

# JOSEPH GETACHEW

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## Education

### Purdue University

Bachelor of Computer Science — Minor Mathematics

Expected Graduation: Spring 2027

West Lafayette, Indiana

- **GPA: 3.7** — 4x Dean's List
- Courses: Data Structures & Algorithms, Object Oriented Programming, Programming in C, Relational Databases, Computer Architecture, Competitive Programming, Systems Programming

## Work Experience

### AIM Research Team (Artificial Intelligence in Music)

West Lafayette, Indiana

Undergraduate Researcher

May 2025 – Present

- Assisted in development of posture assessment tools in **Evaluator**, a mobile app using **computer vision** to help musicians practice more efficiently; tested with 20+ musicians
- Designed a **shoulder alignment classifier** using **MediaPipe landmarks** and geometric heuristics, achieving **92% precision** in detecting unbalanced posture
- Trained and deployed a **machine learning model** for low-elbow detection with **94% accuracy**, reducing false negatives by **36%** over baseline
- Collaborated in integrating **YOLO object detection** and **spectrogram analysis** into a **multi-modal transformer pipeline** for audio-visual feedback

## Projects

### FallGuard | React, Node.js, Express, PostgreSQL

June 2025 – Present

- Built a full-stack web app to help seniors track fall prevention progress, used by **6 pilot users**, in collaboration with a medical researcher
- Implemented secure caregiver-patient linking via referral codes, enabling shared access to fall logs, exercise data, and **Risk3 assessments**; cut onboarding time by **60%**
- Integrated a dynamic map of local fall-prevention events and education portal, increasing user engagement by **40%** in testing phase
- Selected as **1 of 8 semi-finalist startups** (from 100+ applicants) in the 2025 Indiana Healthcare Innovation Challenge

### Memory Management System | C

January 2025 – March 2025

- Engineered a custom dynamic memory allocator in **C**, implementing core **malloc()**, **free()**, and **realloc()** functionality
- Designed multiple **optimizations** including boundary tags for **O(1)** coalescing, segregated **free lists**, and metadata footprint reduction
- Developed fragmentation-handling techniques including block splitting and chunk coalescing algorithms
- Implemented a robust **error handling system** to cover edge cases and memory safety

### Simple C Compiler | C, x86-64 Assembly, Yacc, Lex

October 2024 – December 2024

- Developed a compiler for SimpleC, supporting pointer and primitive types, generating **x86-64 assembly**
- Implemented full **expression parsing** and code generation using **yacc/lex** for arithmetic and logical operations
- Engineered a **register allocation system** simulating a stack machine for efficient memory/register usage

## Leadership

### Academic Leader – ColorStack

September 2024 – Present

- Mentor underrepresented students in **CS & Engineering**, offering academic and career guidance
- Lead weekly **technical workshops** on core CS topics including data structures and programming fundamentals
- Coordinate with industry pros to host **networking events** and promote opportunities with tech companies

## Technical Skills

**Languages:** Java, C, C++, Python, JavaScript, SQL, HTML/CSS

**Frameworks/Tools:** React.js, Node.js, Express, PostgreSQL, Yacc/Lex, Jupyter Notebook, LaTeX

**Libraries:** MediaPipe, YOLO, Pandas