Patrick W. Spencer - everything engineer

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Experience
(click job titles to read more)

Software + Electrical Engineer, Andson Biotech (YC W22) - Atlanta, GA — May 2024 - Present
- Architected and maintained software for cell therapy development machine, as sole software engineer, spanning Python backend, TypeScript/React frontend, and embedded C++ running on custom PCBs
- Built infra: Database (Postgres) with user dashboard, custom OTA update system, Tail/Headscale VPN
- Designed and tested PCBs (100+ components), controlling various motors and sensors over I2C, SPI, UART
- Solved fundamental electrical problem: Chased down over months, prototyped, then implemented fix into PCBs
- Implemented and iterated core application logic including control system regulating liquid flow and pressure

Software Engineering Intern, NASA Ames Research Center - Mountain View, CA — Aug – Dec 2023
- Developed rotor testing software (frontend + backend) using Python + Qt GUI framework
- Improved Mars Helicopter flight dynamics analysis (MATLAB), enabling discovery of new flight regime risks
- Developed computer vision software (Python + OpenCV) to determine pointing angle of aerodynamic tufts

Propulsion Engineering Intern, Masten Space Systems - Mojave, CA — Sep 2021 – Apr 2022
- Managed lunar lander propulsion system routing, including valves, regulators, fittings, tubes, clamps
- Coordinated with structures, integration, and systems teams on interfaces, integration schedule, mass budgets
- Operated VTVL rocket (Xodiac) for 6 flights, as part of small team: armed abort system, system checkouts

Mechanical Engineering Intern, Conn Center for Renewable Energy - Louisville, KY — Feb – May 2021
- Managed research project evaluating performance of sodium and phosphorus as battery electrode materials
- Assembled batteries, tested, then used Raman and X-ray diffraction spectroscopy for performance analysis

Education

University of Louisville, KY: Bachelor of Science in Mechanical Engineering — May 2024

Projects
(click project names to read more)

Vision-LLM Car — Dec 2024
- Programmed interface and agentic loop letting any VLLM (API or local) control a Raspberry Pi-based robot car
- Tested & optimized, using custom webapp for observability, on tasks like finding objects finding areas

Pterobot - quadruped trained with reinforcement learning — Apr 2024
- Created 3D model mimicking pterodactyl bodyplan and trained on cloud GPUs using JAX, Brax, MuJoCo
- Iterated reward function weights and terms to encourage desired behavior. Not walking (yet), but hopping!

PCB Motor — Dec 2024
- Designed and tested axial flux BLDC motor with highly configurable (serial- or parallel-izable) PCB stator
- Wrote Python script for entirely automated and modular PCB creation in Kicad format

Rocket Team Captain & Propulsion Lead, River City Rocketry, Univ. of Louisville — Oct 2019 – Apr 2023
- Led team of 30+ engineering students to top third finish at Spaceport America Cup / IREC 2022
- Secured $50k+ in funding, managed conflicts, held design reviews, led recruiting efforts

Skills and Tools

Soft: self-teaching, self-direction, efficient collaboration, prioritization, resilience & adaptability, documentation

Programming: Git, Python (Torch, OpenCV, Qt), TypeScript+React, embedded C/++, system design

Electrical: Circuit design, LTspice, PCB layout (Kicad) & debugging, oscilloscope, soldering

Mechanical: Machining, 3D printing, welding, waterjet, composites, CAD (Solidworks, Onshape)

Interests & hobbies: AI, hiking, unicycling, drones, rockets, paleontology