Thesis Project Portfolio

Design and Implementation of Power Walker Related Experimentation

(Technical Report)

How Changes in Music Technology Have Impacted the Industry and Society

(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

Introduction

What do walking and music have in common? Other than relating them through dancing or making a pun involving songs about walking, there is very little to relate the technical and STS projects presented in this portfolio. However, there is a connection: they both center around my personal interest and inability to focus on only one topic when I have the opportunity to discuss both.

Beginning with the technical report, my motivation lies within a personal passion for mobility devices. A member of my immediate family lost a leg due to cancer, but a prosthetic device allowed him the mobility back that he had once lost. My goal as a biomedical engineer is to provide the same service to other families like mine. In this case, I have the wonderful opportunity to help provide critical background research to go toward the creation of a motorized walker. This walker will help return some lost mobility to children with cerebral palsy without forcing them to sacrifice the energy of pushing a large object around. Even though I am not working on the walker itself, I know that my work will make a difference in the lives of these children.

It is difficult to create a seamless transition to a project centered around music distribution and consumption technology, but music is another passion of mine that I do not often get the opportunity to explore in an academic manner. It is fascinating to see how people first consumed music during the age of the phonograph to the easy and accessible streaming that is used today. Since music is such an important part of my life, exploring its history helps to better understand why it works the way it does today and the effects of music technology on American society and culture.

Both topics explore how technology can affect society from a child being able to walk to machinery that produces music. Discussing both topics within this portfolio helps me explore what I am passionate about and share the information with the readers.

Summary of Technical Report

People often take the ability to walk for granted. What is such a natural activity to most people is not always available for children with cerebral palsy to the degree that children without a motor disorder would experience. The longitudinal goal of this project is to provide a motorized walker to children with cerebral palsy to minimize energy expenditure from pushing around a walker. This paper discusses a method of experimentation that will encompass just a portion of this massive endeavor. From pulleys to load cells, this project designs and implements a laboratory set-up that will provide a forward force to a person walking across the floor. This set-up will be used to test if providing a certain percentage of a person's body weight as a forward force will reduce energy expenditure. This design begins as a proof of concept and then grows into a fully formed system that is adjustable to people of various weights during experimentation. If a force value can be confirmed, then the walker will be programmed to provide that force to the children to reduce their energy expenditure in day-to-day life. The results from this experimentation could also be generalized to other mobility devices so that people with motor disorders can walk in the way many others take for granted.

Summary of STS Report

Is it possible that the inventor of the phonograph could ever have foreseen a future filled with music streaming and at-home music production? The music industry itself has changed drastically since the phonograph's invention in the 1800s – jumping from technology to

technology that revolutionized how music was made, recorded, distributed, and consumed. This has, in turn, had an immeasurable effect on societies and cultures across the globe. This paper aims to answer the question: how has the changing technology used to consume and distribute songs impacted the music industry and society as a result, specifically in the United States? This goal will be accomplished using the actor network theory to conduct a thorough exploration of the music industry network at the time of a couple major technological advancement relating to music distribution and consumption. This paper provides crucial insight as to how different technologies have changed the industry, and in turn, changed society. By understanding this, engineers can better predict the effects and impacts of future music technologies. This knowledge will also illuminate the role that music has played on American culture to raise understanding on how music shapes culture. Artists and producers can use this information to better understand the possible impacts of their music on the world around them, and consumers would understand their role in a societal sense.

Reflection

By working on both of these projects simultaneously, I was able to broaden my thinking past its normal application. In one project, I employed rational, logical thinking to problem solving. I spent time analyzing forces and physical concepts through an engineering and design lens. With my STS project, I explored a more creative type of thinking to analyze how technologies play a role in society. I likely would have reached the same conclusions had I done the project separately, but by doing them together, I began to see how engineering can play a role in my passions. Had I done them separately, I likely would have still separated music and mobility devices as left and right brain topics that cannot mix. Completing these two projects

simultaneously eradicated this assumption and challenged me to explore engineering outside the stereotypes I had previously held about my major.