

Vrushang Anand

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Education

University of California, Irvine

Bachelor of Science, Computer Engineering

Jun 2026

Relevant coursework: Advanced Python & C, VHDL, RISC-V, Computer Architecture, Object-Oriented Programming, Data Structures and Algorithms, Computer Organization & Programming, Embedded Systems, Network Analysis.

Experience

Resilient Cyber-Physical Systems Lab

Mar 2025 - Present

Undergraduate Researcher

- Designed and integrated a custom Bernstein polynomial layer into the Stable-Baselines3 (SB3) reinforcement-learning framework, enabling policy networks to operate in Bernstein basis for improved stability and constraint handling
- Implemented efficient Bernstein coefficient computation using matrix-based transformations, reducing computational complexity from $O(n^2)$ to $O(n^{k+1})$ and enabling scalable high-dimensional use
- Built a GPU-accelerated PyTorch pipeline for Bernstein layer evaluation, supporting parallel execution and efficient backpropagation during RL training
- Benchmarked and validated the custom SB3 integration against MATLAB-based implementations, optimizing memory layout and eliminating redundant copies to improve preprocessing throughput and numerical accuracy

SwipeTax

Sep 2024 - Mar 2025

Software Engineering Intern

- Developed a full-stack accounting platform for freelancers and small businesses using ReactJS, Node.js, and AWS EC2, featuring an intuitive UI and streamlined financial workflows.
- Integrated Plaid API for secure real-time bank synchronization and transaction tracking, with data persisted and managed via Supabase.

Projects

Reinforcement Learning Powered OS Scheduler (Kernel Space)

Aug 2025

Python, C, Reinforcement Learning, Kernel Development

- Designed and integrated a PPO-based scheduling policy directly into the Linux kernel, operating under strict kernel constraints (no floating-point, low-latency execution)
- Implemented fixed-point neural-network inference to enable real-time decision-making inside the scheduler path
- Reduced average task wait time by 70% vs. CFS while preserving turnaround time and fairness under mixed workloads

High Frequency Trading (HFT) System

Oct 2025

C, Verilog, Reinforcement Learning, FPGA Programming

- Designed and implemented a custom tensor processing unit (TPU) on FPGA to accelerate neural-network inference under strict latency and resource constraints
- Integrated the TPU into a low-latency trading infrastructure, enabling hardware-accelerated prioritization and caching of hot orders directly in BRAM
- Offloaded order-matching and inference workloads from CPU to FPGA, achieving microsecond-level execution latency and reducing CPU contention on the critical path

UCI HyperXite | Control Systems Lead "Dean's choice for best design project 2024"

Aug 2023 - Jun 2025

Rust, C++, ReactJS, Real Time Embedded System

- Led the design and implementation of a Finite State Machine (FSM) in C++ to coordinate propulsion, pneumatics, and braking, ensuring safe and efficient pod operation through real-time system control.
- Built an interactive and user-friendly Graphical User Interface (GUI) using ReactJS, enabling seamless real-time communication between the pod and the remote control station for live monitoring of critical operational metrics.
- Integrated advanced sensor systems, including an Inertial Measurement Unit (IMU), wheel encoders, lidar, Hall Effect sensors, and thermistors, to collect and analyze vital data, enhancing system functionality and safety.

PikaPower - P2P Energy Trading System

Apr 2025

Python, ReactJS, Embedded Systems

- Designed and implemented a Raspberry Pi-based system enabling real-time peer-to-peer energy exchange using Python, INA219 current sensors, relays, and other sensors to simulate solar generation and control power delivery.
- Built a full-stack platform with a Python backend and ReactJS frontend, using WebSockets for real-time communication and live dashboard visualization of energy usage, market dynamics, and trade execution.

Skills

- **Programming Languages:** C, C++, Python
- **Systems:** Linux Kernel Development, Scheduling, Performance Profiling, Concurrency
- **Machine Learning & AI:** Reinforcement Learning, CUDA, Pytorch, Tensorflow

- **Hardware:** FPGA, Verilog, Embedded Systems, STM32, PCIe
- **Tools:** Git, Linux, Bash
- **Software Development:** System Design, Data Structures and Algorithms, Debugging, Object Oriented Programming

Leadership

Vice President of Technology | Engineering Student Council at UCI

Mar 2023 - Jun 2025