
EDUCATION

2018
(expected)

Ph.D, Informatics

University of Edinburgh, School of Informatics

Deep learning over programs. Developing machine learning methods for random program generation, compiler optimisations, and representative benchmarking. Applications for heterogeneous parallelism and adaptive performance tuning. Best Paper CGO'17.

2015

MSc by Research, Pervasive Parallelism (*Distinction*)

University of Edinburgh, School of Informatics

Thesis: *Autotuning Stencil Codes with Algorithmic Skeletons* (mark 85%)

Runtime adaptive tuning for heterogeneous parallelism, achieving $3.79\times$ speedup of multi-GPU stencil programs. Machine learning over distributed training sets. High-level GPGPU programming. Published in *HLPGPU '16* and *ADAPT '16*.

2014

MEng Electronic Engineering & Computer Science (*First Class Honours*)

Aston University, School of Engineering & Applied Science

Thesis: *Protein Isoelectric Point Database* (mark 90%)

Created a novel search engine and research tool for molecular biochemistry. Developed full integration of BLAST search tools, a publicly accessible API, and tooling to generate synthetic payloads from confidential datasets for whitebox systems testing. Released open source. Published in *Bioinformatics*.

PROFESSIONAL EXPERIENCE

2016

Codeplay Software

Software Engineer Intern, Eigen SYCL Interface

Developing OpenCL port of Tensorflow. Implemented GPU memory management for Eigen. Compile time scheduling and kernel fusion for expression trees on GPUs. Proposed and implemented a Python interface for VisionCpp. Extensive C++ meta-programming.

2012–2013

Intel Corporation

Open Source Developer Intern

Patched `ioctl` subsystem in Linux kernel. Developed a novel SIMD register visualisation tool for Intel GPU assembly programming. Implemented GTK+ support for Wayland display server. Fixed memory and usability bugs in GNOME desktop applications. Developed particle effects engine for a 3D rendering program. Rapid prototyping of Android applications. Numerous contributions to open source projects.

2010–2014

Freelance

Web Developer

Full-stack development for small businesses, including graphic design and branding. Front-end experience with JavaScript; back-end development using Clojure, Node.js, PHP, MySQL, PostgreSQL, and Jekyll. Clients have included publishing companies, musicians, and a beauty parlour.

2008

Rolls Royce Holdings plc

Work placement in the Design Methods & Improvements team.

PUBLICATIONS

- 2017 C. CUMMINS, P. PETOUMENOS, Z. WANG, H. LEATHER. **Synthesizing Benchmarks for Predictive Modeling**. Best Paper CGO'17 (22% acceptance rate), Austin, Texas.
Deep learning over massive codebases from GitHub to generate benchmark programs. Automatically synthesizes OpenCL kernels which are indistinguishable from hand-written code, and improves state-of-the-art predictive model performance by $4.30\times$.
- 2016 C. CUMMINS, P. PETOUMENOS, M. STEUWER, H. LEATHER. **Towards Collaborative Performance Tuning of Algorithmic Skeletons**. HLPGPU'16, HiPEAC, Prague.
An extensible and distributed framework for dynamic prediction of optimisation parameters at runtime. *OmniTune* provides a flexible API to enable predictive autotuning with machine learning, automatically exceeding human experts by $1.22\times$.
- 2016 C. CUMMINS, P. PETOUMENOS, M. STEUWER, H. LEATHER. **Autotuning OpenCL Workgroup Size for Stencil Patterns**. ADAPT'16, HiPEAC, Prague.
Three methodologies to autotune stencil patterns using machine learning classification and regression. We demonstrate a median $3.79\times$ speedup over the best possible fixed workgroup size, achieving 94% of the maximum performance.
- 2015 E. BUNKUTE, C. CUMMINS, F. CROFTS, G. BUNCE, I. T. NABNEY, D. R. FLOWER. **PIP-DB: The Protein Isoelectric Point Database**. Bioinformatics, 31(2), 295-296. Chicago.
An open source search engine of protein isoelectric points. Provides public access to bioinformatics data from the literature for comparison and benchmarking purposes.

AWARDS

- 2017 **Best Paper Winner, CGO**
- 2015 **PhD studentship, EPSRC grant EP/L01503X/1**
- 2014 **Institute of Engineering & Technology Prize**
Annual prize for top engineering student at Aston University.
- 2009 **Arkwright Scholarship, Rolls Royce Holdings plc**
Funded scholarship awarded to less than 250 students nationwide.
- 2009 **Engineering Education Scheme of England**
R&D for a (now patented) supermarket trolley mounted shopping aid.
- 2008 **AESSEAL Design Innovation Award**
Cash prize for first place in an industrial 3D CAD competition.

ACADEMIC ACTIVITIES

- Invited Talks* Codeplay Software 2016, Ocado Technology 2016, Amazon Development Center 2016.
- Posters* Google 2016, ACACES 2016, PLDI 2016, HiPEAC 2016, Google 2015, PPar 2015.
- Peer reviews* ACM TACO 2016, LCTES 2016, CGO 2016.

TECHNICAL SKILLS

- Expert* C++, Python, bash, git, GNU/Linux.
- Advanced* C, JavaScript, OpenCL, SYCL, SQL, \LaTeX , GNU autotools, gdb.