Beyond Video-Conferencing: Telepresence Technologies for Extending Expertise Reach and Specialised Skill Sharing

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Abstract

Despite resurgent interest in remote work technologies, many forms of specialised work remain inaccessible. Participation in remote activities often requires more than video-conferencing. Telepresence technologies, using robotics and mixed reality, can fill that gap by providing more affordances (movement and embodied expressions). However, we still need to know what kinds of affordances are needed and how they should be implemented. This workshop focuses on telepresence technologies for mediating specialised tasks and extending expertise reach, such as teaching technical skills or providing healthcare assistance. We will invite experts from specific fields (e.g., education, healthcare, industry) to guide participants through use cases, and use interactive exercises to identify what kinds of actions and interaction modalities are important in different scenarios. The aim of the workshop is to explore this hands-on, needs-driven design approach, initiate critical discussions into the design of telepresence technologies and foster future work driven by a focus on understanding practical user needs.

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CCS Concepts

• **Human-centered computing** → **HCI theory, concepts and models**; **Computer supported cooperative work**.

Keywords

mobile robotic telepresence, virtual reality, mixed reality, hybrid collaboration, hybrid participation

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1 Background

Many types of remote, collaborative activities require more engaging forms of interactivity than what mainstream technology currently supports. Specialised work, such as teaching technical skills, often requires moving, altering one's point of view and interacting with objects. Telepresence technology, such as robotics and Virtual Reality (VR), is a potential avenue for extending the reach of experts to underserved populations [4, 6, 12]. However, such technologies often miss the mark of what is required in order to successfully participate in hybrid modalities, such as subtler embodied cues or the capacity to interact with objects[e.g., 3, 10, 13].

This workshop aims to draw attention to the importance of understanding the specific demands of specialised tasks so as to inform design that caters to those needs. As Hollan and Stornetta (1992) argued, the media and mechanisms of remote work technologies ought to address specific user needs, rather than simply imitate the experience of 'being there'.

There have been previous workshops and panels focusing on telepresence and hybrid collaboration, [1, 5, 7, 8, 11], including a CSCW '23 workshop by some of the present authors which invited users to test and compare various forms of telepresence [2]. We also hosted a workshop at Mobile HCI '23, which utilised embodied design ideation techniques [15] to engage participants in thinking about telepresence in novel ways [14]. In this workshop, we will draw on our experience with interactive workshop approaches, but also focus on specialised applications, in order to facilitate thinking about telepresence in ways that respond to specific user needs.

This workshop explores a participation-driven approach to telepresence, to examine ways of supporting the remote application of specialised work, and extending the reach of experts. It will be open to HCI researchers and developers, as well as to academics and practitioners from other fields who are interested in this topic. The workshop will include interactive exercises to engage our thinking. Guided by experts from specialised fields, we will go over application scenarios and use bodystorming activities to identify the participation needs of those cases. Bringing together people from various backgrounds, the aim of the workshop is to foster discussions about telepresence technologies that respond to real-world challenges and envision possible mechanisms for supporting them.

2 The Workshop

This will be a full day hybrid workshop, with remote attendees participating through Microsoft Teams and a Miro board for shared note-taking.

The first activity is aimed at understanding the practical considerations of using telepresence technologies for specified tasks. Experts from different fields will give an overview of the setting in which they work. Outlining the tasks involved, they will present a use case to support subsequent discussions and activities. After each presentation, attendees will split into groups and discuss the implications of mediating that work through telepresence technologies. Each group will share their ideas, and have a chance to discuss them with the presenting expert.

The selection of use cases will be decided based on the interest we receive from attendees. The organisers include researchers from education, rehabilitation, and assistive care, who can present use cases from their own work. If prospective attendees express interest in other areas of work, we will ask them to present their own use cases.

The second part of the workshop, following a structure we have used at a previous workshop [14], is aimed at cultivating our attention to the different elements of interaction and envisioning effective mediation modalities. Attendees will split into small hybrid groups and select a use case; it may be one of those presented earlier or not. They will role-play scenarios involving the tasks of that use case and identify the relevant modes of interaction. The remote attendees can take the roles of remote workers and thus explore the limitations of their available modalities. The attendees will also be offered a variety of tools, props, and craft supplies (e.g., cardboard paper, Velcro, wheels, lights), as well as soma bits [16]), which they can use to create prototypes and explore possible forms of telepresence technologies for their use case. The aim of this activity is not to produce fully-fledged solutions but to use this active, embodied experience to engage our thinking on challenges and possibilities of telepresence. Each group will have a chance to present their ideas to the rest of the attendees.

We will finish the workshop with brief guided discussions to reflect and re-frame ideas gathered throughout the day into directions for future work. Following the workshop, we will collate the generated ideas into a short blog post for ACM Interactions and invite attendees to co-author it.

More information regarding our workshop can be found on our website: https://sites.google.com/view/group25-telepresence-ws/home.

3 Organisers

- **Andriana Boudouraki** is a Research Fellow at the Mixed Reality Lab, at the University of Nottingham. Her PhD examined the use and deployment of Mobile Robotic Telepresence technologies for organisational settings.
- **Niki Chouliara** is an applied psychologist, researching stroke rehabilitation, implementation and health services research. She currently leads a Stroke Association funded project examining stroke telerehabilitation.
- **Laura Fiorini** is an Assistant Professor in Bioengineering at the Department of Industrial Engineering, University of Florence. Currently, she is the coordinator of Pharaon Italian Pilot where telepresence services were tested for promoting socialization beyond the video-calling.
- **Juan Martinez Avila** is an Assistant Professor in Computer Science at the University of Nottingham. As part of the Mixed Reality Lab, he steers an interest group that investigates intelligent and interactive music technology research through practice-based methods, ethnography, participatory design, and embodied design ideation.
- **Gisela Reyes-Cruz** is a Transitional Assistant Professor at the University of Nottingham. Her work investigates interaction with, trust in, and public acceptance of, a range of autonomous and robotic systems. She currently leads a project exploring the use of telepresence robots in museums.
- **Pratyusha Ghosh** is a Computer Science Ph.D. student in the Healthcare Robotics Lab at the University of California San Diego. Her work is focused on the design and development of accessible telepresence robot systems that facilitate the remote inclusion of people with chronic illnesses and disabilities.
- **Veronica Ahumada-Newhart** is an Assistant Professor of health informatics and HRI in the School of Medicine, Center for Health & Technology at UC Davis. Her work is focused on the use of social robots and interactive technologies for improved health and developmental outcomes, including the use of telerobots for healthcare worker safety and community social inclusion.

- **Houda Elmimouni** is an Assistant Professor in the Department of Computer Science at the University of Manitoba. Her current work focuses on the use of Mobile Robotic Telepresence in the Classroom and human values. She previously organised a SIG and workshops about telepresence at CHI'18, CHI'22, CSCW'23, MobileHCI'23.
- **Praminda Caleb-Solly** is Professor of Embodied Intelligence in the School of Computer Science, University of Nottingham. She leads the Cyber-physical Health and Assistive Robotics Technologies Research Group, which conducts research in assistive robotics, smart sensing and artificial intelligence for personalised healthcare.

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