“Good Enough” is not Good Enough: Challenges of Social Interaction in Video-Mediated Telepresence

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Abstract
As video-mediated communication reaches broad adoption, improving immersion and social interaction are important areas of focus in the design of tools for exploration and work-based communication. Here we present three threads of research focused on developing new ways of enabling exploration of a remote environment and interacting with the people and artifacts therein.

Author Keywords
Telepresence; Immersion; Video-mediated communication

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

Introduction
Video-mediated communication is becoming increasingly widespread as a means of connecting people for both professional and personal use. People now use free tools like Skype or Google Hangouts to connect and talk to each other with little specialized technical setup needed, and with continually-improving quality. As a user in one of our recent studies simply stated, they are “good enough.” However, despite their

ubiquity, these tools still struggle to provide a truly immersive, engaging experience.

The telepresence research frontier is moving beyond "good enough" to providing experiences to users that are engaging, enjoyable, and productive. More specifically, the next generation of telepresence tools must provide a better sense of immersion in the remote environment and support many of the social cues and dynamics intrinsic to face-to-face interaction.

Moving beyond the status quo

In many respects, video conferencing tools can be relatively easily utilized to support smooth and effective collaboration and ad-hoc communication. Evidence of this success comes particularly from large companies with the resources to support dedicated rooms and "always-on" connections [5].

At the same time, there is growing awareness that existing video communication tools are not ideal for interactions beyond "talking heads" conversations between two people [2]. As a result, one line of recent research has focused on adapting video communication tools to enable shared experiences among friends and family members, both online and offline (e.g. [4][6][9]).

In other domains, such as work-related communications, challenges remain to help remote participants feel included in the conversation, participate, and not be overlooked [12]. This is important because meetings are not just about information exchange; they serve an important social purpose as well. Lack of social presence can lead to feeling distant from other people and affect behavior towards them [8].

Additionally, in workplaces focused around creative interdependent collaboration, few solutions exist for sharing, simultaneously viewing and editing work artifacts in non-digital form, such as sticky notes or whiteboard drawings [3].

Ways of addressing these problems could range from augmenting the interfaces of web-based tools to facilitate focusing on shared artifacts rather than "talking heads," or by enabling or enhancing the autonomy of stand-alone physical proxies to increase a sense of social closeness.

In our work, we are focusing on improving the experience of immersion and social interaction in both the work and leisure spheres. These areas are related to what Rae et al. [11] refer to as the social environment, communication, and independence design dimensions. We focus on these dimensions as they are present in almost all types of telepresence scenarios that involve at least two people. This multi-dimensional exploration allows us to examine telepresence needs and possibilities through different domains and to understand what it takes to address the pervasive "out of sight, out of mind" challenge that persists in distributed work and other interactions [10].

Here we highlight three recent projects that reveal insights and challenges regarding how new technology design can enhance immersion and social interaction in the context of video-mediated telepresence.

Figure 1. Polly, a wearable telepresence device, allows users to explore remote locations or experience events remotely by means of a person that serves as a mobile "guide".

Figure 2. Jarvis: Embodied social interaction through a desktop presence. The Jarvis project is part of an emerging class of technologies that seek to mitigate the social disadvantages of video-based communication by providing remote collaborators with a local embodiment.

Project 1: Immersive real-time exploration with a guide

Currently, most telepresence technologies are either desktop/mobile device-based or allow people to maneuver through an environment with the help of a robotic proxy. As another means of providing mobility to a remote user, we developed the Polly system [7], a wearable telepresence device that allows a remote user to be transported through an environment by a human guide, while maintaining control over their view from the video feed (Figure 1). The use of another person as a facilitator of telepresence could be advantageous both in terms of mobility (ease of navigation in human-built environments) and social interaction (helping to create a sense of connection between the user and the guide by allowing them to interact, communicate, and act on the remote user's wishes).

Initial field tests of Polly indicate the potential for such a system for exploration, social and professional scenarios. The ability to assert greater control over the field of view may help increase a sense of engagement (whether or not it is actually employed). Beyond the technical challenges of ensuring that the video streaming connection is of good quality, additional questions to explore for guide-based telepresence center on how to prevent the remote user from feeling "left out" of audio conversations and fully present in the experience.

Project 2: Embodied social interaction through a desktop presence

The Jarvis project also focuses on giving a remote participant greater control over their viewpoint to enable immersion and social presence (see Figure 2).

In a recent experiment [1], we compared the experience of a participant discussing a topic with two collocated teammates either face to face or via video mediated communication that was either kinetic (e.g. the remote participant could control their view and position) or static. Our findings indicate that while the kinetic embodied technology increased local participants' perceived presence of remote teammates, it did not enhance the remote participants' own sense of telepresence. Providing people with a sense of agency in a remote space remains a challenge.

Project 3: Increasing the presence of work artifacts as co-participants in remote meetings

Finally, in the area of work-related communication, we are conducting exploratory work to understand current use of video conferencing technology in small to medium sized organizations with distributed teams.

Initial findings suggest that teams using video conferencing tools to collaborate on shared work still face challenges in synchronously accessing or revisiting ephemeral work artifacts. Within teams that meet regularly, seeing each other's faces may help to increase trust and social cohesion, but at the same time, this focus on others' presence comes at the expense of being able to effectively refer to or use other types of work information. There is therefore, in the case of distributed meetings, a balance to strike between social awareness and artifact access in the proper ways. We plan to use these insights to develop tools to help make meetings more streamlined and efficient. In this case, the challenge lies in how to enable work artifacts such as shared documents to

have greater presence as elements of the meeting alongside the human collaborators.

Conclusion

Nowadays, many people who use video chat technology take for granted the ability to see and be seen by someone far away. At the same time, much of the remote others' social and physical situation remains inaccessible due to current constraints with the tools being used.

Feeling close to a remote place and to the people (or artifacts) in it are fundamental to increasing the success of telepresence in any context. By improving people's abilities to experience elements of a situation that are currently inaccessible to them, we can improve immersion and social presence in video mediated telepresence from "good enough" to "great."

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