

Thesis Project Portfolio

Defending Democracy: Cybersecurity in Elections

(Technical Report)

Content Moderation as an Evolving System: A Comparison of Societal Values of Free Speech and Public Safety

(STS Research Paper)

An Undergraduate Thesis

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An Exploration of How Virtues Drive Progress

Technology challenges us to assert our human values, which means that first of all, we have to figure out what they are.

— Sherry Turkle

Humans are driven by values. In fact, every action we take is determined by an internal set of values and our desire to be in compliance with them. Although different people possess different values, a good number of values are shared by many; these traits that are deemed morally and holistically good are called virtues. Society values safety and freedom, for instance. In my technical report, I discuss the prominence of these values in America's election system. In order to maintain public confidence in elections, we strive not only for safe and secure elections, but also fair and free elections. The work done in my internship was an effort to improve the quality of election cybersecurity to fulfill these values. In my STS research paper, I explore how these ideals have influenced opinion on the matter of content moderation. On one hand, there is a value of public safety in the face of hate crimes, whereas on the other hand, there is a value of free speech in the context of algorithms curtailing it. My work aims to deepen our understanding of how these values can be catalytic in driving progress towards technology that better reflects the needs of society.

The technical component of this project details my experience as a local government cybersecurity intern during Summer 2022. Public trust in American elections has been on a sharp decline since the recount of the 2001 Presidential Election and hit an all-time low during the foreign interference in the 2016 Presidential Election. In response, the Virginia Department of Elections created the Locality Election Security Standards (LESS) to measure compliance with best practices each year. In 2022, the Department created the CyberNavigators Internship Program, an initiative designed to improve compliance scores in locality election offices throughout the state. My team approached this task by researching and developing eight lengthy protocols that ultimately doubled the compliance score in just ten weeks. Fully securing our nation's elections will be an ongoing effort as technology continues to evolve; however, my team's contributions thus far have laid a solid foundation for future growth.

My STS research paper discusses the implications of hate speech moderation on social media. Throughout the paper, I explore the primary arguments for and against moderation to gain a deeper understanding of their origin and reasoning. First, I examine evidence of instances where more moderation would have been beneficial, as well as instances where less moderation would have been beneficial. Following this research, I evaluate each argument through a comparison to assertions set forth by philosopher Noah Carl regarding the harm that comes from stifling debate over taboo topics. This comparison provided a concrete understanding that a middle ground between the two opposing viewpoints must exist and guided my understanding of where it may lie. This analysis of flaws in both arguments, as well as of flaws in the system, is beneficial in that it facilitates constructive conversation surrounding how to create technologies that better reflect the needs of society.

My two projects are seemingly dissimilar; however, this disconnect has actually served to enrich my project in the long run. Seeing the mutual shaping of societal values and technological devices as such a common and prevalent theme in two unrelated areas of research gave me a solid understanding of how said values drive technological progress. Additionally, analysis in both projects from a removed perspective allowed me to fully grasp the holistic systems at work. For instance, in the case of my technical project, I viewed the election system as all of the voting technology, the voters, the poll workers, and the locality staff. Similarly, in the case of my STS research, I viewed the content moderation system as the algorithms, the companies that implement them, and the users that are affected by them. In separating the actual technological device from its users and uses, it becomes far easier to foresee the consequences of releasing the technology. It is imperative that we understand the implications of the systems we create in order to ensure ethical responsibility in engineering.