

Thesis Portfolio

Improving Pedestrian and Bicyclist Safety and Comfort Along the Water Street Corridor

(Technical Report)

The Impact of the Transportation Security Administration (TSA) Security Technologies on Passenger Privacy and Ethics Concerns

(STS Research Paper)

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Sociotechnical Synthesis

The Capstone and Science, Technology, and Society (STS) projects described in this paper are not connected nor related. The STS topic was chosen because of the author's interest. There is a personal connection to and interest in aviation for the author, therefore the STS topic is based upon airport security, as described below. Furthermore, the STS topic is currently relevant because airport security procedures are tackling the field of biometrics. This technology is not widely understood by the general public and could pose security risks, which is the foundation for the STS research question. On the other hand, the Capstone project is motivated by the city of Charlottesville, Virginia and the Systems and Information Engineering Department at the University of Virginia (UVA). Charlottesville is currently facing bicyclist and pedestrian crashes in one of its downtown corridors, therefore new roadway designs need to be created. The focus of the Capstone project is to construct, test, and recommend a roadway design that increases bicyclist comfort and safety.

In terms of the Capstone project, the Virginia Department of Transportation (VDOT) has identified the West Water Street corridor in downtown Charlottesville as an area of focus for bicyclist safety due to a high rate of pedestrian crashes between 2012 and 2016. Water Street hosts one of the main bicycle routes in the city; however, there is a high level of traffic stress for bicyclists. Therefore, it is critical to determine pedestrian and bicyclist safety countermeasures. Ideally, Water Street would be able to accommodate vehicles, pedestrians, and bicyclists in a safe and efficient manner. The focus of this project is to research, create, and test alternative roadway designs to improve bicyclist and pedestrian safety in the Water Street corridor. The design team analyzes best practices from other bicycle- and pedestrian-friendly cities to inspire design ideas. Multi-criteria decision analysis is used to choose the best design idea. This one

design is then extrapolated to other similar designs in which one aspect of the main design alternative is changed. The team tests those designs using a virtual reality (VR) environment and biometric data collection. Due to the novel coronavirus and UVA's decision to move all Spring 2020 classes online, a modified version of the user testing plan will be implemented in March and April 2020. User comfort and safety will be evaluated across four different design alternatives. From this evaluation, a recommendation will be proposed to the City of Charlottesville as to what design should be implemented.

In terms of the STS research project, airport security changed forever when the deadliest terrorist attacks happened on American soil on September 11, 2001. To help prevent similar future attacks, the Transportation Security Administration (TSA) was formed. However, there have recently been concerns that the TSA is overreaching its bounds and perhaps violating constitutional rights. This research is important because it calls into question TSA security procedures which is a process that many Americans take for granted on a regular basis. Nonetheless, citizens' constitutional rights are perhaps being violated by invasive technology. Therefore, the research question is: how do TSA security technologies impact passenger privacy and ethics concerns? To answer this research question, documentary research, historical case study, and policy analysis methods are used. Documentary research provides background information to the reader about current TSA policies and procedures. In addition, historical case study and policy analysis methods go hand-in-hand as they build the foundation for the answer to the research question. Essentially, TSA policy is compared and contrasted with passenger testimonies to evaluate a potential breach of privacy. All of these methods are put in the scope of the political technology framework to analyze how a technology that is implemented by a federal government agency impacts the general public. The goal of this paper is to gain an improved

understanding of TSA security technologies and their impact on passenger privacy. This paper strives to spread cultural awareness and edification about possible violations of privacy for something that society takes for granted as a second-nature process. This paper also contributes to a new field within STS that is related to advances in air travel. It also addresses new technologies in the biometric and transportation engineering disciplines.

Although both the STS and Capstone projects are not related and were worked on separately, there are a few takeaways that are important to note. First, even though the topics were different, the way in which research was conducted was quite similar. Learning how to recognize key search terms and identify trustworthy sources is a crucial part of the research process. Also, being able to synthesize information in a clear and concise manner is fundamental for the audience to be able to understand a research paper. In addition, the STS project was an independent project while the Capstone project was a group project. Having the opportunity to work on both types of projects simultaneously was a great way to learn how I, as an individual, work best. It was also a time to practice time management skills and recognize what type of work I want to pursue in my future career. Overall, I am very fortunate and grateful for having had the opportunity to work on such amazing projects and will be thankful to UVA for my learning experiences.