

Thesis Project Portfolio

3D Printed Stroke Rehabilitation Exoskeleton Design

(Technical Report)

The Ethical Impact of Body Enhancement Technology

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science

University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

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Sociotechnical Synthesis

In my capstone, it is the goal of our team to support stroke surviving patients. Through research, some studies showed that many stroke surviving patients suffer paralysis. Understanding this, our team decided to create a 3D printed and pneumatic exoskeleton that will support patients with rehabilitation. The overall goal of the exoskeleton is to be 3 degrees of freedom, cheap, open sourced, and accessible to all. Creating the 3D printed exoskeleton will address a social problem of healthcare in the US. Many citizens struggle with healthcare, whether it be too expensive, the options are inadequate, or they just don't have any insurance. We address this problem by creating this exoskeleton. There is a list of societal problems that can be addressed and created with this technology. Healthcare, insurance, rehabilitation and access are all ideas that this capstone addresses. Some problems are created, such as dealing with corporations as well as releasing open-source information could lead others to use the product in the wrong way for wrong reasons. It is important to consider these social dimensions in order to truly release a successful product. Successful can have many meanings, but our team defined successful as a "working product that addresses a problem, while being available and easy to use for those who need it the most". With this in mind, my STS research paper will focus on the uses of body technology, and the complex relationship between communities and new releasing technology. The theories I use are Social Construction of Technology (SCOT), as well as Ethics of Care. Using SCOT, I address the relationship created between communities and technology to analyze who drives the relationship and how the entire community can make the relationship better. Ethics of Care will be used to understand the engineers' perspective when creating these technologies, and how engineers relate to the community that they are building for. I use literature review and analyzing statistics to conduct my research and to answer the question,

“How will technology affect society, and how as engineers must we build technology so it can be successful?”. In this research, I expect to find community perspectives and underlying problems that have not been conversed publicly enough. I expect to find situations that I have never considered, and continue to increase my awareness and understanding of the complex world we live in. The implication of my research is to bring awareness and open dialogue to the topic of body technology, and how it relates to communities. I’d like to bring together different perspectives so that engineers can have a better understanding when building for communities.