Drones are ever present in our current society; from their public use in the war in Ukraine, to drone shows and drone photography, drones have become a technology that has been adopted by many different groups for various uses. They can be used to better protect our nation, increase logistical capabilities, increase agricultural yields, and save lives in humanitarian settings; they are truly a technological medium that can be molded to suit many different applications. In the last decade, overall drone use within commercial sectors has increased exponentially, with projections of around 100,000 new drone-related jobs being created in 2025. Drone usage by the government has also increased by a large margin, with resources being allocated to their implementation into infrastructure analysis and military applications. With the leaps that have been made in both drone development and use, it is clear that in the near future, drones will become even more prevalent, which will result in changes to a variety of different sectors of both our economy and society. Given the prospective drone-filled future that we could live in, it is useful for us to speculate on what this future will look like, how we can utilize drones to benefit our society as a whole, and what steps are necessary take to get there.

The technical portion of this project will focus on the military applications of advancing drone technology for use in national defense. As geopolitical tensions become increasingly unpredictable between the US and other foreign powers, it is paramount that our nation possesses the tools and capabilities to defend against outside threats. This includes the use of ICBMs and airstrikes from enemy nations. Our current solutions to air-based threats are effective but extremely costly; the production of effective interceptors, such as missile defense systems and aircraft, is extremely high and not available in numbers that could defend a vast majority of airspace from a coordinated assault. Therefore, it is both beneficial and necessary to create a platform that is effective both in cost and performance, being able to be mass produced in large

quantities. This problem is the crux of the technical portion of the thesis. It centers around the design of a next-generation supersonic drone interceptor, which would be used to target a variety of airborne threats that could threaten US and allied territory. The primary focus of its design is to be as cost-effective as possible while still possessing the capabilities to stop airborne attacks and perform necessary maneuvers and missions. Through the use of simulations, research into preexisting aircraft, and production testable models of the aircraft, we have created a design that we feel can fulfill these requirements in order to better protect our home territory.

The STS portion of this thesis will focus on more civilian use cases of drone technology, specifically in the commercial sector for use in logistics. Small-scale integration of drones in specific locales and sectors has shown that they possess a variety of benefits over traditional methods in both transport and analysis. As drones become more integrated into our society, it has become clear that there are several barriers that exist to their full integration into existing logistical infrastructure. Through review of literature, governmental legislation, surveys, and available statistical data, this paper works to understand the primary barriers that serve to slow down the incorporation of drone technology into existing logistics systems. The research indicates that issues concerning both public perception as well as a lack of governmental standards and regulations are the primary barriers that must be overcome in order for widespread adoption of the technology to take place.

This thesis portfolio worked to achieve two different objectives: to design a practical solution for airborne threats to US territory and to determine the primary barriers to civilian drone integration into domestic logistics infrastructure. In both cases, I believe that the thesis succeeded to an acceptable degree. The technical portion yielded a design that theoretically should meet the desired requirements and allowed us to gain a further understanding of military

aircraft design in general. The STS portion of the project yielded concrete answers concerning what the primary barriers are to logistical drone integration and presented the steps that must be taken in order to break these barriers. For future research into these topics, my primary advice would be to attempt to find some primary sources, such as experts in the field. The available knowledge that one can gain through internet research is limited due to the secrecy of aircraft design and the recency of commercial drone integration. Getting first-hand knowledge from experts in the field would most likely lead to an even better understanding of the topics and provide a stronger foundation for the arguments made.