Figure 1: An overview of the interface-robot pipeline and the study tasks.

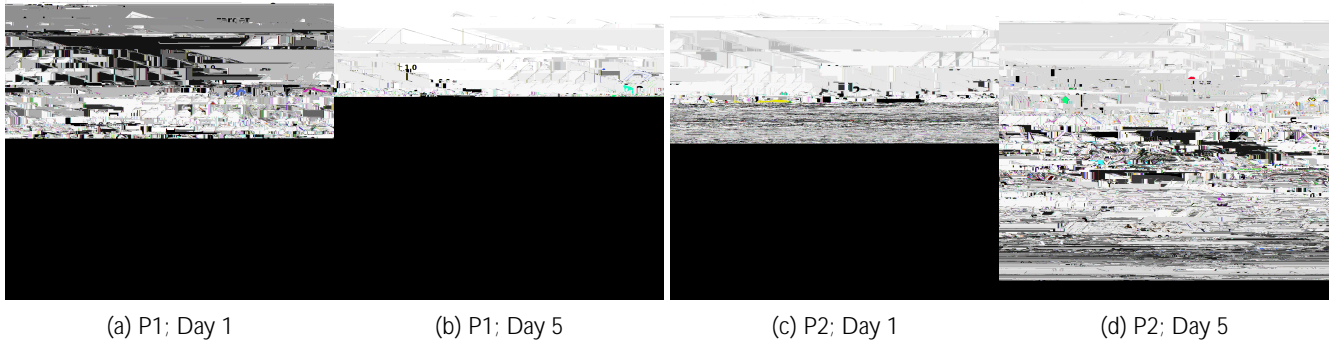| (a) P1; Day 1 | (b) P1; Day 5 | (c) P2; Day 1 | (d) P2; Day 5 |

Figure 4: Trajectory plots of robot end-effector position during the 3D-star task on Days 1 and 5, for both participants. The task consists of reaching to five different targets (∂) in succession. Start (●) and end (✖) points for each reach, and the straight-line path between them (dotted line), are shown. Each target, start, end, and straight-line path for a single reach are the same color.

control is unintuitive at times. There are instances when participants feel uncertain about how to move the robot in certain dimensions, despite having become familiar with the dynamics of the robot, and other instances where slight differences in a participant's movements lead to the robot moving in unexpected directions. As a result, we observe participants regularly issuing unintended commands through the interface—either by moving in the undesired direction of an intended control dimension or activating an unintended dimension altogether. The result is time spent attempting corrections and recovery instead of progressing towards task goals. The use of interface-aware autonomy (Gopinath, Nejati-Javaremi, and Argall 2021) that infers about and prevents these unintended commands in a shared-control framework could not only prevent the subsequent need for corrective action, but can also be used within a training and rehabilitation framework to aid in learning to provide control commands through the interface.

Conclusion and Future Work

In this short paper, we presented preliminary results from a study with two uninjured participants in which they controlled a high-DoF robotic arm, using limited upper body movements, to perform a variety of reaching tasks. We presented some key insights on the typical control asymmetries that arise as well as observations on human learning in the context of high-DoF robot control. We also identified intervention opportunities for robotics autonomy.

In the future, we will use the data and insights collected to