Thesis Project Portfolio

Modular Walker Handles for a Motorized Posterior Walker

(Technical Report)

Healthcare Disparities Amongst the Disabled

(STS Research Paper)

An Undergraduate Thesis

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Bachelor of Science, School of Engineering

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Sociotechnical Synthesis

My capstone project involved the further research and development of medical walking aids for people with disabilities. The utilization of medical walkers and other assistive devices can lead to improved gait patterns and patient position while walking. My research primarily focused on children with cerebral palsy, which is one of the most common motor disabilities. The Motion Analysis and Motor Performance Lab at UVA is developing a motorized walker to follow the patient based on the force they apply to the handlebars. The handles are equipped with force transducers that calculate their input and move the walker accordingly. This helps alleviate the physical strain put on their body when walking, as well as preventing injury. My specific project within this study was to improve and modularize the handles to allow for faster and easier assembly and testing.

Individuals with disabilities represent a large subpopulation, yet disparities within their healthcare persist. My STS research project examined these disparities that have significant effects on the quality and accessibility of care. The human and social dimensions of this technology are important to analyze due to the differing utilizations based on individual needs. Medical devices are used for a variety of disorders and associated treatments, so analysis of stakeholders is necessary for enhanced understanding of the scope of the issue and potential solutions. I used the Social Construction of Technology (SCOT) to better analyze this system and the various interactions within it. Recognizing the relationship between doctor and patient will help improve the medical design and implementation of devices and treatments. SCOT discusses how the social group using the technology will determine its function. Therefore, understanding the various needs of the stakeholders will result in more efficient treatments.

To analyze this research, I conducted interviews of active medical providers to identify any disparities among the technology and other treatments available to those with disabilities. Through the direct observation of a primary stakeholder, I gained insight into the medical provider's specific role within the doctor-patient relationship and the associated treatment outcomes. In addition, I examined previous surveys and interviews performed by studies regarding personal opinions on healthcare. I also researched prior literature and legislation related to people with disabilities and the disparities they experience. Through analysis of these methods, the main factors affecting healthcare are medical training, personal knowledge and biases, and federal regulations.

My technical and social aspects were both related to the improvement of those with disabilities. My technical project enhanced data collection for the development of a motorized walking aid. My STS research examined the disparities that people with disabilities experience when trying to receive healthcare. When considered in concert, all-encompassing advancements surrounding the lives of the disabled will be observed.