Aditya Prashant Chaudhari

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RESEARCH INTERESTS

Compiler optimization and autotuning; WebAssembly intermediate representations; performance analysis of code generation strategies; high-performance computing systems.

EDUCATION

Michigan State University, East Lansing, MI — Aug 2021 – May 2025
B.S. in Computer Science, Minor in Business — GPA: 3.97/4.0
Graduated *with Honor*; Honors College Member
Dean's Showcase of Stars Scholar (top 1% of undergraduates for academic excellence)

TECHNICAL PROJECTS

WebAssembly Compiler Optimization Research — Summer 2025 – Present
Independent Project — Repo: `https://github.com/AdityaC4/tubular-upgrade`

- Investigating autotuning frameworks for systematic exploration of WebAssembly code generation strategies and optimization combinations
- Implemented optimization pipeline with function inlining and loop unrolling passes; initial benchmarking shows up to 22% performance improvements in execution time for loop-intensive workloads
- Built comprehensive benchmarking infrastructure for quantitative analysis of compiler optimization impact across diverse test cases
- Technical implementation: Complete compilation pipeline from lexer through WebAssembly code generation with modular optimization pass manager architecture
- Current development: Grid search-based autotuning system for systematic exploration of optimization parameter combinations

High-Performance Computing I/O Performance Analysis — Aug 2024 – May 2025
Technical Research Intern, MSU Institute for Cyber-Enabled Research (Mentor: Dr. Xiaoge Wang)

- Conducted systematic comparative analysis of distributed file system performance (GPFS scratch vs. research storage) across 1,000+ node cluster configurations using IO500 benchmark suite
- Developed automated SLURM-based parameter sweep tools and Python visualization pipeline for multi-dimensional performance analysis
- Research impact: Performance analysis and configuration recommendations directly influenced ICER's infrastructure upgrade planning decisions
- Analyzed throughput vs. metadata operation tradeoffs under various node and process layouts; tools adopted for ongoing system optimization efforts

TECHNICAL REPORTS

- Chaudhari, A. *IO500 Benchmark Analysis of MSU HPCC File Systems: Performance Characterization and Infrastructure Planning Recommendations.* Technical Report, Institute for Cyber-Enabled Research, Michigan State University, 2025. *Adopted for infrastructure optimization.*
- Chaudhari, A. *Security Analysis of Campus RFID Access Control Systems: MIFARE Classic and HID/iCLASS Vulnerability Assessment.* Research Report, Michigan State University, 2024. (See MIFARE Classic; HID/iCLASS)

OPEN SOURCE CONTRIBUTIONS

- **LLVM Project:** Implemented constexpr support for x86 vector intrinsics in Clang:
  - "Enable constexpr evaluation for element extraction/insertion intrinsics." Merged PR #161302, October 2025. Addresses Issue #159753.
  - "Enable constexpr support for AVX/AVX512 subvector insertion intrinsics." Merged PR #158778, September 2025. Addresses Issue #157709.

  Technical writeups: adityac4.github.io (includes detailed LLVM contribution analysis)

INDUSTRY EXPERIENCE

Software Engineer Intern – XOneFi May 2024 – Aug 2024

- Designed and implemented a web-based network authentication layer connecting custom OpenWRT firmware with Web3Auth using a custom React interface.

Capstone Project Collaborator – Stryker Corporation Aug 2024 – Dec 2024

- Led 5-member team developing computer vision surgical instrument tracking system; implemented YOLOv11 model with CoreML optimization achieving 95% real-time accuracy.

COMPETITIONS & RECOGNITIONS

Dean's Showcase of Stars Award (2021 – 2025) – University-wide recognition for academic excellence
MITRE eCTF Global Top-10 Finisher (2023, 2024) – International embedded systems security competition

TEACHING EXPERIENCE

Teaching Assistant – CSE 232 (C++ Programming, Data Structures & OOP) Aug 2022 – May 2023

- Provided technical instruction and mentorship to 60+ undergraduate students per semester in programming and data structures in C++

Teaching Assistant – MTH 103 (College Algebra) Aug 2023 – May 2024

- Guided students in problem-solving and mathematical reasoning; conducted weekly recitation sessions and provided academic support to undergraduate students in foundational mathematics

RELEVANT COURSEWORK

Translation of Programming Languages (CSE 450)
Computer Organization & Architecture (CSE 320)
Computer Systems (CSE 325)
Database Systems (CSE 480)
Operating Systems (CSE 410)
Algorithms & Data Structures (CSE 331)
Computer Security (CSE 425)
Independent Study: Embedded Systems Security (CSE 490)

Additional: CS 6120: Advanced Compilers (Cornell University, self-guided online course - completed independently)

TECHNICAL EXPERTISE

- **Compiler & Language Design:** LLVM IR, WebAssembly (WAT/WASM), optimization pass development, autotuning frameworks, lexical analysis, and parsing
- **Systems & HPC:** C/C++, Rust, Python, distributed systems, parallel computing, performance benchmarking, SLURM workload management
- **Development Tools:** Git, Docker, data visualization, technical documentation