Ainsley Rutterford

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Interested in Deep Learning, Computer Architecture, and High Performance Computing. Proficient in C, C++, JavaScript, TypeScript, and Python. Experience with Fortran, Java, and Haskell.

Education

University of Bristol   *Bristol*
MENG COMPUTER SCIENCE (FIRST CLASS 77%)   *Sep. 2016 – Jun. 2020*

- Thesis: Coral Density Analysis using Deep Learning 78%
- Advanced Computer Architecture 78%
- Advanced High Performance Computing 82% (top of class)
- Computational Neuroscience 92%
- Applied Cryptography 98%
- Theory of Computation 78%
- Web Technologies 80%

Portland Place School   *London*
A LEVELS   *Sep. 2012 – Jul. 2015*

- Maths (A), Physics (A), Computing (A), AS Graphic Design (A)

Work Experience

Bx   *London*
SOFTWARE ENGINEER (FULL STACK)   *Jan. 2021 – Present*

- Web development in TypeScript using the Next.js React framework.
- Native mobile app development in TypeScript using React Native.
- Developing a serverless backend using AWS Lambda, API Gateway, DynamoDB, etc.
- Deploying resources within AWS and GitHub using the Pulumi infrastructure as code SDK.
- Creating and editing assets on the Algorand blockchain using the Algorand SDK.

University of Bristol   *Bristol*
COMPUTER ARCHITECTURE INTERN   *Jul. 2020 – Oct. 2020*

- Extended the University of Bristol's ARM processor simulator (*SimEng*) to include a model of the memory hierarchy using the C++ SST library.

HIGH PERFORMANCE COMPUTING TEACHING ASSISTANT   *Sep. 2019 – Dec. 2019*

- Taught third year students taking the High Performance Computing unit. Helped students parallelise stencil codes using the MPI and OpenMP libraries to run on multiple nodes of the Blue Crystal Phase 4 supercomputer.

Advanced Computing Research Centre (ACRC)   *Bristol*
INTERN   *Jun. 2019 – Sep. 2019*

- Optimised scientific codes written in Fortran and C for researchers at the University of Bristol.
- Ported these codes to the ARM based Isambard and Catalyst supercomputers in Bristol.
- Set up a CI system using Buildkite to automatically keep track of the number of R packages successfully ported to ARM.

Projects

- **High Performance Computing:** parallelised Lattice-Boltzmann codes with the OpenCL, OpenMP and MPI libraries to run on both GPUs and CPUs. All implementations were written in C. Achieved the highest grade in the class. Available on GitHub.
- **Computer Architecture:** implemented a simulation of a superscalar, out-of-order processor with register renaming and dynamic branch prediction. From scratch using Python. Available on GitHub.
- **Deep Learning (thesis project):** implemented and ablated the U-Net CNN architecture using Keras. It successfully extracts the density banding information present in coral skeleton CT scans, enabling researchers to more accurately calculate coral growth rates. Available on GitHub.
- **Deep Learning:** wrote a small deep learning library from scratch in Python enabling the creation, training, and inference of fully connected neural networks. Available on GitHub.
- **Cryptography:** implemented a Differential Power Analysis (DPA) attack in Python that targets software AES implementations. Wrote an AES software implementation in C that utilises various DPA countermeasures such as 'masking'.
- **Computer Graphics:** created a 3D rasteriser using C++ and the SDL, and GLM libraries. Implemented full triangle clipping, shadow volumes, and anti-aliasing. Also using C++, SDL, and GLM, implemented a real-time raytracer with soft shadows and anti-aliasing. Available on GitHub.
- **Web Development:** implemented the backend and frontend of an interactive 3D timeline using pure HTML, CSS and JavaScript. The pseudo 3D animation uses no frameworks or libraries. Available on GitHub.

Achievements

- Awarded the Cray prize for achieving the highest grade in the Advanced High Performance Computing unit at the University of Bristol.
- Awarded the Bloomberg prize for achieving a top five grade in the third year of the Computer Science course at the University of Bristol.
- Selected as part of a team to fly to Switzerland to take part in the START Hack 2019 hackathon.