Mikayla Lahr - Academic Statement of Purpose

My current engineering position at General Dynamics Mission Systems involves designing new technology for defense systems and spacecraft development. I find this field of study highly rewarding because it is both challenging and at the forefront of innovation. I have held a very strong interest in aerospace technology since beginning my undergraduate studies in mechanical engineering. The Master of Engineering in Aerospace Engineering (Distance Learning) appeals to me because I can expand my knowledge of the fields directly relevant to my areas of professional specialization. In addition, I will improve my analytical and critical thinking skills, which will be beneficial for my career path. Ultimately, a Master of Engineering in Aerospace Engineering from Cornell University will equip me with the necessary background to advance into more technically focused roles as well as pursue engineering leadership and managerial positions.

Within my Systems Engineering position at General Dynamics, I manage and collect the necessary information to ensure that General Dynamics and the United States Military can assemble and safely operate the newly developed guidance defense technology. My Mission Systems colleagues and I frequently meet to discuss projects involving guidance, navigation, and control algorithms. These algorithms are used when designing and testing the physical defense systems.

In December 2022, I received my Bachelor of Science degree (Cum Laude) from Cornell University - Sibley School of Mechanical and Aerospace Engineering. Attending Cornell University for my undergraduate education was both a challenging and fulfilling experience. The undergraduate coursework in Mechanical Engineering prepared me for future success in my career. While completing my rigorous undergraduate coursework, I was active in several organizations until graduation. Among these organizations were the Cornell Mars Rover (CMR) Project Team and the Solar Heating and Thermoelectric Co-Generation Research Team led by Professor Zhiting Tian. After joining both teams during my freshman year, I worked towards earning leadership positions on these teams. My interest in aerospace engineering is one of the reasons why I decided to apply for the CMR project team. CMR is a student-run engineering project team with the goal of competing in the Annual University Rover Challenge at the Mars Desert Research Center in Utah. Approximately fifty CMR team members make up the different sub-teams, which include Arm, Astrotech, Drivetrain, Electrical, and Software. As a team member, I was responsible for designing a new six-wheel suspension system during my sophomore and junior years. I modeled the differential bar of the suspension system using Fusion 360's Generative Design and Inventor Computer-Aided Design (CAD) software. In addition, I performed structural analysis on the suspension system using ANSYS and was responsible for the manufacturing of urethane wheels using a 3D-printed mold. In the fall semester of 2022, I was selected by my peers to serve as CMR Drives Lead. My team was responsible for developing, building, and testing the mechanical drive system of the rover: including its suspension, wheels, frame, camera mast, and electrical housing.

As a member of the Solar Heating and Thermoelectric Co-Generation research team, my responsibilities in this patent-pending research included: CAD development, system thermodynamics, development of a PLECS (circuit modeling software) simulation of the co-generation system, and the creation of a MATLAB code to determine the thermal resistance between each material layer. When I was a senior member of our research group, I held a supervisory role for new members involved with this research. I also led the prototyping and testing of thermoelectric generators that use a heat gradient to produce electricity.

I had the opportunity to serve as a Teacher's Assistant for the Mechanical Synthesis (MAE 2250) course at Cornell University. In this position, I led lab sessions to explain CAD design assignments and machine shop projects to students. As a Teacher's Assistant, I articulated the critical points of classroom lessons to students, assisted them in developing their engineering design skills, and supervised students utilizing the Cornell machine shop tools to construct class projects (i.e., metal lamp stand and water pump components). While serving as a Teacher Assistant, I gained leadership skills and became more proficient at CAD design.

My duties as a Systems Engineer at General Dynamics involves working on large-scale systems where I design system components necessary for mission success. Due to these duties, I am particularly interested in guidance, navigation, and control course offerings in Cornell University's Master of Engineering in Aerospace Engineering program. These fields of study are directly related to my work at General Dynamics in the Independent Research and Development (IRAD) program for space systems. Furthermore, the specific courses offered for Spacecraft Altitude Dynamics, Estimation, and Control; Model-Based Estimation; and Multivariable Control Theory are very relevant to my current and future work. The projects that I am involved with also include using methods such as linear feedback systems in time, altitude dynamics, least-squares estimation, and Kalman filters. These projects require mechanical and aerospace technology knowledge, ingenuity, and expertise to create and test new systems. I believe this academic program will provide me with the necessary background to advance as a valuable team member in spacecraft systems for General Dynamics.

Finally, I wish to continue my studies at Cornell University and work alongside the many dedicated and passionate professors. By providing me with their guidance, Cornell University professors will be able to help me achieve my personal and professional goals in the aerospace sector. I would be very grateful for the opportunity to continue my education at the Sibley School of Mechanical and Aerospace Engineering.

Thank you for taking time to consider this graduate studies program application! I eagerly await your response.

Mikayla Lahr