Patrick W. Spencer

patrickwspencer@gmail.com | 502-807-8738 | **pwspencer.com/portfolio** | linkedin.com/in/pwsp | Louisville, KY | US Citizen

Education

University of Louisville | Louisville, KY
Bachelor of Science in Mechanical Engineering, GPA 3.17 Expected Graduation December 2023

Skills

CAD/FEA: SolidWorks (CAD, CAM, FEA, CFD), Inventor, Ansys, KiCad
Programming: Python, C incl. Arduino, MATLAB/Octave, LabVIEW
Fabrication: Machining (manual, CNC), printing (FDM, SLA), welding (MIG, TIG), soldering, waterjet, composites, DFM
Design: fluid systems, electrical, experimental, aerodynamic, thermal, combustion, structural

Experience

Masten Space Systems | Mojave, CA | Propulsion Engineering Intern 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)| Louisville, KY | Mechanical Engineering Intern 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 examine microstructure
- Incorporated updates to material preparation and battery assembly processes according to spectroscopy and literature

Projects

River City Rocketry (student competition engineering team) Oct 2019 – Present

- Captained team of 30+ engineering students to finish in top third of teams at Spaceport America Cup / IREC 2022
- Lead 5-10 person propulsion team for 2 years in development of solid and liquid engines, mainly 1000lbf kero/lox engine
- Personally secured $50k+ in funding from academic, corporate, and individual donors, maintained contact with donors
- Taught rocket design + building courses for new members on aerodynamics, structures, fabrication
- Managed internal conflicts, held subteam and entire-team design reviews, ensured communication between subteams

Masten: Xodiac Testing Sept – Nov 2021

- As member of 5-person test team, enabled 6 flights of Xodiac, 2’ x 14’ VTVL testbed rocket, w/ ExoCam camera payload
- Setup, armed, and monitored flight termination system (radio relay disabling vehicle’s autonomous navigation)
- 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

Masten: XL-1 Propulsion Routing Sept 2021 – Apr 2022

- Used Solidworks to position valves, tubes, clamps, etc. to meet bending, structural, integratn, press. drop, mass reqmnts
- Assisted with 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 integration to other teams
- Presented work during company-wide design reviews, provided feedback to other teams and projects during the same

Rocket Team: Propulsion Oct 2019 – Present

- Taught all parts of propulsion design: fluid systems, combustion, cooling, component selection, P&ID design, safety
- Communicated with liquid propulsion advisor & safety professionals to meet specified safety requirements
- Used trade studies to make decisions like propellants, chamber pressure, thrust, cooling architecture, P&ID design
- Oversaw and assisted with creation of LabVIEW control and data logging program, with a focus on safety
- Managed member workload, meeting regularly to ensure adequate progress to meet internal deadlines

Rocket Team: Hopper Aug 2022 – Present

- On very small team, created high-level design of small cold-gas VTVL rocket capable of 30s flight time
- Planned series of test articles as incremental steps eventually resulting in final vehicle
- Designed and built electronics and structure of self-stabilizing stick using compressed air nozzles, IMU, solenoid valves
- Achieved self-stabilizing stick w/Raspberry Pi running Python, interfacing with valve relay board and BNO055 IMU stick
- Designed + built drone with same control architecture as stick and final vehicle. Finalizing drone electronics and code.

Interests: FPV RC drones/planes, amateur rocketry (L2 certified), unicycling, neuroscience, biotech, philosophy, hiking, reading