

Robot-Mediated Learning: Exploring School-Deployed Collaborative Robots

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Goal: Create telerobots with new inclusive interfaces, control modalities, and telemanipulators to enable children with medical conditions or disabilities remotely attend school.
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Problem:

- Each year, over 2.5 million children in the US are restricted to their homes due to medical risk [1]
- Urgent need to use inclusive technologies beyond static platforms such as Zoom or online schools [2]
- Commercially available telerobots were not designed for children or schools [2]

Approach:

- Create best practices/guidelines that incorporate social norms for daily robot interactions [3]
- Explore how to make mobile telemanipulators accessible to remote children and children with disabilities [4]
- Leverage interaction with an embodied co-robot to motivate interest in STEM for all children

Highlight: Robot-Mediated Play [5]

Discovered new insights into the creation of future robot systems that facilitate play activities. Additionally, this work will generate new insights into child-operated telerobots in public spaces.



Highlight: New Partnerships [6]



Developed new partnerships with after school programs. Deployment in public spaces with masked interactants practicing social distancing created updated guidelines for child-robot interactions (e.g., no touching hard surfaces of the robot).

[1] V. Ahumada-Newhart, M. Warschauer, and L. Sender, "Virtual inclusion via telepresence robots in the classroom: An exploratory case study," *The International Journal of Technologies in Learning*, vol. 23, no. 4, pp. 9-25, 2016.

[2] V. Ahumada-Newhart and J. S. Olson, "My student is a robot: How schools manage telepresence experiences for students," in *Proceedings of the 2017 CHI conference on human factors in computing systems*, 2017, pp. 342-347.

[3] V. Ahumada-Newhart and J. S. Eccles, "A Theoretical and Qualitative Approach to Evaluating Children's Robot-Mediated Levels of Presence," *Technology, Mind, and Behavior*, vol. 1, no. 1, 2020.

[4] V. Ahumada-Newhart and L. Riek, "Telerobots for informal learning in schools," in *proceedings of ACM/IEEE International Conference on Human-Robot Interaction, Workshop on Robots4Learning*, 2021.

[5] V. Ahumada-Newhart, T. Hwu, H. Kashyap, J. Krichmar, and J. Eccles, "Evaluation of Toyota's human service robot pan/tilt head, autonomous navigation, and arm/ hand hardware for learning environments.," *In Review*, 2022.

[6] A. Katsnelson, "Dream machine," ed: American Association for the Advancement of Science, 2022.



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