Curriculum Vitae

Giacomo Indiveri

December 2, 2016

Institute of Neuroinformatics
University of Zurich and ETH Zurich
Winterthurerstrasse 190, 8057, Zurich, Switzerland
Tel. +41 44 6353024 Fax: +41 44 6353025 Mobile: +41 76 3391100
giacomo@ini.uzh.ch
http://www.ini.uzh.ch/people/giacomo

General information

Nationality:	Italian
Marital Status:	Married (with two children)
Date of Birth:	17 October 1967
Languages:	Italian (mother tongue), English (fluent), German (basic)
Private address:	Mattackerstrasse 33, CH-8052, Zurich

Current status

Professor	at the Faculty of Science, University of Zurich.
Faculty member	of the Institute of Neuroinformatics, University of Zurich and ETH Zurich.
Group Leader	at the Neuroscience Center Zurich, University of Zurich and ETH Zurich.
Member	of the CITEC Virtual Faculty, University of Bielefeld, Germany
Director	of the Institute of Neuromorphic Engineering, College Park, Maryland, USA

Education

28/08/2006	Habilitation in Neuromorphic Engineering, ETH Zurich.
21/05/2004	Ph.D. in Electrical Engineering and Computer Science,University of Genoa, Italy.
14/03/1995	Industrial doctoral award (30/30 *cum laude*) of a 32-month "National Research and Training Program on Technologies for Bioelectronics".
30/06/1992	M.Sc. (Laurea) degree in Electronic Engineering (110/110), University of Genoa, Italy.

Academic appointments

2011 – present	ERC Assistant Professor, Faculty of Science, University of Zurich, Zurich.
2009 – 2011	Group leader, Neuroscience Center Zurich, University of Zurich and ETH Zurich.
2006 – 2011	Academic Associate, Institute of Neuroinformatics, University of Zurich and ETH Zurich.
1998 – 2006	Research assistant, Institute of Neuroinformatics, University of Zurich and ETH Zurich.
1996 – 1998	Postdoctoral fellow, Institute of Neuroinformatics, University of Zurich and ETH Zurich.
1994 – 1996	Postdoctoral fellow, Division of Biology of the California Institute of Technology (Caltech).

Teaching

2014 – present	Teacher of the UZH "Readings in Neuroinformatics" course (fall semester).
2008 – present	Teacher of the INI "Journal Club" course (spring and fall semester)
2007 – present	Co-teacher of the UZH/ETH Zurich courses "Neuromorphic Engineering I" (fall semester) and "Neuromorphic Engineering II" (spring semester).
2007 – 2014	Co-teacher of the UZH/ETH "Insights Into Neuroinformatics" block-course (fall semester).
2005	Course on "Neuromorphic Analog VLSI Systems" at the International Winter School in Humanoid Robotics, KAIST, Daejeon, Korea, January 2005.
2003-2004	Private lecturer appointment for the "Corso di Microlettronica e ingegneria neuromorfa" class, at the Engineering Faculty of the University of Genoa.
2002-2003	Private lecturer appointment for the "Neuromorphic VLSI circuits for implementing Sensory/Perceptive Systems" course at the Engineering Faculty of the University of Genoa.
1996-1998	Invited lecturer for the "Models of perceptive systems" course at the Engineering Faculty of the University of Genoa.

Mentoring

2000 - present	15 MsC students, 22 PhD students, 8 PostDocs

Academic services

Organization of international workshops

2007 – present	*Workshops toward Cognitive Neuromorphic Engineering*, Sardinia, Italy.
2015 – 2016	MemoCIS Training School on "Memristors - Devices, Models, Circuits, Systems and Applications", Sardinia, Italy.
1998 – 2008	*Workshops on Neuromorphic Engineering*, Telluride (CO), USA.
2004	INI-EU Workshop *Integration of neuromorphic systems for sensory-motor processing*, Zurich, Switzerland.
2003	NIPS satellite workshop *Computing With Spikes: Implementation of Biology and Theory*, Vancouver, Canada.
2002	NIPS satellite workshop *Neuromorphic Engineering in the Commercial World*, Vancouver, Canada.
2001	ESF *Summer Symposium on Neural Computation and Neuroinformatics*, Trieste, Italy

Editorial and review appointments

2010 – present	Chief editor of "Frontier in Neuromorphic Engineering".
2008 – present	Associate editor of "Cognitive Computation" (Springer).
2008	Chair of the IEEE ISCAS Neural Systems and Applications Technical Committee.
2008	Chair of the Neural Information Processing Systems Demo Track.
2007 – present	Associate editor of "Advances in Artificial Neural Systems" (Hindawi).
2007 – present	Tecnical Committee member of IEEE Biomedical Circuits and Systems TC, IEEE Neural Systems and Applications TC, and IEEE Sensory Systems TC
2007 – 2010	Associate editor of the IEEE "Transactions on Neural Networks".
2003	Associate editor of the IEEE Transactions on Neural Networks Special Issue on Neural Networks Hardware Implementations.
2003 – present	Review committee member of $>$10 international conferences, including IEEE ISCAS, IEEE BioCAS, NIPS, IJCNN and ICANN.

Invited talks

Over 60 invited talks and tutorial since 2000. The following are the invited talks since 2010:

2016 IEEE International Electron Devices Meeting (IEDM), San Francisco, CA, USA
2016 INCF Neuroinformatics Short course 2016, Reading, UK
2016 International Symposium on Neuromorphic Cognitive Computing and Robotics, Chengdu, China
2016 IEEE CEDA DESIGN AUTOMATION FUTURES WORKSHOP 2016, Menlo Park, CA, USA
2016 2016 Neuro-Inspired Computational Elements Workshop, Berkeley, CA, USA
2016 International Symposium on Quality Electronic Design (ISQED), Santa Clara, CA, USA
2015 IMEC Academy, Computing Cycle - Neuromorphing computing two-day course, Leuven Belgium
2015 IEEE International Electron Devices Meeting (IEDM), Washington DC, USA
2015 INCF Neuroinformatics 2015 Congress, Cairns, Australia
2015 UZH Robotics and perception Group Seminar series, Zurich, Switzerlad
2015 DATE'15 Conference, 2nd International Workshop on Neuromorphic and Brain-Based Computing Systems, Grenoble, France
2015 University of Bielefeld - CITEC Virtual Faculty Guest talk, Bielefeld, Germany
2014 IEEE Swiss CAS/ED Workshop 2014 on Memristive Devices and Neuromorphic Applications, Zurich, Switzerlad
2014 Bernstein Conference 2014, Satellite Workshop "Brain-like Computation in Hardware: Advances in Neuromorphic Engineering", Göttingen, Germany
2014 KTH Dean's Forum Workshop on Brain-Like Computing, Stockholm, Sweden
2014 Italian Institute of Technology Seminar Series, Genova, Italy
2014 IBM Research, Zurich, Switzerland
2014 University of Cyprus, Invited tutorial, Nicosia, Cyprus
2014 1st International Symposium on Neuromorphic and Nonlinear Engineering, Tokio, Japan
2014 CASFEST - Circuits & Systems Society Forum on Emerging & Selected Topics, Melbourne, Australia
2014 MURI Winter school and Workshop: "Dynamics of Multifunction Brain Networks: Neuromorphic Engineering"
2013 Nano Saclay Nanoelectronics Workshop, Paris, France
2013 EU FET Seminar on Neuromorphics "Neuromorphic cognitive systems: Computers like brains?", Brussels, Belgium
2013 Joint US-EU workshop Cortical Processors, Heidelberg, Germany
2013 HIPEAC'13 Conference, Neuro-Inspired Accelerators for Computing (NIAC) workshop, Berlin, Germany
2013 ISCA20'13 Brain-Inspired Computing (BIC) workshop, Tel Aviv, Israel
2013 University of Bielefeld - CITEC Seminar series, Bielefeld, Germany
2013 University of Kiel Colloquium series, Kiel, Germany
2012 ESSDERC-ESSCIRC 2012, Bordeaux, France
2012 NCEI'12 Neural Computing and Evolving Intelligence conference, Auckland, New Zealand
2012 Swiss Society for Neuroscience Annual Meeting 2012, Zurich, Switzerland
2011 Data Storage Institute - A*STAR, Singapore, Republic of Singapore
2011 University of Bielefeld - CITEC Seminar series, Bielefeld, Germany
2011 WIRN 2011, Vietri, Italy.
2010 ISCAS'10 Tutorial lecture, Paris, France.

Competitive grants, submitted and in preparation

I am main co-ordinator of a Swiss NCCR competitive grant (UZH leading house) in very early stages of preparation. The call for this grant is expected to be in April 2017.

Competitive grants, awarded

NeuroAgents	ERC Consolidator Grant "Neuromorphic electronic agents: from sensory processing to autonomous cognitive behavior" , 1'990'000 EUR
CResPace	EU H2020 FET Proactive Grant 732170 , "Adaptive Bio-electronics for Chronic Cardiorespiratory Disease", 2016-2021, 833'000 EUR
ECogNeT	EU H2020 MSCA Grant 707373, "Embodied Cognitive Neuromorphic Technology", 2016-2018, 187'000 EUR
NeuroPSense	EU H2020 ERC POC Grant 713736, "Embedded Neuromorphic Sensory Processor", 2016-2018, 150'000 EUR
NeuRAM^3	EU H2020 ICT Grant 687299, "NEUral computing aRchitectures in Advanced Monolithic 3D-VLSI nano-technologies", 2016–2019, 470'000 EUR
CMOS-memristors	SNFS Sinergia , "Hybrid CMOS/memristive neuromorphic systems for data analytics", 2015–2018, 477'085 CHF
NPP	Samsung industrial grant, "Neuromorphic processor project", (coordinator: Tobi Delbruck), 2015-2018, 525'000 USD.
NeuroP	EU FP7 ERC Grant 257219, "Neuromorphic processors: event-based VLSI models of cortical circuits for brain-inspired computation", 2011-2017, 1'494'023 EUR.
RAMP	EU FP7 FET Open Grant 612058, "Real neurons-nanoelectronics Architecture with Memristive Plasticity", 2013-2016, 298'952 EUR
SpikeComp	SNSF Grant 138798, "Spike-based computation and learning in distributed neuromorphic systems", 2013-2016, 335'800 CHF.
SI-CODE	EU FP7 FET Open Grant 284553, "Towards new Brain-Machine Interfaces: state-dependent information coding", 2012-2015, 440'574 EUR
PNEUMA	SNSF CHIST-ERA Grant 138798, "Plasticity in NEUral Memristive Architectures", 2011-2013, 310'000 EUR.
CSN-II	EU FP7 CA Grant 601167, "Convergent Science Network of Biomimetics and NeuroTechnology", 2012-2015, 950'000 EUR.
CSN	EU FP7 CA Grant 248986, "Convergent Science Network of biomimetic and biohybrid systems", 2009-2012, 52'000 EUR.
eMorph	EU FP7 FET Grant 231467, "Event-Driven Morphological Computation for Embodied Systems", 2009-2012, 257'240 EUR.
SCANDLE	EU FP7 FET Grant 231168, "acoustic SCene ANalysis for Detecting Living Entities", 2009-2012, 561'480 EUR.
nAttention	SNSF Grant 121713, "Neuromorphic Attention", 2009-2012, 109'367 EUR.
SoundRec	SNSF Grant 119973, "Real-time sound recognition using neuromorphic VLSI", 2009-2012, 212'864 EUR.
ARIADNA	European Space Agency (ESA) Ariadna study 08/6303, "Neuromorphic computation of optic flow data", 2010, 28'960 EUR.
STDPVLSI	ETH (TH-Gesuch) Grant 2533 "Spike-based learning in mixed analog-digital VLSI networks of integrate and fire neurons", 2004-2007.
ALAVLSI	EU FP5 Grant #IST-2001-38099 "Attend-to-learn and learn-to-attend with neuromorphic, analogue VLSI (ALAVLSI)", 2001-2005.

Non-competitive grants, awarded

IEEE	IEEE CASS Major Projects/Initiatives Grant, for the 2009 CapoCaccia Workshop toward Cognitive Neuromorphic Engineering (one year workshop support, principal investigator), 2009, $4000.
Telluride	US NSF Grant #NSF03-041 “Annual workshop on Neuromorphic Engineering” (5 year workshop support, coordinated by R. Etienne-Cummings, University of Maryland, College Park, USA), 2004-2009.

Publications and bibliometrics

As of February 2016, Indiveri submitted one patent, co-authored 2 books, wrote 14 chapters in edited books, and published 145 papers in peer reviewed journals and peer-reviewed conferences.

Google scholar metrics as of 02.12.2016

- Google scholar profile: http://scholar.google.ch/citations?user=kdHjCAMAAA
- h-index:34
- i10-index: 79
- citations: 4498

In October 2013 the h-index was 24, in October 2014 it was 28, and in October 2015 it was 31. Figure 1 shows how the number of citations per year, obtained from Google scholar.

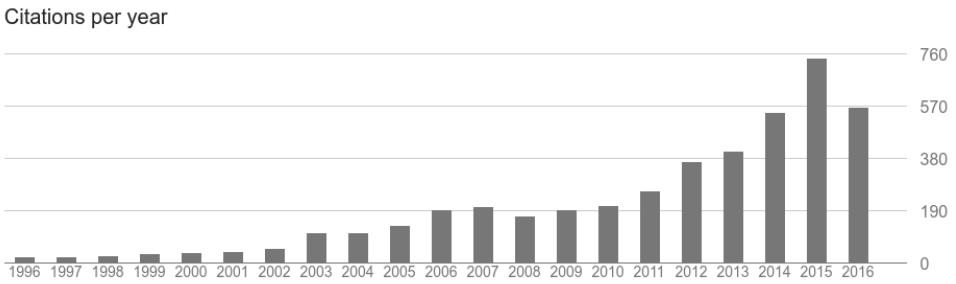

Figure 1: Number of citations per year, as of 02.12.2016.

Giacomo Indiveri's publications

Books

[1] S.-C. Liu, T. Delbruck, G. Indiveri, A. Whatley, and R. Douglas. *Event-based neuromorphic systems*. Wiley, 2014.

[2] S.-C. Liu, J. Kramer, G. Indiveri, T. Delbruck, and R.J. Douglas. *Analog VLSI:Circuits and Principles*. MIT Press, 2002.

Chapters in books

[1] G. Indiveri, E. Linn, and S. Ambrogio. *Resistive Switching: From Fundamentals of Nanoionic Redox Processes to Memristive Device Applications*, chapter ReRAM-Based Neuromorphic Computing, pages 715–735. Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, Germany, 2016.

[2] G. Indiveri. *Handbook of Computational Intelligence*, chapter 38, pages 715–723. Springer-Verlag, Berlin, Heidelberg, 2015.

[3] G. Indiveri and R.J. Douglas. *Encyclopedia of Computational Neuroscience: SpringerReference*, chapter Neuromorphic Cognition. Springer-Verlag, Berlin Heidelberg, 2014.

[4] G. Indiveri. *Principles of Neural Coding*, chapter Coding in Neuromorphic VLSI Networks. CRC Press, 2013.

[5] C. Bartolozzi and G. Indiveri. *Treccani Cervello Mente Psiche*, chapter Organi Sensoriali Artificiali, pages 520–523. Istituto della Enciclopedia Italiana fondata da Giovanni Treccani, 2010.

[6] G. Indiveri, S.-C. Liu, T. Delbruck, and R.J. Douglas. *New Encyclopedia of Neuroscience*, chapter Neuromorphyc Systems, pages 512–528. Elsevier, 2008.

[7] G. Indiveri and R.J. Douglas. *Handbook on "Nano- and Molecular Electronics"*, chapter Neuromorphic Networks of Spiking Neurons, pages 10–1–10–9. CRC Press, 2007.

[8] G. Indiveri. *Neurobiology of Attention*, chapter Neuromorphic Selective Attention Systems, pages 633–637. Elsevier, 2005.

[9] G. Indiveri. *Smart Adaptive Systems in Silicon*, chapter Neuromorphic Engineering, pages 67–84. Kluwer Academic Publishers, 2004.

[10] D. Ben Dayan Rubin, E. Chicca, and G. Indiveri. Characterizing the firing proprieties of an adaptive analog VLSI neuron. In Masayuki Murata Auke Jan Ijspeert and Naoki Wakamiya, editors, *Biologically Inspired Approaches to Advanced Information Technology First International Workshop, BioADIT 2004, Lausanne, Switzerland, January 29-30, 2004, Revised Selected Pa*, volume 3141/2004 of *LCNS*, pages 189–200. Springer-Verlag Heidelberg, 2004.

[11] G. Indiveri, C. Rasche, and R.J. Douglas. Neuromorphic sensory processing using analog very large-scale integration. In D. Baltimore, R. Dulbecco, F. Jacob, and R. Levi-Montalcini, editors, *Frontiers of Life*. Academic Press, San Diego, CA, 2001.

[12] G. Indiveri, C. Rasche, and R.J. Douglas. *Frontiere della Vita*, volume III of *Sistemi Intelligenti*, chapter Elaborazione Neuromorfa dei Segnali Sensoriali con Circuiti VLSI Analogici. Istituto della Enciclopedia Italiana, 1999.

[13] G. Indiveri. Analog VLSI model of locust DCMD neuron for computation of object approach. In L.S. Smith and A. Hamilton, editors, *Neuromorphic Systems. Engineering Silicon from Neurobiology*, volume 10 of *Progress in Neural Processing*, pages 47–60. World Scientific, 1998.

[14] G. Indiveri. Winner-take-all networks with lateral excitation. In T.S. Lande, editor, *Neuromorphic Systems Engineering*, pages 367–380. Kluwer Academic, Norwell, MA, 1998.

Journal papers

[1] R. Berdan, E. Vasilaki, A. Khiat, G. Indiveri, A. Serb, and T. Prodromakis. Emulating short-term synaptic dynamics with memristive devices. *Scientific Reports*, 6(18639):1–9, 2016.

[2] Hesham Mostafa, L. K. Müller, and Giacomo Indiveri. Rhythmic inhibition allows neural networks to search for maximally consistent states. *Neural Computation*, 27:2510–2547, 2015.

[3] Hesham Mostafa, L. K. Müller, and Giacomo Indiveri. An event-based architecture for solving constraint satisfaction problems. *Nature Communications*, 6:1–10, 2015.

[4] Hesham Mostafa, Ali Khiat, Alexander Serb, Christian G Mayr, Giacomo Indiveri, and Themis Prodromakis. Implementation of a spike-based perceptron learning rule using TiO2x memristors. *Frontiers in Neuroscience*, 9(357), 2015.

[5] F. Corradi and G. Indiveri. A neuromorphic event-based neural recording system for smart brain-machine-interfaces. *Biomedical Circuits and Systems, IEEE Transactions on*, 9(5):699–709, 2015.

[6] G. Indiveri and S.-C. Liu. Memory and information processing in neuromorphic systems. *Proceedings of the IEEE*, 103(8):1379–1397, 2015.

[7] Ning Qiao, Hesham Mostafa, Federico Corradi, Marc Osswald, Fabio Stefanini, Dora Sumislawska, and Giacomo Indiveri. A re-configurable on-line learning spiking neuromorphic processor comprising 256 neurons and 128k synapses. *Frontiers in Neuroscience*, 9(141), 2015.

[8] Mostafa Rahimi Azghadi, Saber Moradi, Daniel B Fasnacht, Mehmet Sirin Ozdas, and Giacomo Indiveri. Programmable spike-timing-dependent plasticity learning circuits in neuromorphic VLSI architectures. *ACM Journal on Emerging Technologies in Computing Systems (JETC)*, 12(2):17:1–17:18, 2015.

[9] K. Papadimitriou, S.-C. Liu, G. Indiveri, and E.M. Drakakis. Neuromorphic log-domain silicon synapse circuits obey bernoulli dynamics: A unifying tutorial analysis. *Frontiers in Neuroscience*, 8(428), 2014.

[10] E. Chicca, F. Stefanini, C. Bartolozzi, and G. Indiveri. Neuromorphic electronic circuits for building autonomous cognitive systems. *Proceedings of the IEEE*, 102(9):1367–1388, Sep 2014.

[11] M. Rahimi Azghadi, N. Iannella, S. Al-Sarawi, G. Indiveri, and D. Abbott. Spike-based synaptic plasticity in silicon: Design, implementation, application, and challenges. *Proceedings of the IEEE*, 102(5):717–737, May 2014.

[12] F. Corradi, D. Zambrano, M. Raglianti, G. Passetti, C. Laschi, and G. Indiveri. Towards a neuromorphic vestibular system. *Biomedical Circuits and Systems, IEEE Transactions on*, 8(5):669–680, Oct 2014.

[13] Hesham Mostafa and Giacomo Indiveri. Sequential activity in asymmetrically coupled winner-take-all circuits. *Neural Computation*, 26(9):1973–2004, 2014.

[14] F. Stefanini, S. Sheik, E. Neftci, and G. Indiveri. Pyncs: a microkernel for high-level definition and configuration of neuromorphic electronic systems. *Frontiers in Neuroinformatics*, 8(73), 2014.

[15] J. Binas, U. Rutishauser, G. Indiveri, and M. Pfeiffer. Learning and stabilization of winner-take-all dynamics through interacting excitatory and inhibitory plasticity. *Frontiers in Computational Neuroscience*, 8, 2014.

[16] F. Sandin, A.I. Khan, A.G. Dyer, A.H.M. Amin, G. Indiveri, E. Chicca, and E. Osipov. Concept learning in neuromorphic vision systems: What can we learn from insects? *Journal of Software Engineering and Applications*, 7:387–395, Apr. 2014.

[17] N.K. Mandloi, G. Indiveri, and C. Bartolozzi. Compact analog temporal edge detector circuit with programmable adaptive threshold for neuromorphic vision sensors. *Circuits and Systems I: Regular Papers, IEEE Transactions on*, PP(99):1–11, 2014.

[18] S. Moradi and G. Indiveri. An event-based neural network architecture with an asynchronous programmable synaptic memory. *Biomedical Circuits and Systems, IEEE Transactions on*, 8(1):98–107, February 2014.

[19] M. Coath, S. Sheik, E. Chicca, G. Indiveri, S.L. Denham, and T. Wennekers. A robust sound perception model suitable for neuromorphic implementation. *Frontiers in Neuroscience*, 7, 2013.

[20] E. Neftci, J. Binas, U. Rutishauser, E. Chicca, G. Indiveri, and R. Douglas. Synthesizing cognition in neuromorphic electronic systems. *Proceedings of the National Academy of Sciences*, 110(37):E3468–E3476, 2013.

[21] G. Indiveri, B. Linares-Barranco, R. Legenstein, G. Deligeorgis, and T. Prodromakis. Integration of nanoscale memristor synapses in neuromorphic computing architectures. *Nanotechnology*, 24(38):384010, 2013.

[22] T. Serrano-Gotarredona, T. Masquelier, T. Prodromakis, G. Indiveri, and B. Linares-Barranco. STDP and STDP variations with memristors for spiking neuromorphic learning systems. *Frontiers in Neuroscience*, 7(2), 2013.

[23] N. Kasabov, K. Dhoble, N. Nuntalid, and G. Indiveri. Dynamic evolving spiking neural networks for on-line spatio- and spectro-temporal pattern recognition. *Neural Networks*, 41:188–201, 2013.

[24] E. Neftci, J. Binas, E. Chicca, G. Indiveri, and R. Douglas. Systematic construction of finite state automata using VLSI spiking neurons. In Tony Prescott, Nathan Lepora, Anna Mura, and Paul Verschure, editors, *Biomimetic and Biohybrid Systems*, volume 7375 of *Lecture Notes in Computer Science*, pages 382–383. Springer Berlin / Heidelberg, 2012.

[25] S. Sheik, M. Coath, G. Indiveri, S.L. Denham, T. Wennekers, and E. Chicca. Emergent auditory feature tuning in a real-time neuromorphic VLSI system. *Frontiers in Neuroscience*, 6(17), 2012.

[26] G. Indiveri and T.K. Horiuchi. Frontiers in neuromorphic engineering. *Frontiers in Neuroscience*, 5(118):1–2, 2011.

[27] R. Mill, M. Coath, T. Wennekers, and S.L. Denham. Abstract stimulus-specific adaptation models. *Neural Computation*, 23:435–476, 2011.

[28] E. Neftci, E. Chicca, G. Indiveri, and R.J. Douglas. A systematic method for configuring VLSI networks of spiking neurons. *Neural Computation*, 23(10):2457–2497, Oct. 2011.

[29] G. Indiveri, B. Linares-Barranco, T.J. Hamilton, A. van Schaik, R. Etienne-Cummings, T. Delbruck, S.-C. Liu, P. Dudek, P. Häfliger, S. Renaud, J. Schemmel, G. Cauwenberghs, J. Arthur, K. Hynna, F. Folowosele, S. Saighi, T. Serrano-Gotarredona, J. Wijekoon, Y. Wang, and K. Boahen. Neuromorphic silicon neuron circuits. *Frontiers in Neuroscience*, 5:1–23, 2011.

[30] G. Indiveri, E. Chicca, and R.J. Douglas. Artificial cognitive systems: From VLSI networks of spiking neurons to neuromorphic cognition. *Cognitive Computation*, 1:119–127, 2009.

[31] S. Mitra, S. Fusi, and G. Indiveri. Real-time classification of complex patterns using spike-based learning in neuromorphic VLSI. *Biomedical Circuits and Systems, IEEE Transactions on*, 3(1):32–42, Feb. 2009.

[32] C. Bartolozzi and G. Indiveri. Global scaling of synaptic efficacy: Homeostasis in silicon synapses. *Neurocomputing*, 72(4–6):726–731, Jan 2009.

[33] C. Bartolozzi and G. Indiveri. Selective attention in multi-chip address-event systems. *Sensors*, 9(7):5076–5098, 2009.

[34] G. Indiveri. Neuromorphic VLSI models of selective attention: from single chip vision sensors to multi-chip systems. *Sensors*, 8(9):5352–5375, 2008.

[35] G. Indiveri. Synaptic plasticity and spike-based computation in VLSI networks of integrate-and-fire neurons. *Neural Information Processing - Letters and Reviews*, 11(4–61):135–146, 2007.

[36] C. Bartolozzi and G. Indiveri. Synaptic dynamics in analog VLSI. *Neural Computation*, 19(10):2581–2603, Oct 2007.

[37] E. Chicca, A.M. Whatley, P. Lichtsteiner, V. Dante, T. Delbruck, P. Del Giudice, R.J. Douglas, and G. Indiveri. A multi-chip pulse-based neuromorphic infrastructure and its application to a model of orientation selectivity. *IEEE Transactions on Circuits and Systems I*, 5(54):981–993, 2007.

[38] G. Indiveri, E. Chicca, and R.J. Douglas. A VLSI array of low-power spiking neurons and bistable synapses with spike–timing dependent plasticity. *IEEE Transactions on Neural Networks*, 17(1):211–221, Jan 2006.

[39] C. Bartolozzi and G. Indiveri. Selective attention implemented with dynamic synapses and integrate-and-fire neurons. *NeuroComputing*, 69(16–18):1971–1976, 2006. Selected papers from the 1st International Conference on Brain Inspired Cognitive Systems (BICS 2004).

[40] R. Reeve, B. Webb, A. Horchler, G. Indiveri, and R. Quinn. New technologies for testing a model of cricket phonotaxis on an outdoor robot platform. *Robotics and Autonomous Systems*, 51(1):41–54, 2005.

[41] V. Becanovic, R. Hosseiny, and G. Indiveri. Robot soccer using optical analog VLSI sensors. *International Journal of Robotics and Automation*, 19(4):213–221, 2004.

[42] L. Carota, G. Indiveri, and V. Dante. A software-hardware selective attention system. *Neurocomputing*, 58–60:647–653, Jun 2004.

[43] G. Indiveri. A current-mode hysteretic winner-take-all network, with excitatory and inhibitory coupling. *Analog Integrated Circuits and Signal Processing*, 28(3):279–291, September 2001.

[44] G. Indiveri. A neuromorphic VLSI device for implementing 2-D selective attention systems. *IEEE Transactions on Neural Networks*, 12(6):1455–1463, November 2001.

[45] G. Indiveri, R. Mürer, and J. Kramer. Active vision using an analog VLSI model of selective attention. *IEEE Transactions on Circuits and Systems II*, 48(5):492–500, May 2001.

[46] S.-C. Liu, J. Kramer, G. Indiveri, T. Delbruck, T. Burg, and R.J. Douglas. Orientation-selective aVLSI spiking neurons. *Neural Networks*, 14(6/7):629–643, July 2001.

[47] G. Indiveri. Modeling selective attention using a neuromorphic analog VLSI device. *Neural Computation*, 12(12):2857–2880, 2000.

[48] G. Indiveri and R.J. Douglas. ROBOTIC VISION: Neuromorphic vision sensor. *Science*, 288:1189–1190, May 2000.

[49] G. Indiveri. Neuromorphic analog VLSI sensor for visual tracking: Circuits and application examples. *IEEE Transactions on Circuits and Systems II*, 46(11):1337–1347, 1999.

[50] G. Indiveri. Winner-take-all networks with lateral excitation. *Analog Integrated Circuits and Signal Processing*, 13(1/2):185–193, May 1997.

[51] G. Indiveri, J. Kramer, and C. Koch. System implementations of analog VLSI velocity sensors. *IEEE Micro*, 16(5):40–49, October 1996.

[52] G. Indiveri, L. Raffo, S.P. Sabatini, and G.M. Bisio. A recurrent neural architecture mimicking cortical preattentive vision systems. *Neurocomputing*, 11:155–170, 1996.

[53] R. Sarpeshkar, J. Kramer, G. Indiveri, and C. Koch. Analog VLSI architectures for motion processing: from fundamental limits to system applications. *Proceedings of the IEEE*, 84(7):969–987, July 1996.

[54] G. Indiveri, L. Raffo, S.P. Sabatini, and G.M. Bisio. A neuromorphic architecture for cortical multi-layer integration of early visual tasks. *Machine Vision and Applications*, 8:305–314, 1995.

[55] L. Raffo, S.P. Sabatini, G. Indiveri, G. Nateri, and G.M. Bisio. A memory-based recurrent neural architecture for chips emulating cortical visual processing. *IEICE Transactions on Electronics*, E77-C(7):1065–1074, 1994.

Conference peer-reviewed papers

[1] J. Binas, G. Indiveri, and M. Pfeiffer. Spiking analog VLSI neuron assemblies as constraint satisfaction problem solvers. In *International Symposium on Circuits and Systems, (ISCAS), 2016*, pages 2094–2097. IEEE, 2016.

[2] H. Mostafa, C. Mayr, and G. Indiveri. Beyond spike-timing dependent plasticity in memristor crossbar arrays. In *International Symposium on Circuits and Systems, (ISCAS), 2016*, pages 926–929. IEEE, 2016.

[3] D. Sumislawska, N. Qiao, M. Pfeiffer, and G. Indiveri. Wide dynamic range weights and biologically realistic synaptic dynamics for spike-based learning circuits. In *International Symposium on Circuits and Systems, (ISCAS), 2016*, pages 2491–2494. IEEE, 2016.

[4] N. Qiao and G. Indiveri. Scaling mixed-signal neuromorphic processors to 28nm fd-soi technologies. In *Biomedical Circuits and Systems Conference, (BioCAS), 2016*, pages 552–555. IEEE, 2016.

[5] N. Qiao and G. Indiveri. An auto-scaling wide dynamic range current to frequency converter for real-time monitoring of signals in neuromorphic systems. In *Biomedical Circuits and Systems Conference, (BioCAS), 2016*, pages 160–163. IEEE, 2016.

[6] N. Qiao, C. Bartolozzi, and G. Indiveri. Automatic gain control of ultra-low leakage synaptic scaling homeostatic plasticity circuits. In *Biomedical Circuits and Systems Conference, (BioCAS), 2016*, pages 156–159. IEEE, 2016.

[7] R. George, C. Mayr, G. Indiveri, and S. Vassanelli. Event-based softcore processor in a biohybrid setup applied to structural plasticity. In *Event-based Control, Communication, and Signal Processing (EBCCSP), 2015 International Conference on*, pages 1–4, June 2015.

[8] F. Boi, F. Diotalevi, F. Stefanini, G. Indiveri, C. Bartolozzi, and A. Vato. A modular configurable system for closed-loop bidirectional brain-machine interfaces. In *Neural Engineering (NER), 2015 7th International IEEE/EMBS Conference on*, pages 198–201, April 2015.

[9] F. Corradi, H. You, M. Giulioni, and G. Indiveri. Decision making and perceptual bistability in spike-based neuromorphic VLSI systems. In *International Symposium on Circuits and Systems (ISCAS), 2015*, pages 2708–2711. IEEE, 2015.

[10] J. Binas, G. Indiveri, and M. Pfeiffer. Local structure helps learning optimized automata in recurrent neural networks. In *International Joint Conference on Neural Networks, (IJCNN) 2015*, pages 1–7. IEEE, 2015.

[11] F. Corradi, C. Eliasmith, and G. Indiveri. Mapping arbitrary mathematical functions and dynamical systems to neuromorphic VLSI circuits for spike-based neural computation. In *International Symposium on Circuits and Systems, (ISCAS), 2014*, pages 269–272. IEEE, 2014.

[12] E. Donati, F. Corradi, C Stefanini, and G. Indiveri. A spiking implementation of the lamprey's central pattern generator in neuromorphic VLSI. In *Biomedical Circuits and Systems Conference (BioCAS)*, pages 512–515. IEEE, Oct 2014.

[13] N.K. Mandloi, C. Bartolozzi, and G. Indiveri. Smart motion sensing for autonomous robots. In *Biomedical Circuits and Systems Conference (BioCAS)*, pages 520–523. IEEE, Oct 2014.

[14] H. Mostafa, F. Corradi, F. Stefanini, and G. Indiveri. A hybrid analog/digital spike-timing dependent plasticity learning circuit for neuromorphic VLSI multi-neuron architectures. In *International Symposium on Circuits and Systems, (ISCAS), 2014*, pages 854–857. IEEE, 2014.

[15] F. Corradi, D. Bontrager, and G. Indiveri. Toward neuromorphic intelligent brain-machine interfaces: An event-based neural recording and processing system. In *Biomedical Circuits and Systems Conference (BioCAS)*, pages 584–587. IEEE, Oct 2014.

[16] G. Rovere, N. Qiao, C. Bartolozzi, and G. Indiveri. Ultra low leakage synaptic scaling circuits for implementing homeostatic plasticity in neuromorphic architectures. In *International Symposium on Circuits and Systems, (ISCAS), 2014*, pages 2073–2076. IEEE, 2014.

[17] M. Rahimi Azghadi, S. Moradi, and G. Indiveri. Programmable neuromorphic circuits for spike-based neural dynamics. In *New Circuits and Systems Conference, (NEWCAS) 2013*, pages 1–4, Paris, France, 2013. IEEE.

[18] H. Mostafa, F. Corradi, M. Osswald, and G. Indiveri. Automated synthesis of asynchronous event-based interfaces for neuromorphic systems. In *Circuit Theory and Design, (ECCTD) 2013 European Conference on*, pages 1–4. IEEE, 2013.

[19] H. Mostafa, L. K. Müller, and G. Indiveri. Recurrent networks of coupled Winner-Take-All oscillators for solving constraint satisfaction problems. In C.J.C. Burges, L. Bottou, M. Welling, Z. Ghahramani, and K.Q. Weinberger, editors, *Advances in Neural Information Processing Systems (NIPS)*, volume 26, pages 719–727, 2013.

[20] S. Moradi, N. Imam, R. Manohar, and G. Indiveri. A memory-efficient routing method for large-scale spiking neural networks. In *Circuit Theory and Design, (ECCTD), 2013 European Conference on*, pages 1–4. IEEE, 2013.

[21] G. Passetti, F. Corradi, M. Raglianti, D. Zambrano, C. Laschi, and G. Indiveri. Implementation of a neuromorphic vestibular sensor with analog VLSI neurons. In *Biomedical Circuits and Systems Conference, (BioCAS), 2013*, pages 174–177. IEEE, Oct. 2013.

[22] S. Sheik, M. Pfeiffer, F. Stefanini, and G. Indiveri. Spatio-temporal spike pattern classification in neuromorphic systems. In *Biomimetic and Biohybrid Systems*, pages 262–273. Springer, 2013.

[23] E. Neftci, B. Toth, G. Indiveri, and H. Abarbanel. Dynamic state and parameter estimation applied to neuromorphic systems. *Neural Computation*, 24(7):1669–1694, July 2012.

[24] D. Corneil, D. Sonnleithner, E. Neftci, E. Chicca, M. Cook, G. Indiveri, and R. Douglas. Real-time inference in a VLSI spiking neural network. In *International Symposium on Circuits and Systems, (ISCAS), 2012*, pages 2425–2428. IEEE, 2012.

[25] D. Corneil, D. Sonnleithner, E. Neftci, E. Chicca, M. Cook, G. Indiveri, and R. Douglas. Function approximation with uncertainty propagation in a VLSI spiking neural network. In *International Joint Conference on Neural Networks, IJCNN 2012*, pages 2990–2996. IEEE, 2012.

[26] S. Sheik, E. Chicca, and G. Indiveri. Exploiting device mismatch in neuromorphic VLSI systems to implement axonal delays. In *International Joint Conference on Neural Networks, (IJCNN) 2012*, pages 1940–1945. IEEE, 2012.

[27] K. Dhoble, N. Nuntalid, G. Indiveri, and N. Kasabov. Online spatio-temporal pattern recognition with evolving spiking neural networks utilising address event representation, rank order, and temporal spike learning. In *International Joint Conference on Neural Networks, IJCNN 2012*, pages 554–560. IEEE, 2012.

[28] S. Moradi and G. Indiveri. A VLSI network of spiking neurons with an asynchronous static random access memory. In *Biomedical Circuits and Systems Conference (BioCAS), 2011*, pages 277–280. IEEE, November 2011.

[29] C. Bartolozzi, C. Clercq, N. Mandloi, F. Rea, G. Indiveri, D. Fasnacht, G. Metta, M. Hofstätter, and R.B. Benosman. emorph: Towards neuromorphic robotic vision. volume 7, pages 163–165, 2011. Proceedings of the 2nd European Future Technologies Conference and Exhibition 2011 (FET 11).

[30] C. Bartolozzi, N.K. Mandloi, and G. Indiveri. Attentive motion sensor for mobile robotic applications. In *International Symposium on Circuits and Systems, (ISCAS), 2011*, pages 2813–2816. IEEE, May 2011.

[31] C. Bartolozzi, F. Rea, C. Clercq, M. Hofstätter, D.B. Fasnacht, G. Indiveri, and G. Metta. Embedded neuromorphic vision for humanoid robots. In *IEEE Computer Society Conference on Computer Vision and Pattern Recognition Workshops (CVPRW)*, pages 129–135. IEEE, June 2011.

[32] D. Sonnleithner and G. Indiveri. Active vision driven by a neuromorphic selective attention system. In *Proc. of International Symposium on Autonomous Minirobots for Research and Edutainment, AMiRE 2011*, pages 1–10, May 2011.

[33] D. Sonnleithner and G. Indiveri. A neuromorphic saliency-map based active vision system. In *Conference on Information Sciences and Systems, CISS 2011*, pages 1–6, Johns Hopkins University, March 2011.

[34] D.B. Fasnacht and G. Indiveri. A PCI based high-fanout AER mapper with 2 GiB RAM look-up table, 0.8 μs latency and 66 MHz output event-rate. In *Conference on Information Sciences and Systems, CISS 2011*, pages 1–6, Johns Hopkins University, March 2011.

[35] S. Sheik, F. Stefanini, E. Neftci, E. Chicca, and G. Indiveri. Systematic configuration and automatic tuning of neuromorphic systems. In *International Symposium on Circuits and Systems, (ISCAS), 2011*, pages 873–876. IEEE, May 2011.

[36] P. Abshire, A. Bermak, R. Berner, G. Cauwenberghs, S. Chen, J.B. Christen, T. Constandinou, E. Culurciello, M. Dandin, T. Datta, T. Delbruck, P. Dudek, A. Eftekhar, R. Etienne-Cummings, G. Indiveri, M.K. Law, B. Linares-Barranco, J. Tapson, W. Tang, and Y. Zhai. Confession session: Learning from others mistakes. In *International Symposium on Circuits and Systems, (ISCAS), 2011*, pages 1149–1162. IEEE, May 2011.

[37] E. Neftci and G. Indiveri. A device mismatch compensation method for VLSI spiking neural networks. In *Biomedical Circuits and Systems Conference (BioCAS), 2010*, pages 262–265. IEEE, 2010.

[38] R. Mill, S. Sheik, G. Indiveri, and S. Denham. A model of stimulus-specific adaptation in neuromorphic aVLSI. In *Biomedical Circuits and Systems Conference (BioCAS), 2010*, pages 266–269. IEEE, 2010.

[39] S. Mitra, G. Indiveri, and R. Etienne-Cummings. Synthesis of log-domain integrators for silicon synapses with global parametric control. In *International Symposium on Circuits and Systems, (ISCAS), 2010*, pages 97–100, Paris, France, 2010. IEEE, IEEE.

[40] G. Indiveri, F. Stefanini, and E. Chicca. Spike-based learning with a generalized integrate and fire silicon neuron. In *International Symposium on Circuits and Systems, (ISCAS), 2010*, pages 1951–1954, Paris, France, 2010. IEEE.

[41] E. Neftci, E. Chicca, M. Cook, G. Indiveri, and R.J. Douglas. State-dependent sensory processing in networks of VLSI spiking neurons. In *International Symposium on Circuits and Systems, (ISCAS), 2010*, pages 2789–2792, Paris, France, 2010. IEEE.

[42] G. Orchard, C. Bartolozzi, and G. Indiveri. Applying neuromorphic vision sensors to planetary landing tasks. In *Biomedical Circuits and Systems Conference, (BioCAS), 2009*, pages 201–204. IEEE, Nov. 2009.

[43] P. Livi and G. Indiveri. A current-mode conductance-based silicon neuron for address-event neuromorphic systems. In *International Symposium on Circuits and Systems, (ISCAS), 2009*, pages 2898–2901. IEEE, May 2009.

[44] C. Bartolozzi, O. Nikolayeva, and G. Indiveri. Implementing homeostatic plasticity in VLSI networks of spiking neurons. In *International Conference on Electronics, Circuits, and Systems, ICECS 2008*, pages 682–685. IEEE, 2008.

[45] M. Giulioni, P. Camilleri, V. Dante, D. Badoni, G. Indiveri, J. Braun, and P. Del Giudice. A VLSI network of spiking neurons with plastic fully configurable "stop-learning" synapses. In *International Conference on Electronics, Circuits, and Systems, ICECS 2008*, pages 678–681. IEEE, 2008.

[46] D.B. Fasnacht, A.M. Whatley, and G. Indiveri. A serial communication infrastructure for multi-chip address event system. In *International Symposium on Circuits and Systems, (ISCAS), 2008*, pages 648–651. IEEE, May 2008.

[47] E. Neftci, E. Chicca, G. Indiveri, J.-J. Slotine, and R.J. Douglas. Contraction properties of VLSI cooperative competitive neural networks of spiking neurons. In J.C. Platt, D. Koller, Y. Singer, and S. Roweis, editors, *Advances in Neural Information Processing Systems (NIPS)*, volume 20, pages 1073–1080, Cambridge (MA), 2008. MIT Press.

[48] S. Mitra, G. Indiveri, and S. Fusi. Learning to classify complex patterns using a VLSI network of spiking neurons. In J.C. Platt, D. Koller, Y. Singer, and S. Roweis, editors, *Advances in Neural Information Processing Systems (NIPS)*, volume 20, pages 1009–1016, Cambridge (MA), 2008. MIT Press.

[49] S. Mitra, G. Indiveri, and S. Fusi. Robust classification of correlated patterns with a neuromorphic VLSI network of spiking neurons. In *Biomedical Circuits and Systems Conference, (BioCAS), 2007*, pages 87–90. IEEE, 2007.

[50] H.-P. Wang, E. Chicca, G. Indiveri, and T.J. Sejnowski. Reliable computation in noisy backgrounds using real-time neuromorphic hardware. In *Biomedical Circuits and Systems Conference, (BioCAS), 2007*, pages 71–74. IEEE, 2007.

[51] P. Camilleri, M. Giulioni, V. Dante, D. Badoni, G. Indiveri, B. Michaelis, J. Braun, and P. Del Giudice. A neuromorphic aVLSI network chip with configurable plastic synapses. In *Hybrid Intelligent Systems, 2007, HIS 2007*, pages 296–301, Los Alamitos, CA, USA, 2007. IEEE Computer Society. (Best paper award).

[52] G. Indiveri and S. Fusi. Spike-based learning in VLSI networks of integrate-and-fire neurons. In *International Symposium on Circuits and Systems, (ISCAS), 2007*, pages 3371–3374. IEEE, 2007.

[53] E. Chicca, G. Indiveri, and R.J. Douglas. Context dependent amplification of both rate and event-correlation in a VLSI network of spiking neurons. In B. Schölkopf, J.C. Platt, and T. Hofmann, editors, *Advances in Neural Information Processing Systems (NIPS)*, volume 19, pages 257–264, Cambridge, MA, USA, Dec 2007. Neural Information Processing Systems Foundation, MIT Press.

[54] C. Bartolozzi and G. Indiveri. A selective attention multi–chip system with dynamic synapses and spiking neurons. In B. Schölkopf, J.C. Platt, and T. Hofmann, editors, *Advances in Neural Information Processing Systems (NIPS)*, volume 19, pages 113–120, Cambridge, MA, USA, Dec 2007. Neural Information Processing Systems Foundation, MIT Press.

[55] C. Bartolozzi, S. Mitra, and G. Indiveri. An ultra low power current–mode filter for neuromorphic systems and biomedical signal processing. In *Biomedical Circuits and Systems Conference, (BioCAS), 2006*, pages 130–133. IEEE, 2006.

[56] C. Bartolozzi and G. Indiveri. Silicon synaptic homeostasis. In *Brain Inspired Cognitive Systems, BICS 2006*, pages 1–4, October 2006.

[57] S. Mitra, S. Fusi, and G. Indiveri. A VLSI spike-driven dynamic synapse which learns only when necessary. In *International Symposium on Circuits and Systems, (ISCAS), 2006*, pages 2777–2780. IEEE, May 2006.

[58] E. Chicca, P. Lichtsteiner, T. Delbruck, G. Indiveri, and R.J. Douglas. Modeling orientation selectivity using a neuromorphic multi-chip system. In *International Symposium on Circuits and Systems, (ISCAS), 2006*, pages 1235–1238. IEEE, 2006.

[59] S. Mitra and G. Indiveri. A low-power dual-threshold comparator for neuromorphic systems. In *2005 PhD Research in Microelectronics and Electronics*, volume 2, pages 402–405, Lausanne, Jul 2005. IEEE.

[60] C. Hofstoetter, M. Gil, K. Eng, G. Indiveri, M. Mintz, J. Kramer, and P.F. M.J. Verschure. The cerebellum chip: an analog VLSI implementation of a cerebellar model of classical conditioning. In Lawrence K. Saul, Yair Weiss, and Léon Bottou, editors, *Advances in Neural Information Processing Systems (NIPS)*, volume 17, pages 577–584, Cambridge, MA, USA, 2005. MIT Press.

[61] D.R. Muir, G. Indiveri, and R.J. Douglas. Form specifies function: Robust spike-based computation in analog VLSI without precise synaptic weights. In *International Symposium on Circuits and Systems, (ISCAS), 2005*, pages 5150–5153. IEEE, May 2005.

[62] V. Becanovic, R. Hosseiny, and G. Indiveri. Object tracking using multiple neuromorphic vision sensors. In D. Nardi et al. et al., editor, *Proc. Robocup 2004*, LNAI 3276, pages 426–433, Berlin Heidelberg, 2005. Springer-Verlag.

[63] C. Bartolozzi and G. Indiveri. A neuromorphic selective attention architecture with dynamic synapses and integrate-and-fire neurons. In *Brain Inspired Cognitive Systems, BICS 2004*, volume BIS2.2, pages 1–6, Aug 2004.

[64] D. Ben Dayan Rubin, E. Chicca, and G. Indiveri. Firing proprieties of an adaptive analog VLSI neuron. In *Proceedings of Bio-ADIT 2004 , Lausanne*, LNCS, pages pp.314–327, 2004.

[65] E. Chicca, G. Indiveri, and R.J. Douglas. An event based VLSI network of integrate-and-fire neurons. In *International Symposium on Circuits and Systems, (ISCAS), 2004*, pages V-357–V-360. IEEE, 2004.

[66] G. Indiveri, E. Chicca, and R.J. Douglas. A VLSI reconfigurable network of integrate-and-fire neurons with spike-based learning synapses. In *Proceedings of 12th European Symposium on Artificial Neural Networks (ESANN04)*, pages 405–410, 2004.

[67] G. Indiveri. Neuromorphic selective attention systems. In *International Symposium on Circuits and Systems, (ISCAS), 2003*, volume III, pages 770–773. IEEE, May 2003.

[68] G. Indiveri. A low-power adaptive integrate-and-fire neuron circuit. In *International Symposium on Circuits and Systems, (ISCAS), 2003*, volume IV, pages 820–823. IEEE, May 2003.

[69] E. Chicca, G. Indiveri, and R.J. Douglas. An adaptive silicon synapse. In *International Symposium on Circuits and Systems, (ISCAS), 2003*, pages I–81–I–84. IEEE, May 2003.

[70] G. Indiveri. Neuromorphic bistable VLSI synapses with spike-timing-dependent plasticity. In *Advances in Neural Information Processing Systems (NIPS)*, volume 15, pages 1091–1098, Cambridge, MA, USA, December 2003. MIT Press.

[71] G. Indiveri, P. Oswald, and J. Kramer. An adaptive visual tracking sensor with a hysteretic winner-take-all network. In *International Symposium on Circuits and Systems, (ISCAS), 2002*, pages 324–327. IEEE, May 2002.

[72] G. Indiveri, T. Horiuchi, E. Niebur, and R.J. Douglas. A competitive network of spiking VLSI neurons. In F. Rattay, editor, *World Congress on Neuroinformatics*, ARGESIM Report no. 20, pages 443–455, Vienna, 2001. ARGESIM / ASIM - Verlag.

[73] S.-C. Liu, J. Kramer, G. Indiveri, T. Delbruck, and R.J. Douglas. Orientation-selective aVLSI spiking neurons. In *Advances in Neural Information Processing Systems (NIPS)*, volume 14, pages 1107–1114, Vancouver, Canada, Dec 2001.

[74] G. Indiveri. Computation in neuromorphic analog VLSI systems. In *12th Italian Workshop on Neural Networks. WIRN 2001*, pages 3–19, Vietri (SA), Italy, May 2001.

[75] G. Indiveri. A 2D neuromorphic VLSI architecture for modeling selective attention. In S.-I. Amari, C.L. Giles, M. Gori, and V. Piuri, editors, *Proceedings of the IEEE-INNS-ENNS International Joint Conference on Neural Networks; (IJCNN) 2000*, volume IV, pages 208–213. IEEE Computer Society, 2000.

[76] G. Indiveri, A.M. Whatley, and J. Kramer. A reconfigurable neuromorphic VLSI multi-chip system applied to visual motion computation. In *Proceedings of the Seventh International Conference on Microelectronics for Neural, Fuzzy and Bio-inspired Systems; Microneuro'99*, pages 37–44, Los Alamitos, CA, April 1999. IEEE Computer Society.

[77] R. Mudra and G. Indiveri. A modular neuromorphic navigation system applied to line following and obstacle avoidance tasks. In A. Löffler, F. Mondada, and U. Rückert, editors, *Experiments with the Mini-Robot Khepera*, volume 64 of *Proceedings of the 1^{st} International Khepera Workshop*, pages 99–108, Paderborn, December 1999.

[78] J. Kramer and G. Indiveri. Neuromorphic vision sensors and preprocessors in system applications. In T.M. Bernard, editor, *Advanced Focal Plane Arrays and Electronic Cameras II*, volume 3410 of *Proc. SPIE*, pages 134–146, Bellingham, WA, May 1998. SPIE.

[79] G. Indiveri. Neuromorphic systems for industrial applications. In *Proc.International Body Engineering Conference & Exposition*, Stuttgart, Germany, 1997.

[80] G. Indiveri and P.F.M.J. Verschure. Autonomous vehicle guidance using analog VLSI neuromorphic sensors. In A. Germond M. Hasler W. Gerstner and J-D. Nicoud, editors, *Proceedings Artificial Neural Networks-ICANN97: Lausanne, Switzerland*, volume 1327 of *Lecture Notes in Computer Science. Berlin: Springer*, pages 811–816. Springer Verlag, 1997.

[81] G. Indiveri, J. Kramer, and C. Koch. System implementations of analog VLSI velocity sensors. *IEEE Micro*, 16(5):40–49, October 1996.

[82] G. Indiveri, J. Kramer, and C. Koch. Neuromorphic vision chips: intelligent sensors for industrial applications. In *Proc Advanced Microsystems for Automotive Applications*, Berlin, Germany, December 1996.

[83] G. Indiveri, J. Kramer, and C. Koch. Parallel analog VLSI architectures for computation of heading direction and time-to-contact. In D.S. Touretzky, M.C. Mozer, and M.E. Hasselmo, editors, *Advances in Neural Information Processing Systems (NIPS)*, volume 8, pages 720–726, Cambridge, MA, USA, September 1996. MIT Press.

[84] J. Kramer, G. Indiveri, and C. Koch. Analog VLSI motion projects at Caltech. In T.M. Bernard, editor, *Advanced Focal Plane Arrays and Electronic Cameras*, volume 2950, pages 50–63, Bellingham, WA, October 1996. SPIE.

[85] G. Indiveri, J. Kramer, and C. Koch. Analog VLSI architecture for computing heading direction. In *Intelligent Vehicles '95 Symposium*, pages 24–29, Piscataway, NJ, September 1995. IEEE Industrial Electronics Society, IEEE.

[86] G. Indiveri and G.M. Bisio. Analog sbtheshold VLSI implementation of a neuromorphic model of the visual cortex for pre-attentive vision. In *Proceedings of the Fourth International Conference*

on Microelectronics for Neural, Fuzzy and Bio-inspired Systems; Microneuro'94, pages 439–448, Los Alamitos, CA, 1994. IEEE Computer Society Press. (Best Student Paper).

[87] L. Raffo, S.P. Sabatini, G. Indiveri, D.D. Caviglia, and G.M. Bisio. Cortical perceptual processing mapped into an active resistor network. In *Proc. WCNN94-San Francisco-CA*, 1994.

[88] G.M. Bisio, D.D. Caviglia, G. Indiveri, L. Raffo, and S.P. Sabatini. A neural network architectural model of visual cortical cells for texture segregation. In *Proc Int Conf on Neural Networks*, SanFrancisco CA, March 1993.

[89] G. Indiveri, L. Raffo, S.P. Sabatini, and G.M. Bisio. A neuromorphic architecture for visual processing. In *Proc. Giornata di Studio: Elaborazione di Immagini mediante Reti Neurali*, pages 105–110, Fondazione Ugo Bordoni - Roma, 1993.

[90] L. Raffo, S.P. Sabatini, G. Indiveri, D.D. Caviglia, and G.M. Bisio. An active resistor mesh embedding cortical visual processing. In *Proc. ICANN93*, page 250, Amsterdam NL, September 1993.

[91] S.P. Sabatini, L. Raffo, G. Indiveri, D.D. Caviglia, and G.M. Bisio. Computational anatomy in low-level visual processing. In *4th Italian Workshop on Neural Networks. WIRN 1993*, Vietri (SA), Italy, May 1993.

[92] G.M. Bisio, D.D. Caviglia, G. Indiveri, L. Raffo, and S.P. Sabatini. A linear model of the recurrent inhibition in visual cortex leading to Gabor-like receptive fields. In *Proceedings of NeuroNimes92 Conference*, pages 517–528, Nimes FRANCE, November 1992.

[93] G.M. Bisio, D.D. Caviglia, G. Indiveri, L. Raffo, and S.P. Sabatini. Un modello neurale per l'analisi di tessitura. In *Congresso AICA*, Torino ITALY, October 1992.

[94] G.M. Bisio, D.D. Caviglia, G. Indiveri, L. Raffo, and S.P. Sabatini. A neural model of cortical cells characterized by Gabor-like receptive fields-Application to texture segmentation. In I.Aleksander and J. Taylor, editors, *Artificial Neural Networks 2*, volume 2, pages 917–920. Elsevier Science, 1992.

[95] L. Raffo, G.M. Bisio, D.D. Caviglia, G. Indiveri, and S.P. Sabatini. A neural architectural model of simple and complex cortical cells. In *EMBS Congress*, Paris FRANCE, October 1992.

[96] L. Raffo, G.M. Bisio, D.D. Caviglia, G. Indiveri, and S.P. Sabatini. A multi-layers analog VLSI architecture for texture analysis isomorphic to cortical cells in mammalian visual system. In *Proc. Int. Workshop on VLSI for AI and NN*, Oxford UK, September 1992.