Thesis Portfolio

VOCAL HARMONIZER: REAL-TIME HARMONIZATION USING FREQUENCY IDENTIFICATION AND AUDIO SIGNAL MANIPULATION

(Technical Report)

The Decline of Music Education: A Predictive Analysis

(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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Spring, 2021

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Sociotechnical Synthesis

The Capstone technical report and the STS Research report described in this paper are related by the concept of music. While there is not a strong connection between the two, both have musical origins and were both inspired by the difficulty of music performance during a pandemic. The Capstone project was to create a vocal harmonizer, which allowed for a single person to sing into a device that let them harmonize with themself. The goal of this project was to give the user the experience of singing in a group, even when alone. The STS Research paper evaluated the current state of music education, specifically during the pandemic. The research included the various technologies available to educators to improve the virtual learning process. Both projects were successful, and both projects emphasized the importance of music.

The Capstone project involved designing hardware that could take in a user's voice, let them play a piano keyboard, and output their voice modulated to the keys played in real-time. The hardware and software for this system were designed and implemented, and this process is recorded in the technical report. The project was successful, and the system was properly built.

The STS Research paper is an analysis of the current state of music education. The two biggest factors it discusses are the rise of STEM education and the COVID-19 pandemic. The paper discusses the difficulties of virtual learning and the different technologies available for teaching music virtually. The paper concludes with remarks on the best solutions found for educators during virtual teaching.

Both projects were written about music-related topics, yet the two projects were very different. The technical project taught me about creating a project with my own requirements, and then following through with those requirements. The STS project taught me how to thoroughly research a very narrow topic, and use that research to form new conclusions.