Thesis Portfolio

A Space-Based Solution to Improve Roadway Safety and Efficiency in Virginia: Real-Time Winter Weather Data for Navigation

(Technical Paper)

The Ethics of Precision Autonomous Drones in Warfare

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science
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In Fulfillment of the Requirements for the Degree
Bachelor of Science, School of Engineering

Xavier Castillo-Vieira
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Department of Aerospace Engineering

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Sociotechnical Synthesis

Throughout this semester, the combined work on both STS Research Paper, *The Ethics of Precision Autonomous Drones in Warfare,* and my Capstone Technical Paper, *Space-Based Solutions to Virginia's Roadway Problems Real-Time Weather and Traffic Data Integration,* has proven a challenging and enlightening endeavor. The topics themselves are very dissimilar, the STS research explores an ethical debate on autonomy in warfare, while the technical portion is an in-depth design and analysis of a satellite constellation system to integrate weather information into traffic data. Each of the two projects had its own advantages and together, they formed a rigorous coursework that explored both aspects of engineering.

The STS Research Project consisted of no engineering technical analysis. Rather, it explored the ethical and social implications of engineering. This aspect of engineering is often overlooked in modern society, where newer, more efficient technology and development are valued most. Through this research, I learned to consider the risks associated with engineering and how to balance that analysis with actual engineering development and innovation. Most people are invested in the advancement of technology and our society and nation, but this must always be balanced by a diligent analysis of associated risks and consequences.

On the other hand, the Capstone Technical Project was strictly hand on engineering design and analysis. The most important portion of engineering is the technical development and analysis of ideas. This portion of my thesis was fundamental in my development as an engineer. It consisted of a deep dive of a problem to address, analysis of a variety of associated factors, and the development of a solution from the idea phase to a preliminary design review. This portion of the thesis allowed the team to learn all that goes into a large project, from budgeting, to

licensing, to prototyping, and I personally gained a lot of context and appreciation for the magnitude of planning and coordination that goes into large projects.