THESIS PROJECT PORTFOLIO

Hypersonic Atmospheric Reentry Deceleration Experiment (HARD-E)

(Technical Report)

STS 4600 Thesis: Takata Airbag Incident

(STS Research Paper)

An Undergraduate Thesis

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Socio-Technical Synthesis: Transparent and Ethical Engineering

Successful, ethical engineering requires balancing honesty as an engineer and openness in your practice. In my technical paper I propose, along with my teammates, a new means for hypersonic testing through the use of CubeSats. In my STS research paper I analyzed the chain of failures leading to the Takata Airbag Incident, in order to determine which parties were morally responsible. Both the technical and STS papers address responsibility and transparent engineering in different ways, but still remain coordinated in their efforts. In what follows I will explain the benefit of studying a modern application of hypersonic research using CubeSat technology, along with the responsibility of developing parties with the Takata Airbag Incident. This paper will address the value in working on these distinct projects in tandem, to gain a better understanding of how to address the issue of transparent and ethical development in the engineering world.

The technical portion of my prospectus takes a deeper look into the possibilities of using CubeSat technology as a cost effective and diverse research platform for hypersonic flight. The success of the proposed mission will allow for better analysis on how a CubeSat functions as a means for hypersonic research, and if it is viable to use for testing in the future. The main advantages of CubeSats is that they are constructed on a modular base using parts that have already been produced, and can be hosted on another spacecraft entering space that can then place the CubeSat into orbit. The low cost of CubeSats makes them an attractive and accessible platform, and could help make knowledge of hypersonics more available to the public.

The STS paper seeks to analyze the distribution of responsibility in the Takata Airbag Incident in order to better understand the roles engineers and developers play in creating safe products. One recurring theme in the analysis of the incident is that the public lacked knowledge

of the issue, and the developers repeatedly failed to be transparent with society. This lack of transparency caused the problem to continue for almost twenty years, and made it difficult for the NHTSA and other regulators to develop a solution. The STS paper finishes by emphasizing the importance of responsible engineering, of which transparency and availability of information is an integral part of.

Working on these projects simultaneously provided me with a new perspective on some of the challenges engineers face every day, and the importance of maintaining transparent and open engineering practice. The technical project has shown me that unconventional applications of technologies and making engineering accessible allows for greater development in the engineering field. The STS analysis of the Takata Airbag Incident showed me how being open as a developer and an engineer can allow for solutions to complex problems, and create ethical pathways to artifact development. Together they illustrate the benefits to both engineers and the rest of society of accessible information. It is important for engineering developers and the society they are ingrained in to work together. By doing this we can allow for more groundbreaking technology to manifest in the upcoming years of our careers.