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# Interaction Techniques for Mobile Collocation

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**Abstract**

Research on *mobile collocated interactions* has been exploring situations where collocated users engage in collaborative activities using their personal mobile devices (e.g., smartphones and tablets), thus going from *personal/individual* toward *shared/multiuser* experiences and interactions. The proliferation of ever-smaller computers that can be worn on our wrists (e.g., Apple Watch) and other parts of the body (e.g., Google Glass), have expanded the possibilities and increased the complexity of interaction in what we term "*mobile collocated*" situations. The focus of this workshop is to bring together a community of researchers, designers and practitioners to explore novel interaction techniques for *mobile collocated interactions*.

**Author Keywords**

Collaboration; collocated; handheld devices; multi-device; multi-user.

**ACM Classification Keywords**

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

**Introduction***Mobile Collocated Interactions*

Mobile devices such as smartphones and tablets were originally conceived and have traditionally been utilized



**Figure 1.** CHI '15 workshop on *Mobile Collocated Interactions: From Smartphones to Wearables*. [http://www.funkydesignspaces.com/mobile\\_collocated/](http://www.funkydesignspaces.com/mobile_collocated/)

In the morning, individual presentations were followed by group discussions where relevant topics were identified for the afternoon 'hands on' session.

In the afternoon, we used LightBlue Beans to create working prototypes. <https://punchthrough.com/bean/>

for individual use. Research on *mobile collocated interactions* [5] has been exploring situations in which collocated users engage in collaborative activities using their mobile devices, thus going from *personal/individual* multi-device workflows [11] toward *shared/multiuser* experiences and interactions.

Several researchers have explored *mobile collocated interactions*, encouraging people to share their devices to create a collective experience or reach a common goal. Various physical and social contexts of use have been taken into account, such as teamwork at the office, sharing media content at home and outdoors, and public expression in a theme park and in a pub [4]. More recently, researchers have been looking into simple ways to bind such devices together [2]. Most of this research initially looked at the use of smartphones (and tablets) to study *mobile collocated interactions*. However, as computers get smaller, more powerful, and closer to our bodies, a rich ecosystem of small wearable devices becomes available for interaction.

#### *Micro Mobility*

Micro-interactions, device-to-device interactions or ad-hoc interactions can be realized by device-to-device coordination. By contrast, proxemics interaction in HCI is based on the assumption that an ecosystem [13] of connected devices will have knowledge of the configuration of people and objects within range. Proxemics prototypes [7] have been developed which exploit knowledge of the configuration of devices and people in personal and group settings. The knowledge required is largely based on details of proximity between devices or between people and their devices. Less common is the use of the full spatial knowledge described within proxemics.

This can be extended to consider mobile settings where personal and mobile devices form the basis for the sensing system for proxemics interaction. The sensed data required for rich *mobile collocated interactions* often results in the development of prototype systems reliant on fixed infrastructure.

#### *Interaction Techniques for Mobile Collocation*

The proliferation of ever-smaller computers that can be worn on our wrists and other parts of the body, have expanded the possibilities and increased the complexity of interaction in *mobile collocated* situations. These include novel gestural interactions with wearables [9] and interactions distributed between wearables and handheld devices [1]. Head-worn displays could be used to create a unified collocated experience by allowing multiple users to interact with a single shared virtual desktop [12]. The focus of this workshop is to bring together a community of researchers, designers and practitioners to explore novel interaction techniques for *mobile collocated interactions*.

#### **Workshop Goals**

The first workshop on *mobile collocated interactions* at MobileHCI'11 [8] identified several design and evaluation challenges as being the core of this research area: group size, physical distance, device-binding, operating systems, privacy, extending to public displays and tabletops, and conducting in-the-wild evaluations. More recent workshops have focused on technology and prototyping at CHI'15 [3] (Figure 1), bodily exploration with wearable devices at MobileHCI'15 [6] (Figure 2), and proxemics at CHI'16 [10] (Figure 3).

One pressing question that remains unanswered is, *how can we move beyond existing interaction paradigms?*



**Figure 2.** MobileHCI '15 workshop on *Mobile Collocated Interactions With Wearables*.

[http://www.funkydesignspaces.com/collocated\\_wearables/](http://www.funkydesignspaces.com/collocated_wearables/)

Following presentations of accepted position papers, attendees worked together in small groups to acquaint themselves with a design framework for mobile collocated interactions.

Attendees used different materials, conductive fabrics, and strappings to provoke thought and explore ideas around embodied interactions.

<http://www.daniellewilde.com/swing-that-thing/the-owl-interviews/>

We are witnessing how computers are getting smaller, more powerful, and closer to our bodies. As Google Glass, Pebble, Android Wear and Apple Watch gain popularity, we will soon be considering situations where people want to use a rich ecosystem of small wearable devices and engage in *mobile collocated interactions*. Such interactions may include clothing, eyewear, wristwatches, rings, pendants, and jewelry.

In this workshop we want to continue the exploration of *mobile collocated interactions* and promote research into this domain. In particular, the focus in this MobileHCI 2016 workshop will be on creating a deeper understanding of designing and evaluating novel interaction techniques for *mobile collocated interactions*. The goals of this workshop are:

- Identify key opportunities for interaction in *mobile collocated* contexts.
- Investigate how devices will be bound together.
- Consider more intimate or personal interaction techniques, as these devices get closer to our bodies.
- Explore interaction paradigms that can be (re-) appropriated for such interactions.
- Examine ways of visually, functionally and experientially prototyping and evaluating such systems.

### Workshop Plan

The aim is to bring together a mix of researchers and practitioners from disciplines such as interaction design, UX, human factors, product design, computer science, art, fashion, and HCI, who are interested in exploring interaction techniques for mobile collocation.

The first half of the workshop (the morning) will be dedicated to introducing emerging forms of interacting in the context of *mobile collocated interactions*, 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 interacting in mobile collocated situations (presented or identified during the morning session). We will bring a range of technologies to sketch interaction techniques for *mobile collocated interactions*. We will then work out a concept for collocated interactions and create a working prototype. This activity will stimulate discussion on how to prototype and evaluate such concepts and how existing ecosystems and uses may be studied in the wild.

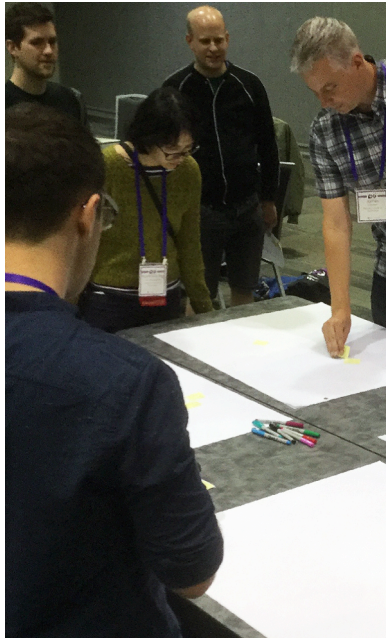
The results of the workshop will be summarized and published on the workshop's website<sup>1</sup>.

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<sup>1</sup> [http://www.funkydesignspaces.com/collocation\\_techniques/](http://www.funkydesignspaces.com/collocation_techniques/)





**Figure 3.** CHI '16 workshop on Proxemic Mobile Collocated Interactions.  
<https://proxemicmci.wordpress.com>

In the morning, accepted position paper presentations were followed by a number of activities to explore ideas relating to the workshop goals to frame the afternoon discussion.

In the afternoon, we split into two large groups for an in-depth discussion on proxemics from an evaluation and technological standpoint.

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