

CAROLINE ZIMMER

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EDUCATION

University of Pennsylvania, School of Engineering and Applied Science | Philadelphia, PA *May 2027*

Candidate for Bachelor of Science in Engineering | **GPA:** 3.70 / 4.0

Major: Mechanical Engineering | **Minors:** Mathematics, Engineering Entrepreneurship

Relevant Coursework: Thermodynamics, Intro to Energy Systems, Statics & Structures, Machine Design & Manufacturing, Mechatronics, Dynamics, Finite Element Analysis, Electricity & Magnetism

EXPERIENCE

Infra Solutions | *Mechanical Engineer Intern* *Summer 2025*

- Delivered finalized AutoCAD models of complete HVAC ductwork and piping systems for construction plans within the Novant Health hospital network, contributing to the largest Energy-as-a-Service transaction in U.S. healthcare history and advancing energy-saving infrastructure for clinical environments
- Created comprehensive 3D models of existing ductwork and piping layouts in Revit, coordinating with mechanical teams and point cloud data in ReCap to ensure spatial accuracy and support future renovation planning
- Drafted detailed reports quantifying energy and monetary savings by integrating metered energy consumption data with utility bills, verifying that facility performance met guaranteed energy efficiency targets

Engineers Without Borders at Penn | *Project Team Member* *September 2023 – May 2025*

- Produced AutoCAD construction drawings for an ADA-compliant accessibility ramp, coordinating with professional advisors and local stakeholders to meet safety and accessibility standards for a community center

PROJECTS

Mechanical Design and Precision Manufacturing Project | Gamma-type Stirling Engine *Fall 2025*

- Designed and modeled a functional Gamma-type Stirling engine assembly in SolidWorks
- Programmed CNC toolpaths in Mastercam and conducted high-precision machining operations (lathe, mill, threading, reaming) to manufacture components that are in spec with engineering drawings
- Applied GD&T callouts and tolerance stack-up analysis across critical interfaces to optimize component dimensions, improving engine efficiency, reliability, and ease of assembly

Mechatronic Systems & Controls Project | BLDC Motor Balancing System *Fall 2025*

- Derived nonlinear equations of motion and linearized state-space model for a BLDC motor-actuated rotating rod system; designed and tuned PID controller in MATLAB across perturbation and noise conditions
- Deployed tuned PID controller on physical hardware, commanding real motor throttle via IMU feedback and validating that experimental closed-loop response matched simulation predictions across gain sets

Electrochemical Energy Systems Project | Supercapacitor Assembly and Characterization - ETH Zurich *Spring 2026*

- Hand-assembled a symmetric supercapacitor using activated carbon electrode and electrolyte in a Swagelok cell configuration at ETH Zurich's Electrochemical Energy Systems Laboratory
- Conducted cyclic voltammetry and galvanostatic cycling to measure gravimetric capacitance, coulombic efficiency, and electrolyte degradation thresholds, and analyzed results in MATLAB

Mechanical Design Project and Flight Model | Bottle Rocket and Propulsion Flight Model *Spring 2025*

- Designed, built, and tested butane-propelled water bottle rocket modifications using SolidWorks and DraftSight
- Developed and calibrated a rocket propulsion simulation in Python, integrating empirical data to fine-tune trajectory predictions under varying launch conditions using aerodynamic modeling and iterative experimentation

INTERESTS AND EXTRACURRICULARS

Clubs & Leadership: Kappa Alpha Theta Sorority Beta Eta Chapter (Academic Development Director); Society of Hispanic Professional Engineers (Member); Guidance, Empowerment, and Medicine for Women's Health (Member)

TECHNICAL SKILLS

Programming Languages: Python, MATLAB, Java

Software/Tools: SolidWorks, AutoCAD, Revit, COMSOL, Arduino, CNC Mastercam