Alan Kelly

EXPERT IN SOFTWARE PERFORMANCE

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EXPERIENCE

SEPT 2018 – PRESENT

Prophesee, Paris
SENIOR C++ SOFTWARE ENGINEER

I make it possible to process the data from Prophesee's event based camera in real-time on Arm systems by developing innovative algorithms and applying my expertise in software performance.

- I developed a new frame generation algorithm so that frames can be generated in real-time on Prophesee's reference system Onboard.

- Deploying deep neural networks in real-time on cpu, gpu and dsp by quantizing the networks and adding custom, high performance convolution layers some of which were contributed to the Arm Compute Library.

- By re-designing an algorithm and by using SIMD instructions, I achieved a speed-up of 27 times for a computer vision application.

OCT 2016 – AUGUST 2018

NumScale, Île de France
DIRECTOR OF RESEARCH AND DEVELOPMENT

- Leading the development of machine learning tools:
  - The development of a tool which compresses pre-trained neural networks with minimal loss of precision, making them suitable for deployment on portable, low-power devices.
  - Implementation of high performance, multi-architecture neural network interference routines.

- Managing the architectural design and implementation of Numscale's HPC libraries:
  - Development of a parallel FFT implementation which in many cases is faster than Intel's MKL on Intel processors and the FFTW on ARM and AMD. Benchmarks available here. Going Faster than the FFT-Talk at Paris C++ FRUG
  - Preparing product releases, ensuring that everything is correctly documented, tested and benchmarked on each target architecture and system.

- Managing client projects to ensure that they are delivered on time, on budget and on spec. For example, a speed-up of 4 was obtained on a simulation code by identifying the symmetry in the problem and by optimizing memory accesses.

NOV 2013 – SEPT 2016

NumScale, Île de France
R&D SOFTWARE DEVELOPER

- I developed a real-time ice detection system for airplanes, using image processing techniques to identify candidate objects and a neural network to classify the detected objects.

- Working closely with the hardware development team, I implemented the software which controlled the cameras, laser and all communication with the plane's network. This system was mounted on an Airbus plane for a series of flight tests in 2016.

OCT 2010 – NOV 2013

University of Glasgow
PHD RESEARCHER - THE OPTIMIZATION OF FINITE ELEMENT MESHES

- I developed mesh optimization algorithms so that for the first time, complex surface meshes may be optimized whilst preserving volume and geometry.

- I also developed new algorithms for aggressively improving the worst elements in meshes making them much better suited for finite element simulations.

SKILLS

Programming Languages	C++	Python	C	asm (x86_64 & aarch64)
Software Performance	Multithreading	SIMD	OpenMP	Optimization
Tools	Streamline	Perf	Valgrind	Git
Machine Learning	TensorFlow (lite)	Qualcomm SNPE	ArmNN	
Architectures	x86	Arm	PowerPC	
OS	Linux	Android	Windows	
Languages	English (native)	French (fluent)	Irish (fluent)	

EDUCATION

2013	**Ph.D.** COMPUTATIONAL SCIENCE *The University of Glasgow*
2010	**Master of Science** HIGH PERFORMANCE COMPUTING *The University of Edinburgh*
2009	**Bachelor of Engineering** 1st Class Honours (2nd place in class) *National University of Ireland, Galway*

INTERESTS

- Running - I have completed the Paris marathon four times.

- Scientific communication - performed stand-up comedy based on my research at the Edinburgh Fringe festival.

- Reading

- Traveling

PUBLICATIONS

JOURNAL:

Goggins J., Keane T. and Kelly A. The Assessment of Embodied Energy in Typical Reinforced Concrete Building Structures in Ireland, Energy and Buildings 42 (2010) 735744.

Kelly, A., Kaczmarczyk, L. and Pearce, C.J. 'Mesh Improvement Methodology for 3D Volumes with non-Planar Surfaces', Engineering with Computers.

CONFERENCE PROCEEDINGS:

Kelly, A., Kaczmarczyk, L. and Pearce, C.J. 'Mesh Improvement Methodology for Evolving Geometries', Proceedings of the 19th UK Conference of the Association for Computational Mechanics in Engineering.

Kelly, A., Kaczmarczyk, L. and Pearce, C.J. 'Mesh Quality Optimisation Using a Log-Barrier Function', Proceedings of the 20th UK Conference of the Association for Computational Mechanics in Engineering.

Kelly, A., Kaczmarczyk, L. and Pearce, C.J. 'Mesh Improvement Methodology for 3D Volumes with non-Planar Surfaces', Proceedings of the 21st International Meshing Roundatable.

Kelly, A., Kaczmarczyk, L. and Pearce, C.J. 'The Optimisation of 3D Mesh Surfaces whilst Preserving Geometry and Volume', Proceedings of the 21st UK Conference of the Association for Computational Mechanics in Engineering.

AWARDS

2013	**Travel Support to the International Meshing Roundtable, Orlando** *GiD, MeshGems, Pointwise & Siemens*
2012	**Travel Support to the International Meshing Roundtable, San Francisco** *Commissariat à l'Énergie Atomique et aux Énergies Alternatives (CEA), France*
2009	**MSc Fees and Stipend Scholarship** *The University of Glasgow*
2009	**Frank Lydon Award for Best Final Year Dissertation** *Arup Consulting Engineers*
2006 & 2008	**University Scholar** *National University of Ireland, Galway*
2006 - 2009	**Undergraduate Sponsorship** *Laing O'Rourke*
2005	**Irish Language Fluency Scholarship** *National University of Ireland, Galway*
2005	**Entrance Scholarship based on Leaving Certificate Results** (570 points out of a maximum of 600) *National University of Ireland, Galway*