

JOSEPH DAVID HUGHES

Birmingham, United Kingdom

Birmingham, UK | +44 7552 046130 | joeydarlo1000@gmail.com Portfolio: [Joe-hughes.dev](https://joe-hughes.dev) |
GitHub: github.com/JoeHughes9877 | [LinkedIn](#) | British Citizen (BPSS / SC Eligible)

EDUCATION

Aston University | Birmingham, UK

BSc (Hons) Computer Science | 2025 - 2029

- **Academic Standing:** Stage 1 Average: 63.12% | Introductory Programming for Digital Science: **90.00%**
- **Relevant Coursework:** Secure Networks & Operating Systems, Data Structures & Algorithms, Software Engineering.

TECHNICAL SKILLS

- **Languages:** C (C99/C11), C++ (C++17), Python, Bash, SQL, Assembly
- **Embedded & Hardware:** ARM Cortex-M4 (STM32), Microchip AVR, FreeRTOS, NVIC Interrupts, Hardware Timers, PWM, ADC/DAC, Memory Mapped I/O
- **Protocols:** UART, SPI, I2C, GPIO
- **Tools & Toolchains:** GNU Make, Linker Scripts (`.ld`), GNU Toolchain (`arm-none-eabi`), GDB, Valgrind, Git, Linux/POSIX

PROJECTS

Bare Metal Firmware Sandbox

- Architected register level peripheral drivers (UART, SPI, I2C) from base memory addresses, eliminating vendor HAL dependencies.
- Configured NVIC priorities, EXTI lines, and hardware PWM timers for deterministic, microsecond level event handling.
- Built a cross compilation pipeline using custom GNU Linker Scripts (`.ld`) and automated MMD dependency tracking in Make, reducing build times by 60%.

High Performance C Data Structure Library & Persistent Engine

- *Implemented generic dynamic data structures (vectors, circular queues, linked lists) in pure C with amortized $O(1)$ reallocations.*
- *Enforced strict memory ownership patterns across a modular engine, verifying zero memory leaks via Valgrind profiling.*

- *Integrated an embedded SQLite3 layer with parameterized queries for deterministic state persistence.*

Real Time Kinematic Flocking Engine

- *Implemented Reynolds' Boids algorithm in modern C++, calculating separation, alignment, and cohesion steering vectors in real time.*
- *Optimized the Raylib rendering pipeline to sustain a deterministic 60 FPS while simulating hundreds of dynamic agents.*

Full Stack Architectural Registry & RESTful API Service

- *Built an end-to-end full-stack platform pairing a responsive Vue 3 client with an asynchronous FastAPI and Uvicorn backend.*
- *Designed relational SQLite schemas mapped through SQLAlchemy with Pydantic validation for robust runtime data integrity.*
- *Implemented non blocking RESTful endpoints to process concurrent client requests with deterministic sub-100ms response times.*

TRANSFERABLE PROFESSIONAL EXPERIENCE

Pharmacy Dispensing Assistant & Operations | Birmingham, UK | 2022 – Present

- Maintained absolute precision in inventory management, pharmaceutical tracking, and auditing under strict UK healthcare regulatory frameworks with zero compliance errors.
- Executed financial reconciliations and technical customer service in high-throughput environments while managing full-time undergraduate engineering studies.