"One small step for man, one giant leap for mankind." In 1969, Neil Armstrong uttered these infamous words as the moon landing was confirmed and the world forever changed. The Space Race during the Cold War was a monumental time when the two most powerful countries, the United States of America and the Soviet Union, battled for the title of the most technologically advanced nation on earth. Space has always been a powerful symbol, as the country with control of this asset has typically been viewed as the Great Power of the time. This is why anti-satellite weaponry has been deemed a crucial resource by many powerful countries, as it gives a nation the ability to not only destroy satellites but also destroy the idea of a Great Power's greatest asset on a more sociopolitical level. As space is now used for countless commercial purposes, improving countless lives every day through accurate weather services and satellite connection, many questions arise about how space should be used to protect the current assets in orbit, as countries continue to jostle for both technical and military superiority.

Since the first satellite reached space in 1957, those responsible for these missions have been careless about leaving rocket and satellite remnants in space, as even the first satellite, Sputnik 1, was left in orbit after its battery died and ceased transmitting. Although leaving a satellite in space without a plan to remove it is inherently problematic, it's the small pieces of junk that are the real concern, as they are just as lethal and harder to avoid.

In 1968, the Soviet Union performed the first anti-satellite (ASAT) weapons test, intentionally blowing up a satellite and creating a large cloud of debris. Since then, China, India, and the United States have followed suit, each government blowing up its own satellites in a show of force, creating much more debris. When a debris hits a satellite, it can cause the satellite to explode, sending more debris going in all directions. In fact, this has already happened

multiple times, but most notably in 2009 when an old Soviet satellite collided with an operational communication satellite, blowing it up. These shards become more debris, which then threaten other satellites in orbit.

The growing international concern for the safety of space has been evident in recent decades, leading to a shifting attitude toward ASAT testing. Comprehending the impact of this changing attitude on the prevalence of ASAT tests is the first step in fully understanding the approach that can be taken to protect space.

ASAT testing is not the only way that space has been used by militaries; space is the latest battleground. In fact, for my team's project as the UVA Class of 2024 Spacecraft Design Capstone, we are studying the effects of hypersonic reentry into the atmosphere using a small satellite called a CubeSat. Hypersonic research is one of the highest priorities of the defense industry right now, as international tensions climb and the United States seeks to catch up to Russia and China in this field, and it can be applied to create missiles traveling up to ten-times the speed of sound, or Mach 10. These missiles travel through the atmosphere rather than in space, allowing for real-time navigation and control of the missile and less time for defensive measures to be taken by the target. Understanding the behavior of materials travelling hypersonic speeds is crucial for national security, as we are incredibly vulnerable to foreign attacks without this technology. Our CubeSat, known as HEDGE, will be launched into low Earth orbit (LEO), and will reenter the atmosphere at hypersonic speeds, transmitting crucial data back to us before it burns up.

HEDGE is a three-year project, and our class is working on it for the second year. It has been a great experience to take an idea from the class before ours and build upon it in such a way

that allows us to bring it to the final stages for next year's class to complete. I am very excited to see our design in action in the coming years, as this has been a truly rewarding experience. It has been very useful to learn about the industry and government procedures that are used in big projects such as these, and I look forward to bringing this knowledge with me into my career after I graduate. I also feel that my STS research paper has given me a deeper understanding into the overarching relationships and tensions at play in these areas, and I am grateful to have been given the experience to research these in depth, as it will allow me to perform my duties more responsibly going forward into the workforce.