

# CHRIS CUMMINS

<http://chriscummins.cc>

[chrisc.101@gmail.com](mailto:chrisc.101@gmail.com)

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## EDUCATION

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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  $3.79\times$  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).

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## PROFESSIONAL EXPERIENCE

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2016

### **Codeplay Software**

Software Engineer Intern, Eigen SYCL Interface

Contributed to OpenCL port of Tensorflow. Implemented GPU memory management for Eigen. Compile time scheduling and kernel fusion for expression trees on GPUs. 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.

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## PUBLICATIONS

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- 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  $1.22\times$ .
- 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  $3.79\times$  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
- PIP-DB provides public access to a unique collation of bioinformatics data from the literature for comparison and benchmarking purposes.

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## AWARDS

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- 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.

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## TECHNICAL SKILLS

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- 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, VHDL, x86 assembly.

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## ACADEMIC ACTIVITIES

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- Talks** Codeplay Software 2016, Ocado Technology 2016, Amazon Development Center 2016, PPar lunch 2016, PPar kickoff 2014.
- Posters** ACACES 2016, PLDI 2016, HiPEAC 2016, Google 2015, PPar 2015.
- Peer reviews** ACM TACO 2016, LCTES 2016, CGO 2016.
- Volunteering** ParCo 2015.