

Towards understanding the robot-mediated identity of telepresence

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ABSTRACT

Robotic telepresence technologies allow users to remotely inhabit robotic forms, so as to project their presence in remote spaces in ways that allow them to independently move and interact in those spaces. This creates a social identity that is mediated through the form and affordances of a robot yet represents a real person. This position paper collates insights and from the literature to describe this robot-mediated identity as it is manifested, experienced and responded to in interaction. Understanding how features of this distinct type of identity impact the users' capacity for self-expression and participation in social interaction is an important part of understanding the reality of robotic telepresence.

CCS CONCEPTS

• **Human-centered computing** → **Accessibility theory, concepts and paradigms; HCI theory, concepts and models.**

KEYWORDS

robotic telepresence, computer-mediated communication

ACM Reference Format:

Andriana Boudouraki. 2018. Towards understanding the robot-mediated identity of telepresence. In *HRI '24: ACM/IEEE International Conference on Human Robot Interaction, March 11–15, 2024, Boulder, CO*. ACM, New York, NY, USA, 4 pages. <https://doi.org/XXXXXXX.XXXXXXX>

0 ABOUT THE AUTHOR

Andriana Boudouraki has been studying interactions via Mobile Robotic Telepresence for her PhD research.

1 INTRODUCTION

Beyond social and service-based functions, robotic technologies are also leveraged for remote communication; robotic telepresence allows users to assume control of a robotic vessel in order to project their presence through it and interact in a physical environment without being there in-person. This position paper contributes to the discussion on robotic identities by presenting this *robot-mediated* identity as a distinct kind of robo-identity.

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HRI '24, March 11–15, 2024, Boulder, CO

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ACM ISBN 978-1-4503-XXXX-X/18/06

<https://doi.org/XXXXXXX.XXXXXXX>

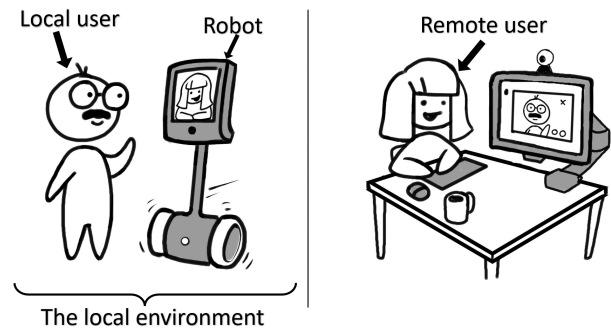


Figure 1: The MRP set up. On the left, the local environment includes the robotic device, displaying the remote user's face, interacting with a local user. On the right, a remote user operates the device from their computer interface and is able to see the local user through it.

The form that most such technologies take is referred to as Mobile Robotic telePresence (MRP). MRPs generally consist of a screen, mounted on a simple robotic base with wheels at the bottom (e.g., Figure 2). A remote user operates the robot through an online interface whilst having a video-call through the robots' cameras, speakers, microphones and screen (Figure 1). There are also MRPs that deviate from this form in terms size, appearance and affordances, such as smaller, less mobile, tabletop robots [e.g., 13] or more anthropomorphic robots [e.g., 18]. This technology allows users to project a version of themselves that is embodied as a robot and has some capacity for movement, in order to support remote social interaction.

Robotic telepresence technologies are used in a variety of settings [9, 22]. One of the biggest areas of application is in education, with the robots being used to allow hospitalised children to participate in classrooms [6, 7] and provide specialised staff to remote areas [14]. MRP have also been used with mixed success in conferences and offices for somewhat more "spontaneous", unplanned, social interactions [10, 15, 20]. Another notable case is the Avatar Robot Cafe, which enabled people with disabilities to work at the cafe by teleoperating robots which welcomed the customers, took their orders and served drinks [18]. The telepresent users in all those cases are not simply observing or having a conversation, but are also moving around in the environment and dynamically interacting with people and objects in it using verbal as well as embodied actions [2, 5].

The user's mediated presence is bound by the way in which the robot allows them to perceive the environment and act in it.



Figure 2: The Double 2 telepresence robot by Double Robotics

The way in which their identity is perceived by others in that environment also depends on the form of the robot, how it displays features of the user, and the ways in which it permits the user to act. This results in an identity that may not be entirely that of the user, but neither is it entirely robotic.

This position paper presents this robot-mediated identity of MRP users as a distinct type of robo-identity. Drawing on previous literature as well as my own experience researching MRP, I describe some elements of this identity, so as to begin reflecting on what it entails. The below account approaches the subject with a focus on the realities of interaction, where the orientation to the social identity becomes relevant to user experience. Whilst not a comprehensive overview of the robot-mediated identity of telepresence, it can serve to motivate more discussion on the subject.

2 ROBOT-MEDIATED IDENTITY IN INTERACTION

2.1 A social identity through robotic form

The robot-mediated identity of robotic telepresence is a social identity; it exists in a mediated environment entirely for the purpose of enabling interaction between the remote user and those local to the robotic device. This identity differs from the user's personal identity but also from their in-person social identity in several ways.

In terms of the subjective experience of interacting through the robot, users' accounts reveal that the users are keenly aware that the robot mediates between them and the world they are interacting in. Contrary to commonplace conceptions of virtual presence as an immersive sense of 'being there', users report that they are aware that they are operating a device which represents them in another location [3]. Thus the robot-mediated identity is one the users consciously perform.

The robotic medium filters the resulting identity through the behaviours it elicits as a result of users knowing that they are

being represented as a robot. Users might feel more "adventurous" in their telepresence form, due to a conscious detachment from the mediated environment and thus behave more boldly [e.g., 8]. Others they might become more shy. Feeling self-conscious to be seen in this form, knowing it will attract attention and cause disruption, they might limit their appearances or intentionally try to make themselves inconspicuous [3, 4]. A user might even feel confident using a robot model that they were very familiar with (after becoming highly adept at driving it around their workplace), but self-conscious when using a different model which they are not able to drive as smoothly [3]. Such accounts again suggest an awareness of the performed social identity, and further demonstrate that the medium alters the users' self-expression.

In addition, the robotic medium filters the user's perceived identity through the form that it allows users to take and the types of interactions that this form invites. Generally, telepresence robots display the remote user's face through a screen. Apart from the contents of that screen, nothing else distinguishes the identity of the user — seen from behind or from afar, the user might be unrecognisable. Their identity as a robot is perhaps more salient to others than their own personal identity. Furthermore, form can affect the behaviours of those local to the robot. This impact of form can vary across telepresence robot models depending on their features. For example a short robot invites people to 'look down' on the remote user, whereas a tall robot would not [3]. However, in all cases the person is embodied as a material object, which can be touched and handled in different ways (i.e., objectified). For instance, the form of the Double robots (Figure 2), features a thin easily grab-able, hand-sized pole, which often results in people thinking it is appropriate to grab and pick up the robot. On some models the speaker volume is adjustable through buttons on the physical device —rather than through the remote user's interface — enabling other people to dictate how loud the remote user should be. Features of the robots then, by enabling interactions with the device, can define this robot-mediated identity in terms of how human-like or object-like it is perceived to be.

Another aspect of the robot-mediated identity is that the remote user is not always entirely in control of how the robot behaves, and thus of how their identity comes across. Even for the most familiar users, operating robotic telepresence technology can be difficult. The robotic body moves slowly and is not very flexible. Moreover, the user does not have a perfect view of their environment [2, 3]. It is entirely possible, that a user accidentally bumps into furniture, get stuck in narrow pathways or gets in the way of other people in the environment. Coupled with the implementation of autonomous driving functions in recent models, the robot can display behaviors that do not reflect the users' intentions. For example, a user might want to approach a table and join a conversation happening there, but the automatic driving system might perceive it as an obstacle and cause the robot to move sideways, resulting in the user facing away from the people they wanted to speak to. Some studies have even suggested that such incidents can result in people forming more negative perceptions of the remote users [10, 21].

In line with this, the robot-mediated identity inherently exists in a fractured ecology. A fractured ecology describes a context in which people access the same interaction environment in different ways, and in ways that are meaningfully asymmetrical [11].

In robotic telepresence interactions, the remote user perceives the unfolding activities and takes part in them through the technology of the robot, whilst local people can use their own bodies. The capacity that the two sides have to perceive and act is unequal, with the remote user generally at a disadvantage. For instance, by the time it might take for a remote user to direct their gaze to an object of the conversation, the topic may have moved on without them having had a chance to contribute. Within this asymmetry, the remote user has less access to knowing how they appear in the mediated space (e.g., are they loud enough? are they being looked at?), and therefore are less capable of adjusting their self-presentation in response to the demands of the interaction. In addition, people local to the robot do not have an accurate understanding of the remote user's capabilities — they might not know how well they can see or hear, or whether they need help [2]. This asymmetry results in the robot-mediated identity appearing awkward and difficult to incorporate into normal interaction.

In consideration of the above, the robot-mediated identity is not simply a reflection of the remote user's social identity, but a version of their identity that is emergent from the specific material and situational circumstances of robot mediation. The form of the robot and the context in which it is used bring about this distinct identity, which combines elements of robotic identity with aspects of the user's social identity, imperfectly filtered through the affordances of the robot.

2.2 Facing the robot-mediated identity

Given this peculiar nature of the robot-mediated identity, it should be perhaps unsurprising that robotically telepresent individuals are often treated differently to in-person individuals. Faced in interaction, the robot-mediated identity is often responded to in ways that deviate from how we commonly treat one another, with a tendency towards exclusion.

A pattern that can be observed in anecdotes of MRP interactions reported across studies is that people do not always treat MRP users in ways that follow conventions of politeness. Incidents range from mildly rude, invasions of personal space or touching the robot, to outright bullying, such as intentionally stepping in front of the robot to stop it from moving [10, 12, 15]. Users have also reported being pointed at and laughed at when making driving errors within workplace contexts. Normally, in-person blunders of similar inconsequence tend to be politely ignored so as not to further embarrass someone by drawing attention to their mistake. Telepresent users, however are not given such grace [3]. This different orientation towards the robot-mediated identity also is evident in experiment-based studies of MRP which show that remote users can be excluded from interaction, and be perceived as less trustworthy or more distant [1, 16, 19]. As noted above, the form of the robot might sometimes invite perceiving the robot-mediated identity as not entirely human — resulting in a somewhat dehumanised, impolite treatment of the user. Indeed, [Takayama and Go \(2012\)](#) have observed that people interchangeably refer to the remote user/robot using language that implies both human and object-like orientations [17]. The robot-mediated identity seems to cause some confusion. It does not engender a normal treatment of the telepresent individual as just another co-present person, but

neither does it elicit complete objectification. In practice, in terms of how the identity is responded to, is not simply a mediated human identity, but type of a robot-human hybrid.

3 ROBOT-MEDIATED PRESENCE GOING FORWARD

With remote and hybrid participation now being accepted as a necessity of inclusive spaces, and with accelerating advancements in robotics and automation, robot-mediated forms of telepresence might become increasingly more common. Individuals unable to travel or work in-person might have more opportunities, or face greater pressure, to present themselves in this way. However, as outlined in this paper, the robot-mediated identity is far from an accurate or effective reflection of the remote user. At best, it is a slightly altered version of the user, filtered —or rather, limited— through the ways in which the robot allows the user to experience and interact with the world. This involves conscious effort to operate the device, whilst aware that the resulting behaviour will not always match the user's intentions. In some cases, the robotic aspects of the identity, and the fractured ecology in which it inherently operates, can result in failing to properly to incorporate the user in interactions as a person, and potentially result in mistreating and dehumanising the user. These aspects of the robot-mediated identity are not merely conceptual, but relate directly to the users' experience of mediated spaces. That is, the robot-mediated identity impacts the users capacity to express themselves and their ability to be included in social activities.

This position paper has outlined only some aspects of the robot-mediated identity from the perspective of participation in interaction. The reality of robotic telepresence, and its impact on robot-mediated expressions of identity should further be examined from more practical standpoints, such as looking at how use of such devices is made available in real world situations and integrated in activities. Moreover, recent advancements in autonomous systems being embedded in robotic telepresence (e.g., autonomous driving) will further impact on the users' capacity for self-expression and participation. Given that the primary purpose of robotic telepresence is to facilitate social inclusion, understanding the reality of the robot-mediated identity and the factors that affect it should be at the core of future work in the area.

ACKNOWLEDGMENTS

This work was supported by the Engineering and Physical Sciences Research Council [grant number EP/V00784X/1].

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