

# Sensory Systems Technical Committee Annual Report

## IEEE Circuits and Systems Society

### Activities for May 2006 through April 2007

**Chair:** Andre van Schaik, University of Sydney, Australia, [andre@ee.usyd.edu.au](mailto:andre@ee.usyd.edu.au)

**Chair Elect:** Shih-Chii Liu, Institut für Neuroinformatik, Switzerland, [shih@ini.phys.ethz.ch](mailto:shih@ini.phys.ethz.ch)

**Secretary:** Denise Wilson, University of Washington, [wilson@ee.washington.edu](mailto:wilson@ee.washington.edu)

**Secretary Elect:** Bernabe Linares, National Microelectronics Center, Spain, [Bernabe.Linares@imse.cnm.es](mailto:Bernabe.Linares@imse.cnm.es)

**Past Chair:** Orly Yadid-Pecht, Ben-Gurion University, Israel, [oyp@ee.bgu.ac.il](mailto:oyp@ee.bgu.ac.il)

#### Summary of Activities

The goal of the Sensory Systems (SS) Technical Committee is to foster research, development, education and industrial dissemination of knowledge relating to the emerging field of sensors, MEMS and associated processing systems. The activity is genuinely multidisciplinary, drawing upon knowledge and expertise from fields such as biology, physics, mechanics and chemistry, in addition to areas more traditionally associated with the IEEE such as electrical and computer engineering, computer science and information technology.

Committee members are renowned experts, who are both committed to, and active within, the field. The committee membership currently stands at 38 active members, down from 54 last year. This is the result of the removal of 19 members according to our by-law: "A member is removed from the committee if he/she does not attend three consecutive annual committee meetings." In addition 5 new members were welcomed to the committee at ISCAS06.

The following details the CASS-related Sensory Systems activity by the committee and its members.

**1. Participation in ISCAS track paper reviews:** We had a total of 53 papers originally submitted to the track. At least three reviews were arranged for each paper. The acceptance rate was 47.2% with 15 papers accepted for oral presentation and 10 papers accepted for poster presentation. The lower targeted acceptance rate has allowed us to significantly increase the average quality of the accepted papers.

#### 2. Best Paper Award:

The 9 best papers in the Sensors track (according to the reviews) were selected by the TC 2007 Sensory Systems track chair (Dr. van Schaik & Dr. Liu) based on the feedback on all papers from the reviewers and Review Committee Members. These 9 papers were then re-examined by Drs. van Schaik, Liu, & Linares, each examining 6 papers, so that each paper would receive an additional 2 reviews. Examining of a (co-)author's paper by the author was avoided. Each examiner ranked the 6 papers assigned with the best ranked paper receiving 6 points and the lowest ranked paper 1 point. The paper's points were tallied and the highest scoring paper has been selected as the best Sensory Systems track paper for 2007. The next ranked 3 papers are awarded honorary mentions.

The first honorary mention goes to paper "A Spike Based Saccadic Recognition System", by M. Oster, P. Lichtsteiner, T. Delbruck, and S.C. Liu, from ETH Zurich.

Second Honorary Mention goes to paper “A CMOS Front-End for a Lossy Image Compression Sensor by Zhiqiang Lin, Michael W. Hoffman, Walter D. Leon, Nathan Schemm, and Sina Balkir, from the University of Nebraska-Lincoln.

Third Honorary Mention goes to paper “An AER Contrast Retina with On-Chip Calibration”, by J. Costas-Santos, T. Serrano-Gotarredona, R. Serrano-Gotarredona, and B. Linares-Barranco, from the Sevilla Microelectronics Institute.

Best Paper is honored to “Low Fixed Pattern Noise Current-mode Imager Using Velocity Saturated Readout Transistors” by Zheng Yang, Viktor Gruev and Jan Van der Spiegel, from the University of Pennsylvania.

**3. Journal Special Issues:** A special issue for TCASI based on the best papers from ISCAS 2005 has been published in January 2007.

**4. Out Reach:** Members of our TC serve on program committees of various conferences such as SPIE, NIPS, ISSCC, ICECS, BIS and many others.

**5. Technical Committee Membership.** We have recruited a group of TC members that cover all the thrusts of our TC. The committee has members from academia, national labs and industry. We have also attempted to diversify the membership to include senior and junior scientists, as well as women and minorities. In addition, our members serve on the editorial boards of various Journals, such as IEEE TVLSI, TSensors, TCAS and AICSP journal.  
(Appendix A contains a full list of current TC members)

**6. Future Plans:** Extend visibility of TC via special issues, books, workshops etc.

**7. Committee members activities:**

The activities by the various committee members are listed in appendix B

## Appendix A

### Chairman

#### André van Schaik

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### Secretary

#### Denise Wilson

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### Past Chair

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## Appendix B

**André van Schaik**

Chair IEEE CAS Sensory Systems TC

Member, IEEE CAS Technical Committees: Analogue Signal Processing, Biomedical Circuits and Systems, Neural Systems and Applications

Co-chair, Sensory Systems Track IEEE ISCAS07

AE IEEE TCASI

Board Member, Institute of Neuromorphic Engineering

Organizer, Telluride Neuromorphic Engineering Workshop

Member EPSRC peer review college

### Publications:

Journal papers:

1. 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.
2. 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.

Conference papers:

3. [T. Hamilton, C. Jin, & A. van Schaik, "An Analysis of Matching in the Tau Cell Log-Domain Filter," \*Proceedings of the IEEE International Symposium on Circuits and Systems \(ISCAS 2006\)\*, May 2006, Kos, Greece, pp 421-424.](#)
4. [V. Chan, A. van Schaik, & S-C. Liu, "Spike Response Properties of an AER EAR," \*Proceedings of the IEEE International Symposium on Circuits and Systems \(ISCAS 2006\)\*, May 2006, Kos, Greece, pp 859-862.](#)

## **Shih-Chii Liu**

Chair Elect, IEEE CAS Sensory Systems TC

Co-chair of Sensory Systems Track

Co-organizer of special session on Spike Processing Based Hardware Vision Systems Vice-Chairman of IEEE Sensory Systems Technical Committee Secretary-Elect of IEEE Neural Systems and Applications Technical Committee

Editorial Board member of Neuromorphic Engineering newsletter

### **Publications:**

Chan, V., Liu, S-C., and van Schaik, A. (2007), "AER EAR: A matched silicon cochlea pair with address event representation interface," *IEEE Transactions on Circuits and Systems I-Special Issue on Smart Sensors*, Yadid-Pecht, O., Wilson, D., and Zaghloul, M., eds.

Huang, Y-Y., Rinner, O., Hedinger, P., Liu, S-C., and Neuhauss, S. (2006), "Oculomotor instabilities in zebrafish mutant *belladonna*: A behavioral model for congenital nystagmus due to axonal misrouting," *Journal of Neuroscience*, 26(39), pp.~9873--9880.

## **Denise Wilson**

Secretary IEEE CAS Sensory Systems TC

Associate Editor, IEEE Sensors Journal

### **Publications:**

Denise M. Wilson and Lisa E. Hansen, "Current-Mode System-on-Chip Interface for SPR-based Sensing Systems," IEEE Sensors Journal, submitted for publication, March 2007.

Vaibhav Vaidya, Susan Soggs, Jungbae Kim, Andreas Haldi, Bernard Kippelen, and Denise M. Wilson, "Comparison of Pentacene and Amorphous Silicon AMOLED Display Driver Circuits," IEEE Transactions Circuits and Systems I, submitted for publication, November 2006.

M.W. Johnston, Lisa E. Hansen, and Denise M. Wilson, "System-on-Chip Circuit Architecture for Eliminating Interferents in Surface Plasmon Resonance Sensing Systems," IEEE Sensors Journal, in press.

### **Out Reach:**

## **Katrina Aftermath a Life-changing Classroom**

**H**ands-on learning and real-world experience are touted as keys to reforming engineering education and teaching skills needed in the global economy. And so much more, especially when “hands-on” and “real-world” encompass the devastation wrought by Hurricane Katrina.

Junior electrical engineering major Charlene Reyes found a passion and a career path. Mayra Garcia, who will receive her civil and environmental engineering degree this summer, embraced the importance of bringing people and their needs to the fore in project planning.

The transformative catalyst was a winter quarter course titled “Impact of Katrina on Technology and Infrastructure,” led by Denise Wilson, associate professor of electrical engineering. She took five engineering students and seven from other disciplines to the Gulf Coast town of Bay St. Louis, Miss., to learn about natural disasters, emergency response, and infrastructure issues.

Reyes and Garcia signed up for similar reasons. “I had never traveled outside the West Coast and this was the closest I could get to the experience of studying abroad,” Reyes said.

Wilson had more in mind than an introduction to different regional culture. Her own life-altering experiences volunteering on the Gulf Coast in 2005 inspired her to develop an undergraduate course that immersed students in community service work and exposed them to the societal, economic, and technological issues entangling an epic environmental and human tragedy.

In Bay St. Louis, population 10,000, the students bunked in the small, stuffy classrooms of a church and washed in a make-shift shower tent. “We complained for the first week,” Reyes said, “but we saw so many families still living in cramped FEMA trailers parked outside their wrecked homes. It was so humbling. I used to be all about ‘poor me,’ but now I appreciate everything.”

For their community service, the students spent three to four days a week repairing homes, learning how to install dry wall and do plumbing, electrical repair, tiling, and painting. “The local people were so friendly, optimistic, and grateful,” Garcia said. “One man whose house we worked on would bring us food like gumbo.”

The academic component of the course included field trips to study the effects of wetland degradation, weak infrastructure, and the problems with government response. Students looked at flood control structures along the Mississippi and were briefed on rescue operations by the Coast Guard in New Orleans and on electrical grid restoration by Mississippi Power. Wilson led regular discussion sessions to reflect on their experiences, and the students completed weekly writing assignments and wrote a term paper.



In researching her paper on the effects of Katrina on the power grid, Reyes discovered her engineering passion and mission — large-scale power systems. She’s eager to go to graduate school and then work in the South. “This experience changed my life,” Reyes said.

“Once you get out of your own bubble, you can’t get back in,” Wilson affirmed. “I’m encouraged that some students came back with a strong, enduring desire to serve the community.”

That’s the power of hands-on, real-world learning.



*Electrical engineering student Charlene Reyes, operating a tile saw, and Associate Professor Denise Wilson (right) tackle the nitty gritty work of repairing a damaged home.*

*The UW’s Carlson Center assisted in designing the course. Wilson will lead another group of undergraduates to Bay St. Louis this summer.*

## **Bernabe Linares-Barranco**

Secretary-Elect IEEE CAS Sensory Systems TC

ISCAS2007: Session chair, RCM, and running a special session (Spike Processing Based Hardware Vision Systems)

AE for IEEE Trans. on Neural Networks

### **Publications:**

R. Serrano-Gotarredona, L. Camuñas-Mesa, T. Serrano-Gotarredona, J. A. Leñero-Bardallo, and B. Linares-Barranco, "The Stochastic I-Pot: A Circuit Block for Programming Bias Currents," *IEEE Trans. Circuits and Systems, Part-II: Brief Papers*, accepted for publication.

J. Costas-Santos, T. Serrano-Gotarredona, R. Serrano-Gotarredona and B. Linares-Barranco, "A Spatial Contrast Retina with On-chip Calibration for Neuromorphic Spike-Based AER Vision Systems," *IEEE Trans. Circuits and Systems, Part-I: Regular Papers*, accepted for publication.

Bernabe Linares-Barranco and Teresa Serrano-Gotarredona, "On an Efficient CAD Implementation of the Distance Term in Pelgrom's Mismatch Model," *IEEE Trans. on CAD*, in Press.

R. Serrano-Gotarredona, T. Serrano-Gotarredona, A. Acosta-Jimenez, and B. Linares-Barranco, "A Neuromorphic Cortical-Layer Microchip for Spike-Based Event Processing Vision Systems," *IEEE Trans. Circuits and Systems, Part-I: Regular Papers*, vol. 53, No. 12, pp. 2548-2566, December 2006.

Teresa Serrano-Gotarredona and Bernabe Linares-Barranco, "A Low-Power Current Mode Fuzzy-ART Cell," *IEEE Trans. on Neural Networks*, November 2006.

Alejandro Linares-Barranco, Matthias Oster, Daniel Cascado, Gabriel Jimenez, Anton civit, Bernabe Linares-Barranco, "Inter-Spike-Intervals Analysis of AER Poisson like Generator Hardware," *Neurocomputing*, in Press.

Alejandro Linares-Barranco, Gabriel Jimenez-Moreno, Bernabe Linares-Barranco and Anton Civit-Ballcells, "On Algorithmic Rate-Coded AER Generation," *IEEE Transactions on Neural Networks*, vol. 17, No. 3, pp. 771-788, May 2006.

## **Orly Yadid-Pecht**

Past Chair IEEE CAS Sensory Systems TC

### **1 IEEE Services**

#### **1.1 Invited Lectures**

“CMOS Imagers Characterization” - Invited Lecture for the CMOS Imaging Workshop, Franhuafer Institute, Germany, May 2006.

“Challenges in CMOS Imaging” - Invited Lecture for the Advanced Technologies Workshop, Banff, July 2006.

#### **1.3 Other professional activities**

Member of the IEEE CAS Analog Signal Processing, Neural Networks, Biocas and Sensors Technical Committees (1996-present).

Member of the SPIE Solid State Sensor Arrays international conference program committee (1997-present).

Board memberships:

2007 - 2008 **IEEE Trans. on BioMedical Circuits and Systems** Associate Editor

2005 - 2006 **IEEE Trans. on Circuits and Systems** Guest Editor – Special Issue on Smart Sensors

2007-2008 **IEEE Sensors Council**, Circuits and Systems (CAS) Society representative (2007-2008).

### **2. Awards and honors**

2007 IEEE Fellow

### **3. Publications**

#### **3.1 Peer Reviewed Papers:**

*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.

*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.

*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.

*R. Segal, I. Shcherback, O. Yadid-Pecht*, “CMOS Image Sensors two dimensional MTF for anisotropic resolution characterization”, accepted to *IEEE Sensors*, March 2006.

*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*.

*E. Artyomov, A. Fish, O. Yadid-Pecht*, “Image sensors for security and medical applications”, accepted to the *International Journal on Information Theory and Applications*.

*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.

*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*.

### **3.2 Peer reviewed conference papers:**

*I. Shcherback, R. Segal, A. Belenky, and O. Yadid-Pecht*, "Two-Dimensional CMOS Image Sensor Characterization", *IEEE ISCAS2006*, Kos, May 2006.

*A. Belenky, A. Fish and O. Yadid-Pecht*, " Global Shutter CMOS Image Sensor With Wide Dynamic Range", *IEEE ICECS 2006*, Nice, France, December, 2006.

*A. Fish, T. Rothschild, A. Hodes, Y. Shoshan and Orly Yadid-Pecht*, “Low Power CMOS Image Sensors Employing Adaptive Bulk Biasing Control (AB<sup>2</sup>C) Approach”, accepted to *IEEE ISCAS 2007*.

*T. Tam, G. A. Jullien, O. Yadid-Pecht*, “A CMOS Contact Imager for Cell Detection in Bio-Sensing Applications”, accepted to *IEEE ISCAS 2007*.

## Ralph Etienne-Cummings

### **Professional Activities and Service**

- Σ Board of Governors, *IEEE CAS Society*, 2003-2005, 2006 – Present (Re-elected)
- Σ Assoc. Director for Education and Outreach, *ERC on CISST at Johns Hopkins University*, 2004-Present
- Σ Organizing Committee of the NSF Telluride Neuromorphic Engineering Workshop, 2003-Present
- Σ Director of the Institute of Neuromorphic Engineering, 2002-Present (an Institute “with-out walls”)
- Σ Journal Formation Committee Member: IEEE CASS, Trans. Biomedical Circuits and Systems, 2005 – 2006
- Σ Associated Editor, *IEEE Sensors Journal*, 2002 – Present
- Σ Associated Editor, *IEEE Trans. Biomedical Circuits and Systems*, 2006 – Present
- Σ Strategic Committee: IEEE CASS Board of Governors, 2003 – present
- Σ Regional Activities Committee: IEEE CASS Board of Governors, 2003 – present
- Σ Member of the Editorial Board: *INE The Neuromorphic Engineer*, 2002 – present
- Σ Member of Program Committee: ISSCC, SPIE, BIS, ISCAS, NIPS, COSI, BioCAS
- Σ Reviewer: IEEE SJ, IEEE TCAS II, IEEE TNN, IEEE TR, IEEE TBME, IEEE IJSSC, IJCV, NIPS, EWNS, ISCAS, Wiley, NSF, NIH

### **Honors**

- Σ Science Spectrum Trailblazer Award for Top Minorities in Science, 2006
- Σ Fulbright Fellowship Award to South Africa, 2006/2007
- Σ Visiting African Fellowship Award, *University of Cape Town*, 2006/2007
- Σ Diversity Leadership Council Diversity Award, *JHU* 2006

### **Journal Publications:**

- Σ 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)
- Σ J. Vogelstein, 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)
- Σ 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)
- Σ 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)
- Σ 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)
- Σ 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)

### **Conference Publications:**

- Σ Y. Chi, T. Tran and R. Etienne-Cummings, “Optical Flow Approximation of Sub-Pixel Accurate Block Matching for Video Coding” accepted to *IEEE ICASSP 2007*, Honolulu, HI, April 2007.
- Σ R. Philipp and R. Etienne-Cummings, “A Single Chip Stereo Imager” *ISSCC’06 Digest of Technical Papers*, Vol. 49, Feb 2006.
- Σ S. Acharya, V. Aggarwal, F. Tenore, H.C. Shin, R. Etienne-Cummings, M.H. Schieber, N.V. Thakor, “Towards a Brain-Computer Interface for Dexterous Control of a Multi-Fingered Prosthetic Hand,” Submitted to *IEEE EMBS NeuroEngineering*, Honolulu, HI, USA, Summer 2007.
- Σ J. Tapon and R. Etienne-Cummings, “A Simple Neural Cross-Correlator Engine,” accepted to *IEEE ISCAS 2007*, New Orleans, LA, May 2007.
- Σ N. Ekekwe, P. Kazanzides and R. Etienne-Cummings, “Incremental Encoder Based Position and Velocity Measurements VLSI Chip with Serial Peripheral Interface,” accepted to *IEEE ISCAS 2007*, New Orleans, LA, May 2007.
- Σ C. Clark, C. White and R. Etienne-Cummings, “Design and Optimization a Capacitive Micromachined Ultrasonic Transducer Micro-Array for Near Field Sensing ,” accepted to *IEEE ISCAS 2007*, New Orleans, LA, May 2007.
- Σ V. Gruev, Z. Yang, J. van der Spiegel and R. Etienne-Cummings, “2 Transistor, Current-Mode Active Pixel Sensor,” accepted to *IEEE ISCAS 2007*, New Orleans, LA, May 2007.

- Σ A. Russell, G. Orchard and R. Etienne-Cummings, "Configuring Spiking Central Pattern Generator Networks with Genetic Algorithms," accepted to *IEEE ISCAS 2007*, New Orleans, LA, May 2007.
- Σ R. Etienne-Cummings, V. Gruev, S. Mehta and R. Philipp, "Neuromorphic Vision Systems for Mobile Applications," *IEEE CICC 2006*, San Jose, CA, September 2006 (Invited)
- Σ R. Philipp and R. Etienne-Cummings, "Second Generation Single-Chip Imager," *IEEE ISCAS 2006*, Kos, Greece, May 2006.
- Σ N. Ekekwe, R. Etienne-Cummings and Peter Kazanzides, "Modeling and simulation of a VLSI chip for adaptive speed control of brushed DC motors", *IASTED International Conference on Control and Applications*, Montreal, Canada, May 2006.
- Σ F. Tenore, J. Vogelstein, R. Etienne-Cummings, G. Cauwenberghs and P. Hasler, "A Floating-Gate Programmable Array of Silicon Neurons for Central Pattern Generating Networks," *IEEE ISCAS 2006*, Kos, Greece, May 2006.
- Σ M. Chi, U. Mallik, E. Choi, M. Clapp, G. Cauwenberghs and R. Etienne-Cummings, "CMOS Pixel-Level ADC with Change Detection," *IEEE ISCAS 2006*, Kos, Greece, May 2006.
- Σ N. Ekekwe, R. Etienne-Cummings and P. Kazanzides, "A Configurable VLSI Chip for DC Motor Control for Compact, Low-Current Robotic Systems," *IEEE ISCAS 2006*, Kos, Greece, May 2006.
- Σ J. Vogelstein, R. Etienne-Cummings and A. Cohen, "Dynamic Control of Spinal Locomotion Circuits," *IEEE ISCAS 2006*, Kos, Greece, May 2006.
- Σ S. Mehta and R. Etienne-Cummings, "Normal Flow Measurement Visual Motion Sensor" *IEEE ISCAS 2006*, Kos, Greece, May 2006.
- Σ V. Gruev, R. Philipp and R. Etienne-Cummings, "General Image Processing Chip in 3D Integration," *IEEE ISCAS 2006*, Kos, Greece, May 2006.
- Σ R. Etienne-Cummings, Swati Mehta, R. Philipp and V. Gruev, "Neuromorphic Vision Systems for Mobile Applications," *IEEE CICC '06*, San Jose, CA, September 2006.
- Σ R. Etienne-Cummings and J. Tapson, "Wireless Address Event Representation System For Biological Sensor Network," accepted to *Proc. SPIE (Bioengineered and Bioinspired Systems)*, May 2007
- Σ C. Clark, J. Whitney and R. Etienne-Cummings, "Design of an Ultrasonic Micro-Array for Near Field Sensing during Retinal Microsurgery," *Proc. EMBS*, New York, NY, August 2006.

**Patents:**

- Σ R. Etienne-Cummings and M. A. Lewis, "A Biomorphic Rhythmic Movement Controller," Patent #7164967, September 2006.

**Workshops/Conferences/Panels/Invited Talks:**

- Σ Session Chairman: International Symposium on Circuits and Systems, 2001-2006
- Σ Program Co-Chair: IEEE BioCAS Conference, Montreal, Fall 2007
- Σ Invited Speaker: Yale University, CT, 2006.
- Σ Invited Speaker: University of Alberta, Canada, 2006.
- Σ Invited Speaker: IEEE CICC '06, Signal and Data Processing, San Jose, CA, 2006.
- Σ Invited Speaker: University of Cape Town, IEEE Chapter, 2006.
- Σ Organizer: NSF Telluride Neuromorphic Engineering Workshop, Telluride, CO, 2003-2006.
- Σ Organizer: ISCAS 2006, Special Sessions on Sensory Systems for Biological Applications, Kos, Greece, May 2006.
- Σ Organizer: ISCAS 2006, Demonstration Sessions on Sensory Systems, Kos, Greece, May 2006.

## **Khaled Salama**

ISCAS 2007: Tutorial presenter, Session Chair

### **Publications:**

Book chapter:A. El Gamal et al, CMOS Sensors For Optical Molecular Imaging, in CMOS bio technology, (editors Hakho Lee, Donhee Ham, and Robert M. Westervelt)

## **Philipp Häfliger**

ISCAS 2007: Special session organizer (live demonstrations of circuits and systems)

### **Publications:**

Adaptive WTA with an analog VLSI neuromorphic learning chip, P. Häfliger, accepted for publication in IEEE Transactions on Neural Networks) .

Exploiting Gate Leakage in Sub-Micrometer CMOS for Input Offset Adaptation P. Häfliger and H. K. O. Berge, IEEE Transactions on Circuits and Systems II, 2007, vol. 54 (2), p 127-130).



## Eugenio Culurciello

### Publications:

**Three-Dimensional Photodetectors in 3D Silicon-on-insulator technology**, Eugenio Culurciello and Pujitha Weerakoon, IEEE Electron Device Letters, to be published in February 2007.

[A Multi-Chip Neuromorphic System for Spike-Based Visual Information Processing](#), R. Jacob Vogelstein, Udayan Mallik, Eugenio Culurciello, Gert Cauwengberghs, Ralph Etienne-Cummings, (NECO-03-06-179R2) Neural Computation, 2006.

[An Integrated Patch-Clamp Amplifier in Silicon-on-Sapphire CMOS](#), F. Laiwalla, K.G. Klemic, F.J. Sigworth, E. Culurciello, IEEE Transactions on Circuits and Systems, TCAS-I, special issue on Life Science and Applications, Volume 53, Issue 11, Nov. 2006, pp. 2364 - 2370.

[CMOS image sensors for sensor networks](#), Eugenio Culurciello and Andreas G. Andreou, Analog Integrated Circuits and Signal Processing, Springer Netherlands, Volume 49, Issue1, October 2006, pp. 39-51.

[A Monolithic Isolation Amplifier in Silicon-on-Insulator CMOS: Testing and Applications](#), G. Marcus, K. Strohben, S. Jaskulek, A.G. Andreou, E. Culurciello, Analog Integrated Circuits and Signal Processing, Publisher: Springer Netherlands, Volume 49, Issue1, October 2006, pp. 63-70.

**An Integrated Silicon-on-Sapphire Patch-Clamp Amplifier**, F. Laiwalla, K.G. Klemic, F.J. Sigworth, E. Culurciello, IEEE/NLM Life Science Systems and Application Workshop 2006, NIH, Bethesda MD, 13-14th July 2006.

Conference proceedings

**An Integrated Silicon-on-Sapphire Patch-Clamp Amplifier**, F. Laiwalla, K.G. Klemic, F.J. Sigworth, E. Culurciello, IEEE/NLM Life Science Systems and Application Workshop 2006, NIH, Bethesda MD, 13-14th July 2006.

## **Martin Haenggi**

ISCAS'07 Tutorial entitled "Wireless Sensor Networks: From Theory to Practice"

TPC of GLOBECOM'06, ICC'06, GLOBECOM'07, ICC'07.

Assoc. Editor of the Elsevier Journal on Ad Hoc Networks.

CAS Distinguished Lecturer for 2005/06.

### **Publications:**

- [1] X. Liu and M. Haenggi, "Towards Quasi-Regular Sensor Networks: Topology Control Algorithms for Improved Energy Efficiency," *IEEE Transactions on Parallel and Distributed Systems*, vol. 17, pp. 975-986, Sept. 2006. Special Issue on Localized Communication and Topology Protocols for Ad Hoc Networks.
- [2] M. Sikora, J. N. Laneman, M. Haenggi, D. J. Costello, and T. Fuja, "Bandwidth- and Power-Efficient Routing in Linear Wireless Networks," *Joint Special Issue of IEEE Transactions on Information Theory and IEEE Transactions on Networking*, vol. 52, pp. 2624-2633, June 2006.

## **Maysam Ghovanloo**

Technical Review Committee, IEEE Intl. Symp. on Circuits and Systems, New Orleans, LA, May 2007.

Special Session Co-Organizer, Neuroengineering Circuits and Microsystems, IEEE Intl. Symp. on Circuits and Systems, New Orleans, LA, May 2007.

Session Co-Chair: BioMEMS, IEEE Intl. Symp. on Circuits and Systems, New Orleans, LA, May 2007.

Technical Program Committee, Bioengineering, IEEE Midwest Symp. on Circuits and Systems, Montreal, Canada, August 2007.

Technical Program Committee, IEEE Biomedical Circuits and Systems conference, Montreal, Canada, November 2007.

Special Session Organizer, Modern Assistive Technologies, IEEE Engineering in Medicine and Biology Conference, Lyon, France, August 2007.

## **Tobi Delbrück**

Tobi Delbrück chaired 4 sessions at ISCAS2007, co-organized (with Philipp Hafliger) the special session on "Live demonstrations", and was a review committee member. He is also named associate editor of the IEEE Transactions on Biomedical Circuits and Systems, served as reviewer for ISCAS and NIPS meetings, and reviewer for several journals. He was selected as a distinguished lecturer for the IEEE in 2007 and received 3 IEEE awards, including the 2006 ISSCC Jan van Vessel Outstanding European Paper award.

### **Publications:**

Berner, R., T. Delbrück, A. Civit-Balcells and A. Linares-Barranco (2007). A 5 Meps \$100 USB2.0 Address-Event Monitor-Sequencer Interface. ISCAS 2007.

Chicca, E., A. M. Whatley, P. Lichtsteiner, V. Dante, T. Delbrück, R. Douglas and G. Indiveri (accepted 4 Nov. 2006). "A multi-chip pulse-based neuromorphic infrastructure and its application to a model of orientation selectivity." IEEE Transactions on Circuits and Systems, part I (TCAS-I).

Delbrück, T. and P. Lichtsteiner (2006). Fully programmable bias current generator with 24 bit resolution per bias. 2006 IEEE International Symposium on Circuits and Systems (ISCAS 2006), Athens, IEEE.

Delbrück, T. and P. Lichtsteiner (2007). Fast sensory motor control based on event-based hybrid neuromorphic-procedural system. ISCAS 2007, New Orleans.

Delbrück, T., A. M. Whatley, R. Douglas, K. Eng, K. Hepp and P. F. M. J. V. Verschure (2007). "A Tactile Luminous Floor for an Interactive Autonomous Space." Robotics and Autonomous Systems (in press).

Fasnacht, D. and T. Delbrück (2007). Dichromatic spectral measurement circuit in vanilla CMOS. IEEE International Symposium on Circuits and Systems (ISCAS 2007), New Orleans, IEEE.

Lichtsteiner, P., T. Delbrück and C. Posch (2006). A 100dB dynamic range high-speed dual-line optical transient sensor with asynchronous readout. 2006 IEEE International Symposium on Circuits and Systems (ISCAS 2006), Athens, IEEE.

Lichtsteiner, P., C. Posch and T. Delbrück (2006). "A 128\_128 120dB 15us-Latency Asynchronous Temporal Contrast Vision Sensor." (accepted to JSSC).

Lichtsteiner, P., C. Posch and T. Delbrück (2006). A 128\_128 120dB 30mW Asynchronous Vision Sensor that Responds to Relative Intensity Change. ISSCC Dig. of Tech. Papers, San Francisco.

Linares-Barranco, A., F. Gómez-Rodríguez, A. Jiménez, T. Delbrück and P. Lichtsteiner (2007). Using FPGA for visuo-motor control with a silicon retina and a humanoid robot. ISCAS 2007.

**Mona E. Zaghoul**

For ISCAS07 I arranged the ISACS07 Tutorials with Prof. Majid Ahmadi

Guest Co- editor of IEEE T-CAS special issue on Smart Sensors January 2007 with Orly Yadid and Denise Wilson

President Elect of the IEEE -Sensors Council

Trying to arrange special sessions jointly at IEEE Sensors07 and the IEEE CASS. I am trying to promote joint technical activities between Sensors and and CASS. Suggestions from SSTC are welcomed.

Published Two Transaction papers on Sensors in IEEE Sensors Journal this year

**Andrew Mason**

TPC for IEEE Int Conf Sensors

Received Michigan State University Teacher-Scholar Award

**Publications:**

K. Oweiss, A. Mason, K. Thomson, Y. Suhail, A. Kamboh, "A Scalable Wavelet Transform VLSI Architecture for Real-Time Neural Signal Conditioning in Implantable Multichannel Neuroprosthetic Devices," IEEE Trans. Circuits and Systems I (in press).

A. Mason, A. V. Chavan, K. D. Wise, "A Mixed-Voltage Sensor Readout Circuit with On-Chip Calibration and Built-In Self-Test," IEEE Sensors J. (in press).

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.

## **Piotr Dudek**

ISCAS 2007 Review Committee Member

Technical Programme Committee Member: European Conference on Circuit Theory and Design

(ECCTD 2007). Track chair for "Gigascale Systems: Neural Networks, CNNs and Fuzzy Systems"

Programme Committee Member: International Conference on Sensing Technology (ICST 2007)

Scientific Committee Member: National Conference on Information Technologies (TI 2007, Poland)

### **Journal Publications:**

P.Dudek and S.J.Carey, "A General-Purpose 128x128 SIMD Processor Array with Integrated Image Sensor ", Electronics Letters, vol.42, no.12, pp.678-679, June 2006

P.Dudek, "An Asynchronous Cellular Logic Network for Trigger-Wave Image Processing on Fine-Grain Massively Parallel Arrays", IEEE Transactions on Circuits and Systems - II, vol. 53, no.5, pp. 354-358, May 2006

### **Conference Publications:**

J.H.B.Wijekoon and P.Dudek, "A simple analogue VLSI circuit of a cortical neuron", IEEE International Conference on Electronics, Circuits and Systems, ICECS 2006, pp.1344-1347, December 2006

A.Lopich and P.Dudek, "A processing element for a digital asynchronous/synchronous vision chip", IASTED International Conference on Circuits, Signals, and Systems CSS 2006, November 2006

A.Lopich and P.Dudek, "Global operations on SIMD cellular processor arrays: towards functional asynchronism", International Workshop on Computer Architectures for Machine Perception and Sensing, CAMPS 2006, pp.18-23, September 2006

P.Dudek, "Adaptive sensing and image processing with a general-purpose pixel-parallel sensor/processor array integrated circuit", International Workshop on Computer Architectures for Machine Perception and Sensing, CAMPS 2006, pp.18-23, September 2006

D.R.W.Barr, S.J.Carey, A.Lopich and P.Dudek, "A Control System for a Cellular Processor Array", IEEE International Workshop on Cellular Neural Networks and their Applications, CNNA 2006, pp.176-181, Istanbul, August 2006

P.Dudek and D.L.Vilarino, "A Cellular Active Contours Algorithm Based on Region Evolution", IEEE International Workshop on Cellular Neural Networks and their Applications, CNNA 2006, pp.269-274, Istanbul, August 2006

A.Lopich and P.Dudek, "Architecture of a VLSI cellular processor array for synchronous/asynchronous image processing", IEEE International Symposium on Circuits and Systems, ISCAS 2006, pp.3618-3621, May 2006

## **Shantanu Chakrabartty**

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

Organizing committee: IEEE electro-information-technology conference. East Lansing, Michigan, May 7-10, 2006

Reviewer: ISCAS 2007, IEEE Transactions on circuit and systems, IEEE transactions of signal processing, IEEE Transactions of speech and language processing

### **Publications:**

Journal papers

Gore, A.; Chakrabartty, S.; Pal, S.; Alocilja, E. C. "A Multichannel Femtoampere-Sensitivity Potentiostat Array for Biosensing Applications", IEEE Transactions on Circuits and Systems I: Regular Papers, Volume 53, Issue 11, Nov. 2006 Page(s):2357-2363

Zuo, Y.; Chakrabartty, S.; Pal, S.; Tahir, Z., Alocilja, E. C. "Spatio-temporal Processing of Multi-channel Biosensors using Support Vector Machines", IEEE Sensors Journal, Dec 2006.

Chakrabartty, S.; Cauwenberghs G. "A Sub-microwatt Analog VLSI Trainable Pattern Classifier", IEEE Journal of Solid-State Circuits, May 2007.

Venkataramani, V., Chakrabartty S., and Byrne W., Gini-Support Vector Machines for Segmental Minimum Bayes Risk Decoding of Continuous Speech, Computer Speech and Language, October 2006 (available online).

Conference proceedings

Yang Liu , Dimitris Stamatis Gkinosatis, Amar K.Mohanty, and Shantanu Chakrabartty, .Carbon Nanotube/Poly lactide Nanocomposites for Wearable Strain Sensors., Nano and Giga Challenges in Electronics and Photonics, Phoenix, Arizona, March, 2007, U.S.A

N. Lajnef, S. Chakrabartty, N. Elvin and A. Elvin, A sub-microwatt self-powered fatigue sensor , 14th International Symposium on: Smart Structures and Materials & Nondestructive Evaluation and Health Monitoring, San Diego, March 2007.

A. Gore and S. Chakrabartty , Large Margin Analog-to-digital converters with applications in Neural Prosthetics, Adv. Neural Information Processing Systems (NIPS'2006).

S. Chakrabartty, A.Gore and K.Oweiss, An Adaptive multiple-input multiple-output sigma-delta converter for high-density neuroprosthetic electrode arrays, IEEE Conference on Engineering in Medicine and Biology (EMBC 2006), New York.



A.Gore, S.Chakrabartty, S. Pal and E. Alocilja, A Multi-channel Femtoampere Sensitivity Conductometric Array for Biosensing Applications, IEEE Conference on Engineering in Medicine and Biology (EMBC 2006), New York.

N. Lajnef, S.Chakrabartty and N.Elvin, A Sub-microwatt Piezo-floating-gate Sensor for Long-term Fatigue Monitoring in Biomechanical Implants, IEEE Conference on Engineering in Medicine and Biology (EMBC 2006), New York

C.Kong and S.Chakrabartty, Analog Margin Propagation based Iterative LDPC Decoders, Analog Decoding Workshop, Torino, Italy 2006.

S. Chakrabartty, CMOS analog iterative decoders using margin propagation circuits, Proceedings of IEEE International Symposium on Circuits and Systems (ISCAS 2006), 21-24 May 2006

P. Kucher and S. Chakrabartty, An Adaptive CMOS Imager with Time-based Compressive Active-pixel Response, , Proceedings of IEEE International Symposium on Circuits and Systems (ISCAS 2006), 21-24 May 2006.

# Amine Bermak

## 1. Professional activities

Organizer of the High Performance and Low-Power Digital Circuit Design Educational Session at the IEEE Custom Integrated Circuit Conference (IEEE CICC'2006), USA.

Member of Technical Program Committee of: "Design Automation and Test in Europe", DATE'2007, "IEEE International Conference on Consumer Electronics", ICCE'2007; "IEEE Custom Integrated Circuit Conference", CICC'2006/2007; "IEEE Internal Workshop on Electronic Design, Test and Applications", DELTA'2006.

Member of the IEEE CAS Sensors Technical Committees (2005-present).

Board memberships:

Associate Editor (2007 – 2008), **IEEE Trans. on Very Large Scale Integration (VLSI) Systems**;

## 2. Publications

### 2.1 Peer Reviewed Papers:

1. B. Guo, A. Bermak, G. Yan and P. C.H. Chan, "A Monolithically integrated 4x4 Tin Oxide Gas Sensor Array with on-chip multiplexing and Differential Readout Circuits," To appear in *Solid-State Electronics*, 2007.
2. S. Chen, and A. Bermak, "Arbitrated Time-To-First Spike CMOS Image Sensor with On-Chip Histogram Equalization," *IEEE Transactions on Very Large Scale Integration Systems*, Issue 3, Volume 15, pp. 346-357, March 2007.
3. A. Bermak, and A. Kitchen, "A Novel Adaptive Logarithmic Digital Pixel Sensor," *IEEE Photonics Technology Letters*, Vol. 18, Issue 20, pp. 2147-2149, Oct. 2006.
4. M. Shi, and A. Bermak, "An Efficient Digital VLSI Implementation of Gaussian Mixture Models-based classifier," *IEEE Transactions on Very Large Scale Integration Systems*, Vol. 14, no. 9, pp. 962-974, Sept. 2006.
5. S. Chen, A. Bermak, W. Yan and D. Martinez, "Adaptive-Quantization Digital Image Sensor for Low-Power, Real-Time Image Compression," To appear in *IEEE Transactions on Circuits and Systems*, part I: Regular papers, Vol. 53, Issue 1, pp. 13-26, Jan. 2007.
6. S. Chen, A. Bermak and F. Boussaid<sup>(\*)</sup> "A Compact Reconfigurable Counter Memory for Spiking Pixels," *IEEE Electron Device Letters*, Vol. 27, Issue 4, pp. 255-257 April 2006.
7. A. Bermak and Y. F. Yung, "A DPS Array with programmable Resolution and reconfigurable Conversion Time," *IEEE Transactions on Very Large Scale Integration Systems*, Vol. 14, Issue 1, pp. 15-22, Jan. 2006.
8. M. Shi, A. Bermak, S. B-Belhouari<sup>(\*)</sup> and P. Chan, "Gas Identification based on a committee machine for Microelectronics gas sensors," *IEEE Transactions on Instrumentation and Measurements*, Vol. 55, Issue 5, pp. 1786-1793, October 2006.

9. A. Bermak and S. B-Belhouari<sup>(\*)</sup>, "Bayesian Learning using Gaussian Process for Gas Identification," *IEEE Transactions on Instrumentation and Measurements*, Volume 55, Issue 3, pp. 787- 792, June 2006.

## 2.2 Peer reviewed conference papers:

1. B. Guo and A. Bermak and D. Martinez, "A 4x4 Logarithmic Spike Timing Encoding Scheme for Olfactory Sensor Applications" *IEEE International Symposium on Circuits and Systems ISCAS2007*, New Orleans, USA, 2007.
2. M. Law and A. Bermak, "A CMOS Image Sensor Using Variable Reference Time Domain Encoding" *IEEE International Symposium on Circuits and Systems ISCAS2007*, New Orleans, USA, 2007.
3. M. Lu<sup>(\*)</sup>, A. Bermak and Y.K. Lee, "Fabrication Technology of Piezoresistive Conductive PDMS for Micro Fingerprint Sensors" *IEEE-MEMS07*, Kobe Japan, 2007.
4. B. Guo, A. Bermak, G. Yan and P. C.H. Chan, "A Tin Oxide Gas Sensor Array with Surface Micro-machined Convex Micro-hotplates," *5<sup>th</sup> IEEE International Conference on Sensors*, Daegu, Korea, Oct 22 - 25, 2006.
5. S. Chen, A. Bermak, W. Yan and D. Martinez, "A CMOS Image Sensor with combined adaptive-quantization and QTD-based on-chip compression processor," *IEEE Custom Integrated Circuits Conference CICC 2006*, SJ, California, USA, Sept 2006.
6. B. Guo, A. Bermak, G. Yan and P. C.H. Chan, "A 4x4 Tin Oxide Gas Sensor Array with Integrated DRC," *8<sup>th</sup> International Conference on Microelectronics*, Dhahran, S.A Dec. 2006.
7. S. Chen, A. Bermak, W. Yan and D. Martinez, "Smooth Boundary Point Adaptive Quantizer for On-Chip Image Compression," *8<sup>th</sup> International Conference on Microelectronics*, Dhahran, S.A Dec. 2006.
8. M. Shi and S. Chandrasekaran, A. Bermak, A. Amira, "An Efficient FPGA Implementation of Gaussian Mixture Models-Based Classifier Using Distributed Arithmetic," *13<sup>th</sup> IEEE International Conference on Electronics, Circuits and Systems*, Nice, France, 2006.
9. M. Shi and A. Bermak, "Committee Machine with Over 95% Classification Accuracy for Combustible Gas Identification," *13<sup>th</sup> IEEE International Conference on Electronics, Circuits and Systems*, Nice, France, 2006.
10. F. Boussaid<sup>(\*)</sup>, S. Chen and A. Bermak, "A Novel Scalable spiking pixel architecture for deep submicron technologies," *IEEE International Conference on Design and Test of Integrated Systems in Nanoscale Technology (DTIS)*, Tunisia, 2006.
11. S. Chen and A. Bermak, "A Second Generation Time-to-First-Spike Pixel with Asynchronous Self Power-off," *IEEE International Symposium on Circuits and Systems ISCAS2006*, Island of Kos, Greece, 2006.
12. M. Shi, B. Guo and A. Bermak, "Redundancy analysis of Tin Oxide Gas Sensors," *IEEE International Workshop on Electronic Design, Test and Applications (DELTA 2006)*, pp.448-454, Malaysia, Jan. 2006.

## **Giacomo Indiveri**

Co-organizer of the Neuromorphic Engineering Workshop, Telluride, CO.  
USA (July 2006)

Co-organizer of the 2007 Neuromorphic Cognition Meeting, Tramariglio, Sardegna, Italy (April 2007)

Co-chair of the Demonstration Session of NIPS\*2006, Vancouver, Canada (December 2006)

Teaching faculty of the 3-week VLSI tutorial course at the 2006 Neuromorphic Engineering Workshop

Invited lecture at the International Symposium on Artificial Brain with Emotion and Learning  
(ISABEL 2006), Seoul, Korea (August, 2006)

Invited Lecture at the Neuro-IT EC information workshop, Brussels, Belgium (January, 2007)

Invited Lecture at the FET INFORMATION EVENT FP7, Brussels, Belgium (February, 2007)

Reviewer for International Journal of Neural Systems

IEEE-TCAS

IEEE-TNN

IEEE "Systems, Man and Cybernetics"

Network: Computation in Neural Systems

Analog Integrated Circuits and Signal Processing

Electronic Letters

## **Publications:**

Chicca, E. and Whatley, A. M. and Lichtsteiner, P. and Dante, V. and Delbruck, T. and Del Giudice, P. and Douglas, R. J. and Indiveri, G., A multi-chip pulse-based neuromorphic infrastructure and its application to a model of orientation selectivity, IEEE Transactions on Circuits and Systems I, Regular Papers

Bartolozzi, C. and Indiveri, G., A spiking VLSI selective attention multi--chip system with dynamic synapses and integrate-and-fire neurons, Advances in Neural Information Processing Systems

Chicca, E. and Indiveri, G. and Douglas, R. J., Context dependent amplification of both rate and event-correlation in a VLSI network of spiking neurons, Advances in Neural Information Processing

Systems5 2007Indiveri, G. and Fusi, S., Spike-based learning in VLSI networks of integrate-and-fire neurons, Proceedings of the IEEE International Symposium on Circuits and Systems (ISCAS 07)

Bartolozzi, C. and Indiveri, G., Synaptic dynamics in analog VLSI, Neural Computation

Bartolozzi, C. and Mitra, S. and Indiveri, G., An ultra low power current-mode filter for neuromorphic systems and biomedical signal processing, IEEE Biomedical Circuits and Systems Conference (BioCAS06)

Indiveri, G. and Chicca, E. and Douglas, R., A VLSI array of low-power spiking neurons and bistable synapses with spike-timing dependent plasticity, IEEE Transactions on Neural Networks

Mitra, S. and Fusi, S. and Indiveri, G., A VLSI spike-driven dynamic synapse which learns only when necessary, Proceedings of IEEE International Symposium on Circuits and Systems ISCAS06

Chicca, E. and Lichtsteiner, P. and Delbruck, T. and Indiveri, G. and Douglas, R. J., Modeling Orientation Selectivity Using a Neuromorphic Multi-Chip System, Proceedings of IEEE International Symposium on Circuits and Systems

Bartolozzi, C. and Indiveri, G., Selective attention implemented with dynamic synapses and integrate-and-fire networks, Neurocomputing

Bartolozzi, C. and Indiveri, G., Silicon synaptic homeostasis, Brain Inspired Cognitive Systems (BICS 2006)

## **Timothy Horiuchi**

### **Publications:**

Journal:

MacLeod, K., Horiuchi, T. K., Carr, C., "A role for short-term synaptic facilitation and depression in the processing of intensity information in the auditory brainstem", J. Neurophysiol. (DOI: 10.1152/JN-01030-2006.R1)

Xu, P., Wong, Y. L., Horiuchi, T. K., and Abshire, P. A. "A compact floating-gate true random number generator", Electronics Letters, vol 42(23) pp. 1346-1347, 2006

Shi, R. Z. and Horiuchi, T. K., "A Neuromorphic VLSI Model of Bat Interaural Level Difference Processing for Azimuthal Echolocation", Trans. Circuits and Systems I, vol. 54(1), pp. 74-88, 2007

Ghose, K., Horiuchi, T., Krishnaprasad, P.S., and Moss, C., "Echolocating Bats Use a Nearly Time-Optimal Strategy to Intercept Prey", Public Library of Science (PLoS) Biology, vol. 4, issue 5, May 2006

-----  
Conference Papers:

Horiuchi, T. K., and Cheely, M., "A Systems View of a Neuromorphic VLSI Echolocation System" to be presented at the International Symposium on Circuits and Systems (ISCAS 2007) May 2007 in New Orleans, LA. (4 pages)

Horiuchi, T. K., Tucker, D., Boyle, K., and Abshire, P., "Spike discrimination using amplitude measurements with a low-power CMOS neural amplifier" to be presented at the International Symposium on Circuits and Systems (ISCAS 2007) May 2007 in New Orleans, LA. (4 pages)

Horiuchi, T. K., "A Neural Model for Sonar-Based Navigation in Obstacle Fields", Proceedings of the International Symposium on Circuits and Systems pp. 4543-4546 (ISCAS 2006) May 2006, in Kos, Greece, - ('Runner up' to the 'Best Paper Award' in the Sensory Systems Track, IEEE ISCAS 2006)