

Thesis Project Portfolio

Proposing a New CS Course: Modern Computing and Security Practices

(Technical Report)

Sustainable Technology Development in the Corporate Sphere

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science

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In Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

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Sociotechnical Synthesis

As a Computer Science major, my core education has taught me much about the history, methods, and applications of computing as we understand it. However, no curriculum is exhaustive, and there are many social ramifications of the modern, digitalized world that are not discussed as thoroughly as they could be amongst students. Serious analysis of security issues, ethics, and social and environmental effects surrounding technology and computing is critical, both now and looking forward. My two areas of research work to accomplish these goals in different ways.

The technical project consisted of proposing and designing a new course for the Computer Science curriculum at UVA. My group decided to take topics that are briefly mentioned in several CS courses, such as practical security methods, ethics of software design, and the consequences of cryptocurrencies, and build a course that dove deeper into those important topics to today's world. As this was a course proposal and not an entire design plan, we created several weeks' worth of content including lectures with unique subject matter, interactive and engaging homework assignments, and assessments to ensure student comprehension. To lay out the rest of the course, we drafted a full syllabus to cover the rest of the intended material for a semester-long course.

My STS research focused on the consequences of technological corporations on efforts towards a more sustainable world, both societally and environmentally. I sought to explore how global tech manufacturers, primarily Apple Inc., both succeed and fail in integrating sustainable practices into the design, strategy, and advertising of their products. The technology market is quickly becoming oversaturated with iterative yearly releases, and it is crucial that those with the most influence take action to develop sustainable infrastructure and practices that consumers and other manufacturers can follow.

Our technical project was a success; we produced detailed course materials on caliber with a UVA CS course. With more time, research, and background knowledge, we are confident that this course could be fully developed into a semester's worth of content and could even be seriously considered as an addition to the actual curriculum! In my STS research, I believe I effectively brought to light the current state of sustainable efforts, spearheaded by groups like the United Nations, and marketing and production practices of large technology corporations. Synthesizing the two areas together showed that there are areas where Apple and other companies successfully integrate sustainable ideals into their production strategies, but there is also room for growth if global sustainability efforts are ever to be fully realized. More time spent researching this field would help discover more specific, tangible changes companies can undergo to forward societal and environmental progress.

I would like to thank my technical project partner Caroline Ehler for her invaluable efforts in building our course from the ground up, my friend and colleague Andrew Taylor for his input and wise council into both areas of my research, and Professors Aaron Bloomfield, Jack Davidson, and Sean Ferguson for their guidance throughout the entire thesis process.