

Using digital human modeling to predict operator performance of a mobile fluid powered patient transfer device

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Abstract

Human Factors Researchers have made great advances to design systems that are tailored to user needs. Strategies for effective design must be utilized early in product development cycle to reassure the system is effective, efficient, and easy to use. The objective of this research is to investigate human performance of a current market patient transfer device (PTD) to collaborate with designers to determine suitable operating parameters for designing a new fluid powered PTD. Unfortunately, the functions of the current devices are antiquated and insufficient for user and patient needs. Furthermore, many devices lack the functionality to reduce user workload. Studies have shown that nursing personnel has the highest back-related worker compensation claims with more than 10% resulting from patient transfers. Currently The Center for Compact and Efficient Fluid Power (CCEFP) is conducting research focused on designing a fluid powered PTD. Digital human models (DHM) in Jack® will be developed to simulate humans with different weight percentiles and gender to represent caregivers transferring patients. Lower-back forces and fatigue analysis was performed to measure differences between the current PTD and the fluid Power PTD. Findings from this research will provide design suggestions to fluid powered PTD developers and also improve caretaker's performance.

Dr. Eui H. Park, Professor of the Department of Industrial and Systems Engineering (ISE) at North Carolina A&T (NC A&T) State University, received his Ph.D. from Mississippi State University in 1983. Upon completion of his Ph.D., he joined NC A&T and has since initiated and developed a successful Human-Machine Systems Engineering program and interdisciplinary manufacturing program. He has also conducted STEM outreach programs, the Para-Research Program, Partnership in Education and Research, REU, and RET, for the past sixteen years. He is the founder of teaching factory, Piedmont Triad Center for Advanced Manufacturing. Dr. Park was also the Chairperson of the ISE Department for sixteen years from July 1990. He has been an IIE Fellow since 2000. His research interest include Human-Machine Systems Engineering and Quality Assurance. He has been a principle investigator in 24 awarded funded research projects totaling over \$12 million in the past ten years.

Keywords

Human Performance Modeling, Fluid Powered, Digital Human Models

BIOGRAPHY

Brittney Jimerson is a Ph.D. Candidate at North Carolina A&T State University. She graduated from North Carolina A&T State University with a M.S. in Industrial and System Engineering in 2013. She was an undergraduate research scholar and earned her B.S. in Industrial Engineering and Management from the University of North Carolina at Asheville in 2009. She is an Alpha Pi Mu Engineering Honor Society Member, NSBE member, and IIE member. Her research interest include quality assurance, engineering ethics, human performance modeling, and human computer interaction.