

**Thesis Project Portfolio**

**The Air Guitar: Developing a Cost-Effective Digital Guitar**

(Technical Report)

**Saved by the Dell: A Study of Technology Based Music Classes**

(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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Department of Electrical and Computer Engineering

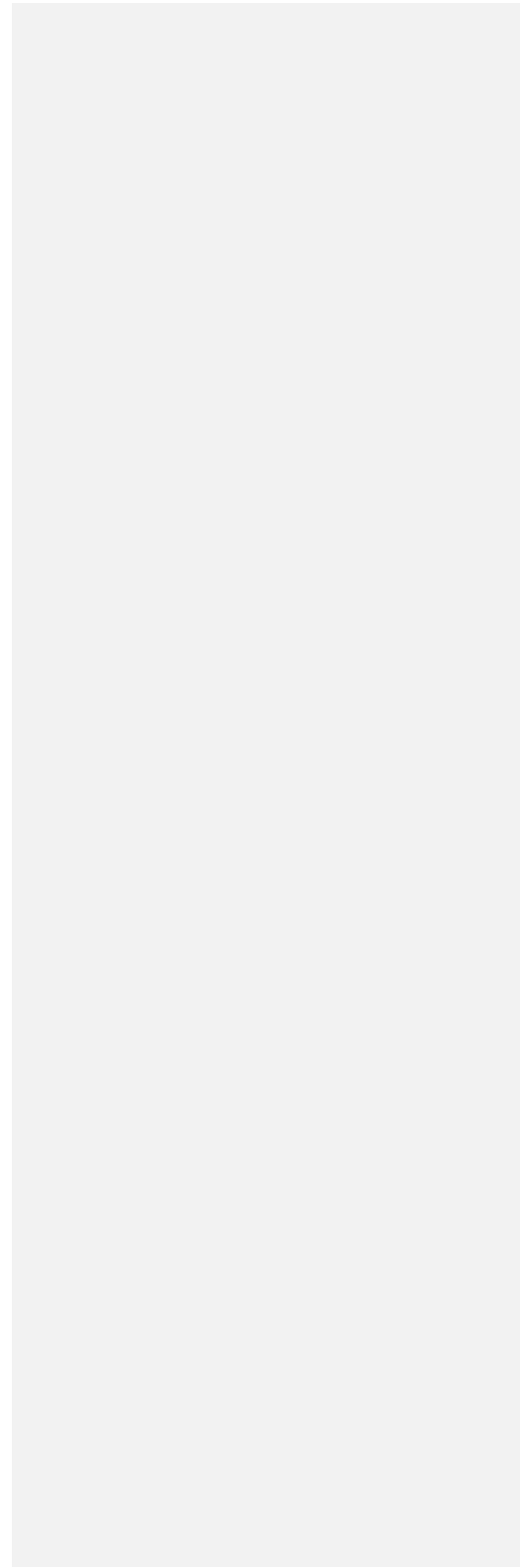
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## Sociotechnical Synthesis

“All we have to decide is what to do with the time that is given us.” (Tolkien, 2006, p. 19).

This quote from *The Lord of the Rings* captures the essence of pursuing an engineering degree at the University of Virginia. From “Intro to Engineering” and declaring a major to late nights at Thornton Hall and eventually completing your respective STS research and capstone projects, the University generates a myriad of challenges and opportunities for learning and growth. I decided to spend my time at UVA volunteering at Albemarle High School mentoring students and coaching. Listening to at-risk students explain the importance of music production classes to their personal and academic development inspired both my STS research and capstone project. It was neither my involvement in various engineering societies, nor my electrical engineering curriculum that inspired my final engineering projects. Instead, looking to my surrounding community and culture allowed me to see the world and the needs of the people in it from a new perspective.

High school education was no longer seemed a means to getting into the best college, but rather an important experience that could benefit greatly from sociotechnical innovations, especially in the budding technology-based music curriculum. This development occurred over the course of my four years in Charlottesville, but I did not notice it happening until I started the sociotechnical problem definition process in STS 4500. I could have finished my capstone project with an entertaining invention, but my STS research guided me along a path of discovery as to why I chose to make a digital guitar for use in music education. My capstone project brought about this question: Is technology beneficial or detrimental in education? Then, my STS research sought to use actor network theory to acknowledge and respond to that question.

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Unbeknownst to me, I was developing my thesis through my cultural experience in Charlottesville, but I needed STS to draw out and organize my thoughts into a research paper.

To future engineering students, I offer this perspective: Engineering education provides all the tools necessary to developing a technical solution to a problem, but community and cultural experiences shape your ability to frame and solve sociotechnical problems. So, learn your partial differential equations, fluid dynamics, and solid-state physics, but remember to stop and look around beyond yourself at the vibrant culture surrounding you because that is where you understand the “socio” portion of a sociotechnical problem. Remember the words of Tolkien when you look to start your STS research and capstone projects because your time at SEAS is limited and it is up to you how to spend it.

I would like to acknowledge and thank my technical advisor Professor Harry Powell for providing me with knowledge, funding, and a space to accomplish my capstone project. Furthermore, I thank my capstone team members: Karan Chawla, Erik Haukenes, Hua Uehara, and Josie Li, for working diligently with me to complete our capstone project. Lastly, I acknowledge the staff and students at Albemarle High School for innovating the classroom and being the source of inspiration for my STS research paper.

Works Cited

Tolkien, J. R. R. (2006). *The lord of the rings*. Boston: Houghton Mifflin.