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Annual Report 2006-2007

Biomedical Circuits and Systems (BiOCAS) Technical Committee

IEEE Circuits and Systems Society

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Introduction

Our TC members are all actively involved in a number of technical activities. Below is a list of those who participated to build this report. Also, I am sure several more colleagues should have been included. In addition to the numerous contributions of our members, the past year was marked by increasing interest in Biocas activities in most CASS activities. Also, we were representing the CASS in biotechnology council and we launched the Transactions on biomedical circuits and systems (TBCAS), and we organized the BiOCAS conference. Here are the main contributions.

1. IEEE Services: Workshops/Conferences/Panels/Invited Talks/Review committees

1.1. Invited Speakers

- R. Harrison, Medtronic, Inc. Technical Forum, Minneapolis, MN., 2006;
- R. Harrison, 20th International Conference on VLSI Design, Bangalore, India, 2007;
- R. Harrison, Low Power Analog IC Seminar Series, University of Washington, Seattle, WA, 2007.
- R. Harrison, WIMS ERC Seminar Series, University of Michigan, Ann Arbor, MI, 2007.
- W.A. Serdijn, "Advanced ultra low-power biomedical signal processing based on analog wavelet transform," invited presentation, SFORUM-SBMICRO-SBCCI, S.A.P. Haddad, R.L.M. Peeters, J.M.H. Karel, R.L. Westra and W.A. Serdijn, Ouro-Preto, Brazil, August 28 - September 1, 2006.
- R. Etienne-Cummings, Invited Speaker: Yale University, CT, 2006.
- R. Etienne-Cummings, Invited Speaker: University of Alberta, Canada, 2006.
- R. Etienne-Cummings, Invited Speaker: IEEE CICC '06, Signal and Data Processing, San Jose, CA, 2006.
- R. Etienne-Cummings, Invited Speaker: University of Cape Town, IEEE Chapter, 2006.
- O. Yadid-Pecht, "CMOS Imagers Characterization" - Invited Lecture for the CMOS Imaging Workshop, Fraunhofer Institute, Germany, May 2006.
- O. Yadid-Pecht, "Challenges in CMOS Imaging" - Invited Lecture for the Advanced Technologies Workshop, Banff, July 2006.
- M. Sawan, "Engineering Biosensing Microsystems for Advanced Diagnostic Tools", Keynotes at ICBME, Tehran, February 2007.
- M. Sawan, "Microsystèmes dédiés aux applications médicales intracorticales: réalisation et expérimentation", FETCH, Lyon, France, Jan. 2007.
- M. Sawan, "Implantable Smart Medical Microsystems: Limits and Challenges", Keynotes at IEEE ICECS, Nice, France, December 2006.

- M. Sawan, "La recherche en ingénierie par l'exemple: µélectronique dédiée aux micro-systèmes implantables", Seminar at Journée Franco-Québécoise, Marseille, France, Dec.2006.
- M. Sawan, "Engineering Biosensing Microsystems for Advanced Diagnostic Tools", Invited seminar at Shanghai Jiao Tong University, China, October 2006.
- M. Sawan, "Micro/Nano Opportunities in Implantable Medical Devices", Keynotes at Micro-NanoUtah, Salt Lake City, USA, October 2006.
- M. Sawan, "Signal Processing Based Implantable Microsystems for Intracortical Therapeutic Purposes", Keynotes at IEEE SIPS, Calgary, October 2006.
- M. Sawan, "Biomedical Circuits and Systems Dedicated to Remote Sensing and Neurostimulation", DL North Jersey CAS Chapter, USA, May 2006.
- M. Sawan, "Wireless Communication Circuits for Biomedical Devices", SYTACom Workshop, ACFAS, Montreal, May 2006.
- M. Sawan, "Mise en oeuvre de dispositifs de surveillance et stimulation intracorticales", GRSTB Workshop, Montreal, May 2006.

1.2. Organizers : Panels, Special Sessions, ...

- A. Demosthenous, Session chair and RCM for ASPTC and BioCAS, ISCAS, New Orleans, USA, May 2007.
- A. Demosthenous, TPC of Biomedical Circuits and Systems, ECCTD 2007.
- R. Harrison, Co-Organizer, Integrated Neural Interfaces special session; IEEE International Symposium on Circuits and Systems (ISCAS) 2006;
- R. Harrison, Organizer, Implantable and Prosthetic Devices special technical session; IEEE International Solid-State Circuits Conference (ISSCC), 2007.
- Y. Lian serves as the Review Committee Member of ISCAS07
- Y. Lian serves as the Session Chairs of: 1. Circuits for Medical Applications; 2. Digital Filters; 3. Hardware Oriented Digital Signal Processing
- Y. Lian serves as the Tutorial Chair of the IEEE International Conference on Biomedical Circuits and System, November 27-30, 2007, Montreal, Canada
- Y. Lian serves as the International Coordinator of ISCAS08
- Y. Lian served as the Review Committee Member of ISCAS06
- Y. Lian organized an Invited Session on Digital Signal Processing Techniques for Biomedical Circuits and Systems in ISCAS06
- Y. Lian served as the Technical Session Chairs in ISCAS06: 1. Biomedical Circuits and Systems I; 2. Circuits for Biomedical Applications; 3. Frequency Masking Digital Filters.
- Y. Lian served as the Technical Program Co-Chair of the IEEE International Conference on Biomedical Circuits and Systems (BioCAS06), London, UK, Nov 29 - Dec 1, 2006.
- Y. Lian served as the Technical Program Co-Chair of the IEEE 2006.
- Asia Pacific Conference on Circuits and Systems, Singapore, Dec 4-7, 2006.
- Y. Lian served as the International Program Committee Member of 2006 IASTED Signal and Image Processing, Hawaii, USA, 2006.
- Y. Lian served as a member of International Advisory Committee of the International Conference on Computer and Communication Engineering (ICCCE), Malaysia, May 9-11, 2006.
- A. Masson, Technical Program Committee, IEEE International Conference on Sensors, 2006.
- A. Masson, Technical Review Committee, IEEE Engineering in Medicine and Biology Society Int. Conference, 2006.
- A. Masson, Technical Review Committee and Session Chair, IEEE International Conf. on Electro/Information Technology, 2006.

- A. van Schaik, Chair Sensory Systems TC
- A. van Schaik, Track Chair of the Sensory Systems track
- A. van Schaik, Member of the TPC of ISCAS 2007
- W. A. Serdijn, Special Session Chair, ISCAS 2007
- G. Bah Hwee, Publication Chair - IEEE Asia Pacific Conference on Circuits and Systems 2006 (APCCAS'06)
- G. Bah Hwee, Chair - IEEE CAS Singapore Chapter in 2006
- R. Etienne-Cummings, Session Chairman: International Symposium on Circuits and Systems, 2001-2006
- R. Etienne-Cummings, Program Co-Chair: IEEE BioCAS Conference, Montreal, Fall 2007
- R. Etienne-Cummings, Organizer: NSF Telluride Neuromorphic Engineering Workshop, Telluride, CO, 2003-2006.
- R. Etienne-Cummings, Organizer: ISCAS 2006, Special Sessions on Sensory Systems for Biological Applications, Kos, Greece, May 2006.
- R. Etienne-Cummings, Organizer: ISCAS 2006, Demonstration Sessions on Sensory Systems, Kos, Greece, May 2006.
- E. Bruun, IEEE Prime (Ph.D. research in microelectronics and electronics) 2006 (Otranto, Italy)
- E. Bruun, ESSCIRC 2006 (Montreux, Switzerland)
- E. Bruun, IEEE Norchip 2006 (Linkoping, Sweden)
- E. Bruun, International Conference on Electronics, Circuits and Systems (ICECS) 2006, (Nice, France)
- E. Bruun, IASTED International Conference on Circuits, Signals and Systems (CSS 2006) (San Francisco, USA).
- A. McEwan, Biocas 2006, London Track Chair
- P. Hafliger, ISCAS 2007 special session on 'Live demonstrations of circuits and systems'
- S. Chakrabartty, Organizing committee, IEEE electro-information-technology conference. May 2006
- M. Sawan, General Chair of the Int. Biomedical Circuits and Systems (BiOCAS2007);
- M. Sawan, General Chair of the Int. Midwest Symposium on Circuits and Systems (MWSCAS 2007) and the NEWCAS 2007
- M. Sawan, Member of Prompt-Quebec Scientific Coordination Committee
- M. Sawan, Technical program co-Chair of the Int. Midwest Symposium on CAS (MWSCAS2006)
- M. Sawan, General Chair of the NEWCAS2006
- M. Sawan, General Co-Chair of the IEEE Int. Conf. On Electronics, Circuits and Systems (ICECS2006)
- M. Sawan, Co-Chair of the IEEE Int. Computer Architecture for Machine Perception and Sensors (CAMPS2006)
- M. Sawan, Chair BiOCAS TC for 2006 – 2007.
- M. Sawan, Guest Editor of the Kluwer Analog integrated Circuits and Signal Processing Journal (NEWCAS 2005-07, ICECS 2006-08)
- M. Sawan, Editor of the mixed-signal letter of Springer Journal

1.3. Other professional activities, editorial services, ...

- M. Zaghoul, President -Elect of the IEEE Sensors Council for 2008-2009
- A. Demosthenous, Associate Editor: IEEE Trans. Circuits and Systems II: Express Briefs;
- A. Demosthenous, Associate Editor: IEEE CAS Electronic Newsletters;

- A. Demosthenous, Associate Editor: Open Electrical and Electronic Engineering Journal;
- R. Harrison, Member, Biomedical Circuits and Systems Technical Committee; IEEE International Symposium on Circuits and Systems (ISCAS), 2006-07.
- R. Harrison, Member, Technical Subcommittee for Imagers, MEMS, Medical and Display; IEEE International Solid-State Circuits Conference (ISSCC), 2006 –07.
- Y. Lian serves as the CASS VP Region 10.
- Y. Lian serves as the Chair of International Steering Committee of Asia Pacific Conference on Circuits and Systems.
- Y. Lian serves as a member of the CASS Ad hoc Committee on Industrial Liaison
- Y. Lian serves as an Associate Editor, IEEE Trans. on Circuit and Systems II
- Y. Lian serves as an Associate Editor, IEEE Trans. On Biomedical Circuits and Systems
- Y. Lian serves as an Associate Editor, Circuits, Systems and Signal Processing
- A. van Schaik, Associate Editor, IEEE Trans. on Circuit and Systems I
- W. A. Serdijn, IEEE Transactions on Circuits and Systems - II, Associate Editor (2006 -- 2007)
- W. A. Serdijn, International Journal of Low-Power Electronics, member of the Editorial Board
- W. A. Serdijn, Analog Integrated Circuits and Signal Processing (Kluwer), member of the Editorial Board
- W. A. Serdijn, Member of the Technical Program Committee of ISCAS'2007
- W. A. Serdijn, Member of the Technical Program Committee of APCCAS'2006
- W. A. Serdijn, Member of the Technical Program Committee of the Biomedical Circuits and Systems Conference (BioCAS'2006)
- W. A. Serdijn, Member of the Board of Governors of the IEEE Circuits and Systems Society
- W. A. Serdijn, Member of the Conference Division of the IEEE Circuits and Systems Society
- W. A. Serdijn, Member of the Long Term Strategy Committee of the IEEE Circuits and Systems Society
- W. A. Serdijn, Member of the International Program Committee of 4th IASTED International Conference on Circuits, Signals and Systems (IASTED CDD'2006)
- R. Etienne-Cummings, Board of Governors, IEEE CAS Society, 2003-2005, 2006 – Present (Re-elected)
- R. Etienne-Cummings, Assoc. Director for Education and Outreach, ERC on CISST at Johns Hopkins University, 2004-Present
- R. Etienne-Cummings, Organizing Committee of the NSF Telluride Neuromorphic Engineering Workshop, 2003-Present
- R. Etienne-Cummings, Director of the Institute of Neuromorphic Engineering, 2002-Present (an Institute “with-out walls”)
- R. Etienne-Cummings, Journal Formation Committee Member: IEEE CASS, Trans. Biomedical Circuits and Systems, 2005 – 2006
- R. Etienne-Cummings, Associated Editor, IEEE Sensors Journal, 2002 – Present
- R. Etienne-Cummings, Associated Editor, IEEE Trans. Biomedical Circuits and Systems, 2006 – Present
- R. Etienne-Cummings, Strategic Committee: IEEE CASS Board of Governors, 2003 – present
- R. Etienne-Cummings, Regional Activities Committee: IEEE CASS Board of Governors, 2003 – present
- R. Etienne-Cummings, Member of the Editorial Board: INE The Neuromorphic Engineer, 2002 – present

- R. Etienne-Cummings, Member of Program Committee: ISSCC, SPIE, BIS, ISCAS, NIPS, COSI, BioCAS
- R. Etienne-Cummings, Reviewer: IEEE SJ, IEEE TCAS II, IEEE TNN, IEEE TR, IEEE TBME, IEEE IJSSC, IJCV, NIPS, EWNS, ISCAS, Wiley, NSF, NIH
- O. Yadid-Pecht, Member of the IEEE CAS Analog Signal Processing, Neural Networks, BiOCAS and Sensors Technical Committees (1996-present).
- O. Yadid-Pecht, Member of the SPIE Solid State Sensor Arrays international conference program committee (1997-present).
- O. Yadid-Pecht, 2007 - 2008 IEEE Trans. on BioMedical Circuits and Systems Associate Editor.
- O. Yadid-Pecht, 2005 - 2006 IEEE Trans. on Circuits and Systems Guest Editor – Special Issue on Smart Sensors.
- O. Yadid-Pecht, 2007-2008 IEEE Sensors Council, Circuits and Systems (CAS) Society representative (2007-2008).
- E. Bruun, Reviewer for IEEE J. Solid state circuits and IEEE Trans. circuits & systems I and II.
- E. Chicca, Reviewer for IEEE TNN, IEEE TCAS-I, ISCAS 2007, ICANN06.
- A. McEwan, Reviewer for IEEE Transactions on Medical Imaging, International Journal of Biomedical Imaging, Physiological Measurement
- A. McEwan, Reviewer for IEEE MWSCAS/NEWCAS 2007, IEEE Sensors Journal, IEEE Transactions on Circuits and Systems-II, IEE Proceedings of Circuits Devices and Systems.
- A. Mason, TPC for IEEE Int. Conf Sensors
- S. Chakrabarty, Reviewer for ISCAS 2007, IEEE Transactions on circuit and systems, IEEE Transactions of signal processing, IEEE Transactions of speech and language processing
- M. Sawan, Member of Canada Bio & nanotechnology mission to India;
- M. Sawan, Member of the International Advisory Board of the Emirates Journal of Engineering Research (EJER)
- M. Sawan, Reviewer for ISCAS 2006, ISCAS 2007, Artificial Organs, IEE Microelectronics Journal, IEEE Trans. On CAS 1, IEEE Trans. On CAS II.
- M. Sawan, Member of the International Biotechnology council, IEEE CAS representative (2006-07)
- M.Sawan, Member of the Board of Director of Montreal rehabilitation interdisciplinary Research Center (CRIR)

2. Awards, and honors

- R. Harrison, University of Utah College of Engineering Outstanding Teaching Award, 2006;
- R. Harrison, Jack Raper Award for Outstanding Technology Directions Paper, ISSCC 2006;
- M. Zaghoul, Awarded Honorary Doctor Degree in Engineering from University of Waterloo Canada for life time achievement;
- A. Masson, 2006 Michigan State University Teacher-Scholar Award
- R. Etienne-Cummings, Science Spectrum Trailblazer Award for Top Minorities in Science, 2006
- R. Etienne-Cummings, Fulbright Fellowship Award to South Africa, 2006/2007
- R. Etienne-Cummings, Visiting African Fellowship Award, University of Cape Town, 2006/2007
- R. Etienne-Cummings, Diversity Leadership Council Diversity Award, JHU 2006
- O. Yadid-Pecht, 2007 IEEE Fellow.
- A. McEwan, Visiting Research Fellow, The University of Sydney, March 2007
- A. Mason, Received Michigan State University Teacher-Scholar Award

- M. Sawan, Recipient of the American University of Science and Technology Achievements Award.

3. Patents

- R. Etienne-Cummings and M. A. Lewis, "A Biomorphic Rhythmic Movement Controller," Patent #7164967, September 2006.
- M. Sawan, J.F. Harvey, J.F., M. Roy, et al., "Body Electronic Implant and Artificial Vision System Thereof", USA US7027874 Apr. 2006, Europe EP1333883 B1 Aug. 2006, Europe EP1721633 A3 Nov. 2006, Pending: Japan No.2002-542464, Canada No.2427867, Mexique No.PA/a/2003/004320.
- B. Gosselin, M. Sawan, "Low Power Bioamplifiers with an active DC Rejection Scheme", Pending, USPTO 60747723, May 2006.
- M. Sawan, A. Saleh, F. Mounaim, et al, "A Method and System for Estimating the Bladder Volume & Pressure", Pending No US 60/862549, Nov. 2006.
- K. El-Sankary, M. Sawan, "Circuit Calibration Using Voltage Injection", WO/2006/092055, September 2006.

4. Publications

4.1. Books and book chapters

- [1] W. A. Serdijn, S. A.P. Haddad and J. A. De Lima: Ultra Low-Power Low-Voltage Analog Integrated Filter Design, in J.H. Huijsing, A.H.M. van Roermund and M. Steyaert (Editors) Analog Circuit Design, Kluwer Academic Publishers, February, 2006, ISBN: 1-4020-3884-4.
- [2] F. Triantis, A. Demosthenous, N. Donaldson, and M. Rahal, "ENG recording amplifier configurations for tripolar cuff electrodes," in Handbook of Neural Engineering, ch. 34, Wiley/IEEE Press, pp. 555-567, Nov. 2006.

4.2. Journal manuscripts

- [1] E. Artyomov, O. Yadid-Pecht, "Adaptive Multiple Resolution CMOS Active Pixel Sensor", IEEE Transactions on Circuits and Systems I, Vol. 53, No. 10, pp. 2178-2186, Oct. 2006.
- [2] A. Fish, S. Hamami and O. Yadid-Pecht, "CMOS Image Sensors with Self-Powered Generation Capability", IEEE Transactions on Circuits and Systems II, Vol. 53, no. 11, pp.131-135, November 2006.
- [3] S. Hamami, L. Fleshel and O. Yadid-Pecht, "CMOS APS Imager employing 3.3V 12 bit 6.3 MS/s pipelined ADC", Sensors and Actuators, Vol. A 135/1, pp. 119-125, Mar. 2007.
- [4] R. Segal, I. Shcherback, O. Yadid-Pecht, "CMOS Image Sensors two dimensional MTF for anisotropic resolution characterization", accepted to IEEE Sensors, March 2006.
- [5] L. Hartley, K. V. I. S. Kaler, O. Yadid-Pecht, "Hybrid Integration of an Active Pixel Sensor and Microfluidics for Cytometry on a Chip", accepted to IEEE Transactions on Circuits and Systems I.
- [6] E. Artyomov, A. Fish, O. Yadid-Pecht, "Image sensors for security and medical applications", accepted to the International Journal on Information Theory and Applications.
- [7] A. Fish, L. Sudakov-Boresha and O. Yadid-Pecht, "Low-power Tracking Image Sensor based on biological models of attention", accepted to the International Journal on Information Theory and Applications, Vol.14, 2007
- [8] J. L. Gonzalez-Guillaumin, D. Sadowski, O. Yadid-Pecht, , K. V. I. S. Kaler, M. P. Mintchev, "Multi-channel Pressure, Bolus Transit, and pH Esophageal Catheter", accepted to IEEE Trans. on Sensors.
- [9] J. Vogelstein, F. Tenore, R. Etienne-Cummings, M. A. Lewis, N. Thakor and A. Cohen,

- “Control of Locomotion After Injury or Amputation,” *Biological Cybernetics*, Vol. 95, No. 6, pp. 555 – 566, December 2006. (IF 2.14)
- [1] J. Volgelstein, U. Mallick, G. Cauwenberghs and R. Etienne-Cummings, “Real-Time Image Processing using a Spiking Imager and an Integrate-and-Fire Array Transceiver System,” accepted to *Neural Computation*, Fall 2006. (IF 2.36)
- [2] J. Vogelstein, R. Etienne-Cummings, N. Thakor and A. Cohen, “Phase-Dependent Effects of Stimulation of the Spinal Central Pattern Generator for Locomotion,” *IEEE Trans. Neural Systems and Rehabilitation Engineering*, Vol. 14, No. 3, pp. 257 – 265, September 2006. (IF 1.27)
- [3] N. Ekekwe and R. Etienne-Cummings, “Power Dissipation Sources and Possible Control Techniques in Ultra Deep Submicron CMOS Technologies,” *Elsevier Journal of Microelectronics*, Vol. 37, No. 9, pp. 851-860 September 2006 (IF 0.48)
- [4] M. Clapp and R. Etienne-Cummings, “Bearing Angle Estimation for Sonar Micro-Array Using Analog VLSI Spatiotemporal Processing,” *IEEE Trans. Circuits and Systems-I*, Vol. 53, No. 4, pp. 769 – 783, 2006. (IF 0.93)
- [5] S. Mehta and R. Etienne-Cummings, “A Simplified Normal Optical Flow CMOS Camera,” *IEEE Trans. Circuits and Systems-I*, Vol. 53, No. 6, pp. 1223 – 1234, June 2006 (IF 0.93)
- [6] P. J. Langlois and A. Demosthenous, “Sweet spots in moderate inversion for MOSFET squarer transconductors,” *IEEE Trans. Circuits and Systems II – Express Papers*, in print (available on IEEE Xplore).
- [7] K.S. Chong, B.H. Gwee and J.S. Chang, "Energy-Efficient Synchronous-Logic and Asynchronous-Logic FFT/IFFT Processors," accepted for publication in *IEEE Journal of Solid State Circuits*, (Regular Paper), 2007.
- [8] K.S. Chong, B.H. Gwee, and J.S. Chang, "Design of Several Asynchronous-Logic Macrocells for a Low-Voltage Micropower Cell Library," accepted for publication in *IET Circuits, Devices and Systems*, 2007.
- [9] K.S. Chong, B.H. Gwee, and J.S. Chang, "Low Energy 16-bit Booth Leapfrog Array Multiplier using Dynamic Adders," accepted for publication in *IEE Proceedings on Circuits, Devices and Systems*, 2006.
- [10] K.S. Chong, B.H. Gwee and J.S. Chang, "A 16-Channel Low Power Non-Uniform Spaced Filter Bank Core for Digital Hearing Aids," *IEEE Transactions on Circuits and Systems II: Express Briefs*, vol. 53, no. 9, pp. 853-857, 2006.
- [11] S. A.P. Haddad, R. P.M. Houben and W. A. Serdijn: The history of cardiac pacemakers: an electronics perspective, *IEEE EMBS Magazine*, Vol. 25, No. 3, May/June 2006, pp 38 - 48.
- [12] R. Reeve, A. van Schaik, C. Jin, T. Hamilton, B. Torben-Nielsen and B. Webb, "Directional hearing in a silicon cricket," *Biosystems*, Volume 87, Issues 2-3, 2007, pp 307-313.
- [13] V. Chan, S. Liu, and A. van Schaik, "AER EAR: A Matched Silicon Cochlea Pair with Address Event Representation Interface," *IEEE Transactions on Circuits and Systems I*, Vol 54, No 1, pp 48-59.
- [14] I. Pachnis, A. Demosthenous and N. Donaldson, “Passive neutralisation of myoelectric interference from neural recording tripoles,” *IEEE Trans. Biomed. Eng.*, in print (available on IEEE Xplore).
- [15] O. A. Adeniran and A. Demosthenous, “An ultra-energy-efficient, wide-bandwidth video pipeline ADC using optimized architectural partitioning,” *IEEE Trans. Circuits and Systems – Regular Papers*, vol. 53, no.12 pp. 2485-2497, Dec. 2006.
- [16] C. Sawigun and A. Demosthenous, “Compact low-voltage CMOS four-quadrant analogue multiplier”, *Electronics Letters*, vol. 42, issue 20, pp. 1149-1151, Sep. 2006.
- [17] M. Panovic and A. Demosthenous, “CMOS compact difference-squared cell for analogue motion estimation processor designs,” *Int. J. Electronics*, vol. 93, no. 8, pp. 543-558, Aug. 2006.

- [18] M. Panovic and A. Demosthenous, "Motion estimation processor using mixed-signal approach," IEEE Trans. Circuits and Systems II – Express Papers, vol. 53, no. 6, pp. 492-496, June 2006.
- [19] R.J. Kier, J.C. Ames, R.D. Beer, and R.R. Harrison, "Design and implementation of multipattern generators in analog VLSI," IEEE Transactions on Neural Networks **17**:1025-1038, July 2006.
- [20] C.J. Myers, R.R. Harrison, D. Walter, N. Seegmiller, and S. Little, "The case for analog circuit verification," Electronic Notes in Theoretical Computer Science **153**:53-63, 2006.
- [21] C.A. Chestek, P. Samsukha, M. Tabib-Azar, R.R. Harrison, H.J. Chiel, and S.L. Garverick, "Microcontroller-based wireless recording unit for neurodynamic studies in saltwater," IEEE Sensors Journal **6**:1105-1114, Oct. 2006.
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- [25] J. Zhang, J. Zhou and A. Mason, "Highly Adaptive Transducer Interface Circuit for Multi-Parameter Microsystems," IEEE Trans. Circ. Sys. I, vol. 54, no. 1, pp. 167-178, Jan. 2007.
- [26] Eugenio Culurciello and Pujitha Weerakoon, Three-Dimensional Photodetectors in 3D Silicon-on-insulator technology, IEEE Electron Device Letters, to be published in February 2007.
- [27] R. Jacob Vogelstein, Udayan Mallik, Eugenio Culurciello, Gert Cauwenberghs, Ralph Etienne-Cummings, A Multi-Chip Neuromorphic System for Spike-Based Visual Information Processing, (NECO-03-06-179R2) Neural Computation, 2006.
- [28] F. Laiwalla, K.G. Klemic, F.J. Sigworth, E. Culurciello, An Integrated Patch-Clamp Amplifier in Silicon-on-Sapphire CMOS, IEEE Transactions on Circuits and Systems, TCAS-I, special issue on Life Science and Applications, Volume 53, Issue 11, Nov. 2006, pp. 2364 - 2370.
- [29] Eugenio Culurciello and Andreas G. Andreou, CMOS image sensors for sensor networks, Analog Integrated Circuits and Signal Processing, Springer Netherlands, Volume 49, Issue1, October 2006, pp. 39-51.
- [30] G. Marcus, K. Strohben, S. Jaskulek, A.G. Andreou, E. Culurciello, A Monolithic Isolation Amplifier in Silicon-on-Insulator CMOS: Testing and Applications, Analog Integrated Circuits and Signal Processing, Publisher: Springer Netherlands, Volume 49, Issue1, October 2006, pp. 63-70.
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- [33] J.H. Nielsen and E. Bruun, "An Implantable CMOS Front-End System for Nerve-Signal Sensors," Analog Integrated Circuits and Signal Processing, vol.46, pp. 7-16, January 2006.
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