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Internship Abstract

Mars is a hard place to land on, but my internship with NASA's Aerosciences & Flight Mechanics branch has shown me the ways in which men and women will one day land safely. I work on Mars Aerocapture, an aeroassist maneuver that reduces the fuel necessary to "capture" into Martian orbit before a descent. The spacecraft flies through the Martian atmosphere to lose energy through heating before it exits back into space, this time at a slower velocity and in orbit around Mars. Spacecraft will need to maneuver through the Martian atmosphere to accurately hit their orbit, and they will need to survive the generated heat. Engineering teams need simulation data to continue their designs, and the guidance algorithm that ensures a proper orbit insertion needs to be refined – two jobs that fell to me at the summer's start.

Engineers within my branch have developed two concept aerocapture vehicles, and I run simulations on their behavior during the maneuver. I also test and refine the guidance algorithm. I spent the first few weeks familiarizing myself with the simulation software, troubleshooting various guidance bugs and writing code. Everything runs smoothly now, and I recently sent my first set of trajectory data to a Thermal Protection System group so they can incorporate it into their heat-bearing material designs. I hope to generate plenty of data in the next few weeks for various engineering groups before my internship ends mid-August.

My major accomplishment so far is improving the guidance algorithm. It is a relatively new algorithm that promises higher accuracy and fuel efficiency, but it hasn't undergone extensive testing yet. I've had the opportunity to work with the principle developer – a professor at Iowa State University – to find and fix several issues. I was also assigned the task of expanding the branch's aerodynamic heating simulation software. I am excited to do this because engineers in the future will use my work to generate meaningful data and make design decisions.

My internship has taught me to how to teach myself. There are no tutors, study sessions or professor office hours. When I am given an assignment I am expected to figure out how to accomplish it, and I have grown in my problem solving abilities. My summer experience has reinforced my drive to work at NASA, and I can definitely see myself working full time on the aerocapture project, or something similar.