirt. http://cutecircuit.com/collections/the-hug-shirt/

Figure 2. Blast Theory's *Can You See Me Now?* is a mixed reality game that combines online players with collocated on-street runners.

Figure 3. *hipDisk* leverages social aspects of collocation to engender other kinds of collaboration.

Mobile Collocated Interactions with Wearables

Wearables are becoming increasingly prevalent[2]. Computers are getting smaller, more powerful, and closer to our bodies, and clothing that incorporates interactive and responsive technologies is becoming commercially viable. Wearable gadgets (e.g., Google Glass) provide extended capabilities for the wearer, yet tend to minimize the rich sensorial aesthetics of experience, of being in constantly intertwined experiential relationship with our surrounds and other people.

As more people wear technology, situations where there are multiple persons present with wearables will become commonplace. In those situations, wearables could support collaborative tasks and experiences through multi-user applications. However, existing binding methods designed for computers, smartphones and tablets are not necessarily applicable to wearables which may be far more personal and intimate. For example, while touching can be a natural way of selecting another user's phone or tablet, it might be inappropriate when the device is head-mounted, or centered on the torso.

Existing methods for mobile collocated interactions do not take advantage of unique features of wearables that could enable more natural and innovative ways to form groups. If we consider wearables as already attached to their owners, binding of multi-user wearables can form through people's social interactions. A handshake may indicate a level of acquaintance, prompting wearables to connect and share business contacts. A hug, on the other hand, is more intimate, and may prompt the transfer of more personal information. Pairing with the previously mentioned Hug Shirt could be achieved through similarly physical acts such as grasping or hugging. Possibilities such as these call for new research from various domains on group binding methods for connecting wearable devices.

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[2] World Economic Forum. http://bit.ly/OJMtvA

Some researchers have actively looked into novel input wearable devices. Nenya [1] (Figure 4) consists of a magnetic finger ring that provides an always-available input mechanism. It allows for simple input actions such as twist to select and slide along the finger to click. The ring itself is subtle and socially acceptable, yet requires a wrist-worn sensor for tracking. Facet [9] (Figure 5), a multi-display bracelet consisting of multiple independent touch-sensitive segments claims to yield a rich set of touch input techniques. Yet touch is achieved through the fingers alone. This workshop asks what might it look like if the sophisticated knowledge of Mobile Collocated Interactions was leveraged to generate powerful experiences such as CYSMN, hipDisk and hug shirt. Might researchers be able to develop wearables that speak to the rich gamut of embodied experience, while bringing, sophisticated advantages of technological collocation?

Figure 4. Nenya is a magnetic ring allowing simple input actions such as twist to select and slide to click.

WORKSHOP GOALS

In previous workshops on *mobile collocated interactions* [10][2][7], several challenges were identified as core to this research area: group size, physical distance, device-binding, operating systems, privacy, extending to public displays and tabletops, and in-the-wild evaluations. One question that remains unanswered is *how can we move beyond just designing (for) gadgets?*

As wearables gain popularity, we will need to consider situations where people want to use a rich ecosystem of

Figure 5. Facet is a multi-display bracelet consisting of independent touch-sensitive segments.

wearables to engage in *mobile collocated interactions*. Such interactions may include clothing, accessories, prosthetics, and jewelry. It is imperative that this research area move beyond gadgets.

In this workshop we will continue exploration of *mobile collocated interactions* with a focus on fostering deeper understanding of designing and evaluating interactions with wearables. The goals of this workshop are:

• Identify key opportunities for *mobile collocated interactions* with wearable devices.

• Investigate how devices will be bound together.

• Consider more intimate or personal ways forinteraction, as these devices get closer to our bodies.

• Explore interaction paradigms that can be (re-) appropriated for such interactions.

• Examine adequate ways of prototyping and evaluating such systems.

WORKSHOP PLAN

The aim is to bring together a mix of researchers and practitioners from interaction design, human factors, computer science, art, and HCI, interested in exploring *mobile collocated interactions* with wearables.

The first half of the workshop (the morning) will be dedicated to introducing emerging forms of *mobile collocated interactions* with wearables, and presentations of attendees. Time will also be spent preparing a list of topics for the afternoon.

The second half of the workshop (the afternoon) will consist of a 'hands on' session, where we split into three teams and create technology scenarios based on a specific aspect of *mobile collocated interactions* with wearables (presented or identified during the morning session). We will scaffold this activity by introducing participants to Lundgren et al.'s design framework for mobile collocated interaction [8]. We will have on hand a range of technologies and strapping to attach ad hoc devices to different parts of the body. Instead of starting with a brief that takes its origin in technological potential, we will begin

with the body and its capacity for movement and connection. This approach supports conceptualization of technology scenarios that are experientially rich. It fruitfully destabilizes assumptions, and affords the emergence of novel outcomes.

The results of the workshop will be summarized and published on the workshop website. Depending on the maturity of submissions and outcomes of the workshop, we intend to write a special journal issue with an appropriate publisher to promote this research area.

REFERENCES

1. Ashbrook, D., Baudisch, P. and White, S. Nenya: subtle and eyes-free mobile input with a magnetically- tracked finger ring. In *Proc. CHI '11*, ACM Press (2011).

2. Benford, S., Crabtree, A., Flintham, M., Drozd, A., Anastasi, R., Paxton, M., Tandavanitj, N., Adams, M. and Row-Farr, J. Can you see me now? *TOCHI 13*, 1 (2013), 100-133.

3. Campos, P., Ferreira, A. and Lucero, A. Collaboration meets interactive surfaces: walls, tables, tablets, and phones. In *Proc. ITS '13*, ACM Press (2013), 481-482.

4. Clawson, J., Voida, A., Patel, N. and Lyons, K. Mobiphos: a collocated-synchronous mobile photo sharing application. In *Proc. MobileHCI '08*, ACM Press (2008), 187-195.

5. Durrant, A., Rowland, D., Kirk, D.S., Benford, S., Fischer, J.E. and McAuley, D. Automics: souvenir generating photoware for theme parks. In *Proc. CHI '11*. ACM Press (2011), 1767-1776.

6. Lucero, A., Jones, M., Jokela, T. and Robinson, S. Mobile collocated interactions: taking an offline break together. *interactions 20*, 2 (March 2013), 26-32.

7. Lucero, A., Clawson, J., Lyons, K., Fischer, J., Ashbrook, D., and Robinson, S. Mobile Collocated Interactions: From Smartphones to Wearables. In *Proc. CHI EA '15*, ACM Press (2015).

8. Lundgren, S., Fischer, J.E., Reeves, S. and Torgersson, O. Designing Mobile Experiences for Collocated Interaction. In *Proc. CSCW '15*. ACM Press (2015).

9. Lyons, K., Nguyen, D., Ashbrook, D. and White, S. Facet: a multi-segment wrist worn system. In *Proc. UIST '12*, ACM Press (2012), 123-130.

10. Patel, N.J. and Clawson, J. Designing and evaluating mobile systems for collocated group use. In *Proc. MobileHCI '11*. ACM Press (2011), 765-768.

11. Robinson, S., Vartiainen, E., Jones, M. and Marsden, G. PicoTales: collaborative authoring of animated stories using handheld projectors. In *Proc. CSCW '12*, ACM Press (2012), 671-680.

12. Wilde, D. hipDisk: understanding the value of ungainly, embodied, performative, fun. In *CHI EA '12*, ACM Press (2012), 111-120.