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Wheel2VR

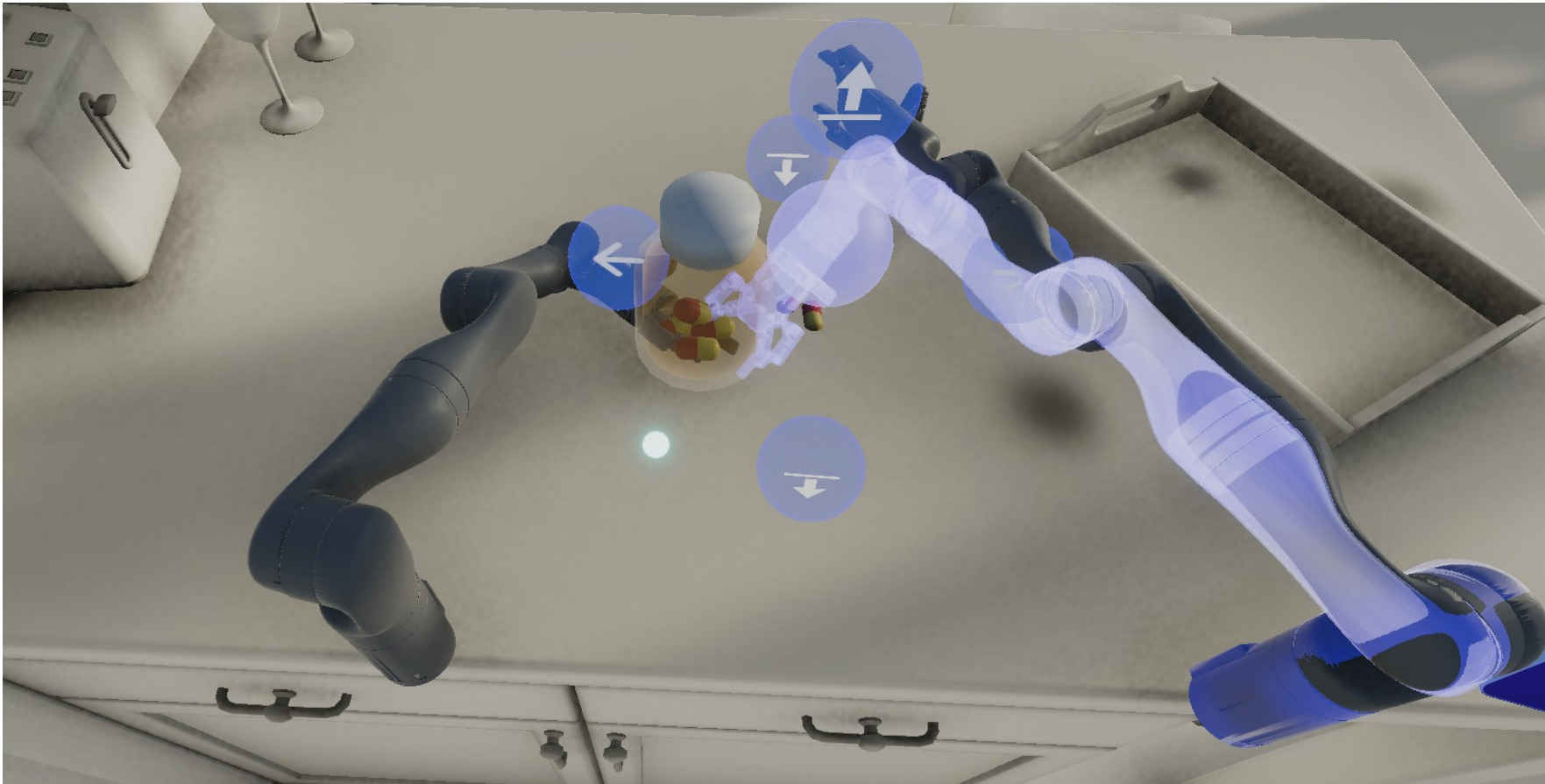


Sources: paper, website, study outputs

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Wheel2VR

Gaze-Controlled Dual Robotic Arms for Assistive Wheelchair Interaction in Virtual Reality



Sources: paper, website, study outputs

Why Wheel2VR?

A safe way to evaluate assistive dual-arm interaction before moving toward real hardware.

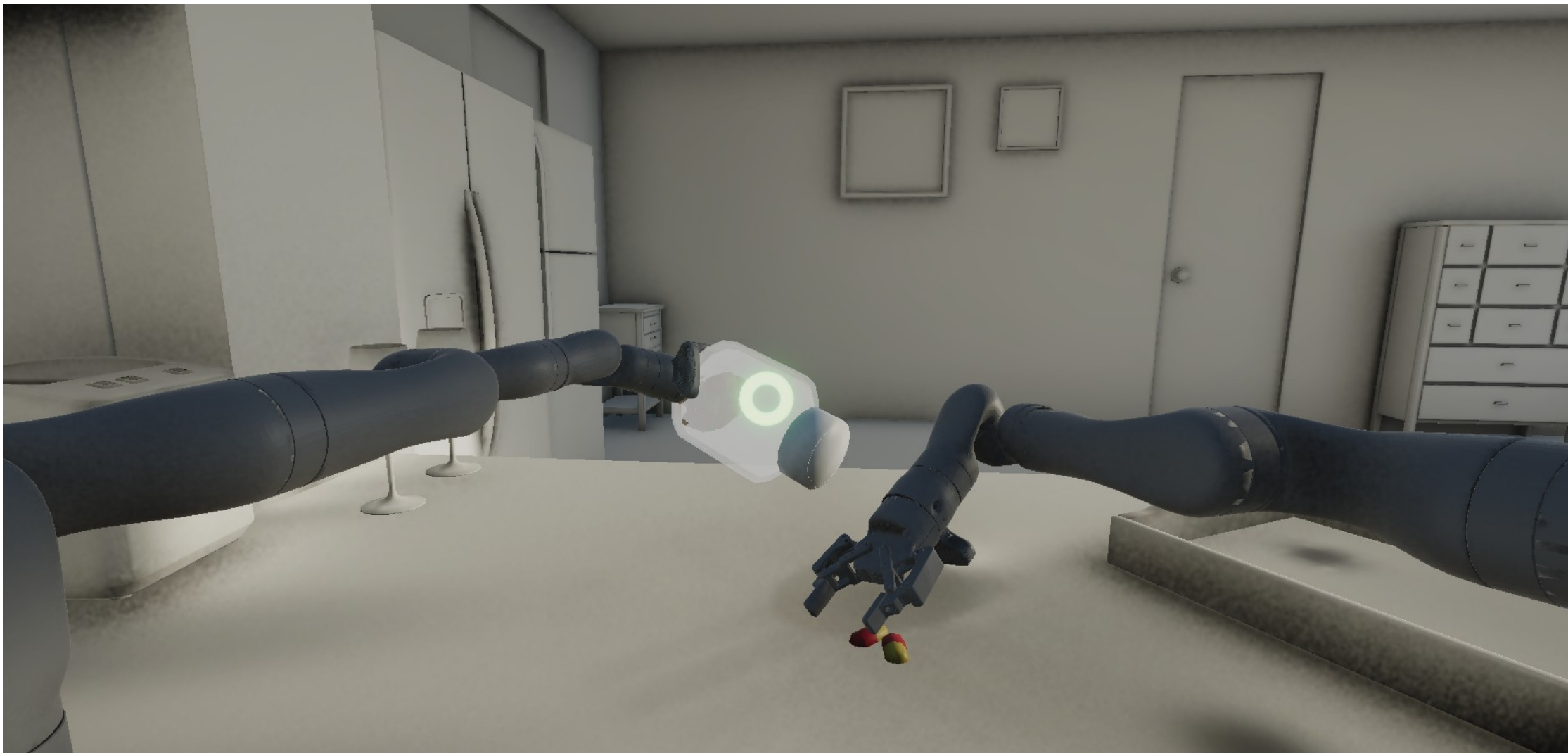
- Tetraplegia makes everyday grasping tasks very difficult
- Support humans using a wheelchair in their everyday activities
- Need for intelligent systems that reduce workload



Wheel2VR simulates a wheelchair-mounted assistive setup with robotic arms in Unity VR.



Wheel2VR in the headset



How does it work? From gaze to motion

1 Select

Eye or head tracking picks a target through dwell-based selection.

2 Preview

A ghost arm shows the proposed pose before anything moves.

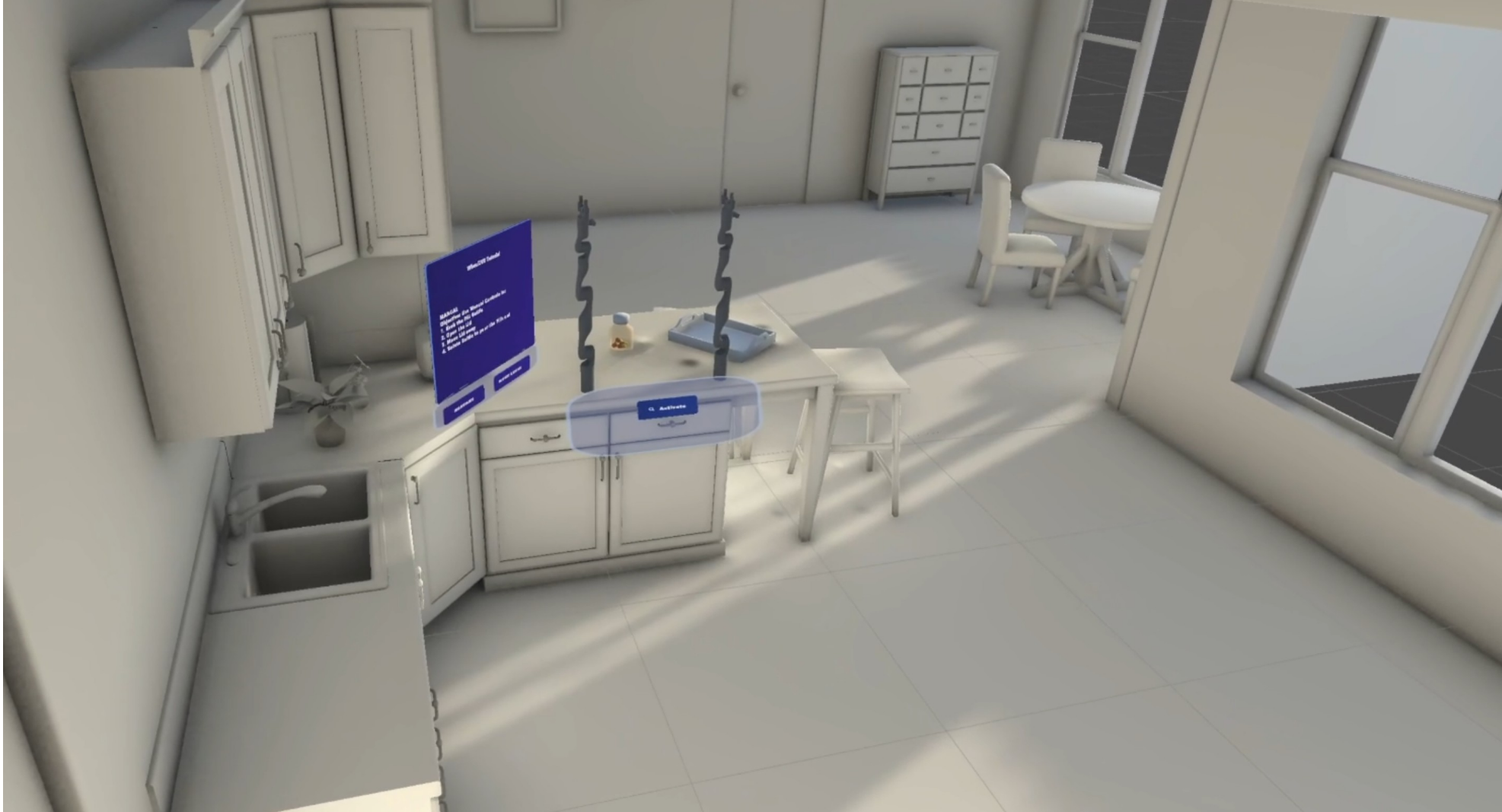
3 Confirm

The real arm moves only after explicit user approval.

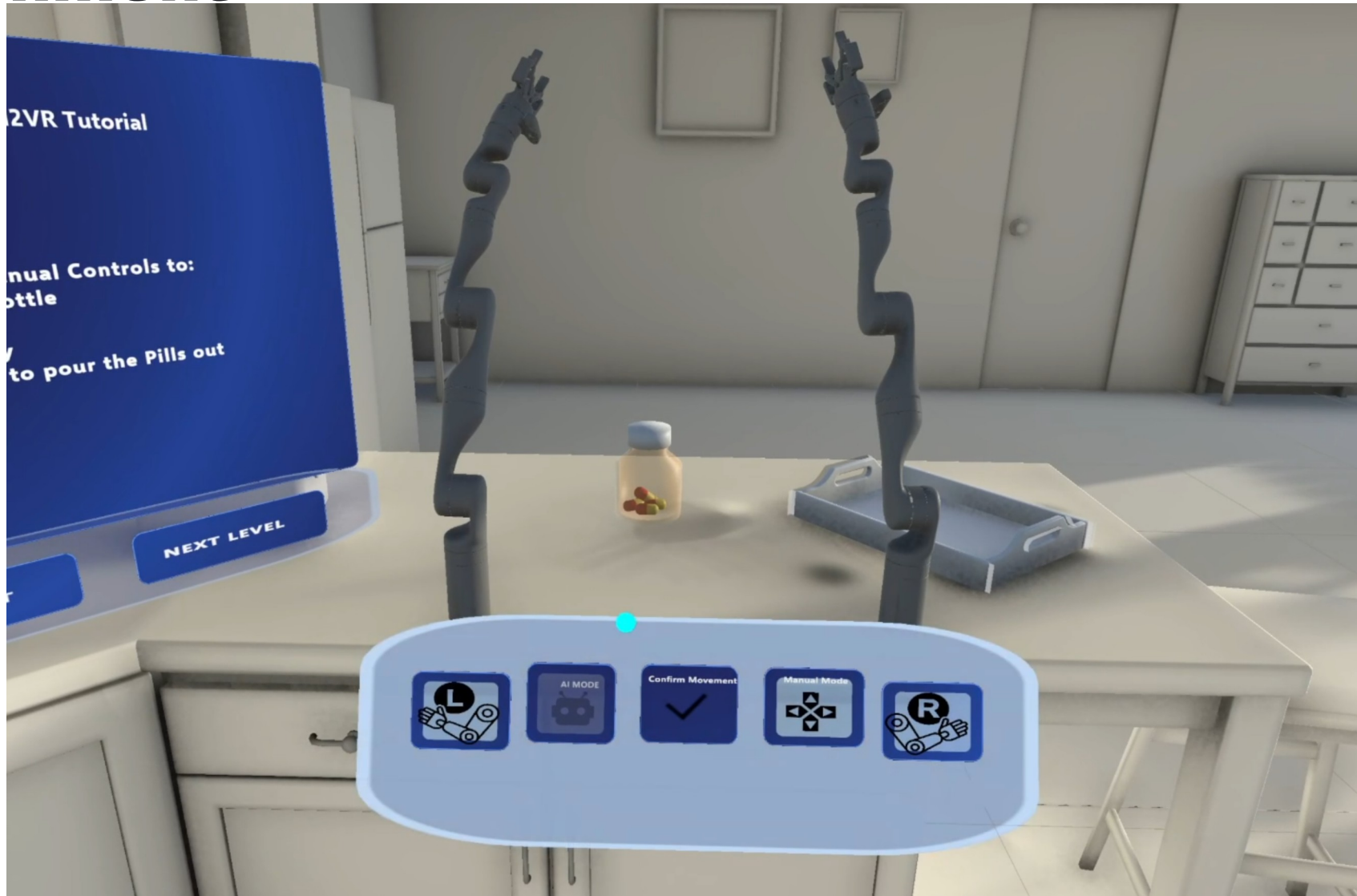
4 Assist

In AI mode, a behaviour tree suggests supportive arm actions.

Environment



Environment



What we investigated

Exploratory lab study with autonomy as the controlled within-subject factor.

18

40-50 min

2 runs

- Eye vs Head Tracking (preferred system)
- Manual and AI-assisted runs were completed by every participant.
- Evaluation: NASA-TLX, SUS and a short interview followed each session.

Task sequence

1. Grab bottle
2. Grab cap
3. Remove cap
4. Lift bottle
5. Pour pills

Strongest result: less interaction load

The clearest effect is how much the AI condition cuts required button presses.

241

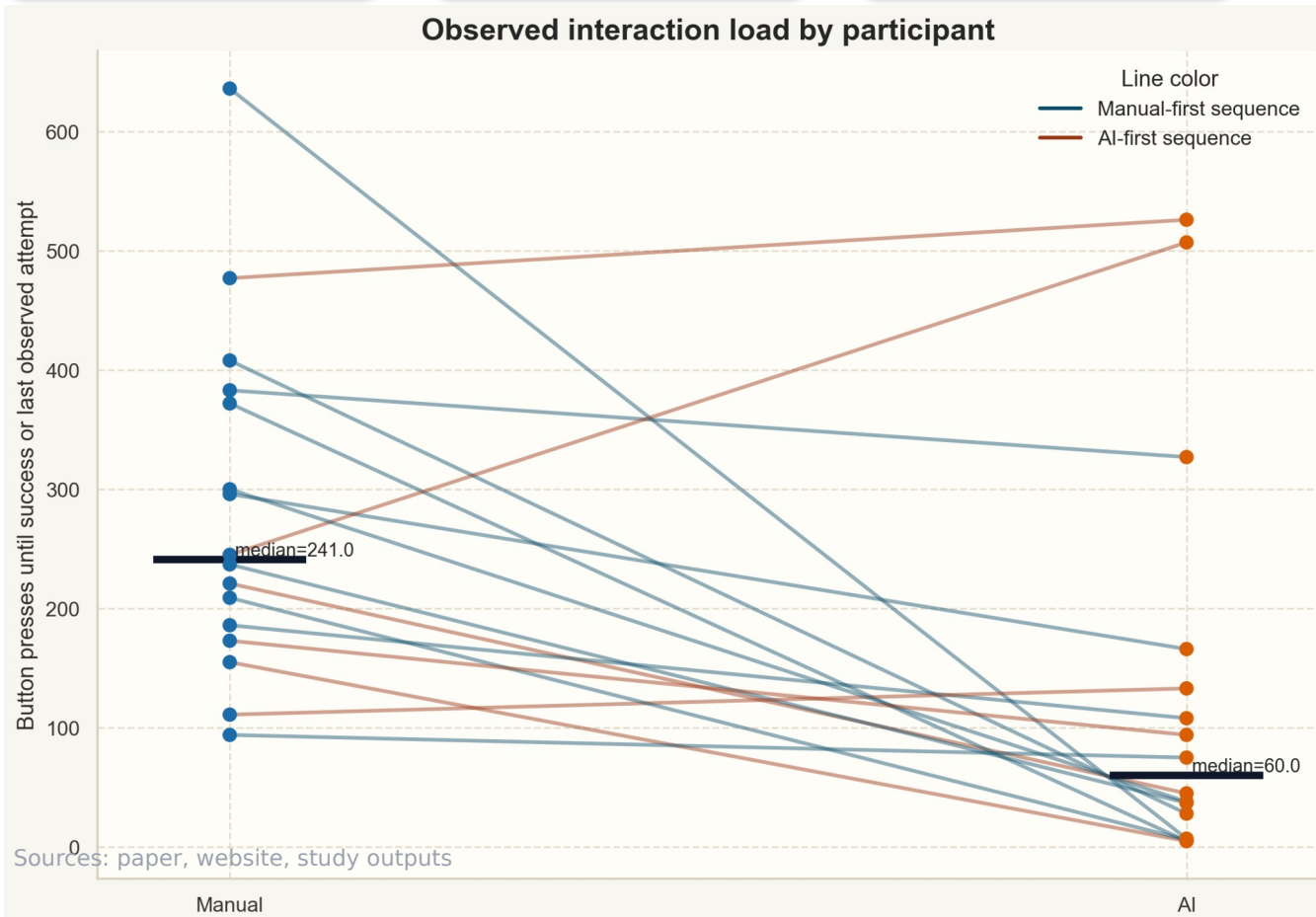
Manual median

60

AI median

p = 0.009

Wilcoxon



Takeaway

AI reduced the amount of interaction significantly.

Interpretation

Assistance helped mainly by lowering control effort, not by fully replacing the user.

Try it out!



Built from paper, website, study outputs, and screenshots

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Thanks for listening. Happy Coding.



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