

Thesis Project Portfolio

Monitoring Web Applications: An Automated Approach

(Technical Report)

**A New Era of Space: The Outer Space Treaty and Its Applicability to Anti-satellite
Weapons Testing and Space Debris**

(STS Research Paper)

An Undergraduate Thesis

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Bachelor of Science, School of Engineering

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Executive Summary

As a future software engineer, it is imperative that throughout my career I remain mindful of the impacts my work has on society, both on a personal scale and on a wider one. So far, I have been fortunate enough to have two prime opportunities to consider the impacts of my field of engineering. Firstly, in one internship position, I was tasked with creating an application that monitors website performance for my employer. This constituted my technical project, and was an excellent learning opportunity for me to both learn the software development lifecycle and be mindful of how programmed websites require maintenance over time. Secondly, in another internship position I held at a company where I will continue growing my career, I was fortunate enough to work with the modeling of satellite capabilities to assist in satellite imaging. Part of the company's mission is to increase sustainability efforts and limit the debris produced in space, which inspired me to research issues relating to satellite technology more. Given how integrated with satellite technology our current telecommunications system is, any threat to the use of satellites in orbit—such as space debris or anti-satellite weaponry—could be devastating for our current way of life. For my STS research project, I looked into international outer space law to determine whether anti-satellite weapons testing, which often results in an increase in space debris, is protected or prohibited by treaty.

For my technical project, I designed a web-based application from scratch as part of an internship. My team of interns and I were tasked with creating an application for automatically monitoring websites after our employer realized their current manual system of monitoring was not efficient. The app we created was for internal use within the company and included features to periodically test the company's hosted websites for metrics such as downtime and response

time and alert the user to any performance issues. The application's basic functionality was to provide a user interface to send Hypertext Transfer Protocol (HTTP) calls to websites and wait for a response. Over the course of the project, we utilized an Agile software development cycle, which included regular meetings with an internal client to discuss our progress and the functionality of the application. After deploying our final product, users were able to effectively make use of the website to successfully check their websites and send alerts if it is performing poorly. The application will require future maintenance and updates, which should include increasing the usability of the interface, allowing for more types of website tests that we were not able to implement within our time restriction, and including a better analysis of website statistics over time.

For my research paper, I sought to place the Outer Space Treaty of 1967, an international treaty regarding the peaceful uses of space, into the context of modern geopolitical relations to evaluate whether the testing of anti-satellite weaponry would be considered protected or prohibited by the treaty. After analyzing the specific wording of the Outer Space Treaty, I assert that the treaty protects anti-satellite testing as well as the subsequent issue of the creation of space debris. To summarize, I interpret the treaty as protecting the launching of weapons as long as they are not stored in orbit nor damage the property of other countries, hence allowing anti-satellite testing on satellites in orbit. Ultimately, in recent decades, there has been a shift into more aggressive militarization of space and distrust between global powers. With an arms race and perhaps even plain warfare in space imminent, it would be imperative for the nations of the world to develop a new international peace treaty that accounts for newly developing technology.

Over the course of the past year, the experience of exploring my interests in an academic setting and sharing my work has been very valuable. With my technical project, I was able to

evaluate the work I had already completed. This was an eye-opening endeavor for me, since I was able to combine my knowledge about my project with new information I learned as I researched. This helped me to reflect on my work and understand the significance of software development and maintenance in a new way. With my research project, I found a starting point in a topic I was interested in, and was able to stretch my comfort zone as I dove into the subjects of space militarization and international relations. I was able to develop and eventually answer a meaningful research question that I believe holds significance on the topic. If further research is done on the topic of my research project, I would recommend looking into other international space agreements and how they are applicable in modern times. I had to focus on the Outer Space Treaty to keep my research focused, but more research can be done while considering other agreements.