

Simeon Bamford - CV

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- Neuromorphic Engineer: Modelling neural sensing, computation and learning, in hardware and software.
- Full custom mixed-signal chip design, including test from PCB through FPGA to software.
- Machine learning, including cloud deployments, in computer vision and natural language processing.
- Spearheaded a neuromorphic tech start-up; Previously created a cycling education organisation.

2019-present **Researcher**, Event-Driven Perception for Robotics, Italian Institute of Technology

- Event-based perception (including geometric and learnt approaches) for robotic navigation

2019-present **Member of Advisory Board**, Machines With Vision (Edinburgh)

2018-2019 **Deep Learning Consultant** for Aegon (Netherlands)

- AI, deep learning, natural language processing, graph database
- Serverless cloud deployment (AWS)

2013-2017 **Engineering and Sales, Company Director**, Inilabs GmbH (www.inilabs.com)

CTO, Inivation AG (www.inivation.com) (spin-offs from INI, Zurich)

- VLSI design, incl. a dynamic vision sensor to connect to IBM True North.
- Marketing, sales and support of neuromorphic sensors.
- Explored algorithms and applications with over 100 organisations.

2011-2013 **Researcher**, Complex Systems Modelling group, Istituto Superiore di Sanità (ISS), Rome

- Mesoscopic model of brain dynamics, with populations of neurons as units and bi-stable attractor dynamics.
- VLSI design: sub-threshold-analogue, incl. novel bias-generator architecture.

2009-2011 **Researcher**, ISS, and SPECS Lab, Pomeu Fabra University, Barcelona, EU ReNaChip project

- Replacing cerebellar learning circuit in closed-loop in-vivo experiment for classical conditioning.
- VLSI design: Field-programmable array of mixed-signal components for neural signal processing and neural modelling, full test incl. routing software.
- Post-production chip modification with FIB.

2005-2009 **PhD**, Neuromorphic Engineering, University of Edinburgh

- VLSI design, PCB, logic and software for full test.
- Spiking neural networks: formation & elimination of learning synapses for development of topographic maps.
- Asynchronous broadcast of address-events for neural fan-out.
- Weight-dependent STD-plasticity from transistor properties.

2004-2005 **MSc by Research**, Neuroinformatics, University of Edinburgh

- Testing a planar patch-clamp chip for recording from neurons.
- Learned the patch-clamp technique.
- Gained silicon clean-room experience.

1998-2004 **Founder and Director**, Cycle Training UK Ltd, London

- Started a not-for-profit company, which helped to spawn an industry and overhaul British standards for cycling education.

1996-1998 **Database Developer and Technical Manager**, JHC, London (<https://jhc.financial>)

- Delivering solutions to stock market traders (Figaro software suite).

1995-1996 **English Teacher**, Greenwich School of English, Włocławek, Poland

1992-1995 **BA honours**, Artificial Intelligence, Sussex University

- Search, robotic control, genetic algorithms, machine translation

Selected publications

(Out of 10 peer-reviewed journal articles, 12 conference papers and abstracts, and 1 book chapter; see also [scholar](#))

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|---|-------------|--|
| <p>“A Sensitive Dynamic and Active Pixel Vision Sensor for Color or Neural Imaging Applications”
Moeys D, Corradi F, Li C, Bamford S, Longinotti L, Voigt FF, Berry S, Taverni G, Helmchen F, Delbruck T
<i>IEEE Transactions on Biomedical Circuits and Systems</i>, vol. 12, no. 1, pp: 123-136</p> | <p>2018</p> | <p>2017 “Recovery of Brain Function by Neuroprostheses: A Challenge for Neuroscience and Technology”
Hogri R, Bamford SA, Del Giudice P, Mintz M
In “<i>Brain-Computer Interface Research</i>” (pp. 81-97), Springer International Publishing</p> |
| <p>“A neuro-inspired model-based closed-loop neuroprosthesis for the substitution of a cerebellar learning function in anesthetized rats”
Hogri R, Bamford SA, Taub AH, Magal A, Del Giudice P, Mintz M
<i>Scientific Reports</i>, vol 5, pp. 8451</p> | <p>2015</p> | <p>2012 “A VLSI field-programmable mixed-signal array to perform neural signal processing and neural modelling in a prosthetic system”
Bamford SA, Hogri R, Giovannucci A, Taub AH, Herreros I, Verschure PFMJ, Mintz M, Del Giudice P
<i>IEEE Trans. on Neural Sys. and Rehabilitation Engineering</i>, vol. 20, no. 4, pp. 455-467</p> |
| <p>“Silicon synapses self-correct for both mismatch and design inhomogeneities”
Bamford SA, Murray AF, Willshaw DJ
<i>Electronics Letters</i>, vol. 48, no. 7, pp. 360-361</p> | <p>2012</p> | <p>2012 “Spike-timing-dependent plasticity with weight dependence evoked from physical constraints”
Bamford SA, Murray AF, Willshaw DJ
<i>IEEE Transactions on Biomedical Circuits and Systems</i>, vol. 6, no. 4, pp. 385-398</p> |
| <p>“Synaptic rewiring for topographic map formation and receptive field development”
Bamford SA, Murray AF, Willshaw DJ
<i>Neural Networks</i>, vol. 23, pp. 517-527</p> | <p>2010</p> | <p>2010 “Large developing receptive fields using a distributed and locally reprogrammable address-event receiver”
Bamford SA, Murray AF, Willshaw DJ
<i>IEEE Trans on Neural Nets</i>, vol. 21, no. 2, pp. 286-304</p> |

Technical skills

Chip design	Cadence (Virtuoso, Spice, Ultrasim, DRC, LVS, Calibre PEX etc), HACKT (asynchronous design from Cornell)
VLSI technology	CMOS AMS 350nm; TowerJazz CIS 180nm; Neuromorphic designs included DACs, subthreshold-analogue, asynchronous digital, switched-cap, bias generators etc
PCB design	Altium, ORCAD, KiCad, Eagle
Logic programming	Xilinx ISE – VHDL
Machine learning	Tensorflow 2, Keras
Machine vision	OpenCV, jAER (event-based vision from INI Zurich)
Robotics	YARP (Alternative to ROS from IIT)
NLP and linguistics	SpaCy, BERT, Universal Sentence Encoder, RASA-NLU, phrase-structure grammar
Programming	Python, Matlab, C/C++, (many others over 30+ years), Git , CICD etc
Cloud computing	Docker, AWS: Cloud formation, Lambda, S3, EC2, Code pipeline, etc
Databases	MySQL, MS Access, IBM system i – RPG, graph-DB: Gremlin, Neo4j
Data capture	Molecular Devices - Axoscope and Clampex, CED - Spike2
Web	Beautiful soup, Python-Flask, Node.js, PHP

Native English speaker, fluent Italian.

Hobbies include Lego, DIY and mushroom hunting.

Just for fun:

[Dialogues between scientists and artists](http://www.sim.me.uk/ensight) www.sim.me.uk/ensight

[Dorkbot - fun electronics projects](https://wiki.ehlab.uk/waldfloete) <https://wiki.ehlab.uk/waldfloete>

[Bicycle-mounted sound systems](http://www.sim.me.uk/soundsystems) www.sim.me.uk/soundsystems

References on request