Thesis Portfolio

A Technical Analysis of Issues Plaguing the Data and Information Technology Systems of Political Campaigns in the United States
(Technical Report)

Autonomous Vehicles: An STS Perspective into the Development, Production, and Deployment of Autonomous Vehicles in the United States
(STS Research Paper)

An **Undergraduate Thesis Presented to the**

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Sociotechnical Synthesis

For my STS research project and technical research project, I chose to investigate two different topics. As I conducted my technical project research primarily during the Fall 2020 semester, I chose to pursue a separate topic of interest for my STS project, which I began during the Spring 2020 semester. While the STS research project investigated the development and deployment of autonomous vehicles within society, the technical research project analyzed the current state of information technology infrastructure used within political campaigns. My primary motivation for choosing autonomous vehicles as the STS research topic was the ability of STS frameworks to provide further insight into a traditionally highly technical topic. While an emerging technology from the computer science and engineering fields, autonomous vehicles also present many interesting social and political debates. What originally piqued my interest in autonomous vehicles is the disparity between public trust of autonomous vehicles and statistics showing that they are at least marginally safer than human-driven cars. I believed STS frameworks would be able to explain this disparity and serve as a useful analytical tool to describe the vignette between positivist and constructivist models of thinking. In other words, I planned to use STS frameworks to explain the difference between the typical engineering mindset trusting that the technology is safer and the societal mindset of general distrust toward the technology. Thus, the purpose of my STS research paper is to provide insight into what factors affect society's trust in the emerging technology of autonomous vehicles and predict what the most successful strategy for the future would be.

In my STS research, I employed several frameworks to analyze the development of autonomous vehicles. One framework that stood out in particular was the sociology of science, which is the theory of how facts are socially constructed concepts, not purely scientific

statements. I found that the concept of safety is socially constructed—pure statistics from engineers are not enough to influence the way general members of society rationalize. Instead, autonomous vehicles and the technology powering them should be slowly introduced over time in order to build user trust. For example, automatic emergency braking and lane-keeping assist are common features in modern cars, which have built trust over time by demonstrating their effectiveness to users in the real world. As these technologies slowly expand and advance, autonomous driving will be reached through stepping stones, not a single leap. In addition, I found that a multitude of sociotechnical actors influence the development of autonomous vehicles. Besides the manufacturers themselves, a network of actors including regulatory boards, drivers, pedestrians, and American car culture have contributed to the specific way autonomous vehicles developed. In my technical research, I concluded that centralization of infrastructure is the key to robust, secure, and effective campaign technology. For applications such as online fundraising, data analytics, and data storage, centralized infrastructure improves security and the pooling of data improves accuracy and the depth of analytics that can be generated. As modern campaigns move into the 21st century and respond to the transition to online platforms, campaigning in the midst of a pandemic, and low-propensity voters, maintaining updated, efficient, and flexible infrastructure is paramount.

After completing both research projects, I am satisfied with my decision to pursue two separate topics. While campaign technology infrastructure certainly has important societal implications and autonomous vehicles are an interesting technical topic, the opportunity to research two separate topics in depth allowed me to learn more than if I had only chosen a single topic. As someone who's interested in politics and was vaguely familiar with the topic before the research began, learning about the technical aspects of campaigns has led me to appreciate the

amount of work put in the background to run a successful campaign. The topics I researched are also of significant social importance, as learning how to encourage the most amount of people to vote effectively is ultimately paramount to preserving our democracy—participation by as many people as possible in our elections is a virtuous goal. On the other hand, I also appreciated the opportunity to learn about the societal lessons and implications of autonomous vehicles. Anecdotally, I've had non-engineering friends question the efficacy or safety of autonomous cars, while I as an engineer have rarely held many reservations. What is a straightforward statistic for many engineering-oriented minds is not how society interprets information. Learning about how facts are interpreted and viewing technology through social constructs was an enriching experience.

Lastly, I would like to acknowledge all of the people who have helped me through the process of assembling this thesis portfolio. Both of my STS professors, Toluwalogo Odumosu and Richard Jacques, provided insightful feedback throughout the writing process. Professor Nada Basit, my technical advisor, provided support and guidance throughout the research and writing of the technical project. Kevin Dang, my research partner, contributed to the research and writing of the technical portion of the thesis.