Examining the implications of automation on user autonomy in robot-mediated presence

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Abstract: Within robotic solutions for accessibility, automation has begun to play a bigger role. Automation can be beneficial. However, this position paper puts forward that the relationship between automation and user autonomy ought to be examined more critically. I ground this discussion on the example of Mobile Robotic Telepresence (MRP) technology. MRP allows us to remotely control a robotic body with a videoconferencing screen so as to be ``present'' in another location when unable to travel there in-person. This is often presented as an accessibility solution. Existing MPR systems are limited in what they can do and they can be difficult to operate. As such, many proposed improvements to these systems involve automating their various functions. It is important to consider how such implementations of automation affect the ways in which the users experience this robot-mediated access, as well as how automation affects the ways in which their robotic presence is incorporated in social interactions.

Figure 1: Left, The Double 2 Telepresence robot. Right, The point of view of a remote user, showing the interface of automated navigation on Double robots.

Automation in telepresence: Many parts of actions mediated by robots can be automated to varying degrees. Advancements in robotic telepresence technology include robots that drive autonomously, adjust the size of the robot to match an appropriate height, adjust for appropriate interpersonal distance, track the person the user is speaking to, automatically move to avoid occlusions to the user's vision, following the speaker as they move in space, guide the user's attention and even change the user's speech input into more polite phrases [e.g., 1-4].

Implications: Robots with automation require less input from users. This *can* make them easier to use, but can also result in a loss of autonomy. Some implications of this include:

- Less opportunity for spontaneity and exploration.
- A different experience of a sense of self in the physical world, especially at younger ages.
- Avoidance of intentional, playful collisions with the world and others [5].
- Loss of idiosyncratic and cultural diversity of behaviours.
- Control over what behaviours are appropriate is subjugated to organisations/stakeholders deploying the technology.
- Less user control over how their social identity is being projected by the robot.
- Worse quality of interactions as an autonomously moving robot, representing a person can be difficult for people to make sense of and include in activities.

This paper only lists some possible implications. Automating assistive robotic technologies and robotic telepresence means automating users' presence in the world. The implications need to be carefully examined.

A little video example of the joy of user control

Configuring automation to support user autonomy: The relationship between automation and user autonomy needs to be better understood.

In some cases, this relationship can be seen as a **trade-off.** Automation makes use easier (e.g., the robot tracks and automatically turns to face a speaker, so the user can focus on the conversation rather than on teleoperation), at the cost of some autonomy (e.g., the user doesn't get to see what else is happening in that space or choose where to focus their attention). In other cases, **automation can be seen as enabling autonomy** (e.g., telling the robot where to go without having to drive it there respects the users wishes).

More research on the different dimensions of automated robot-mediated actions is needed, in conjunction with how this intersects with disability, contextual factors and user values and needs.

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