

NICHOLAS CARPENTER

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EDUCATION

Northeastern University, Boston, MA Expected May 2029
Candidate for Bachelor of Science in Electrical Engineering, Minors in Mechanical Engineering & Business Administration GPA 3.89
Coursework: Embedded Design, Differential Equations and Linear Algebra, Computing Fundamentals for Engineers, Cornerstone of Engineering 2, Physics 2, Calculus 3, Statistics, Chemistry (1 & 2)
Activities & Honors: IEEE-HKN Treasurer, Tau Beta Pi, John Martinson Honors Program, Dean's List, Forge Hardware & Software Product Lab, Entrepreneurs Club Husky Startup Challenge (2nd Place, NU Oakland)
Study Abroad: Global Scholars Program: NU Oakland (Fall 2024), NU London (Spring 2025)

SKILLS

Hardware: PCB design, circuit design, soldering, oscilloscopes, DMMs, function generators, Raspberry Pi, Arduino
Programming Languages: C/C++, Python, MATLAB
Engineering Software: OrCAD Capture, KiCad, LTspice, Altium, SOLIDWORKS, AutoCAD
Languages: Spanish (Massachusetts State Seal of Bilingualism)

EXPERIENCE

Electrical Engineering Co-op – *CPI Electron Device Business*, Beverly, MA Jun 2026 – Present

- Root-caused a component-fit failure on a production RF/microwave PCB by comparing datasheets, footprints, and electrical ratings of original and substitute ICs, isolating the fault to the board layout rather than the part.
- Developed manual rework procedures to recover 5 affected boards and, after identifying a second pin-mapping discrepancy against internal documentation, submitted a formal ECO documenting both corrections across all board revisions.
- Redesigned the PCB in OrCAD X Capture, building a custom part library with class-correct component properties and validating connectivity with a digital multimeter (DMM).
- Designed, built, and tested a validation harness for the redesigned PCB, tracing a test failure to an incorrectly documented ground pin in the legacy schematic; corrected the schematic and validated the board's truth table.
- Manage vendor communication for all active and upcoming PCB layout designs, submitting ECRs and ECOs, deriving form-fit-function (FFF) part substitutes, and producing vendor-ready BOMs and design packages.

Spacecraft Technology Intern – *NASA*, Mountain View, CA (Remote) Jun – Aug 2025

- Structured spacecraft subsystem performance and design tables from NASA's Small Satellite Report into query-ready datasets, supporting a searchable system that reduced data retrieval time by 40%.
- Standardized 18 spacecraft data tables across 3 report chapters for cross-platform use, improving consistency for NASA researchers and external partners.

PROJECTS

Brushless Motor Controller & Reaction-Wheel Inverted Pendulum – Personal Project Jul 2026 – Present

- Architecting a custom field-oriented control (FOC) brushless motor controller for a reaction-wheel inverted self-balancing pendulum, spanning an STM32G4, three-phase inverter, gate driver, and shunt current sensing with encoder feedback.
- Designed the three-phase inverter power stage from first principles (six N-channel MOSFETs, bootstrap high-side drive, dead-time protection) and validated hardware bring-up through first motor spin on an STM32G431 platform.

DC Power Analyzer – Personal Project Feb – May 2026

- Built a working DC power measurement prototype (INA219, Raspberry Pi Pico, OLED) displaying live voltage, current, and power, validated within 1% against a calibrated multimeter.
- Completed the full Altium Designer schematic-to-Gerber workflow on the analyzer's RC filter stage as a standalone PCB, including custom symbol and footprint libraries built from scratch, routing, ground pour, clean DRC, and fabrication outputs.

Boxy: Assistive Communication Caddy – *Forge: A Sherman Center Program Hardware Product Lab* Jan – Jun 2026

- Designed and prototyped the electromagnetic lock subsystem for the Communication Caddy, an assistive classroom device for nonverbal students; built a 5V relay driver in KiCad 9 and wrote non-blocking Arduino control firmware.
- Built and verified the project's 6.67V battery pack (2x2 AA) and measured per-component current draw with a multimeter to size the team's shared power budget, coordinating integration with mechanical sub-team.

IR-Sensor Puzzle Controller – *Cornerstone of Engineering 2 Project* Jan – Jun 2026

- Designed and built the complete electronics system for an interactive escape-room puzzle, wiring a Raspberry Pi Pico with eight IR break-beam sensors, an I2C LCD, and a pushbutton across shared power and ground rails with pull-up resistors.
- Wrote MicroPython firmware from scratch for sensor polling, hold-to-check button debouncing, and a state-based LCD interface, refining the input logic and display loop through iterative playtesting to eliminate false triggers and screen flicker.