My interest in aerospace engineering with specialization in aerodynamics is stemmed from the wide application of the subject to the current society. Air is variable, shapeshifting, and is present everywhere on the surface of this planet. Its universal nature requires its existence to be included on the design of every high-speed vehicle. “How do we make an object having less resistance when moving through a fluid?”, said my professor during our first lecture on aerodynamics. Camber, aspect ratio, span… the answers go on and on. There are infinite number of ways to make an object more aerodynamic, yet the most intriguing aspect about this subject is that a simple change in shape can have huge impacts on its performance. Take a golf ball for example, manipulations as simple as applying dimples to its surface doubles its range when struck. For all modern machineries that hinge their operations around air, namely, cars, airplanes and rockets, every external feature, from a simple dent to large devices such as vortex generators, is the collective results of hundreds of engineers spending thousands of hours conducting trade studies. Aerospace engineering is the pinnacle real life representation of the saying “the devil is in the detail” and I consider myself to be a rather professional hunter.

During my four years of undergraduate studies at the University of Michigan, I became especially involved in the aerodynamic subteam of the student project team Michigan Aeronautical and Science Association (MASA), becoming the lead of fin aerostructure for one of the most powerful rockets ever built by students, the Tangerine Space Machine (TSM). The TSM is a spaceshot rocket, aimed to be the first liquid engine bi-propellent rocket designed purely by students to reach above the Karmen Line. This ambitious goal came with difficult problems such as decreases in stability and increases in aerodynamic load. However, leading a team of 6, after spending thousands of hours re-running simulations, discussing potential design revisions, we have caught our devils. By downsizing our fin span from 20 inches to 12 inches, we reduce the total rocket mass by XX% while maintaining the ideal minimum stability magnitude 2 calibers. By switching the internal supporting structure from sheet metals to square tubes, we again saved XX lbs in mass budget while increasing the stress safety factor above 1.5 at conditions of maximum dynamic pressure. Each discovery of one of these devils not only brought profound joy but also deeper fascination with aerodynamics. In addition to the required aerodynamics courses offered by the University, I went on and took master leveled classes such as AEROSP 523 Computational Fluid Dynamics. Or simply, how do we use computers to simulate fluids.