Pratham Hegde

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Education

Arizona State University Tempe, AZ

GPA 4.18/4.0, Barrett Honors College, Grand Challenges Scholars Program *August. 2023 – May 2027*

Skills

Key Skills

Python, Java, JavaScript, TypeScript, C/C++, Embedded C, MATLAB, SQL, Linux, Git, DSA, React/Next.js, TailwindCSS, Django, Flask, REST API Development, Docker, Kubernetes, AWS, Firebase, PostgreSQL, MySQL, Automated Testing, Debugging, Reverse Engineering, GDB, pwntools, Shell Scripting, Flutter, Cloud Deployment, LLM Integration (OpenAI, Gemini, Amazon Q), Prompt Engineering, Model Evaluation, Data Preprocessing for ML Pipelines

Professional Experience

Undergraduate Researcher May 2025 – Present

SEFCOM Lab, Arizona State University *Tempe, AZ*

- Developed and automated exploits for **ASLR/PIE bypass**, **shellcode injection**, and **ROP chains** on real-world binaries using **pwntools**, **GDB**, and framebuffer manipulation techniques.
- Reverse engineered x86/MIPS binaries using **Ghidra** and **IDA Pro** to analyze **custom file formats**, decrypt framebuffer directives, and reconstruct **ANSI-rendered flags**.

Web Experience Designer April 2025 - Present

University College, Arizona State University

- Conceptualized and developed **10+** responsive web pages using ASU's branded design system, **enhancing mobile usability and increasing user engagement.**
- Conducted **20+** user research interviews and usability tests, leading to **improved navigation flow and reduced bounce rates across redesigned pages.**
- Oversaw front-end, back-end, and design efforts across UC's entire web portfolio, streamlining content workflows and accelerating site update processes.

Software Development Intern August 2024 - December 2024

UNIUS *Remote*

- Designed and optimized user-facing features using **Next.js** and **React**, resulting in a **30% reduction in page load times** and improved user engagement across platforms.
- Collaborated with cross-functional teams to integrate front-end components with back-end APIs, ensuring seamless data flow and **consistent feature delivery** across deployments.

Projects

CarbonCompass

Role: Full-Stack Developer

- Developed a climate-impact analytics application using Cloudflare Workers and D1, integrating LLM-powered data extraction through Gemini and Amazon Q to deliver real-time carbon-footprint estimates for consumer products.
- Implemented serverless compute pipelines that preprocess emissions datasets in Python, enabling lightweight model evaluation and rapid response times under 150 ms across globally distributed edge nodes.

Sherpa – Autonomous Vehicle Collaboration Platform

Role: Lead Developer

- Built a scalable, distributed platform enabling real-time communication between autonomous vehicles using **React**, **Node.js**, and traffic APIs (TomTom), achieving a **15% reduction in simulated congestion**.
- Created scenarios for integrating backend services with **Redis** and WebSockets for efficient message handling and route updates across clients.

SecureChat – Encrypted Messaging System and Exploit Simulation

Role: Security Researcher and Exploit Developer

- Built and reverse-engineered a full-stack messaging platform using **Flask**, **SQLite**, and **AES-ECB**, simulating encrypted DHE-AES conversations across sandboxed hosts via `dojjail`.
- Launched **XSS**, **ECB replay**, and **Diffie–Hellman key manipulation** attacks using Selenium automation to extract messages, impersonate users, and trace sensitive flag leakage.