Patrick W. Spencer

patrickwspencer@gmail.com | 502-807-8738 | Portfolio: **www.pwspencer.com** | linkedin.com/in/pwsp | US Citizen

Education

University of Louisville | Louisville, KY
Bachelor of Science in Mechanical Engineering, GPA 3.00   Expected Graduation May 2024

Skills

Programming: Python (Qt, OpenCV, Torch), C/++, MATLAB, LabVIEW, basic web dev
CAD/FEA: SolidWorks (CAD, CAM, FEA, CFD), Inventor, Ansys, KiCad
Fabrication: Machining (manual, CNC), printing (FDM, SLA), welding (MIG, TIG), soldering, waterjet, composites, DFM
Design: fluid systems, electrical, test design, aerodynamic, thermal, combustion, structural

Experience

NASA Ames Research Center | Software Engineering Intern | Mountain View, CA   Aug – Dec 2023
- Developed rotor testing software (GUI, data acquisition) software using Python + Qt GUI framework for rotor airflow tests
- Worked with software's users and other software engineers to create maintainable, easy-to-use, robust testing tool
- Developed computer vision software (Python + OpenCV) to determine pointing angle of aerodynamic tufts
- Miscellaneous: Added features to Mars helicopter software, wrote library for sensor, wrote CFD output parsing program

Masten Space Systems | Propulsion Engineering Intern | Mojave, CA   Sept 2021 – Apr 2022
- Managed propulsion system routing inside of XL-1 lunar lander, including valves, regulators, fittings, tubes, clamps
- Coordinated with structures, integration, and systems teams on structural interfaces, integration schedule, mass budgets
- Communicated with vendors for component information including availability, cost, certifications, material compatibility
- Supported VTVL rocket flights and engine static firings: various system checkouts, armed abort system, propellant mgmt.

Conn Center for Renewable Energy (university lab) | Mechanical Engineering Intern | Louisville, KY   Feb – May 2021
- Managed research project evaluating performance of sodium and black phosphorus as battery electrode materials
- Assembled experimental batteries in argon glovebox then electrically tested to determine voltage, capacity, cyclability
- Performed Raman and X-ray diffraction spectroscopy on batteries in various discharge states to assess microstructure

Projects

NASA: Rotor Testing Software (Python, Qt, OpenCV)   Aug – Dec 2023
- Developed (from scratch) and thoroughly validated safety-critical software for controlling tests and visualizing data
- Continuously showcased new features to future software users and integrated feedback into next version
- Worked with SW engineers to ensure proper maintainability, conciseness, and documentation (for both users and devs)

NASA: Mars Helicopter Software (MATLAB)   Dec 2023
- Developed new data visualization features for Mars Sample Return helicopter flight performance estimation program
- New features enabled discovery of previously unknown flight dynamics effect, requiring further investigation

Masten: XL-1 (Lunar lander) Propulsion Routing   Sept 2021 – Apr 2022
- Used Solidworks to position valves, tubes, clamps, etc. to meet bending, structural, integration, pressure drop, mass reqs
- Supported rework of propulsion integration order, greatly easing schedule pressure by enabling more parallel assembly
- Created visuals and animations to clearly communicate changes in positioning and assembly order to other teams

Masten: Xodiac (VTVL rocket) Testing   Sept – Nov 2021
- Setup, armed, and monitored flight termination system (radio relay disabling vehicle's autonomous navigation abilities)
- Performed checkouts: valve operation, torque stripe, leak, electrical, rapidly resolved issues to maintain schedule
- Assisted with propellant and pressurant fill (including cryogenic), vehicle transportation, equipment preparation

Rocket Team: Captain, Propulsion Lead   Oct 2019 – Apr 2023
- Captained team of 30+ engineering students to finish in top third of teams at Spaceport America Cup / IREC 2022
- Personally secured $50k+ in funding from various donors. Managed conflicts, held design reviews, lead recruiting efforts
- Lead propulsion team for 2 years in development of solid and liquid engines, mainly 1000lbf kerosene/oxygen engine
- Taught all parts of propulsion design: fluid systems, combustion, cooling, component selection, P&ID design, safety

Rocket Team: Hopper   Aug 2022 – Jan 2023
- Coordinated small team to create and optimize design of small cold-gas VTVL rocket capable of 30s flight time
- Designed, built, programmed self-stabilizing stick using compressed air nozzles, IMU sensor, solenoid valves, Raspberry Pi

Interests: AI, biotech/biology, neuroscience, paleontology, hiking, running, RC drones + planes, unicycling, rocketry