Corvus: Urban Air Mobility Solutions for Package Delivery
(Technical Report)

Autonomous Vehicles and Virtue Ethics in Societal Experimentation
(STS Research Paper)

An Undergraduate Thesis Portfolio

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Bachelor of Science in Aerospace Engineering

By

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Socio-technical Synthesis: Autonomous Land and Air Vehicles

Both my technical and STS research work with the issue of implementing fully autonomous systems into vehicles. A vehicle that is controlled by a fully autonomous system is a vehicle that relies solely on its own programming in order to maneuver and perform any actions deemed necessary in order to achieve an objective. While both my STS research and technical work are involved with autonomous vehicles, they differ in how they approach the issue of implementing autonomous vehicles. My STS research focuses on the ethical implications of utilizing unproven autonomous systems in an unrestricted, public setting. My technical research consists of the design of an autonomous delivery drone delivery system.

My technical work focuses on the design of an autonomous drone for package delivery logistics. While remote control drones are common, there has never been a wide spread application of fully autonomous drones of any sort. Working with a team of other undergraduate engineers, we designed a drone fully capable of autonomous flight from the ground up. The drone is capable of picking up new packages from an origin point and dropping them off at a destination within an urban environment for a total of two trips, all without any human interaction. Current regulations that are enforced by the Federal Aviation Administration make it difficult to implement autonomous aircraft systems. With our drone design, we hope to prove the viability of autonomous drone systems in a safe and efficient manner.

My STS research focuses on the effects of exposing an immature autonomous vehicle system to the public. I explore this topic within the realm of virtue ethics, and focus on the case

of Elaine Herzberg's death as a result of Uber's autonomous vehicle experiments. Uber failed to practice the virtues of temperance and prudence when introducing their self-driving vehicles into society. This ultimately led to Uber executing an immoral societal experiment. Using evidence from this case, I build the argument that mature application of virtue ethics is essential to the success of an engineering societal experiment. The goal of my research is to explore the relationship between how virtue ethics are practiced and how societal experiments are applied.

Working on both my STS research and my technical research has helped me to understand both projects within a different context. Through working on my technical project, I can appreciate the difficulties that face engineers when designing autonomous systems for use in the general public. It is already difficult to design an autonomous drone just to achieve its main objective, but it is even more difficult and necessary to overdesign the drone for safety and regulations. Through working on my STS research, I realize that I cannot take autonomous systems for granted. I have a much greater understanding of virtue ethics now, and applied that understanding to my work on the autonomous drone. I believe that working on both projects in tandem has helped me to grow as an engineer, as I can now appreciate the design of a technology through both a technical and ethical lens.