

Thesis Project Portfolio

Generative AI Microfrontend Chatbot Development

(Technical Report)

The Impact of AI-Generated Music on Human Creativity in the Music Industry

(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, 2025

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Prospectus

Artificial intelligence (AI) is defined as the field of research in computer science dedicated to the development of algorithms able to simulate human intelligence, with the ability to perform tasks such as visual perception, speech recognition, decision-making, and translation between languages. The term “artificial intelligence” was initially coined in 1955. The idea originated from Alan Turing, who created the Turing Test, a method for determining a computer’s ability to think like a human by evaluating how it generates human-like intelligence. In the years since, various projects involving autonomous machines have been developed, including industrial robots (Unimate), chatterbots (ELIZA), autonomous vehicles (The Stanford Cart), and many others. In the years from 1997-2011, more well-known creations were discovered, including inventions such as Deep Blue, Mars rovers named Spirit and Opportunity, and Apple’s development of Siri, the virtual assistant available on iOS devices. As AI continues to improve, the scope of AI applications’ capabilities will continue to broaden. For example, AI generation has expanded to various artistic industries such as music and art. Specifically, AI-generated music platforms have introduced a new era where compositions can be created in seconds based on simple text prompts. Compared to the years of training and creative dedication that musicians and composers invest in, generative AI can dramatically shorten the production time of music, which calls into question the value of human expertise in a field increasingly influenced by automation.

The STS portion of my thesis analyzes the impact of AI-generated music on commercial production, specifically on the careers of composers, producers, and musicians through the lens of the Social Construction of Technology. Using the SCOT framework, I conducted a discourse analysis on relevant resources from the past 15 years, including existing surveys, news articles, and research publications. This analysis focuses on the narratives and ethical concerns raised by

industry professionals to provide insights into how AI is shaping creativity and labor in music. Through qualitative analysis, I identified recurring themes and examined the unique ways AI affects different sectors – composition, performance, and production. This research explores not only the practical effects of AI but also the larger societal and ethical implications of these technologies. I structured my findings on three concerns: artistic authenticity, economic sustainability, and legal regulation. While AI undeniably offers new tools for creativity and innovation, it also challenges the traditional ideals of artistic authenticity and musicianship, economic and career opportunities, and legal frameworks. As a composer, producer, or musician, it is important to adapt and integrate AI into their careers by leveraging its strengths while preserving the unique qualities of human creativity and performances that audiences will always value.

The technical portion of my thesis reflects on my internship experience in the summer of 2024 at General Dynamics Mission Systems (GDMS). My Custom Applications team was assigned with the task of creating a previously nonexistent generative AI chatbot for company-wide use to improve productivity and scalability. With the rise of ChatGPT, Copilot, and other large generative AI chatbots, it would be beneficial for GDMS to have access to similar tools. However, as a government contractor, GDMS is unable to utilize the commercial AI tools since the chatbots are continuously being trained on publicly available information. Through design and development, my team and I utilized Python for the backend of the tool and Angular for the frontend. The primary function of the AI chatbot was to assist employees in basic tasks and improve productivity across the board. Our initial user testing was conducted within a small, controlled environment consisting of employees from the IT and engineering departments. Early results showed promising improvements in productivity. The chatbot's ability

to pull and generate information quickly and accurately was highlighted as a key benefit and great success within the company. Moving forward, several areas of improvement need to be made in order to push the fully functional chatbot for broader company use. With the ongoing improvements, the generative AI chatbot has the potential to revolutionize how GDMS employees approach their daily tasks, creating a more streamlined and productive work environment.

Overall, my combined experience with the Custom Applications team at GDMS and my STS research on AI-generated music has given me valuable insights into both the advantages and challenges of AI. Through my research, I analyzed how AI-generated music is reshaping creativity, labor, and ethical considerations within the music industry. Simultaneously, my technical work at General Dynamics Mission Systems allowed me to witness the practical advantages AI can bring to professional environments. Together, these experiences highlight that while AI offers powerful tools for innovation and efficiency, it also presents critical challenges that require careful consideration and response. Moving forward, it is essential for industries to balance the benefits of AI with a commitment to preserving artistic authenticity, economic displacement, and ethical responsibility.