

Jack Sangl

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EDUCATION

The Pennsylvania State University
Computer Engineering

Expected Graduation: May 2028
GPA: 3.83

- **Related Coursework:** Data Structures and Algorithms (Fall 2025), Object Oriented Programming (Fall 2025), Intermediate C++ Programming, CS50 (Harvard), and Discrete Mathematics
- **Certifications:** Fundamentals of Deep Learning – NVIDIA

EXPERIENCE

Undergraduate Researcher

University Park, PA

- **One of 80** students selected throughout the university for the **Multi-Campus Research Experience for Undergraduates**.
- Currently authoring a **literature review** and preparing a final presentation on **regulatory challenges** for AI-assisted medical devices as the culmination of the project.
- **Presented** weekly analysis of research findings to mentors and peers, incorporating feedback to refine the project's scope and identify key compliance risks.

PROJECTS

MOS 6502 CPU (C++)

- Engineered a functional **MOS 6502 CPU** emulator in C++, demonstrating understanding of computer architecture, low-level instruction sets, and processor design, gained through independent study of **technical documentation** and **video resources**.
- Implemented complex **opcode decoding**, **register management**, and **memory mapping systems**, effectively translating CPU specifications into robust, functional code.
- Developed a core emulation engine capable of executing ROMs, showcasing proficiency in system-level programming and meticulous attention to detail required for precise hardware simulation.

AI Calorie Tracking Mobile App (React Native, TypeScript, Supabase)

- **Independently** developed a **full-stack AI-powered** fitness and calorie tracking mobile app using **React Native**, **TypeScript**, and a serverless **Supabase backend** delivering nutritional analysis and progress tracking.
- Integrated **Google's Gemini API** calls in **Supabase Edge functions** to recognize foods and estimate portion sizes from images, creating an intuitive and frictionless calorie logging experience for users.
- Used **MMKV** caching for frequent foods, reduced retrieval time from ~300ms (API) to <1ms (local), a speedup of over **99.7%**.
- Managed user authentication and **JWT** tokens via a centralized **Zustand** store, which streamlined **session management** and **secured API communication**, resulting in a seamless user experience.
- Engineered a responsive frontend with **NativeWindCSS** and modular UI components; implemented **Supabase authentication** and used **PostgreSQL** tables for robust **user data management** and streamlined onboarding.

Image Processing Application (C)

- Used C to implement core image filters, including **grayscale**, **Gaussian blur**, and **horizontal reflection**, which provided fundamental image manipulation capabilities for BMP files.
- Implemented the **Sobel operator** and **dynamic programming** to develop an **advanced seam carving algorithm**, which enabled content-aware compression by optimizing the removal of low-energy pixels.
- Utilized **heap memory management** and in-place image modifications to overcome stack overflow issues and **reduce memory overhead**, achieving efficient processing for large images.

SKILLS

Languages: C++, C, Python, TypeScript, JavaScript, SQL

Frontend: React, React Native, Next.js, TailwindCSS, Bootstrap

Backend: Node.js, Flask, Django, Supabase, PostgreSQL, SQLite

Developer Tools & Platforms: Git, VS Code, Vercel, Ollama, Resend, PyTorch