

Luke Caffarey

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At GE I walked into a role with no assignment and walked out with five delivered projects. At NC State I started a wind team from nothing. Now I want to help scale metal printing into factories, and in the future, onto the Moon.

EDUCATION

North Carolina State University, B.S. Mechanical Engineering, Economics minor

Expected May 2028

GPA 3.69 | Raleigh, NC | Coursework: thermodynamics, fluid mechanics, mechanics of materials, dynamics, intro to machine learning.

EXPERIENCE

Center for Additive Manufacturing and Logistics (CAMAL), NC State, Undergraduate Researcher

Sept 2026 to Present

- Assist gas atomization runs producing metal alloy powder feedstock for electron beam powder bed fusion (EB-PBF) research.
- Characterize atomized powder via scanning electron microscopy (SEM), imaging to qualify feedstock
- Support development of in-situ process monitoring for EB-PBF, working toward real-time detection of build defects

NC State Mechanical and Aerospace Engineering, Senior Design Teaching Assistant

Aug 2026 to Present

- Work 10 hours a week training students in the senior design machine shop, specializing in welding: manual and CNC mills and lathes, waterjet and ProtoMAX, laser cutter, metal shear, Romer arm scanning, and 3D printers.
- Coach capstone teams through design reviews, prototyping, and engineering drawing and documentation feedback.

GE Vernova, Data Analytics, System Engineering Summer Intern

May to Aug 2026 | Greenville, SC

- Arrived to an undefined role and self-initiated interviews with 5 people leaders to find where I could be useful, then scoped and delivered five projects for the onshore wind fleet.
- Created a Python tool that scrapes drone-inspection imagery, reads blade serial numbers with a vision model, and automatically reconciles them against fleet records via SQL. Replaced a \$50,000 external vendor quote.
- Cut 3 to 6 engineer-hours per week by automating turbine controller fault triage in Python and SQL, and ran a measurement system analysis across two fleet databases to set the authoritative source for forced controller variables.

FPAC Laboratory, NC State, Undergraduate Researcher

Dec 2024 to Apr 2025

- Logged in remotely to the KSTAR fusion reactor's experiment database in South Korea to pull spectroscopy and high-speed camera data from reactor runs.
- Built Python time-series processing with adaptive Gaussian smoothing to detect peaks in noisy diagnostic signals, supporting reactor wall stability assessment.

LEADERSHIP

Windpack, NC State Collegiate Wind Competition Team, Founder and President | www.windpack.club

Aug 2025 to Present

- Founded the team and grew it to 35 active members across mechanical, electrical, and project development sub-teams; we placed 6th of 10 at its first national competition in 2026.
- Moved the turbine off last year's 3D-printed parts onto machined precision components, using my TA position to train members on the mills and lathes.
- In our first year, led the controls sub-team building a Simulink PID loop on an Arduino that actuates collective blade pitch and adjusts generator load with wind speed.
- Ran a blade materials trade study on the team dynamometer, testing three glass fiber and epoxy composite layups against the 3D-printed ABS blades that competed.

PROJECTS

Blade Dynamometer Test Stand, Windpack

2026

- Blades were our turbine's most common failure last season, so I pulled together a 3-person team to design and build a benchtop dynamometer that tests blades to failure before competition, not at it.
- Ran ANSYS vibration analysis and SolidWorks FEA on the frame and motor mounts so the stand's own shaking would not corrupt torque and thrust readings.
- Wired a load cell, RPM sensor, and motor controller to an ESP32 that spins blades up to 2,500 RPM, then used the stand to test our composite blades against 3D-printed ones.

SKILLS

CAD and Analysis: SolidWorks (part, assembly, drawings, Simulation FEA), ANSYS, QBlade, design for manufacturing

Fabrication: Welding, manual and CNC mill and lathe, waterjet, laser cutter, sheet metal, 3D printing, composite layup, soldering

Materials: Metal powder gas atomization, SEM powder characterization (morphology, particle size)

Electronics and Controls: ESP32 and Arduino, Simulink PID control, load cells, encoders, motor controllers, data acquisition

Software: Python (signal processing, data analysis), MATLAB, SQL, C++ (embedded), Git, Linux and Raspberry Pi