Statement of Purpose

Bhavini Rao Sreeram

Watching documentaries about the formation of solar system and galaxies that entrenched a deep interest in me about outer space during my school years. The elite organizations and their feats such as ISRO and NASA missions to Moon and Mars: their ingenious rockets and spacecraft have inspired me to be a part of them. This led me to think about rockets and space vehicles that enable us to think about space travel and make studying these places possible. It was this thought that drove me to study aerospace engineering.

During my undergraduate program, I found Propulsion and Composites to be the most interesting subjects. However, the important subjects that made me understand the fundamentals and played a vital role in strengthening my decision of pursuing higher education in the space sector were Thermodynamics, Aerodynamics, Mechanics of Fluids, Structures, Compressible Fluid Flow, Avionics, Finite Element Methods, Spacecraft and Rocket Propulsion, Air Breathing Engines and Aero Design.

In the Low-Speed Aerodynamics Lab, I was part of a wind tunnel experiment where we had to build a wing to find the pressure distribution across an airfoil in low Reynolds number flow and in the Flight-Testing Lab I worked on Waypoint Navigation Tuning for UAVs using MATLAB where I was able to apply theoretical concepts to practical scenarios. The Aero-Design Course tasked my team with creating the preliminary design of an amphibious search and rescue aircraft, which required us to dive headfirst into hydrodynamics and mechanics with no prior experience which helped me understand problem solving and pragmatic approximations. Even though I had no formal course about Design Thinking, I absorbed it by working with experienced faculty and insightful colleagues on multiple topics.

Several distinctive features of TU Delft make it my top choice for pursuing a Master's in Aerospace Engineering. The faculty at TU Delft includes some of the leading experts in aerospace engineering. The state-of-the-art laboratories and research facilities like the low-speed and high-speed (up to Mach 11) wind tunnels, GPS measurement stations, the Structures and Materials Laboratory, the SIMONA research flight simulator, a Cessna Citation II flying laboratory, the Delfi Ground Station for satellite communications will also provide an unparalleled environment for hands-on learning and innovation. Access to advanced equipment and resources will not only enrich my academic experience but also empower me to undertake meaningful research projects that address contemporary challenges in aerospace engineering. TU Delft’s strong ties with industry leaders like the European Space Agency, KLM, Airbus, Schiphol Airport other aerospace industries and research institutes provides valuable networking opportunities and potential avenues for internships and collaborative projects. This connection to the industry ensures that the knowledge gained during the program is not only academically rigorous but also directly applicable to real-world scenarios. Finally, the vibrant academic community at TU Delft, characterized by diverse perspectives and a culture of innovation, is conducive to personal and intellectual growth.

In July 2023, I had the opportunity to do my first internship in Srihari Kota High Altitude Range (SHAR), an organisation under ISRO where I got to learn about the various kinds of tests done on different parts of a rocket such as ignitor, crew module, nozzle, and AGNI motor before launching. This further propelled me to realise my strong interest in space and made me think about astronomy and space engineering with TU Delft’s Space track being the most attractive one. The master curriculum covers the full life cycle of space missions, from conceptual design to implementation and utilization. This track focuses on space engineering, spaceflight dynamics and planetary exploration. The elective streams I have chosen during my bachelor's degree pertain to propulsion (Air Breathing Engines) and/or space (Rocket and Spacecraft Propulsion).

At this stage of my academic journey, I believe that pursuing a Master's degree in Aerospace Engineering is the logical next step to deepen my knowledge and skills in this field. The experiences gained during my undergraduate studies and internships have provided me with a strong foundation, and I am now eager to engage in advanced coursework and research that will prepare me for leadership roles in the aerospace industry. I am particularly motivated to address current challenges and contribute to the ongoing advancements in space technology.

Upon completion of the Master's program, I aspire to pursue a career in Propulsion systems in rockets and other spacecrafts where I can leverage the knowledge and skills acquired to contribute to advancements in the aerospace industry. I aspire to contribute to transformative projects involving Sustainability in Space Exploration which advocate for environmentally sustainable propulsion technologies to minimize the environmental impact of space exploration activities. This could involve researching alternative propulsion methods, such as electric or nuclear propulsion, that reduce reliance on traditional chemical propellants. Looking ahead, my long-term goal is to assume a leadership role in space systems research and development in organization’s like ISRO and ESA. I aspire to contribute to transformative projects that push the boundaries of space technology, potentially working on innovations in propulsion systems or contributing to the exploration of deep space. I envision myself collaborating with industry leaders, research institutions, and governmental agencies to shape the future of space engineering Whether in academia, industry, or research institutions.

In my final year, I worked on a project that applied machine learning techniques to optimize an Expansion-Deflection (ED) nozzle. We designed axisymmetric ED nozzles with varying geometries using SolidWorks and meshed it using GAMBIT. We generated data from CFD analysis and used a Machine Learning algorithm to optimize it. We worked on enhancing its performance through rigorous testing and optimization using tools like ANSYS Fluent and MATLAB.

In conclusion, I am enthusiastic about the prospect of joining the esteemed program at your university and contributing to the rich legacy of innovation and excellence. I am confident that my academic background, research experience, and dedication to the field make me a strong candidate for admission to your esteemed institution.

If selected, I wish to engage in collaborative projects, participate in student organizations, and contribute to the rich academic tapestry of the institution.