

# Vrushang Anand

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## Projects

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### SpaceX Hyperloop Competition - UCI HyperXite | [Github Repo](#)

- Awarded “Best Guidance System,” “Best Research” and “Best Presentation” at Hyperloop Global Conference 2025.
- Served as the *Control Systems Lead* for a full-scale Hyperloop pod, running a real-time software coordinating propulsion, braking, and pneumatics for safe high-speed runs.
  - Architected a Rust-based finite state machine enforcing deterministic behavior under hard safety constraints.
  - Built the full telemetry and monitoring stack (IMU, LiDAR, encoders, thermistors) and deployed a live React dashboard for real-time operator visibility and control.

### Reinforcement Learning Powered OS Scheduler (Linux Kernel) | [Article](#)

- Built an adaptive reinforcement learning based Linux kernel scheduler that reduced average task wait time by 70% while preserving fairness and turnaround across mixed CPU and I/O-bound workloads.
  - Designed and trained a custom PPO agent in a Python simulator replicating Linux CFS runqueue and virtual deadline logic to dynamically adjust task time slices.
  - Deployed the policy inside the kernel using Q32.32 fixed-point arithmetic, reimplementing neural network inference in C to ensure deterministic, low-latency scheduling decisions without floating-point support.

### High Frequency Trading (HFT) System

- Engineered an FPGA-accelerated high-frequency trading system for equity markets achieving sub-microsecond order matching latency on the critical execution path.
  - Built a custom TPU-style neural network accelerator on FPGA that dynamically selects which orders remain resident in BRAM, enabling low-latency order book access while offloading inference and prioritization logic from the CPU to eliminate execution jitter.

## Experience

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### Resilient Cyber-Physical Systems Lab

Mar 2025 - Present

Undergraduate Researcher

- Developed reinforcement-learning controllers for safety-critical systems (autonomous systems and robotics applications), enabling formally verifiable safety guarantees via backward reachability analysis.
- Built a GPU-accelerated Bernstein polynomial pipeline in PyTorch, scaling safety verification to high-dimensional control policies and validating results against MATLAB baselines.

### SwipeTax

Sep 2024 - Mar 2025

Software Engineering Intern

- Designed and implemented a swipe-based expense classification system, reducing manual bookkeeping time from several hours to couple minutes and simplifying separation of personal vs. business expenses for small business users.
- Shipped a scalable full-stack accounting platform using ReactJS, NodeJS, and AWS to automate core financial workflows and improve organizational efficiency.

## Leadership

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### Vice President of Technology | Engineering Student Council at UCI

Mar 2023 - Jun 2025

- Founded and led EngiTank, securing corporate sponsorship, organizing technical workshops, and mentoring multidisciplinary teams through end-to-end project development.

## Skills

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**Languages:** C/C++, Python, Rust

**Machine Learning:** Reinforcement Learning, PyTorch, CUDA, OpenAI Gym

**Hardware:** FPGA (Verilog), STM32, PCIe, Embedded Systems

**Systems:** Linux Kernel Development, OS Development, RISC-V, Computer Architecture

**Cloud & Tools:** AWS, Google Cloud, Docker, Git, Bash

## Education

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### University of California, Irvine

Jun 2026

B.S., Computer Engineering

GPA: 3.6

**Relevant Coursework:** Operating Systems, Embedded Systems, Control Systems, Machine Learning and Artificial Intelligence, VLSI, Discrete Time Signals, Software Engineering