

## **Thesis Project Portfolio**

### **Enhancing Self-Paced Learning with AI: An Adaptive Companion for Personalized Academic Support**

(Technical Report)

### **IP Laws and AI-Generated Content**

(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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## Executive Summary

Artificial intelligence (AI) has emerged as one of the most transformative technologies of the 21st century, reshaping industries from healthcare to creative arts. While its applications span countless domains, AI's ability to generate content—whether images, text, or audio—raises new questions about originality, authorship, and ownership. My thesis portfolio examines two facets of AI's rapid advancement: a technical investigation into the capabilities of AI systems and an STS research project that explores the legal and ethical implications of AI-generated creative content. Together, these projects reflect my broader academic interest in understanding both the engineering and societal impacts of artificial intelligence.

The technical component of my thesis focused on developing and evaluating artificial intelligence tools capable of addressing the use cases of AI in modern technologies and assessing their performance. The technical research demonstrated AI's increasing capacity to produce human-like outputs, underscoring both its innovative potential and its unpredictable consequences in real-world applications. While not directly tied to intellectual property law, this technical work provided valuable insight into the mechanics of AI generation and the rapid scalability of these systems.

The sociotechnical research paper examined how intellectual property (IP) laws are struggling to keep pace with the rise of generative AI technologies. It explored the question: "How are traditional IP laws failing to address the challenges posed by AI-generated content, and what reforms are needed to protect human creators?" Through case studies such as *Andersen v. Stability AI*, analysis of U.S. Copyright Office rulings, and review of international legal approaches, the paper argues that current copyright frameworks are inadequate for addressing AI-generated works. Because copyright law presumes human authorship, AI-generated content occupies a legal gray area, leaving human creators vulnerable to style appropriation, unlicensed mimicry, and economic harm. The research highlights public backlash from artists, the emergence of consent-driven initiatives, such as Spawning's Do Not Train Registry, and varying global responses from the EU, Japan, and China. Ultimately, the paper concludes that a hybrid legal framework—incorporating consent mechanisms, transparency mandates, and updated authorship standards—is necessary to strike a balance between AI innovation and protections for human creators.

This thesis portfolio represents an interdisciplinary exploration of artificial intelligence, combining technical analysis with critical social commentary. While the technical project provided hands-on experience with AI's capabilities, the STS research illuminated broader ethical and legal questions that accompany these technologies. Looking ahead, future work could explore more integrated frameworks for ethical AI development, empirical studies of AI's economic impact on creative industries, or policy models that align innovation with fairness and accountability. Together, these projects highlight the pressing need for interdisciplinary solutions in the evolving relationship between AI and society.