Thesis Project Portfolio

Secured Card: Using Frontend to Increase Business and Improve User Satisfaction
(Technical Report)

Managing Cryptocurrency's Impact in Darknet Marketplaces
(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

(Executive Summary)

Researching and Working with Legal and Illegal Online Transactions

Legal and illegal transactions online make up a significant portion of the global economy. The volume of credit card and cryptocurrency transactions are increasing rapidly in the digital space. I analyzed and worked with these systems for my STS research and the technical portion of my thesis. For my technical piece, I interned at Capital One last summer and worked on the front end of their sign-on page, aiming to decrease calls to the help center, update old software, and improve the flow of the website to onboard more new users. For my STS research, I researched cryptocurrency and darknet marketplaces focused on the questions of why are crypto and darknet markets so intertwined, and how should society regulate potential harmful technologies that anonymize users?

The work done for the technical portion of my thesis produced a more eloquent web design for the Capital One Credit Card page. In regards to education and learning about large-scale code bases, this was my first time, as well as most of my team's first time working with an extensive and well-established code base. Even in just editing the site's front end, we studied large-scale computing architecture and how it applied to the sign-on page. Regarding results for the company, by the end of the summer, my team successfully implemented user data tracking, updated software for developers, and redesigns in the front end that aimed to save the help center from getting calls from confused users.

In my STS research, I analyzed the sociotechnical relationship between cryptocurrency and dark web marketplaces. I discovered that cryptocurrency is crucial for these markets. Crypto

allows anonymized transactions and money laundering. In other words, consumers can buy, and drug dealers can profit without government interference. Regulation of these markets is complex as governments cannot shut down crypto or darknet technology because the people who use these technologies cannot be tracked. Therefore, in thinking about potential ways to govern this system, I analyzed how other hard-to-govern systems, like cheating in games and illegal hunting, implement their rules and incentives to minimize harm.

While my projects were loosely connected by finance - one is coding for a sign-on page, and the other is analyzing illegal internet transactions - both have changed my perception of economic market forces. Illegal transactions are anonymous, with no one even able to look at specific user data. Credit card transactions are the opposite. Companies spend billions of dollars to observe and capitalize on this data to improve their products. In a world where data leads to innovation and better user experiences, it is clear why legal markets accepting cryptocurrency are growing much faster than illegal ones. Viewing the architecture of both systems makes it much more understandable why this is the case.