

# Nicholas Sprague

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## EDUCATION

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### **Binghamton University, State University of New York, Thomas J. Watson College of Engineering and Applied Science**

*Bachelor of Science in Mechanical Engineering*, GPA 3.93/4.00

May 2025

**Relevant Coursework:** Computational Fluid Dynamics, Heat Transfer, Control Systems, Mechanical Engineering Design

### **Onondaga Community College, State University of New York**

*Associate of Science in Engineering*, GPA 3.92/4.00

May 2023

## TECHNICAL SKILLS

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**Analysis & Simulation Software:** Abaqus CAE, Altair HyperWorks, NASGRO, Ansys Fluent, SimScale

**CAD Software:** SOLIDWORKS (CSWA), Autodesk Inventor, Fusion 360, Creo Parametric, AutoCAD

**Programming Languages:** MATLAB, Python

## PROFESSIONAL EXPERIENCE

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### **General Dynamics Electric Boat, Structural Engineer I, Reactor Compartment**

September 2025 – Present

- Develop and modify finite element models and submodels from CAD geometry using Altair HyperWorks and Abaqus CAE
- Perform static and dynamic finite element analyses (FEA) on compartment-level and component-level models involving thermal expansion, contact interactions, transient shock response, buckling, and natural frequency characterization
- Evaluate failure modes of submarine components governed by fracture mechanics using NASGRO crack growth analysis software to support structural adequacy assessments
- Create MATLAB and Python scripts to automate engineering workflows and incorporate as-built optical measurement data into existing finite element models to reduce non-conformance adjudication turnaround times
- Conduct research and development on material testing methodologies to evaluate the structural condition of cold-bent steel
- Provide engineering support for shipyard construction and manufacturing activities through technical evaluations and non-conformance dispositions of as-built parts using first-principles analysis and finite element model modifications

### **General Dynamics Electric Boat, Structural Engineering Intern, Reactor Compartment**

May 2025 – August 2025

## PROJECT EXPERIENCE

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### **RocketSuite Solid Rocket Motor Simulation Platform, Developer**

May 2024 – Present

- Developed a MATLAB application that simulates the burn progression of a solid rocket motor using user-defined grain geometries (BATES, chamfered BATES, finocyl, pseudo-finocyl, and star), propellant characteristics, and nozzle shape
- Implemented Fast Marching Method (FMM) burn regression algorithms on discretized 2D grain slices and validated simulation results to within 2.18% of established open-source motor simulators
- Developed an open-source Python application (RocketSuite) that imports STEP grain geometry and generates voxelized motor representations to enable simulation of arbitrary grain configurations
- Create a three-dimensional FMM-based burn simulator for voxelized solid rocket motor geometries that captures localized three-dimensional burn behavior not represented by 2D grain-slice models

### **Composite Airframe CNC Filament Winder Senior Design Project, Project Lead**

September 2024 – May 2025

- Coordinated a team of six engineering students in the design, development, assembly, and testing of a 4-axis CNC filament winder for manufacturing composite rocket airframes up to 10 feet long
- Designed the carriage subsystem and supporting structures in Fusion 360, performing finite element analysis (FEA) to ensure structural adequacy under expected loading conditions
- Manufactured, assembled, and integrated components including two linear motion systems, two rotational motion systems, filament-path hardware, a resin bath, and structural framing through multiple design iterations
- Demonstrated successful four-axis motion and carbon fiber filament dry winding operations on a 10-foot mandrel, and authored a 62-page LaTeX report detailing the design, engineering analyses, testing procedures, and project outcomes

### **Yo-Yo Despin Junior Design Project, Design Engineer**

January 2024 – May 2024

- Designed Yo-Yo Despin system to reduce the spin of AeroBing rockets to improve parachute deployment
- Conducted computational fluid dynamics (CFD) analysis and finite element analysis (FEA) using SimScale to determine airflow disruptions around the rocket and the stress conditions experienced by the yo-yo masses
- Summarized design, including MATLAB analysis, CFD and FEA diagrams, and detail drawings in a 52-page LaTeX report

## LEADERSHIP AND INVOLVEMENT EXPERIENCE

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### **Science Olympiad Volunteering, Content Developer**

November 2021 – Present

- Created publicly available forestry and ornithology educational videos and authored exams for 25+ Science Olympiad competitions from regional to national levels, supporting thousands of students and grading 130,000+ questions