

# Shantanu Chakrabartty

Department of Electrical and Systems Engineering  
Washington University in St. Louis.  
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## RESEARCH INTERESTS

Analog computing and Analog integrated circuits with focus on: (a) Energy scavenging and self-powered sensors, circuits and systems; (b) biomedical and implantable circuits and systems; (c) neuromorphic engineering; (d) neuromorphic systems; (e) floating-gate circuits and systems.

## EDUCATION

**The Johns Hopkins University**, Baltimore, MD

*Ph.D., Electrical and Computer Engineering, 2004.*

*Dissertation: Design and Implementation of Ultra-low-power Pattern Recognizers and Sequence Decoders;*

*Advisor: Gert Cauwenberghs*

**The Johns Hopkins University**, Baltimore MD

*M.S., Electrical and Computer Engineering, 2001.*

**Indian Institute of Technology**, New Delhi

*B.Tech, Electrical Engineering, 1996.*

## PROFESSIONAL EXPERIENCE

**Washington University**, St. Louis, MO

**7/2015 – Present**

*Vice Dean for Research and Graduate Education, McKelvey School of Engineering*

*Clifford W. Murphy Professor, Department of Electrical and Systems Engineering*

*Professor, Division of Biology and Biomedical Sciences (Neurosciences)*

*Professor (by courtesy), Department of Biomedical Engineering*

*Professor (by courtesy), Department of Computer Science and Engineering*

**Michigan State University**, East Lansing, MI

**7/2010 – 6/2015**

*Associate Professor, Department of Electrical and Computer Engineering*

**Michigan State University**, East Lansing, MI

**1/2012 – 6/2015**

*Adjunct Professor, Department of Biosystems Engineering*

**Piezonix LLC.**, East Lansing, MI

**5/2013 – Present**

*Co-founder and Chief Scientific Officer*

**Michigan State University**, East Lansing, MI

**8/2004 – 6/2010**

*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

**1/1996 – 5/1999**

*Engineer, Network and Switching Subsystem Group*

## **AWARDS AND HONORS**

- *Keynote Speaker, IEEE CIBCB 2018.*
- *MSU Innovation of the Year Award, 2012.*
- *NSF CAREER Award, 2010.*
- *MSU Teacher-Scholar Award, 2011.*
- *Alumni, U.S. National Academy Frontiers of Engineering.*
- *Honorary Mention, Best Paper Award, IEEE ISCAS 2015.*
- *Best Paper Award in Sensory Systems, IEEE ISCAS 2014.*
- *Best Paper Award in Sensory Systems, IEEE ISCAS 2013.*
- *Honorary Mention, Best Paper Award, IEEE ISCAS 2012.*
- *Honorary Mention, Best Paper Award, IEEE ISCAS 2011.*
- *Invited Member, Defense Science Research Council, USA, 2006.*
- *Catalyst Foundation Fellow, 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**

Average Student Instructional Rating Score (Washington University): 6.5/7.00

Average Student Instructional Rating Score (Michigan State University): 3.84/4.00

*Courses:*

- Analog Integrated Circuits, Spring 2009, Spring 2010, 2012, 2014.
- Introduction to Mixed-signal Integrated Circuits, Fall 2007,2008,2009,2010,2011,2012,2014.
- Biomedical Instrumentation, Fall 2007.
- Low-power analog and mixed-signal VLSI systems, Michigan State University, Fall 2004, Spring 2006, Spring 2007. Spring 2008
- Mixed-signal Prototyping and Testing, Michigan State University, Spring 2005.
- Algorithms of Circuit Design, Michigan State University, Fall 2005, Fall 2006.
- Introduction to Electronic Instrumentation, Washington University, Spring 2016,2017.
- Analog Integrated Circuits, Washington University, Fall 2015,2016,2017,2018,2019, 2020, 2021.
- Fundamentals of Hardware for Machine Learning, Washington University, Fall 2021.

## INVITED PRESENTATIONS

- *Analog Computing and Dynamical Systems – from simple to complex*, Distinguished Seminar Series, University of Missouri, Columbia, Oct 22, 2021.
- *Of Insects and Cyborgs*, Washington University Parent’s Council, St. Louis, October 30 2019.
- *Growth transform neural network: A scalable neuromorphic learning framework to address neuron-to-network performance gap*, Brain Computing and Learning Workshop, Indian Institute of Sciences, Bengaluru, India, July 2019.
- *IoT Security Solution based on Zero-power Timer Technology*, Cybersecurity TTP Workshop, Chicago, June 19, 2019.
- *Expeditions in Self-powered Computing*, Graduate Seminar Series, Saint Louis University, MO, USA, April 9, 2019.
- *Hardware Form Factors/System Design for Sustained Usage and Data Gathering: Wireless devices, body area networks, online services*, “Workshop on Reconfigurable Sensor Systems Integrated with Artificial Intelligence and Data Harnessing to Enable Personalized Medicine.” March 7-8, 2019, National Science Foundation, Alexandria, VA
- *Neuromorphic Computing at Crossroads*, Brain, Computing and Learning Workshop, Indian Institute of Science, Bangalore, India, Jan. 2019 (Host: Chetan Thakur).
- *Self-powered Dynamic Signatures for Authentication of Passive IoTs*, TAME Workshop, Columbus, Ohio, Nov. 2018 (Host: Mark Tehranipour).
- *Spiking, Bursting, Noise-shaping and Population Dynamics in a Network of Growth Transform Neurons*, Brain, Computing and Learning Workshop, Indian Institute of Science, Bangalore, India, Jan. 2018 (Host: Chetan Thakur).
- *Towards a Universal Analog Computing Paradigm*, Department of Mathematics and Computer Science Colloquium, University of Missouri, St. Louis, MO, Nov. 2017 (Host: Ravindra Giraviru).
- *Expeditions in Self-powered Sensing*, Air Force Research Laboratory, Dayton, OH, Oct. 2017 (Host: Jeremy Ward).
- *Zero-power Dynamic Signature for Trust Verification of Passive Sensors and Tags*, Internet2 Cybersecurity Symposium, Indianapolis, Oct. 2017 (Host: Emily Nichols).
- *Zero-power Dynamic Signature for Trust Verification of Passive Sensors and Tags*, Global Research Consortium, Bangalore, India, Jan. 2016 (Host: William Joyner Jr.).
- *Expeditions in Self-powered Sensing, Computing and Imaging*, Department of Biomedical Engineering, Washington University in St. Louis, MO, Nov. 2015 (Host: Prof. Baranidharan Raman).
- *Expeditions in Floating-gate Circuits and Systems: Self-powered sensing and computing*, Department of Electrical and Computer Engineering, Stony Brook University, NY, Dec. 2013 (Host: Prof. Milutin Stanacevic).
- *Expeditions in Floating-gate Circuits and Systems: Self-powered sensing and computing*, Department of Electrical and Computer Engineering, Tufts University, MA, Nov. 2013 (Host: Prof. Valencia Koomson).
- *Expeditions in Floating-gate Circuits and Systems: From Self-powered sensors to nano-watt analog processors*, Department of Electrical and Computer Engineering, University of

Toronto, Canada, Nov. 2013 (Host: Prof. Roman Genov).

- *Expeditions in Floating-gate Circuits and Systems: From Self-powered sensors to nano-watt analog processors*, Department of Computer Science and Engineering, Washington University, St. Louis, Oct. 2013 (Host: Prof. Viktor Gruev).
- *Approaching limits of sensing using neuromorphic noise-exploitation principles*, SPIE, San Diego, Mar. 2013 (Host: Prof. R.J. Martin-Palma)
- *Reproducing Kernel-based Methods for Extracting and Identifying Noise-robust Speech Features*, IEEE Asilomar Conference on Signal, Systems and Computers, Nov. 2012. (Host: Ghassan Alregib)
- *Noise-exploitation and Adaptation in Neuromorphic Sensors*, SPIE, San Diego, Mar. 2012 (Host: Prof. Akhlesh Lakhtakia).
- *Grand Challenge: Sensing-to-learn and Learning-to-sense – Exploiting biological symbiosis of sensing, computing, memory and adaptation for designing the next-generation of smart sensors*, NSF sponsored US-Japan Joint Workshop on Bioinspired Sensing and Actuation, Berkeley, Nov 12-13, 2011.
- *Morphing, Synthesis and Monitoring: Exploring the trinity of Hybrid Analog Integrated Circuits*, Department of Engineering Mechanics, Penn State University, Apr. 2011 (Host: Prof. Akhlesh Lakhtakia).
- *CMOS Integrated Circuits for Energy Scavenging and Self-powered Sensors*, IEEE Biomedical Circuits and Systems Conference, Paphos, Cyprus, Nov, 2010 (Host: Dr. Jennifer Blain)
- *Designing Microsystems that Learn: Algorithms and Hardware, Pattern Recognition and Machine Intelligence (PReMI09)*, Indian Institute of Technology, Delhi, Dec. 2009 (Host: Prof. Jayadeva).
- *Forward error-correcting biosensors: Hybrid bio-CMOS circuits and systems*, CMOS Emerging Technologies Workshop, Sep. 2009 (Host: Dr. Kris Iniweski).
- *Design of Neuromorphic Data Converters*, Telluride Neuromorphic and Cognitive Workshop, Telluride, Colorado, Jul. 2009 (Host: Prof. John G. Harris).
- *Sigma-Delta Learning: Bridging the gap between neuromorphic systems, machine learning and mixed-signal processing*, Department of Informatics, University of Tokyo, Japan, June 2009 (Host: Prof. Toshihiko Yamasaki).
- *Sensors and Processors for Structural Health Monitoring*, VDEC, University of Tokyo, Japan, June 2009 (Host: Prof. Tadashi Shibata).
- *Operating below the sub-microwatt barrier – Explorations in Analog Computing*, Invited Presentation, Wireless Integrated Microsystems (WIMS), University of Michigan, Ann Arbor, April 2009 (Host: Prof. Jerome K. Lynch).
- *CMOS Circuits for Biomechanical Implants*, Invited Presentation, CMOS Emerging Technologies Workshop, Vancouver, August 2008 (Host: Dr. Kris Iniweski).
- *Sub-microwatt Sensors for Structural Health Monitoring of Biomechanical Implants*, Invited Presentation, Department of Bioengineering, University of California, San Diego, August 2008 (Host: Prof. Gert Cauwenberghs).

- *Towards Reliable Multi-pathogen Biosensors using High-dimensional Encoding and Decoding Techniques*, Invited Presentation, SPIE Symposium on NanoScience+Engineering, CA 2008 (Host: Prof. Gert Cauwenberghs, UCSD) .
- *High-dimensional Encoding-Decoding Techniques for Reliable Pathogen Detection*, Invited Presentation, Hunter College, City University of New York, Feb 2008 (Host: Prof. Hiroshi Matsui).
- *Mixed-signal data mining on microphone array hearing aids*, Invited Presentation, Radio-Frequency Integrated Circuits Symposium, Atlanta Georgia, July, 2008 (Host: Sudipto Chakraborty, Texas Instruments).
- *Trainable Mixed-signal Interfaces*, Invited Presentation, Defense Science Research Council (DSRC) Adaptive Electronics Workshop, Arlington VA, Nov 28<sup>th</sup> 2006 (Host: Prof. Peter Asbeck, UCSD).
- *Micro-power Speaker Verification System-on-chip*, Invited Presentation, Applied Physics Laboratory, Laurel, MD, July 2005 (Host: Dr. Chris P. Diehl).
- *Sequence Learning and Decoding in Margin Propagation Networks*, Invited Presentation, Snowbird Learning Workshop, Snowbird, Utah, April 2005 (Host: Dr. Yoshua Bengio).
- *Hardware-Algorithm Tradeoffs in Implementing Support Vector Machines in Silicon*, PRIP Seminar Series, Michigan State University, 2004 (Host: Prof. Anil Jain).
- *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 (Host: Prof. Paul Hasler, Georgia Tech).
- *A hybrid HMM/SVM speech recognition system*, IEEE Midwest Symposium on Circuits and Systems, Lansing MI, 2000.

## RESEARCH GRANTS AND CONTRACTS

### Current Grants and Contracts

- [G1] Co-Principal Investigator, Benchmarking and enhancing the performance of the insect-based chemical sensing biorobotic platforms, **Office of Naval Research**, N000142112343, 04/30/2021-04/30/2022 \$750,000 (Credit 30%).
- [G2] Co-principal Investigator, *Low-cost, portable electromyometrial imaging system for managing human labor*, **Bill and Melinda Gates Foundation**, 7/7/2020 - 8/31/2021, \$1.4 Million (Credit 10%).
- [G3] Principal Investigator, *Addressing neuron-to-network energy-efficiency gap by investigating neuromorphic processors as a unified dynamical system*, **National Science Foundation**, **1935073**, 09/15/2019-09/14/2022, \$380,000.
- [G4] Multi-Principal Investigator, *Wireless Self-powered Sensors for Continuous and Long-term Monitoring of Spinal fusion process*, **National Institute of Health 1 R21AR075242 01**, 09/01/2019-08/31/2021, \$457,000 (Credit 50%).
- [G5] Co-Principal Investigator, *Real-time Chemical Sensing in Complex Environments with Insect Olfaction*, **Office of Naval Research**, **N000141912049**, 01/01/2019-12/31/2021 \$750,000 (Credit 25%).
- [G6] Multi-Principal Investigator, *Development of a Wireless Biosensor to Track Bone Resorption in Periodontitis*, **National Institute of Health 1R01DE02709801**, 09/01/2017-

08/31/2021, \$1,525,000 (Credit 30%).

[G7] Principal Investigator and Project Lead, *CPS:TTP Option: Synergy: Collaborative Research: Internet of Self-powered Sensors - Towards a Scalable Long-term Condition-based Monitoring and Maintenance of Civil Infrastructure*, **National Science Foundation CNS1646380**, 09/01/2016-08/31/2020, \$1,100,000.

### **Completed Grants and Contracts**

- [G8] Principal Investigator and Project Lead, *Self-powered Sensing and Data-logging for Large-scale In-vivo Monitoring of Neural Ensemble Activity*, **National Institute of Health 1R21EY02836201**, 09/01/2017-08/31/2020, \$457,000.
- [G9] Co-Principal Investigator, *Hybrid Chemical Sensing with bio-electronic nose*, **Office of Naval Research N000141612426**, 06/01/2016-05/31/2019, \$750,000 (Credit: 30%).
- [G10] Principal Investigator and Project Lead, *STARSS: Small: Collaborative: Zero-Power Dynamic Signature for Trust Verification of Passive Sensors and Tags*, **National Science Foundation / Semiconductor Research Corporation CNS1525476**, 8/16/2015 - 8/15/2020, \$450,000.
- [G11] Principal Investigator, *Scavenging Thermal-noise Energy and Quantum Fluctuations for Self-powered Time-stamping and Sensing*, **National Science Foundation ECCS1550096**, 8/16/2015 - 8/15/2020, \$344,387.
- [G12] Co-Principal Investigator, *CSR: Medium: Self-organizing Cyber Substrates: Exploring a Modular Computing and Communications Architecture for Structural Health Monitoring*, **National Science Foundation CNS1405273**, 08/01/14-07/30/18, \$1,000,000 (Credit 30%).
- [G13] Co-Principal Investigator, *Ultra-low Power Wireless Sensing System for Multi-metric Self-Powered Monitoring of Bridge Components*, **United States Department of Transportation**, 08/01/13-07/30/17, \$937,135 (Credit 30%).
- [G14] Principal Investigator, *SHF:FAST: A Simulation and Analysis Framework for Designing Large-Scale Biomolecular-Silicon Hybrid Circuits*, **National Science Foundation**, 09/01/11-08/30/17, \$386,602.
- [G15] Principal Investigator, *CAREER: Integrated Research and Education in Self-powered Microsensing for Embedded and Implantable Structural Health Monitoring*, 04/01/10-03/31/16, **National Science Foundation**, CMMI:0954752, \$406,000.
- [G16] Principal Investigator, *Motion Artifact Cancelling MIMO method for Ambulatory Respiratory-rate Monitoring*, **National Institute of Health/General Electrical Global Research**, 08/01/13-07/31/16, \$164,000.
- [G17] Principal Investigator, *Trusted Verification of CMOS Integrated Circuits using Zero-power Timers and Synchronization Circuits*, **Defense Advanced Research Projects Agency (DARPA)**, 9/1/2014 - 8/31/2015, 133,564.
- [G18] Senior Personnel, *Mechanically-Equivalent Response Amplifiers and Frequency Modulators for Energy-harvesting Devices*, **National Science Foundation**, 8/16/2014 - 8/15/2017, \$324,309.00 (Credit 10%)
- [G19] Principal Investigator, *STTR Phase I: Health Monitoring of Orthopedic Implants using Self-powered Piezo-floating-gate Sensing Technology*, **Piezonix LLC/National Science**

**Foundation**, 07/01/14-12/31/14, \$72,253.

- [G20] Principal Investigator, *Self-powered RFID Sensing for Monitoring Complex Product Supply-chain*, **Midland Research Institute for Value Chain Creation**, 05/20/14-05/19/17, \$300,000.
- [G21] Principal Investigator, *Design and Evaluation of Self-powered Time-stamped Event-logger*, **Johns Hopkins Applied Physics Laboratory/US Department of Navy**, 04/01/14-09/30/14, \$68,000.
- [G22] Co-Principal Investigator, *Smart Pavement Monitoring System*, **Federal Highway Administration** (Contract: DTFH61-13-C-00015), 08/15/13-08/14/16, \$444,944 (Credit 25%).
- [G23] Co-Principal Investigator, *Center for Cyber-enabled Cognitive Structures*, **Strategic Partnership Grant, Michigan State University**, 08/01/13-07/31/16, \$481,000 (Credit 35%).
- [G24] Principal Investigator, *Development of Self-powered Age-monitoring Sensor*, **Targeted Support Grant for Technology Development (TSGTD)**, MSU Foundation, 09/01/12-08/01/13, \$60,000.
- [G25] Principal Investigator, *Fabrication and Testing of Gen-II Age-monitoring Sensors*, **Johns Hopkins Applied Physics Laboratory**, 03/01/12-08/30/12, \$47,574.
- [G26] Principal Investigator, *AIR: Development and Evaluation of Self-Powered Piezo-Floating-Gate Sensor Chipsets for Embedded and Implantable Structural Health Monitoring*, **National Science Foundation**, 08/01/11-07/31/14, \$258,000.
- [G27] Principal Investigator, *Self-powered Age Monitoring Sensors*, **Johns Hopkins Applied Physics Laboratory**, 04/15/11-08/30/11, \$65,000.
- [G28] Principal Investigator, *Low-power Speaker Identification System (LPSIS)*, **Johns Hopkins Applied Physics Laboratory** (sub-contract through MSU Foundation), 10/01/09-07/30/11, \$286,046.
- [G29] Co-Principal Investigator, *Smart Pavement Monitoring System*, **Federal Highway Administration**, Contract: DTFH61-08-C-00015, 08/15/08-08/14/11, \$375,000 (Credit 25%)
- [G30] Principal Investigator, *SGER: Cooperative Learning-Unlearning Algorithms for Identifying Noise Robust Auditory Manifolds*, **National Science Foundation**, IIS: 0836278, 08/01/08-07/31/09, \$62,010.
- [G31] Principal Investigator, Investigation into *non-conventional analog decoders for low-density parity check codes*, **National Science Foundation**, CCF: 0728996, 01/01/07-09/30/10, \$250,000.
- [G32] Principal Investigator, *A sub-microwatt self-powered fatigue sensor*, CMMI: 0700632, **National Science Foundation**, 05/01/07-04/30/10 \$295,999.
- [G33] Principal Investigator, *Development of forward error-correcting biosensor based on molecular biowires*, **National Science Foundation**, ECCS: 0622056, 09/01/06-08/30/10 \$270,000.
- [G34] Principal Investigator, *Development of micro-power VLSI devices*, **Johns Hopkins Applied**

**Physics Laboratory** (sub-contract through MBI International), Contract No: 0905899, 04/01/08-03/31/09, \$75,300.

[G35] Co-Principal Investigator, *Advanced Microsystems for Neural Information Processing*, **National Institute of Health**, 04/01/06-03/31/08 \$375,000 (Credit 25%).

[G36] Principal Investigator, *Micropower speaker verification systems*, **Johns Hopkins Applied Physics Laboratory** (sub-contract through MBI), Contract No: 0939031, 12/01/2005-11/30/2006, \$75,000.

[G37] 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

### Issued Patents

- [P1] S. Chakrabartty, L. Zhou, ``*Self-powered sensors for long-term monitoring*`, U.S. Patent No. 11,041,764, 06/22/2021
- [P2] S. Chakrabartty, L. Zhou, ``*Self-powered timers and methods of use*`, US patent: 10,446,234, 10/15/2019.
- [P3] N. Lajnef, S. Chakrabartty, R. Burgueno, W. Borchani ``*Self-Powered Sensing System for the Monitoring of Quasi-static Structural Response*`, US patent: 9,793,830, 10/17/2017
- [P4] S. Chakrabartty, ``*Temperature Compensation Method for High-density Floating-gate Memory*`, US patent: 9,437,602, 09/06/2016
- [P5] S. Chakrabartty, ``*Self-powered Strain-gauge*`, US patent: 9,331,265, Issued: 05/03/2016.
- [P6] S. Chakrabartty, ``*Self-powered Timer Apparatus*`, US patent: 8,963,647 , Issued Feb. 24, 2015.
- [P7] S. Chakrabartty, ``*Margin Decoding Communication System*`, US patent: 8,060,810 , Issued Nov. 15, 2011.
- [P8] S. Chakrabartty, N. Lajnef, N. Elvin, A.Gore, ``*Self-powered Sensor*`, US Patent: 8,056,420, Issued Nov. 15, 2011.
- [P9] S. Chakrabartty, ``*Self-powered Strain-rate Sensor*`, US Patent: 7,757,565, Issued Jul. 20, 2010.
- [P10] S. Chakrabartty, ``*Multiple-input Multiple-output Analog-to-digital Converter*`, US Patent no: 7,479,911, Issued Jan. 20, 2009.

### Pending Patents

- [P11] S. Chakrabartty, A. Gangopadhyay, ``*Growth Transform Neural Network, Neuromorphic Processors and Analog-to-digital Converters*`, US Patent Application US 16/462,805 and US 16/910,971, 2017.
- [P12] S.Chakrabartty, Y. Alazzawi, K. Aono, E. Scheller, ``*Methods And Apparatus For Wireless Power Delivery And Remote Sensing Using Self-capacitances*`, US Patent Application 20200259365 16/789007, 2019.
- [P13] S. Chakrabartty, S. Kondapalli, X. Zhang, ``*Variance-Based Logic and Self-Powered Microprocessor*`, Washington University in St. Louis, Disclosure Reference Number, 016445, 2016.
- [P14] S. Chakrabartty, W.A. Qureshi, ``*Method and Apparatus for On-Chip Optical Spectroscopy*`,



Michigan State University Disclosure Reference Number, TEC2011-0020, 2010.

[P15] A. Fazel, S. Chakrabartty, ``*Sparse Auditory Reproducing Kernel (SPARK) Features for Noise-robust Speech and Speaker Recognition*”, US provisional patent: 61/643,550, Filed: 05/07/2012.

## PROFESSIONAL ACTIVITIES

- *Fellow*, American Institute of Medical and Biological Engineering (AIMBE)
- *Senior Member*, Institute of Electronic and Electrical Engineers (IEEE)
- *Member*, American Society for Engineering Education (ASEE)
- *Associate Editor*, IEEE Transactions of Biomedical Circuits and Systems (2010-2018)
- *Associate Editor*, Advances in artificial neural systems, Hindawi Publications (2010-2015)
- *Associate Editor*, Frontiers in Neuroscience (2012 -).
- *Chair*, IEEE Circuits and Systems Society, Neural Systems and Applications Technical Committee (2015).
- *Panelist* :
  - National Science Foundation, ECCS, 2006, 2008,201.
  - National Science Foundation, CISE, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019.
  - National Science Foundation, CMMI, 2007, 2010, 2012.
  - National Science Foundation, IIP, 2011, 2012, 2013, 2014,2015.
- *Panelist* :
  - American Society of Engineering Education, SMART Scholarship, 2012.
  - American Society of Engineering Education, NDSEG Scholarship, 2012.
- *International Panel Reviewer* :
  - Natural Sciences and Engineering Research Council of Canada (NSERC), 2008.
  - Dutch Technology Foundation STW, 2009.
- *Keynote Panel*:
  - Pattern Recognition and Machine Intelligence (PReMI09), IIT Delhi, 2009.
- *Organizing Committee* :
  - IEEE Biomedical Circuits and Systems Conference, San Diego, 2011.
  - IEEE Electro-Information Technology Conference, East Lansing, MI, 2006.
- *Technical Committee Member* :
  - IEEE Circuits and Systems: Sensory Systems
  - IEEE Circuits and Systems: Biomedical circuits and systems
  - IEEE Circuits and Systems: Neural systems and applications.
- *Program Committee Member* :
  - 20th Symposium on Integrated Circuits and Systems Design, 2007.
  - 22nd Symposium on Integrated Circuits and Systems Design, 2009
  - IEEE Biomedical Circuits and Systems Conference, 2006-2011.
  - IEEE Statistical Signal Processing Workshop, Ann Arbor, 2012.
- *Session Chair/Co-chair*:
  - Neural Systems and Applications, ISCAS 2012, Seoul, Korea.
  - Analog Circuits and IC Technology, ISCAS 2009, Taipei, Taiwan.

- Sensor Networks and Algorithms, ISCAS 2009, Taipei, Taiwan.
- Image Sensors, ISCAS 2009, Taipei, Taiwan
- Biomedical Instrumentation and Bioanalysis, BIOCAS 2008, Baltimore, MD, USA.
- Sigma-Delta Modulators, ISCAS 2007, New Orleans, USA.
- *Reviewer*
  - IEEE Journal of Solid-State Circuits.
  - IEEE transactions on Circuits and Systems I and II (TCAS).
  - IEEE transactions on Signal Processing (TSP).
  - IEEE transactions on Very Large Scale Integration (TVLSI).
  - IEEE transactions on Neural Networks (TNN)
  - IEEE sensor journal
  - IEEE transactions on Biomedical Engineering (TBME)
  - IEEE transactions on Biomedical Circuits and Systems (TBioCAS)
  - IEEE transactions on Neural Systems and Rehabilitation Engineering
  - Pattern Recognition Journal
  - IEEE Communication Letters
  - Advances in fuzzy systems, Hindawi.
  - Fuzzy sets and systems, Elsevier.
  - Sensors and Actuators, Elsevier.
  - Analytical Chemistry
  - IEEE Int. Symp. On Circuits and Systems (ISCAS).

## **INSTITUTIONAL SERVICES**

- Co-Chair – WashU ESE Faculty Search Committee – 2019 - 2021.
- Member – WashU ESE Department Executive Committee
- Washington University’s Institutional Conflict of Interest Committee (ICOI) – Member 2018-present.
- Wash U ESE Strategic Planning Committee Chair - 2019.
- Wash U ESE Graduate Studies Committee – Member – 2017-2019
- Wash U ESE Ph.D. admissions committee – Chair – 2018
- Wash U MEMS Faculty Search Committee – Member – Spring 2018
- Wash U CSE Faculty Search Committee – Member – Fall 2018
- *Chair*, Graduate Studies Committee (Michigan State Univ.), 2011 – 2013
- *Publicity Chair*, (MSU Electrical and Computer Engineering), 2013 – 2015.
- *Member*, Department Advisory Committee (MSU Electrical and Computer Engineering), 2011-2013, 2014 – 2015.
- *Member*, Strategic Research Task force Committee (MSU Electrical and Computer Engineering), 2011- 2015.
- *Member*, College Graduate Studies Committee (Michigan State Univ.), 2011-2012.
- *Advisor*, Computer Engineering, 2015 - current

## **GRADUATE ADVISEES**

*Past Graduate Advisees*

- Oindrila Chatterjee, (Ph.D. Spring 2021), Currently, Intel Corp., Chandler, AZ.
- Darshit Mehta, (Ph.D. Spring 2021), Currently, Entrepreneur.
- Sri Harsha Kondapalli, (Ph.D. Fall 2020) Currently, Mathworks, California
- Yarub Alazzawi, (Ph.D. Spring 2020) Currently, Assistant Professor, Baghdad University, Iraq.
- Kenji Aono, (Ph.D. 2018) Currently Post-doctoral Researcher, Electrical and Systems Engineering,
- Mingquan Yuan, (Ph.D. 2018) Currently Research Engineer, Walmart Inc., Dallas, Tx
- Liang Zhou, (Ph.D. 2018) Currently Research Engineer, Analog Devices Inc. CA
- Tao Feng, (Ph.D. Fall 2016) Currently Research Engineer, Skyworks Inc., Ames, IA.
- Hassan Aqeel Khan, (Ph.D. Fall 2015) Currently Assistant Professor, National University of Sciences and Technology, Islamabad.
- Ming Gu, (Ph.D. Spring 2012) Currently Principal Engineer, Fairchild Semiconductors, California.
- Pikul Sarkar, (M.S. Summer 2012). Currently Staff Engineer, Cosmic Circuits., Bangalore, India.
- Amin Fazel, (Ph.D. 2012) Currently Research Staff, *Qualcomm Inc., San Diego, CA.*
- Chenling Huang, (Ph.D. 2011) Currently Staff Engineer, *Qualcomm Incorporated, San Diego.*
- Ravi Shaga, (M.S. 2011) Currently Senior Engineer, *Apple., Cupertino, CA.*
- Yang Liu, (Ph.D. 2010) Currently CEO and co-founder, *Piezonix LLC, East Lansing.*
- Amit Gore, (Ph.D. 2008) Currently Research Scientist, *General Electric Corporate Research, New York, USA.*
- Nizar Lajnef, (Ph.D. 2008) Currently Associate Professor, *Department of Civil and Environmental Engineering, Michigan State University, East Lansing, MI, USA.*
- Paul Kucher, (M.S. 2007), Currently Research Scientist, *Johns Hopkins University, Applied Physics Laboratory, Laurel, MD, USA.*
- Cheong Kun, (M.S. 2006) Currently Senior Engineer, *Qualcomm Incorporated, San Diego, CA, USA.*

## PUBLICATIONS

### Book Chapters

- [B1] S.Chakrabartty, N. Lajnef, N.Elvin, A.Elvin, ``Toward Self-powered Sensors and Circuits for Biomechanical Implants'', *VLSI Circuits for Biomedical Applications*, eds. Krzysztof Iniewski, Artech House, 2008.
- [B2] S.Chakrabartty, E.C. Alocilja, Y.Liu, ``Integrated Nano-Bio-VLSI Approach for Designing Error-free Biosensors'', *Nano-biosensors*, eds. Sandro Carrara, Springer, 2010.
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- [C2] Kondapalli, S. H.; Zhou, L.; Aono, K.; and Chakrabartty, S., Long-term, Time-synchronized Temperature Monitoring using Self-Powered CMOS Timers. In 62nd IEEE International Midwest Symposium on Circuits and Systems, MWSCAS 2019, Dallas, TX, USA, August 4-7, 2019, pages 856–859, 2019.
- [C3] Kondapalli S. H., Pochettino O., Embedded H-gauge with Hybrid-Powered Sensors for Pavement Monitoring, Proceedings 9th International Conference on Structural Health Monitoring of Intelligent Infrastructure, 2019.
- [C4] Pochettino. O, Aono. K. Infrastructural Internet-of-things Using Quasi-self-powered Structural Health Monitoring Sensors, Proceedings 9th International Conference on Structural Health Monitoring of Intelligent Infrastructure, 2019.
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- [C10] A. Gangopadhyay; O. Chatterjee ; S. Chakrabartty, “Continuous-time Optimization using Sub-threshold Current-mode Growth Transform Circuits”, 2018 IEEE 61st International Midwest Symposium on Circuits and Systems (MWSCAS)
- [C11] M. H. Afifi ; Liang Zhou ; Shantanu Chakrabartty ; Jian Ren, “HPMAP: A Hash-Based

Privacy-Preserving Mutual Authentication Protocol for Passive IoT Devices Using Self-Powered Timers”, 2018 IEEE International Conference on Communications (ICC).

- [C12] L. Zhou, S. Chakrabartty, “Self-powered Continuous Time-Temperature Monitoring for Cold-Chain Management”, IEEE Mid-west Symposium of Circuits and Systems (MWSCAS 2017), Boston, USA, 2017.
- [C13] Y. Alazzawi, S. Chakrabartty, “Self-powered System-on-Chip for Substrate Computing and Ultrasonic Communications”, IEEE Mid-west Symposium of Circuits and Systems (MWSCAS 2017), Boston, USA, 2017.
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