Mingoo Seok

Associate Professor

1300 S.W. Mudd Building
West 120th Street
New York, NY 10027

212.854.1701(office)
mgseok@ee.columbia.edu
http://www.ee.columbia.edu/∼mgseok

Field of Specialization

Seok's expertise is to design general-purpose and specialized computing and sensing systems in the form of integrated circuits. The foci are given to: ultra-low power/voltage circuits, variation tolerent and better-than-worst-case design, dynamic themral and reliability management, integrated power management, hybrid analog digital computing, and machine-intelligence.

Academic Training

- **University of Michigan** — Ann Arbor, MI, US
  MS and Ph.D. in Electrical Engineering — *Sep. 2005 - Dec. 2010*
  - Advisor/sponsor: Dennis Sylvester
  - Thesis title: *Extreme Power-Constrained IC Design*, available at deepblue.lib.umich.edu
- **Seoul National University** — Seoul, South Korea
  Bachelor of Science in Electrical Engineering — *Mar. 1998 - Aug. 2005*
  - *summa cum laude*
- **Seoul Science High School** — Seoul, South Korea
  School for gifted students in science and mathematics — *Mar. 1995 - Feb. 1998*
  - *summa cum laude*

Professional Positions

- **Columbia University at the City of New York** — New York, NY
  Associate Professor — *Mar.2018 - present*
  - Assistant Professor: Jan. 2012 - Feb. 2018
  - Department of Electrical Engineering
  - Found and run VLSI Design Lab at Columbia University
- **Systems and Applications R&D Center, Texas Instruments** — Dallas, TX
  Member of Technical Staff — *Jan.2011 - Nov.2011*
  - Signal processing VLSI design department
- **Design and Automation Lab, EECS, University of Michigan** — Ann Arbor, US
  Research Assistant — *Jan.2006 - Dec.2010*
  - Investigate ultra-low power CMOS integrated circuit and system designs

Honors and Society Membership

- **IEEE Senior Member (2018)**; Member (2012); Student Member (2006)
- **NSF CAREER Award** - Awarded for "Addressing Deepening Variability Challenges for Next Generation Margin Free VLSI Computing Platform Design," 2015
- **AMD/CICC Student Scholarship Award** - Awarded for "A 0.5V 2.2pW 2-Transistor Voltage Reference", US, Aug. 2009
- **DAC/ISSCC Student Design Contest** - Awarded for "Phoenix: an Ultra-Low Power Processor for Cubic Millimeter Sensor Systems", US, Feb. 2009

- **Rackham Pre-doctoral Fellowship** - One of three recipients in the EECS department, University of Michigan, Ann Arbor, US, Sep.2008-Aug. 2009
- **Doctoral Study Abroad Fellowship** - One of 15 recipients, nationally, Korea Foundation for Advanced Studies, South Korea, Sep.2005-Aug. 2007
- **Excellency Fellowship** - Seoul National University, South Korea, Mar.1998-Mar.2001
- **Distinguished Undergraduate Scholarship** - One of 20 recipients, nationally, Korea Foundation for Advanced Studies, South Korea, Sep. 1999 - Feb. 2002

Teaching - Semester Courses

- CSEE E4823x Advanced Logic Design
  - Spring 2018 - enrollment: 45, course evaluation: N/A
- EECS E6321 Advanced Digital Electronic Circuits
  - Newly created after more than 10 years of the absence in the department curricula
  - Spring 2017 - enrollment: 22, course evaluation: 4.18/5
  - Spring 2016 - enrollment: 11, course evaluation: 4.89/5
  - Spring 2015 - enrollment: 11, course evaluation: 3.70/5
  - Spring 2014 - enrollment: 49, course evaluation: 3.63/5
  - Spring 2013 - enrollment: 37, course evaluation: 3.73/5
  - Spring 2012 - enrollment: 37, course evaluation: n/a
- EECS E6322 VLSI Architecture for Digital Signal Processing and Machine Learning
  - Newly created
  - Fall 2017 - enrollment: 16, course evaluation: N/A
  - Fall 2016 - enrollment: 17, course evaluation: 4.05/5
  - Fall 2015 (offered as ELEN E6920) - enrollment: 26, course evaluation: 4.27/5
  - Fall 2014 (offered as ELEN E6920) - enrollment: 6, course evaluation: 4.18/5

Short Courses, Tutorials, Fora, Panels, and Special Sessions

- Near/Sub-Threshold Voltage Circuits and Architectures for Digital Processors (Summer course)
  - Introductory course focusing on state of the art circuit and architecture techniques for ultra-low-power (μW and sub-μW) digital VLSI design
  - Offered at Shanghai Jiao Tong University
  - Seven lectures, three hours per lecture, final exam
  - Shanghai Jiao Tong University, Shanghai, China, July., 2018
- The Next Waves of Machine/Deep Learning Hardware (Forum)
  - Discuss the emerging trends and directions on deep learning hardware design
  - A forum in 2018 IEEE Custom Integrated Circuits Conference (CICC)
  - Co-chair with the chair (Jae-Sun Seo at ASU). The forum participants are: Leland Chang (IBM), Chris Nicol (Wave Computing), Vivienne Sze (MIT), Anand Raghunathan (Purdue), Dmitri Strukov (UCSB)
  - San Diego CA, USA, Apr., 2018
- What Can/Should Analog Circuit Designers Do to Ride on the Wave of Machine Learning? (Panel)
  - Discuss the role of analog circuit designers in the wave of machine learning
  - A panel in 2018 IEEE Custom Integrated Circuits Conference (CICC). Co-chaired by Mike Chen (USC) and John Khoury (SiLabs)

  - Participate as a panelist. Other panelists are: Boris Murmann (Stanford), Edgar Sanchez-Sinencio (TAMU), Vivek De (Intel).
  - San Diego CA, USA, Apr., 2018

- Bio-Inspired Learning and Inference Systems: What Works Well and What didn't (Panel)
  - Discuss the successes and challenges in bio-inspired learning and inference systems design
  - A 60-min panel discussion in 2017 Custom Integrated Circuits Conference (CICC)
  - Organize together with Prof. Jae-Sun Seo (ASU, co-chair); Panelists: Rajit Manohar (Yale), Vijaykrishnan Narayanan (PSU), Gert Cauwenberghs (UCSD), Ram Krishnamurthy (Intel), Andrew Cassidy (IBM)
  - Austin TX, USA, Apr., 2017

- Towards Energy-Efficient Intelligence in Power/Area-Constrained Hardware (Tutorial)
  - Introduce recent algorithm, architecture, circuit, device co-design techniques to implement intelligence in compact, low-power devices
  - A 40-min lecture (out of three 40-min lectures) in 2017 Asian and South Pacific Design Automation Conference (ASP-DAC)
  - Together with Prof. Jae-Sun Seo (ASU) and Prof. Zhengya Zhang (UMichigan)
  - Chiba/Tokyo, Japan, Jan. 16, 2017

- Near/Sub-Threshold Circuits and Architectures for Microprocessors (Short course)
  - Introduce key circuit and architecture techniques for designing ultra-low-power computing hardware (e.g., microprocessors) in near/sub-threshold digital circuits for creating ultra-low-power Internet of the Things (IoT) devices.
  - A part of Global Initiative of Academic Network (GIAN) programme
  - Five lectures, three hours per lecture, assignments, and an exam
  - Indian Institute of Technology, Madras, India, Jan., 9-13, 2017

- Variation-Adaptive Design in Near/Sub-Threshold Voltage Digital Computing Hardware (Tutorial)
  - Introduce recent and important techniques to design computing hardware in near/sub-threshold digital circuits for creating the ultra-low-power IoT devices.
  - One hour tutorial (out of three 1-hr tutorials) during 2016 IEEE SOI-3D-Subthreshold Microelectronics Technology Unified Conference (S3S)
  - Together with Prof. Massimo Alioto (NUS) and Prof. Hanh-Phuc Le (Colorado)
  - San Jose, CA, USA, Oct. 10, 2016

- Enabling Technologies for Data Science and Analytics: the Internet of Things (Short Course)
  - Contributing segments: (1) ultra-low-power computing hardware and (2) machine-learning hardware.
  - Offered via the edX (link) from 7/Mar/2016

Teaching - Research Supervise

Visiting Professor: Total: 1

Name	Project Area	Duration, Status
Weiwei Shan	Analog/digital voice processing systems	2017-2019 (estimated)
Hyuk-jae Lee	Video processing systems	2018-2018 (estimated)

Postdoc: Total: 1

Name	Project Area	Duration, Status
Minhao Yang	Analog/digital voice processing systems	2016-2018

Ph.D.: Total: 9

Name	Project Area	Duration, Status

Seongjong Kim	Near/sub-V_T variation-adaptive processors; advising	2012-2016, Intel CRL
Teng Yang	Area-efficient on-chip thermal and aging monitoring; co-advising with Prof. Peter R. Kinget	2012-2018, Intel AD
Jiangyi Li	Scalable power and security circuits; advising	2013-2018; Apple
Doyun Kim	Event-driven control circuits and systems; advising	2013-2018 (estimated)
Joao Pedro Cerqueira	Active leakage suppression techniques; advising	2014-2020 (estimated)
Zhewei Jiang	Low-power machine learning and AI hardware; advising	2015-2020 (estimated)
Pavan Kumar Chundi	On-chip machine learning; advising	2016-2021 (estimated)
Sung Kim	Integrated and distributed regulators; advising	2017-2022 (estimated)
Dongkwon Kim	Integrated power converter and load codesign; advising	2017-2022 (estimated)
Bo Zhang	Mixed-signal AI hardware; advising	2018-2023 (estimated)

Visiting Ph.D.: Total: 3

Name	Project Area	Duration, Status
Wei Jin	Ultra-low voltage sequencing circuits	2014-2016
Tianchan Guan	Scalable synaptic memory model	2015-2018
Peiye Liu	Deep learning acceleration	2017-2019

Member of PhD Committee: Total: 12

Name	Project Area	Duration, Status
Christos Vezyrtzis	Continuous Time DSP	2013, IBM TJ Watson
John Sarik	Systems for Pervasive Electronics and Interfaces	2013
Jayanth Kuppambatti	Mixed-Signal Design Techniques in Scaled CMOS	2014, Startup
Chun-Wei Hsu	Challenges and Solutions for High Performance Analog Circuits with Robust Operation in Low Power Digital CMOS	2015, Analog Dev.
Chengrui Le	Efficient and Integrated Switched-Capacitor Converter	2014, Apple
Fabio Carte	Low Temperature Monolithic Integration for Silicon and Organic Electronics	2015, IBM TJ Watson
Ning Guo	Investigation of Energy-Efficient Hybrid Analog Digital Approximate Computation in Continuous Time	2016, Startup
Yu Chen	Digital Signal Processing with Signal-Derived Timing: Analysis and Implementation	2016, Apple
Sharvil Patil	Energy-Efficient Time-based Encoders and Digital Signal Processors in Continuous Time	2016, Analog Devices
Linxiao Zhang	RF/Analog Spatial Equalization for Integrated Digital MIMO Receivers	2017
Jeffrey Chuang	RF Mixed-signal Phase-Locked Loop (PLL) for Broadband radio	2017 (expected)
Jahnavi Sharma	CMOS Synthesizers for Emerging RF-to-Optical Applications	2017 (expected)

MS Research Students Supervised: Total: 29

Name	Project Area	Duration, Status
Jian Liu, MS	Asynchronous pipeline design	2012, Qualcomm
Hongtao Li, MS	Active decoupling capacitor design	2012, LSI
Junyan Gao, MS	Digital differential analyzer	2012, SanDisk
Kevin Kuo, MS	Design flow exploration	2012, Qualcomm
Changzhuo Chen, MS	Temperature sensor design	2012, CAS
Masayuki Pak, MS	Power grid integrity analysis	2012, Sony
Hongsen Yu, MS	On-chip SRAM design	2013, Marvell
Zhe Cao, MS	Pipeline and parallel architecture	2013, Marvell

Jiangyi Li, MS	Aging monitoring technique	2013, Columbia U.
Artem Lakoviev, MS	OFET design flow	2013, Argo-Logic
Zhenyu Zhu, MS	Ultra-low-power processor	2014, Cavium
Beinuo Zhang, MS	Low-power cognitive computing	2014, Oracle
Cong Zhu, MS	Low-power floating point unit design	2014, Oracle
Jiachen Li, MS	Crosstalk noise analysis	2014, Oracle
Zhewei Jiang, MS	Low-power cognitive computing	2015, Columbia U.
Yini Zhou, MS	Fine-grained thermal monitoring	2016, Broadcom
Blayne Kettlewell, MS	Custom FPGA design and implementation	2017, Magnetic Ins.
David Yu, MS	Custom FPGA design and implementation	2017, Startup
Tom Cheng, MS	Custom FPGA design and implementation	2017
Sung Justin Kim, MS	Hybrid comparator circuits	2017, Columbia U.
Yuxiang Chen, MS	Clock domain crossing	2017, Micron
Song Wang, MS	Neural signal compression systems	2017, Intel
Simarpreet Chawla, MS	Neural signal compression systems	2017, Qualcomm
Sheng Zhang, MS	Embedded AI for chip security	2017, TSMC
Shijian Chi, MS	Occupancy sensing systems	2017
Chuanjun Shan, MS	Occupancy sensing systems	2017
Yucan Liu, MS	Energy-efficient spiking neural networks	2018
Gautham Harinarayan, MS	In-memory computing	2018
Varun Ahalawat, MS	In-memory computing	2018
Ajay Kumar Sidhar, MS	Memory capacity monitoring	2018

BS Research Students Supervised: Total: 5

Name	Project Area	Duration, Status
Christopher Hong, BS	Ultra-low-power processor	2013, Bloomberg
Kyung Min Lee, BS	Ultra-low-power processor	2013, Cornell
Andreas Hoffman, BS	Energy-efficient motor control	2014, Innsbruck
Harrison Liew, BS/MS	In-situ error detection and correction	2017, Analog Bits
Saarthak Sarup	Neural network memory capacity	2018 (expected)
Jay Mok	In-memory computing	2019 (expected)

Peer-Reviewed Journals and Conference Publications

- Total number of publications = 25 (Journal), 67 (conference); h-index = 23; i10-index = 31; total citation count = 2200 (3/2018)

Journals

Under review

Seongjong Kim, Joao Pedro Cerqueira, Mingoo Seok, "A Near-Threshold Spiking Neural Network Accelerator with a Body-Swapping based InSitu Error Detection and Correction Technique," *IEEE Journal of Solid-State Circuits (JSSC)*, 2018, submitted, h-index: 72

Teng Yang, Doyun Kim, Jiangyi Li, Peter R. Kinget, Mingoo Seok, "In-Situ and In-Field Technique for Monitoring and Decelerating NBTI in 6T-SRAM Register Files," *IEEE Transactions of Very Large Scale Integration Systems (TVLSI)*, 2018, submitted, h-index: 42

Seongjong Kim, Mingoo Seok, "A 30.1-μm^2, $\pm 1.1^oC$-3σ-Error, 0.4-1V Digital-Standard-Cell Comparable Temperature Sensor for On-Chip Accurate Thermal Monitoring," *Journal of Low Power Electronics and Applications*, 2018, submitted, h-index: 25

Tianchan Guan, Xiaoyang Zeng, Mingoo Seok, "Recursive Synaptic Bit Reuse: An Efficient Way to Increase Memory Capacity in Associated Memory," *IEEE Transactions on VLSI Systems (TVLSI)*, 2018, submitted, h-index: 42

Saarthak Sarup, Mingoo Seok, "Dynamic Capacity Estimation in Hopfield Networks," *Neural Computation (NECO)*, 2018, submitted, h-index: 31, preprint is uploaded at Arxiv

2018

25. Jiangyi Li, Teng Yang, Minhao Yang, Peter R. Kinget, Mingoo Seok, "An Area-Efficient Microcontroller-SoC with an Instruction-Cache Transformable to a Temperature Sensor and a Physically Unclonable Function," *IEEE Journal of Solid-State Circuits (JSSC)*, 2018, invited for the special issue, h-index: 72

2017

24. Doyun Kim, Mingoo Seok, "A Fully-Integrated Digital Low-Drop-Out Regulator based on Event-Driven Explicit-Time-Coding Architecture," *IEEE Journal of Solid-State Circuits (JSSC)*, 2017, h-index: 72

23. Wei Jin, Seongjong Kim, Weifeng He, Zhigang Mao, Mingoo Seok, "Near and Sub-Vt Pipelines based on Wide-Pulsed-Latch Design Techniques," *IEEE Journal of Solid-State Circuits (JSSC)*, 2017, h-index: 72

22. Jiangyi Li, Jae-Sun Seo, Ioannis Kymissis, Mingoo Seok, "Triple-Mode, Hybrid-Storage Energy Harvesting Power Management Unit: Achieving High Efficiency against Harvesting and Load Variabilities," *IEEE Journal of Solid-State Circuits (JSSC)*, 2017, *invited for the special issue*, h-index: 72

21. Yipeng Huang, Ning Guo, Mingoo Seok, Yannis Tsividis, Simha Sethumadhavan, "Analog Computing in a Modern Context: A Linear Algebra Accelerator Case Study," *IEEE MICRO Magazine*, 2017, **Top Picks from the Computer Architecture Conferences**, h-index: 28

2016

20. Wei Jin, Seongjong Kim, Weifeng He, Zhigang Mao, Mingoo Seok, "In-Situ Error Detection Technique in Ultra-Low-Voltage Pipelines: Analysis and Optimizations," *IEEE Transactions on VLSI Systems (TVLSI)*, 2016, h-index: 42, link

19. Jiangyi Li, Mingoo Seok, "Ultra-Compact and Robust Physically-Unclonable-Function based on Voltage-Compensated Proportional-to-Absolute-Temperature Voltage Generators," *IEEE Journal of Solid-State Circuits (JSSC)*, 2016, h-index: 72, link

18. Le Zheng, Zhenzhi Wu, Mingoo Seok, Xiaodong Wang, Quanhua Liu, "High-Accuracy Compressed Sensing Decoder Based on Adaptive (l_0,l_1) Complex Approximate Message Passing: Cross-Layer Design, *IEEE Transactions on Circuits and Systems I (TCAS-I)*, 2016, h-index: 52, link

17. Daniel Marti, Mattia Rigotti, Mingoo Seok, Stefano Fusi, "Energy-Efficient Neuromorphic Classifier," *Neural Computation (NECO)*, 2016, h-index: 34, preprint is uploaded at ArXiv

16. Ning Guo, Yipeng Huang, Tao Mai, Shavil Patil, Chi Cao, Mingoo Seok, Simha Sethumadhavan, Yannis Tsividis, "Low-Energy Hybrid Analog/Digital Approximate Computation in Continuous Time," *IEEE Journal of Solid-State Circuits (JSSC)*, 2016, *invited for the special issue*, h-index: 72, link

15. Joao Pedro Cerqueira, Mingoo Seok, "Temporarily Fine-Grained Sleep Technique for Near- and Sub-Threshold Parallel Architectures," *IEEE Transactions on VLSI Systems (TVLSI)*, 2016, h-index: 42, link

2015

14. Teng Yang, Seongjong Kim, Peter R. Kinget, Mingoo Seok, "Ultra-compact and Voltage-Scalable Temperature Sensor Design for Dense Dynamic Thermal Management Techniques," *IEEE Journal of Solid-State Circuits (JSSC)*, 2015, h-index: 72, link

13. Seongjong Kim, Mingoo Seok, "Variation-Tolerant Near-threshold Microprocessor Design with Low-Overhead, Within-a-Cycle In-situ Error Detection and Correction Technique," *IEEE Journal of Solid-State Circuits (JSSC)*, 2015, h-index: 72, link

2013

12. Yoonmyung Lee, Mingoo Seok, Scott Hanson, Dennis Sylvester, David Blaauw, "Achieving Ultra-low Standby Power with an Efficient SCCMOS Bias Generator," *IEEE Transactions on Circuits and Systems II (TCAS-II)*, 2013, h-index: 32, link

11. Mohammad Hassan Ghaed, Gregory Chen, Razi-ul Haque, Michael Wieckowski, Yejoong Kim, Gyouho Kim, Yoonmyung Lee, Inhee Lee, David Fick, Daeyeon Kim, Mingoo Seok, Kensall, and K. Wise, David Blaauw, and Dennis Sylvester, "Circuits for a Cubic-Millimeter Energy-Autonomous Wireless Intraocular Pressure Monitor," *IEEE Transactions on Circuits and Systems I (TCAS-I)*, vol.60, no.12, pp.3152-3162, 2013, h-index: 52, link

10. Matthew Fojtik, Daeyeon Kim, Gregory K. Chen, Yu-Shiang Lin, David Fick, Junsun Park, Mingoo Seok, Mao-Ter Chen, Zhiyoong Foo, David Blaauw, Dennis Sylvester, "Millimeter-Scale Energy-Autonomous Sensor System with Stacked Battery and Solar Cells," *IEEE Journal of Solid-State Circuits (JSSC)*, vol.48, no.3, pp.801-813, Mar. 2013, h-index: 72, link

2012

9. Dongsuk Jeon, Mingoo Seok, Zhengya Zhang, David Blaauw, Dennis Sylvester, "A Design Methodology for Voltage Overscaled Ultra-Low Power Systems," *IEEE Transactions on Circuits and Systems II (TCAS-II)*, vol.59, no.12, pp.952-956, Dec. 2012, h-index: 32, link

8. Mingoo Seok, Gyouho Kim, David Blaauw, Dennis Sylvester, "A Portable 2-Transistor Picowatt Temperature-Compensated Voltage Reference Operating at 0.5V," *IEEE Journal of Solid-State Circuits (JSSC)*, vol.47, no.10, pp.2534-2545, Oct. 2012, h-index: 72, link

7. Dongsuk Jeon, Mingoo Seok, Chaitali Chakrabarti, David Blaauw, Dennis Sylvester, "A Super-Pipelined Energy Efficient Subthreshold 240MS/s FFT Core in 65nm CMOS," *IEEE Journal of Solid-State Circuits (JSSC)*, vol.47, no.1, pp.23-34, 2012, **invited**, h-index: 72, link

2011

6. Mingoo Seok, David Blaauw, Dennis Sylvester, "Robust Clock Network Design Methodology for Ultra-Low Voltage Operations," *Journal on Emerging and Special Topics on Circuits and Systems (JETCAS)*, vol.1. no.2, pp.120-130, 2011, **invited**, h-index: 26, link

5. Mingoo Seok, Gregory Chen, Scott Hanson, Michael Wieckowski, David Blaauw, Dennis Sylvester, "Mitigating Variability in Near Threshold Computing," *Journal on Emerging and Special Topics on Circuits and Systems (JETCAS)*, vol.1. no.1, pp.42-49, 2011, **invited**, h-index: 26, link

4. Mingoo Seok, Scott Hanson, David Blaauw, Dennis Sylvester, "Sleep Mode Analysis and Optimization with Minimal-Sized Power Gating Switch for Ultra-low Vdd Operations," *Transactions on VLSI systems (TVLSI)*, vo.20. no.4, pp.605-615, 2011, h-index: 42, link

2009

3. Scott Hanson, Mingoo Seok, Yu-shiang Lin, Zhiyoong Foo, Daeyeon Kim, Yoonmyung Lee, Nurrachman Liu, Dennis Sylvester, David Blaauw, "A Low-Voltage Processor for Sensing Applications With Picowatt Standby Mode," *Journal of Solid State Circuits (JSSC)*, vol.44, no.4, pp.1145-1155, 2009, **invited**, h-index: 72, link

2008

2. Scott Hanson, Bo Zhai, Mingoo Seok, Brian Cline, Kevin Zhou, Meghna Singhal, Michael Minuth, Javin Olson, Leyla Nazhandali, Todd Austin, Dennis Sylvester, David Blaauw, "Exploring Variability and Performance in a Sub-200mV Processor," *Journal of Solid State Circuits (JSSC)*, vol.43, no.4, pp.881-891, Apr., 2008, **invited**, h-index: 72, link

2007

1. Scott Hanson, Mingoo Seok, Dennis Sylvester, David Blaauw, "Nanometer Device Scaling in Subthreshold Logic and SRAM," *Transactions on Electron Devices (TED)*, vol.55, no.1, pp.175-185, 2007, **invited**, h-index: 59, link

Conferences

Under review

Zhewei Jiang, Shihui Yin, Mingoo Seok, Jae-sun Seo, "XNOR-SRAM: In-Memory Computing SRAM Macro for Binary/Ternary Deep Neural Networks," Hot Chips, 2018, submitted, h-index: 15

Weiwei Shan, Liang Wan, Wentao Dai, Xinchao Shang, Jun Yang, Mingoo Seok, "An All-digital, Bi-directional Adaptive Clocking Circuit and AVFS System in 28nm CMOS," *IEEE European Solid-State Circuits Conference (ESSCIRC)*, 2018, submitted, h-index: 22

Weiwei Shan, Mingoo Seok, Minyi Lu, Jiaming Xu, Shuai Zhang, Jun Yang,"A 0.59-pJ/bit AES Core in a 28 nm CMOS with a Machine-Learning Assisted DPA Countermeasure," *IEEE European Solid-State Circuits Conference (ESSCIRC)*, 2018, submitted, h-index: 22

Jiangyi Li, Pavan Kumar Chundi, Sung Justin Kim, Zhewei Jiang, Minhao Yang, Joonseong Kang, Seungchul Jung, Sang Joon Kim, Mingoo Seok, "A 0.78-μW 96-Ch. Neural Signal Processor Integrated with a Nanowatt Power Management Unit based on Energy-Robustness Co-Optimization Control ," *IEEE European Solid-State Circuits Conference (ESSCIRC)*, 2018, submitted, h-index: 22

Joao Pedro Cerqueira, Jiangyi Li, Mingoo Seok, "A 100-pW 1-kHz Class Always-On FIR Filter based on Feedforward Leakage Self-Suppression Logic," *IEEE European Solid-State Circuits Conference (ESSCIRC)*, 2018, submitted, h-index: 22

Sung Justin Kim, Doyun Kim, Jonghwan Kim, Hyunju Ham, Mingoo Seok, "A Fully-Integrated Digital LDO based on Hybrid Event- and Time-Driven Control," *European Solid-State Circuits Conference (ESSCIRC)*, 2018, submitted, h-index: 22

Tianchan Guan, Xiaoyang Zeng, Mingoo Seok, "Recursive Binary Neural Network Learning Model with 2-bit/weight Storage Requirement," *IEEE International Conference on Machine Learning (ICML)*, 2018, submitted, h-index: NA, preprint is uploaded at ArXiv

2018

67. Sheng Zhang, Adrian Tang, Zhewei Jiang, Simha Sethumadhavan, Mingoo Seok, "Blacklist Core: Machine-Learning Based Dynamic Operating-Performance-Point Blacklisting for Mitigating Power-Management Security Attacks," *ACM/IEEE International Symposium on Low Power Electronics and Design (ISLPED)*, 2018, h-index: 24

66. Dongkwun Kim, Mingoo Seok, "Better-Than-Worst-Case Design Methodology for a Compact Integrated Switched-Capacitor DC-DC Converter," *ACM/IEEE International Symposium on Low Power Electronics and Design (ISLPED)*, 2018, h-index: 24

65. Zhewei Jiang, Shihui Yin, Mingoo Seok, Jae-Sun Seo, "XNOR-SRAM: In-Memory Mixed-Signal Accelerator for Binary/Ternary-Input and Binary-Weight Deep Neural Networks," *IEEE Symposium on VLSI Technology (VLSIT)*, 2018, h-index: 32

64. Doyun Kim, Sung Justin Kim, Jonghwan Kim, Hyunju Ham, Mingoo Seok, "0.5V-V_{IN}, 165-mA/mm^2 Fully-Integrated Digital LDO based on Event-Driven Self-Triggering Control," *IEEE Symposium on VLSI Circuits (VLSIC)*, 2018, h-index: 28

63. Mingoo Seok,, Peter R. Kinget, Teng Yang, Jiangyi Li, Doyun Kim, "Recent Advances in *In-situ* and *In-field* Transistor-Aging Monitoring and Compensation Techniques," *IEEE International Reliability Physics Symposium (IRPS)*, 2018, **invited**, h-index: 25

62. Minhao Yang, Chung-Heng Yeh, Yiyin Zhou, Joao Pedro Cerqueira, Aurel Lazar, Mingoo Seok, "1-μW Voice Activity Detector using Analog Feature Extraction and Digital Deep Neural Network," *IEEE International Solid-State Circuits Conference (ISSCC)*, 2018, h-index: 60

2017

61. Yipeng Huang, Ning Guo, Mingoo Seok, Yannis Tsividis, Kyle Mandli, Simha Sethumadhavan, "Hybrid Analog-Digital Accelerator for Differential and Algebraic Equations," *IEEE International Conference on Rebooting Computing (ICRC)*, 2017, h-index: NA

60. Tom Repetti, Joao Pedro Cerqueira, Martha Kim, Mingoo Seok, "Pipelining a Triggered Processing Element," *IEEE/ACM Symposium on Microarchitecture (Micro)*, 2017, h-index: 41

59. Yipeng Huang, Ning Guo, Kyle T. Mandli, Mingoo Seok, Yannis Tsividis, Simha Sethumadhavan, "Hybrid Analog-Digital Solution of Nonlinear Partial Differential Equations," *IEEE/ACM Symposium on Microarchitecture (Micro)*, 2017, **Honorable Mention, Top Picks from the Computer Architecture Conferences**, h-index: 41

58. Joao Pedro Cerqueira, Mingoo Seok, "0.17mm^2 3.19nJ/Transform 256-pt FFT Processor based on Spatiotemporal Active Leakage Suppression Techniques," *European Solid-State Circuits Conference (ESSCIRC)*, 2017, h-index: 22

57. Seongjong Kim, Joao Pedro Cerqueira, Mingoo Seok, "Ultra-Low-Power and Robust Power-Management/Microprocessor System Using Digital Error-based Regulation," *European Solid-State Circuits Conference (ESSCIRC)*, 2017, h-index: 22

56. Pavan Kumar Chundi, Yini Zhou, Martha Kim, Eren Kursun, Mingoo Seok, "Evaluation of Miniature Temperature Sensors on On-Chip Hotspot Monitoring," *ACM/IEEE International Symposium on Low Power Electronics and Design (ISLPED)*, 2017, h-index: 24

55. Sung Kim, Doyun Kim, Mingoo Seok, "Comparative Study and Optimization of Synchronous and Asynchronous Comparators at Near-threshold Voltages," *ACM/IEEE International Symposium on Low Power Electronics and Design (ISLPED)*, 2017, h-index: 24

54. Teng Yang, Pavan Chundi, Seongjong Kim, Eren Kursun, Martha Kim, Peter R. Kinget, Mingoo Seok, "Compact and Voltage-Scalable Sensor for Accurate Thermal Sensing in Dynamic Thermal Management," *IEEE International Midwest Symposium on Circuits and Systems (MWSCAS)*, 2017, invited, h-index: 17

53. Jiangyi Li, Teng Yang, Mingoo Seok, "A Technique to Transform 6T-SRAM Arrays into Robust Analog PUF with Minimal Overhead," *IEEE International Symposium on Circuits & Systems (ISCAS)*, 2017, h-index: 27

52. Teng Yang, Jiangyi Li, Minhao Yang, Peter R. Kinget, Mingoo Seok, "An Area-Efficient Microprocessor-SoC with an Instruction-Cache Transformable to a Temperature Sensor and a Physically Unclonable Function," *IEEE Custom Integrated Circuits Conference (CICC)*, 2017, h-index: 22

51. Zhewei Jiang, Chisung Bae, Joonseong Kang, Sang Joon kim, Mingoo Seok, "Microwatt End-to-End Digital Neural Signal Processing Systems for Motor Intention Decoding," *Design, Automation, and Test in Europe (DATE)*, 2017, h-index: 39

50. Tianchan Guan, Xiaoyang Zeng, Mingoo Seok, "Extending Memory Capacity of Neural Associative Memory based on Recursive Synaptic Bit Reuse," *Design, Automation, and Test in Europe (DATE)*, 2017, h-index: 39

49. Doyun Kim, Jonghwan Kim, Hyunju Ham, Mingoo Seok, "A 0.5V-V_{IN} 1.44mA-Class Event-Driven Digital LDO with a Fully-Integrated 100pF Output Capacitor," *IEEE International Solid-State Circuits Conference (ISSCC)*, 2017, h-index: 60

2016

48. Wei Jin, Seongjong Kim, Weifeng He, Zhigang Mao, Mingoo Seok, "A 0.35V 1.3pJ/Cycle 20MHz 8-Bit 8-Tap FIR Core Based on Wide-Pulsed-Latch Pipelines," *IEEE Asian Solid-State Circuits Conference (ASSCC)*, 2016, h-index: 14

47. Jiangyi Li, Jae-Sun Seo, Ioannis Kymissis, Mingoo Seok, "Triple-Mode Photovoltaic Power Management: Achieving High Efficiency against Harvesting and Load Variability," *IEEE Asian Solid-State Circuits Conference (ASSCC)*, 2016, h-index: 14

46. Tianchan Guan, Letian Huang, Xiaoyang Zeng, Mingoo Seok, "Neural Network based Seizure Detection System using Raw EEG Data," *International SoC Design Conference (ISOCC)*, 2016, *invited for special session*

45. Teng Yang, Peter R. Kinget, Mingoo Seok, "Register File Circuits and Post-Deployment Framework to Monitor Aging Effects *in Field*," *European Solid-State Circuits Conference (ESSCIRC)*, 2016, h-index: 22, link

44. Seongjong Kim, Joao Pedro Cerqueira, Mingoo Seok, "A 450mV Timing-Margin-Free Waveform Sorter based on Body Swapping Error Correction," *IEEE Symposium on VLSI Circuits (VLSI)*, 2016, h-index: 28, link

43. Zhewei Jiang, Joao Pedro Cerqueira, Seongjong Kim, Qi Wang, Mingoo Seok, "1.74-$\mu W/ch$, 95.3%-Accurate Spike-Sorting Hardware based on Bayesian Decision" *IEEE Symposium on VLSI Circuits (VLSI)*, 2016, h-index: 28, link

42. Yipeng Huang, Ning Guo, Mingoo Seok, Yannis Tsividis, Simha Sethumadhavan, "Evaluation of an Analog Accelerator," *ACM/IEEE International Symposium on Computer Architecture (ISCA)*, 2016, *Top Pick in 2016*, h-index: 50, link

41. Doyun Kim, Mingoo Seok, "Fully-Integrated Low Drop-Out Regulator based on Event-Driven PI Control," *IEEE International Solid-State Circuits Conference (ISSCC)*, 2016, h-index: 60, link

2015

40. Jae-Sun Seo, Mingoo Seok, "Digital CMOS Neuromorphic Processor Design Featuring Unsupervised Online Learning," *IEEE/IFIP International Conference on VLSI and System-on-Chip (VLSI-SoC)*, 2015, **invited**, link

39. Doyun Kim, Jiangyi Li, Mingoo Seok, "Energy-Optimal Voltage Model Supporting a Wide Range of Nodal Switching Rates for Early Design-Space Exploration," *IEEE International Conference on Computer Design (ICCD)*, 2015, h-index: 19, link

38. Seongjong Kim, Mingoo Seok, "A 30.1μm^2, $\pm 1.1^oC$-3σ-Error, 0.4-to-1.0V Temperature Sensor based on Direct Threshold-Voltage Sensing for Dense On-Chip Thermal Monitoring," *IEEE Custom Integrated Circuits Conference (CICC)*, 2015, h-index: 22, link

37. Ning Guo, Yipeng Huang, Tao Mai, Shavil Patil, Chi Cao, Mingoo Seok, Simha Sethumadhavan, Yannis Tsividis, "Continuous-Time Hybrid Computation with Programmable Nonlinearities," *European Solid-State Circuits Conference (ESSCIRC)*, 2015, h-index: 22, link

36. Beinuo Zhang, Zhewei Jiang, Qi Wang, Jae-Sun Seo, Mingoo Seok, "A Neuromorphic Neural Spike Clustering Processor for Deep-Brain Sensing and Stimulation Systems ," *ACM/IEEE International Symposium on Low Power Electronics and Design (ISLPED)*, 2015 h-index: 24, link

35. Jiangyi Li and Mingoo Seok, "A 3.07$\mu m^2/bitcell$ Physically Unclonable Function with 3.5% and 1% Bit-Instability across 0 to 80^oC and 0.6 to 1.2V in a 65nm CMOS," *IEEE Symposium on VLSI Circuits (VLSI)*, 2015, h-index: 28, link

34. Zhewei Jiang, Qi Wang, Mingoo Seok, "A Low Power Unsupervised Spike Sorting Accelerator Insensitive to Clustering Initialization in Sub-optimal Feature Space," *ACM/EDAC/IEEE Design Automation Conference (DAC)*, 2015, h-index: 43, link

33. Fabio Carta, Htay Hlaing, Hassan Edrees, Shyuan Yang, Mingoo Seok, Ioannis Kymissis, "Co-Development of Complementary Technology and Modified-CPL Family for Organic Digital Integrated Circuits," *Material Research Society Proceedings*, vol.1795, 2015, link

32. Teng Yang, Doyun Kim, Peter R. Kinget, Mingoo Seok, "In-situ Techniques for In-field Sensing of NBTI Degradation in an SRAM Register File," *IEEE International Solid-State Circuits Conference (ISSCC)*, 2015, h-index: 60, link

2014

31. Seongjong Kim, Mingoo Seok, "Analysis and Optimization of In-Situ Error Detection Techniques in Ultra-Low-Voltage Pipeline," *ACM/IEEE International Symposium on Low Power Electronics and Design (ISLPED)*, 2014, h-index: 24, link

30. Seongjong Kim, Mingoo Seok, "Reconfigurable Interconnect-Driving Technique for Ultra-Dynamic-Voltage-Scaling Systems," *ACM/IEEE International Symposium on Low Power Electronics and Design (ISLPED)*, 2014, h-index: 24, link

29. Seongjong Kim, Mingoo Seok, "R-Processor: 0.4V Resilient Processor with a Voltage-Scalable and Low-Overhead In-Situ Error Detection and Correction Technique in 65nm CMOS," *IEEE Symposium on VLSI Circuits (VLSI)*, 2014, h-index: 28, link

28. Jiangyi Li, Mingoo Seok, "Robust and In-Situ Self-Testing Technique for Monitoring Device Aging Effects in Pipeline Circuits," *ACM/EDAC/IEEE Design Automation Conference (DAC)*, 2014, h-index: 43, link

27. Teng Yang, Seongjong Kim, Peter R. Kinget, Mingoo Seok, "0.6-1.0V, 279μm^2, 0.92μW Temperature Sensor with $<$ +3.2/-3.4^oC Error for Dense On-Chip Thermal Monitoring," *IEEE International Solid-State Circuits Conference (ISSCC)*, pp.282-283, 2014, h-index: 60, link

2013

26. Mingoo Seok, Zhe Cao, "Parallelism and Pipelining in Ultra-Low Voltage Digital Circuits," *IEEE SOI-3D-Subthreshold Microelectronics Technology Unified Conference (S3S)*, 2013, **invited**, link

25. Yu Chen, Mingoo Seok, Steve M. Nowick, "Robust and Energy-Efficient Asynchronous Dynamic Pipelines for Ultra-Low-Voltage Operations Using Adaptive Keeper Control," *ACM/IEEE International Symposium on Low Power Electronics and Design (ISLPED)*, pp.267-272, 2013, h-index: 24, link

24. Jian Liu, Steve M. Nowick, Mingoo Seok, "Soft MOUSETRAP: a Bundled-Data Asynchronous Pipeline Scheme Tolerant to Random Variations at Ultra Low Supply Voltages," *IEEE International Symposium on Asynchronous Circuits and Systems (ASYNC)*, pp.1-7, 2013, link

2012

23. Mingoo Seok, "Performance and Energy-Efficiency Improvement through Modified CPL in Organic Transistor Integrated Circuits," *ACM/IEEE International Symposium on Low Power Electronics and Designs (ISLPED)*, pp. 215-220, 2012, h-index: 24, link

22. Mingoo Seok, "A Fine-Grained Many VT Design Methodology for Ultra Low Voltage Operations," *ACM/IEEE International Symposium on Low Power Electronics and Designs (ISLPED)*, pp. 161-166, 2012, h-index: 24, link

21. Mingoo Seok, "Decoupling Capacitor Design Strategy for Minimizing Supply Noise of Ultra Low Voltage Circuits," *ACM/EDAC/IEEE Design Automation Conference (DAC)*, pp. 968-973, 2012, h-index: 43, link

20. Mingoo Seok, Dongsuk Jeon, Chaitali Chakrabarti, David Blaauw, Dennis Sylvester, "Extending Energy-Saving Voltage Scaling in Ultra Low Voltage Integrated Circuit Designs," *International Conference on IC Design and Technology (ICICDT)*, pp.1-4, 2012, **invited**, h-index: 9, link

2011

19. Mingoo Seok, Dongsuk Jeon, Chaitali Chakrabarti, David Blaauw, Dennis Sylvester, "A 0.27V, 30MHz, 17.7nJ/transform 1024-pt Complex FFT Core with super-pipelining," *International Solid-State Circuits Conferences (ISSCC)*, pp. 342-344, 2011, h-index: 60, link

18. Gregory Chen, Hassan Ghaed, Razi-Ul Haque, Michael Wieckowski, Yejoong Kim, Gyouho Kim, David Fick, Daeyeon Kim, Mingoo Seok, Kensall Wise, David Blaauw, Dennis Sylvester, "A 1 Cubic Millimeter Energy-Autonomous Wireless Intraocular Pressure Monitor," *International Solid-State Circuits Conferences (ISSCC)*, pp.310-312, 2011, h-index: 60, link

17. Mingoo Seok, Dongsuk Jeon, Chaitali Chakrabarti, David Blaauw, Dennis Sylvester, "Pipeline Strategy for Improving Optimal Energy Efficiency in Ultra-Low Voltage Design" *ACM/IEEE Design Automation Conference (DAC)*, pp.990-995, 2011, h-index: 43, link

16. Dongsuk Jeon, Mingoo Seok, Chaitali Chakrabarti, David Blaauw, Dennis Sylvester, "Energy-Optimized High Performance FFT Processor," *International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, pp.1701-1704, 2011, h-index: 61link

15. Daeyeon Kim, Gregory K. Chen, Matthew Fojtik, Mingoo Seok, Dennis Sylvester, David Blaauw, "A Femtowatt-Scale Ultra-Low Leakage 10T SRAM with Speed Compensation Scheme," *International Symposium on Circuits and Systems (ISCAS)*, pp.69-72, 2011, h-index: 27, link

2010

14. Mingoo Seok, Gyouho Kim, David Blaauw, Dennis Sylvester, "Variability Analysis of a Digitally Trimmable Ultra-Low Power Voltage Reference," *European Solid-State Circuits Conference (ESSCIRC)*, pp.110-113, Sep, 2010, h-index: 22, link

13. Mingoo Seok, David Blaauw, Dennis Sylvester, "Clock Network Design for Ultra-Low Power Applications," *ACM/IEEE International Symposium on Low Power Electronics and Design (ISLPED)*, pp.271-276, Aug, 2010, h-index: 24, link

12. Mingoo Seok, Scott Hanson, Michael Wieckowski, Gregory K. Chen, Yu-Shiang Lin, David Blaauw, Dennis Sylvester, "Circuit Design Advances to Enable Ubiquitous Sensing Environments," *International Symposium on Circuits and Systems (ISCAS)*, pp.285-288, 2010, **invited**, h-index: 27, link

11. Gregory K. Chen, Matthew Fojtik, Daeyeon Kim, David Fick, Junsun Park, Mingoo Seok, Mao-Ter Chen, Zhiyoong Foo, Dennis Sylvester, David Blaauw, "A Millimeter-Scale Nearly-Perpetual Sensor System with Stacked Battery and Solar Cells," *International Solid-State Circuits Conference (ISSCC)*, pp.288-289, 2010, h-index: 60, link

2009

10. Mingoo Seok, Gyouho Kim, Dennis Sylvester, David Blaauw, "A 0.5V 2.2pW 2-Transistor Voltage Reference," *Custom Integrated Circuit Conference (CICC)*, pp.577-580, 2009, h-index: 22, link

9. Michael Wieckowski, Gregory K. Chen, Mingoo Seok, Dennis Sylvester, David Blaauw, "A Hybrid DC-DC Converter for Nanoampere Sub-1V Implantable Applications," *IEEE Symposium on VLSI Circuits (VLSI)*, pp.166-167, 2009, h-index: 28, link

2008

8. Dennis Sylvester, Scott Hanson, Mingoo Seok, Yu-Shiang Lin, David Blaauw, "Designing Robust Ultra-Low Power Circuits," *International Electron Device Meetings (IEDM)*, pp.1 2008, **invited**, h-index: 42, link

7. Mingoo Seok, Scott Hanson, Jae-sun Seo, Dennis Sylvester, David Blaauw "Robust Ultra-low Voltage ROM Design," *Custom Integrated Circuit Conference (CICC)*, pp.423-426, 2008, h-index: 22, link

6. Yoonmyung Lee, Mingoo Seok, Scott Hanson, David Blaauw, Dennis Sylvester "Standby Power Reduction Techniques for Ultra-Low Power Processors," *European Solid-State Circuits Conference (ESSCIRC)*, pp.186-189, 2008, h-index: 22, link

5. Mingoo Seok, Dennis Sylvester, David Blaauw, "Optimal Technology Selection for Minimizing Energy and Variability in Low Voltage Applications," *ACM/IEEE International Symposium on Low Power Electronics and Design (ISLPED)* , pp.9-14, 2008, h-index: 24, link

4. Mingoo Seok, Scott Hanson, Yu-Shiang Lin, Zhiyoong Foo, Daeyeon Kim, Yoonmyung Lee, Nurrachman Liu, Dennis Sylvester, David Blaauw, "The Phoenix Processor: A 30pW Platform for Sensor Applications," *IEEE Symposium on VLSI Circuits (VLSI)*, pp.188-189, 2008, h-index: 28, link

2007

3. Mingoo Seok, Scott Hanson, Dennis Sylvester, David Blaauw, "Analysis and Optimization of Sleep modes in Subthreshold Circuit Design," *ACM/IEEE Design Automation Conference (DAC)*, pp.694-699, 2007, h-index: 43, link

2. Scott Hanson, Mingoo Seok, David Blaauw, Dennis Sylvester, "Nanometer Device Scaling in Subthreshold Circuits," *ACM/IEEE Design Automation Conference (DAC)*, pp.700-705, 2007, h-index: 43, link

1. Scott Hanson, Bo Zhai, Mingoo Seok, Brian Cline, Kevin Zhou, Meghna Singhal, Michael Minuth, Javin Olson, Leyla Nazhandali, Todd Austin, Dennis Sylvester, David Blaauw, "Performance and Variability Optimization Strategies in a 150mV processor," *IEEE Symposium on VLSI Circuits (VLSI)*, pp.152-153, 2007, h-index: 28, link

Non-Peer-Reviewed Publications

13. Guanshun Yu, Tom Cheng, Blayne Kettlewell, Harrison Liew, Mingoo Seok, Peter R. Kinget, "An FPGA Architecture and Chip-Prototype based on Open-Source VTR CAD Flow," Arxiv.org, 2017, link

12. Zhewei Jiang, Shuhui Yin, Mingoo Seok, Jae-sun Seo, "XNOR-SRAM: In-Memory Mixed-Signal Accelerator for Binary/Ternary-Input and Binary-Weight Deep Neural Networks," *Presentation at the 2018 ISSCC Student Research Preview (SRP) (Student work in progress)*, Feb., 2018

11. Yipeng Huang, Ning Guo, Mingoo Seok, Yannis Tsividis, Kyle Mandli, Simha Sethumadhavan, "Hybrid Analog-Digital Solution of Nonlinear Partial Differential Equations," *Heidelberg Laureate Forum, Heidelberg University*, Sep. 2017

10. Mingoo Seok, Minhao Yang, Zhewei Jiang, Tianchan Guan, "Machine Learning with Constrained Resources," *IBM / IEEE CAS EDS Symposium*, Sep. 2017

9. Yipeng Huang, Ning Guo, Kyle Mandli, Mingoo Seok, Yannis Tsividis, Simha Sethumadhavan, "Hybrid Analog-Digital Solution of Nonlinear Partial Differential Equations," *Data Science Day @ Columbia University*, Apr., 2017

8. Yipeng Huang, Ning Guo, Mingoo Seok, Yannis Tsividis, Simha Sethumadhavan, "Hybrid Analog-Digital Computing for Solving Nonlinear Systems," *Frontiers in Computing Systems Symposium, Columbia University*, March 2017

7. Yipeng Huang, Ning Guo, Mingoo Seok, Yannis Tsividis, Simha Sethumadhavan, "Hybrid Analog-Digital Computation for Solving Non-Linear Systems," *Data Science Day @ Columbia University*, Apr., 2016

6. Seongjong Kim, Joao Pedro Cerqueira, Mingoo Seok, "A 450mV Timing-Margin-Free Unsupervised Sorter based on Spiking Neural Network," *Data Science Day @ Columbia University*, Apr., 2016

5. Seongjong Kim, Joao Pedro Cerqueira, Mingoo Seok, "Variation Adaptive Digital Circuit Design," *Presentation at the 2016 ISSCC Student Research Preview (SRP) (Student work in progress)*, Jan., 2016

4. Zhewei Jiang, Mingoo Seok, "A Low Power Unsupervised Spike Sorting Accelerator Insensitive to Clustering Initialization in Sub-Optimal Feature Space," *Data on a Mission, Internet of Things, A Mini-Symposium with Industry Experts, Columbia University*, May, 2015

3. Seongjong Kim, Mingoo Seok, "R-Processor: Resilient Microprocessor Design for Ultra-Low-Power Ubiquitous Computing," *Data on a Mission, Internet of Things, A Mini-Symposium with Industry Experts, Columbia University*, May, 2015

2. Paolo Mantovani, Emilion G. Cota, Seongjong Kim, Kevin Tien, Johnnie Chan, Giuseppe Di Guglielmo, Christian Pilato, Martha A. Kim, Mingoo Seok, Kenneth Shepard, Luca P. Carloni, "Benchmarking Methodology for Embedded Scalable Platforms," *SEAK: DAC Workshop on Suite of Embedded Applications and Kernels during ACM/EDAC/IEEE Design Automation Conference*, 2014

1. Mingoo Seok, Scott Hanson, Yu-Shiang Lin, Zhiyoong Foo, Daeyeon Kim, Yoonmyung Lee, Nurrachman Liu, Dennis Sylvester, David Blaauw, "Phoenix: an Ultra-Low Power Processor for Cubic Millimeter Sensor Systems," *ACM/IEEE Design Automation Conference (DAC)*, 2009 [DAC/ISSCC Student Design Contest Winner], link

Professional Activities

- Journal Editor
  - Associate Editor - IEEE Solid-State Circuits Letters (SSCL), 2017-present
  - Associate Editor - IEEE Transactions on Very Large Scale Integration (VLSI) Systems, 2015-present
  - Guest Editor - IEEE Jounal of Solid-State Circuits (JSSC), the special issue of 2019 IEEE International Solid-State Circuits Conference (ISSCC), 2018
  - Associate Editor - IEEE Transactions on Circuits and Systems I: Regular Papers, 2014-2016
- Service to Professional Societies
  - Treasurer, IEEE New York Section EDS/SSCS Chapter, 2016-present
  - Chair, IEEE New York Section EDS/SSCS Chapter, 2014-2015
  - Vice Chair, IEEE New York Section EDS/SSCS Chapter, 2012-2013
- Conference Organization and Technical Program Committee
  - Technical program committee member, Digital Circuits (DCT), IEEE International Solid-State Circuits Conference (ISSCC), 2019-present
  - Technical program committee member, Student Research Preview (SRP), IEEE International Solid-State Circuits Conference (ISSCC), 2018-present
  - Technical program committee member, Power Management, IEEE Custom Integrated Circuits Conference (CICC), 2017-present
  - Special Session Co-Organizer, Panels, IEEE Custom Integrated Circuits Conference (CICC), 2018
  - Technical program committee member, digital circuits and technology, ACM/IEEE International Symposium on Low Power Electronics and Design (ISLPED), 2013-present
  - Student Design Contest Co-Chair, ACM/IEEE International Symposium on Low Power Electronics and Design (ISLPED), 2013-2014
  - Technical program committee member, Subthreshold Circuits - IEEE SOI-3D-Subthreshold Microelectronics Technology Unified Conference (S3S), 2014-present

  - Tutorial Chair, Energy-Efficient Computing for the Internet of Things, IEEE SOI-3D-Subthreshold Microelectronics Technology Unified Conference (S3S), 2016
  - Technical program committee member, Digital Design, IEEE International Conference on Computer Design (ICCD), 2013 and 2015-2017
  - Technical program committee member, Computing Systems, IEEE International Conference on Computer Design (ICCD), 2017
  - Registration Co-Chair, IEEE International Conference on Computer Design (ICCD), 2015-2017
  - Session Chair, Processor and Memory, IEEE Midwest Symposium on Circuits and Systems (MWCAS), 2017
  - Technical program committee member, Digital Design, IEEE/ACM International Conference on VLSI Design (VLSID), 2013, 2016, 2017

- Organization of Professional Workshops and Seminars
  - Organizer, Columbia Integrated System Laboratory (CISL) Seminar Series, 2013-2017
  - IEEE SSCS Distinguished Lecture Tour: Half-Day Colloquium on the Recent Advances in RF, Mixed-Signal, and Digital IC designs; Organize; sponsored by IEEE EDS/SSCS and Columbia University; Dec. 4, 2015
  - IEEE SSCS Distinguished Lecture Tour: Half-Day Colloquium on the Recent Advances in RF, Mixed-Signal, and Digital IC designs; Organize; sponsored by IEEE EDS/SSCS and Columbia University; Oct. 17, 2014
  - Workshop on Connected, Autonomously Powered Systems; A one-day in-depth discussion of the issues required to address the challenge of bringing energy harvesting, wireless communication, and self-powered systems to market; Co-Organize with Prof. John Kymissis and Prof. Harish Krishinawamy; sponsored by IEEE EDS/SSCS and Columbia University; Apr. 11 2014

- Consulting Activities
  - Consultant - Vitcon (link) - Oct/2017-present
  - Consultant - TexasLDPC (link) by the support from NSF SBIR/STTR Phase-I, July/2015-Dec/2015

- Outreach
  - Columbia University Outreach Office and Seoul Science High School, “Internet-of-Things X Machine-Learning,” Oct., 2017
  - Columbia University Outreach Office and Seoul Science High School, “Internet-of-Things X Machine-Learning,” Oct., 2016
  - Math Minds, “Introduction to Circuits”, Jun., 2016
  - Booker T Washington Middle School 54, “Introduction to Circuits”, May, 2016
  - Columbia University Outreach Office and Seoul Science High School, “Introduction to Modern Integrated Circuit Design”, Oct., 2015
  - Society of Women Engineers (SWE), “Engineering Exploration Experience (EEE)”, Mar. 2015
  - Columbia University Outreach Office and Seoul Science High School, “Introduction to Modern Integrated Circuit Design,” Oct., 2014
  - Johns Hopkins Center for Talented Youth and Columbia SEAS Outreach Office, “Full-day Workshop on Engineering and Applied Science”, Co-organize with Prof. Javad Lavaei, Prof. Christine P. Fleming, and Prof. Shiho Kawashima, Sep. 20, 2014
  - Columbia University Outreach Office and Seoul Science High School, “Introduction to Engineering”, Oct. 2013

- Grant Panel/Review Participation
  - National Science Foundation
  - Israeli Ministry of Science, Technology and Space

  - Columbia University Office of the Executive Vice President for Research

- Journal Paper Reviewers
  - *IEEE Journal of Solid-State Circuits, IEEE Transactions on Very Large Scale Integration Systems, IEEE Transactions on Circuits and System I and II, IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems*

Invited Talks and Presentations

40. Samsung LSI, "Toward Ultra-Low-Power Computing in the Era of Artificial Intelligence," May, 2018
39. Analog Circuit Workshop, organized by Samsung SAIT, "The Roles of Analog and Mixed-Signal Circuits in AI and ML Hardware," May, 2018
38. California Institute of Technology, Electrical Engineering Seminar Series, "Toward Ultra-Low-Power Computing in the Era of Artificial Intelligence," Apr., 2018
37. IBM TJ Watson Research Center, "Machine Learning with Less Resources," Apr., 2018
36. Qualcomm, "Recent Advances in Ultra-Low-Power VLSI Circuits: ," Apr., 2018
35. SK hynix, Frontier Research Lab, "In-Memory Computing Hardware for Deep Neural Networks," Dec. 18, 2017
34. SK hynix, "Fully-Integrated Low-Drop-Out Regulator Design based on Event-Driven Control," Dec. 18, 2017
33. Seoul National University, "Fully-Integrated Low-Drop-Out Regulator Design based on Event-Driven Control," Dec. 15, 2017
32. Samsung SAIT, "Internet of Things X Machine Learning," Dec. 14, 2017
31. Samsung SAIT, "On-Chip Processing and Machine-Learning for a Nanowatt Brain-Computer-Interface Implant," Dec. 14, 2017
30. Silicon Labs, "Tackling Variability and Leakage Challenges in Designing a Microwatt Near-Threshold Digital Processor", Dec. 9, 2017
29. Data Science Institute, Sensing, Collecting, and Moving Data Center (SCM), "Internet of Things X Machine Learning," Oct., 2017
28. University of Michigan at Ann Arbor, "IoT Sensing Devices X Machine Learning," Sep., 2017
27. ARM Research Summit, Cambridge, England, "IoT Sensing Devices X Machine Learning," Sep., 2017
26. NE-Ohio Regional Workshop on Community Infrastructure for Analog Circuit Design, Case Western Reserve University, "Analog Computing for the 21-st Century," Aug., 2017, *keynote talk*
25. MIT, "IoT Sensing Devices X Machine Learning," Aug., 2017
24. Northeastern University, "IoT Sensing Devices X Machine Learning," Aug., 2017
23. ARM Research Lab at Austin, "Challenges and Opportunities in VLSI Design at the End of Moore's Law", May. 2017
22. Data Science Day, Lightning Session II: Applications of Data Science, "Computational Principles of Biological Memory: from Models to VLSI Neuromorphic Systems," with Prof. Stefano Fusi (Neuroscience), Apr. 5, 2017
21. Indian Institute of Technology at Madras (IIT Madras), "Fully Integrated Low-Drop-Out Regulator Based on Event-Driven Control," Jan. 2017

20. Korea Advanced Institute of Science and Technology, Daejeon, "Challenges and Opportunities in VLSI Design at the End of Moore's Law", Aug. 2016

19. Yeonsei University, Seoul, "Challenges and Opportunities in VLSI Design at the End of Moore's Law", Aug. 2016

18. SK hynix Frontier Lab, Icheon, "IoT × Machine Learning," Aug. 2016

17. SK hynix, "Fully-Integrated Digital Low-Dropout Regulator Design based on Novel Event-Driven Control Systems," Jun., 2016

16. Samsung SAIT, "Challenges and Opportunities in VLSI Design at the End of Moore's Law," Jun., 2016

15. SK hynix, "Challenges and Opportunities in VLSI Design at the End of Moore's Law," Jun., 2016

14. University of California Irvine, Design for Adaptivity: Tackling Variability Challenges in VLSI Circuits, Apr., 2016

13. Korea Institute of Energy Technology Evaluation and Planning, Ultra-Low-Energy Microsystems for the Internet of Things Era, Nov., 2015

12. Intel, Circuit Research Lab, Hillsboro OR, Tackling Variability Challenge in VLSI Circuits, Apr. 2015

11. University of Texas, Austin TX, Tackling Variability Challenge in VLSI Circuits, Jan. 2015

10. International Symposium on New Frontiers in Scientific Innovation (Organized by Korea Foundation of Advanced Studies (KFAS) and Chosun Ilbo), Seoul, Energy-Efficient Integrated Circuits and Systems for Emerging Applications, Jul. 2014, *more than 5,000 RSVPs*

9. Seoul National University, Seoul, Advances in Energy-Efficient and Variation-Tolerant Integrated Circuits & Systems Design, Jul. 2014

8. Korea Advanced Institute of Science and Technology, Daejeon, Advances in Energy-Efficient and Variation-Tolerant Integrated Circuits & Systems Design, Jul. 2014

7. Samsung Electronics, System LSI, Hwaseong, Advances in Energy-Efficient and Variation-Tolerant Integrated Circuits & Systems Design, Jul. 2014

6. SK hynix, Icheon, Advances in Energy-Efficient and Variation-Tolerant Integrated Circuits & Systems Design, Jul. 2014

5. IEEE SOI-3D-Subthreshold Microelectronics Technology Unified Conference (S3S), Monterey CA, "Parallelism and Pipelining in Ultra-Low Voltage Digital Circuits," Oct. 2013

4. International Conference on IC Design and Technology (ICICDT), Austin TX, Extending Energy-Saving Voltage Scaling in Ultra Low Voltage Integrated Circuit Designs, May 2012

3. Polytechnic Institute of New York Uniersity, Brooklyn NY, The Next Class of Computing: Millimeter-Scale," Nanoelectronic Devices for Defense and Security Conference, Aug. 2011

2. Faculty Candidate Talks, University of Southern California, Columbia University, University of Washington at Seattle, Extremely Energy Efficient Circuit and System Design for Millimeter-Scale Medical Devices, Mar. 2011

1. Job Talks, IBM TJ Watson Research Center, Intel Advanced Technology Development, AMD Research and Advanced Development Labs, Oracle Sun Lab, Texas Instruments Systems and Applications R&D Center, Extreme-Power Constrained Integrated Circuit Design, Jul.-Nov., 2010

Patents

Patents (issued: 6; filed: 5; provisional filed: 0)

11. Doyun Kim, Sung Kim, Mingoo Seok, Hyun-Ju Ham, Jong-Hwan Kim, "Digital Low Drop-Out Regulator," US and S. Korea patent filed, 2018

10. Sung Kim, Doyun Kim, Mingoo Seok, Hyun-Ju Ham, Jong-Hwan Kim, "Digital Low Drop-Out Regulator," US and S. Korea patent filed, 2018

9. Mingoo Seok, Zhewei Jiang, Shihui Yin, Jae-Sun Seo, "SRAM Design with Embedded XNOR Functionality for Binary and Ternary Neural Networks," US patent filed, 2017

8. Doyun Kim, Mingoo Seok, Hyun-Ju Ham, Jong-Hwan Kim, "Digital Low Drop-Out Regulator," US and S. Korea patent filed, 2017

7. Doyun Kim, Mingoo Seok, Hyun-Ju Ham, Jong-Hwan Kim, "Digital Low Drop-Out Regulator," US and S. Korea patent filed, 2017

6. Mingoo Seok, Peter Kinget, Teng Yang, "Circuits, Methods, and Media For Detecting and Countering Aging Degradation in Memory Cells," US Patent 9,424,952, 2016

5. Seongjong Kim, Mingoo Seok, "Circuits for temperature monitoring," US 20160265981 A1, 2015

4. Mingoo Seok, Jiangyi Li, "Voltage and temperature compensated device for physically unclonable function," US 20160337123 A1, 2015

3. Mingoo Seok, Peter Kinget, Teng Yang, Seongjong Kim, "Circuits for temperature sensors," WO 2015066629 A1, 2014

2. Mingoo Seok, Jing-Fei Ren, Manish Goel, "Security of Cryptographic Devices Against Differential Power Analysis," US2013191652(A1), US8782446(B2), WO2013110055(A1), WO2013110055(A8)

1. Mingoo Seok, Dennis Sylvester, David Blaauw, Scott Hanson Gregory K. Chen, "Pico-power Reference Voltage Generator," US2010327842(A1) US8564275(B2) WO2010151754(A2) WO2010151754(A3) TW201116968(A), KR20120132459 (A), JP2012531825(A), EP2446337(A2), CN102483634(A), *commercially licensed*

Invention Disclosures

3. Yannis Tsividis, Ning Guo, Mingoo Seok, "A Continuous-Time Apparatus for Generating Analog Look-up Tables and Generating Analog Nonlinear Functions," Disclosure filed, 2013

2. Mingoo Seok, Yoonmyung Lee, Scott Hanson, David Blaauw, Dennis Sylvester, "Low leakage memory circuit," Disclosure filed, UM file number 3760

1. Mingoo Seok, Scott Hanson, Jae-sun Seo, David Blaauw, Dennis Sylvester, "Robust low voltage read-only memory," Disclosure filed, UM file number 4159