

# ATHARVA GAWDE

+1 (630) 453-4699 ◊ agawde05@gmail.com ◊ Ann Arbor, MI  
atharvagawde.com ◊ linkedin.com/in/atharva-gawde

## EDUCATION

### University of Michigan – Ann Arbor

Bachelor's in Computer Science and Honors Mathematics, Minor in Physics  
GPA: 3.764/4.00

September 2023 – May 2027  
Ann Arbor, MI

- **Honors:** Univ. Honors (2024–2026), Victors Award Scholarship (2023–2025), National Merit Finalist, National German Exchange Scholar
- **Relevant Coursework:** Machine Learning (EECS 553), Operating Systems (EECS 482), Data Structures & Algorithms (EECS 281), Computer Organization (EECS 370), Differential Topology I–II (Math 395/396), Probability Theory (Math 525), Algebra I (Math 593), Algebraic Geometry I–II (Math 631/632), Lie Groups (Math 637), Algebraic Topology I–II (Math 695/696), Tensor Categories (Math 715)
- **Certifications:** Stanford Online – [Machine Learning Specialization](#) by Andrew Ng. Completed courses covering [Supervised ML: Regression and Classification](#), [Advanced Learning & Algorithms](#), and [Unsupervised Learning, Recommenders, Reinforcement Learning](#).
- **Teaching:** Course Grader for Math 425: Introduction to Probability; Assistant/Tutor for Math 592: Algebraic Topology

## EXPERIENCE

### Undergraduate Researcher – Finding Ellipses Project

Polymath Jr. Collaborative Research Program

June 2025 – August 2025  
Online/Remote

- Designed and implemented computational tools in Python for symbolic and numerical analysis of Blaschke curves; built an interactive web tool (React, WebGL) to visualize and experiment with Blaschke products in the complex plane.
- Investigated connections between Poncelet 3-ellipses, Blaschke products, and matrix numerical ranges, proving geometric correspondence results and extending classical results such as the Chapple-Euler and Fuss theorems.
- Co-authored a collaborative manuscript and presented findings at a program conference, under the supervision of Valentin Kunz (Ohio State Univ.), Nathan Wagner (Brown Univ.), Lars Wagoner (Leiden Univ.), and Yunus Zeytuncu (Univ. of Michigan–Dearborn).

### Vice President of Internal Affairs & Web Development Committee Lead

Kappa Theta Pi – Professional Technology Fraternity

January 2025 – Present  
Ann Arbor, MI

- Led instructional web development programming for an 80+ member professional technology fraternity, teaching React.js/TypeScript, React Router, Convex, Supabase, SSR/CSR, REST APIs, SEO, DNS, and Git through hands-on full-stack application development.
- Facilitated PiHacks, a 200+ participant hackathon and the largest Michigan-exclusive technology hackathon, managing event logistics, participant experience, internal operations, and day-of execution.

### Student Researcher

Dahl Research Group, Northwestern University High-Energy Physics Group

September 2021 – June 2023  
Evanston, IL

- Analyzed large, complex datasets from PICO, LZ, and SBC dark matter experiments using Python (NumPy, pandas, scikit-learn), applying machine learning and statistical methods for signal processing, anomaly detection, rare-event analysis, and acoustic imaging of bubble chamber events.
- Developed and validated Monte Carlo simulations (MCNP) to model neutron source activation and detector geometries for dark matter detection in bubble chambers, improving experimental prediction accuracy, detection resolution, and reliability.

## PROJECTS

### Assertionista: Teaching LLMs to Generate Provably Correct Code

Python, PyTorch, Hugging Face, Qwen2.5-3B-Instruct, Dafny, AWS

Fall 2025  
Project Repository

- Developed a two-model RLVR pipeline for formal code generation on DafnyBench, where a *writer* model generated Dafny code from specifications and an *annotator* model added proof annotations. Used GRPO-style policy optimization with automated reward signals.
- Built a JSON patching and deterministic edit-application pipeline with a staged verifier reward function for annotation generation; cut annotator outputs from 411 to ~120 tokens per sample, while sustaining format compliance and 94.5% compilation success on rollouts.
- Extended DafnyBench with specification-only `unimplemented_body` skeletons for staged SFT → RL training, and validated the RL training pipeline over 2,735 optimization steps (~4.4 epochs) on an AWS g6e.2xlarge instance with an NVIDIA A40 (48 GB VRAM).
- Designed the training setup to handle sparse verifier rewards and tight GPU memory constraints for formal code generation.

### Concurrent C++ Systems Infrastructure

C++, Linux, ucontext, Boost, TCP Sockets, Virtual Memory

Winter 2026

- Implemented core operating systems abstractions in C++, including a user-level thread library with FIFO scheduling, context switching, mutexes, condition variables, joins, interrupt handling, and multiprocessor synchronization.
- Built a virtual memory pager supporting swap-backed and file-backed pages, page fault handling, eager swap reservation, copy-on-write sharing across forked address spaces, and second-chance clock eviction to minimize disk I/O.
- Developed a multi-threaded network file server with a hierarchical inode-based file system, TCP request parsing, ownership-based access control, crash-consistent disk write ordering, and fine-grained reader/writer locking for safe concurrent client requests.

## SKILLS & INTERESTS

### Programming Languages

Python, C++, Java, TypeScript, JavaScript, SQL, HTML/CSS,  $\LaTeX$

### Libraries & Frameworks

PyTorch, Hugging Face, NumPy, pandas, scikit-learn, React.js, Node.js, Convex, Supabase

### Tools & Systems

Git/GitHub, Linux, Docker, AWS, Dafny, MATLAB, Mathematica, MCNP

### Skills

Machine Learning, Systems Programming, Data Science, Statistical Analysis, Web Development

### Interests

Algebraic Topology, Formal Methods, Machine Learning, Sports Analytics, Chess, Tennis, Cycling