

Rushi Faldu

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Aerospace Engineering graduate with experience in CAD design, MATLAB/Python analysis, CFD, propulsion, orbital mechanics, aerospace structures, composites coursework, prototype development, undergraduate research, and early-stage product/customer discovery. Interested in aerospace design, UAVs, composites, tooling, advanced manufacturing, lightweight structures, and aerospace-adjacent entrepreneurship.

EDUCATION

North Carolina State University

August 2022 – May 2026

B.S. Aerospace Engineering; Minor in Business Entrepreneurship

GPA: 3.67/4.0

Coursework: *Statics / Dynamics / Solid Mechanics / Aerospace Structures / Aerospace Composites / Aerodynamics / Thermal-Fluid Sciences / Controls and Vibrations / Aerospace Design / Space Flight and Orbital Mechanics / Rocket Propulsion / Fluid Mechanics / Engineering Statistics / Technical Writing / Business Ethics / Business Analysis*

Woodstock School

June 2019 – May 2022

High School Diploma

Mussoorie, India

Coursework: *IB Physics / IB Chemistry / IB Mathematics Analysis and Approaches / Economics / French / English*

TECHNICAL SKILLS

Software

MATLAB / Simulink / Octave	Controls compensator design, propeller and airfoil analysis, aerospace structures analysis, asteroid orbit design, CFD post-processing, and data visualization	150–170 hours
GMAT	Satellite maneuvers, trajectory analysis, and orbital mission visualization	20–30 hours
AVL	Aircraft geometry generation, aerodynamic derivative calculation, flight stability analysis, and dimensional/non-dimensional stability evaluation	15–20 hours
XFOIL	Basic airfoil analysis, polar generation, and aerodynamic coefficient evaluation	5–10 hours
OpenVSP	Basic aircraft geometry modeling and conceptual aircraft configuration exploration	5–10 hours
CAD: SolidWorks, Fusion 360, FreeCAD	Sketching, prototyping, engineering component design, aerospace component design, and preliminary finite element analysis for aerospace structures	130–150 hours
CFD: ANSYS, OpenFOAM, Gmesh	Airfoil fluid-flow analysis, computational-domain setup, and flow-field visualization	15–20 hours
OpenRocket	Preliminary rocket design, basic vehicle sizing, and conceptual mission design	5–10 hours
Logisim Evolution	Circuit design and basic CPU design	10–20 hours
Documentation: MS Office, Google Workspace, LaTeX	Technical writing, project documentation, engineering reports, presentations, and formatting of technical documents	400–450 hours

Programming Languages

Python Machine learning, optimization, numerical analysis, 100–120 hours
Bayesian analysis support, conjugate-gradient methods,
and data visualization

Manufacturing and Prototyping

3D Printing, Balsa Wood Fabrica- Component manufacturing, fast prototyping, assembly, 40–60 hours
tion, Hand Tools, Power Tools, Sol- glider fabrication, prototype testing, and hands-on engi-
dering, Drilling neering project work

Professional Strengths

Confident working in fast-paced environments, collaborating with multiple team members, contributing in team settings, and taking on multiple roles when needed.

Primary strengths: *Perseverance / Problem Solving / Teamwork / Adaptability / Communication*

ENGINEERING PROJECTS

NASA RASCAL Lunar Rover Concept

NC State University

Senior Aerospace Capstone Design Project; Thermal and Financial Lead

2025 – 2026

- Designed lunar rover subsystems for a NASA RASCAL concept focused on drilling, analyzing, and collecting 10–100 kg of lunar regolith for Helium-3 extraction.
- Served as Thermal and Financial Lead, developing thermal-control concepts for lunar operating conditions. Evaluated ceramic fiber insulation, heat shielding, radiators, and thermoelectric coolers for rover thermal management.
- Selected and integrated a LIBS spectrometer concept for in-situ lunar soil composition analysis.
- Developed rover and subsystem design concepts using SolidWorks and supported analytical trade studies and engineering calculations using MATLAB.
- Led cost estimation and budgeting, adapting space-grade concepts into prototype alternatives under a \$2,000 manufacturing constraint.
- Supported prototype planning and subsystem integration for the capstone project.
- Presented the completed project at the NC State University Symposium.

2D CFD Solver for Grid Bump and Half-Cylinder Flows

NC State University

MATLAB, CFD, Numerical Methods

2026

- Developed a MATLAB-based 2D CFD analysis program using instructor-provided structured grids for grid-bump and half-cylinder geometries.
- Implemented Green-Gauss gradient reconstruction to estimate spatial gradients across the computational domain.
- Used Gauss-Seidel iterative methods to solve flow-field equations and improve numerical convergence.
- Generated post-processing outputs to study pressure, velocity, and flow-field trends across different geometries.
- Strengthened understanding of CFD fundamentals, structured-grid analysis, numerical methods, iterative solvers, and MATLAB-based visualization.

Glider Design, Analysis, Build, and Flight Testing

NC State University

Flight Stability and Control; AVL, Octave, Balsa Fabrication, 3D Printing

2026

- Designed and built a flight-tested glider using balsa wood and 3D-printed components for a flight stability and control project.

- Used AVL to create the aircraft geometry model and support aerodynamic analysis.
- Evaluated dimensional and non-dimensional aerodynamic derivatives to study stability and control behavior.
- Wrote Octave scripts to automate AVL geometry-file generation and support aircraft configuration calculations.
- Applied flight stability and control principles to evaluate center of gravity, lifting-surface placement, weight distribution, and flight behavior.
- Connected analytical stability predictions with physical prototype design, fabrication constraints, and flight-test observations.

Liquid Rocket Engine Design

Rocket Propulsion

NC State University

November 2025 – December 2025

- Designed a preliminary liquid rocket propulsion system for payload transfer from low Earth orbit to geostationary Earth orbit.
- Defined mission requirements through literature review and trajectory analysis.
- Performed propulsion sizing and trade studies, including ΔV budgeting, mass-ratio calculations, propellant stoichiometry, and tank pressurization modeling.
- Developed preliminary designs for the combustion chamber, nozzle, feed system, engine cycle, ignition system, cooling mechanism, and propellant storage tanks.
- Conducted system-level analysis and visualization using MATLAB and GMAT.
- Used ANSYS and SolidWorks for preliminary component-level validation and visualization.
- Produced technical documentation summarizing assumptions, design methodology, calculations, and results.

Asteroid Orbit Design

Orbital Mechanics

NC State University

April 2025 – May 2025

- Designed a heliocentric interplanetary transfer orbit from Earth to an asteroid.
- Performed mission analysis, trajectory planning, and orbital-transfer calculations.
- Computed orbital elements, transfer parameters, and maneuver requirements using MATLAB.
- Developed custom MATLAB scripts for numerical calculations and visualization.
- Produced a technical report documenting methodology, assumptions, results, and limitations.

Aircraft Propeller Design, Manufacturing, and Wind Tunnel Testing

SolidWorks, 3D Printing, Wind Tunnel Testing

NC State University

November 2025

- Designed an aircraft propeller using CAD and preliminary aerodynamic reasoning.
- Manufactured the propeller using 3D printing.
- Conducted subsonic wind-tunnel testing to evaluate prototype performance.
- Connected aerodynamic theory, CAD design, manufacturing constraints, and experimental validation into a final report.

Converging-Diverging Nozzle Design, Manufacturing, and Testing

SolidWorks, ANSYS, 3D Printing

NC State University

April 2025

- Designed a converging-diverging nozzle using SolidWorks and performed preliminary analysis using ANSYS.
- Manufactured the nozzle using 3D printing.

- Tested and evaluated prototype behavior against expected flow-performance concepts in a subsonic wind tunnel.

Mini Prototype Rover Manufacturing and Testing

Part of NASA RASCAL Project

NC State University

October 2025

- Supported manufacturing and testing of a mini prototype rover as part of the NASA RASCAL capstone effort.
- Assisted with translating rover design concepts into a physical prototype.
- Contributed to integration and testing of mechanical subsystems.

Conceptual Rocket and Mission Design for LEO Payload Delivery

Rocket and Mission Design

NC State University

October 2025

- Developed a conceptual rocket and mission design for payload delivery to low Earth orbit.
- Evaluated mission requirements, vehicle concepts, and basic propulsion considerations.
- Produced preliminary calculations and design documentation.

PID Controls Circuit Making and Testing

Controls

NC State University

November 2025

- Built and tested a PID controls circuit.
- Applied controls concepts to understand system response, stability, and tuning behavior.
- Connected theoretical controls coursework with hands-on circuit testing.

Aircraft Structural Plate Component Design and Stress Testing

Aerospace Structures

NC State University

November 2024

- Designed and manufactured an aircraft structural plate component.
- Conducted preliminary stress testing using SolidWorks to evaluate structural behavior.
- Conducted experimental stress test using strain gauges in a hydraulic machine.
- Applied aerospace structures concepts to understand load paths, stress concentration, and failure behavior culminating into a final report.

Bell Tower Animatronic

E101 Engineering Design Project

NC State University

January 2023 – May 2023

- Designed and 3D printed a working animatronic model of the NC State Bell Tower.
- Designed moving parts and structural supports within project size constraints.
- Prototyped the 3D printed tower structure and platform to hold bearings and motors.
- Used SolidWorks, Fusion 360, and Blender for prototyping and preliminary design development.
- Participated in NC State First Year Engineering Design Day and won 2nd place.

BUSINESS AND ENTREPRENEURSHIP PROJECTS

DentalHold

Business Development and Product Discovery Contributor

Raleigh, United States

2026

- Partnered with the founder of DentalHold to support early-stage marketing and customer discovery for an MVP AI interface serving dental offices and doctors in the United States.
- Conducted surveys and interviews to evaluate customer needs, product positioning, MVP direction, and adoption barriers.

- Developed marketing pamphlet content and outreach materials to communicate the product value proposition to dental-office stakeholders.
- Gained experience in startup customer discovery, market validation, product communication, and founder support.

Business Opportunity Analysis for Future Situations of Blue Origin **NC State University**
Business Entrepreneurship / Aerospace Industry Analysis *November 2025*

- Conducted a business opportunity analysis related to Blue Origin and future space-sector scenarios.
- Evaluated technical, commercial, and strategic factors affecting the company's potential direction.
- Applied business entrepreneurship coursework to aerospace industry analysis.

RESEARCH EXPERIENCE

Undergraduate Research Assistant **North Carolina State University**
Python, Optimization, Bayesian Analysis *January 2024 – January 2025*

- Conducted computational research using Python to improve reaction-coordinate evaluation for protein folding cases.
- Developed Python-based optimization methods that improved reaction-coordinate evaluation accuracy by approximately 40%.
- Led a coding project focused on optimizing reaction coordinates using the conjugate-gradient method.
- Collaborated with an NC State research team to advance Bayesian analysis techniques in protein folding cases.
- Presented research at the NC State Undergraduate Spring Symposium in April 2024.

MANUFACTURING EXPOSURE

Family-Owned Power Press Manufacturing Business **Gujarat, India**
Informal Manufacturing Exposure *Ongoing*

- Gained exposure to mechanical and hydraulic power press manufacturing through family business background.
- Observed fabrication workflows involving externally sourced steel plates, welding, machining/vendor-supplied components, assembly, and final machine integration.
- Developed understanding of mechanical press systems, hydraulic systems, gears, motors, electrical panels, machine frames, and industrial customer requirements.
- Observed how supplier coordination, shop-floor execution, practical manufacturing constraints, and customer needs affect industrial machinery delivery.

WORK EXPERIENCE

NC State Dining **North Carolina State University**
Dining Associate *August 2025 – May 2026*

- Served approximately 200 customers daily within a 3-hour peak service period while maintaining speed, accuracy, and food-service quality standards.
- Operated grill station, packed food orders, served customers, and used the POS system to process transactions accurately.
- Supported back-of-house kitchen operations by restocking, organizing food items, and preparing packaging products for continued service.

- Collaborated with team members in a fast-paced environment while balancing part-time work with full-time aerospace engineering coursework.

STEM Intern / Student Intern Leader

Research Assistant

Woodstock School

October 2019 – December 2019

- Roasted fresh coffee beans using industrial roasters while maintaining quality and consistency.
- Enhanced customer experience and sales through effective communication and service.
- Contributed to production efficiency and smoother operations.
- Promoted to student intern leader and managed a team of 7 interns.

CLUBS, LEADERSHIP, AND ACTIVITIES

Aqua Pack Robotics

Mechanical and Business Team Member

NC State University

August 2024 – May 2025

- Contributed to the mechanical design of an updated torpedo launcher for an autonomous underwater vehicle.
- Collaborated with cross-functional team members to support subsystem design and integration for competitive aquatic robotics applications.
- Supported the Business Team by assisting with sponsor outreach, budgeting tasks, logistics, merchandise, and equipment procurement.

Water Conservation Team

Team Member

Woodstock School

August 2020 – May 2022

- Participated in a student-led water conservation initiative supporting communities facing water shortages in rural regions of India.
- Designed, modeled, and 3D printed a tap-mounted water aerator to reduce water waste.
- Achieved approximately 30% improvement in water efficiency during prototype testing.
- Proposed campus-wide deployment of the aerator system; implementation was deferred due to COVID-19 disruptions and graduation timeline.

National Honor Society

Member

Woodstock School

June 2020 – May 2022

- Volunteered as a peer mentor and peer leader for younger students.
- Tutored students in mathematics and science.
- Developed mentoring, communication, and leadership skills by helping bridge the gap between school faculty and junior students.

AWARDS AND ACHIEVEMENTS

Dean's List

2022 – 2026

North Carolina State University

First Year Engineering Design Day, 2nd Place

2023

NC State University; Bell Tower Animatronic Project

Best Chemistry Student Award

May 2022

Woodstock School; awarded in Grade 11 and Grade 12

CAREER INTERESTS

Aerospace design, UAV systems, composite structures, thermoplastic composites, lightweight structures, tooling, CAD design, prototyping, manufacturing, reverse engineering, propulsion systems, orbital mechanics, advanced manufacturing, aerospace entrepreneurship, and aerospace-adjacent product development.