Playing with Telepresence Robots for Design Speculation

Juan Pablo Martinez Avila
The University of Nottingham
School of Computer Science
Nottingham, United Kingdom
j.avila@nottingham.ac.uk

Andriana Boudouraki
University of Nottingham
Mixed Reality Laboratory, School of Computer Science
Nottingham, United Kingdom
andriana.boudouraki@nottingham.ac.uk

Harriet R Cameron
University of Nottingham
Computer Science
Nottingham, United Kingdom
harriet.cameron@nottingham.ac.uk

Gisela Reyes-Cruz
University of Nottingham
Mixed Reality Lab - School of Computer Science
Nottingham, United Kingdom
gisela.reyescruz@nottingham.ac.uk

Velvet Spors
Tampere University
Gamification Group
Tampere, Finland
velvet.spors@tuni.fi

Laia Turmo Vidal
KTH Royal Institute of Technology
Media Technology and Interaction Design
Stockholm, Sweden
laiatv@kth.se

Charles Windlin
KTH Royal Institute of Technology
MID
Stockholm, Sweden
charles.windlin@gmail.com

Houda Elmimouni
University of Manitoba
Department of Computer Science
Winnipeg, Manitoba, Canada
houda.elmimouni@umanitoba.ca

Janet Read
ChiCI Lab, University of Central Lancashire
Preston, Lancs, United Kingdom
jcread@uclan.ac.uk

Jennifer Rode
University College London
Knowledge Lab
London, United Kingdom
jen@acm.org

Abstract

This workshop explores how telepresence robots can be used for playful design speculation, leveraging their inherent asymmetries to create engaging and innovative experiences. By focusing on playfulness instead of purely utilitarian applications this workshop seeks to transform the limitations of telepresence robots into opportunities for creative interaction. We wish to explore the ways in which we can exploit the asymmetrical capabilities of remote and local users of telepresence robots. Given the person using the robot will always have more constraints due to the technical limitations of the robot (e.g., limited movement, limited space awareness, etc), we want to investigate if moving away from utilitarian applications towards playfulness can help make these robots more attractive and useful. In this workshop participants will adapt physical games using embodied methods embodied design ideation methods, such as magic machines, embodied sketching, and soma bits, to create playful interventions with robots and to discover new ways to enhance telepresence technology. The focus is on embracing asymmetry to foster innovative, inclusive, and enjoyable interactions.

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CCS Concepts

• **Human-centered computing** → **Human computer interaction (HCI)**; *Accessibility technologies*; **Ubiquitous and mobile devices**; • **Computer systems organization** → **Robotics**.

Keywords

Mobile telepresence robots, Design methods, Playfulness, Embodied ideation

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1 Background and Motivation

Mobile Robotic telepresence (MRP)—i.e., robots that support remote mobility and communication—offers vast potential for redefining the ways that people can remotely access physical space. These robots typically have a tablet with a screen that features an array of cameras and microphones, which is attached to a pole and a wheeled based. These elements allow users to remotely control the robot to navigate spaces, and to see and hear their surroundings. Primarily, these features aim to facilitate two-way communication

by allowing the user to be "present" in a remote space, and to make themselves visible (and audible) to people in said space.

Telepresence robots have seen some uptake in environments such as education [9, 10], healthcare [20], office spaces [1] and home environments [6, 19], but commonly cited reasons for disuse include unsuitable or missing functionality (e.g., poor WiFi), inability to navigate elements of the space (e.g., stairs), or discomfort of bystanders [5, 24]. These issues can create frustration, at least in part, due to the perceived asymmetry of experience keeping bystanders and remote users tele-operating the robots from sharing an equitable experience.

We believe that telepresence robots have a wealth of untapped potential for use in a broader range of spaces than those typically found in the literature. In order to access this potential, we propose revisiting telepresence robots as unique and engaging pieces of asymmetrical technology through the lens of playfulness and games wherein users do not *need* to have an equitable experience, in order to share a playful and valuable experience.

By employing playful and embodied design ideation methods, like soma bits [37] and embodied sketching [29] (among others), to adapt a series of physically engaging playground games so that they may be played with telepresence robots, our is goal to unpick the robots' limitations as experienced by both remote and local users during play, as well as playfully speculate in potential futures for this technology. After generating a series of physical telepresence games, we will discuss limitations and explore novel mitigation strategies.

Asymmetry in Telepresence Asymmetries, in the context of mediated communication, describe an imbalance in the capabilities of different users within an interaction [12, 36]. These can arise when users have different types of access into the interaction (e.g., in-person vs online attendees in hybrid meetings or some users having better devices than others). In MRP, asymmetry occurs primarily because the capabilities of the remote user are significantly limited compared to those of the local interactants. In the commercially available MRP devices, for instance, the robot moves at a very slow speed, with limited degrees of freedom of movement or flexibility [1, 21, 33].

Furthermore, the visual and auditory fidelity of the devices can be quite low, resulting in remote users having to go very close to other people to clearly see their faces or hear them, while their local peers have already seen and heard them from further away [4, 11, 33]. In addition, lacking arms, remote users generally find the environment or objects in it (e.g., pressing buttons, moving objects, opening doors) difficult, resulting in them often being more of a passive spectator than an active participant in hybrid events [4, 5]. These asymmetries can often result in awkward situations and interaction breakdowns, where a remote user is ignored, laughed at or mistreated [3, 4, 15, 18, 21, 32]. However, Rode [24] offers hope for playfully manipulating the environment if the articulation work of telepresence robots can be effectively managed.

Playful Telepresence Playful telepresence is a novel area in telepresence research initially theorized by Rode [24] where telepresence robots are integrated into interactive and dynamic activities, encouraging user engagement through fun and embodied experiences. More recently, Rode along with workshop organizers Elmimouni and Read[25] had children engaged in tasks such as navigating an obstacle course, participating in a treasure hunt, and parking the telepresence robots. This approach and playful experiences highlighted the potential for playful engagements with telepresence robots to be integrated into educational and recreational environments, which can enhance children's engagement with technology in a hands-on, fun, and interactive manner.

Embodied Playful Approaches Playfulness is vital to human life and society [7, 13]. From an individual perspective, it stimulates cognitive (ibid), development, supports us emotionally [14] and socially [22], and fosters our capacity to be creative [26] and adaptable [23]. Leveraging those qualities by design, though, is not trivial. An important trait of play and playfulness is that it can manifest (and hence be designed for) in a broad palette of shapes and forms: starting with games, yes, but extending to other forms of artifacts and experiences. In this workshop, we will explore a broad array of ways in which play and playfulness might add value to experiences of telepresence.

In order to engage hands-on with play and playfulness in the workshop, especially when designing physical games, we will employ embodied design ideation methods, such as bodystorming, soma bits [37] and embodied sketching [29, 30, 35]. These methods harness play and playfulness as conductors of creativity. They also prioritize the designer's somatic experience, favoring a hands-on engagement with the whole body and senses to co-create design ideas. Finally, in these methods the social and spatial setting in which ideation takes place become key design resources to come up with interesting core mechanics and games. As done in prior research [16, 17, 28, 34], we will leverage these methods to co-create interesting and meaningful physical games.

2 Organisers

- **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.
- **Andriana Boudouraki** is a Research Fellow at the Mixed Reality Lab, at the University of Nottingham. She recently completed her PhD there, which examined the use and deployment of Mobile Robotic Telepresence technologies for organisational settings.
- **Harriet Cameron** is a Research Fellow of Responsible Digital Futures at the University of Nottingham. They completed their PhD about personal data, power, and museums in 2023, and have been working on various projects around the ethical development and application of technologies since then. They are passionate about creativity, accessibility, and power, and love to play in areas where the three may intersect.
- **Gisela Reyes-Cruz** is a Transitional Assistant Professor at the University of Nottingham. Her work investigates interaction with, trust in, and public acceptance of autonomous

and robotic systems, including the use of telepresence robots in museums.

- **Velvet Spors** is a creative technologist and post-doctoral researcher working at Gamification Group, based at Tampere University in sunny Finland. Their research centres around feminist notions of care as a core value to investigate how technology shapes ourselves, and our relations to others, and the wider world beyond. Currently, they are researching the potentials of video games as a mediator for how human beings make sense of nature, and sustainability.
- **Laia Turmo Vidal** is a Digital Futures Research Fellow at KTH Royal Institute of Technology, Sweden. Laia's work explores sensorimotor transformations facilitated by on-body systems and bio-responsive technologies, with the aim to foster physical, emotional and social well-being. Drawing from embodiment theories, her work has often targeted domains of play and playfulness, such as sports and exergames. Laia has facilitated multiple body- and movement-centered design workshops at CHI, DIS, TEI and IDC. www.laiaturmovidal.com
- **Charles Windlin** is a lecturer in Immersive Technologies at Stockholm University, and an Interaction and User Experience Designer with a background in Industrial Design and has previously worked for the Swiss Federal Institute of Intellectual Property. He received a PhD from KTH under the supervision of Kristina Höök. He is the creator of soma bits.
- **Houda Elmimouni** is an Assistant Professor in the Department of Computer Science at the University of Manitoba. Her telepresence research focuses on the classroom and human values. She previously chaired several workshops on telepresence including CHI'18 & 22.
- **Janet Read** is a full professor of child computer interaction at UCLan, UK. She has previously organised numerous workshops, SIGs and courses at CHI focussing primarily on the design of experience for children. She will bring her experiences of playful interaction with telepresence robots into this workshop.
- **Jennifer Rode** is an Associate Professor at the UCL. She has been using a telepresence robot for about a decade, and she uses her lived experience as a disabled person as a starting point for playful telepresence robot design in education. She has co-organized multiple workshops including the CHI'18 and '22 workshops on telepresence.

3 Website and Pre-workshop Plans

We will create a website to circulate the call for participation as well as provide prospective participants with information about the organisers, schedule and goals of the workshop, and a list of game ideas that we will aim to adapt to telepresence. The page will also include a link to a form for participants to submit expressions of interest. In this form we will ask participants for their name, e-mail, affiliation, and form of participation (i.e., online or in person), and to describe their expectations of the workshop.

Optionally, participants will also be able to submit a game idea, which may be an adaption or variation of an existing game, or a completely new game. In such case, we will also ask them to additionally provide details on how they speculate to do it, i.e., the roles of local and remote players (and the telepresence robot), rules of the game, and so on. This form will allow us to both have an estimate of participant numbers, and to expand on our game ideas for the workshop.

4 Workshop Plans

The workshop can accommodate 12-15 in-person and 10 remote participants. Numbers are restricted to allow for all participants to meaningfully engage in design and play elements of the workshop. There are 10 organisers who will be participating in person and online, acting as both facilitators and participants.

4.1 Hybrid Participation

Telepresence robots will be available throughout the day for participants to use—one at the physical location, and six others at two of the organizers' host institutions (one at the University of Nottingham, and five at UCL). Although we have transported multiple telepresence robots to other conferences in the past [2, 27], we will not do this in this instance due to the environmental costs and logistical with doing so. By having the telepresence robots based in our labs we ensure a stable networking and usage environment, which will allow workshop participants to explore robots for games. This mitigates the risks of robots being damaged in travel or being setup in an unknown networking environment. However, we will also bring additional tablets to be used both as back up makeshift telepresence robots—by having organisers hold them and move them around the space—but also as part of the creative design activities (like pretending to be a robot [8]).

4.2 Accessibility

To ensure safe participation we will draw on Rode and Elmimouni's working guidelines on making telepresence accessible to people with disabilities. Participants will follow the ASSETS guidelines for accessible presentation [31].

5 Workshop Activities

Each session will start with introductions from organizers and participants, followed by a series of cycles of game design and playing, and conclude with a group discussion to reflect on the games played, challenges faced when adapting them, limitations of the telepresence robots and speculations on future telepresence robot designs (see Table 1).

5.1 Introductions

At the beginning of each session, we (the organizers) will introduce ourselves, and outline the workshop's structure (see Table 1) and aims. We will then show a video of our previous explorations on designing physical games with telepresence robots to give participants a notion of the expected outputs of the workshop. Next, we will give a short presentation on playfulness and games (dissecting aspects of classic games, e.g., their rules, goals, roles, dynamics, etc.), as well as present the playful design, and embodied design ideation methods to be employed in the workshop. We will have an icebreaker activity using telepresence robots.

Table 1: Workshop Schedule

Local Time	Activity	Duration
9:00	Welcome and introduction to the workshop's aims and topics	40 minutes
9:40	Ice breaker game to encourage name memorisation and socialization	20 minutes
10:00	Game allocations to adapt to telepresence	10–15 minutes
10:10	Coffee break	10 minutes
10:20	Play session 1: Designing, playing, and iterating telepresence games	2 hours
12:20	Reflecting on telepresence games, and discuss design implications and speculations for telepresence design	40 minutes
13:00	Lunch	1 hour
14:00	Welcoming new participants into the physical room and online video call	5–10 minutes
14:10	Brief recap intro for new attendees with a summary of the first session	10 minutes
14:20	Ice breaker game to integrate new attendees	10 minutes
14:30	Game allocation + active coffee break	10–15 minutes
14:40	Play session 2	2 hours
16:40	Discussion 2 + Closing	20 minutes

5.2 Play time!

Following introductions, we will ask the participants who submitted game ideas during the expression of interest stage (prior to the workshop) or who came up with game ideas at the start of the session, to share with the whole group. If no ideas are suggested by participants, we will choose a game from our own selection of games as a starting point. The selection of games will mainly include playground games (e.g., "Statues"), physical games (e.g., "What time is it, Mr. Wolf?"), and social deduction games (e.g., "The werewolf game"). If participants, wish to be more adventurous, they may also try to adapt other kinds of games to telepresence, like video games, board games, or role playing games.

We will then split into two or more groups (depending on the number of participants), with a balanced mix of organisers and participants with different types of expertise and preferred approaches to design, aiming to create different adaptations of the same game. Participants will also be encouraged to split into hybrid groups, each assigned a telepresence robot to use during this activity. However, depending on the design approach, participants may also choose to role-play as telepresence robots using tablets. Besides the tablets, a range of materials will be provided to be used as proxies for the games. These materials will include boxes, cardboard, tape, balloons, pool noodles, hula hoops, balls, and cones, among others. They may also augment the telepresence robot or craft entirely new robots to play with, by using these materials.

After designing the games, participants and organisers will play the game variations one after the other. At the end of each round, participants may choose to merge aspects of each variation, iterate on the game, adapt another game or create a new game. We will allow for some flexibility at this stage prioritising an active engagement with the game design and play cycle. At the end of each game round, new participants may join each time, including those who may be just arriving to the workshop.

5.3 Cool down and wrap up

After several rounds of game design and playing, we will pause and talk about our experiences. The discussion will be semi-structured, allowing for conversations to flow freely, but also keeping the conversation going with guiding questions such as "what challenges did you face when adapting these games to telepresence robots?", "how did you manage to deal with asymmetrical interactions between remote and local players?", "What applications could these design idea have for real-world applications, such as accessibility or education?", or "How could telepresence robots be improved?".

Participants will be be able to share their thoughts and ideas in different ways. They may be sharing out loud to the whole group, drawing sketches or writing on sticky notes to be posted on a physical board or a Miro board.

6 Call for Participation

In this workshop, we will explore the intersection of playfulness and telepresence. We seek participants with expertise in designing playful experiences, games, and embodied design ideation, as well as interest in telepresence robotics, remote collaboration, and mixed reality. Together we will discuss the design of playful teleprescence activities, using teleprescence robot technology in playful ways, and conceptualising play in teleprescence-enabled systems.

Participants will engage in a full-day session of hands-on creative activities to design new physical games for telepresence robots controlled by remote users. We'll provide telepresence robots at the workshop and in remote UK locations. Participants will be using telepresence robots and tablets provided during creative design activities, such as embodied sketching, magic machines, and role-playing, facilitated by experts. Examples of games to be reimagined for telepresence may include 'What time is it, Mr. Wolf?', 'Hide and Seek', 'Hokey Pokey', 'Pacman', 'Keep Away', 'Treasure Hunts', 'Obstacle Course', and 'Red Light'.

Participants are encouraged to come up with original game ideas and reflect how they balance asymmetries introduced by the telepresence robot's physical constraints to achieve playful activities like driving the robots, navigating spaces, avoiding or encouraging collisions, and finding objects. Workshop participants will publish their game ideas in our archive and contribute to a full paper publication emerging from the workshop results.

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