Hem Vadgama

Schreyer Honors Scholar | Computer Engineering | Software, Systems & AI

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Education

The Pennsylvania State University – Schreyer Honors College **University Park, PA**
B.S. Computer Engineering, GPA: 3.44/4.00 *Expected May 2028*

Current Coursework: Computer Organization & Design, Object-Oriented Programming, Discrete Mathematics, Differential Equations, Linear Algebra

Professional Experience

Penn State Campus Recreation – Esports Center *Aug 2026 – Present*
Esports Center Attendant

- Support daily operations of the university esports facility, assisting visitors with gaming stations, equipment, and technical issues.
- Troubleshoot workstation and peripheral issues while maintaining equipment readiness and a reliable user experience.

Research & Engineering

IBM AssetOpsBench *Jun 2026 – Present*
Open-Source Research Contributor – AI Agent Reliability

- Built bounded avoid/recover/stop logic for plan-execute AI agents, preventing unsupported downstream execution after failures.
- Added deterministic traces exposing failure classification, recovery attempts, and execution behavior.
- Reduced diagnostic token usage 27.7% and LLM calls from 7 to 4 in a controlled failure experiment.
- Added evaluator tests, safety annotations, and reproducible experiments while preserving benchmark behavior.

Offline BLE Messaging Network *Aug 2026 – Sep 2026*
Creator & Lead Developer – Swift, SwiftUI, Core Bluetooth

- Built a native iOS system for nearby messaging without internet, cellular service, or external network infrastructure.
- Engineered BLE discovery, bidirectional transport, connection lifecycle, routing, and disconnect recovery.
- Coordinated scanning, advertising, connections, and delivery through asynchronous Core Bluetooth state.
- Integrated low-level wireless networking with a responsive native SwiftUI interface.

Distributed Autonomous Systems Testbed *May 2026 – Present*
Founder & Lead Developer – Python

- Built an open-source framework for testing autonomous-agent coordination under failures and safety constraints.
- Modeled agent-local beliefs, constrained messaging, action validation, execution, and reassessment.
- Implemented centralized/decentralized protocols with latency, packet loss, replayable traces, and unsafe-state detection.
- Added TOML experiments, parameter sweeps, structured metrics, extensible protocols, automated tests, and CI.

Self-Hosted Linux Infrastructure *May 2026 – Present*
Independent Systems Engineering – Linux, Docker, Networking

- Repurposed legacy hardware into a persistent headless Debian server running containerized services with Docker Compose.
- Configured WireGuard/Gluetun isolation, SSH, Tailscale, and Linux networking for private access and routing.
- Diagnosed storage, container, VPN, networking, permissions, and transcoding failures using Linux tooling.
- Maintain the server for self-hosted services, deployments, networking experiments, and systems projects.

Technical Skills

- **Languages:** Python, Java, C, Swift, SQL, Bash, MIPS Assembly, Verilog
- **Systems & Networking:** Linux, Debian, Docker, Git/GitHub, SSH, WireGuard, Tailscale, Bluetooth LE
- **Frameworks & Libraries:** SwiftUI, Core Bluetooth, PyTorch, NumPy, Pandas, SciPy, OpenCV
- **Tools:** Docker Compose, GitHub Actions, GeoPandas, GDAL, QGIS

Honors & Interests

- **Honors:** Schreyer Honors Scholar, Excellence in Physics, AP Scholar with Distinction
- **Technical Interests:** Computer Architecture, Distributed Systems, Embedded Systems, Firmware, Reliable AI