Gert Cauwenberghs

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Born July 30, 1965; Belgium. US Citizen.
Married to Langche Zeng; two children (Kalyani and Ginkgo).

Research Interests

Biomedical integrated circuits and systems, micropower analog VLSI, neuromorphic engineering, computational and systems neuroscience, neuron-silicon and brain-machine interfaces, learning and intelligent systems.

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

Professor, Department of Bioengineering, Jacobs School of Engineering, University of California San Diego, La Jolla CA 92093, 2009-present.

Professor, Neurobiology Section, Division of Biological Sciences, University of California San Diego, La Jolla CA 92093, 2005-2009. Affiliate Professor, 2009-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 and Honors

Fellow, American Institute for Medical and Biological Engineering (AIMBE), 2015.

Fellow, Institute of Electrical and Electronic Engineers (IEEE), 2011.

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

"Collaborative Research: Visual Cortex on Silicon," National Science Foundation CCF-1317407, G. Cauwenberghs, 10/2013-9/2018.

"Dynamics of Multifunction Brain Networks," Office of Naval Research MURI N00014-13-1-0205, H. Abarbanel (PI), 12/2012-5/2015.

"Event-driven Sensory Analog Processing," Texas Instruments, G. Cauwenberghs, 6/2012-5/2015.

"Micropower Analog VLSI Signal Separation and Classification," SAIC/Leidos (D. Braunreiter, PI), DARPA CLASSIC Program, G. Cauwenberghs, 10/2011-9/2014.

"EFRI-M3C: Distributed Brain Dynamics in Human Motor Control," National Science Foundation EFRI-1137279, G. Cauwenberghs (PI), K. Kreutz-Delgado, S. Makeig, H. Poizner, and T.J. Sejnowski, 9/2011-8/2015.

"Neuromorphic Synapse Arrays," Qualcomm Inc., G. Cauwenberghs, 5/2010-4/2012.

"Neuromorphic Modular and Evolvable Vision Systems," Evolved Machines (P. Rhodes, PI), DARPA Neovision2 Program, G. Cauwenberghs and T. Sejnowski, 3/2010-12/2011.

"Capacitive ECG Sensor Systems and Unobtrusive ECG Sensors," National Semiconductor, G. Cauwenberghs, 11/2009-11/2010.

"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, 8/2004-7/2006.

"SST: Minimally-Attended Integrated Visual Surveillance Network," R. Etienne-Cummings (PI) and G. Cauwenberghs, National Science Foundation, ECS-0428042, 10/2004-9/2007.

"Integrated Multi-Signal Adaptive Microphone," G. Cauwenberghs (PI), L. Degertekin and G. Zweig, The Catalyst Foundation, 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, 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, 7/2001-6/2004.

"Development of SVM-Based VLSI Processor for Real-Time Face Detection and Recogniter," G. Cauwenberghs, WatchVision, Korea, 9/2001-8/2002.

"Reconfigurable VLSI Systems for Real-Time Biosonar Signal Processing," G. Cauwenberghs (PI) and R.T. Edwards, Office of Naval Research, 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, 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, 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, 4/1999-9/2000.

"Micropower Analog VLSI Continuous Speech Recognition," G. Cauwenberghs (PI), H. Bourlard and Jayadeva, The Catalyst Foundation, 6/1999-5/2004.

"VLSI Image Sensor for Nonlinear Optical Information Processing," G. Cauwenberghs (PI) and A. Andreou, Army Research Office, 5/1998-5/1999.

"CAREER: Engineering Research and Education in Analog VLSI Parallel Computational Systems," G. Cauwenberghs, National Science Foundation, 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), 3/1995-2/2000.

"VLSI for A/D Conversion," G. Cauwenberghs, Maryland Industrial Partership Program (MIPS) and Northrop Grumman, 2/1997-2/1999.

"Smart Silicon Controller for Optical Phase Distortion Suppression," G. Cauwenberghs, Army Research Office, 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, 2/1997-1/1998.

"Low-Power Integrated Acoustic Classifiers/Recognizers," G. Cauwenberghs (PI) and F. Pineda, APL/WSE Collaborative R&D Initiative, 9/1995-8/1996.

"Smart Focal Plane Arrays," A. Andreou and G. Cauwenberghs (co-PI), DCS Corporation, 9/1994-11/1997.

"Neuromimetic Microelectronic Systems for Sensory Information Processing," A. Andreou, F. Pineda, and K. Strohbehn, G. Cauwenberghs (co-PI), Army Research Laboratory, 9/1995-4/1996.

Graduate, Postgraduate and Sabbatical Research Advisees

Pedro Julian, sabbatical fellow and visiting scholar (2003-2004, with Andreas G. Andreou).
     Currently at: Universidad Nacional del Sur, Bahia Blanca, Argentina (Professor).
Muhammad T. Akhtar, sabbatical fellow and visiting scholar, Institute for Neural Computation (with Scott Makeig, 2010-2011).
     Currently at: University of Electro-Communications, Tokyo, Japan (Associate Professor).
Akinori Ueno, sabbatical fellow and visiting scholar, Department of Bioengineering (2013-2014).
     Currently at: Tokyo Denki University, Tokyo, Japan (Professor).
Stephen Levitan, sabbatical fellow and visiting scholar, Institute for Neural Computation (2014-).

Tim Horiuchi, postdoctoral fellow, Mind-Brain Institute (1997-1999, with Ernst Niebur).
     Currently at: ECE Dept., University of Maryland, College Park (Associate 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.
Massoud L. Khraiche, postdoctoral fellow, Bioengineering (with Gabriel Silva, Yuhwa Lo and Deli Wang, 2009-2012).
     Currently at: Institute of Engineering in Medicine, UCSD (Assistant Project Scientist).

Frederic Broccard, postdoctoral fellow, Institute for Neural Computation (2010-present).

Christoph Maier, postdoctoral fellow, Institute for Neural Computation (2011-present).

Emre Neftci, postdoctoral fellow, Institute for Neural Computation (2012-present).

Sadique Sheik, postdoctoral fellow, Institute for Neural Computation (2014-present).

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: Johns Hopkins University Applied Physics Laboratory.

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 Chakrabartty, 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 (Associate 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 (Associate 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, June 2008.
>   Thesis: Instantaneous Frequency Analysis for Audio Source Separation Based on Comodulation
>   Currently at: Yale School of Medicine (Postdoctoral Fellow).

Kartik Murari, Ph.D. Degree (JHU Biomedical Engineering, with Nitish Thakor), May 2010.
>   Thesis: Optical Methods and Integrated Systems for Brain Imaging in Awake, Untethered Animals
>   Currently at: ECE Department, University of Calgary, Canada (Assistant Professor).

Mike Chi, Ph.D. Degree (Electrical and Computer Engineering), May 2011.
>   Thesis: Non-contact Biopotential Sensing
>   Currently at: Cognionics Inc., San Diego CA (Chief Technical Officer).

Mohsen Mollazadeh, Ph.D. Degree (JHU Biomedical Engineering, with Nitish Thakor), Sept. 2011.
>   Thesis: Integrated Neural Systems and Algorithms for Analysis of Population Activity during Dexterous Hand Movements
>   Currently at: Advanced Bionics, Valencia CA.

Jonathan Driscoll, Ph.D. Degree (Physics, with David Kleinfeld), Nov. 2011.
>   Thesis: Techniques in Two Photon Microscopy for Neuroscience
>   Currently at: Acutus Medical Inc., San Diego CA.

Theodore Yu, Ph.D. Degree (Electrical and Computer Engineering), June 2012.
>   Thesis: Biophysical Neuron and Synapse Circuits in Reconfigurable and Scalable Analog VLSI

Currently at: Kilby Labs, Texas Instruments, Santa Clara CA.

Paxon Frady, Ph.D. Degree (Neurosciences, with Bill Kristan), May 2014.
>Thesis: Scalable Mapping of Neural Activity and Circuitry Using Voltage-Sensitive Dyes Reveals Canonical Networks in the Leech
>Currently at: UCSD Division of Biological Sciences, La Jolla CA (Postdoctoral Fellow).

Jongkil Park, candidate for Ph.D. Degree (Electrical and Computer Engineering).

Siddharth Joshi, candidate for Ph.D. Degree (Electrical and Computer Engineering).

Chris Thomas, candidate for Ph.D. Degree (Electrical and Computer Engineering, with Larry Larson/Jim Buckwalter).

Sohmyung Ha, candidate for Ph.D. Degree (Bioengineering).

Abraham Akinin, candidate for Ph.D. Degree (Bioengineering).

Cory Stevenson, candidate for Ph.D. Degree (Bioengineering).

Chul Kim, candidate for Ph.D. Degree (Bioengineering).

Bruno Pedroni, candidate for Ph.D. Degree (Bioengineering).

Sheng-Hsiou (Shawn) Hsu, candidate for Ph.D. Degree (Bioengineering, with Tzyy-Ping Jung).

Chun-Shu Wei, candidate for Ph.D. Degree (Bioengineering, with Tzyy-Ping Jung).

Srinjoy Das, candidate for Ph.D. Degree (Electrical and Computer Engineering, with Ken Kreutz-Delgado).

Omer Tal, candidate for Ph.D. Degree (Bioengineering, with Thomas Liu).

Vikram Gupta, candidate for Ph.D. Degree (Electrical and Computer Engineering, with Nuno Vasconcelos).

Espoir Kyubwa, candidate for combined M.D.-Ph.D. Degree (Bioengineering, with Ed Callaway, Salk Institute).

Andrew Arluk, M.S.E. Degree (Electrical and Computer Engineering, Johns Hopkins University), Spring 1995.

James Waskiewicz, M.S.E. Degree (ECE, JHU), Fall 1997.

Srinadh Madhavapeddi, M.S.E. Degree (ECE, JHU), Fall 1998.

Rajagopalan Rangarajan, M.S.E. Degree (Biomedical Engineering, JHU, with Nitish Thakor), Fall 1999.

Jeremy Lubkin, M.S.E. Degree (ECE, JHU), Spring 1999.

Grant Mulliken, M.S.E. Degree (BME, JHU, with Nitish Thakor), Summer 2002.

Adam Sutker, M.S.E. Degree (ECE, JHU), Fall 2003.

Christian Sauer, M.S.E. Degree (BME, JHU, with Nitish Thakor), Spring 2005.

Adeel Abbas, M.S.E. Degree (ECE, JHU), Spring 2005.

Abdullah Celik, M.S.E. Degree (ECE, JHU), Spring 2005.

Andrew Heiberg, M.S. Degree (CSE, UCSD), Spring 2013.

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); Vu Cao, Ph.D. Degree, University of Oslo, Norway, 2012 (advisor: Dag Wisland and Tor Sverre Lande).

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

"Principles of Bioinstrumentation Design," BENG 186B (2010-present).

"Design Development/Implementation in Bioinstrumentation/Neural Engineering/Molecular Systems," BENG 179A-B, 147A-B, 127A-B (2010-present).

"Mathematical Methods in Bioengineering," BENG 221 (2009-present).
"Neural Prostheses," BISP 194 (2008, 2009).
"Neurodynamics," BENG/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

"Reverse Engineering the Cognitive Brain in Silicon," *Int. IEEE EMBS Workshop on Advanced NeuroTechnologies for BRAIN Initiatives (ANTBI)*, Chicago IL, Aug. 26, 2014.

"Wireless and Unobtrusive Brain-Machine Interfaces," *Frontiers of Neurotechnology: Innovations and Translation,* International Neurotechnology Consortium Workshop, Chicago IL, Aug. 26, 2014.

"Efficiency and Specificity in Event Coding for Sensory Analog Signal Processing," *Silicon Valley Labs NVSEL Seminar,* Texas Instruments Kilby Labs, Santa Clara, CA, June 10, 2014.

"Biological and Silicon Adaptive Neural Systems," *ONR MURI Winter School on Neuromorphic Engineering: Dynamics of Multifunction Brain Networks*, San Diego CA, Jan. 7, 2014.

"Brain Dynamics of Human Motor Control: Neuromorphic Modeling and Brain-Machine-Body Interfaces," *Symposium on Neural Informatics and Modeling,* IEEE Neural Engineering Conference (NER'2013), San Diego CA, Nov. 6, 2013.

"Nanoscale Integrated Neuromorphic Systems Engineering," *DARPA/MTO Hardware Aspects of the Cortical Processor Workshop*, San Francisco CA, Sept. 18, 2013.

"Event-driven Sensory Adaptive Analog Processing," *Silicon Valley Labs NVSEL Seminar,* Texas Instruments, Santa Clara, CA, March 26, 2013.

"Wireless Integrated Brain-Machine-Body Interfaces," *San Diego IEEE MTT/AP/ED/SSC/CAS Chapter Lecture*, San Diego CA, Oct. 31, 2012.

"Event-Driven Neural Synchrony and Coincidence Detection," *Computational Neuroscience Minisymposium*, Workshop on Neuromorphic Cognitive Engineering, Telluride CO, July 9, 2012.

"Wireless Integrated Brain-Machine Interfaces," *IEEE EMBS Chapter Lecture*, Cal Lutheran Univ., Thousand Oaks CA, March 21, 2012.

"Analog VLSI Adaptive Neural Systems," *Silicon Valley Labs NVSEL Seminar,* Texas Instruments, Santa Clara, CA, March 5, 2012.

"To spike or not to spike: a neuromorphic perspective," *Computational Neuroscience Minisymposium*, Workshop on Neuromorphic Cognitive Engineering, Telluride CO, July 6, 2011.

"Large-Scale Silicon Models of Cortical Sensorimotor Systems," *NSF ERC in Sensorimotor Neural Engineering Seminar,* San Diego State University, San Diego CA, Febr. 6, 2011.

"Wireless Integrated Brain Interfaces," *NYMU-UCSD Brain and Neuroscience Symposium,* UCSD, La Jolla CA, Dec. 9, 2010.

"Silicon Integrated Brain Interfaces," *Texas Analog Center of Excellence (TxACE) Seminar*, UT Dallas, and Texas Instruments, Houston TX, Dec. 7, 2010.

"Silicon and Biological Adaptive Neural Circuits," *BME Department Seminar Series*, University of Southern California, Los Angeles CA, Oct. 11, 2010.

"Silicon and Biological Adaptive Neural Circuits," *JPL Seminar*, Caltech/NASA Jet Propulsion Laboratory, La Cañada CA, July 28, 2010.

"Humans, Machines, Spikes, and Dopamine in Sequential Games," *Computational Neuroscience Minisymposium*, Workshop on Neuromorphic Cognitive Engineering, Telluride CO, July 5, 2010.

"Wireless Brain Interfaces," *Beyond Brain Machine Interface Workshop*, Neural Interfaces Conference, Long Beach CA, June 20, 2010.

"Silicon and Biological Adaptive Neural Circuits," Plenary talk, *US-Europe Workshop on Reverse Engineering of the Human Brain* (European Science Foundation, National Science Foundation, and Air Force Office of Scientific Research), Dubrovnik, Croatia, May 24, 2010.

"Reverse Engineering the Visual System in Neuromorphic Silicon," *Neurosciences Seminar*, University of California Riverside, Apr. 27, 2010.

"Auditory Neuroengineering for Intelligent Hearing Aids," *TATRC Acoustic Trauma Workshop*, Del Mar CA, Febr. 10, 2010.

"Neuromorphic Adaptive Microsystems for Visual Reconnaissance," *Bio-Inspired Computing Seminar*, Air Force Research Laboratory, Wright-Patterson OH, Feb. 2, 2010.

"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.

"Silicon Learning Machines," *IEEE Computational Intelligence Society Seminar*, Lockheed Martin, San Diego CA, Dec. 12, 2007.

"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,* Tel-

luride 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 and Service

Society memberships: Institute of Electrical and Electronic Engineers (IEEE, Fellow); American Institute for Medical and Biological Engineering (AIMBE, Fellow); Biomedical Engineering Society (BMES); 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:

Editor-in-Chief, IEEE Transactions on Biomedical Circuits and Systems (http://ieee.org/tbiocas), 2011-present.

Senior Editor, IEEE Journal on Emerging and Selected Topics in Circuits and Systems, 2011-present.

Senior Editor, IEEE Sensors Journal, 2008-present.

Editorial Board Member, IEEE Transactions on Biomedical Engineering, 2013-present.

Associate Editor, Neuromorphic Engineering, Frontiers in Neuroscience, 2010-present.

Associate Editor, IEEE Trans. Biomedical Circuits and Systems, 2007-2010.

Associate Editor, IEEE Trans. Neural Systems and Rehabilitation Engineering, 2006-2010.

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. Zaghloul, 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, with M. Ghovanloo and P. Georgiou, IEEE Biomedical Circuits and Systems Conference (BioCAS 2014), Lausanne Switzerland, Oct. 22-24, 2014.

Program co-chair, with J. Weiland, IEEE Engineering in Medicine and Biology Conference (EMBC 2012), San Diego CA, Aug. 29-Sept. 2, 2012.

General chair, with A. Mason, IEEE Biomedical Circuits and Systems Conference (BioCAS 2011), San Diego CA, Nov. 10-12, 2011.

Program chair, ISSNIP Biosignals and Biorobotics Conference 2011, Vitoria, Brazil, Jan. 6-8, 2011.

Program chair, ISSNIP Biosignals and Biorobotics Conference 2010, Vitoria, Brazil, Jan. 4-6, 2010.

Program co-chair, with V. Pedroni, 20th Symp. Integrated Circuits and Systems Design (SBCC'2007), 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 1999, MWSCAS 2000, SVM 2002, Bio-CAS 2004-present, BIOSTEC-2008 (BIOSIGNALS, and BIODEVICES), INSSPEC 2007, BSN 2009-present, SPIE Biosensing II (OP106) 2008-present, ESSCIRC 2010-present, Wireless Health 2010.

Conference special and invited sessions:

Co-chair, with R. Newcomb and M. Zaghloul, 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:

Co-organizer, with H. Abarbanel, K. Lindenberg, and E. Neftci, "Neuromorphic Engineering: Dynamics of Multifunction Brain Networks," ONR MURI Winter School and Workshop, UC San Diego, La Jolla CA, Jan. 7-10, 2014.

Lecturer, Topic Area "Neuromorphic Engineering,", q-bio Summer School, San Diego Center for Systems Biology, La Jolla CA, 2012-present (July 21-August 4, 2013; July 22-August 3, 2012).

Chair, with co-chairs M. Ghovanloo and J. del R. Millan, "IEEE EMB/CAS/SMC Workshop on Brain-Machine-Body Interfaces," San Diego CA, August 27, 2012.

Co-chair, with G. Indiveri, Topic Area "Learning and Computational Intelligence in Neuromorphic Cognitive Systems," NSF Workshop on Neuromorphic Engineering, Telluride CO, July 1-21, 2012.

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:

Journals: IEEE Electronic Device Lett., IEEE Journal of Solid-State Circuits, IEEE Sensors Journal, IEEE Trans. Biomedical Engineering, IEEE Trans. Biomedical Circuits and Systems, 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 program committees: Int. Conf. Pattern Recognition (ICPR), IEEE Biomedical Circuits and Systems (BioCAS), IEEE Body Sensor Networks (BSN), IEEE Engineering in Medicine and Biology (EMBC), 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, Joint Symposium on Neural Computation, Neural Information Processing Systems (NIPS), Wireless Health.

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

Research funding proposal panels: Australian Research Council, Future Emerging Technologies (FET Open, Europe), Hong Kong University Grants Committee, National Aeronautics and Space Administration (NASA), National Science Foundation (NSF), National Institutes of Health (NIH), Swiss National Science Foundation, UC Discovery iLink, 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 Academic Senate, Graduate Student Council, 2013-present.

UCSD Department of Bioengineering: Undergraduate Studies Committee, 2009-present; Biosystems Engineering Program Committee, 2009-present.

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

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

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; UC Discovery iLink Committee, 2011.

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, 2006-2010.

Chair, Scientific Advisory Board, and co-founder, Cognionics Inc., San Diego CA, 2011-present.

Publications

Journal Publications

"A Correlation-based Framework for Evaluating Postural Control Stochastic Dynamics," M. Hernandez, J. Snider, C. Stevenson, G. Cauwenberghs, and H. Poizner, *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, to appear.

"A 1.3 mW 48 MHz 4 Channel MIMO Baseband Receiver With 65 dB Harmonic Rejection and 48.5 dB Spatial Signal Separation," C. Kim, S. Joshi, C.M. Thomas, S. Ha, L.E. Larson and G. Cauwenberghs, *IEEE Journal of Solid-State Circuits*, vol. **51** (4), pp. 832-844, 2016.

"Real-Time Adaptive EEG Source Separation Using Online Recursive Independent Component Analysis," S. H. Hsu, T. R. Mullen, T. P. Jung and G. Cauwenberghs, *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, vol. **24** (3), pp. 309-319, 2016.

"Real-Time Neuroimaging and Cognitive Monitoring Using Wearable Dry EEG," T.R. Mullen, C.A.E. Kothe, Y.M. Chi, A. Ojeda, T. Kerth, S. Makeig, T. Jung, and G. Cauwenberghs, *IEEE Transactions on Biomedical Engineering*, vol. **62** (11), pp. 2553-2577, 2015.

"Memristors Empower Spiking Neurons With Stochasticity," M. Al-Shedivat, R. Naous, G. Cauwenberghs, and K.N. Salama, *IEEE Journal on Emerging and Selected Topics in Circuits and Systems*, vol. **5** (2), pp. 242-253, 2015.

"Event-Driven Contrastive Divergence: Neural Sampling Foundations," E. Neftci, S. Das, B. Pedroni, K. Kreutz-Delgado, and G. Cauwenberghs, *Frontiers in Neuroscience,* doi: 10.3389/fnins.2015.00104, vol. **9**, pp. 104:1-3, 2015.

"Closed-Loop Brain-Machine-Body Interfaces for Noninvasive Rehabilitation of Movement Disorders," F.D. Broccard, T. Mullen, Y.M. Chi, D. Peterson, J.R. Iversen, M. Arnold, K. Kreutz-Delgado, T.P. Jung, S. Makeig, H. Poizner, T. Sejnowski, and G. Cauwenberghs, *Annals of Biomedical Engineering*, vol. **42** (8), pp. 1573-1593, 2014.

"Integrated Circuits and Electrode Interfaces for Noninvasive Physiological Monitoring," S. Ha, C. Kim, Y.M. Chi, A. Akinin, C. Maier, A. Ueno, G. Cauwenberghs, *IEEE Trans. Biomedical Engineering*, vol. **61** (5), pp. 1522-1537, 2014.

"Event-Driven Contrastive Divergence for Spiking Neuromorphic Systems," E. Neftci, S. Das, B. Pedroni, K. Kreutz-Delgado, and G. Cauwenberghs, *Frontiers in Neuroscience,* doi: 10.3389/fnins.2013.00272, vol. **7**, pp. 272:1-14, 2014.

"Two-Photon Imaging of Blood Flow in the Rat Cortex," J.D. Driscoll, A.Y. Shih, P.J. Drew, G. Cauwenberghs, and D. Kleinfeld, *Cold Spring Harbor Protocols,* vol. **2013** (8), doi:10.1101/pdb.prot076513, pp. 759-767, 2013.

"Wireless Noncontact ECG and EEG Biopotential Sensors," Y.M. Chi, P. Ng, and G. Cauwenberghs, *ACM Trans. Embedd. Comput. Syst.*, vol. **12** (4), pp. 103:1-19, 2013.

"1.1 TMACS/mW Fine-Grained Stochastic Resonant Charge-Recycling Array Processor," R. Karakiewicz, R. Genov, and G. Cauwenberghs, *IEEE Sensors Journal*, vol. **12** (4), pp. 785-792, 2012.

"Dry and Noncontact EEG Sensors for Mobile Brain-Computer Interfaces," Y.M. Chi, Y.-T. Wang, Y. Wang, C. Maier, T.-P. Jung, and G. Cauwenberghs, *IEEE Trans. Neural Systems and Rehabilitation Engineering*, vol. **20** (2), pp. 228-235, 2012.

"Ultra-High Input Impedance, Low Noise Integrated Amplifier for Noncontact Biopotential Sensing," Y.M. Chi, C. Maier, and G. Cauwenberghs, *IEEE J. Emerging Topics in Circuits and Systems*, vol. **1** (4), pp. 526-535, 2011.

"A CMOS In-Pixel CTIA High Sensitivity Fluorescence Imager," K. Murari, R. Etienne-Cummings, N. Thakor, and G. Cauwenberghs, *IEEE Transactions on Biomedical Circuits and Systems,* vol. **5** (5), pp. 449-458, 2011.

"Biophysical Neural Spiking, Bursting, and Excitability Dynamics in Reconfigurable Analog VLSI," T. Yu, T.J. Sejnowski, and G. Cauwenberghs, *IEEE Transactions on Biomedical Circuits and Systems*, vol. **5** (5), pp. 420-429, 2011.

"Fast-Settling Multiple-Loop Adaptive Frequency Locking Scheme for Energy-Efficient Resonant FSK Transmitter," C. Maier, T.-V. Cao, D. Wisland, T.S. Lande, and G. Cauwenberghs, *Electronics Letters*, vol. **47** (14), pp. 794-796, 2011.

"Neuromorphic Silicon Neuron Circuits," 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, K. Boahen, *Front. Neuroscience*, vol. **5** (73), 2011.

"Photon Counting, Censor Corrections, and Lifetime Imaging for Improved Detection in Two-Photon Microscopy," J.D. Driscoll, A.Y. Shih, S. Iyengar, J.J. Field, G.A. White, J.A. Squier, G. Cauwenberghs, and D. Kleinfeld, *J. Neurophysiology*, vol. **105** (6), pp. 3106-3113, 2011.

"Dry-Contact and Noncontact Biopotential Electrodes: Methodological Review," Y.M Chi, T.P. Jung, and G. Cauwenberghs, *IEEE Reviews in Biomedical Engineering,* vol. **3**, pp. 106-119, 2010.

"Analog VLSI Biophysical Neurons and Synapses with Programmable Membrane Channel Kinetics," T. Yu and G. Cauwenberghs, *IEEE Transactions on Biomedical Circuits and Systems,* vol. **4** (3), pp. 139-148, 2010.

"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*, vol. **57** (1), pp. 53-63, 2010.

"Wireless Micropower Instrumentation for Multimodal Acquisition of Electrical and Chemical Neural Activity," M. Mollazadeh, K. Murari, G. Cauwenberghs, and N. Thakor, *IEEE Transactions on Biomedical Circuits and Systems,* vol. **3** (6), pp. 388-397, 2009.

"Which Photodiode to Use: a Comparison of CMOS-Compatible Structures," K. Murari, R. Etienne-Cummings, N. Thakor, and G. Cauwenberghs, *IEEE Sensors Journal*, vol. **9** (7), pp. 752-760, 2009.

"Focal-Plane Change Triggered Video Compression for Low-Power Vision Sensor Systems," Y.M. Chi, R. Etienne-Cummings and G. Cauwenberghs, *PLoS ONE*, vol. **4** (7), e6384, 2009.

"Rapid Determination of Particle Velocity from Space-Time Images Using the Radon Transform," P.J. Drew, P. Blinder, G. Cauwenberghs, A.Y. Shih and D. Kleinfeld, *J. Computational Neuroscience,* 10.1007/s10827-009-0159-1, 2009.

"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*, vol. **3** (1), pp. 1-10, 2009.

"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, A.G. Andreou, L. Riddle, S. Shamma, D.H. Goldberg and G. Cauwenberghs, *IEEE Trans. Circuits and Systems I: Regular Papers,* vol. **51** (4), pp. 640-648, 2004.

"Dynamic MOS Sigmoid Array Folding Analog-to-Digital Conversion," R. Genov and G. Cauwenberghs, *IEEE Trans. Circuits and Systems I: Regular Papers,* vol. **51** (1), pp. 182-186, 2004.

"Kerneltron: Support Vector Machine in Silicon," R. Genov and G. Cauwenberghs, *IEEE Trans. Neural Networks,* vol. **14** (5), pp. 1426-1434, 2003.

"Silicon Support Vector Machine with On-Line Learning," R. Genov, S. Chakrabartty and G. Cauwenberghs, *Int. J. Pattern Recognition and Artificial Intelligence*, vol. **17** (3), pp. 385-404, 2003.

"Image Sharpness and Beam Focus VLSI Sensors for Adaptive Optics," M. Cohen, G. Cauwenberghs and M.A. Vorontsov, *IEEE Sensors Journal*, vol. **2** (6), pp. 680-690, Dec. 2002.

"VLSI Implementation of Fuzzy Adaptive Resonance and Learning Vector Quantization," J. Lubkin and G. Cauwenberghs, *Int. J. Analog Integrated Circuits and Signal Processing*, vol. **30** (2), pp. 149-157, 2002.

"Charge-Mode Parallel Architecture for Matrix-Vector Multiplication," R. Genov and G. Cauwenberghs, *IEEE Trans. Circuits and Systems II: Analog and Digital Signal Processing*, vol. **48** (10), pp. 930-936, Oct. 2001.

"Probabilistic Synaptic Weighting in a Reconfigurable Network of VLSI Integrate-and-Fire Neurons," D.H. Goldberg, G. Cauwenberghs and A.G. Andreou, *Neural Networks*, vol. **14** (6-7), pp. 781-793, Aug. 2001.

"Micro-Scale Adaptive Optics: Wavefront Control with μ-Mirror Array and VLSI Stochastic Gradient Descent Controller," T. Weyrauch, M.A. Vorontsov, T.G. Bifano, J.A. Hammer, M. Cohen, and G. Cauwenberghs, *Applied Optics*, vol. **40** (24), pp. 4243-4253, 2001.

"Floating-Gate Adaptation for Focal-Plane On-Line Nonuniformity Correction," M. Cohen and G. Cauwenberghs, *IEEE Trans. Circuits and Systems II: Analog and Digital Signal Processing*, vol. **48** (1), pp. 83-89, Jan. 2001.

"Adaptive Digital Correction of Analog Errors in MASH ADCs — Part I. Off-Line and Blind On-Line Calibration," G. Cauwenberghs and G.C. Temes, *IEEE Trans. Circuits and Systems II: Analog and Digital Signal*

Processing, vol. **47** (7), pp. 621-628, July 2000.

"Adaptive Optics Based on Analog Parallel Stochastic Optimization: Analysis and Experimental Demonstration," M.A. Vorontsov, G.W. Carhart, M. Cohen and G. Cauwenberghs, *J. Optical Society of America A*, vol. **17** (8), pp. 1440-1453, Aug. 2000.

"Synthesis of Log-Domain Filters from First-Order Building Blocks," R.T. Edwards and G. Cauwenberghs, *Analog Integrated Circuits and Signal Processing, Int. J.*, vol. **22**, pp. 177-186, 2000.

"Mixed-Mode Correlator for Micropower Acoustic Transient Classification," R.T. Edwards and G. Cauwenberghs, *IEEE Journal of Solid-State Circuits*, vol. **34** (10), pp. 1367-1372, Oct. 1999.

"Delta-Sigma Cellular Automata for Analog VLSI Random Vector Generation," G. Cauwenberghs, *IEEE Trans. Circuits and Systems II: Analog and Digital Signal Processing*, vol. **46** (3), pp. 240-250, March 1999.

"A Nonlinear Noise-Shaping Delta-Sigma Modulator with On-Chip Reinforcement Learning," G. Cauwenberghs, *Int. J. Analog Integrated Circuits and Signal Processing*, vol. **18** (2/3), pp. 289-299, Febr. 1999.

"Focal-Plane Analog VLSI Cellular Implementation of the Boundary Contour System," G. Cauwenberghs and J. Waskiewicz, *IEEE Trans. Circuits and Systems I: Fundamental Theory and Applications*, vol. **46** (2), pp. 327-334, Febr. 1999.

"A Learning Parallel Analog-to-Digital Vector Quantizer," J. Lubkin and G. Cauwenberghs, *Journal of Circuits, Systems and Computers* (special issue on analog and digital arrays), vol. **8** (5-6), pp. 605-614, 1998.

"An Analog VLSI Chip with Asynchronous Interface for Auditory Feature Extraction," N. Kumar, W. Himmelbauer, G. Cauwenberghs and A. Andreou, *IEEE Trans. Circuits and Systems II: Analog and Digital Signal Processing*, vol. **45** (5), pp. 600-606, 1998.

"Auditory Feature Extraction Using Self-Timed, Continuous-Time Discrete-Signal Processing Circuits," N. Kumar, G. Cauwenberghs and A. Andreou, *IEEE Trans. Circuits and Systems II: Analog and Digital Signal Processing*, vol. **44** (9), pp. 723-728, 1997.

"A Low-Power CMOS Analog Vector Quantizer," G. Cauwenberghs and V. Pedroni, *IEEE Journal of Solid-State Circuits,* vol. **32** (8), pp. 1278-1283, 1997.

"Analog VLSI Stochastic Perturbative Learning Architectures," G. Cauwenberghs, *Int. J. Analog Integrated Circuits and Signal Processing,* vol. **13** (1/2), pp. 195-209, 1997.

"Oversampling Architecture for Analog Harmonic Modulation," R.T. Edwards and G. Cauwenberghs, *IEEE Trans. Circuits and Systems I: Fundamental Theory and Applications,* vol. **43** (8), pp. 696-698, 1996.

"An Analog VLSI Recurrent Neural Network Learning a Continuous-Time Trajectory," G. Cauwenberghs, *IEEE Trans. Neural Networks,* vol. **7** (2), pp. 346-361, 1996.

"A Micropower CMOS Algorithmic A/D/A Converter," G. Cauwenberghs, *IEEE Trans. Circuits and Systems I: Fundamental Theory and Applications,* vol. **42** (11), pp. 913-919, 1995.

"Fault-Tolerant Dynamic Multi-Level Storage in Analog VLSI," G. Cauwenberghs and A. Yariv, *IEEE Trans. Circuits and Systems II: Analog and Digital Signal Processing,* vol. **41** (12), pp. 827-829, 1994.

"Analysis and Verification of an Analog VLSI Incremental Outer-Product Learning System," G. Cauwenberghs, C.F. Neugebauer and A. Yariv, *IEEE Trans. Neural Networks,* vol. **3** (3), pp. 488-497, May 1992.

Conference Proceedings

"A 5 μW/Channel 9b-ENOB BioADC Array for Electrocortical Recording," E. Greenwald, E. So, M. Mollazadeh, C. Maier, R. Etienne-Cummings, N. Thakor, and G. Cauwenberghs, *IEEE Biomedical Circuits and Systems Conference (BioCAS 2015)*, Atlanta GA, Oct. 22-24, 2015.

"EEG Based Inference of Causal Cortical Network Dynamics in Reward-Based Decision Making," H. Courellis, D. Peterson, H. Poizner, G. Cauwenberghs, and J. Iversen, *IEEE Biomedical Circuits and Systems Conference*

(BioCAS 2015), Atlanta GA, Oct. 22-24, 2015.

"Bidirectional Neural Interface: Closed-Loop Feedback Control for Hybrid Neural Systems," Z. Chou, J. Lim, S. Brown, M. Keller, J. Bugbee, F. Broccard, M. Khraiche, G. Silva, and G. Cauwenberghs, *Proc. IEEE Engineering in Medicine and Biology Conf. (EMBC 2015)*, Milan Italy, Aug. 25-29, 2015.

"Tracking Non-Stationary EEG Sources Using Adaptive Online Recursive Independent Component Analysis," S.-H. Hsu, L. Pion-Tonachini, T.-P. Jung, and G. Cauwenberghs, *Proc. IEEE Engineering in Medicine and Biology Conf. (EMBC 2015)*, Milan Italy, Aug. 25-29, 2015.

"Real-Time EEG Source-Mapping Toolbox (REST): Online ICA and Source Localization," L. Pion-Tonachini, S.-H. Hsu, S. Makeig, T.-P. Jung, and G. Cauwenberghs, *Proc. IEEE Engineering in Medicine and Biology Conf. (EMBC 2015)*, Milan Italy, Aug. 25-29, 2015.

"Estimating Direction and Depth of Visual Fixation Using Electrooculography," C. Stevenson, T.-P. Jung, and G. Cauwenberghs, *Proc. IEEE Engineering in Medicine and Biology Conf. (EMBC 2015)*, Milan Italy, Aug. 25-29, 2015.

"Non-Parametric Group-Level Statistics for Source-Resolved ERP Analysis," C. Lee, M. Miyakoshi, A. Delorme, G. Cauwenberghs, and S. Makeig, *Proc. IEEE Engineering in Medicine and Biology Conf. (EMBC 2015)*, Milan Italy, Aug. 25-29, 2015.

"A 144MHz Integrated Resonant Regulating Rectifier with Hybrid Pulse Modulation," C. Kim, S. Ha, J. Park, A. Akinin, P.P. Mercier, and G. Cauwenberghs *Proc. IEEE Symp. VLSI Circuits (VLSI Circuits 2015)*, pp. 284-285, Kyoto Japan, Jun. 15-18, 2015.

"A 16-Channel Wireless Neural Interfacing SoC with RF-Powered Energy-Replenishing Adiabatic Stimulation," S. Ha, A. Akinin, J. Park, C. Kim, H. Wang, C. Maier, and G. Cauwenberghs, *Proc. IEEE Symp. VLSI Circuits (VLSI Circuits 2015)*, pp. 106-107, Kyoto Japan, Jun. 15-18, 2015.

"A CMOS 4-Channel MIMO Baseband Receiver with 65dB Harmonic Rejection over 48MHz and 50dB Spatial Signal Separation over 3MHz At 1.3 mW," C. Kim, S. Joshi, C. Thomas, S. Ha, A. Akinin, L. Larson, and G. Cauwenberghs, *Proc. IEEE Symp. VLSI Circuits (VLSI Circuits 2015)*, pp. 304-305, Kyoto Japan, Jun. 15-18, 2015.

"Gibbs Sampling with Low-Power Spiking Digital Neurons," S. Das, B. Pedroni, P. Merolla, J., A. Cassidy, B.L. Jackson, D. Modha, G. Cauwenberghs, and K. Kreutz-Delgado, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2015)*, Lisbon Portugal, May 24-27, 2015.

"Validating Online Recursive Independent Component Analysis on EEG data," S.-H. Hsu, T. Mullen, T.-P. Jung, G. Cauwenberghs, *7th Ann. Int. IEEE EMBS Conf. Neural Engineering (NER 2015)*, Montpellier France, Apr. 22-24, 2015.

"Inherently Stochastic Spiking Neurons for Probabilistic Neural Computation," M. Al-Shedivat, R. Naous, E. Neftci, G Cauwenberghs, and K.N. Salama, *7th Ann. Int. IEEE EMBS Conf. Neural Engineering (NER 2015)*, Montpellier France, Apr. 22-24, 2015.

"Frequency Domain Identification of Proprioceptive Evoked Potentials in Compliant Kinematic Experiments," A. Akinin, N. Govil, H. Poizner, and G. Cauwenberghs, *7th Ann. Int. IEEE EMBS Conf. Neural Engineering (NER 2015)*, Montpellier France, Apr. 22-24, 2015.

"A 65k-Neuron 73-Mevents/s 22-pJ/event Asynchronous Micro-Pipelined Integrate-and-Fire Array Transceiver," J. Park, S. Ha, T. Yu, E. Neftci, and G. Cauwenberghs, *IEEE Biomedical Circuits and Systems Conference (BioCAS 2014)*, Lausanne Switzerland, Oct. 22-24, 2014.

"A 12.6 mW 8.3 Mevents/s Contrast Detection 128×128 Imager with 75 dB Intra-Scene DR Asynchronous Random-Access Digital Readout," J. Park, S. Ha, C. Kim, S. Joshi, T. Yu, W. Ma and G. Cauwenberghs, *IEEE Biomedical Circuits and Systems Conference (BioCAS 2014)*, Lausanne Switzerland, Oct. 22-24, 2014.

"Continuous Wave Ultrasonic Doppler Tonometry," A. Akinin, J. Yang, A. Williams, A. Lee, P. Pourhoseini, A.

Fronek, and G. Cauwenberghs, *IEEE Biomedical Circuits and Systems Conference (BioCAS 2014)*, Lausanne Switzerland, Oct. 22-24, 2014.

"A 7.86 mW 12.5 dBm In-Band IIP3 8-to-320 MHz Capacitive Harmonic Rejection Mixer in 65nm CMOS," C. Kim, S. Ha, C. Thomas, S. Joshi, J. Park, L. Larson, and G. Cauwenberghs, *Proc. 40th IEEE Eur. Solid State Circuits Conf. (ESSCIRC 2014)*, pp. 227-230, Venice Italy, Sept. 22-26, 2014.

"A BiCMOS 50 MHz Input Bandwidth, 1-to-16 Channelizer Optimized for Low Power Analog Signal Classification," H. Li, C.M. Thomas, G. Cauwenberghs, and L.E. Larson, *Proc. IEEE Bipolar/BiCMOS Circuits and Technology Meeting (BCTM 2014)*, pp. 76-79, San Diego CA, Sept. 28-Oct. 1, 2014.

"Online Recursive Independent Component Analysis for Real-Time Source Separation of High-Density EEG," S.H. Hsu, T. Mullen, T.P. Jung and G. Cauwenberghs, *Proc. IEEE Engineering in Medicine and Biology Conf. (EMBC 2014)*, Chicago IL, Aug. 26-30, 2014.

"An Efficient ASIC Implementation of 16-Channel On-Line Recursive ICA Processor for Real-Time EEG System," W.C. Fang, K.J. Huang, C.C. Chou, J.C. Chang, T.P. Jung and G. Cauwenberghs, *Proc. IEEE Engineering in Medicine and Biology Conf. (EMBC 2014)*, Chicago IL, Aug. 26-30, 2014.

"Causal Analysis of Cortical Networks Involved in Reaching to Spatial Targets," J.R. Iversen, A. Ojeda, T. Mullen, M. Plank, J. Snider, G. Cauwenberghs, and H. Poizner, *Proc. IEEE Engineering in Medicine and Biology Conf. (EMBC 2014)*, Chicago IL, Aug. 26-30, 2014.

"Energy-Recycling Integrated 6.78-Mbps Data 6.3-mW Power Telemetry over a Single 13.56-MHz Inductive Link," S. Ha, C. Kim, J. Park, S. Joshi, and G. Cauwenberghs, *2014 IEEE Symp. VLSI Circuits*, Honolulu HI, June 10-13, 2014.

"High Gamma Band Activity in Noninvasively Measured EEG Preceding Anti-Saccade Initiation," M. Furukawa, S. Wada, A. Ueno, A. Akinin, and G. Cauwenberghs, *2014 IEEE Int. Symp. Medical Measurements and Applications (MeMeA 2014)*, London UK, June 11-12, 2014.

"Video Analytics Using Beyond CMOS Devices," V. Narayanan, S. Datta, G. Cauwenberghs, D. Chiarulli, S. Levitan, and P. Wong, *2014 Design, Automation and Test in Europe Conference and Exhibition (DATE 2014)*, Dresden Germany, March 24-28, 2014.

"Noncontact Sensing of Electrocardiographic Potential and Body Proximity by In-bed Conductive Fabrics," K. Ito, Y. Fukuoka, G. Cauwenberghs, and A. Ueno, *2013 IEEE Computing in Cardiology Conf. (CinC 2013)*, pp. 523-526, Zaragoza Spain, Sept. 22-25, 2013.

"Neuromorphic Adaptations of Restricted Boltzmann Machines and Deep Belief Networks," B.U. Pedroni, S. Das, E. Neftci, K. Kreutz-Delgado, and G. Cauwenberghs, *2013 Int. Joint Conf. Neural Networks (IJCNN'2013)*, Dallas TX, Aug. 4-9, 2013.

"Concentric Bipolar Active Electrode for Noninvasive Biopotential Measurement in Autonomic Nervous System," S. Hasegawa, Y. Aoki, S. Wada, A. Ueno, G. Cauwenberghs, Y. Fukuoka, Y. Shimizu, N. Nishimura, and S. Iwase, *E-Health and Bioengineering Conf. (EHB'2013)*, Iasi Romania, Nov. 21-23, 2013.

"A CMOS Neurostimulator with On-chip DAC Calibration and Charge Balancing," E. Greenwald, C. Chen, N. Thakor, C. Maier, and G. Cauwenberghs, *2013 IEEE Biomedical Circuits and Systems Conf. (BioCAS'2013)*, pp. 89-92, Oct. 31-Nov. 2, 2013.

"85 dB Dynamic Range 1.2 mW 156 kS/s Biopotential Recording IC for High-Density ECoG Flexible Active Electrode Array," S. Ha, J. Park, Y.M. Chi, J. Viventi, J. Rogers, and G. Cauwenberghs, *IEEE Eur. Solid-State Circ. Conf. (ESSCIRC'2013)*, Bucharest Romania, Sept. 16-20, pp. 141-144, 2013.

"Real-Time Modeling and 3D Visualization of Source Dynamics and Connectivity using Wearable EEG," T. Mullen, C. Kothe, Y.M. Chi, A. Ojeda, T. Kerth, S. Makeig, G. Cauwenberghs, and T.P. Jung, *Proc. IEEE Engineering in Medicine and Biology Conf. (EMBC 2013)*, Osaka Japan, July 3-7, pp. 2184-2187, 2013.

"Visual evoked potential characterization of rabbit animal model for retinal prosthesis research," M.L. Khraiche, S.

El Emam, A. Akinin, G. Cauwenberghs, W. Freeman, G.A. Silva, *Proc. IEEE Engineering in Medicine and Biology Conf. (EMBC 2013)*, Osaka Japan, July 3-7, pp. 3539-3542, 2013.

"The Role of Proprioceptive Feedback in Parkinsonian Resting Tremor," N. Govil, A. Akinin, S. Ward, J. Snider, M. Plank, G. Cauwenberghs, and H. Poizner, *Proc. IEEE Engineering in Medicine and Biology Conf. (EMBC 2013)*, Osaka Japan, July 3-7, pp. 4969-4972, 2013.

"An Efficient VLSI Implementation of On-Line Recursive ICA Processor for Real-Time Multi-Channel EEG Signal Separation," W.-Y. Shih, J.C. Liao, K.-J. Huang, W.C. Fang, G. Cauwenberghs, and T.P. Jung, *Proc. IEEE Engineering in Medicine and Biology Conf. (EMBC 2013)*, Osaka Japan, July 3-7, pp. 6808-6811, 2013.

"65k-Neuron Integrate-and-Fire Array Transceiver with Address-event Reconfigurable Synaptic Routing," T. Yu, J. Park, S. Joshi, C. Maier, and G. Cauwenberghs, *Proc. IEEE Biomedical Circuits and Systems Conf. (Bio-CAS'2012)*, Hsinchu Taiwan, Nov. 28-30, pp. 21-24, 2012.

"An Effective Chip Implementation of a Real-Time Eight-Channel EEG Signal Processor based on On-Line Recursive ICA Algorithm," W.-Y. Shih, K.-J. Huang, C.-K. Chen, W.-C. Fang, G. Cauwenberghs, and T.-P. Jung, *Proc. IEEE Biomedical Circuits and Systems Conf. (BioCAS'2012)*, Hsinchu Taiwan, Nov. 28-30, pp. 192-195, 2012.

"BFSK MICS Direct-DCO Transmitter with Adaptive Background Frequency Regulation," T.-V. Cao, C. Maier, D. Wisland, T.S. Lande, and G. Cauwenberghs, *IEEE Eur. Solid-State Circ. Conf. (ESSCIRC'2012)*, Bordeaux France, Sept. 17-21, pp. 305-308, 2012.

"Event-driven Neural Integration and Synchronicity in Analog VLSI," T. Yu, J. Park, S. Joshi, C. Maier, and G. Cauwenberghs, *Proc. IEEE Engineering in Medicine and Biology Conf. (EMBC 2012)*, San Diego CA, Aug. 28-Sept. 1, pp. 775-778, 2012.

"Direct inductive stimulation for energy-efficient wireless neural interfaces," S. Ha, M.L. Khraiche, G.A. Silva, G. Cauwenberghs, *Proc. IEEE Engineering in Medicine and Biology Conf. (EMBC 2012)*, San Diego CA, pp. 883-886, 2012.

"Live Demonstration: Hierarchical Address-Event Routing Architecture for Reconfigurable Large Scale Neuromorphic Systems," J. Park, T. Yu, C. Maier, S. Joshi, and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2012)*, Seoul Korea, May 20-23, pp. 707-711, 2012.

"Multi-channel mixed-signal noise source with applications to stochastic equalization," J. Cao, R. Raich, G.C. Temes, and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2012)*, Seoul Korea, May 20-23, pp. 2497-2500, 2012.

"Recursive Independent Component Analysis for Online Blind Source Separation," M.T. Akhtar, T.-P. Jung, S. Makeig and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2012)*, Seoul Korea, May 20-23, pp. 2813 -2816, 2012.

"A Micropower Integrated Platform for Wireless Multichannel Recording of ECoG Activity," M. Mollazadeh, E. Greenwald, M. Schieber, N. Thakor, and G. Cauwenberghs, *Proc. Wireless Health (WH'2011)*, San Diego CA, pp. 30:1-2, 2011.

"Wireless Micro-ECoG Recording in Primates during Reach-to-Grasp Movements," M. Mollazadeh, E. Greenwald, N. Thakor, M. Schieber, and G. Cauwenberghs, *IEEE Biomedical Circuits and Systems Conf. (BioCAS'2011)*, San Diego CA, 10-12 Nov., pp. 237-240, 2011.

"Integrated Ultra-High Impedance Front-End for Non-Contact Biopotential Sensing," Y.M. Chi, C. Maier, and G. Cauwenberghs, *IEEE Biomedical Circuits and Systems Conf. (BioCAS'2011)*, San Diego CA, 10-12 Nov., pp. 456-459, 2011.

"Ultra-High Photosensitivity Silicon Nanophotonics for Retinal Prosthesis: Electrical Characteristics," M.L. Khraiche, Y. Lo, D. Wang, G. Cauwenberghs, W. Freeman, G.A. Silva, *Proc. IEEE Engineering in Medicine and Biology Conf. (EMBC 2011)*, Boston MA, pp. 2933-2936, Aug. 30-Sept. 3, 2011.

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"OLAM: A Wearable, Non-contact Sensor for Continuous Heart-rate and Activity Monitoring," R.K. Albright, B.J. Goska, T.M. Hagen, Y.M. Chi, G. Cauwenberghs, and P.Y. Chiang, *Proc. IEEE Engineering in Medicine and Biology Conf. (EMBC 2011)*, Boston MA, pp. 5625-5628, Aug. 30-Sept. 3, 2011.

"Wireless Dry EEG for Drowsiness Detection," J. Park, L. Xu, V. Sridhar, Y.M. Chi, G. Cauwenberghs, *Proc. IEEE Engineering in Medicine and Biology Conf. (EMBC 2011)*, Boston MA, pp. 3298-3301, Aug. 30-Sept. 3, 2011.

"Properties of Dry and Non-contact Electrodes for Wearable Physiological Sensors," N. Gandhi, C. Khe, D. Chung, Y.M. Chi, and G. Cauwenberghs, *IEEE Int. Conf. Body Sensor Networks (BSN'2011)*, Dallas TX, May 23-25, pp.107-112, 2011.

"Energy-Efficient Resonant BFSK MICS Transmitter with Fast-Settling Dual-Loop Adaptive Frequency Locking," C. Maier, T.-V. Cao, D. Wisland, T.S. Lande, and G. Cauwenberghs, *IEEE Int. Symp. Circuits and Systems (ISCAS'2011)*, Rio de Janeiro, Brazil, May 15-18, pp. 2601-2604, 2011.

"Confession Session: Learning from Others Mistakes," 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, *IEEE Int. Symp. Circuits and Systems (ISCAS'2011)*, Rio de Janeiro, Brazil, May 15-18, 2011.

"Subthreshold MOS Dynamic Translinear Neural and Synaptic Conductance," T. Yu, S. Joshi, V. Rangan, and G. Cauwenberghs, *Int. IEEE/EMBS Conf. Neural Engineering (NER'2011)*, Cancun, Mexico, Apr. 27-May 1, pp. 68-71, 2011.

"Biophysical Neural Spiking and Bursting Dynamics in Reconfigurable Analog VLSI," T. Yu, T.J. Sejnowski, and G. Cauwenberghs, *IEEE Biomedical Circuits and Systems Conf. (BioCAS'2010)*, Pathos, Cyprus, Nov. 3-5, pp.186-189, 2010.

"Wireless Non-Contact Biopotential Electrodes," Y.M. Chi, P. Ng, C. Maier, and G. Cauwenberghs, *Proc. ACM Wireless Health Conf. (WH 2010)*, San Diego, Oct. 4-6, 2010.

"Wireless Non-Contact Cardiac and Brain Monitoring," Y.M. Chi, P. Ng, E. Kang, J. Kang, J. Fang, and G. Cauwenberghs, *Proc. ACM Wireless Health Conf. (WH 2010)*, San Diego, Oct. 4-6, 2010.

"Micropower Integrated Bioamplifier and Auto-ranging ADC for Wireless and Implantable Medical Instrumentation," Y.M. Chi and G. Cauwenberghs, *Proc. IEEE Eur. Solid State Circuits Conf. (ESSCIRC 2010)*, Sevilla, Spain, Sept. 13-17, 2010.

"Wireless Physiological Monitoring and Ocular Tracking: 3D Calibration in a Fully-Immersive Virtual Health Care Environment," L. Zhang, Y.M. Chi, E. Edelstein, J. Schulze, K. Gramann, A. Velasquez G. Cauwenberghs, and E. Macagno, *Proc. IEEE Engineering in Medicine and Biology Conf. (EMBC 2010)*, Buenes Aires, Argentina, Aug. 31-Sept. 4, 2010.

"A Subthreshold aVLSI Implementation of the Izhikevich Simple Neuron Model," V. Rangan, A. Ghosh, V. Aparin, and G. Cauwenberghs, *Proc. IEEE Engineering in Medicine and Biology Conf. (EMBC 2010)*, Buenes Aires, Argentina, Aug. 31-Sept. 4, 2010.

"An Integrated Imaging Microscope for Untethered Cortical Imaging in Freely-moving Animals," K. Murari, R. Etienne-Cummings, N. Thakor, and G. Cauwenberghs, *Proc. IEEE Engineering in Medicine and Biology Conf. (EMBC 2010)*, Buenes Aires, Argentina, Aug. 31-Sept. 4, 2010.

"Wireless Non-contact EEG/ECG Electrodes for Body Sensor Networks," Y.M. Chi and G. Cauwenberghs, *Proc. Body Sensor Networks (BSN 2010)*, Biopolis, Singapore, June 7-9, 2010.

"Log-Domain Time-Multiplexed Realization of Dynamical Conductance-Based Synapses," T. Yu and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2010)*, Paris France, May 30-June 2, 2010.

"Intensity Histogram CMOS Image Sensor for Adaptive Optics," Y.M. Chi, G. Carhart, M.A. Vorontsov, and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2010)*, Paris France, May 30-June 2,

2010.

"Scalable Event Routing in Hierarchical Neural Array Architecture with Global Synaptic Connectivity," S. Joshi, S. Deiss, M. Arnold, J. Park, T. Yu, and G. Cauwenberghs, *Proc. IEEE Int. Workshop Cellular Nanoscale Networks and Their Applications (CNNA 2010)*, Berkeley CA, Febr. 3-5, 2010.

"Micropower Non-Contact EEG Electrode with Active Common-Mode Noise Suppression and Input Capacitance Cancelation," Y.M. Chi and G. Cauwenberghs, *Proc. IEEE Engineering in Medicine and Biology Conf. (EMBC 2009)*, Minneapolis MN, Sept. 2-6, 2009.

"Biophysical Synaptic Dynamics in an Analog VLSI Network of Hodgkin-Huxley Neurons," T. Yu, and G. Cauwenberghs, *Proc. IEEE Engineering in Medicine and Biology Conf. (EMBC 2009)*, Minneapolis MN, Sept. 2-6, 2009.

"Design and Characterization of a Miniaturized Epi-Illuminated Microscope," K. Murari, E. Greenwald, R. Etienne-Cummings, G. Cauwenberghs, and N. Thakor, *Proc. IEEE Engineering in Medicine and Biology Conf. (EMBC 2009)*, Minneapolis MN, Sept. 2-6, 2009.

"CMOS Descanning and Acousto-Optic Scanning Enable Faster Confocal Imaging," D. Vucinic, Y.M. Chi, M.W. Hetzer, G. Cauwenberghs, and T.J. Sejnowski, *Proc. OSA Novel Techniques in Microscopy (NTM 2009)*, Vancouver BC Canada, April 26-30, 2009.

"Non-contact Low Power EEG/ECG Electrode for High Density Wearable Biopotential Sensor Networks," Y.M. Chi, S.R. Deiss, and G. Cauwenberghs, *Proc. Body Sensor Networks (BSN 2009)*, Berkeley CA, June 3-5, 2009.

"Analog VLSI Neuromorphic Network with Programmable Membrane Channel Kinetics," T. Yu and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2009)*, Taipei Taiwan, May 24-27, 2009.

"An Active Pixel CMOS Separable Transform Image Sensor," Y.M. Chi, A. Abbas, S. Chakrabartty, and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2009)*, Taipei Taiwan, May 24-27, 2009.

"Wireless Multichannel Acquisition of Neuropotentials," M. Mollazadeh, K. Murari, H. Schwerdt, X. Wang, N. Thakor, and G. Cauwenberghs, *IEEE Proc. Biomedical Circuits and Systems Conf. (BioCAS'2008)*, Baltimore MD, Nov. 20-22, 2008.

"From Spikes to EEG: Integrated Multichannel and Selective Acquisition of Neuropotentials," M. Mollazadeh, K. Murari, G. Cauwenberghs, and N. Thakor, *IEEE Eng. Med. Biol. Conf. (EMBC'2008)*, Vancouver Canada, Aug. 20-24, 2008.

"Simultaneous Wireless Electrophysiological and Neurochemical Monitoring," K. Murari, M. Mollazadeh, N. Thakor, and G. Cauwenberghs, *Proc. SPIE Biosensing II (OP106)*, vol. 7035, 70350Q, San Diego CA, Aug. 12-14, 2008.

"A Brain-Machine Interface using Dry-Contact, Low-Noise EEG Sensors," T.J. Sullivan, S.R. Deiss, T.-P. Jung, and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2008)*, Seattle WA, May 18-21, 2008.

"Adaptive Delay Compensation in Multi-Dithering Adaptive Control," D.N. Loizos, P.P. Sotiriadis, and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2008)*, Seattle WA, May 18-21, 2008.

"A 7-decades Tunable Translinear SiGe BiCMOS 3-phase Sinusoidal Oscillator," D.N. Loizos, P.P. Sotiriadis, and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2008)*, Seattle WA, May 18-21, 2008.

"High-Speed Adaptive RF Phased Array," D.N. Loizos, P.P. Sotiriadis, and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2008)*, Seattle WA, May 18-21, 2008.

"Image Sensor with Focal Plane Change Event Driven Video Compression," Y.M. Chi, R. Etienne-Cummings, and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2008)*, Seattle WA, May 18-21, 2008.

"A Low-Noise, Non-Contact EEG/ECG Sensor," T.J. Sullivan, S.R. Deiss, and G. Cauwenberghs, *IEEE Proc.*

Biomedical Circuits and Systems Conf. (BioCAS'2007), Montreal, Canada, Nov. 27-30, 2007.

"A Low-Noise, Low-Power EEG Acquisition Node for Scalable Brain-Machine Interfaces," T.J. Sullivan, S.R. Deiss, G. Cauwenberghs, and T.-P. Jung, *Proc. SPIE Bioengineered and Bioinspired Systems III*, vol. 6592, 659203, Gran Canaria, Spain, May 2-4, 2007.

"Multi-Channel Coherent Detection for Delay-Insensitive Model-Free Adaptive Control ," D.N. Loizos, P.P. Sotiriadis, and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2007)*, New Orleans LA, May 27-30, 2007.

"Wireless Video Sensor for Ad-hoc Networks," Y. Chi, P. Carpenter, K. Colling, G. Cauwenberghs, and R. Etienne-Cummings, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2007)*, New Orleans LA, May 27-30, 2007.

"Integrated Multi-Dithering Controller for Adaptive Optics," D. N. Loizos, L. Liu, P.P. Sotiriadis, G. Cauwenberghs, and M.A. Vorontsov, in *Atmospheric Optics: Models, Measurements, and Target-in-the-Loop Propagation*, Proc. of SPIE, vol. 6708, 67080B, San Diego CA, Aug. 26-30, 2007.

"Coherent Combining of Multiple Beams with Multi-Dithering Technique: 100 kHz Closed-Loop Compensation Demonstration," L. Liu, D. N. Loizos, M.A. Vorontsov, P.P. Sotiriadis, and G. Cauwenberghs, in *Atmospheric Optics: Models, Measurements, and Target-in-the-Loop Propagation*, Proc. of SPIE, vol. 6708, 67080D, San Diego CA, Aug. 26-30, 2007.

"1.1 TMACS/mW Load-Balanced Resonant Charge-Recycling Array Processor," R. Karakiewicz, R. Genov, and G. Cauwenberghs, *IEEE Proc. Custom Integrated Circuits Conf. (CICC'2007)*, San Jose CA, Sept. 16-19, 2007.

"High-Speed, Model-Free Adaptive Control Using Parallel Synchronous Detection," D.N. Loizos, P.P. Sotiriadis, and G. Cauwenberghs, *Proc. IEEE 20th Symp. Integrated Circuits and Systems Design (SBCCI'2007)*, Rio de Janeiro, Brazil, Sept. 3-6, 2007.

"Video Sensor Node for Low-Power Ad-hoc Wireless Networks," Y.M. Chi, R. Etienne-Cummings, G. Cauwenberghs, P. Carpenter, and K. Colling, *41st Ann. Conf. Information Sciences and Systems (CISS'07)*, Baltimore MD, March 14-16, pp. 244-247, 2007.

"Wireless Integrated Voltametric and Amperometric Biosensing," M. Mollazadeh, K. Murari, C. Sauer, M. Stanacevic, N. Thakor, and G. Cauwenberghs, *Proc. IEEE/NLM Life Sciences Systems and Applications Workshop*, Bethesda MD, 2006.

"175 GMACS/mW Charge-Mode Adiabatic Mixed-Signal Array Processor," R. Karakiewicz, R. Genov, A. Abbas and G. Cauwenberghs, *Proc. IEEE 2006 Symp. VLSI Circuits*, Honolulu HI, Jun 13-17, 2006.

"A Floating-Gate Programmable Array of Silicon Neurons for Central Pattern Generating Networks," F. Tenore, R.J. Vogelstein, R. Etienne-Cummings, G. Cauwenberghs and P. Hasler, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2006)*, Kos, Greece, May 21-24, 2006.

"A Robust Continuous-Time Multi-Dithering Technique for Laser Communications Using Adaptive Optics," D. Loizos, P. Sotiriadis and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2006)*, Kos, Greece, May 21-24, 2006.

"Gradient Flow Independent Component Analysis in Micropower VLSI," A. Celik, M. Stanacevic and G. Cauwenberghs,, *Adv. Neural Information Processing Systems (NIPS'2005)*, Cambridge: MIT Press, vol. **18**, 2006.

"Wireless Multichannel Integrated Potentiostat for Distributed Neurotransmitter Sensing," K. Murari, C.M. Sauer, M. Stanacevic, G. Cauwenberghs and N. Thakor, *Proc. 27th Ann. Int. Conf. IEEE Engineering in Medicine and Biology Society (EMBS'2005)*, Shanghai, China, Sept. 1-4, 2005.

"A Spiking Silicon Central Pattern Generator with Floating Gate Synapses," F. Tenore, R.J. Vogelstein, R. Etienne-Cummings, G. Cauwenberghs, M.A. Lewis and P. Hasler, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2005)*, Kobe Japan, May 23-26, 2005.

"A Real-Time Spike Domain Sensory Information Processing System," U. Mallik, R.J. Vogelstein, E. Culurciello,

R. Etienne-Cummings and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2005),* Kobe Japan, May 23-26, 2005.

"Field Tests of Micropower Bio-Inspired Integrated Circuits for Bearing Estimation," P. Julian, A.G. Andreou, G. Cauwenberghs, L. Riddle, S. Shamma, M. Stanacevic, P. Mandolesi, D.G. Goldberg, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2005),* Kobe Japan, May 23-26, 2005.

"Fixed-Current Method for Programming Large Floating-Gate Arrays," S. Chakrabartty and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2005),* Kobe Japan, May 23-26, 2005.

"A Miniature, Low-Power, Intelligent Sensor Node for Persistent Acoustic Surveillance," G. Cauwenberghs, A. Andreou, J. West, M. Stanacevic, A. Celik, P. Julian, T. Teixeira, C. Diehl and L. Riddle, *Proc. SPIE Defense and Security Symposium,* vol. 5895, 58950L, Orlando FL, Mar. 28-Apr. 1, 2005.

"Temporal Change Threshold Detection Imager," U. Mallik, M. Clapp, E. Choi, G. Cauwenberghs and R. Etienne-Cummings, *Proc. IEEE Int. Solid-State Circuits Conf. (ISSCC'2005)*, San Francisco, Febr. 6-10, 2005.

"Sub-Microwatt Analog VLSI Support Vector Machine for Pattern Classification and Sequence Estimation," S. Chakrabartty and G. Cauwenberghs, *Adv. Neural Information Processing Systems (NIPS'2004)*, Cambridge: MIT Press, vol. **17**, 2005.

"Saliency-Driven Image Acuity Modulation on a Reconfigurable Silicon Array of Spiking Neurons," R.J. Vogelstein, U. Mallik, E. Culurciello, G. Cauwenberghs, and R. Etienne-Cummings, *Adv. Neural Information Processing Systems (NIPS'2004)*, Cambridge: MIT Press, vol. **17**, 2005.

"Power Harvesting and Telemetry in CMOS for Implanted Devices," C. Sauer, M. Stanacevic, G. Cauwenberghs and N. Thakor, *Proc. IEEE Int. Workshop Biomedical Circuits and Systems (BioCAS'2004)*, Singapore, Dec. 1-3, 2004.

"16-Channel Wide-Range VLSI Potentiostat Array," M. Stanacevic, K. Murari, G. Cauwenberghs and N. Thakor, *Proc. IEEE Int. Workshop Biomedical Circuits and Systems (BioCAS'2004)*, Singapore, Dec. 1-3, 2004.

"Spike Sorting with Support Vector Machines," R.J. Vogelstein, K. Murari, P.H. Thakur, G. Cauwenberghs, S. Chakrabartty and C. Diehl, *Proc. 26th Ann. Int. Conf. IEEE Engineering in Medicine and Biology Society (EMBS'2004)*, San Francisco, Sept. 1-4, 2004 (Region 2 Finalist, EMBS-Whitaker Student Paper Competition).

"Wide-Range, Picoampere-Sensitivity Multichannel VLSI Potentiostat for Neurotransmitter Sensing," K. Murari, N. Thakor, M. Stanacevic and G. Cauwenberghs, *Proc. 26th Ann. Int. Conf. IEEE Engineering in Medicine and Biology Society (EMBS'2004)*, San Francisco, Sept. 1-4, 2004 (Second Prize Finalist, EMBS-Whitaker Student Paper Competition).

"Analog Auditory Perception Model for Robust Speech Recognition," Y. Deng, S. Chakrabartty and G. Cauwenberghs, *Proc. IEEE Int. Joint Conf. Neural Networks (IJCNN'2004),* Budapest Hungary, July 25-29, 2004.

"Robust Speech Feature Extraction by Growth Transformation in Reproducing Kernel Hilbert Space," S. Chakrabartty, Y. Deng and G. Cauwenberghs, *Proc. IEEE Int. Conf. Acoustics Speech and Signal Processing (ICASSP'2004),* Montréal Canada, May 17-21, 2004.

"Margin Propagation and Forward Decoding in Analog VLSI," S. Chakrabartty and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2004),* Vancouver Canada, May 23-26, 2004.

"Integrated Multi-Electrode Fluidic Nitric-Oxide Sensor and VLSI Potentiostat Array," M. Naware, A. Rege, R. Genov, M. Stanacevic, G. Cauwenberghs and N. Thakor, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2004),* Vancouver Canada, May 23-26, 2004.

"Silicon Spike-Based Synaptic Array and Address-Event Transceiver," R.J. Vogelstein, U. Mallik and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2004),* Vancouver Canada, May 23-26, 2004.

"Mixed-Signal Real-Time Adaptive Blind Source Separation," A. Celik, M. Stanacevic and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2004),* Vancouver Canada, May 23-26, 2004.

"Gradient Flow Bearing Estimation with Blind Identification of Non-Stationary Signal and Interference," M. Stanacevic, G. Cauwenberghs and L Riddle, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2004),* Vancouver Canada, May 23-26, 2004.

"Three-Decade Programmable Fully Differential Linear OTA," Y. Deng, S. Chakrabartty and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2004),* Vancouver Canada, May 23-26, 2004.

"Micropower Mixed-Signal Acoustic Localizer," M. Stanacevic and G. Cauwenberghs, *Proc. IEEE Eur. Solid State Circuits Conf. (ESSCIRC'2003)*, Estoril Portugal, Sept. 16-18, 2003.

"Sparse Probability Regression by Label Partitioning," S. Chakrabartty, G. Cauwenberghs and Jayadeva, *Proc. 16th Conf. Computational Learning Theory (COLT'03),* Washington DC, Aug. 24-27, 2003.

"VLSI Multi-Channel Track-and-Hold Potentiostat," R. Genov, M. Stanacevic, M. Naware, G. Cauwenberghs and N. Thakor, in *Microtechnologies for the New Millennium 2003*, Proc. SPIE vol. **5119**, pp. 117-128, May 2003.

"SVM Incremental Learning, Adaptation and Optimization," C.P. Diehl and G. Cauwenberghs, *Proc. IEEE Int. Joint Conf. Neural Networks (IJCNN'2003)*, Portland OR, July 20-23, 2003.

"Power Dissipation Limits and Large Margin in Wireless Sensors," S. Chakrabartty and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2003),* Bangkok Thailand, May 25-28, 2003.

"Algorithmic Partial Analog-to-Digital Conversion in Mixed-Signal Array Processors," R. Genov and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2003),* Bangkok Thailand, May 25-28, 2003.

"Distributed Neurochemical Sensing: *In Vitro* Experiments," G. Mulliken, M. Naware, A. Bandyopadhyay, G. Cauwenberghs and N. Thakor, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2003),* Bangkok Thailand, May 25-28, 2003.

"Mixed-Signal Gradient Flow Bearing Estimation," M. Stanacevic and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2003),* Bangkok Thailand, May 25-28, 2003.

"A Comparison of Algorithms for Sound Localization," P. Julian, A.G. Andreou, L. Riddle, S. Shamma and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2003),* Bangkok Thailand, May 25-28, 2003.

"Robust Cephalometric Landmark Identification Using Support Vector Machines," S. Chakrabartty, M Yagi, T. Shibata and G. Cauwenberghs, *Proc. IEEE Int. Conf. Acoustics Speech and Signal Processing (ICASSP'2003),* Hong Kong, Apr. 6-10, 2003.

"Expectation Maximization of Forward Decoding Kernel Machines," S. Chakrabartty and G. Cauwenberghs, *Proc. 9th Int. Workshop Artificial Intelligence and Statistics (AISTATS'2003),* Key West FL, Jan. 3-6, 2003.

"Spike Timing-Dependent Plasticity in the Address Domain," R.J. Vogelstein, F. Tenore, R. Philipp, M.S. Adlerstein, D.H. Goldberg, and G. Cauwenberghs, *Adv. Neural Information Processing Systems (NIPS'2002)*, Cambridge: MIT Press, vol. **15**, 2003.

"Forward-Decoding Kernel-Based Phone Sequence Recognition," S. Chakrabartty and G. Cauwenberghs, *Adv. Neural Information Processing Systems (NIPS'2002)*, Cambridge: MIT Press, vol. **15**, 2003.

"Detector Array For Direct Control of a Deformable Mirror," R. Winsor, A. Sivaramakrishnan, G. Cauwenberghs, M. Cohen, M. Frazier, M. Kruger and T. Myers, in *High-Resolution Wavefront Control: Methods, Devices, and Applications IV*, J.D. Gonglewski et al., Eds., Proc. SPIE vol. **4825**, pp. 228-236, July 2002.

"A 5.9mW 6.5GMACS CID/DRAM Array Processor," R. Genov, G. Cauwenberghs, G. Mulliken and F. Adil, *Proc. European Solid-State Circuits Conference (ESSCIRC'2002),* Florence Italy, Sept. 24-26, 2002.

"Kerneltron: Support Vector 'Machine' in Silicon," R. Genov and G. Cauwenberghs, *Proc. SVM'2002*, Lecture Notes in Computer Science, vol. **2388**, pp. 120-134, 2002.

"Forward Decoding Kernel Machines: A Hybrid HMM/SVM Approach to Sequence Recognition," S. Chakrabartty and G. Cauwenberghs, *Proc. SVM'2002*, Lecture Notes in Computer Science, vol. **2388**, pp. 278-292, 2002.

"Delta-Sigma Algorithmic Analog-to-Digital Conversion," G. Mulliken, F. Adil, G. Cauwenberghs, and R. Genov, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2002),* Phoenix AZ, May 26-29, 2002.

"Charge-Based MOS Correlated Double Sampling Comparator and Folding Circuit," R. Genov and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2002),* Phoenix AZ, May 26-29, 2002.

"VLSI Potentiostat Array for Distributed Electrochemical Neural Recording," A. Bandyopadhyay, G. Mulliken, G. Cauwenberghs, and N. Thakor, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2002),* Phoenix AZ, May 26-29, 2002.

"Neuromorphic Processor for Real-Time Biosonar Object Detection," G. Cauwenberghs, R.T. Edwards, Y. Deng, R. Genov and D. Lemonds, *Proc. IEEE Int. Conf. Acoustics Speech and Signal Processing (ICASSP'2002),* Orlando FL, May 13-17, 2002.

"Sequence Estimation and Channel Equalization Using Forward Decoding Kernel Machines," S. Chakrabartty and G. Cauwenberghs, *Proc. IEEE Int. Conf. Acoustics Speech and Signal Processing (ICASSP'2002),* Orlando FL, May 13-17, 2002.

"Gradient Flow Adaptive Beamforming and Signal Separation in a Miniature Microphone Array," M. Stanacevic, G. Cauwenberghs and G. Zweig, *Proc. IEEE Int. Conf. Acoustics Speech and Signal Processing (ICASSP'2002),* Orlando FL, May 13-17, 2002.

"Stochastic Mixed-Signal VLSI Architecture for High-Dimensional Kernel Machines," R. Genov and G. Cauwenberghs, *Adv. Neural Information Processing Systems (NIPS'2001)*, Cambridge: MIT Press, vol. **14**, 2002.

"Gradient Flow Broadband Beamforming and Source Separation," M. Stanacevic, G. Cauwenberghs and G. Zweig, *ICA'2001*, La Jolla CA, Dec. 2001.

"Blind Separation of Linear Convolutive Mixtures Using Orthogonal Filter Banks," M. Stanacevic, M. Cohen and G. Cauwenberghs, *ICA'2001*, La Jolla CA, Dec. 2001.

"Advanced On-FPA Signal Processing for Staring IRFPAs," K.V. Dang, W.P. Blase, S.B. Horn, P. Pouliquen, A.G. Andreou, G. Cauwenberghs, and J.T. Caulfield, in *Wave Optics and VLSI Photonic Devices for Information Processing,* P. Ambs and F.R. Beyette, Eds., Proc. SPIE vol. **4435**, pp. 247-257, Dec. 2001.

"CID/DRAM Mixed-Signal Parallel Distributed Array Processor," R. Genov and G. Cauwenberghs, *14th Int. IEEE ASIC/SOC Conf.*, Washington DC, Sept. 12-15, 2001 (postponed).

"Embedded Dynamic Memory and Charge-Mode Logic for Parallel Array Processing," R. Genov and G. Cauwenberghs, *5th World Multi-Conference on Systemics, Cybernetics and Informatics (SCI'2001)*, Orlando FL, July 22-25, 2001. *Best Student Paper Award.*

"Massively Parallel Inner-Product Array Processor," R. Genov, G. Cauwenberghs, *Int. Joint Conf. Neural Networks (IJCNN'2001),* Washington, DC, July 2001.

"Analog Array Processor with Digital Resolution Enhancement and Offset Compensation," R. Genov, G. Cauwenberghs, *Conf. on Information Sciences and Systems (CISS'2001),* Baltimore MD, April 2001.

"Micro-Scale/VLSI Adaptive Optics Systems," T. Weyrauch, M.A. Vorontsov, T.G. Bifano, M.H. Cohen and G. Cauwenberghs, in *High-Resolution Wavefront Control: Methods, Devices, and Applications III*, J.D. Gonglewski et al., Eds., Proc. SPIE vol. **4493**, 2001.

"Blind Broadband Source Localization and Separation in Miniature Sensor Arrays," G. Cauwenberghs, M. Stanacevic, and G. Zweig, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2001),* Sydney, Australia, May 6-9, 2001.

"Analog VLSI Spiking Neural Network with Address Domain Probabilistic Synapses," D.H. Goldberg, G. Cauwenberghs and A.G. Andreou, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2001),* Sydney, Australia, May 6-9, 2001.

"Heterogeneous Integration of Biomimetic Acoustic Microsystems," A.G. Andreou, D.H. Goldberg, E. Culurciello,

M. Stanacevic and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2001),* Sydney, Australia, May 6-9, 2001.

"Focal-Plane Image and Beam Quality Sensors for Adaptive Optics," M. Cohen, G. Cauwenberghs, G. Carhart and M. Vorontsov, *Proc. 19th Conf. Advanced Research in VLSI (ARVLSI*2001)*, Salt Lake City, Utah, March 14-16, 2001.

"Incremental and Decremental Support Vector Machine Learning," G. Cauwenberghs and T. Poggio, *Adv. Neural Information Processing Systems (NIPS*2000),* Cambridge, MA: MIT Press, vol. **13**, 2001.

"Microelectronic VLSI Systems for Adaptive Optics and Advanced Imaging," M. Cohen, G. Cauwenberghs, M. Vorontsov, L. Beresnev and G. Carhart, in *High-Resolution Wavefront Control: Methods, Devices, and Applications II*, J.D. Gonglewski et al., Eds., Proc. SPIE vol. **4124**, pp. 158-169, 2000.

"Charge-Mode Parallel Architecture for Matrix-Vector Multiplication," R. Genov and G. Cauwenberghs, *Proc. 43rd IEEE Midwest Symp. Circuits and Systems (MWSCAS'2000),* Lansing MI, August 8-11, 2000. *Best Student Paper Award (3rd place).*

"Charge-Based CMOS FIR Adaptive Filter," M. Stanacevic and G. Cauwenberghs, *Proc. 43rd IEEE Midwest Symp. Circuits and Systems (MWSCAS'2000),* Lansing MI, August 8-11, 2000.

"Hybrid Support Vector Machine, Hidden Markov Model Approach for Continuous Speech Recognition," S. Chakrabartty, G. Singh and G. Cauwenberghs, *Proc. 43rd IEEE Midwest Symp. Circuits and Systems (MWSCAS'2000),* Lansing MI, August 8-11, 2000.

"A CMOS Smart Focal Plane for Infra-Red Imagers," P.O. Pouliquen, C.W. Terrill, A.G. Andreou and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2000),* Geneva, Switzerland, May 28-31, 2000.

"Focal-Plane On-Line Nonuniformity Correction Using Floating-Gate Adaptation," M.H. Cohen and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2000),* Geneva, Switzerland, May 28-31, 2000.

"Integrated 64-state Parallel Analog Viterbi Decoder," K. He and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2000),* Geneva, Switzerland, May 28-31, 2000.

"Adaptive Wavefront Correction: A Hybrid VLSI/Optical System Implementing Parallel Stochastic Gradient Descent," M. Cohen, M. Vorontsov, G. Carhart and G. Cauwenberghs, *EurOpto,* Florence Italy, Proc. SPIE vol. **3866**, pp. 176-182, 1999.

"Log-Domain Circuits for Auditory Signal Processing," R.T. Edwards and G. Cauwenberghs, *Proc. IEEE Midwest Symp. Circuits and Systems (MWSCAS'99)*, Las Cruces, NM, Aug. 8-11, 1999.

"Performance of Analog Viterbi Decoding," K. He and G. Cauwenberghs, *Proc. IEEE Midwest Symp. Circuits and Systems (MWSCAS'99)*, Las Cruces, NM, Aug. 8-11, 1999.

"AdOpt: Analog VLSI Stochastic Optimization for Adaptive Optics," M. Cohen, R.T. Edwards, G. Cauwenberghs, M. Vorontsov and G. Carhart, *Proc. Int. Joint Conf. Neural Networks (IJCNN'99),* Washington DC, vol. 4, pp. 2343-2346, 1999.

"Learning to Compensate for Sensor Variability at the Focal Plane," P.O. Pouliquen, A.G. Andreou, G. Cauwenberghs, C.W. Terrill, *Proc. Int. Joint Conf. Neural Networks (IJCNN'99),* Washington DC, vol. 4, pp. 2333-2336, 1999.

"Learning to Navigate from Limited Sensory Input: Experiments with the Khepera Microrobot," R. Genov, S. Madhavapeddi and G. Cauwenberghs, *Proc. Int. Joint Conf. Neural Networks (IJCNN'99),* Washington DC, vol. 3, pp. 2061-2064, 1999. *Presentation Award.*

"Adaptive Wavefront Correction Using a VLSI Implementation of the Parallel Perturbation Gradient Descent Algorithm," G. Carhart, M. Vorontsov, M. Cohen G. Cauwenberghs, and R.T. Edwards, in *High-Resolution Wavefront Control: Methods, Devices, and Applications*, Proc. SPIE vol. **3760**, pp. 61-66, 1999.

"Mixed-mode VLSI Implementation of Fuzzy Adaptive Resonance and Vector Quantization," J. Lubkin and

G. Cauwenberghs, *Proc. 7th Int. Conf. Microelectronics for Neural, Fuzzy and Bio-inspired Systems (MicroNeuro'99),* Granada Spain, pp. 147-154, 1999.

"Monaural Separation of Independent Acoustical Components," G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'99),* Orlando FL, vol. 5, pp. 62-65, 1999.

"An Area-Efficient Analog VLSI Architecture for State-Parallel Viterbi Decoder," K. He and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'99),* Orlando FL, vol 2, pp. 432-435, 1999.

"16-Channel Single-Chip Current-Mode Track-and-Hold Acquisition System with 100 dB Dynamic Range," R. Genov and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'99),* Orlando FL, vol. 6, pp. 350-353, 1999.

"Analog VLSI Cellular Implementation of the Boundary Contour System," G. Cauwenberghs and J. Waskiewicz, *Adv. Neural Information Processing Systems (NIPS*98),* Cambridge, MA: MIT Press, vol. **11**, pp. 657-663, 1999.

"Optimizing Correlation Algorithms for Hardware-based Transient Classification," R.T. Edwards, G. Cauwenberghs and F. Pineda, *Adv. Neural Information Processing Systems (NIPS*98),* Cambridge, MA: MIT Press, vol. **11**, pp. 678-684, 1999.

"Blind On-Line Digital Calibration of Multi-Stage Nyquist-Rate and Oversampled A/D Converters," G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'98),* Monterey CA, vol. 11, pp. 508-511, 1998.

"VLSI Delta-Sigma Cellular Neural Network for Analog Random Vector Generation," G. Cauwenberghs, *Proc. IEEE Int. Symposium on Circuits and Systems (ISCAS'98),* Monterey CA, vol. 3, pp. 147-150, 1998.

"Blind Separation of Linear Convolutive Mixtures through Parallel Stochastic Optimization," M. Cohen and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'98),* Monterey CA, vol. 3, pp. 17-20, 1998.

"A Micropower Learning Vector Quantizer for Parallel Analog-to-Digital Data Compression," J. Lubkin and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'98),* Monterey CA, vol. 3, pp. 59-61, 1998.

"Mixed-Mode VLSI Implementation of Fuzzy ART," M. Cohen, P. Abshire and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'98),* Monterey CA, vol. 3, pp. 251-254, 1998.

"A Second-Order Log-Domain Bandpass Filter for Audio Frequency Applications," R.T. Edwards and G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'98),* Monterey CA, vol. 3, pp. 651-654, 1998.

"VLSI Cellular Array of Coupled Delta-Sigma Modulators for Random Analog Vector Generation," G. Cauwenberghs, *Proc. 31st Asilomar Conf. Signals, Systems and Computers,* Asilomar CA (Nov. 2-5, 1997), vol. 2, pp. 1151-1155, 1998.

"Design and VLSI Implementation of an Adaptive Delta-Sigma Modulator," G. Cauwenberghs, *Proc. 1998 11th Int. Conf. VLSI Design,* pp. 155-160, 1998.

"An Analog VLSI Front-End for Auditory Signal Analysis," N. Kumar, W. Himmelbauer, G. Cauwenberghs and A.G. Andreou, *1997 IEEE Int. Conf. Neural Networks (ICNN'97),* Houston, Texas, vol. 2, pp. 876-881, 1997. *Best Student Paper Award.*

"An Oversampled A/D Converter with On-Chip Reinforcement Learning," G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'97),* Hong Kong, June 1997, vol. I, pp. 697-700.

"A Mixed-Signal Correlator for Acoustic Transient Classification," R.T. Edwards, G. Cauwenberghs and F.J. Pineda, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'97),* Hong Kong, June 1997, vol. I, pp. 621-624.

"An Analog VLSI Chip with Asynchronous Interface for Auditory Feature Extraction," N. Kumar, W. Himmelbauer, G. Cauwenberghs and A.G. Andreou, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'97),* Hong Kong, June 1997, vol. I, pp. 553-556.

"Mixed-Mode VLSI Architecture Implementing Fuzzy ART," M. Cohen, P. Abshire and G. Cauwenberghs, *Proc. 31st Annual Conf. Information Sciences and Systems,* Baltimore MD, pp. 337-340, March 1997.

"Focal-Plane Analog VLSI Implementation of the BCS Image Segmentation Algorithm," J. Waskiewicz, G. Cauwenberghs and D. Yochelson, *Proc. 31st Annual Conf. Information Sciences and Systems,* Baltimore MD, pp. 341-344, March 1997.

"An Analog VLSI Architecture for Auditory Based Feature Extraction," N. Kumar, W. Himmelbauer, G. Cauwenberghs and A.G. Andreou, *1997 IEEE Int. Conf. Acoustics, Speech, and Signal Processing, (ICASSP'97)* Munich, Germany, vol. 5, pp. 4081-4084, 1997.

"Bangs, Clicks, Snaps, Thuds, and Whacks: and Architecture for Acoustic Transient Processing," F.J. Pineda, G. Cauwenberghs and R.T. Edwards, in *Advances in Neural Information Processing Systems,* Cambridge, MA: MIT Press, vol. 9, 1997, pp. 734-740.

"Adaptation, Learning and Storage in Analog VLSI," G. Cauwenberghs, *Proc. 9th Ann. IEEE Int. ASIC Conf.,* Rochester NY, Sept. 1996, pp. 273-278 (invited paper).

"Analog VLSI Processor Implementing the Continuous Wavelet Transform," R.T. Edwards and G. Cauwenberghs, *Advances in Neural Information Processing Systems,* Cambridge, MA: MIT Press, vol. 8, pp. 692-698, 1996.

"A Circuit Model of Hair-Cell Transconduction for Temporal Processing and Auditory Feature Extraction," N. Kumar, G. Cauwenberghs, and A. Andreou, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'96),* Atlanta GA, 1996, vol. III, pp. 301-304.

"Analog VLSI Long-Term Dynamic Storage," G. Cauwenberghs, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'96),* Atlanta GA, 1996, vol. III, pp. 334-337.

"Adaptive Calibration of Multiple Quantization Oversampled A/D Converters," G. Cauwenberghs and G.C. Temes, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'96),* Atlanta GA, 1996, vol. I, pp. 512-515.

"Level Crossing Time Interval Circuit for Micro-Power Analog VLSI Auditory Processing," N. Kumar, G. Cauwenberghs, and A. Andreou, *Proc. 1995 IEEE Workshop Neural Networks for Signal Processing (NNSP'95),* pp. 581-590, 1995.

"A VLSI Implementation of the Continuous Wavelet Transform," R.T. Edwards and G. Cauwenberghs, *Proc. 29th Annual Conf. Information Sciences and Systems,* Baltimore MD, pp. 355-359, 1995.

"A Circuit Model of Hair-Cell Transconduction for Temporal Processing and Auditory Feature Extraction," N. Kumar, G. Cauwenberghs, and A. Andreou, *Proc. 29th Annual Conf. Information Sciences and Systems,* Baltimore MD, pp. 350-354, 1995.

"Bit-Serial Bidirectional A/D/A Conversion," G. Cauwenberghs, *Proc. 1995 Conf. Advanced Research in VLSI,* IEEE Computer Society Press, pp. 108-120, 1995.

"A Charge-Based CMOS Parallel Analog Vector Quantizer," G. Cauwenberghs and V. Pedroni, *Adv. Neural Information Processing Systems (NIPS*94), Cambridge,* MA: MIT Press, vol. 7, pp. 779-786, 1995.

"A Learning Analog Neural Network Chip with Continuous-Time Recurrent Dynamics," G. Cauwenberghs, *Adv. Neural Information Processing Systems (NIPS*93),* San Mateo, CA: Morgan Kaufman, vol. 6, pp. 858-865, 1994.

"A Fast Stochastic Error-Descent Algorithm for Supervised Learning and Optimization," G. Cauwenberghs, *Adv. Neural Information Processing Systems (NIPS*92),* San Mateo, CA: Morgan Kaufman, vol. 5, pp. 244-251, 1993.

"An Adaptive CMOS Matrix-Vector Multiplier for Large-Scale Analog Hardware Neural Network Applications," G. Cauwenberghs, C.F. Neugebauer and A. Yariv, *Proc. Int. Joint Conf. Neural Networks (IJCNN'91),* Seattle WA, vol. I, pp. 507-511, 1991.

"Switching Dynamics and Transient Response of Kerr Nonlinear-Optical Heterostructures," G. Cauwenberghs,

H. Thienpont, and I. Veretennicoff, *OSA Proc. Nonlinear Dynamics in Optical Systems,* Optical Society of America, Washington DC, vol. 7, pp. 246-250, 1991.

"Transfer Matrix Formalism for the Stationary Response of Nonlinear, Multilayered Structures for Optical Bistability," J. Danckaert, K. Fobelets, G. Cauwenberghs, and I. Veretennicoff, in *High Speed Phenomena in Photonic Materials and Optical Bistability,* D. Jaeger, Ed., Proc. SPIE vol. **1280**, pp. 167-178, Aug. 1990.

"Large Scale Optoelectronic Integration of Asynchronous Analog Neural Networks," G. Cauwenberghs, C.F. Neugebauer, A. Agranat, and A. Yariv, *Proc. Int. Neural Network Conf. (INNC-90 Paris),* Kluwer Academic, vol. 2, pp. 551-554, 1990.

Books and Book Chapters

Learning on Silicon— Adaptive VLSI Neural Systems, G. Cauwenberghs and M. Bayoumi, Eds., Norwell MA: Kluwer Academic, 1999.

"Wireless Integrated Neurochemical and Neuropotential Sensing," M. Mollazadeh, K. Murari, C. Sauer, M. Stanacevic, N. Thakor, G. Cauwenberghs, in K. Iniewski, Ed., *VLSI Circuits for Biomedical Applications*, Springer-Verlag, 2008.

"CMOS Imager Non-Uniformity Correction Using Floating-Gate Adaptation," M. Cohen and G. Cauwenberghs, in O. Yadid-Pecht and R. Etienne-Cummings, Eds., *CMOS Imagers: From Phototransduction to Image Processing,* Boston MA: Kluwer Academic, 2004.

"Analog Learning Fuzzy ART Microchips," M. Cohen, P. Abshire, J. Lubkin and G. Cauwenberghs, in T. Serrano, B. Linares and A. Andreou, *Adaptive Resonance Theory Microchips,* Norwell MA: Kluwer Academic, 1998.

"Neuromorphic Learning VLSI Systems: A Survey," G. Cauwenberghs, in T.S. Lande, Ed., *Neuromorphic Systems Engineering,* Norwell MA: Kluwer Academic, 1998.

"Analog VLSI Stochastic Perturbative Learning Architectures," G. Cauwenberghs, in T.S. Lande, Ed., *Neuromorphic Systems Engineering,* Norwell MA: Kluwer Academic, 1998.

Other Publications

"Editorial," G. Cauwenberghs and R. Etienne-Cummings, *IEEE Trans. Biomedical Circuits and Systems*, vol. 9 (6), pp. 753-754, 2015.

"Learning Non-deterministic Representations with Energy-based Ensembles," M. Al-Shedivat, E. Neftci, and G. Cauwenberghs, International Conference on Learning Representations (ICLR 2014), *arXiv*, DOI 1412.7272 (http://arxiv.org/abs/1412.7272), 2015.

"Reverse Engineering the Cognitive Brain," G. Cauwenberghs, *Proc. Nat. Acad. Sci. (PNAS)*, vol. **110** (39), pp. 15512-15513, 2013.

"Guest Editorial: Special Issue on Selected Papers From the IEEE Sensors 2011 Conference," A.G. Mignani, G. Cauwenberghs, E. Lewis, and P.P. Shum, *IEEE Sensors Journal*, vol. **13** (3), pp. 889-889, 2013.

"Editorial," G. Cauwenberghs and R. Etienne-Cummings, *IEEE Transactions on Biomedical Circuits and Systems*, vol. **5** (1), pp. 1-2, 2011.

"Integrated Potentiostat for Neurotransmitter Sensing," K. Murari, M. Stanacevic, G. Cauwenberghs, and N.V. Thakor, *IEEE Engineering in Medicine and Biology Magazine*, Nov/Dec, pp. 23-29, 2005 (Invited, Student Paper Award).

"Beyond Address-Event Communication: Dynamically Reconfigurable Spiking Neural Systems," R.J Vogelstein, U. Mallik and G. Cauwenberghs, in *The Neuromorphic Engineer,* Institute of Neuromorphic Engineering, vol. **1** (1), p. 1, Spring 2004.

"Editorial," G. Cauwenberghs, R. Etienne-Cummings, R.W. Newcomb, and M.E. Zaghloul, Special Issue on Inte-

grated Multisensor Systems and Signal Processing, *IEEE Sensors Journal*, vol. **2** (6), pp. 505-507, 2002.

"Editorial," G. Cauwenberghs, K. Jenkins and F. Salam, Special Section on the 1999 IEEE MWSCAS Student Paper Contest Awards, *IEEE Trans. Circuits and Systems II: Analog and Digital Signal Processing*, vol. **48** (10), p. 889, Oct. 2001.

"Learning on Silicon: Editorial," G. Cauwenberghs, M. Bayoumi and E. Sanchez-Sinencio, *Int. J. Analog Integrated Circuits and Signal Processing*, vol. **18** (2/3), pp. 113-116, Febr. 1999.

"Bang, Click, Thud, or Whack?," F.J. Pineda, G. Cauwenberghs, R.T. Edwards, K.T. Ryals and D.G. Steierwald, *Johns Hopkins APL Tech. Digest*, vol. **18** (2), pp. 244-253, 1997.

Patents

"Method and Apparatus for Energy-Recycling Wireless Data and Power Transfer over a Single Resonant Inductive Link," S. Ha and G. Cauwenberghs, patent pending.

"Ultra-High Photosensitivity Vertical Nanowire Arrays for Retinal Prosthesis," M. Khraiche, G. Silva, D. Wang, Y. Lo, G. Cauwenberghs, and W. Freeman, patent pending.

"Integrated Electric Field Sensor," Y.M. Chi, C. Maier, and G. Cauwenberghs, patent pending.

"Non-Contact Biopotential Sensor," T. Sullivan, G. Cauwenberghs, and S. Deiss, United States Patent 8,694,084, April 8, 2014.

"Apparatus and Method for Using Analog Circuits to Embody Non-Lipschitz Mathematics and Properties Using Attractor and Repulsion Modes," R.E. Meyers, K.S. Deacon, and G. Cauwenberghs, United States Patent 8,266,085, Sep 11, 2012.

"Method for Gradient Flow Source Localization and Signal Separation," G. Cauwenberghs, M. Stanacevic and G. Zweig, United States Patent 6,865,490, March 8, 2005.

"Methods and Apparatus for Acoustic Transient Processing," F.J. Pineda, G. Cauwenberghs, and R.T. Edwards, United States Patent 6,389,377, May 14, 2002.

"Method and Apparatus for Long-Term Multi-Valued Storage in Dynamic Analog Memory," G. Cauwenberghs and A. Yariv, United States Patent 5,479,170, Dec. 26, 1995.

"Method and Apparatus for Monotonic Algorithmic Digital-to-Analog and Analog-to-Digital Conversion," G. Cauwenberghs and A. Yariv, United States Patent 5,258,759, Nov. 2, 1993.