

Jack Gaffney

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Education

University of Michigan, Ann Arbor, MI

Expected May 2026

Bachelor of Science in Engineering – Computer Science

Relevant Coursework: Operating Systems, Embedded Systems, Computer Organization, Artificial Intelligence, Data Structures & Algorithms, Linear Algebra, Multivariable Calculus, Physics I & II

Experience

Quantum Opus LLC | *Software Engineering Intern*

Plymouth, MI | Summer 2025

- Built and deployed a full-stack internal database system (Go/Gin backend, Next.js frontend, PostgreSQL, Docker Compose) that centralized fragmented workflows and improved operational scalability for the engineering team.
- Designed modular Go API endpoints that could be consumed independently, enabling seamless integration with Python-based data generation pipelines and reducing redundant data transfers.
- Implemented automated data ingestion and validation pipelines with dynamic entity linking and relationship mapping, improving data reliability and reducing manual intervention across complex datasets.

Renewit Decking | *Carpenter & Logistics Lead*

Charlevoix, MI | Summer 2024

- Constructed large-scale outdoor living spaces using precision carpentry techniques, coordinating multi-phase project planning and adapting designs to structural constraints under limited resources.
- Coordinated logistics and scheduled material deliveries for seven distributed crews within a 50-mile radius, optimizing resource allocation and significantly reducing downtime across simultaneous job sites.
- Transitioned from carpentry to logistics and pre-construction project planning after identifying workflow inefficiencies, demonstrating adaptability and initiative in process improvement.

DTS Enterprises Inc. | *Engineering Intern*

Ellsworth, MI | Summer 2022

- Produced 2D/3D CAD renderings and technical schematics, supporting cross-functional communication between design and production teams to accelerate product iteration.
- Authored a comprehensive technical manual for a mechanical boat door system, enabling customers to independently complete installations and reducing reliance on on-site engineering support.
- Reorganized a database of 10,000+ assembly files and component drawings, implementing a new structure and indexing scheme that greatly improved retrieval speed and reduced production bottlenecks.

Projects

Ocean Microkernel | *C11, x86_64 Assembly*

2025

- Designed a Unix-inspired x86_64 microkernel with capability-based message-passing IPC, where only essential services run in kernel space and userspace servers handle higher-level functionality.
- Implemented memory management including a buddy allocator, 4-level paging, and slab allocator, along with a priority-based preemptive scheduler with per-CPU run queues.
- Built fast syscall paths using SYSCALL/SYSRET, ELF loading for process creation, and a minimal C runtime with a custom libc implementation.

High-Performance Game Engine | *C++17, Lua*

2025

- Engineered a real-time 2D rendering engine optimized for strict frame-timing constraints (16ms), implementing custom memory allocators to prevent heap fragmentation under sustained load.
- Integrated Lua for high-level logic scripting, creating a “software-defined” architecture where core C++ systems expose functionality to flexible upper-level scripts, mirroring embedded control patterns.
- Leveraged advanced STL features and pointer arithmetic to achieve consistent 60 fps when rendering millions of actors on large maps.

Technical Skills

Languages: C++ (Advanced), C, Python, Rust, Go, Lua, Assembly, MATLAB

Systems & Tools: Linux, Docker, Git, PostgreSQL, CMake, GDB, Valgrind, Make, CI/CD

Focus Areas: Systems Programming, Database Systems, Performance Optimization, Multithreading

Activities

Autonomous Robotic Vehicle Project Team – Lights Team

Winter 2024 – Present

Michigan Data Science Team – Algorithm Development

Winter 2024 – Present