Thesis Project Portfolio

An Analysis of Vehicular Telematics and Geo-Location Data to Maximize Road Safety

(Technical Report)

Failure To Advance and Implement Road Safety Initiatives Due to an Overbearing Institutional Actor: The Case of Red Light Cameras, the New Jersey Government, and the New Jersey Department of Transportation

(STS Research Paper)

An Undergraduate Thesis

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Bachelor of Science, School of Engineering

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Sociotechnical Synthesis

My technical work and my STS research are related to the idea of maximizing road and traffic safety. I have defined road and traffic safety to encompass the safety of all those who use and are impacted by the road. While both my technical project and STS research paper utilize this idea of maximizing road safety, they differ in how they evaluate road safety. My technical project is focused on identifying safety infractions among a fleet of motorists and providing countermeasures. In contrast, my STS research is focused on identifying key actors and their roles in establishing safety in a transportation network. While my STS research differs from my technical project in how road safety should be implemented, both establish the theme of maximizing road safety through various socio-technical means.

My technical project examines the use of telematics data from UVA's facilities management vehicle fleet to identify hotspots on UVA grounds where driver safety infractions occur. Additionally, the project aims to both identify areas where the likelihood of a crash is high and develop a list of evidence-based countermeasures that can be implemented at each hotspot to reduce the likelihood of safety infractions or crashes occurring. My capstone team used data from Geotab, a vehicle fleet management software that uses geospatial data from telematics devices implanted in a vehicle fleet to identify safety infractions. These infractions include speeding, harsh cornering, harsh acceleration, harsh braking, and any reported incidents of crashes. We used a method of data mapping called cluster mapping to identify hotspots on grounds where the density of safety infractions was the highest. From there, we visited each hotspot and developed a list of evidence-backed countermeasures that would have a high likelihood of reducing safety infractions occurring at that location.

My STS research paper also seeks to maximize roadway safety from a socio-technical perspective. My research focuses on the relationships between actors in a transportation network.

The case of New Jersey's transportation network is analyzed and Michel Callon's Actor-Network Theory is used to identify flaws preventing the network's objective of maximizing road safety from being achieved. Actor Network Theory is used to identify actors who are not fulfilling their role in the network. My claim is that the New Jersey government actor prevents the New Jersey Department of Transportation actor from contributing effectively leading to the transportation network failing to achieve its objective of maximizing road safety. My research paper examines the importance of establishing an actor network in which each actor has defined roles that are adhered to. The goal of my research is to examine both technical and nontechnical actors and their impact on road safety.

Working on both of these projects concurrently has added tremendous value to both. My technical project has provided me with a better understanding of how road safety can be quantified and how consequential conclusions can be made by observing telematics data. Similarly, my STS research project has allowed me to understand the impacts that organizations and nontechnical factors have on road safety. My research project helped me identify non-technical factors that contributed to safety infractions in my technical project. Conversely, my technical project allowed me to consider how organizations can impact the implementation of effective technology in my research project. Having developed both projects simultaneously, I have been able to explore road safety from both a macroscopic and microscopic scale allowing for the quality of each project to benefit from each other.