

ANTON LOKHMOTOV

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Email: anton.lokhmotov('at')gmail.com **Nationality:** Russian
Web: <http://www.doc.ic.ac.uk/~anton> **UK status:** Tier 1 (HSMP)

EDUCATION

- 2004 – 2008 **University of Cambridge, Computer Laboratory**
PhD in Computer Science, Robinson College (2008)
- 1998 – 2004 **Moscow Institute for Physics and Technology (State University),
Department of Applied Mathematics and Management**
MSc/BSc in Applied Mathematics and Physics (summa cum laude, 2004/2002)
- 1996 – 1998 **Moscow Lyceum of Chemistry (State School 1303),
Department of Physics and Mathematics**

POST-DOCTORAL EXPERIENCE

- Jan 2010 – **ARM, Media Processing Division, Cambridge**
to date Senior compiler engineer
Leading a team of 6 senior engineers on developing the OpenCL C compiler for an OpenCL v1.1 compliant GPU/CPU driver. Responsible for design, implementation and testing of the Clang/LLVM-based frontend, interfaces with the backend and runtime, and integration of the built-in function library. Contributing to the Clang/LLVM code base and to the OpenCL specification. Evangelising ARM GPUs and OpenCL to the research community. Supervised 2 HiPEAC PhD interns.
- Feb 2008 – **Imperial College London, Department of Computing**
Dec 2009 Research associate, Software Performance Optimisation Research Group
Investigated programming tools for heterogeneous multicore architectures, such as GPUs and Cell processors. Proposed to separate high-level algorithm specification from low-level mapping and tuning, based on the concept of decoupled access/execute metadata, which describe memory access and execution patterns. Created a GPU user community, with regular research talks and 60+ mailing list subscribers.

FURTHER RESEARCH EXPERIENCE

- Oct 2004 – **University of Cambridge, Computer Laboratory**
Jan 2008 PhD student, Programming Research Group
PhD thesis: “Programming and compiling for embedded SIMD architectures”
Investigated programming and compilation issues for specialised embedded architectures, in particular, programming languages, automatic code vectorisation and parallelisation, and exploiting vector shuffle instructions.
- Oct 2001 – **Russian Academy of Sciences, Institute for Systems Programming**
Jul 2004 Student, Compiler Technologies Group and Theoretical Informatics Group
MSc thesis: “Program obfuscation using cryptographic primitives”
BSc thesis: “Embedding opaque predicates into C programs”
Designed and implemented (in Java) optimising and obfuscating algorithms for the Integrated Research Environment for program analysis and transformation developed at the Compiler Technologies Group. This work co-operated closely with research on software security at the Theoretical Informatics Group.

FURTHER INDUSTRY EXPERIENCE

- Jul–Sep 2006 **ClearSpeed Technology, Bristol**
Research compiler engineer, Software Development Tools Team
Investigated auto-parallelisation issues for the CSX SIMD-array architecture. Designed and implemented a proof-of-concept auto-parallelising compiler module using the CoSy compiler development system.

FURTHER INDUSTRY EXPERIENCE (cont'd)

- Jul–Sep 2005 **ACE, Amsterdam, Netherlands**
Research compiler engineer, Associated Compiler Experts
Prepared an extensive report on the state-of-the-art in compilation for SIMD extensions (vectorisation). Outlined an implementation plan for supporting retargetable vectorisation in the CoSy compiler development system.
- Jul–Sep 2004, Jun–Aug 2003 **Broadcom, Cambridge**
Intern/contract software engineer, DSL Business Unit
Designed, implemented and enhanced (in C/C++/SML) software tools for the FirePath SIMD/LIW architecture. Specifically worked on assembly-level software conversion, register allocation, and support for the ELF and DWARF formats.

TEACHING EXPERIENCE

- 2010 – to date **University of Cambridge, Computer Laboratory**
Supervisor for BA courses: Compiler Construction (2nd year), Floating-Point Computation (1st year).
- 2008 – 2009 **Imperial College London, Department of Computing**
Course support leader for MSc course in Advanced Computer Architecture: gave a guest lecture on NVIDIA's GPUs; prepared and marked coursework. Co-supervisor for PhD, MSc and UROP (undergraduate) students.
- 2004 – 2007 **University of Cambridge, Computer Laboratory**
Supervisor for BA courses: Optimising Compilers, Comparative Architectures, Digital Signal Processing, Security (3rd year); Algorithms, Complexity Theory, Computer Design, C/C++ (2nd year).
Supervisor for final year projects (two in 05/06, one in 06/07).
- 2011, 2010, 2008, 2004 **Avangard conference for gifted school students**
Member of the Organising Committee (Consultant in Computer Science).
- 2004 – 2005 **Cambridge STIMULUS project**
Volunteer: Assistant teacher in Mathematics in a local high-school.
- 2002 – 2005 **Moscow Lyceum of Chemistry (State School 1303)**
Volunteer: Assistant examiner in Mathematics and Programming.

FUNDING

- 2010 **HiPEAC¹ Industrial Internship Grants: €5,000×2**
Project title: “Generating OpenCL code for an embedded GPU architecture”
Investigators: **A. Lokhmotov** (ARM), R. Membarth (Erlangen), D. Grewe (Edinburgh)
- 2008 – 2011 **EPSRC CASE PhD Award: Imperial College & Codeplay Software**
Project title: “Language and compiler support for heterogeneous multicore systems”
Investigators: A. Konstantinidis, **A. Lokhmotov**, P.H.J. Kelly (Imperial), A.F. Donaldson, A. Richards (Codeplay).
- 2008 – 2010 **Royal Society & Russian Foundation for Basic Research: c. £42,000**
Project title: “Compilation for high-performance parallel processors”
Investigators: **A. Lokhmotov** (Imperial), A. Mycroft (Cambridge), A. Monakov, A. Avetisyan, A. Belevantsev, V.P. Ivannikov (ISP RAS).
- 2008 **HiPEAC Collaboration Grant: €1,000**
Project title: “Context-aware optimisation and run-time adaptation for multicore systems”
Investigators: G. Fursin (INRIA), **A. Lokhmotov**, P.H.J. Kelly (Imperial)
- 2004 – 2007 **Cambridge Overseas Trust and Universities UK: full PhD funding**
TNK-BP Cambridge Kapitza and Overseas Research Students scholarships.

¹ HiPEAC: European Network of Excellence on High Performance and Embedded Architecture and Compilation.

TECHNICAL SKILLS

Languages: C, C++, OpenCL, CUDA, Python, Java, SML, MATLAB, \LaTeX , HTML.
Compiler suits: Clang/LLVM, ACE CoSy, LLNL ROSE, GCC.
Architectures: Mali, Tesla, CSX, Cell, FirePath, ARM/NEON, x86/SSE, PowerPC/VMX.
Systems: GNU/Linux (Ubuntu, Red Hat), Unix (Mac OS X, Solaris), Windows.

AWARDS AND DISTINCTIONS

- Balance of 0x\$3.40 (*three hexadecimal dollars forty hexadecimal cents*) in the Bank of San Serriffe (Chief Cashier: Donald E. Knuth). 2008 – 2009.
- ARM £300 prize for the best presentation at IEE Cambridge Younger Members competition. February 2006.
- HiPEAC-sponsored internship at ARM R&D. 2006. (Declined.)
- Full funding for PhD studies at the University of Oxford (Hill Foundation scholarship) and the University of Manchester (School of Computer Science scholarship). 2004. (Declined.)
- MIT MSc/BSc degrees summa cum laude (“red diploma”). 2004/2002.

PHD CO-SUPERVISION EXPERIENCE

- Lee Howes, Imperial College London (Principal supervisor: Prof P.H.J. Kelly). Dissertation title: “Indexed dependence metadata and its applications in software performance optimisation”. 2008 – 2009 (passed viva voce in December 2009).
- Athanasios Konstantinidis, Imperial College London (Principal supervisor: Prof P.H.J. Kelly). Dissertation title: “Language and compiler support for heterogeneous multicore systems”. 2008 – to date.
- Alexander Monakov, Institute for Systems Programming RAS (Principal supervisor: Dr A. Avetisyan). Dissertation title: “Optimisation and compilation for GPU architectures”. 2008 – to date.
- Richard Membarth, University of Erlangen–Nürnberg (Principal supervisor: Prof J. Teich). ARM internship: “Generating GPU code from a high-level specification for image processing kernels”. August – October 2010.
- Dominik Grewe, University of Edinburgh (Principal supervisor: Prof M. O’Boyle). ARM internship: “Automatically generating and tuning GPU code for the sparse matrix-vector product”. October – December 2010.

INDUSTRY STANDARDS EXPERIENCE

- Contributor to OpenCL v1.1 and v1.2. The Khronos Group. 2010 – to date.
- External reviewer for the Multicore Resource Management API (MRAPI) v1.0. The Multicore Association. 2009.

PROGRAMME COMMITTEE EXPERIENCE

- International Conference on Compiler Construction (CC). Part of the Joint European Conference on Theory and Practice of Software (ETAPS). March 2012.
- Applications for Many-core Processors. Workshop co-located with the 37th International Symposium on Computer Architecture (ISCA). 19 June 2010.
- Facing the Multicore Challenge. Conference for junior researchers organised by the Heidelberg Academy of Sciences (Germany). 17–19 March 2010.

REFEREEING EXPERIENCE

Journals

- Transactions on Parallel and Distributed Systems (IEEE). 2010.
- The Computer Journal (Oxford). 2009.
- Software: Practice and Experience (Wiley). 2009.
- Transactions on Signal Processing (IEEE). 2007.

Conferences

- Principles and Practice of Parallel Programming (PPoPP). 2010.
- International Conference on Compiler Construction (CC). 2009.
- European Conference on Parallel and Distributed Computing (Euro-Par). 2009.
- International Symposium on Static Analysis (SAS). 2005, 2006.
- Asian Symposium on Programming Languages and Systems (APLAS). 2005.

SELECTED TALKS

- “ARM Mali GPU architecture”. “Implementing sparse-matrix vector product in OpenCL”. HiPEAC Tutorial on Heterogeneous Programming with OpenCL. Heraklion, Crete, Greece. 22 January 2011.
- “Mobile and embedded computing on Mali GPUs”. 2nd UK GPU Computing Conference. Cambridge, UK. 13 December 2010.
- “Implementing the OpenCL standard for the next-generation ARM GPU architecture”. ARM Cross-divisional Conference on Software Development Tools. Cambridge, UK. 30 March 2010.
- “Decoupled access/execute programming”. Workshop (by invitation) on the Programming Challenge of Heterogeneous Architectures. University of Birmingham, UK. 3 July 2009.
- “Making parallel programming robust for computational scientists”. Centre for Numerical Algorithms and Intelligent Software. University of Edinburgh, UK. 15 June 2009.
- “Energy efficiency and programmability”. ARM R&D Division. Cambridge, UK. 18 May 2009.
- “Deriving efficient data movement from decoupled access/execute specifications”. Cambridge Programming Research Group. University of Cambridge, UK. 30 January 2009.
- “Programming accelerated systems”. ALCHEMY Research Group. INRIA Saclay, France. 13 May 2008.
- “Delayed side-effects ease multi-core programming”. European Conference on Parallel and Distributed Computing (Euro-Par). Rennes, France. 30 August 2007.
- “Optimal bit-reversal using vector permutations”. IEE Cambridge Younger Members’ competition (best young professional presentation). 6 February 2006.
- “A brief introduction to software obfuscation”. Spring School on Security. Marseille, France. 27 April 2005.

TECHNICAL TRAINING

- ARM NEON. ARM. 29 March 2011.
- Advanced C++ for embedded systems. Feabhas. 22–26 November 2010.
- Introduction to graphics. ARM. 24–25 May 2010.
- Introduction to CoSy. Associated Compiler Experts. 14–16 March 2007.

RESEARCH TRAINING

- Summer School on Advanced Computer Architecture and Compilation for Embedded Systems (ACACES). L'Aquila, Italy. 23–29 July 2006.
- Spring School on Security. Marseille, France, 25–29 April 2005.

TEACHING TRAINING

- Interactive group teaching. Imperial College London. 4 November 2008.
- Assisting with PhD supervision. Imperial College London. 28 October 2008.

SOFT SKILLS TRAINING

- Transition to management. ARM. 16 July 2010.
- Competency based interviewing. ARM. 1 March 2010.
- Personal organisation for research staff. Imperial College London. 5 March 2009.
- Negotiating and influencing skills for research staff. Imperial College London. 8 October 2008.

FURTHER INFORMATION

- Languages: English (fluent), Russian (native), German (rusty), French (rusty).
- Hobbies: Music, art, architecture, mathematics, sports, outdoor.
- Membership:
 - Association for Computing Machinery (ACM), since 2007.
 - European Network of Excellence on High Performance and Embedded Architectures and Compilation (HiPEAC), since 2011.
 - Cambridge University Russian Society (CURS), Trustee in Science & Technology, since 2007. [President, 2006; Events Officer, 2005.]
 - The Art Fund (an independent art charity in the UK), since 2009.

REFEREES

Prof Alan Mycroft

(PhD supervisor)

Computer Laboratory
University of Cambridge
15 JJ Thomson Avenue
Cambridge, CB3 0FD, UK

Prof Michael O'Boyle

(PhD examiner)

School of Informatics
University of Edinburgh
10 Crichton Street
Edinburgh, EH8 9AB, UK

Prof Paul H.J. Kelly

(RA supervisor)

Department of Computing
Imperial College London
180 Queen's Gate
London, SW7 2AZ, UK

Dr Benedict R. Gaster

(Line manager at ClearSpeed)

AMD (ATI Technologies)
4555 Great America Parkway
Suite 501, Santa Clara
California, 95054, USA

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