Design and Testing of a Quick-Connect Wheelchair Power Add-On Unit

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Dissertation submitted to the Faculty of the Virginia Polytechnic Institute and State University in partial fulfillment of the requirements for the degree of
Doctor of Philosophy
in
Industrial and Systems Engineering

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December 4, 1997
Blacksburg, Virginia

Keywords: Power Attachment, Usability Testing, Electric Wheelchair, Product Evaluation

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(ABSTRACT)

A quick-connect wheelchair power add-on unit (PAU) has been developed at the Human Factors Engineering Center of Virginia Tech. The objective of the invention is to provide an inexpensive, highly portable product which can quickly convert a manual wheelchair into a power-operated wheelchair. This dissertation details the three year research and design effort to develop the new wheelchair PAU. Results are presented from a series of evaluations conducted to identify performance and user-interaction characteristics of the PAU. Interpretation of the results provides a prioritized list of identified design deficiencies along with wheelchair expert and design team suggestions for the next generation of design alterations.

The three evaluations conducted with the second generation PAU prototype include a series of wheelchair expert interviews, a PAU performance evaluation, and a usability evaluation which utilized wheelchair operators as subjects. Also included in the dissertation is an explanation of the need for a new PAU, a description of the most recent design iteration, a literature review containing information about the history of wheelchairs, the condition of the current PAU market, and an analysis of wheelchair PAU consumers.

The new invention was conceived and patented by Dr. John G. Casali of the Industrial and Systems Engineering (ISE) Department at Virginia Tech. This research was supported jointly by Southwestern Applied Technologies, L. C., of Roanoke, Virginia and Virginia's Center for Innovative Technology in Herndon, Virginia.

ACKNOWLEDGEMENTS

This dissertation was produced by the efforts and sacrifices of many individuals. I wish to thank everyone who has assisted with this process and acknowledge them here.

Thanks to my committee who have been tolerant and supportive through several years. Dr. John Casali, my advisor, provided unwavering guidance and worked to assemble financial support as well as avenues for continued growth of the project. The basis of this research and design effort was Dr. Casali's PAU invention and he kindly allowed me to share in each step of its development. Mr. Thomas Hanes of Southwestern Applied Technologies contributed financial resources along with his time and energy to oversee the work and assist in my academic achievements. Dr. Robert Williges provided hours of invaluable research design and evaluation counseling. I have also had the pleasure of attending several of his lecture courses throughout the years, which provided a solid foundation for my work. Mrs. Beverly Williges and Dr. Patrick Koelling provided guidance, encouragement, and a willingness to help at all times. I have found them to be very patient and generous; any student would be fortunate to have this assistance through an academic career.

In addition to the financial support provided by Southwestern Applied Technologies, the project was also sponsored by the Center for Innovative Technology located in Herndon, Virginia.

Much of the innovative success of the project was due to the skilled work of Mr. Randy Waldron. Mr. Waldron fabricated two PAU prototypes and contributed many original ideas to the design process. He continually demonstrated a positive attitude which promoted a good team-oriented design atmosphere. I express my gratitude to Mr. Waldron and to Mr. Will Vest who provided the electronic expertise for the project.

I also wish to thank Mr. Jack Mitchell who devoted countless hours to the completion of the PAU evaluation. Mr. Mitchell was indispensable in his work dealing with subjects, recording evaluation data, and contributing design suggestions.

My appreciation is also expressed to those who have provided for my personal development. I thank my grandparents, parents, sister, and teachers: Pete Ingersol, Don McElhone, and Leroy Hampton. My greatest appreciation is expressed to Dixie, Kittie, and Ed. Their sacrifices have provided the opportunity to accomplish this goal. Finally, I must thank Kalimar, without whom I would not have had the time to complete this dissertation.

Thank you all.

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