

TASK: PM-7 POWERED MOBILITY SIMULATOR

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Collaborators: Robert Lang, Jules Legal

Rationale

Evaluation for powered mobility can be a difficult and time consuming process for both service providers and wheelchair users. The decision to recommend or purchase a powered wheelchair must be done carefully and with maximum consumer involvement as the costs are often high and the mistakes are difficult to rectify after the fact. For individuals with severe disabilities, the selection process can often involve trials with different types of input controls in an effort to determine if powered mobility is even a viable option. For others who have been long time manual wheelchair users, manual propulsion may become increasingly more difficult as a result of progressive disability or older age. A powered wheelchair simulator is a multi-purpose tool that allows consumers and clinicians to experiment with powered mobility options at a relatively low cost in an effort to make informed decisions prior to the purchasing process. It allows a person in their manual wheelchair, in their typical seated posture, to experience the sensation of being in a powered wheelchair. The concept is based on having a powered platform or simulator onto which a person can wheel their manual wheelchair. Controls can be readily selected and positioned to meet the individual needs of the user. Assuming the trial is positive, the clinician, working closely with the user and assistive technology supplier, can then more confidently formulate the specifications for the definitive powered wheelchair. This approach can be a significant improvement over the typical trial and error approach, as well as reduce the chances of prescription error and ultimate disappointment by the user. Research work conducted by Mark Schmeler and Nigel Shapcott, while at the University of Buffalo, indicates that the sensation experienced by users while on the simulator closely parallels the motor/perceptual sensations experienced in an actual powered wheelchair (Schmeler, '95).

Methods Summary

A first generation prototype simulator was constructed during the latter part of Year II. Evaluation of the first generation prototype was performed in the University of Pittsburgh Medical Center's Center for Assistive Technology (CAT). A local assistive technology supplier was invited to participate in the prototype implementation and evaluation. The results of this interaction were positive, including suggestions for MK-II design improvements. A mechanical designer (Jules Legal) was added to the team. An unsuccessful STTR proposal was prepared and submitted to NIH/NCMRR in partnership with two local firms in Yr. III. Year IV focused on continued refinement and testing of the MK-II design with consumers in the CAT. Based on the positive local experiences, a second, revised STTR grant proposal was submitted. It was not successful. The CAT also produced several units for use by other clinical facilities.



Figure 23 — Powered Mobility Simulator prototype based on the Suny-Buffalo design.

Outcomes Summary

Transfer of this development to the marketplace was dependent on a commercial partnership and the receipt of technology transfer support from external sources. As indicated above two attempts at securing the necessary federal support were unsuccessful. Several reviewers questioned the viability of such a product given its limited application and therefore numbers that can be potentially sold. This may possibly be the case. However, we were gratified that Mark Bresler, [Bresler, ML, 1990], one of the early proponents of the wheelchair simulator concept, exhibited a new prototype at the 1998 RESNA conference. Hopefully he has captured the interest of a commercial entity that will make this “orphan” development available to those clinicians in most urgent need.

Publications

Schmeler, M.R. Performance Validation of a Powered Wheelchair Mobility Simulator, *Proceedings of the Eleventh International Seating Symposium*, Pittsburgh, PA, February 1995

References

Bresler, MI Turtle trainer: A way to evaluate power mobility readiness. *Proceedings of the Thirteen Annual RESNA Conference*, 1990