A Case Study in Caregiver Overtrust of Pediatric Healthcare Robots

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Abstract

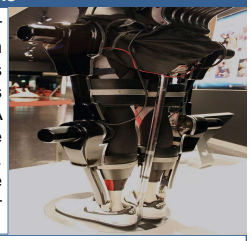
- Numerous types of robots are being interwoven into the U.S. healthcare system, including robotic rehabilitative devices for pediatrics.
- A key ethical concern in the pediatric domain is whether children, their parents, or other caregivers might begin to overtrust the technology.
- Placing too much trust in automated healthcare systems may generate unintended negative consequences, such as harm to the patient or the technology being adopted prematurely.
- Thus, it is necessary to analyze the implications and potential for overtrust within healthcare settings, especially as it pertains to pediatric populations.

Introduction

- We conducted a survey of parents who have at least one child who had any form of disability that affected movement, muscle control, and/or balance.
- The survey sought to assess whether, and in which circumstances, parents may place too much trust in the use of healthcare robots with respect to their child.
- As a first step, the survey's focus was on robotic exoskeletons because these systems are available as clinically-validated rehabilitative device for both adults and children.

Exoskeletons

Children who have limitations in their upper and/or lower extremities can receive therapeutic interventions through wearable robots, such as exoskeletons. The Ekso GT has FDA clearance and is noted as a wearable exoskeleton device for gait therapy. Ekso Bionics explicitly warns that "the devices are not intended for sports or stair climbing".



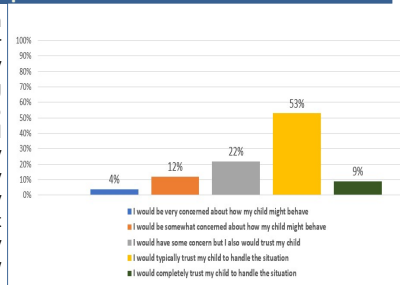
Cyberdyne claims that its device can assist individuals with walking, standing up or sitting down by themselves, but stair climbing (ascent or descent) is not directly mentioned. Given the advancing state of the technology and its reach into an increasing number of contexts, it is important to examine perceptions of the technology's trustworthiness.

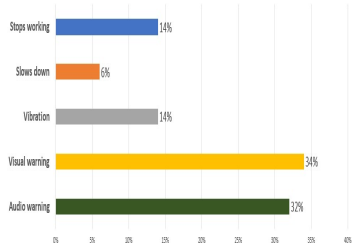
Methodology

- The survey contains 25 questions (plus one a question that gauges whether the participant is paying attention) and was administered using the online survey tool Qualtrics.
- A total of 108 people entered the survey portal; after applying our inclusion criteria, **97 respondents** were included in the data set.
- If parents had more than one child with a movement disability, they were asked to answer based on the oldest child with a movement disability.
- The survey takes about 10 minutes to complete and contains a combination of multiple choice questions (some of which are on a five point Likert-scale), open answer questions, and demographic questions.

Experimental Results

When asked, how much they would trust their child to hand a risky situation while wearing an exoskeleton, 62% stated they would "typically" or "completely trust" their child. Only 16% indicated that they would be "somewhat concerned" or "very concerned" with how their child would behave.

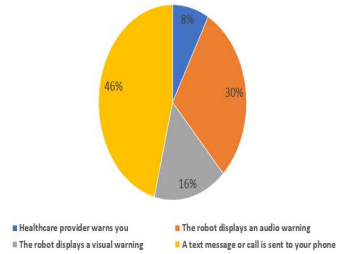




When asked how they would like the device to respond to a risky situation, 66% of parents stated that a visual or audio warning would be the preferred method of warning.

Experimental Results

When asked, how much they would prefer to be notified if their child encountered a risky situation while using an exoskeleton, 76% believed that an audio warning or a text message would be the best method for alerting the parent. The average age of the children was 9 years old.



Discussion

- The current state-of-the-art exoskeletons can only provide limited assistance with slow speed walking under controlled conditions. Thus, it is noteworthy that when asked how their children would want to use the device, 55% of the responses indicated an activity using an exoskeleton, such as climbing, that it is not currently designed to perform or that would place the child at significant risk if attempted.
- These responses are despite the fact that 83% of respondents claim to be "somewhat" or "very" comfortable with robotic technologies.
- These results provide important preliminary data indicating several of the trust-related challenges associated with introducing a new robotic healthcare technology to the public. These challenges highlight the significance of helping parents and users develop a realistic model of how the technology will perform and what its limitations are.

Conclusions and Future Work

- This relatively small pilot study will hopefully facilitate future research on overtrust of robotic technology and how to prevent its occurrence.
- Overtrust of technology, robotic or otherwise, has already shown to have serious, and sometimes life-threatening, consequences.
- For those who plan to pursue research in the Human-Robot Interaction (HRI) realm, one strategy that could mitigate overtrust is embracing the tenets of participatory design. Roboticists and other professionals could work with parents and other caregivers who directly interact with patient populations to better inform the design of robots.

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