

Sociotechnical Synthesis

DESIGNING A COST-EFFICIENT PROGRAMMABLE MULTI EFFECT PEDAL FOR
ELECTRIC GUITARS

(Technical Paper)

THE TRANSFORMATION OF THE MUSIC INDUSTRY DUE TO TECHNOLOGICAL
ADVANCEMENTS

(STS)

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Music is a piece of art form that has evolved with the progression of society. A major factor of its progression has been the technological innovations that have taken place, especially within the last few centuries. One piece of technology that has impacted the music industry, and is commonly paired with electric guitars, are effect pedals. While current effect pedals are a great way to improve your sound, multiple limitations arise when chaining multiple effects together, such as bulkiness of hardware, potential loss of noise in the chaining process, and high cost. After doing a thorough analysis of current effect pedals out in the market, for my technical project, my Capstone group and I designed a cost-efficient programmable multi-effect pedal. This inspired my STS Research, which had a goal of having a better understanding of how other technological advancements impacted the music industry. Therefore, for the STS Research, “The transformation of the music industry due to technological advancements”, I had the opportunity to do a thorough analysis of both the positive and negative impacts of various technologies in the music industry.

The technical portion of the project was centered in designing the multi-effect programmable pedal. The engineering principles that I learned from various electrical engineering and computer science courses in UVA were utilized in the development of the effect pedal. The final design of the effect pedal consisted of 4 main components: input stage, effect processing stage, output stage, and power supply stage. The final output of the project was a fully enclosed pedal with a footswitch that was able to process the incoming guitar signal, filter it, sample it at our desired rate, add a digital gain/drive effect to the signal programmatically, and then output it to the amplifier.

In my STS research, I evaluated various scholarly articles, and datasets about different technologies in the music field and how it has shaped music within the last few centuries. The main technologies that were highlighted in my research were the phonograph, multitrack recording, effect pedal, cassettes, CD's, MP3, and streaming services. My STS research in these technologies, showed that the music industry benefited in various ways, such as improved production, easier promotion, better distribution, accessibility, and the advancement and emergence of new musical genres. However, in the same light, many of these technologies have caused harm financially for the industry, due to issues such as piracy that came to rise with advancing technology.

Overall, both projects were a great learning experience. From the technical project, I was able to actually implement the engineering process which we learned throughout college. In addition, I was able to interact and get very familiar with technologies such as Multisim, Ultiboard, and Code Composer. The biggest obstacle for the completion for this project was time, which was only a semester for Computer Engineers. Due to that, the only successful effect we were able to add to our multi-effect pedal was digital gain/drive effect, which was one of the 4 effects that we initially planned. The STS research project really opened my eyes to the different impacts technology has had in the music industry. It showcased that technology is always evolving, in positive and negative ways. Therefore, it's very important for people and industries to learn to adapt to these changes so that they can mitigate potential downsides of the technology.