

Gert Cauwenberghs

Neurobiology Section
Division of Biological Sciences
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Born July 30, 1965; Belgium. US Citizen.
Married to Langche Zeng; two children (Kalyani and Ginkgo).

Research Interests

Neuromorphic systems engineering, learning and synaptic plasticity, adaptive microsystems, mixed-signal VLSI, micropower instrumentation, implantable electronics, neural interfaces, biosensors, adaptive optics, acoustic microarrays, vision and hearing aids, human-computer interfaces, biometrics.

Education

Ph.D., Electrical Engineering, California Institute of Technology, 1994.
Dissertation: Analog VLSI Autonomous Systems for Learning and Optimization.
Advisor: Amnon Yariv
M.S., Electrical Engineering, California Institute of Technology, 1989.
Engineer's Degree, Applied Physics, University of Brussels, 1988.
Thesis: Electro-Optic Effects in Stratified Media.

Academic Positions

Affiliate Professor, Department of Bioengineering, Jacobs School of Engineering, University of California San Diego, La Jolla CA 92093, 2008-present.
Professor, Neurobiology Section, Division of Biological Sciences, University of California San Diego, La Jolla CA 92093, 2005-present.
Professor, Department of Electrical and Computer Engineering, Johns Hopkins University, Baltimore MD 21218, 2002-2005.
Visiting Professor, Center for Biological and Computational Learning, Department of Brain and Cognitive Science, Massachusetts Institute of Technology, Cambridge MA 02142, 1998-1999.
Associate Professor, Department of Electrical and Computer Engineering, Johns Hopkins University, Baltimore MD 21218, 1998-2002.
Assistant Professor, Department of Electrical and Computer Engineering, Johns Hopkins University, Baltimore MD 21218, 1994-1998.

Awards

Presidential Early Career Award for Scientists and Engineers (PECASE), 2000.
Young Investigator Award, Office of Naval Research, 1999.
Career Award, National Science Foundation, 1997.
Francqui Fellow, Belgian American Educational Foundation, 1988.

Research Grants and Contracts

- “SGER: Wireless EEG Brain Interface for Extended Interactive Learning,” NSF SBE-0847752, G. Cauwenberghs (PI) and T. Sejnowski, 10/2008-9/2010.
- “CRCNS: Imaging and Modeling of Cortical Microvascular Dynamics,” NIH/NIA 1R01AG029681, G. Cauwenberghs (PI), D. Kleinfeld, T. Sejnowski and N. Thakor, 9/2006-8/2010.
- “High-Density, Wearable Dry-Electrode EEG Recording System Incorporating Online Artifact Rejection and Data Reduction,” T.P. Jung (PI), S. Makeig, G. Cauwenberghs and I. Galton, DARPA, 6/2006-6/2007.
- “High-Density Integrated Adaptive Wavefront Control,” G. Cauwenberghs (PI) and P. Yu, US Army Research Office, 6/2006-6/2007.
- “Laser Speckle Field Target-in-the-Loop Identification and Tracking,” G. Cauwenberghs, SPAWAR and DARPA, 9/2005-11/2006
- “Acoustic Target Identification and Localization,” G. Cauwenberghs (PI), A.G. Andreou, C.P. Diehl and J.E. West, Defense Intelligence Agency, and National Science Foundation, IIS-0434161, \$395,904, 8/2004-7/2006.
- “SST: Minimally-Attended Integrated Visual Surveillance Network,” R. Etienne-Cummings (PI) and G. Cauwenberghs, National Science Foundation, ECS-0428042, \$400,000, 10/2004-9/2007.
- “Integrated Multi-Signal Adaptive Microphone,” G. Cauwenberghs (PI), L. Degertekin and G. Zweig, The Catalyst Foundation, \$165,986, 9/2003-8/2007.
- “Trainable Visual Aids for Object Detection and Identification,” G. Cauwenberghs (PI), T. Poggio, G. Dagnelie, and A. Verri, National Science Foundation, IIS-0209289, \$867,525, 10/2002-8/2005.
- “Microscale Adaptive Optical Wavefront Correction,” G. Cauwenberghs (PI), A. Andreou, R. Etienne-Cummings, M. Vorontsov and R. Reedy, National Science Foundation, ECS-0010026, \$299,999, 7/2001-6/2004.
- “Development of SVM-Based VLSI Processor for Real-Time Face Detection and Recognition,” G. Cauwenberghs, WatchVision, Korea, \$21,297, 9/2001-8/2002.
- “Reconfigurable VLSI Systems for Real-Time Biosonar Signal Processing,” G. Cauwenberghs (PI) and R.T. Edwards, Office of Naval Research, \$170,929, 1/2001-12/2002.
- “MEMS Acoustic Sensors and Adaptive VLSI Signal Processing,” G. Cauwenberghs, A.G. Andreou and R. Etienne-Cummings, subcontract from University of Maryland (S. Shamma, PI), ONR/DARPA, JHU budget \$588,724, 6/2000-5/2003.
- “Neuromorphic Autoadaptive Systems and Independent Component Analysis,” G. Cauwenberghs, Office of Naval Research Young Investigator Award, and Presidential Early Career Award for Scientists and Engineers, \$542,000, 3/1999-3/2004.
- “Low-Power Biosonar Signal Processor for Buried Target Detection,” G. Cauwenberghs (PI), R.T. Edwards and F. Pineda, Office of Naval Research, \$140,000, 4/1999-9/2000.
- “Micropower Analog VLSI Continuous Speech Recognition,” G. Cauwenberghs (PI), H. Bourlard and Jayadeva, The Catalyst Foundation, \$155,899, 6/1999-5/2004.
- “VLSI Image Sensor for Nonlinear Optical Information Processing,” G. Cauwenberghs (PI) and A. Andreou, Army Research Office, \$41,617, 5/1998-5/1999.
- “CAREER: Engineering Research and Education in Analog VLSI Parallel Computational Systems,” G. Cauwenberghs, National Science Foundation, \$210,000, 6/1997-5/2001.
- “Algorithms and Architectures for VLSI Neuromorphic Systems,” A. Andreou and G. Cauwenberghs, ONR/DARPA MURI with Boston University (Stephen Grossberg, PI), JHU budget \$1,028,444, 3/1995-2/2000.
- “VLSI for A/D Conversion,” G. Cauwenberghs, Maryland Industrial Partnership Program (MIPS) and Northrop Grumman, \$128,359, 2/1997-2/1999.

- “Smart Silicon Controller for Optical Phase Distortion Suppression,” G. Cauwenberghs, Army Research Office, \$30,857, 2/1997-1/1998.
- “CRI: Neuromorphic VLSI Modelling of Attention-Based Visual Search,” E. Niebur, M. Steinmetz and G. Cauwenberghs (co-PI), National Science Foundation, \$98,800, 2/1997-1/1998.
- “Low-Power Integrated Acoustic Classifiers/Recognizers,” G. Cauwenberghs (PI) and F. Pineda, APL/WSE Collaborative R&D Initiative, WSE budget \$20,000 (GC), 9/1995-8/1996.
- “Smart Focal Plane Arrays,” A. Andreou and G. Cauwenberghs (co-PI), DCS Corporation, \$154,000, 9/1994-11/1997.
- “Neuromimetic Microelectronic Systems for Sensory Information Processing,” A. Andreou, F. Pineda, and K. Strohhahn, G. Cauwenberghs (co-PI), Army Research Laboratory, \$80,000, 9/1995-4/1996.

Graduate and Postgraduate Research Advisees

- Tim Horiuchi, postdoctoral fellow, Mind-Brain Institute (1997-1999, with Ernst Niebur).
Currently at: ECE Dept., University of Maryland, College Park (Associate Professor).
- Pedro Julian, visiting scholar (2003-2004, with Andreas G. Andreou).
On leave from: Universidad Nacional del Sur, Bahia Blanca, Argentina (Professor).
- Tom Sullivan, postdoctoral fellow (2006-2007).
Currently at: Neurosky Inc., San Jose CA.
- Dimitrios Loizos, postdoctoral fellow (2007-2008).
Currently at: Netlogic Inc., San Jose CA.
- Robert Timothy Edwards, Ph.D. Degree, June 1999.
Thesis: Time-Frequency Acoustic Processing and Recognition: Analysis and Analog VLSI Implementations
Currently at: MultiGiG, Inc., San Jose CA.
- Kai He, Ph.D. Degree, June 2000.
Thesis: Analog VLSI Decoding for Digital Communications and High-Performance Data Conversion
Currently at: Octillion Communications, San Jose CA.
- Marc Cohen, Ph.D. Degree, June 2001.
Thesis: Analog VLSI Adaptive Systems for Active Optics and Imaging
Currently at: University of Maryland, College Park (Assistant Research Professor).
- Roman Genov, Ph.D. Degree, August 2002.
Thesis: Massively Parallel Mixed-Signal VLSI Kernel Machines
Currently at: ECE Dept., University of Toronto, Canada (Associate Professor).
- Shantanu Chakrabarty, Ph.D. Degree, August 2004.
Thesis: Design and Implementation of Ultra-Low Power Pattern and Sequence Decoders
Currently at: ECE Dept., Michigan State University, East Lansing MI (Assistant Professor).
- Milutin Stanacevic, Ph.D. Degree, August 2005.
Thesis: Mixed-Signal Micropower VLSI Systems for Biomedical Array Signal Processing
Currently at: ECE Dept., State University of New York, Stony Brook NY (Assistant Professor).
- Yunbin Deng, Ph.D. Degree, May 2006.
Thesis: Analog VLSI Systems for Robust Time-Frequency Processing
Currently at: BAE Systems, Boston MA.
- Dimitrios Loizos, Ph.D. Degree, July 2007.
Thesis: Multi-Dithering Sub-Microsecond Controller: Analysis and SiGe BiCMOS Implementation
Currently at: Netlogic Inc., San Jose CA.
- Barry Jacobson, Ph.D. Degree, Harvard-MIT Division of Health Sciences and Technology, August 2008.

Thesis: Instantaneous Frequency Analysis for Audio Source Separation Based on Comodulation
Currently at: Yale School of Medicine (Postdoctoral Fellow).

Kartik Murari, candidate for Ph.D. Degree (Biomedical Engineering, with Nitish Thakor).

Mohsen Mollazadeh, candidate for Ph.D. Degree (Biomedical Engineering, with Nitish Thakor).

Jonathan Driscoll, candidate for Ph.D. Degree (Physics, with David Kleinfeld).

Theodore Yu, candidate for Ph.D. Degree (Electrical and Computer Engineering).

Mike Chi, candidate for Ph.D. Degree (Electrical and Computer Engineering).

Andrew Arluk, M.S.E. Degree, Spring 1995.

James Waskiewicz, M.S.E. Degree, Fall 1997.

Srinadh Madhavapeddi, M.S.E. Degree, Fall 1998.

Rajagopalan Rangarajan, M.S.E. Degree (Biomedical Engineering), Fall 1999.

Jeremy Lubkin, M.S.E. Degree, Spring 1999.

Grant Mulliken, M.S.E. Degree (Biomedical Engineering), Summer 2002.

Adam Sutker, M.S.E. Degree, Fall 2003.

Christian Sauer, M.S.E. Degree (Biomedical Engineering), Spring 2005.

Adeel Abbas, M.S.E. Degree, Spring 2005.

Abdullah Celik, M.S.E. Degree, Spring 2005.

External thesis committees: Constantine Papageorgiou, Ph.D., Massachusetts Institute of Technology, 1999 (advisor: Tomaso Poggio); Matthew Partridge, Ph.D., University of Sydney, Australia, 2000 (advisor: Marwan Jabri); Bahram Zand, Ph.D., University of Toronto, Canada, 2001 (advisor: David Johns); Ricardo A. Carmona Galán, Ph.D., University of Sevilla, Spain, 2002 (advisor: Angel Rodriguez-Vazquez); Wenjie Hu, Ph.D., Nanyang Technological University, Singapore, 2002 (advisor: Qing Song); Peter Stepien, Ph.D., University of Sydney, Australia, 2004 (advisor: Richard Coggins); Jerry Huang, MSE, University of Sydney, Australia, 1999 (advisor: Marwan Jabri); Kwong Kin Tommy Tsang, MSE, McGill University, Montreal Canada, 2002 (advisor: Mourad El-Gamal).

Teaching

“Neural Prostheses,” BISP 194 (2008, 2009).

“Neurodynamics,” BGGN 260 (2006-present).

“Integrated Electronics,” 520.325/326 (Johns Hopkins University 1995, 1997, 1999-2002).

“Electronics Design Laboratory,” 520.348 (JHU 1996, 1998).

“Analog and Digital VLSI Systems and Architecture,” 520.490 (JHU 1994-97, 1999-2003).

“Mixed-Signal VLSI Systems,” 520.492 (JHU 2005).

“VLSI Design and Prototyping Workshop,” 520.496-497 (JHU 2004-05).

“Senior Design Project,” 520.498-499 (JHU 2000-05).

“Medical Microsystems,” 520/580.725 (JHU 2004).

“Advanced Integrated Circuits,” 520.771-772 (JHU 1996, 1997).

“Seminar on Large-Scale Analog Computation,” 520.761 (JHU 1997, 1998).

“Kernel Machine Learning,” 520/600.774 (JHU 2001, 2003).

“Learning on Silicon,” 520.776 (JHU 2002, 2004).

“Computational Laboratory in Cognitive and Brain Science,” 9.39/390 (Massachusetts Institute of Technology, 1999).

Invited Presentations

“Highly Efficient Adaptive Neuromorphic Vision Systems,” *DARPA NeoVision 2 Workshop*, La Jolla CA, April 8, 2009.

- “Neuromorphic Cognitive Engineering: Large-Scale Silicon Neural Systems,” *4th Decade of the Mind Conf.*, Albuquerque NM, Jan. 15, 2009.
- “Biopotential Sensing and Analog Signal Processing for Health Monitoring and Brain Interfaces,” *NSVL Distinguished Faculty Seminar*, National Semiconductor Corporation, Santa Clara CA, Aug. 28, 2008.
- “Scalable Neuromorphic Spike-Based Learning Systems,” *Woods Hole Workshop on Computational Neuroscience, and Workshop on Neuromorphic Cognitive Engineering*, Telluride CO, July 7, 2008.
- “Scalable Neuromorphic Cortical Systems,” *Joint Symposium on Neural Computation*, Irvine CA, May 2008.
- “Design and Calibration of EEG Electrode Arrays for Wearable BCI,” *VLSI Test Symposium (VTS), Hot Topic: Biomedical Devices - New Test Challenges*, San Diego CA, April 30, 2008.
- “Reconfigurable and Adaptive Mixed-Signal Microsystems,” *DARPA/DSRC eStemCells workshop*, Stanford University, Stanford CA, March 28, 2008.
- “Scalable Adaptive Neuromorphic Systems,” *DARPA Electronic Cortex Workshop*, Arlington VA, August 1, 2007.
- “Adaptive Electronics— A Neuromorphic Perspective,” *DSRC/DARPA 2007 Adaptive Electronics 2020*, Santa Cruz CA, July 18, 2007.
- “Kernel Learning Machines,” *Artificial Intelligence Seminar*, UC San Diego, Apr. 9, 2007.
- “Analog VLSI Auditory Separation and Localization,” *Computation and Neural Systems Seminar*, California Institute of Technology, March 19, 2007.
- “Micropower Adaptive Vector Processing in Analog VLSI,” *DARPA Chip-Scale Avionics Workshop*, Orlando FL, Feb. 20, 2007.
- “Silicon and Neural Adaptive VLSI Microsystems,” *Defense Science and Research Council Workshop*, Arlington VA, Nov. 28, 2006.
- “Auditory Separation and Localization in aVLSI,” *Institute of Neuroscience Seminar, University of Oregon*, Eugene OR, Sept. 28, 2006.
- “aVLSI Auditory Separation and Localization,” *Joint Symposium on Neural Computation*, La Jolla CA, May 20, 2006.
- “Measuring Human Responses,” *Neuroscience and Health Care Architecture Workshop*, Woodshole MA, Aug. 16, 2005.
- “Microscale Integrated Acoustic Source Separation and Localization,” *CISL Seminar Series*, Columbia University, New York, Oct. 15, 2004.
- “Micropower Adaptive VLSI Systems for Acoustic Source Separation,” *Fourth McMaster-Gennum Workshop on Intelligent Hearing Instruments*, Kimberley, ON, Sept. 15, 2003.
- “Kernel Machines for Pattern Classification and Sequence Decoding,” *Center for Language and Speech Processing Seminar Series*, Johns Hopkins University, Febr. 11, 2003.
- “Gradient Flow Adaptive Beamforming and Signal Separation,” *Third McMaster-Gennum Workshop on Intelligent Hearing Instruments*, Kimberley, ON, Oct. 1, 2002.
- “Low-Power Mixed-Signal VLSI Array for Template-Based Pattern Recognition,” *Spring Meeting of the Baltimore Chapter of the IEEE Electron Devices and Solid-State Circuits Societies*, Linthicum MD, May 20, 2002.
- “Low-Power Analog VLSI Array Processors for Pattern Recognition,” *IEEE SSCS Workshop on Low-Power Circuits*, Arlington VA, Oct. 11, 2001.
- “Gradient Flow Sub-Wavelength Beamforming and Independent Component Analysis,” *Second McMaster-Gennum Workshop on Intelligent Hearing Instruments*, Niagara-on-the-Lake, ON, Oct. 1, 2001.
- “Kernel Learning Machines,” RTDC seminar, Applied Physics Laboratory, Laurel MD, Sept. 18, 2001.
- “Vapnik, Bayes, and Silicon,” lecture at *2001 NSF Workshop on Neuromorphic Engineering*, Telluride CO, July 14, 2001.

- “Analog VLSI Adaptive Systems for Vision and Imaging,” seminar, Hungarian Academy of Science, Budapest, Hungary, June 7, 2001.
- “Kernel ‘Machine’ Learning,” lecture at *2000 NSF Workshop on Neuromorphic Engineering*, Telluride CO, July 8, 2000.
- “Monaural Separation of Acoustical Independent Components,” and “Single-Mixture Blind Source Separation,” NIPS*99 workshop, Breckenridge CO, Dec. 2-4, 1999.
- “Adaptive Neuromorphic VLSI and Auditory Signal Processing,” DARPA Resonant Biomimicry Sensor Workshop, Houston TX, Jan. 14, 1999.
- “Analog VLSI Neuromorphic Engineering: Silicon Models of Vision and Cognition,” CAS/CNS Colloquium Series, Boston University, Sept. 11, 1998.
- “Analog VLSI Neuromorphic Systems,” British Telecom International Workshop on Robot Cognition, Lavenham, UK, April 24, 1998.
- “Large-Scale Neuromorphic Learning Systems,” Seminar, Center for Biological and Computational Learning, Department of Brain and Cognitive Science, Massachusetts Institute of Technology, Febr. 4, 1998.
- “VLSI Cellular Array of Coupled Delta-Sigma Modulators for Random Analog Vector Generation,” *31st Asilomar Conf. on Signals, Systems and Computers*, Asilomar CA, Nov. 2-5, 1997.
- “Parallel and Adaptive VLSI Architectures for Delta-Sigma Modulation,” seminar, Electrical and Computer Engineering Dept., Michigan State Univ., East Lansing MI, Oct. 24, 1997.
- “Reinforcement Learning in Analog VLSI,” lecture at *1997 NSF Workshop on Neuromorphic Engineering*, Telluride CO, July 2, 1997.
- “Adaptation, Learning and Storage in Analog VLSI,” *Ninth Annual IEEE International ASIC Conference*, Rochester NY, Sept. 25, 1996.
- “Analog VLSI Adaptive Computational Systems,” G. Cauwenberghs, WSE Junior Faculty Seminar, Computer Science Department, Johns Hopkins University, Febr. 1, 1996.
- “On-Line Learning of Recurrent Continuous-Time Dynamics in Analog VLSI,” seminar at the Naval Research Laboratory, Washington DC, May 11, 1995.
- “On-Line Learning of Recurrent Continuous-Time Dynamics in Analog VLSI,” Seminar Series, Center of Language and Speech Processing, Johns Hopkins University, Oct. 27, 1994.
- “Learning Networks,” lecture at *1994 NSF Workshop on Neuromorphic Engineering*, Telluride CO, July 9, 1994.
- “A Learning Analog Neural Network Chip with Continuous-Time Recurrent Dynamics,” Applied Physics Laboratory, Laurel MD, Febr. 18, 1994.
- “Learning and Storage in Analog VLSI,” NIPS*93 workshop, Vail CO, Dec. 3-6, 1993.

Professional Activity, Service and Honors

Society memberships: Institute of Electrical and Electronic Engineers (IEEE, Senior Member); Society for Neuroscience (SfN); International Neural Network Society (INNS); American Association for the Advancement of Science (AAAS).

Technical committees, IEEE Circuits and Systems Society:

Analog Signal Processing (Chair, 2000-2001, and Vice chair, 1999-2000); Biomedical Circuits and Systems; Cellular Neural Networks and Array Computing; Neural Systems and Applications; Sensory Systems.

Editorial boards:

Senior editor, IEEE Sensors Journal, 2004-present.

Associate editor, IEEE Trans. Biomedical Circuits and Systems, 2007-present.

Associate editor, IEEE Trans. Neural Systems and Rehabilitation Engineering, 2006-present.
Associate editor, IEEE Trans. Circuits and Systems I: Regular Papers, 2004-2007.
Associate editor, IEEE Sensors Journal, 2000-2004.
Associate editor, IEEE Trans. Circuits and Systems II: Analog and Digital Signal Processing, 1999-2003.
Guest editor, with R. Etienne-Cummings, R. Newcomb and M. Zaghoul, Special issue on “Integrated Multisensor Systems and Signal Processing,” IEEE Sensors Journal, Dec. 2002.
Guest editor, with K. Jenkins and F. Salam, Special section on the MWSCAS’2000 Student Paper Award Contest, IEEE Trans. Circuits and Systems II: Analog and Digital Signal Processing, Oct. 2001.
Guest editor, with M. Bayoumi and E. Sanchez-Sinencio, Special issue on “Learning on Silicon,” Int. J. Analog Integrated Circuits and Signal Processing, March 1999.

Conference program and organizing committees:

Program chair, ISSNIP Biosignals and Biorobotics Conference 2010, Vitoria, Brazil, Jan. 4-6, 2010.
Program co-chair, 20th Symp. Integrated Circuits and Systems Design (SBCCI2007), Rio de Janeiro, Brazil, Sept. 3-6, 2007.
Invited sessions track co-chair, IEEE Int. Symp. Circuits and Systems (ISCAS’2003), Bangkok, Thailand, May 25-28, 2003.
Track chair, Analog Circuits and Signal Processing, IEEE Int. Symp. Circuits and Systems (ISCAS’2002), Phoenix, AZ, May 26-29, 2002.
Track chair, Implementations (2001) and Emerging Technologies (2002), IEEE Conf. Neural Information Processing Systems (NIPS), Vancouver BC, Canada.
Publication chair, IEEE Midwest Symp. Circuits and Systems, Lansing MI, Aug. 8-11, 2000.
Other program committees: ISCAS’1996-present, MicroNeuro’99, MWSCAS’2000, SVM’2002, BioCAS’2004-present, BIOSTEC-2008 (BIOSIGNALS, and BIODEVICES), INSSPEC 2007, BSN’2009, SPIE Biosensing II (OP106) 2008-2009.

Conference special and invited sessions:

Co-chair, with R. Newcomb and M. Zaghoul, special session on “MEMS multisensor systems and signal processing,” IEEE Int. Symp. Circuits and Systems (ISCAS’2001), Sydney, Australia, 2001.
Co-chair, with F. Salam, special session on “Neuromorphic signal decomposition and blind source separation,” IEEE Int. Symp. Circuits and Systems (ISCAS’99), Orlando FL, 1999.
Chair, invited special session on “VLSI neuromorphic learning systems,” 7th Int. Conf. Microelectronics for Neural, Fuzzy and Bio-inspired Systems (MicroNeuro’99) Granada Spain, 1999.
Co-chair, with F. Salam and P. Hasler, special session on “Memory, adaptation, and learning,” IEEE Int. Symp. Circuits and Systems (ISCAS’98), Monterey CA, 1998.
Co-chair, with M. Bayoumi and E. Sanchez-Sinencio, special session on “Learning on Silicon,” IEEE Int. Symp. Circuits and Systems (ISCAS’97), Hong Kong, 1997.

Short courses and tutorials:

Distinguished Lecturer, IEEE Circuits and Systems Society, 2003-2004.
Co-chair, with P. Bartlett and A. Smola, tutorial short course on “Support vector machines and statistical learning theory,” IEEE Int. Symp. Circuits and Systems (ISCAS’2001), Sydney, Australia, May 6, 2001.
Co-chair, with F. Salam and R.W. Liu, tutorial short course on “Neural algorithms for blind signal separation and recovery,” IEEE Int. Symp. Circuits and Systems (ISCAS’99), Orlando FL, May 30, 1999.
Co-chair, with R. Etienne-Cummings and M. Jabri, workshop on “Learning chips and neurobots,” IEEE Neural Information Processing Systems Conf. (NIPS’98), Breckenridge CO, 1998.

Co-chair, with M. Jabri, workgroup on “aVLSI Learning Systems,” NSF Workshop on Neuromorphic Engineering, Telluride CO, June 23-July 13, 1997.

Review service:

Journal articles: IEEE Electronic Device Lett., IEEE Journal of Solid-State Circuits, IEEE Sensors Journal, IEEE Trans. Circuits and Systems I and II, IEEE Trans. Circuits and Systems for Video Technology, IEEE Trans. Neural Networks, IEEE Trans. Signal Processing, IEEE Trans. VLSI Systems, Int. J. Analog Integrated Circuits and Signal Processing, Int. J. Electronics, Int. J. Circuit Theory and Applications, J. Circuits Systems and Computers, Measurement Science and Technology, Neural Computation, Pattern Recognition Letters.

Conference articles: Int. Conf. Pattern Recognition (ICPR), IEEE Conference on Neural Information Processing Systems (NIPS), IEEE International (Joint) Conference on Neural Networks (ICNN & IJCNN), IEEE International Symposium on Circuits and Systems (ISCAS), IEEE Midwest Symposium on Circuits and Systems (MWSCAS), IEEE MicroNeuro.

Book proposals: Kluwer Academic/Springer Verlag, MIT Press, Wiley.

Research funding proposal panels: Australian Research Council, Hong Kong University Grants Committee, National Aeronautics and Space Administration (NASA), National Science Foundation (NSF), National Institutes of Health (NIH), Swiss National Science Foundation, UK Engineering and Physical Sciences Research Council (EPSRC).

University service:

Co-director (with Terrence Sejnowski), Institute for Neural Computation, University of California San Diego, La Jolla CA 92093, 2008-present.

UCSD Neurosciences Graduate Program, Computational Neuroscience Track: Executive committee, 2006-present; Chair, admissions committee, 2006-2007.

UCSD Division of Biological Sciences: Faculty Advisory Committee, Saltman Quarterly, 2009-present; Computer committee, 2006-present.

UCSD Institute for Neural Computation: Executive committee, Space committee, Personnel committee, 2006-present.

UCSD California Institute of Telecommunications and Information Technology (CalIT2): Neuroscience for architecture and navigation committee, 2006-present.

University of California Industry-University Partnerships: UC Discovery Grants Selection Committee, 2006.

JHU Whiting School of Engineering, JHU: Information technology committee, 2001-present.

JHU Computer Engineering Program, JHU: Program committee, 1996-present; Search committee, 1998-present.

JHU Department of Electrical and Computer Engineering, JHU: ABET committee, 1997-98; Curriculum committee, 1997-98, 2002-present; Joint appointments committee, 2001-present; Graduate admissions committee, 1994-97, 2000.

Other:

Invited participant, National Academy of Engineering Frontiers in Engineering Symposium, Irvine CA, Sept. 14-16, 2000.

Technical Advisory Board, GTronix Inc., Fremont CA, 2006-present.

Publications

Journal Publications

- “Which Photodiode to Use: a Comparison of CMOS-Compatible Structures,” K. Murari, R. Etienne-Cummings, N. Thakor, and G. Cauwenberghs, *IEEE Sensors Journal*, to appear.
- “A SiGe BiCMOS 8-Channel Multi-Dithering, Sub-Microsecond Adaptive Controller,” D.N. Loizos, P.P. Sotiriadis and G. Cauwenberghs, *IEEE Trans. Circuits and Systems I: Regular Papers*, to appear.
- “Micropower CMOS Integrated Low-Noise Amplification, Filtering, and Digitization of Multimodal Neuropotentials,” M. Mollazadeh, K. Murari, G. Cauwenberghs, and N. Thakor, *IEEE Transactions on Biomedical Circuits and Systems*, to appear.
- “Focal-Plane Change Triggered Video Compression for Low-Power Vision Sensor Systems,” Y.M. Chi, R. Etienne-Cummings and G. Cauwenberghs, *PLoS ONE*, to appear.
- “A Translinear SiGe BiCMOS Current-Controlled Oscillator with 80 Hz-800MHz Tuning Range,” D.N. Loizos, P.P. Sotiriadis, and G. Cauwenberghs, *Analog Integrated Circuits and Signal Processing*, vol. **57** (1-2), pp. 107-115, 2008.
- “480-GMACS/mW Resonant Adiabatic Mixed-Signal Processor Array for Charge-Based Pattern Recognition,” R. Karakiewicz, R. Genov, and G. Cauwenberghs, *IEEE J. Solid-State Circuits*, vol. **42** (11), pp. 2573-2584, 2007.
- “CMOS Camera with In-Pixel Temporal Change Detection and ADC,” Y. Chi, U. Mallik, M. Clapp, E. Choi, G. Cauwenberghs and R. Etienne-Cummings, *IEEE J. Solid-State Circuits*, vol. **42** (10), pp. 2187-2196, 2007.
- “Robust Speech Feature Extraction by Growth Transformation in Reproducing Kernel Hilbert Space,” S. Chakrabartty, Y. Deng and G. Cauwenberghs, *IEEE Trans. Audio, Speech, and Language Processing*, vol. **15** (6), pp. 1842-1849, 2007.
- “A Multi-Chip Neuromorphic System for Spike-Based Visual Information Processing,” R.J. Vogelstein, U. Mallik, E. Culurciello, G. Cauwenberghs and R. Etienne-Cummings, *Neural Computation*, vol. **19** (9), pp. 2281-2300, 2007.
- “Gini-Support Vector Machine: Quadratic Entropy Based Multi-class Probability Regression,” S. Chakrabartty and G. Cauwenberghs, *J. Machine Learning Research*, vol. **8** (4), pp. 813-839, 2007.
- “Sub-Microwatt Analog VLSI Trainable Pattern Classifier,” S. Chakrabartty and G. Cauwenberghs, *IEEE J. Solid-State Circuits*, vol. **42** (5), pp. 1169-1179, 2007.
- “VLSI Potentiostat Array With Oversampling Gain Modulation for Wide-Range Neurotransmitter Sensing,” M. Stanacevic, K. Murari, A. Rege, G. Cauwenberghs and N.V. Thakor, *IEEE Trans. Biomedical Circuits and Systems*, vol. **1** (1), pp. 63-72, 2007.
- “Dynamically Reconfigurable Silicon Array of Spiking Neurons With Conductance-Based Synapses,” R.J. Vogelstein, U. Mallik, J.T. Vogelstein and G. Cauwenberghs, *IEEE Trans. Neural Networks*, vol. **18** (1), pp. 253-265, 2007.
- “16-Channel Integrated Potentiostat for Distributed Neurochemical Sensing,” R. Genov, M. Stanacevic, M. Naware, G. Cauwenberghs and N. Thakor, *IEEE Trans. Circuits and Systems I: Regular Papers*, vol. **53** (11), pp. 2371-2376, 2006.
- “Power Harvesting and Telemetry in CMOS for Implanted Devices,” C. Sauer, M. Stanacevic, G. Cauwenberghs and N. Thakor, *IEEE Trans. Circuits and Systems I: Regular Papers*, vol. **52** (12), pp. 2605-2613, 2005.
- “Micropower Gradient Flow Acoustic Localizer,” M. Stanacevic and G. Cauwenberghs, *IEEE Trans. Circuits and Systems I: Regular Papers*, vol. **52** (10), pp. 2148-2157, 2005.
- “Comparative Study of Sound Localization Algorithms for Energy Aware Sensor Network Nodes,” P. Julián,

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