

Thesis Portfolio

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

Public Understanding of Space: Differences between the Apollo and Contemporary Eras through a Co-Production Framework
(STS Research Paper)

An Undergraduate Thesis

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Bachelor of Science, School of Engineering

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Sociotechnical Synthesis

The STS research paper pertains to a comparison of political and economic actors influencing American society and the public perception of space between the Apollo era and the present Artemis era. Through the use of a co-production framework, which examines the relative impact of economic and political actors on society and of society on space, an understanding of the relationship between space and society will be described. This paper will offer historical context on the rationale for the Apollo and Artemis space programs and the manner in which their framing changed society and captivated the public for different reasons. Through comparison of these programs, it has been made apparent the complexity of analyzing a space program and the motivations of actors that contribute to their establishment. There is no single actor or motivation that rationalizes the need for a space program nor explains the resulting impacts on society. This topic was investigated broadly and further research and discussion is needed that exceeds the scope of this paper. That being said, through investigation of these programs in their respective societal contexts it appears that the dominant influence for the Apollo program was political and that of the Artemis program economic.

The technical report discusses the design proposal of a CubeSat constellation by the students comprising the Spacecraft Design capstone team at UVA. The problem the team was tasked with solving is that of providing real-time weather coverage of snow and ice conditions to improve roadway efficiency and safety in Virginia. Through extensive research and utilization of the engineering design process, the proposed solution of a constellation of 25 6U CubeSats operated through two ground stations at both UVA and Virginia Tech was formed. Satellite data collection and coverage will prioritize Northern Virginia, with a focus on the Capital Beltway

corridor. Potential for expansion to all of Virginia is possible though outside the present scope of the mission due to various constraints.

Both the STS and technical reports touch on the importance of space investment and technology in society. Satellites are one example of the technology that space investment has produced and the ability to monitor and accurately relay weather conditions just one application of satellites in America. Through the process of understanding the political and economic motivators of space and working with a team on the design of a satellite constellation, essentially taking on the role of an actor in present space development, an informed perspective of the working relationship between space and society was formed and touched on throughout this portfolio.