

Harnessing the Power of Movement: A Body-Weight Support System & Assistive Robot Case Study

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Objective

To evaluate how a body-weight support system (BWSS) coupled with an assistive robot could encourage movement and engagement for children with GMFCS Level IV or V motor disabilities

Motivation

- ▶ For children with motor disabilities, engaging in physical activity is important to development [1]
- ▶ A body-weight support harness can provide support for free play [2]
- ▶ Assistive robots may help maintain engagement and encourage movement [3]

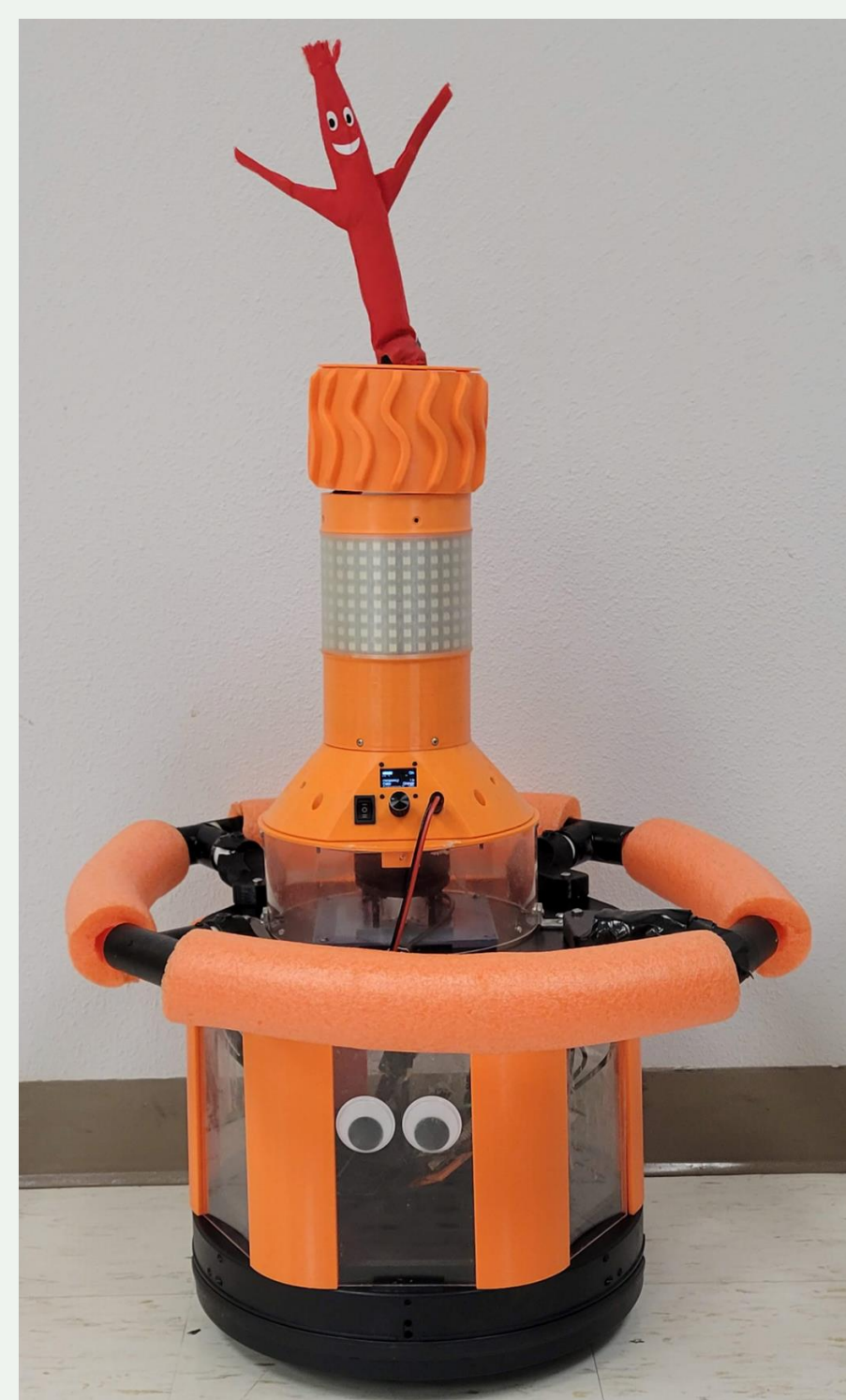
Assistive Robots

Shelbytron

Lights, music, jokes

GoBot

Lights, music, air dancer

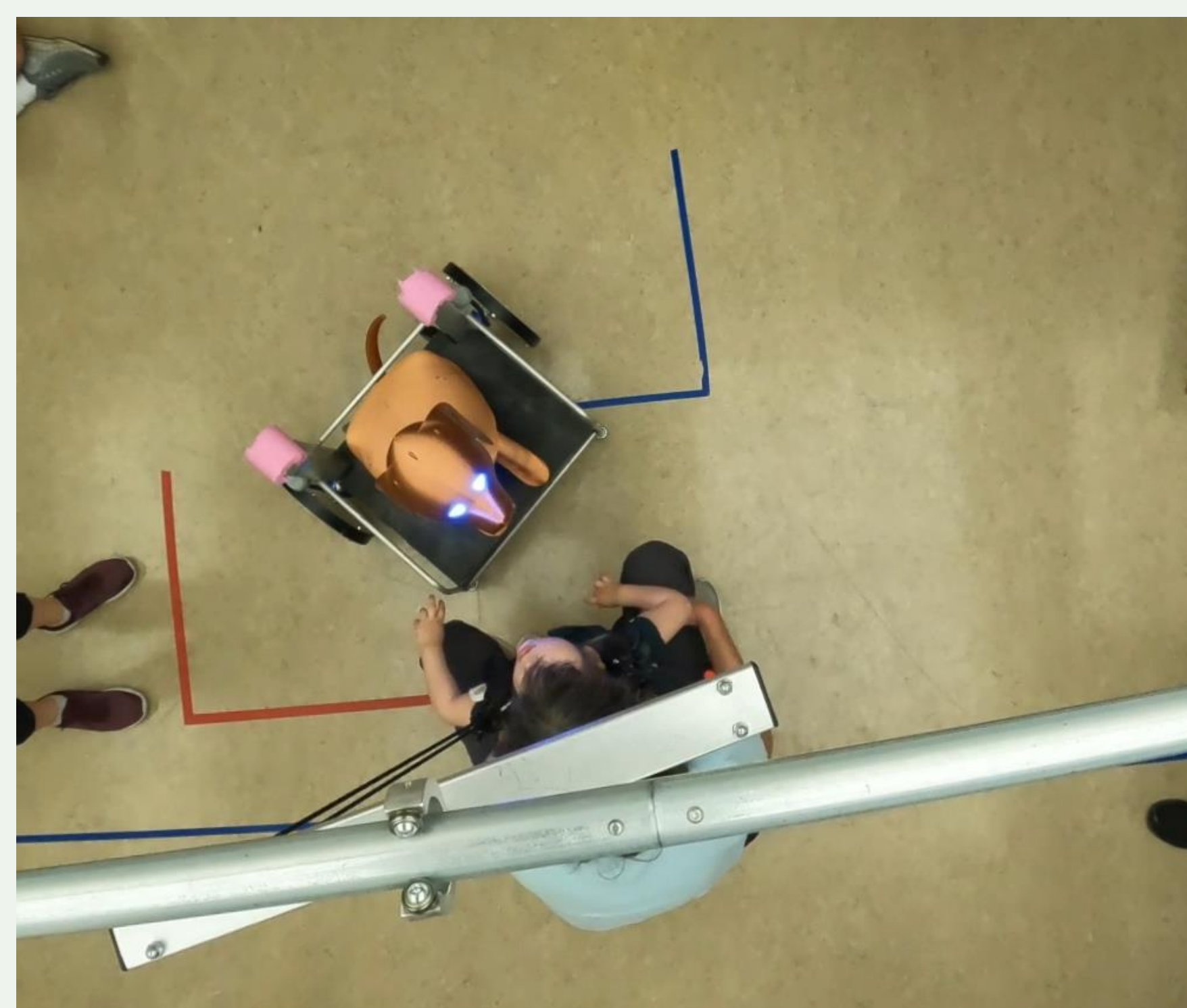


Key Insight

Early evidence that a body-weight support harness and assistive robot pairing can help a child with a motor disability stay engaged and practicing stepping



Participant interacting with GoBot



Participant interacting with Shelbytron

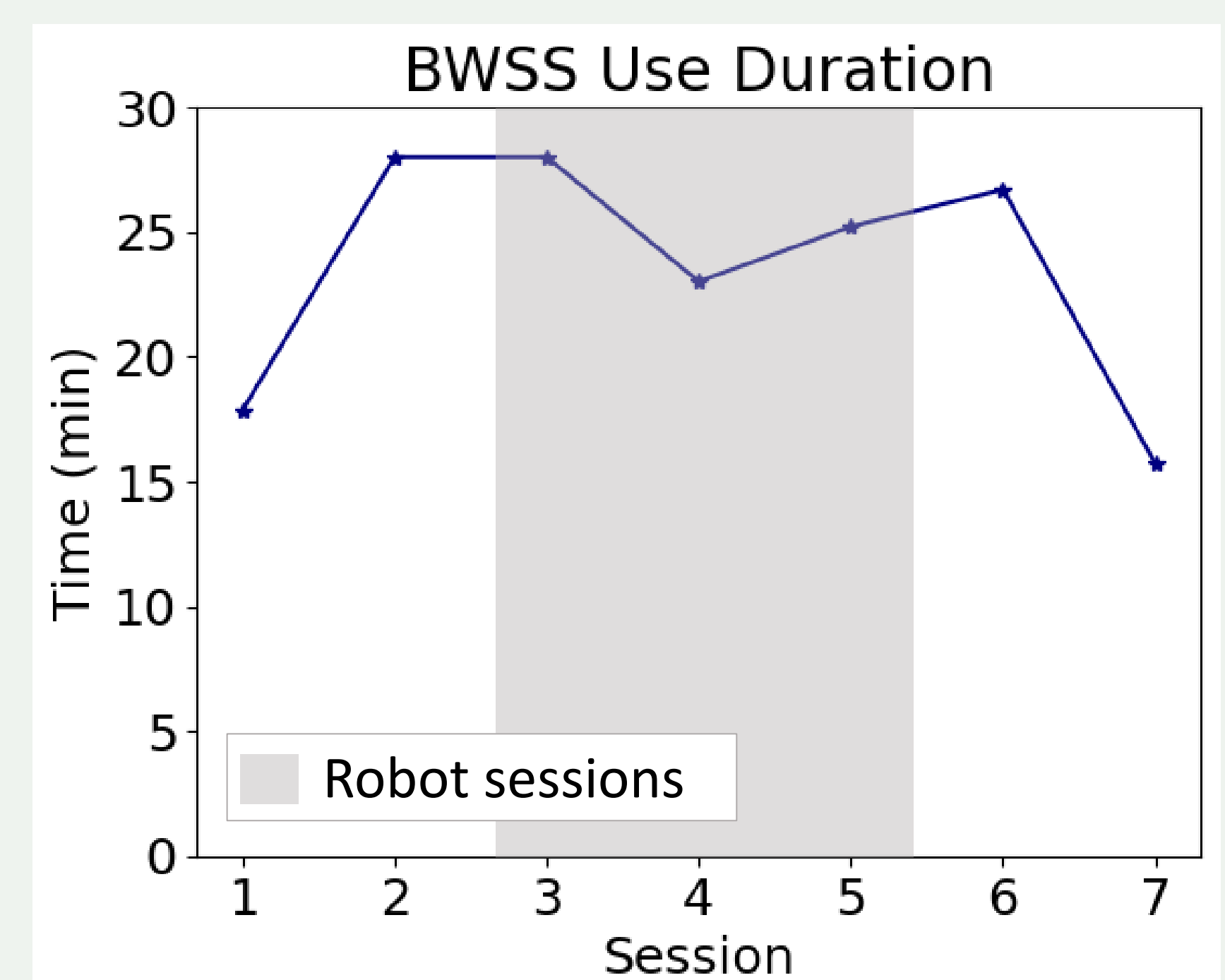
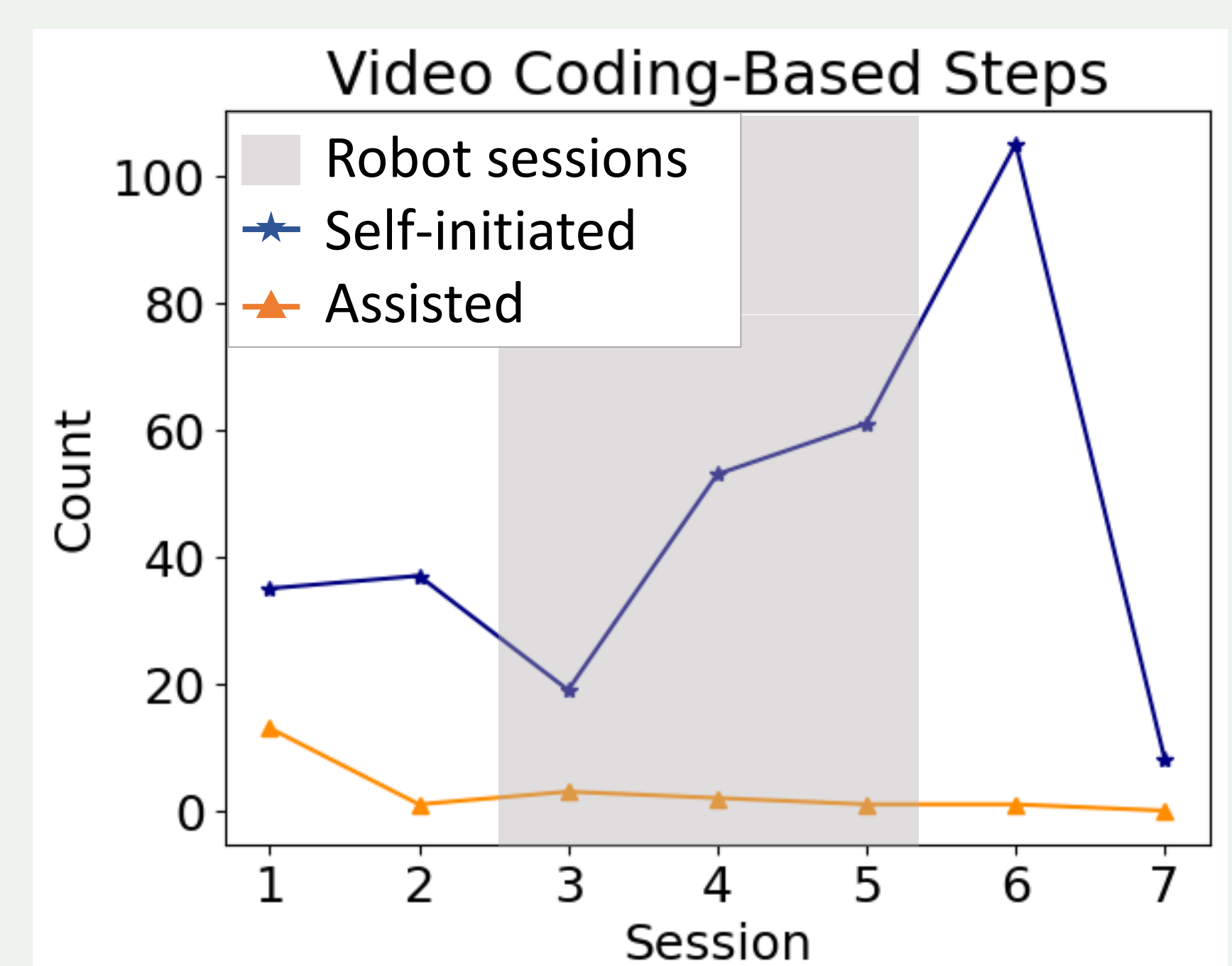
Methods

- ▶ 7 sessions
 - ▶ 2 Baseline, 3 Treatment, 2 Retention
- ▶ Up to 30 minutes of free play while in harness
- ▶ We measured motion and engagement through camera tracking and surveys

Participant

- ▶ Female, 4.1 years old
- ▶ GMFCS Level IV
- ▶ Unable to independently sit, crawl, or walk, or verbalize

Results



Body-Weight Support System

Enliten Portable Mobility Aid (PUMA)



Conclusions & Future Work

- ▶ Self-initiated stepping increased over the study
- ▶ The participant followed the robots around the play space
- ▶ Next steps include a longer study with more users and an autonomous GoBot
- ▶ We will also test Shelbytron's viability to encourage support walker practice

References

1. Uchiyama et al., "Locomotor experience affects self and emotion." *Developmental Psychology*, 2008
2. Kokkoni et al., "Use of an in-home body weight support system by a child with spina bifida," *Pediatric Phys. Therapy*, 2018
3. Vora et al., "Influence of a socially assistive robot on physical activity, social play behavior, and toy-use behaviors of children in a free play environment: A within-subjects study," *Frontiers in Robotics and AI*, 2021

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