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RESEARCH INTERESTS

- Integration of machine learning algorithms with micro-nano-systems.
- Ultra-low power analog/mixed-signal VLSI, biomedical circuits and instrumentation, nano-biosensors, biometric systems.

EDUCATION

The Johns Hopkins University, Baltimore, MD
PhD, Electrical and Computer Engineering, 2004

The Johns Hopkins University, Baltimore MD
M.S., Electrical and Computer Engineering, 2000

Indian Institute of Technology, New Delhi
B.Tech, Electrical Engineering, 1996

PROFESSIONAL EXPERIENCE

Michigan State University, East Lansing, MI **8/2004 – Present**
Assistant Professor, Department of Electrical and Computer Engineering

The Johns Hopkins University, Baltimore, MD **5/1999 – 8/2004**
Research Assistant, Electrical and Computer Engineering

University of Tokyo, Tokyo, Japan **9/2002 - 12/2002**
Visiting Researcher, Department of Informatics

Qualcomm Incorporated, San Diego, CA **1/1998 – 5/1999**
Engineer, Network and Switching Subsystem Group

Qualcomm International, New Delhi, India **7/1996-1/1998**
Field Engineer, Field Engineering Group

AWARDS AND HONORS

- *Catalyst Foundation Fellowship, 1999-2004.*
- *Academic Frontiers Student Exchange Scholarship (Japanese Govt.), 2002.*
- *Best Undergraduate Thesis, IIT Delhi, 1996.*
- *National Talent Search Scholarship Recipient, India, 1990.*
- *Junior Talent Search Scholarship Recipient, India, 1989.*

TEACHING

- Low-power analog and mixed-signal VLSI systems, Michigan State University, Fall 2004, Spring 2006, Spring 2007.
- Mixed-signal Prototyping and Testing, Michigan State University, Spring 2005.
- Algorithms of Circuit Design, Michigan State University, Fall 2005, Fall 2006.

INVITED PRESENTATIONS

- *Trainable Mixed-signal Interfaces*, Invited Presentation, Defense Science Research Council (DSRC) Adaptive Electronics Workshop, Arlington VA, Nov 28th 2006.
- *Micro-power Speaker Verification System-on-chip*, Invited Presentation, Applied Physics Laboratory, Laurel, MD, July 2005.
- *Sequence Learning and Decoding in Margin Propagation Networks*, Invited Presentation, Snowbird Learning Workshop, Snowbird, Utah, April 2005.
- *Micro-power Speaker Verification System-on-chip*, Invited Presentation, Applied Physics Laboratory, Laurel, MD, July 2005.
- *Hardware-Algorithm Tradeoffs in Implementing Support Vector Machines in Silicon*, PRIP Seminar Series, Michigan State University, 2004.
- *Design of a floating-gate CMOS kernel machine for speech recognition*, Tutorial on Floating Gate Technology, IEEE International Symposium on Circuits and Systems, Phoenix AZ, 2002.
- *A hybrid HMM/SVM speech recognition system*, IEEE Midwest Symposium on Circuits and Systems, Lansing MI, 2000.

FUNDING AND CONTRACTS

- Principal Investigator, *Development of forward error-correcting biosensor based on molecular biowires*, National Science Foundation, 09/01/06-08/30/09 \$270,000.
- Principal Investigator, *Investigation into non-conventional analog decoders for low-density parity check codes*, National Science Foundation, 09/01/07-08/30/10, \$250,000.
- Co-Principal Investigator, *Advanced Microsystems for Neural Information Processing*, National Institute of Health, 04/01/06-03/31/08 \$350,000.
- Co-Principal Investigator, *A sub-microwatt self-powered fatigue sensor*, National Science Foundation, 05/01/07-04/30/10 \$289,999.
- Principal Investigator, *Development of micro-power VLSI devices*, Johns Hopkins Applied Physics Laboratory (sub-contract through MBI International), 10/01/07-09/31/08, \$75,300.
- Principal Investigator, *Micropower speaker verification systems*, Johns Hopkins Applied Physics Laboratory (sub-contract through MBI), 12/01/2005-11/30/2006, \$75,000.
- Principal Investigator, *Development of ultra-low power acoustic sensors*, Intramural Research Grant Program, Michigan State University, 12/01/2005-12/14/2007, \$50,000.

PATENTS

- S. Chakrabartty, "**Margin Decoding Algorithm and Circuit for High-speed Communications**", MSU provisional patent 06022, Filed June 2006.
- S. Chakrabartty, A.Gore, K.Oweiss, "**Multiple-input Multiple-ouput Analog-to-digital Converter**", US Provisional Patent no: 60/840,054, Filed Aug 24, 2006.
- S. Chakrabartty, N. Lajnef, N. Elvin, A. Elvin, A. Gore, "**Self-powered sensor**", US Provisional Patent no: 60/840,056, Filed Aug 24, 2006.

PROFESSIONAL ACTIVITIES

- Associate Editor, Advances in artificial neural systems, Hindawi Publications.
- Panelist, National Science Foundation, 2007
- Member, IEEE
- Member technical committee for IEEE Neural Network Society and Biomedical circuits and systems (BioCAS) society.
- Organizing Committee, IEEE Electro-Information Technology Conference (East Lansing, 2006).
- Technical Program Committee for 20th Symposium on Integrated Circuits and Systems Design, 2007.
- Reviewer for IEEE transactions on Circuits and Systems, IEEE Int. Symp. On Circuits and systems, IEEE sensors journal, IEEE transactions on signal processing, IEEE transactions on Neural Networks, IEEE transactions on Biomedical engineering, Pattern Recognition Journal.

PUBLICATIONS

Journal Publications

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.

Y. Zuo; S. Chakrabartty, S. Pal, Z. Tahir, E.C. Alocilja, "**Spatio-temporal Processing of Multi-channel Biosensors using Support Vector Machines**", *IEEE Sensors Journal*, Volume 6, Issue 6, Page(s): 1644-1651, Dec 2006.

Y. Liu, S. Chakrabartty, and E. C. Alocilja, "**Fundamental Building Blocks for Molecular Bio-wire based Forward-error Correcting Biosensors**", *Nanotechnology* (To Appear), 2007.

S. Chakrabartty, G. Cauwenberghs, "**A Sub-microwatt Analog VLSI Trainable Pattern Classifier**", *IEEE Journal of Solid-State Circuits*, vol. 42, no: 5, May 2007.

S. Chakrabartty and G. Cauwenberghs, "**Gini-Support Vector Machine: Quadratic Entropy Based Multi-class Probability Regression**", *Journal of Machine Learning Research*, Volume 8, pp. 813-839, April 2007.

V. Venkataramani, S. Chakrabartty, and W. Byrne, "**Gini-Support Vector Machines for Segmental Minimum Bayes Risk Decoding of Continuous Speech**", *Computer Speech and Language*, Volume 21, Issue 3, July 2007, pp. 423-442.

S. Chakrabartty, Y. Deng and G. Cauwenberghs, "**Robust Speech Feature Extraction by Growth Transformation in Reproducing Kernel Hilbert Space**", *IEEE Transactions on Speech, Language and Acoustics*, pp. 1842-1849, Vol. 15 Issue: 6, Aug. 2007.

C. Kong and S. Chakrabartty, "**Analog Iterative Decoders based on Margin Propagation**", *IEEE*

Transactions on Circuits and Systems II, (To appear) 2007.

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

Refereed Conference Publications

Y. Liu , D. S. Gkinosatis, A. K.Mohanty, and S. 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

P. Kucher and S. Chakrbartty , **An Energy-Scalable Margin Propagation-Based Analog VLSI Support Vector Machine**, IEEE Symposium on Circuits and Systems (ISCAS'2007), New Orleans 2007.

N. Lajnef, S. Chakrbartty, N. Elvin and A. Elvin, **Piezo-Powered Floating Gate Injector for Self-Powered Fatigue Monitoring in Biomechanical Implants**, IEEE Symposium on Circuits and Systems (ISCAS'2007), New Orleans 2007.

N. Lajnef, S. Chakrbartty, 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. Chakrbartty , **Large Margin Analog-to-digital converters with applications in Neural Prosthetics**, Adv. Neural Information Processing Systems (NIPS'2006).

S. Chakrbartty, 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.

A. Gore and S. Chakrabartty, **Online Calibration of Floating-gate Detectors for RFID Sensors**, Midwest Symposium on Circuits and Systems 2005 (Invited Presentation), 7-10 Aug. 2005 Page(s):87 - 90 Vol. 1.

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

C. Kun, S. Chakrabartty and A. Mason, **A Dynamic Reconfigurable A/D Converter for Sensor Applications**, IEEE Sensors Conference, 30 Oct.-3 Nov. 2005.

S. Chakrabartty and G. Cauwenberghs, **Fixed-current Method for Programming Large Floating Gate Arrays**, Proceedings of IEEE International Symposium on Circuits and Systems (ISCAS 2005), 23-25 May 2005.

Vogelstein, R.J.; Murari, K.; Thakur, P.H.; Diehl, C.; Chakrabartty, S.; Cauwenberghs, G.; **Spike sorting with support vector machines**, *IEEE Conference on Engineering in Medicine and Biology (EMBC 2004)*, Volume 1, 2004 Page(s):546 - 549 Vol.1.

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

Y. Deng, S. Chakrabartty and G. Cauwenberghs, **A Three Decades Programmable Fully Differential OTA Design**, *Proc. IEEE Int. Symp. Circuits and Systems (ISCAS'2004)*, Vancouver Canada, 2004.

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

V. Venkataramani, S. Chakrabartty and W. Byrne, **Support Vector Machines for Segmental Minimum Bayes Risk Decoding of Continuous Speech**, *IEEE Automatic Recognition and Understanding Workshop (ASRU'03)* St. Thomas, U.S. Virgin Islands, Nov. 30-Dec. 4, 2003.

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

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

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

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

- S. Chakrabartty and G. Cauwenberghs, **Forward-Decoding Kernel-Based Phone Sequence Recognition**, *Adv. Neural Information Processing Systems (NIPS'2002)*, Cambridge: MIT Press, vol. 15, 2003.
- S. Chakrabartty and G. Cauwenberghs, **Forward Decoding Kernel Machines: A Hybrid HMM/SVM Approach to Sequence Recognition**, *Proc. SVM'2002, Lecture Notes in Computer Science*, vol. 2388, pp. 278-292, 2002.
- S. Chakrabartty and G. Cauwenberghs, **Sequence Estimation and Channel Equalization Using Forward Decoding Kernel Machines**, *Proc. IEEE Int. Conf. Acoustics Speech and Signal Processing (ICASSP'2002)*, Orlando FL, May 13-17, 2002.
- S. Chakrabartty and G. Cauwenberghs, **Hybrid Support Vector Machine, Hidden Markov Model Approach for Continuous Speech Recognition**, *Proc. 43rd IEEE Midwest Symp. Circuits and Systems (MWSCAS'2000)*, Lansing MI, August 8-11, 2000.
- S. Chakrabartty, M. Stanacevic and T.D. Tran, **Adaptive Image Database Using Wavelets**, *Proc. 34th IEEE Asilomar Conference on Signals, Systems and Computers*, vol. 2, pp. 1856-1860, Pacific Grove, Oct. 2000.
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