

# SAMUEL W. STARK

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## Education

PhD in Computer Science — [University of Cambridge](#)

October 2022 - Present

Ongoing, planning to submit in March 2026

- **Secure FPGA Design**

Designed a high-throughput cryptography accelerator for checking memory accesses at the edges of the interconnect. Verified the design using a custom C++ UVM testbench with Verilator. Integrated with a pre-existing soft-CPU interconnect design on a Stratix-10 FPGA.

- **Low-Level Operating System Integration**

Wrote drivers and other software for interacting with the cryptography accelerator in multiple operating systems, including FreeBSD, using C, C++, Rust, and Python.

- **Writing and Communication**

Wrote an article for [ACM Queue](#) on high-performance memory safety in CXL, which was subsequently published in Communications of the ACM - the official magazine of the world's largest scientific computing society. [The article is available online.](#)

M.Phil in Advanced Computer Science — [University of Cambridge](#)

October 2021 - June 2022

Distinction - [Thesis won 1st place in the RISE 2022 Student Competition](#)

- **Large-Scale Data Processing and Systems Research**

Evaluated and presented research papers on many areas in large-scale data processing and cloud computing, focusing on GPU-based data processing. Profiled and replicated results from an open-source CPU/GPU stream processing research project.

- **RISC-V Vector Emulation & Security**

Built a RISC-V CPU emulator with support for the "V" vector extension, the CHERI memory safety extension, and a combination of the two. Added support for combined instructions to Clang/LLVM, tested using C++ inline assembly. [The project is available online.](#)

B.Eng in Computer Systems Engineering — [University of Warwick](#)

October 2018 - July 2021

First Class - Best overall graduating student in subject

- **High Performance CPU and GPU Programming**

Achieved best-in-class (64x) speedup on a C fluid simulation with bit-for-bit accuracy using multithreading and vectorized assembly code. Moved the fluid simulation to the GPU using CUDA, with Vulkan graphics for real-time visualization, for my final-year project. [The project is available online.](#)

- **High Performance FPGA Design**

Built a high-speed video processing filter on an FPGA using SystemVerilog with various parameters controlled in real-time from the onboard hard Arm CPU.

- **Machine Learning**

Learned basics of classic machine learning and neural networks/deep learning.

## Experience

Memory & Systems Architecture Research Intern — [Arm Ltd](#)

Summers of 2019 & 2021

Simulated impact of non-volatile memory and DVM operations in gem5 (C++, 'Ruby' DSL).

- Added DVM operations to existing gem5 CHI protocol model
- Simulated impact of DVM on many-core systems
- Presented results to key stakeholders and senior design members, including a 'CHI protocol crash course'
- Changes upstreamed to public open source gem5 repository ([available online](#))

Junior Programmer — [Virtual Arts Ltd](#)

September 2017 - August 2018

Developed 3D game engine in C++/Vulkan/Metal with two senior engineers

- Implemented Physically Based Rendering with Image Based Lighting
- Ported Unity-based code and shaders to C++, GLSL and Metal
- Supported development of AR racing game (Lightstream Racer) in Unity/C#

## Projects

[yk\\_gmd\\_io](#)

2020 - Present

Python addon for importing and exporting the proprietary GMD file format, used by the 'Yakuza' game series, into Blender.

- Reverse-engineered parts of the file format with the community
- Designed algorithms to convert computer-friendly meshes to artist-friendly meshes
- Developed beginner-friendly user experience for new modders