

Thesis Portfolio

How a Web Application can Better Serve Students during Lockdown
(Technical Report)

**How to Prevent Software Flaws in Finance Industry? Using ANT to Analyze the
Relationship Between Software Engineers and Products**
(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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Sociotechnical Synthesis

After decades of rapid development, computers have become an indispensable product in every industry. Although computers have brought much convenience to human society, they also have brought to public computer users some damage, such as cyber-attack and system vulnerabilities. Because they serve as a key role in software development, software engineers have great responsibilities in responding to software product vulnerabilities. In summary, software engineers do not only implement software to help companies make profits; they are also responsible for preventing software flaws before they are deployed.

The technical thesis discusses the development process of a web application team project about how to better serve the local community during the COVID-19 pandemic period. The website has three major features: an online food ordering system, detailed information about Charlottesville public institutions, and a system to rate local businesses. These features helped local restaurants survive better during the COVID-19 pandemic and provided students with more specific information about Charlottesville public service institutions. This web design project was my first formal and professional software development group project. The epidemic has brought much inconvenience to UVA students and caused great economic loss to many small restaurants in the Charlottesville area. However, using our website has provided UVA students not only more dining options and ability to obtain the most frequent updates of various local public facilities, but also has helped local small restaurants increase their chances of survival through an online food ordering system. In addition, this web application experience has helped me considerably to get a summer web developer internship offer.

The STS report focuses on analyzing the software vulnerabilities in the finance sector and the strategies to prevent them. In the past thirty years, society has benefited from computer technology. However, we also cannot deny that there was a lot of damage caused by software product vulnerabilities. To illustrate, the report talks about the history of the rapid development of computers in the past thirty years, the vulnerabilities of software applications in the finance sector, and three different ways to prevent computer software flaws in the financial industry, which will help to better understand the connection and relationship between software engineers and software products. Using Bruno Latour's article "Actor-Network Theory" to analyze the connection and relationship between software engineers and software products helpful and related to the research topic, the thesis emphasizes and focuses on the connections and relationships that are being made and remade between human and non-human actors. To answer the research question, I picked this method because it requires me to examine all of the involved actors' views and interactions with one another, such as software engineers, software products, and financial businesses. The outcome of this report is to help people understand the importance of computer science in our society, to be aware of the necessity of computer security, and to learn the strategies to prevent software vulnerabilities.

There are many connections between the technical report and the STS thesis report. First, the STS thesis points out what the processes are that a software engineer should follow to develop an application; whereas, the technical report discusses how the development team implemented the web application following the process. Second, the STS thesis states the benefits of using Python building an application; whereas, the technical report illustrates the implementation phases using Python programming language.