Thesis Project Portfolio

Proposing a New Course: Modern Computing and Security Practices
(Technical Report)

**An Analysis of the Failure of COVID-19 Contact Tracing Apps and How Society
Determines the Technology's Demise**
(STS Research Paper)

An Undergraduate Thesis

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

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Sociotechnical Synthesis

As technology continues to advance, security becomes a rising issue. In the midst of the coronavirus pandemic, cybersecurity has been challenged and pushed to limits with the rise in the number of people working from home. The STS Technical Report and Research Paper dive deeper into how security plays a part in the UVa Computer Science curriculum and the adoption of technology, respectively.

It is imperative that students at UVa are taught the most modern security practices if they are to successfully program securely, especially in times of crisis like the pandemic. We do not believe that the current UVa Computer Science (CS) curriculum teaches the most relevant security practices and introduces ethics too late in the curriculum, and so we have proposed a new computer science course covering modern security practices and ethics, found in our STS Technical Report. Course material is provided including lectures, homeworks, quizzes, readings, and a syllabus. The goal is that the proposed course would be considered, modified if needed, and then adopted and integrated into the UVa CS curriculum to be offered as an elective.

Additionally, regarding security, the pandemic has brought about the new technology of contact tracing apps. The STS Research Paper analyzes the adoption of the COVID-19 contact tracing apps, how society determines the technology's success or failure, and reasons why the technology may be considered a failure. The Social Construction of Technology STS Framework is used for the analysis, along with its facets of design flexibility, relevant social groups, and rhetorical closure. The goal of the apps was to get enough of the population to use them to track and control the spread of the virus, but only a few countries with the money to produce the apps and more control over their citizens were able to reach enough of the population. America was unsuccessful reaching high enough adoption numbers. Factors such as concerns with data privacy, surveillance, and the effects of the crisis are the major contributing factors as to why the

adoption of contract tracing apps failed. If they are to succeed in a future pandemic, it is recommended to introduce the technology outside of a global crisis when the population will have less heightened caution or suspicion about these matters.

Students must be prepared to contribute to the ethics and security of future computer systems and need the proper curriculum to learn to do so, especially when we know global crises can impact security. The STS Technical Report's potential contributions would be a new CS course that bridges the gap we have identified in the curriculum so students can better prepare for the workforce and program with modern security knowledge and practices. As the STS Research Paper presents, it is also important to understand how security and the state of the world can impact adoption of technologies so we can better prepare for the next global health crisis when another technology like a contact tracing app can be more widely adopted.