Patrick Youssef

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Select Impact

- **Rivian Gen2 Highway Assist:** Enabled org-wide simulation validation for Rivian's flagship autonomy feature, supporting both pre-launch readiness and ongoing development for its next-generation highway driving experience deployed to customers
- **SpaceX Crew Dragon: First Crewed Mission:** Supported mission validation for SpaceX's first human spaceflight, enabling full launch-to-landing simulation and improved constraint checks ahead of the historic Crew Demo-2 launch to the ISS

Work Experience

Rivian Palo Alto, CA
Software Engineer II, Simulation Infrastructure, Autonomy *Jan. 2024 – Present*

- Architected Rivian's first unified autonomy metrics framework, now adopted as the standard performance evaluation tool across 80%+ of teams. Powers feature checkouts, scales to 200K+ logs/month, and drives debugging and rollout decisions org-wide.
- Designed a performant PyTorch evaluation pipeline to validate BEV model outputs against logs and simulation, achieving 3x faster inference. Enabled regression checks across 5+ releases and contributed modular ML utilities adopted by the perception team.
- Built a pre-deployment evaluation pipeline that eliminated compile/deploy bottlenecks, enabling full-suite validation directly from training artifacts and giving the modeling team faster feedback loops on new architectures.
- Built SanityCheck, a pre-simulation validation framework that prevents crashes by detecting data deficiencies early. Saves $150K/yr in compute costs by terminating faulty jobs and improving debugging efficiency across autonomy teams.
- Drove org-wide adoption of modern Python standards (Ruff, Pylance, typing, dataclasses) and streamlined config practices (Hydra), reducing override complexity and making simulation pipelines easier to extend, debug, and maintain.

SpaceX Hawthorne, CA
GNC Software Engineering Intern *Jun. 2019 – Aug. 2019*

- Overhauled Crew Dragon's flight simulation pipeline to enable full launch-to-land simulations and reduce update time by 70%
- Automated updating 500+ legacy configurations to utilize the new pipeline while cleaning out deprecated simulations
- Executed functional and regression testing on critical verification simulations to ensure the 500+ changes had no adverse effects
- Implemented Python statistics scripts on the cluster to accumulate 100+ performance metrics checked against mission constraints

Vehicle Engineering Intern *Mar. 2019 – Jun. 2019*

- Built CV software to automate inspection of a critical vehicle component, reducing errors by 50% and speeding checks by 5x

Projects

Neural Image Memorization Present

- Investigating spectral bias in coordinate MLPs through systematic experiments comparing learnable vs. fixed positional encodings
- Architecting experimental infrastructure with automated sweeps, structured logging, and systematic result analysis

PatrickYoussef.com Jun. 2020 – Present

- Designed and built a modern content-driven site with Astro (prev: Gatsby) to share projects, technical blogs, and spurious insights
- Features custom layouts, MDX-powered posts, and fast, minimalist performance to encourage exploration and readability

N-Body Orbit Simulation Oct. 2022

- Simulated orbital precession with optimized RK4 integrator (40% faster); validated long-term trajectory stability (LEO to GEO)

Education

University of California, San Diego (UCSD) Mar. 2022
Master of Science, Computer Science *La Jolla, CA*

- GPA 3.95/4.0; Machine Learning, Artificial Intelligence, and Robotics Focus
- **Courses:** Grad Algorithms, Deep Visual Learning, Advanced Computer Vision, Robotic State Estimation, Probabilistic Reasoning

University of California, Irvine (UCI) Mar. 2020
Bachelor of Science, Mechanical Engineering *Irvine, CA*

Skills

- **Programming:** Python, JavaScript, HTML, CSS, MATLAB, R, C/C++, Bash
- **Technologies:** NumPy, Matplotlib, OpenCV, PyTorch, Robot/PyTest, Scikit-Learn, Pandas, TensorFlow, Git, Linux
- **Systems & Infra:** AWS (Batch, EC2, S3), Docker, Linux, GPU-based inference workloads, containerized deployment
- **Concepts:** Machine Learning, Computer Vision, Numerical Methods, Linear Algebra, Optimization, Algorithms