

Jaden Xander Hernandez

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EDUCATION

Purdue University <i>Bachelor of Science in Aeronautical and Astronautical Engineering</i> Awards: Northrop Grumman S.P.A.C.E. Award, Purdue University Presidential Scholarship Relevant Coursework: Rocket Propulsion, Spacecraft Electric Propulsion, Nuclear Thermal-Hydraulics, Thermal Sciences	August 2022 – May 2026 GPA: 3.27 / 4.00
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EXPERIENCE

Nak-seung Hyun Research Program <i>Undergraduate Research Assistant (Design Engineer)</i>	February 2025 – Present West Lafayette, IN
• Evaluated lift trends at varying ranges of wing motion and flapping frequencies for a biomimetic ornithopter robot by conducting unsteady vortex lattice method analysis using the Ptera Software library in Python. • Improved coefficient of lift by 50% over traditional NACA airfoils by designing biomimetic airfoil profiles in MATLAB. • Estimating airfoil and wing performance for gliding with XFOIL and XFLR5 before designing wing spars in SolidWorks. • Developing parametric elliptical wing profiles in SolidWorks to accelerate prototyping and laser cutting fabrication. • Manufacturing 6-10 mm shaft and linkage connectors via stereolithography with less than a 3% defect rate. • Programming FFT MATLAB scripts to filter hundreds of force transducer data sets and evaluate lift and moment trends.	

PROJECTS

Solid Rocket Motor Design and Analysis	October – November 2025
• Formulated a three-point star port geometry to produce a 4.6 inch by 1.2 inch, H91 class propellant grain in SolidWorks. • Estimated chamber pressure in openMotor, ensuring a safety factor of 1.39 for an 800 psi maximum operating pressure. • Programmed a MATLAB trajectory analysis to predict an apogee of 3374 ft, within 0.05% of OpenRocket predictions. • Constructing a model rocket to validate openMotor ballistics and MATLAB trajectory, pending launch in November 2025.	
Five Dynamics – Ultra-Lightweight Rocket Design	
• Leading the design of a 10,000 ft apogee, ultra-lightweight rocket (<250 g) powered by a G-class solid rocket motor. • Optimized motor selection by estimating propellant/inert mass in MATLAB, meeting specific impulse requirements. • Leveraging OpenRocket to optimize airframe features and overall stability to increase predicted apogee by 73%. • Modeling preliminary airframes in SolidWorks and utilizing FEA to ensure a structural safety factor of over 1.25.	
Workflow to Estimate Heat Transfer for High Altitude Flight	
• Developed a MATLAB-based UI to estimate convective heating on high-altitude sounding rockets, achieving results within 10% of Ansys simulations while reducing simulation time by 90% compared to typical finite element methods. • Streamlined the workflow for approximating insulation thickness based on desired internal temperature and intended insulation material, allowing users to make design considerations for insulation earlier in a rocket's design process.	
Analyzing the Aerodynamic Performance of Flexible Finite Wings	
• Designed a 12 inch span wing using the NACA 0012 airfoil geometry in Autodesk Inventor to be manufactured via FDM. • Additively manufactured and tested 3 wings made of TPU filament with differing flexibility to analyze trends between wing flexibility and lift coefficient from subsonic wind tunnel data for -4° to 16° angles of attack. • Verified correlation between lift force and trailing edge deformation up to 0.1 inches through FEA in Autodesk Inventor.	
Purdue SIGBots – VEX Robotics Competition Robot Design	
• Oversaw design of an award-winning, holonomic 15" robot in 2024, achieving a record of 5 wins and 4 losses at tournaments. • Coordinated documentation and time management via Gantt charts to assure timely robot development across subteams. • Designed components in Autodesk Inventor and additively manufactured them with consideration for durability, manufacturability, and fabrication time to be easily implemented and sustainably used in head-to-head competition.	
Mars Sample Retrieval Mission Design	
• Created MATLAB models using the patched conics method for a hypothetical Mars sample retrieval mission to design an 11,000 kg, three-stage spacecraft with a mission delta-V budget of 19 km/s. • Researched and selected launch vehicles capable of meeting a 9 km/s delta-V budget to achieve a 500 km low Earth orbit. • Authored and presented a 72-page design report detailing mission parameters and design specifications, leading to the group's recognition for the Northrop Grumman S.P.A.C.E. Award for excellence in design communication.	

SKILLS

CAD & Analysis: Siemens NX, Autodesk Inventor, SolidWorks, Autodesk Fusion 360, Ansys Fluent (CFD), ASME Y14.5

Programming & Simulation: MATLAB, Simulink, Python, C, OpenRocket, openMotor, XFLR5, XFOIL, NASA CEA

Project Tools: Aras Innovator, Jira, Gantt Charts

Fabrication: Fused Deposition Modeling, Stereolithography, Laser Cutting

Data Acquisition: Subsonic/Supersonic Wind Tunnels, Dual Column Tensile Tester, Force Transducers