# Multiple Ways of Working with Users to Develop Physically Assistive Robots

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Although physically assistive robotics (PAR) research is increasing, nearly _half_ of PAR user studies do _not_ involve participants with the target disabilities.

This is due to several challenges – recruitment, small sample sizes, transportation logistics – all influenced by systemic barriers people with disabilities face.

In this work, we reflect upon 3 multi-year PAR projects, and present **recommendations for working with users**, grouped by 3 key dimensions.

## Project 1
### Assistive Feeding

**Goal:** empower users to feed themselves meals with a robot arm.



**Methods:** community research, remote interviews, out-of-lab studies.

## Project 2
### Assistive Teleoperation

**Goal:** empower users to do diverse tasks with a mobile manipulator.



**Methods:** home deployments, co-design, remote studies.

## Project 3
### Shared Control

**Goal:** enable users to move a robot arm with an intuitive interface.



**Methods:** at-home ethnographic study, trade fair deployment and study.

## Individual- vs. Community-Level Insights

**Key Question:** How should we balance between deep research with few participants versus broad research with many participants?



**Recommendations:** Projects span a long time; there is room for both.

- Look for **tech enthusiasts** from the community; they may be excited to partner with you long-term.
- Recruitment for **deep** and **broad** research is complementary.

## Logistic Burden on Users vs. Researchers

**Key Question:** How can we navigate the differential logistical burdens that end-users and researchers face to participate in a user study?
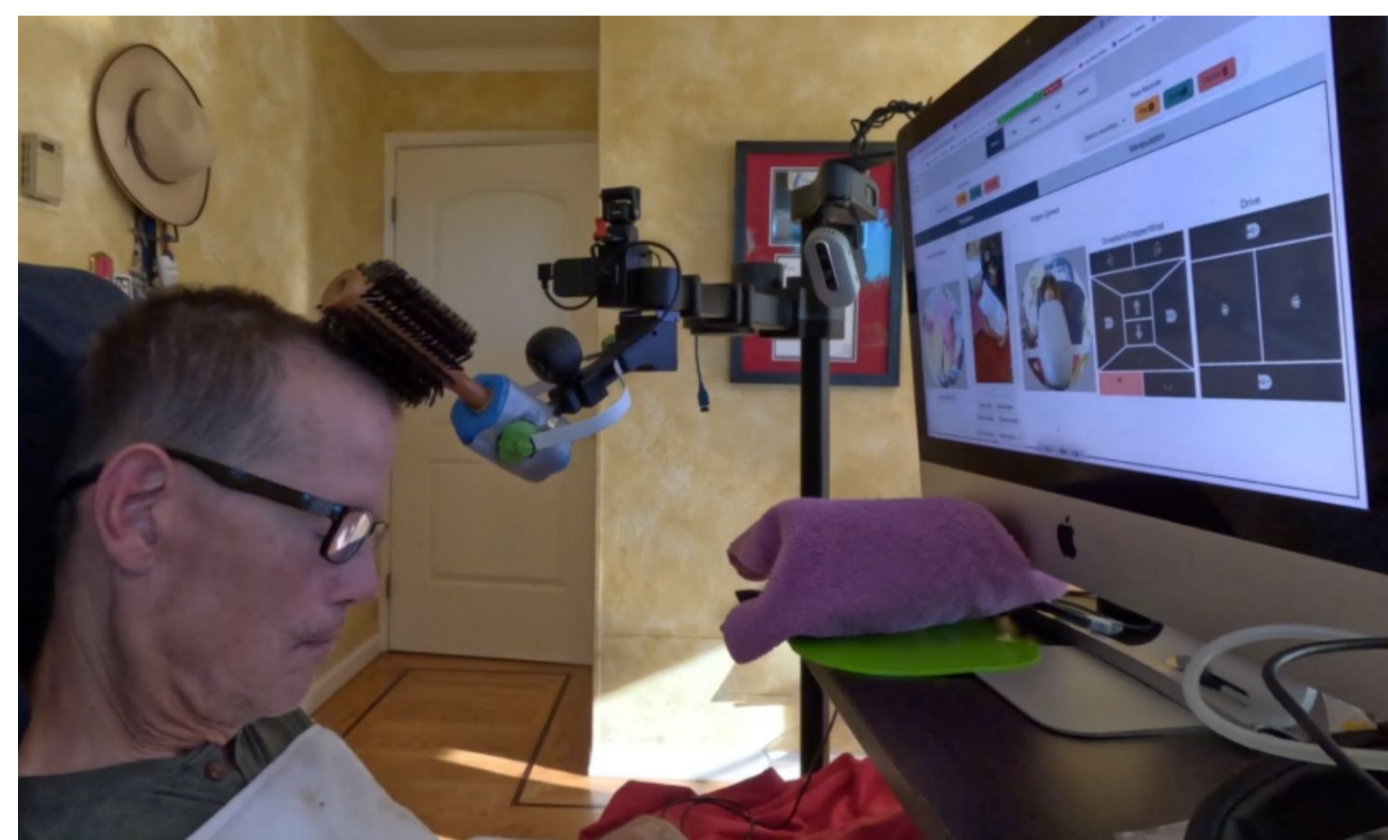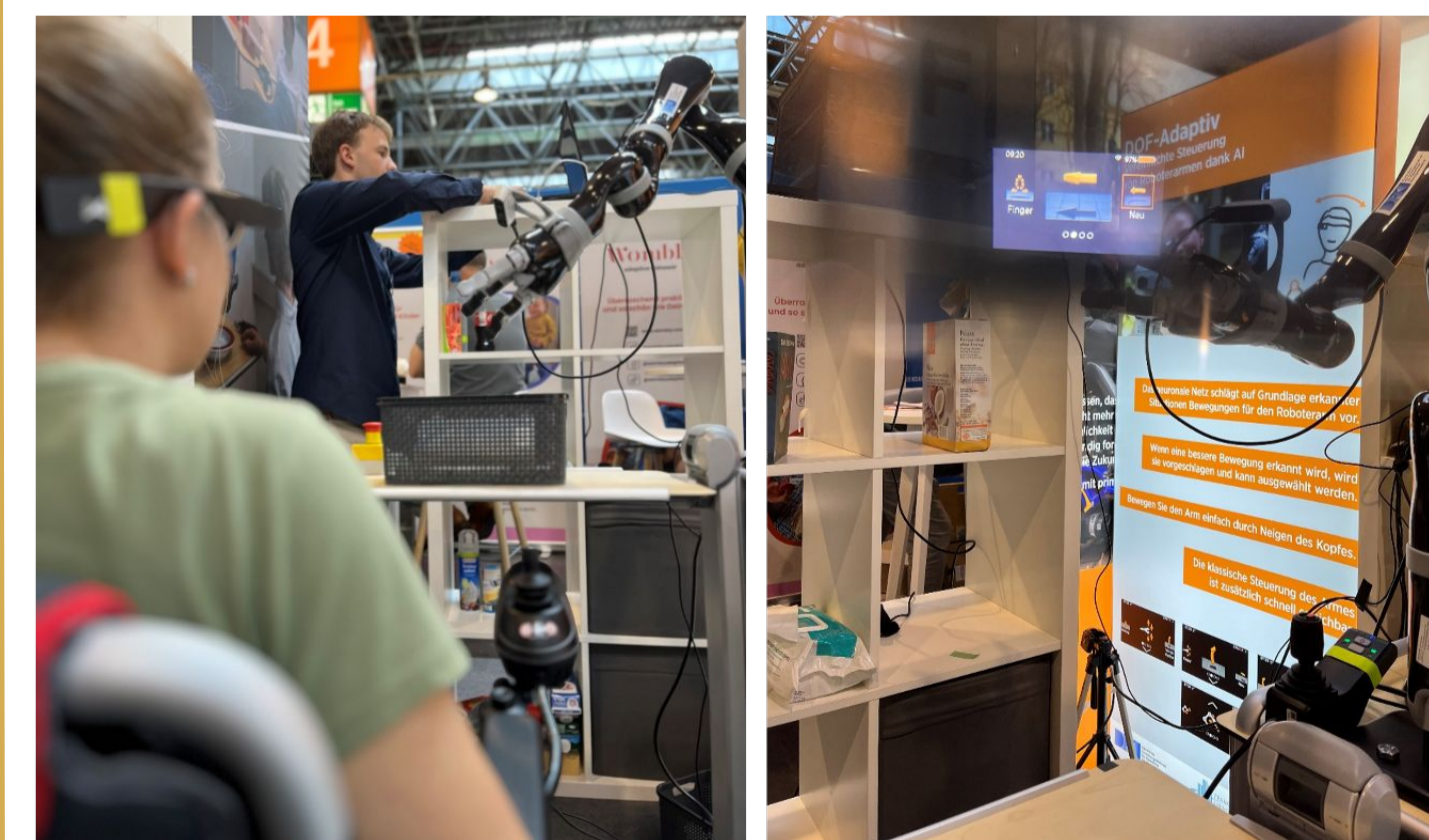


**Recommendations:**

- **Remote studies** can decrease the logistical burden on participants.
- **Go to the participant**: e.g., trade fairs, home deployments.
- **Good system design** makes it easier to go to the participant.

## Benefit to Researchers vs. Community

**Key Question:** What benefits do researchers and users get from study participation? How should that knowledge influence our work?



**Recommendations:**

- **Co-designing tasks with participants** increases the chance they benefit from the study.
- **Support participants beyond the study**, e.g., sharing resources, teaching them desired skills.

**Personal Robotics Lab**

**ihri** inclusive human-robot interaction

**Human-Centered Robotics Lab**