Academic CV

Simeon Bamford

Work:
Modelling Complex Systems Group,
Edificio 1, Piano B,
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Education

2005 - 2008	PhD, Neuroinformatics, University of Edinburgh.
2004 - 2005	MSc by Research, Neuroinformatics (Distinction), Edinburgh University. Taught element included: Neuroscience Research Methods, Neural Computation, Bioinformatics, Neuromorphic VLSI, Neuroinformatics Research.
1995	RSA/CTEFLA, GEOS Language Centre, Hove.
1992 - 1995	BA hons, Artificial Intelligence (First Class), Sussex University.

Employment (Academic and Other)

2009 Apr - present	Research Associate, Laboratory for Synthetic Perceptive, Emotive and Cognitive Systems, Pomeu Fabra University, Barcelona; seconded to Modelling of Complex Systems group at l'Istituto Superiore di Sanità in Rome; working on EU funded ReNaChip project. (www.renachip.org)
2009 Jan-Mar	Research Associate, University of Edinburgh.
2008 (p/t)	Tutor for Neuromorphic VLSI MSc module, University of Edinburgh Doctoral Training Centre for Neuroinformatics.
2007 (p/t)	Website Developer, University of Edinburgh Doctoral Training Centre for Neuroinformatics. (www.anc.ed.ac.uk/dtc)
2004	Business Mentor for social entrepreneurs; freelance with London Development Agency.
1998 - 2004	Entrepreneur and Director, Cycle Training UK Ltd, London. (www.cycletraining.co.uk)
1996-1998	Database Developer and Technical Manager, JHC, London.
1995-1996	English Teacher (EFL), (1) Greenwich School of English, Włocławek, Poland; (2) CESC, Framlingham, Suffolk.

Research

I find both the study of neural systems and the discipline of engineering them fascinating. I see enormous scope for neuroprosthetic and biomedical applications with the potential to improve health provision and better the human condition. This is the basis for the career I am pursuing.

The ReNaChip project I'm currently on aims to create a chip which can be implanted in a brain to

replace a neural circuit which performs a learning task (classical conditioning). My role has involved developing analysis methods for recorded multi-unit activity signals for detection of stimulus events; converting computational models of cerebellar function into integrated electronic circuitry; and building circuitry for front-end amplification and processing of neural signals. These have culminated in the full-custom design of a CMOS chip which has been fabricated and is currently under test. The design includes a novel field-programmable array of mixed-signal components specialised for neural signal processing and modelling applications. My interest in field-programmable circuitry was augmented by my brief work at Edinburgh University on a project to create a related design specialised for neuromorphic applications. I make use of FPGAs in the chip testing environments I create.

My PhD was in the area of neuromorphic engineering, where I created a CMOS chip demonstrating new ideas in spike delivery in multi-chip neuromorphic systems and in virtual synaptic rewiring. This was grounded in a computational modelling endeavour which explored the role of synaptic rewiring in the development of topographic maps and receptive fields, for example in the early visual pathway. In my MSc I gained experience of patch-clamp recording from dissociated cells and in-vitro cultures, using novel integrated patch-clamp devices; I also gained silicon clean-room experience.

In addition to my technical skills and expert knowledge in science and engineering, I have excellent written and spoken communication skills. My self-starting and hard working nature is demonstrated by the success of my previous entrepreneurial career.

Peer-Reviewed Journal Articles

2010 "Synaptic Rewiring for Topographic Map Formation and Receptive Field Development", Bamford SA, Murray AF, Willshaw DJ. *Neural Networks,* 2010 vol. 23, pp. 517-527. (http://www.sim.me.uk/neural/NN.pdf)

2010 "Large Developing Receptive Fields Using a Distributed and Locally Reprogrammable Address-Event Receiver", Bamford SA, Murray AF, Willshaw DJ. *IEEE Transactions on Neural Networks*, vol. 21, no. 2, pp. 286-304. (http://www.sim.me.uk/neural/TNN.pdf)

Peer-Reviewed Conference Papers

2010 "Intimate mixing of analogue and digital signals in a field-programmable mixed-signal array with lopsided logic", Bamford SA, Giulioni M, *IEEE Biomedical Circuits and Systems Conference (BIOCAS) in press*. (http://www.sim.me.uk/neural/2010BIOCAS.pdf)

2008 "Large Developing Axonal Arbors Using a Distributed and Locally-Reprogrammable Address-Event Receiver", Bamford SA, Murray AF, Willshaw DJ, *IEEE International Joint Conference on Neural Networks (IJCNN)* pp.1464-1471. (http://www.sim.me.uk/neural/2008IJCNN.pdf)

2008 "Synaptic Rewiring for Topographic Map Formation", Bamford SA, Murray AF, Willshaw DJ, *International Conference on Artificial Neural Networks (ICANN)* pp. 218-227. (http://www.sim.me.uk/neural/2008ICANN.pdf)

Conference Abstracts (not peer reviewed)

2010 "Replacing a cerebellar microcircuit with an autonomous neuroprosthetic device", Giovannucci A, Bamford SA, Herreros I, Hogri R, Taub A, Zucca R, Prueckl R, Mintz M, Silmon A, Guger C, Del Giudice P, Verschure PFMJ, *Society for Neuroscience (SFN) Meeting*.

2010 "A real-time analysis and control system for the reconstitution of cerebellar

functionality", Prueckl R, Taub A, Hogri R, Giovannucci A, Herreros I, Bamford SA, Zreik M, Nossenson N, Guger C, Mintz M, Verschure PFMJ, Messer-Yaron H, Silmon A, *Society for Neuroscience (SFN) Meeting.*

2010 "Replacing a cerebellar microcircuit with an autonomous neuroprosthetic device", Giovannucci A, Bamford SA, Hogri R, Taub A, Prueckl R, Guger C, Del Giudice P, Verschure PFMJ, *Federation of European Neuroscience Societies (FENS) Forum*.

Other Publications

2009 "Synaptic Rewiring in Neuromorphic VLSI for Topographic Map Formation" PhD Thesis, University of Edinburgh. (http://www.sim.me.uk/neural/thesis.pdf)

Invited Talks

19th Feb 2010 "Modern Classical Conditioning: towards a VLSI chip for bi-directional *in vivo* brain interface for rehabilitation of a learnt eye-blink response", Institute of Biomedical Engineering, Imperial College.

10th June 2008 "Synaptic Rewiring in Neuromorphic VLSI for Topographic Map Formation", Electronic and Computer Engineering Dept., Hong Kong University of Science and Technology.

9th April 2008 "Synaptic Rewiring in Neuromorphic VLSI for Topographic Map Formation", Robotics, Brain and Cognitive Sciences Dept., Italian Institute of Technology.

Professional Development

I have acted as a reviewer for:

IEEE Transactions on Neural Networks.

IEEE International Joint Conference on Neural Networks (IJCNN).

IEEE International Symposium on Circuits and Systems (ISCAS).

International Conference on Artificial Neural Networks (ICANN).

I have attended the following workshops and conferences:

2010 IEEE Biomedical Circuits and Systems Conference (BIOCAS).

2009 Barcelona Cognition, Brain and Technology Summer School.

2008 International Joint Conference on Neural Networks (IJCNN).

2008 International Conference on Artificial Neural Networks (ICANN).

2007 Telluride Neuromorphic Engineering Workshop; (I was named "Best New Neuromorph").

2005 IEEE/EMBS Neural Engineering Conference (NER).

I am a member of the IEEE.

Technical Skills

Electronics design	Cadence, Spice, ORCAD, Target 3001, Xilinx ISE - VHDL
Data capture	Molecular Devices: Axoscope and Clampex
Programming	Matlab, Java, C++, Delphi - Object Pascal, Pop-11, Prolog, Visual Basic
Databases	MySQL, Access, IBM AS400 - RPG
Web development	PHP, HTML, CSS, Javascript, Joomla, Dreamweaver
Operating systems and office tools	Linux, Windows, Word, Latex, Excel, Powerpoint, Photoshop, Corel Draw

References

Academic:

Paolo Del Giudice (Current Supervisor)
Istituto Superiore di Sanità,
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Alan Murray (PhD Supervisor)
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David Willshaw (PhD Supervisor)
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Employment:

James Bednar (Employer for part-time web development work)
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David Dansky (Staff manager for previous company)
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