

Ameya Panchal

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Education

The Pennsylvania State University

B.S. Computer Science, Minors in Physics and AI • Schreyer Honors College • GPA 3.71 / 4.00

University Park, PA

Expected May 2028

Experience

Nittany AI Advance Internship Program

Application Specialist • Team of 5 • Client: Penn State Office of the Physical Plant

State College, PA

Dec 2025 – Present

- Built a Tesseract OCR + LLM + regex pipeline that extracts metadata (project name, ID, and more) from scanned project documents
- Raised extraction accuracy up to 10% by merging the LLM and regex paths and moving from GPT-4o to GPT-5 after benchmarking Azure's 4- and 5-series models; parallelized the pipeline for 5x faster runs

Projects

CrashAI — Crash-Risk Analysis Platform

Founder & Technical Lead • Team of 3 • 1st of 40 teams, Nittany AI Challenge 2026 • Scoped with PennDOT

Feb – Jul 2026

- Built the crash-severity model (XGBoost, 81 road and driver features) with per-site SHAP explanations and what-if simulation, served by a FastAPI REST backend with sub-5 ms road-data lookups from a local spatial index
- Led a team building the React / TypeScript frontend and Python services (33-tool agent loop, retrieval over engineering manuals, hash-verified artifact pipeline, eval harness); shipped with Docker, Cloud Build, Playwright, Vitest

Peira — An Agent-Native Instrument for Benefit Cliffs [GitHub]

Solo • OpenAI WebMCP Challenge entry • TypeScript, React, Zod • Python, FastAPI

Aug – Sep 2026

- Built a web app where a person and a ChatGPT agent investigate US benefit cliffs together: 11 agent-callable tools to sweep income, trace the rule behind a cliff, compare households, and find the smallest policy fix
- Kept each tool reply to ~1 KB of derived numbers; Zod validation on every input, a server-side whitelist for policy edits, rate limiting; 21 backend tests and an end-to-end script; live on Netlify and Render

Web Vulnerabilities Study — Seven Classes, Defended in Rust and Python [GitHub]

Solo • Rust (axum, actix-web, sqlx, diesel, casbin) • Python (Flask)

May 2025

- Wrote and documented a working defense for seven web vulnerability classes, from SQL injection to OAuth misconfiguration

Research

Do Residual-Stream Probes Survive Degrading Chain-of-Thought Legibility?

SPAR • mentored by Marios Tsatsos, with two fellow mentees • PyTorch

Sep 2026 – Present

- Testing whether classifiers on a model's internal activations still catch harmful reasoning as its written reasoning degrades

The J-lens offset is the model's token frequency: z-scoring fixes it [GitHub]

Independent • PyTorch, jacobian-lens • Qwen3, Pythia, GPT-2, Gemma-2

Aug 2026

- Traced a per-token bias in a tool that reads a model's internal activations to the model's word frequency, and fixed it with z-scoring: recovered secret words where the published method scored zero, beating it 0.805 to 0.665 (Cywinski et al. accuracy)

A Dead-ReLU Absorbing State — Resolving an Open Memorization Anomaly [LessWrong]

Independent • PyTorch • LessWrong

Jul 2026

- Explained why one small transformer in a published memorization challenge could barely learn (dead ReLU units cut off the gradient) and *overturned* the authors' explanation with one controlled experiment

Monte Carlo Radiative Transfer — Neutron-Star Pulse Profiles [poster]

Penn State Multi-Campus REU • advised by Prof. Asif ud-Doula • Python

Oct 2025 – Aug 2026

- Simulated X-ray scattering in a neutron-star atmosphere; first-author paper under review at *Astrophysics and Space Science*

Skills

Languages & Frameworks: Python, TypeScript / JavaScript, Rust, Java, SQL • React, Vite, Node, Zod, FastAPI, Flask

Machine Learning: PyTorch, XGBoost, scikit-learn, HuggingFace Transformers, TransformerLens • RAG, agent tool design (WebMCP)

Infrastructure: Docker, Google Cloud Build, GitHub Actions, Netlify, Render • Playwright, Vitest, pytest, uv, Git