**Sociotechnical Synthesis**

**STS 4600**

**Spring 2021**

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**Aerospace Engineering**

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## Sociotechnical Synthesis

There are over 57,000 miles of roadways that need to be maintained by the state of Virginia and the Virginia Department of Transportation. These roadways are crucial to transportation efficiency and the daily lives of the public. The technical portion of this capstone focused on exploring solutions for transportation infrastructure issues including lack of real time weather data, decaying roadway quality, etc. There has always been a connection between the decaying roadway and public transportation infrastructure in America and the growing economic and social inequality. The sociotechnical portion of this paper seeks to understand the larger economic and social implications of transportation policy on low-income and underserved communities and examine the feasibility and effectiveness of proposed solutions to these issues.

In the technical portion of my project, the peers and I in the Spacecraft Design Course at the University of Virginia were tasked with a problem statement that focused on developing solutions to alleviate weather-related traffic congestion and improving roadway efficiency and safety in Virginia by sending predicted weather and traffic data to roadway users through a combination of the state-of-the-art that includes a combination of spacecraft, aircraft, and ground-based systems. As the project developed, the system became a spacecraft 6U CubeSat with necessary components and sensors to send weather data back to a ground station. A summary of the problem assigned to the real time weather data sub team is contained. Following that, are the findings that emerged from meetings with key stakeholders and subject matter experts, a literature review, and an advanced analysis. The solution requirements, data streams, and solution approach pertaining to this project are included as well.

Beyond the technical side of the transportation infrastructure, it is important to examine the social and environmental implications of transportation policy. Decisions about transportation policy and the funds directed towards it are rarely made with consideration toward low-income communities. American cities and their transportation systems are highly automobile centric with roads created to maximize car speed and capacity. Buildings surrounded by large parking lots, and highways and freeways allowing long distances between work, home, and shopping have become the norm. This system has contributed to staggering economic growth. However, the lack of focus on public transportation and building infrastructure to support has produced disastrous environmental and social impacts. This research focuses on the economic and social implications of transportation policy on low-income and underserved communities and examined the feasibility and effectiveness of proposed solutions to these issues.

By doing the STS portion of the capstone on the ethical and social side of transportation policy inequality, the technical portion was developed with these ideas in mind. Instead of focusing purely on the technical side, we were able to ensure that there was no unintentional inequality perpetuated with our design and that the users were all equally able to access and benefit from the data collected.

The completion of this project would not have been possible without the help of all of the professors, industry leaders, local government officials, and Subject Matter Experts (SMEs) who have fostered a productive and lengthy discussion on how to improve the safety of Virginia's roadways. We are privileged to have this opportunity alongside MITRE, with special thanks to Cj Rieser, Michael Balazs and John Griffith for their mentorship. UVA has also played an instrumental role in facilitating this partnership with MITRE, with a special thanks to Jeffrey Fox

and John Ralston for making this partnership possible. Additionally, we would like to extend our gratitude to Christopher Goyne, our technical advisor, as well as Venkataraman Lakshmi, a Professor in UVA's Department of Engineering Systems and Environment, for helping us identify key issues with Virginia's roadway system and data collection. Christopher Goyne has been instrumental to helping our team explore viable, efficient remote-sensing solutions and has introduced us to many vendors who could help source parts for our solution. Further discussions with other professionals, such as Michael Fontaine of the Virginia Department of Transportation (VDOT), Mike McPherson of KQ9P and W4UVA, Harrison Brookeman of the Charlottesville Albemarle Rescue Squad (CARS), Doug Walker of Albemarle county government, and Christopher Walker of the Norfolk Fire Department, provided invaluable insight into current weather data usage and how the current industry could better serve Virginians. Each individual across these various organizations has contributed greatly towards our solution proposal and we are grateful for the opportunity to learn and cooperate with you all.