CHRIS CUMMINS

http://chriscummins.cc chrisc.101@gmail.com

EDUCATION

2018 (expected)

Ph.D, Informatics
University of Edinburgh, School of Informatics

Deep learning over programs. My research focuses on developing AI for synthesising source codes, representative benchmarking, and machine learning for optimisation.

2015

MSc by Research, Pervasive Parallelism *(Distinction)*
University of Edinburgh, School of Informatics
Thesis: *Autotuning Stencil Codes with Algorithmic Skeletons*

Runtime adaptive tuning for heterogeneous parallelism, achieving 3.79× speedup of multi-GPU stencil programs. Machine learning over distributed training sets with synthetic benchmark generation. High-level GPGPU programming with OpenCL. 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*

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 31(2)*.

PROFESSIONAL EXPERIENCE

2016

Codeplay Software
Software Engineer Intern, Eigen SYCL Interface

Contributed to Tensorflow and Eigen. Implemented GPU memory management for expression trees. Compile time scheduling and kernel fusion for expression trees on GPUs using future standards for heterogeneous parallelism. 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. Frontend experience with JavaScript; backend 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

2016 C. Cummins, P. Petoumenos, M. Steuwer, H. Leather. **Towards Collaborative Performance Tuning of Algorithmic Skeletons**. HLPGPU'16, HiPEAC.

Presenting 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, exceeding human experts by 1.22×.

2016 C. Cummins, P. Petoumenos, M. Steuwer, H. Leather. **Autotuning OpenCL Workgroup Size for Stencil Patterns**. ADAPT'16, HiPEAC.

Three methodologies to autotune stencil patterns using machine learning classification and regression. We demonstrate a median 3.79× 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

PIP-DB provides public access to a unique collation of bioinformatics data from the literature for comparison and benchmarking purposes.

AWARDS

2015 **PhD studentship, EPSRC grant EP/L01503X/1**

2014 **Institute of Engineering & Technology Prize**

Annual prize for the top student at Aston University who showed distinction and outstanding merit on an IET accredited course.

2009 **Arkwright Scholarship, Rolls Royce Holdings plc**

A funded industrial scholarship awarded to less than 250 students nationwide for demonstrating exceptional skill in design & technology subjects.

2009 **Engineering Education Scheme of England**

Research & development of a (now patented) supermarket trolley mounted shopping aid. Responsible for designing the wireless power and charging system.

2008 **AESSEAL Design Innovation Award**

Cash prize for first place in an industrial 3D CAD competition.

TECHNICAL SKILLS

Expert C++, Python, bash, git, GNU/Linux, GNU Make, Emacs.

Advanced Java, C, JavaScript, OpenCL, SYCL, gdb, SQL, LaTeX, Mac OS X.

Competent Clojure LISP, Lua, MATLAB, CMake, PHP, x86 assembly.

ACADEMIC ACTIVITIES

Talks Ocado Technology 2016, Amazon Development Center 2016, PPar lunch 2016, PPar kickoff 2014.

Posters ACACES 2016, PLDI 2016, HiPEAC 2016, PPar Industrial Engagement Event 2015.

Peer reviews ACM TACO 2016, LCTES 2016, CGO 2016.

Volunteering ParCo 2015.