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Developing a Patient Transfer Device Prototype Using Human Factors Techniques and Human Digital Modeling

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Abstract-Patient handling remains the top cause of injuries to healthcare workers. Healthcare workers have perceived moving, lifting, transferring patients, equipment, or supplies to be the main cause of back injuries. In the literature, lifting tasks has been consistently cited as a high risk and proven to be the leading cause for occupationally related back injuries. Due to these risk, a significant market need has been identified for an improved assist device for transferring mobility limited patients, particularly those who are heavier or bariatric. This research presents a needs assessment to determine user capabilities and limitations with the current market patient transfer lifts (PTL), as well as user input on proposed improvements. Furthermore, an ergonomics assessment will be conducted using Jack™ digital human modeling software to model and assess ergonomic risks of healthcare workers transferring immobile bariatric patients. The results from the needs and ergonomic assessments will be used to propose a design of a PTL prototype that is more efficient, safer, and easier to use.

Keywords-Human Digital Modeling, Ergonomics Assessment, Patient Handling

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.

Dr. Steven Jiang is an Associate Professor in the department of industrial and systems engineering at NC A&T State University. His research interests include visual analytics, human performance modeling, and human computer interaction. He has published more than 20 peer reviewed journal papers and more than 70 conference papers.

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.