Aaryan Singh

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Education

Rose-Hulman Institute of Technology — Terre Haute, IN
Bachelor of Science, Computer Science (GPA: 3.5) — Expected May 2027

Relevant Coursework: Machine Learning, Artificial Intelligence, Linear Algebra, Game Theory, Introduction to Proofs, Data Structures & Algorithms, Operating Systems, Computer Architecture, Databases, Network Security, Debugging

Work Experience

Rose-Hulman Ventures — Terre Haute, IN
Software Engineering Intern — Mar 2026 – Present

- Started on the frontend and later took over all three layers (**React** UI, **Go** backend, **C** firmware on an **ESP32**) of a touchscreen kiosk device built from scratch for a leading laboratory-equipment manufacturer
- Designed the **I2C** protocol between backend and firmware for **6 command types** (setpoints, calibration, recipes, alarms, emergency stop) and added **8 thermocouple types** with a **PID** control loop
- Kept the kiosk's 4-channel live temperature charts responsive with **LTTB downsampling**, which preserves the shape of each curve, and showed missing sensor readings as gaps instead of drawing through them
- Shipped **200+ merged pull requests** across three repositories, fixed a concurrency bug that corrupted sensor data, reviewed backend PRs, mentored the intern writing test cases, and worked directly with the client

BNC Motors — Bhopal, India
Software Engineering Intern — Jun 2024 – Aug 2024

- Automated data collection with **Python**, **BeautifulSoup**, and **Selenium**, saving **80 hours/month** of manual work
- Integrated the collected data into company systems through **SQL** and **REST APIs** with **Java** and **Go** services

Research

Independent Research: Evaluating Explanation Methods for RL Agents — Aug 2026 – Present
Sole author, working paper: *Auditing Reference Distributions for Observation-Replacement Return Spans* — Paper & Code

- Studied when a return-based explanation test for RL agents can be trusted, training my own **PyTorch** PPO agents on **6,425** Kalshi prediction-market episodes and synthetic data, and checking results on **6** control tasks
- Found that results depend on how inputs are replaced: on synthetic data with no real signal, full replacement still showed a clear effect but a state-preserving method did not, so effect size alone can mislead
- Built a small exact counterexample showing my original decision rule had no general finite-sample guarantee, then tested it on **20** independent reference banks (**2,280** agents): **2.8%** false positives, too uncertain to certify **5%**
- Showed that an input-gradient penalty during training can push a feature's attribution share from **43%** to **2.9%** with no detectable change in return, a concern for oversight that relies on explanations
- Wrote an automated verifier that regenerates every table and figure from saved results, kept failed and unresolved runs in the paper, and corrected my earlier conclusions after finding bugs in my own code

Projects

Click-Ship | *JavaScript, Node.js, Fastify, Chrome Extensions, Babel, GitHub API* — GitHub | Apr 2025 – Aug 2026

- Built a Chrome extension and **Fastify** server that turn a click on a live site plus a plain-English request into a GitHub PR, mapping the element to its exact JSX line with a custom **Babel** plugin
- Restricted the **LLM** to that one line and verified the diff before opening the PR, so a manipulated request cannot add other code; risky additions such as script tags or `eval` are flagged for review
- Built **design-lint**, a CLI, ESLint plugin, and GitHub Action that flags hard-coded styles and Figma-to-code token drift (colors compared in OKLab), with **290+** tests; scanned a **3,829**-file monorepo in **5s**

Technical Skills

Languages: Python, Go, C, C++, Java, TypeScript, JavaScript, SQL, RISC-V Assembly
ML & Research: PyTorch, Stable-Baselines3, Gymnasium, NumPy, pandas, scikit-learn, SHAP, LaTeX
Frameworks & Platforms: React, Node.js, Chart.js, Kafka, PostgreSQL, AWS, Docker, ESP32 / ESP-IDF, Raspberry Pi
Tools: Git, GitHub, Jira, Claude Code, Codex, Cursor, MCP, PlatformIO

Activities

Rose-Hulman Athletics | Senior Game Statistician: real-time data analysis for 10+ DIII sports — Oct 2023 – Present
Alpha Phi Omega Executive Board | Communications Director: 100+ members, coordinated events — Sept 2024 – Present
Student Affairs Committee | Reviewing Committee Member: policy reviews and club approvals — Sept 2024 – Present