

Joe Loach (he/him)

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Profile

Highly motivated and results-oriented Software Developer specialising in SoC design, AI, and GPU programming. Proven ability to deliver innovative hardware and software solutions through University projects and freelance experience. Seeking a challenging developer role to contribute to cutting-edge technology and research.

Education

Bachelor of Computer Science Sep. 2021 - Jun. 2024

The University of Manchester

- Achieved a High 2:1, with a First-Class grade for third-year dissertation.
- Top 5% of class for innovative AI model implementation and creative project approaches.

A Levels Sep. 2019 - Jun. 2021

The Ecclesbourne School

A* Computer Science, A* Mathematics, A Physics

Professional Experience

Freelance Software Developer | C#, Unity, Adobe Photoshop, GitHub, Teams Jun. 2023 - Sep. 2023

Digital Spirit Ltd

Developed a suite of custom tools within Unity. Including:

- A non-destructive 2D UI editing system featuring complex mesh effects, which streamlined UI development and reduced artist-tooling friction.
- Custom Unity editors with multi-object and undo support, enhancing development efficiency.

Key Projects

Third Year Project & Dissertation | Rust, WGSL, Vulkan, WebGPU Sep. 2023 - Apr. 2024

Delivered a high-performance, hardware-agnostic path tracer for real-time black hole rendering, leveraging:

- GPU kernel implementation using Vulkan Compute shaders for significant performance gains over CPU rendering.
- Multithreading and SIMD optimisations using Rayon to maximise utilisation of available resources.
- Achieved 30x speedup using GPU compared to multi-threaded CPU performance.

Web Card Game | Rust, tokio, WebSockets Dec. 2024 - Present

Engineered a highly-scalable web client-server protocol. Utilising:

- Multi-threaded asynchronous code, serving 100K Requests/sec using axum.
- Robust and fault tolerant game protocol implementation, handling real-world situations appropriately.
- Tightly integrated control-flow logs using tracing for maximum debuggability.

- Developed a hand-written lexer and parser for recoverable syntax trees and more informative errors.
- Created an interactive learning handbook using mdbook with runnable code for ARM instructions.

Coursework Highlights

Implementing System-on-Chip Designs | Verilog, Cadence

Jan. 2024 - May. 2024

- Developed, debugged, and verified a CPUs FSM module inside a real-world environment.
- Integrated an ASIC Mandelbrot hardware accelerator with a VGA controller.

Natural Language Understanding | Keras, Python

Jan. 2024 - May. 2024

- Designed deep learning models for textual evidence detection, leading a small team to deliver high-accuracy results.
- Utilised novel DNN architectures adapted from state-of-the-art research.

Teaching Experience

GCSE Maths and Physics Tutor

Jun. 2021 - Sep. 2021

- Delivered structured tutoring to secondary school students, focusing on creative explanations to fill knowledge gaps.

Technical Skills

Programming Languages

Rust, Verilog, C#, C++, C, Python, JavaScript, TypeScript, Lua, Haskell, Java, HTML, CSS

Technologies

git, cargo, VSCode, Visual Studio, Cadence, OpenCV, Eclipse, Adobe Photoshop

Interests

- **Sport:** Enthusiastic Squash player with 10 years of experience, actively participating in university society competitions.
- **Music:** Self-taught guitarist, experimenting with music creation and recording using Reaper software.

References available upon request