Mingoo Seok

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Principal Field of Interest

Very large-scale integration (VLSI) hardware design

Seok's field of research is to design general-purpose and specialized computing systems in the form of integrated circuits. The foci are given to i) ultra-low-power architecture for artificial intelligence and machine learning, ii) variation-tolerant hardware architecture, iii) integrated power management circuits, and iv) hybrid analog-digital computing hardware.

Education

School	Degree	Date
University of Michigan, Ann Arbor, MI, USA	Ph.D. in EE Advisor: Dennis Sylvester	2007-2010
University of Michigan, Ann Arbor, MI, USA	M.S in EE	2005-2007
Seoul National University, Seoul, South Korea	B.S. in EE, *summa cum lade*	1998-2005
Seoul Science High School, Seoul, South Korea	*summa cum laude*	1995-1998

Title of Ph.D. Thesis

Extreme Power-Constrained IC Design

Career History

Employer	Position	Beginning	Ending
Columbia University	Computer Eng. Program Chair	Jul. 2023	present
Columbia University	Associate Professor	Mar. 2018	present
Seoul National University	Visiting Associate Professor	Jul. 2022	Jul. 2023
Columbia University	Assistant Professor	Jan. 2012	Feb. 2018
Texas Instruments, Dallas	Member of Technical Staff	Jan. 2011	Nov. 2011
University of Michigan, Ann Arbor	Research Assistant	Jan. 2006	Dec. 2010

Awards/Honors Received

(13) IEEE Solid-State Circuits Society (SSCS) Distinguished Lecturer (DL), Feb/2023-Feb/2025

(12) Highest performing associate editor, IEEE Transactions on Very Large Scale Integration Systems (TVLSI), 2021, 2022

(11) Best Paper Award for the paper titled ”Vesti: Energy-Efficient In-Memory Computing Accelerator for Deep Neural Networks”, IEEE Transactions on Very Large Scale Integration Systems (TVLSI), 2022

(10) AMiner AI2000 Chip Technology Most Influential Scholars, Honorable Mention (Top 11-100 Scholars), 2020

(9) Qualcomm Faculty Award, 2019

(8) IEEE Senior Member (2018); Member (2012); Student Member (2006)

(7) NSF CAREER Award - Awarded for “Addressing Deepening Variability Challenges for Next Generation Margin Free VLSI Computing Platform Design,” 2015

(6) AMD/CICC Student Scholarship Award - Awarded for ”A 0.5V 2.2pW 2-Transistor Voltage Reference”, US, Aug. 2009

(5) DAC/ISSCC Student Design Contest - Awarded for ”Phoenix: an Ultra-Low Power Processor for Cubic Millimeter Sensor Systems”, US, Feb. 2009

(4) Rackham Pre-doctoral Fellowship - One of three recipients in the EECS department, University of Michigan, Ann Arbor, US, Sep.2008-Aug. 2009

(3) Doctoral Study Abroad Fellowship - One of 15 recipients, nationally, Korea Foundation for Advanced Studies, South Korea, Sep.2005-Aug. 2007

(2) Excellency Fellowship - Seoul National University, South Korea, Mar.1998-Mar.2001

(1) Distinguished Undergraduate Scholarship - One of 20 recipients, nationally, Korea Foundation for Advanced Studies, South Korea, Sep. 1999 - Feb. 2002

Publications

- Total number of publications = 77 (peer-reviewed journal), 132 (peer-reviewed conference), 2 (book or book chapter); h-index = 43; i10-index = 116; total citation count = 7066 (May 2025, based on Google Scholar)
- Authorship convention: the first author who performs the bulk of the experimental work; the last author who directs research and the preparation of the manuscript; other authors listed in between in the order of the magnitude of their contributions.
- The underlined persons are/were directly advised by Seok at Columbia University.

Books and Book Chapters

(2) Grand Quest 10, 2025, ISBN: 9791192248301, link

(1) Mingoo Seok, Changhwan Shin, and Seokjun Kwon, ”Next-Generation Semiconductor,” Pluto, ISBN13: 9791188569564, link, **2024 Sejong Book Recommended List**

Seok, Mingoo

Papers in Referred Journals

2025

(77) Seunghyun Moon, Mao Li, Gregory Chen, Phil Knag, Ram Krishnamurthy, Mingoo Seok, "T-REX: Hardware-Software Co-Optimized Transformer Accelerator with Reduced External Memory Access and Enhanced Hardware Utilization," *IEEE Journal of Solid-State Circuits (JSSC)*, 2025, **invited to the special issue of the 2025 IEEE ISSCC**

(76) Yichen Xu, Zhaoqing Wang, Rentao Wan, Suhwan Kim, Minxiang Gong, Ram Kumar Krishnamurthy, Xin Zhang, Mingoo Seok, "Digital Low-Dropout Regulator-Assisted Buck DC-DC Converter Achieving 68-mV Droop Voltage and 95.5% Efficiency," *IEEE Solid-State Circuits Letter (SSCL)*, 2025

(75) Linfang Wang, Weizeng Li, Zhidao Zhou, Junjie An, Wang Ye, Zhi Li, Hanghang Gao, Hongyang Hu, Jing Liu, Xiaoming Chen, Ling Li, Qi Liu, Mingoo Seok, Chunmeng Dou, Ming Liu, "A Near-Threshold Memristive Computing-In-Memory Engine for Edge Intelligence," *Nature Communications*, 2025

2024

(74) Dongkwun Kim, Zhaoqing Wang, Paul X. Huang, Pavan Chundi, Suhwan Kim, Andres Blanco, Ram Krishnamurthy, Mingoo Seo, "A 4.2V-to-0.5V, 0.8μA-0.8mA, Power-Efficient 3-Level SIMO Buck Converter for a Quad-Voltage RISC-V Microprocessor," *IEEE Transactions on VLSI Systems (TVLSI)*, 2024

(73) Jieyu Li, Weifeng He, Bo Zhang, Chuxiong Lin, Liang Qi, Dingxuan Liu, Mingoo Seok, "A 394 TOPS/W Matched Filter with Charge-Domain Computing for GPS Signal Acquisition," *IEEE Journal of Solid-State Circuits (JSSC)*, 2024

(72) Dewei Wang, Sung Justin Kim, Minhao Yang, Aurel A. Larzar, Mingoo Seok, "Background-Noise- and Process-Variation-Tolerant Sub-Microwatt Keyword Spotting Hardware featuring Spike-Domain Division-based Energy Normalization," *IEEE Journal of Solid-State Circuits (JSSC)*, 2024

(71) Yichen Xu, Zhaoqing Wang, Jonghyun Oh, Mingoo Seok, "Model-Based Study on the Limit of the Dynamic Load Regulation Performance of a Digital Low Dropout Regulator," *IEEE Transactions on VLSI Systems (TVLSI)*, 2024

(70) Mao Li, Jaehan Park, Sung Justin Kim, Dongkwun Kim, Sanu K Mathew, Vivek De, and Mingoo Seok, "EQZ-LDO: A Secure Digital Low Dropout Regulator Armed with Detection-Driven Protection Against Correlation Power Analysis," *IEEE Journal of Solid-State Circuits (JSSC)*, 2024

(69) Zhaoqing Wang, Mao Li, Suhwan Kim, Nachiket Desai, Ram K. Krishnamurthy, Orlando Lazaro, Xin Zhang, Mingoo Seok, "93.89% Peak Efficiency 24V-to-1V DC-DC Converter with Fast In-Situ Efficiency Tracking and Power-FET Code Roaming," *IEEE Journal of Solid-State Circuits (JSSC)*, 2024, **invited to the special issue of the 2023 IEEE ESSCIRC**

(68) Paul Xuanyuanliang Huang, Yannis Tsividis, Mingoo Seok, "INTIACC: A Programmable Floating-Point Accelerator for Partial Differential Equations," *IEEE Journal of Solid-State Circuits (JSSC)*, 2024

(67) Gokul Krishnan, Gopikrishnan Raveendran Nair, Jonghyun Oh, Anupreetham Anupreetham, Pragnya Sudershan Nalla, Ahmed Hassan, Injune Yeo, Kishore Kasichainula, Jae-sun Seo,

Mingoo Seok, Yu Cao, "3D In-Sensor Computing for Real-time DVS Data Compression: 65nm Hardware-Algorithm Co-design," *IEEE Solid-State Circuits Letter (SSCL)*, 2024

(66) Chuan-Tung Lin, Paul X. Huang, Jonghyun Oh, Dewei Wang, Mingoo Seok, "iMCU: A 28nm Digital In-Memory Computing-based Microcontroller Unit for TinyML," *IEEE Journal of Solid-State Circuits (JSSC)*, 2024

2023

(65) Jieyu Li, Weifeng He, Bo Zhang, Guanghui He, Jun Yang, Mingoo Seok, "TICA: Timing Slack Inference and Clock Frequency Adaption Technique for a Deeply-Pipelined Near-Threshold-Voltage Bitcoin Mining Core," *IEEE Journal of Solid-State Circuits (JSSC)*, 2023

(64) Chuxiong Lin, Weifeng He, Yannan Sun, Lin Shao, Bo Zhang, Jun Yang, Mingoo Seok, "A Metastability Risk Prediction and Mitigation Technique for Clock-Domain Crossing with Single-Stage Synchronizer in Near-Threshold-Voltage Multi-Voltage/Frequency Domain Network-on-Chip," *IEEE Journal of Solid-State Circuits (JSSC)*, 2023

(63) Bo Zhang, Jyotishman Saikia, Jian Meng, Dewei Wang, Soon-Wan Kwon, Sungmeen Myung, Hyunsoo Kim, Sang Joon Kim, Jae-sun Seo, Mingoo Seok "MACC-SRAM: A Multistep Accumulation Capacitor-Coupling In-Memory Computing SRAM Macro for Deep Convolutional Neural Networks," *IEEE Journal of Solid-State Circuits (JSSC)*, 2023

(62) Jonghyun Oh, Yoonho Song, Young-Ha Hwang, Jun-Eun Park, Mingoo Seok, Deog-Kyoon Jeong, "A Capacitorless External-Clock-Free Fully-Synthesizable Digital LDO with Time-Based Load-State Decision and Asynchronous Recovery," *IEEE Transactions on Power Electronics (TPEL)*, 2023

(61) Chuan-Tung Lin, Dewei Wang, Bo Zhang, Gregory K. Chen, Phil Knag, Ram K. Krishnamurthy, Mingoo Seok, "DIMCA: An Area-Efficient Digital In-Memory Computing Macro Featuring Approximate Arithmetic Hardware in 28nm," *IEEE Journal of Solid-State Circuits (JSSC)*, 2023

(60) Mao Li, Yunze Yang, Weifeng He, Sanu K Mathew, Vivek De, Mingoo Seok, "A Fully-Digital Variation-Tolerant Runtime Detector for PCB-level Probing Attack in a 28-nm CMOS," *IEEE Solid-State Circuits Letter (SSCL)*, 2023

(59) Jin-O Seo, Mingoo Seok, Seonghwan Cho, "A 44.2-TOPS/W CNN Processor with Variation-Tolerant Analog Datapath and Variation Compensating Circuit," *IEEE Journal of Solid-State Circuits (JSSC)*, 2023

(58) Ashish Shukla, Dmitri E. Kirichenko, Timur V. Filippov, Anubhav Sahu, Erik Lehmann, Mingoo Seok, Deepnarayan Gupta, "60-GHz Single Flux Quantum Pulse Transfer Circuit for Serial Biasing," *IEEE Transactions on Applied Superconductivity*, 2023

(57) Yuxuan Qin, Chuxiong Lin, Weifeng He, Yanan Sun, Zhigang Mao, and Mingoo Seok, "CDAR-DRAM: Enabling Runtime DRAM Performance and Energy Optimization via In-situ Charge Detection and Adaptive Data Restoration," *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)*, 2023

2022

(56) Ashish Shukla, Timur V. Filippov, Dmitri E. Kirichenko, Sukanya Meher, M. Eren Çelik, Mingoo Seok, and Deepnarayan Gupta, "Serial Biasing Technique for Electronic Design Automation in RSFQ Circuits," *IEEE Transactions on Applied Superconductivity*, 2022

(55) Jonghyun Oh, Young-Ha Hwang, Jun-Eun Park, Mingoo Seok, and Deog-Kyoon Jeong, "An Output-Capacitor-Free Synthesizable Digital LDO Using CMP-Triggered Oscillator and Droop Detector," *IEEE Journal of Solid-State Circuits (JSSC)*, 2022

(54) Bo Zhang, Shihui Yin, Minkyu Kim, Jyotishman Saikia, Soonwan Kwon, Sungmeen Myung, Hyunsoo Kim, Sang Joon Kim, Jae-sun Seo, Mingoo Seok, "PIMCA: A Programmable In-Memory Computing Accelerator for Energy-Efficient DNN Inference," *IEEE Journal of Solid-State Circuits (JSSC)*, 2022

(53) Hao Zhang, Weifeng He, Yanan Sun, Mingoo Seok, "A DFT-Compatible In-Situ Timing Error Detection and Correction Structure Featuring Low Area and Test Overhead," *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)*, 2022, link

(52) Ashish Shukla, Dmitri Kirichenko, Timur Filippov, Anubhav Sahu, Eren Çelik, Mingoo Seok, Deepnarayan Gupta, "Pulse Interfaces and Current Management Techniques for Serially Biased RSFQ Circuits"," *IEEE Transactions on Applied Superconductivity, Special Issue*, 2022

2021

(51) Sai Kiran Cherupally, Jian Meng, Adnan Siraj Rakin, Shihui Yin, Mingoo Seok, Deliang Fan, Jae-sun Seo, "Improving DNN Hardware Accuracy by In-Memory Computing Noise Injection," *IEEE Design & Test (D&T)*, 2021

(50) Pavan Kumar Chundi, Xiaodong Wang, Mingoo Seok, "Channel Estimation using Deep Learning on an FPGA for 5G Millimeter-Wave Communication Systems," *IEEE Transactions on Circuits and Systems I: Regular Papers (TCAS-I)*, 2021, link

(49) Pavan Kumar Chundi, Dewei Wang, Sung Justin Kim, Minhao Yang, Joonsung Kang, Seungchul Jung, Sangjoon Kim, Mingoo Seok, "Always-On Sub-Microwatt Spiking Neural Network based on Spike-Driven Clock- and Power-Gating for an Ultra-Low-Power Intelligent Device," *Frontiers in Neuroscience: Hardware for Artificial Intelligence*, 2021, link

(48) Minhao Yang, Hongjie Liu, Weiwei Shan, Jun Zhang, Ilya Kiselev, Sang Joon Kim, Christian Enz, Mingoo Seok, "Nanowatt Acoustic Inference Sensing Exploiting Nonlinear Analog Feature Extraction," *IEEE Journal of Solid-State Circuits (JSSC)*, 2021, link

(47) Fred Douglis, Seth Robertson, Eric van den Berg, Josephine Micallef, Marc Pucci, Alex Aiken, Keren Bergman, Maarten Hattink, Mingoo Seok, "FLEET– Fast Lanes for Expedited Execution at 10 Terabits: Program Overview," *IEEE Internet Computing*, 2021, link

(46) Eren Kurshan, Hai Li, Mingoo Seok, Yuan Xie, "A Case for 3D Integrated System Design for Neuromorphic Computing and AI Applications," *International Journal of Semantic Computing*, 2021, link

(45) Sung Justin Kim, Soo Bong Chang, Mingoo Seok, "A High PSRR, Low Ripple, Temperature-compensated, 10-μA-Class Digital LDO based on Current-Source Power-FETs for a Sub-mW SoC," *IEEE Solid-State Circuits Letter (SSCL)*, 2021, link

(44) Sung Justin Kim, Dongkwun Kim, Yu Pu, Chunlei Shi, Soo Bong Chang, Mingoo Seok, "0.5-1V, 90-400mA, Modular, Distributed, 3X3 Digital LDOs based on Event-Driven Control and Domino Sampling and Regulation," *IEEE Journal of Solid-State Circuits (JSSC)*, 2021, link

(43) Dongkwun Kim, Sung Justin Kim, Zhewei Jiang, Suhwan Kim, Andres Blanco, Ram Krishnamurthy, Mingoo Seok, "A 10-Output, Integrated-Output-Capacitor Single-Inductor-Multiple-Output DC-DC Buck Converter with Integrated Output Capacitors for a Sub-mW System-on-Chip," *IEEE Solid-State Circuits Letter (SSCL)*, 2021, link

2020

(42) Chuxiong Lin, Weifeng He, Yanan Sun, Bingxi Pei, Pavan Kumar Chundi, Zhigang Mao, Mingoo Seok, "MEDAC: A Metastability Condition Detection and Correction Technique for a Near-Threshold-Voltage Multi-Voltage/Frequency-Domain Network-on-Chip," *IEEE Journal of Solid-State Circuits (JSSC)*, 2020, link

(41) Zhewei Jiang, Shihui Yin, Jae-sun Seo, Mingoo Seok, "C3SRAM: An In-Memory-Computing SRAM Macro Based on Robust Capacitive Coupling Computing Mechanism," *IEEE Journal of Solid-State Circuits (JSSC)*, 2020, *invited*, link

(40) Zhewei Jiang, Shihui Yin, Jae-sun Seo, Mingoo Seok, "C3SRAM: In-Memory Computing SRAM Macro Based on Capacitive-Coupling Computing," *IEEE Solid State Circuits Letter (SSCL)*, link, *cross-published in IEEE European Solid-State Circuits Conference (ESSCIRC)*

(39) Joao Pedro Cerqueira, Tomas J. Repetti, Yu Pu, Shivam Priyadarshi, Martha A. Kim, Mingoo Seok, "Catena: A Near-Threshold Sub-0.4-mW 16-Core Programmable Spatial Array Accelerator for the Ultra-Low-Power Mobile and Embedded Internet of Things," *IEEE Journal of Solid-State Circuits (JSSC)*, 2020, link

(38) Shihui Yin, Zhewei Jiang, Jae-sun Seo, Mingoo Seok, "XNOR-SRAM: In-Memory Computing SRAM Macro for Binary and Ternary Deep Neural Networks ," *IEEE Journal of Solid-State Circuits (JSSC)*, 2020 , link

(37) Weiwei Shan, Wentao Dai, Liang Wan, Longxing Shi, Mingoo Seok, Jun Yang, "A Bi-directional, Zero-latency Adaptive Clocking Circuit in a 28nm Wide AVFS System," *IEEE Journal of Solid-State Circuits (JSSC)*, 2020 , link

2019

(36) Doyun Kim, Peter R. Kinget, Mingoo Seok, "SRAM-ADC: SRAM Circuits Transformable to a Stochastic ADC at Ultra-Low Area Overhead," *IEEE Solid State Circuits Letter (SSCL)*, 2019 , link

(35) Zhewei Jiang, Shihui Yin, Jae-sun Seo, Mingoo Seok, "C3SRAM: In-Memory Computing SRAM Macro Based on Capacitive-Coupling Computing," *IEEE European Solid-State Circuits Conference (ESSCIRC)*, 2019 , link, *cross-published in IEEE Solid State Circuits Letter (SSCL)*

(34) Shihui Yin, Zhewei Jiang, Minkyu Kim, Tushar Gupta, Mingoo Seok, Jae-sun Seo, "Vesti: Ultra-Energy-Efficient In-Memory Computing Accelerator for Deep Neural Networks," *IEEE Transactions on VLSI Systems (TVLSI)*, 2019 , link, **2022 TVLSI best paper award**

(33) Tianchan Guan, Peiye Liu, Xiaoyang Zeng, Martha Kim, Mingoo Seok, "Recursive Binary Neural Network Training Model for Efficient Usage of On-Chip Memory," *IEEE Transactions on Circuits and Systems I (TCAS-I)*, 2019, link

(32) Minhao Yang, Chung-Heng Yeh, Yiyin Zhou, Joao Pedro Cerqueira, Aurel A. Lazar, Mingoo Seok, "Design of an Always-On Deep Neural Network Based 1 μW Voice Activity Detector Aided with a Customized Software Model for Analog Feature Extraction," *IEEE Journal of Solid-State Circuits (JSSC)*, 2019 , link

(31) Seongjong Kim, Joao Pedro Cerqueira, Mingoo Seok, "A Near-Threshold Spiking Neural Network Accelerator with a Body-Swapping based In-Situ Error Detection and Correction Technique," *IEEE Transactions of Very Large Scale Integration Systems (TVLSI)*, 2019 , link

2018

(30) Joao Pedro Cerqueira, Jiangyi Li, Mingoo Seok, "A fW- and kHz-Class Feedforward Leakage Self-Suppression Logic Requiring No External Sleep Signal to Enter the Leakage Suppression Mode," *IEEE Solid-State Circuits Letter (SSCL)*, 2018 , link

(29) 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, link

(28) Sung Justin Kim, Doyun Kim, Jonghwan Kim, Hyunju Ham, Mingoo Seok, "A 67.1-ps FOM, 0.5-V-Hybrid Digital LDO With Asynchronous Feedforward Control Via Slope Detection and Synchronous PI With State-Based Hysteresis Clock Switching," *IEEE Solid State Circuits Letter (SSCL)*, 2018 , link

(27) 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, link

(26) Seongjong Kim, Mingoo Seok, "A Sub-50μm^2, Voltage-Scalable, Digital Standard Cell Compatible Thermal Sensor Frontend for On-Chip Thermal Monitoring," *Journal of Low Power Electronics and Applications - Special Issue on CMOS Low Power Design*, 2018 , link

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

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 , link

(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 , link

(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* , link

(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* , link

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 , 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 , 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 , link

(17) Daniel Marti, Mattia Rigotti, Mingoo Seok, Stefano Fusi, "Energy-Efficient Neuromorphic Classifier," *Neural Computation (NECO)*, 2016 , link, 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* , 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 , 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 , 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 , link

2013: Pre-Columbia

(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 , 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 , 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 , 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 , 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 , 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 for the special issue* , 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* , 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* , 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 , 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* , 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* , 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* , link

Proceedings of Referred Conferences

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(132) Chuan-Tung Lin, Seunghyun Moon, Paul Xuanyuanliang Huang, Mingoo Seok, "EPIC: a Sub-6mW In-Memory Computing-Based RISC-V Microcontroller Unit with On-Chip Training Support for TinyML," *IEEE European Solid-State Electronics Research Conference (ESSERC)*, 2025

(131) Mao Li, Paul Xuanyuanliang Huang, Jaehan Park, Sanu Matthew, Vivek De, Mingoo Seok, "GUARD: A Fully-Digital TDC-based Clock and Voltage Glitch Detector with On-Demand Protection in a 28nm CMOS," *IEEE Symposium on VLSI Circuits (VLSI)*, 2025

(130) Rentao Wan, Yichen Xu, Dong-Woo Jee, Mingoo Seok, "AJPEG: A 26.4-pJ/pixel, 252-fps, 128x128 Image Sensor with an In-Sensor Analog DCT Processor for Data Compression," *IEEE Custom Integrated Circuits Conference (CICC)*, 2025

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(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 , 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 , 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 , 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 , 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 , 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

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(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 , 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 , link

2012: Pre Columbia

(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* , 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 , 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 , 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 , 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 , link

(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 , link

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(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 , 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* , link

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(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 , link

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(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 , 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 , 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 , 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 , link

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(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 , 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 , 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 , link

Other Non-Referred Publications

(34) Chuan-Tung Lin, IBM AI Hardware Forum, 2023, *poster*

(33) Seunghyun Moon, IBM/IEEE AI Compute Symposium, 2023, *poster*

(32) Alon S. Levin, Igor Kadota, Sasank Garikapati, Bo Zhang, Aditya Jolly, Manav Kohli, Mingoo Seok, Harish Krishnaswamy, Gil Zussman, "Demo: Experimentation with Wideband Real-Time Adaptive Full Duplex Radios," Brooklyn 6G Summit, 2023, *Demo*

(31) Timur V. Filippov, Dmitri E. Kirichenko, Ashish Shukla, Anubhav Sahu, M. Eren Çelik, Sukanya Meher, Erik Lehmann, Mingoo Seok, and Deepnarayan Gupta, "Serial Biasing Technique for RSFQ Circuits Designed for MIT-LL Fabrication Node," *International Conference on Superconductivity and Magnetism (ICSM)*, 2022, invited presentation

(30) Ashish Shukla, Timur V. Filippov, Dmitri E. Kirichenko, Sukanya Meher, M. Eren Çelik, Mingoo Seok, and Deepnarayan Gupta, "Serial Biasing Technique for Electronic Design Automation in RSFQ Circuits," *European Conference on Applied Superconductivity*, 2022, invited poster

(29) Ashish Shukla, Dmitri E. Kirichenko, Timur V. Filippov, Anubhav Sahu, Erik Lehmann, Mingoo Seok, "60-GHz Single Flux Quantum (SFQ) Pulse Transfer Circuits for Serial Biasing," *European Conference on Applied Superconductivity*, 2022, contributed presentation, **Best Student Paper in Electronics - First Place**

(28) Ashish Shukla, Timur V. Filippov, Dmitri E. Kirichenko, Anubhav Sahu, Mingoo Seok, and Deepnarayan Gupta "Pulse interfaces and current management technique for serially biased RSFQ circuits," *European Conference on Applied Superconductivity*, 2021

(27) Eren Kurshan, Hai Li, Mingoo Seok, Yuan Xie, "A Case for 3D Integrated System Design for Neuromorphic Computing & AI Applications," *arXiv.org*, 2021, link

(26) Ashish Shukla, Timur V. Filippov, Dmitri E. Kirichenko, Anubhav Sahu, Mingoo Seok, and Deepnarayan Gupta "Current Management Techniques for Serially Biased RSFQ Circuits," poster presentation, *IEEE Applied Superconductivity Conference (ASC)*, 2020

(25) Zhewei Jiang, Jiangyi Li, Pavan Kumar Chundi, Sung Justin Kim, Minhao Yang, Joonseong Kang, Seungchul Jung, Sang Joon Kim, Mingoo Seok, "A 6.3-Nanowatt-per-Channel 96-Channel Neural Spike Processor for a Movement-Intention-Decoding Brain-Computer-Interface Implant," *arXiv.org*, 2020, link

(24) Dewei Wang, Pavan Kumar Chundi, Sung Justin Kim, Minhao Yang, Joao Pedro Cerqueira, Joonsung Kang, Seungchul Jung, Sangjoon Kim, Mingoo Seok, "Always-On, Sub-300-nW, Event-Driven Spiking Neural Network based on Spike-Driven Clock-Generation and Clock- and Power-Gating for an Ultra-Low-Power Intelligent Device," arXiv.org, 2020, link

(23) Dongkwun Kim, Mingoo Seok, "A 10-Output Single-Inductor-Multiple-Output DC-DC Buck Converter with 200-pF Integrated Output Capacitors for a Sub-mW Multi-Voltage Domain System-on-Chip," a lecture presentation, SRC TECHCON, Sep, 2020

(22) Dewei Wang, Mingoo Seok, "Always-On, Sub-300nW, Event-Driven Spiking Neural Network for an Ultra-Low-Power Intelligent Device," a lecture presentation, SRC TECHCON, Sep, 2020

(21) Peiye Liu, Bo Wu, Huadong Ma, Pavan Kumar Chundi, Mingoo Seok, "MemNet: Memory-Efficiency Guided Neural Architecture Search with Augment-Trim learning," arXiv.org, 2019, link

(20) Sung Justin Kim, Mingoo Seok, "A 0.5-1V Input Event-Driven Multiple Digital Low-Dropout-Regulator System for Supporting a Large Digital Load," a lecture presentation, SRC TECHCON, Sep 2019

(19) Mingoo Seok, "AI and ML Hardware for Resource-Constrained Devices," poster, TinyML Submit, Santa Clara, CA USA, Mar., 2019

(18) Peiye Liu, Wu Liu, Huadong Ma, Tao Mei, Mingoo Seok, "KTAN: Knowledge Transfer Adversarial Network," arXiv.org, 2018, link

(17) Dongkwun Kim, Suyoung Bang, Minki Cho, Seongjong Kim, Suhwan Kim, Ram Kumar Krishnamurthy, Mingoo Seok, "Better-Than-Worst-Case Design Methodology for a Compact Integrated Switched-Capacitor DC-DC Converter," a lecture presentation, SRC TECHCON, Aug, 2018

(16) 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

(15) 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

(14) Saarthak Sarup, Mingoo Seok, "Dynamic Capacity Estimation in Hopfield Networks," arXiv.org, 2017, link

(13) 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

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

(11) 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

(10) 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

(9) Tianchan Guan, Xiaoyang Zeng, Mingoo Seok, "Recursive Binary Neural Network Learning Model with 2.28b/Weight Storage Requirement," arXiv, 2017, link

(8) 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

(7) 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

(6) 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

(5) 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

(4) Daniel Marti, Mattia Rigotti, Mingoo Seok, Stefano Fusi, "Energy-efficient neuromorphic classifiers," arXiv, 2015, link

(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

Patents, Technology Transfer, and Commercialization

Technology Transfer and Commercialization

(6) Co-founder, Tayen.ai, Dec. 2024 - present

(5) Advisor, ANAFLASH, Sep. 2020 - present

(4) Advisor, VITCON, Jul. 2019 - Feb. 2023

(3) ZSS Microsystems: Zhewei Jiang (Ph.D. student), Prof. Jae-sun Seo (Arizona State University), and I have explored a start-up opportunity to commercialize an in-memory-computing SRAM-based microcontroller, Oct. 2019 - Apr. 2020

(2) Licensing chips, board, and design database for hybrid analog and digital computers to Sendyne, 2018

(1) Licensing multiple sub-milliwatt and sub-microwatt circuits intellectual properties to Ambiq Micro, 2012-2020. In 2020, Ambiq acquired the patents.

Patents

All the pending and approved patents can be searched in this page.

(20) Mingoo Seok, Chuan-Tung Lin, MICROCONTROLLER UNIT INTEGRATING AN SRAM-BASED IN-MEMORY COMPUTING ACCELERATOR, US2024/0169201 A1, May 23, 2024

(19) Mingoo Seok, Jonghyun Oh, 6T-SRAM-BASED DIGITAL COMPUTING-IN-MEMORY CIRCUITS SUPPORTING FLEXIBLE INPUT DIMENSION, US2024/0170050 A1, May 23, 2024

(18) Mingoo Seok, Dewei Wang, Chuan-Tung Lin, DIGITAL IN-MEMORY COMPUTING MACRO BASED ON APPROXIMATE ARITHMETIC HARDWARE, US2023/0266943A1, Aug 24, 2023

(17) Mingoo Seok, Zhewei Jiang, Jae-sun Seo, Shihui Yin, US20230089348, CIRCUITS AND METHODS FOR IN-MEMORY COMPUTING, US, 03.23.2023

(16) Jae-sun Seo, Bo Zhang, Mingoo Seok, Shihui Yin, "PROGRAMMABLE IN-MEMORY COMPUTING ACCELERATOR FOR LOW-PRECISION DEEP NEURAL NETWORK INFERENCE," US2022/0318610A1, Oct. 6, 2022

(15) Jae-sun Seo, Shihui Yin, Zhewei Jiang, Mingoo Seok, US20220309330 - STATIC RANDOM-ACCESS MEMORY FOR DEEP NEURAL NETWORKS, US, 29.09.2022

(14) Mingoo Seok, Zhewei Jiang, Jae-sun Seo, Shihui Yin, CIRCUITS AND METHODS FOR IN-MEMORY COMPUTING, US2021/0327474, Oct. 21, 2021

(13) Mingoo Seok, Zhewei Jiang, Jae-sun Seo, Shihui Yin, CIRCUITS AND METHODS FOR IN-MEMORY COMPUTING, WO/2020/139895, July 2, 2020

(12) Jae-sun Seo, Shihui Yin, Zhewei Jiang, Mingoo Seok, Static Random-Access Memory for Deep Neural Networks," US2019/0087719, Mar. 21, 2019

(11) Mingoo Seok, Seongjong Kim, TEMPERATURE SENSOR BASED ON DIRECT THRESHOLD-VOLTAGE SENSING FOR ON-CHIP DENSE THERMAL MONITORING, US20170234816, Aug. 17, 2017

(10) Mingoo Seok, Peter Kinget, Teng Yang, CIRCUITS, METHODS, AND MEDIA FOR DETECTING AND COUNTERING AGING DEGRADATION IN MEMORY CELLS, US20160358672, Dec. 12, 2016

(9) Mingoo Seok, Jiangyi Li, "Voltage and temperature compensated device for physically unclonable function," US 20160337123 A1, Nov 17, 2016

(8) Seongjong Kim, Mingoo Seok, "Circuits for temperature monitoring," US 20160265981 A1, Sep 15, 2016

(7) Mingoo Seok, Peter Kinget, Teng Yang, CIRCUITS, METHODS, AND MEDIA FOR DETECTING AND COUNTERING AGING DEGRADATION IN MEMORY CELLS, US2016/0232986, Aug. 11, 2016

(6) Mingoo Seok, Peter Kinget, Teng Yang, Seongjong Kim, "Circuits for temperature sensors," WO/2015/066629 A1, May 7, 2015

(5) Mingoo Seok, Jing-Fei Ren, Manish Goel, "Security of Cryptographic Devices Against Differential Power Analysis," US2013/0191652, July 25, 2013

(4) Mingoo Seok, Jing-Fei Ren, Manish Goel, APPARATUS AND METHODS TO HIDE POWER SIGNATURE IN CRYPTOGRAPHIC CIRCUITS, WO/2013/110055, July 25, 2013

(3) Mingoo Seok, Dennis Sylvester, David Blaauw, Scott Hanson Gregory K. Chen, REFERENCE VOLTAGE GENERATOR HAVING A TWO TRANSISTOR DESIGN, EP2446337, May 2, 2012, **commercially licensed**

(2) Mingoo Seok, Dennis Sylvester, David Blaauw, Scott Hanson Gregory K. Chen, REFERENCE VOLTAGE GENERATOR HAVING A TWO TRANSISTOR DESIGN, US2010/0327842, Dec. 30, 2010, **commercially licensed**

(1) Mingoo Seok, Dennis Sylvester, David Blaauw, Scott Hanson Gregory K. Chen, REFERENCE VOLTAGE GENERATOR HAVING A TWO TRANSISTOR DESIGN, WO/2010/151754, Dec. 29, 2010, **commercially licensed**

Invited Lectures

2025

(141) TxACE eSeminar, POD, University of Texas Dallas (UTD), TBD, July 25, 2025

(140) TI visit, HV Power Management, July 24, 2025

(139) Cognisense eWorkshop, "SRAM-based In-Memory Computing Hardware for Energy-Efficient AI: AMS vs. All Analog vs. Digital and Macros to Microprocessors to External Memory Access," May 13, 2025

(138) SBS X GQ, "Neuromorphic Architecture," Apr. 24, 2025

(137) Apple, Silicon Engineering Group (SEG), "SRAM-based In-Memory Computing Hardware: Analog vs Digital and Macros to Microprocessors," Mar 24, 2025

(136) CHEY Institute for Advanced Studies, Trans-Pacific Dialogue, "The Quest for the Ultimate AI Infrastructure," Feb. 21-22, 2025

(135) IEEE Solid-State Circuits Society (SSCS) Distinguished Lecture, organized by IEEE IISc VLSI Chapter, "SRAM-based In-Memory Computing Hardware: Analog vs Digital and Macros to Microprocessors," Jan. 27, 2025, **285 participants joining – the highest attendance for any talk to date in the seminar series**

(134) Yonsei University, "SRAM-based In-Memory Computing Hardware: Analog vs Digital and Macros to Microprocessors," Jan. 14, 2025

2024

(133) Taiwan Semiconductor Manufacturing Company (TSMC), "SRAM-based In-Memory Computing Hardware: Analog vs Digital and Macros to Microprocessors," Dec. 18, 2024

(132) IEEE Solid-State Circuits Society (SSCS) Distinguished Lecture, organized by National Tsinghua University (NTHU) and IEEE SSCS Taipei Chapter, "SRAM-based In-Memory Computing Hardware: Analog vs Digital and Macros to Microprocessors," Dec. 17, 2024

(131) IEEE Solid-State Circuits Society (SSCS) Distinguished Lecture, organized by National Taiwan University (NTU) and IEEE SSCS Taipei Chapter, "SRAM-based In-Memory Computing Hardware: Analog vs Digital and Macros to Microprocessors," Dec. 16, 2024

(130) KFAS 50th Anniversary Future Talent Conference, "Neuromorphic Architecture: Can We Create a Brain-like Computer to Dethrone the Von Neumann Architecture?" Nov. 26, 2024

(129) 2025 Grand Quest Open Forum, "Neuromorphic Architecture: Can We Create a Brain-like Computer to Dethrone the Von Neumann Architecture?" Nov. 15, 2024

(128) Distinguished Colloquium Series sponsored by Booz Allen Hamilton, University of Maryland (UMD), "SRAM-based In-Memory Computing Hardware: Analog vs Digital and Macros to Microprocessors," Oct. 4, 2024

(127) TxACE Day at IBM, "ARCHON: Energy-Efficient Variation-Tolerant Analog CNN Processor based on Analog Datapath Digital Control Architecture," Sep. 6, 2024

(126) CHEY Institute, "R&D Trends for AI Semiconductor: Academia, Industry, and US Dominance," Aug. 27, 2024

(125) Samsung Electronics, Foundry Business, "Recent Advance in Digital In-Memory-Computing Processors," Aug. 26, 2024

(124) Seoul National University, "Recent Advance in Digital In-Memory-Computing Processors," Aug. 23, 2024

(123) Korea University, "Review, Survey, and Benchmark of Recent Digital LDO Voltage Regulators," Aug. 16, 2024

(122) KAIST, "Recent Advance in Digital In-Memory-Computing Processors," Aug. 14, 2024

(121) Sogang University, "Recent Advance in Digital In-Memory-Computing Processors,", Aug. 13, 2024

(120) Delft University of Technology (TU Delft) undergraduate visit to TxACE, "TinyML: Sub-Microwatt Bio-Inspired Automatic Speech Recognition Hardware," Aug. 2, 2024

(119) IEEE Solid-State Circuits Society (SSCS) Distinguished Lecture, organized by IEEE SSCS Oregon Chapter, "SRAM-based In-Memory Computing Hardware: Analog vs Digital and Macros to Microprocessors," Jun. 25, 2024

(118) IO Seminar Series, Brookhaven National Laboratory (BNL), "SRAM-based In-Memory Computing Hardware: Analog vs Digital and Macros to Microprocessors," May 6, 2024

(117) IEEE Solid-State Circuits Society (SSCS) Distinguished Lecture, organized by IEEE SSCS University of Michigan Chapter, "SRAM-based In-Memory Computing Hardware: Analog vs Digital and Macros to Microprocessors," Mar. 29, 2024

(116) TxACE eSeminar, University of Texas Dallas (UTD), "SRAM-based In-Memory Computing Hardware: Analog vs Digital and Macros to Microprocessors," Mar. 22, 2024

(115) IEEE Solid-State Circuits Society (SSCS) Distinguished Lecture, organized by IEEE SSCS India Delhi Chapter, "SRAM-based In-Memory Computing Hardware: Analog vs Digital and Macros to Microprocessors," Feb. 29, 2024

(114) Chey Institute, "Scientific Innovations, Its Geopolitical Impact, and the Future of the Global Supply Chain: IC Design and Manufacturing Perspective," TPD summary recording, Jan. 29, 2024

2023

(113) Trans-Pacific Dialogue, Chey Institute for Advanced Studies, "Scientific Innovation, Its Geopolitical Impact, and Future of the Global Semiconductor Supply Chain," Dec. 4, 2023

(112) University of Southern California, "SRAM-based In-Memory Computing Hardware: Analog vs Digital and Macros to Microprocessors," Nov. 17, 2023

(111) SRC Intel Executive Review, "SRAM-based In-Memory Computing Hardware," Sept. 25, 2023

(110) Korea Foundation of Advanced Studies (KFAS) Summer 2023, "Emerging Semiconductor Technology and Future," July 14, 2023

(109) IEEE Solid-State Circuits Society (SSCS) Distinguished Lecture, organized by IEEE SSCS Israel Chapter and Technion, "SRAM-based In-Memory Computing Hardware: Analog vs Digital and Macros to Microprocessors," June 22, 2023

(108) Korea Foundation of Advanced Studies (KFAS), Dream Lecture at the Boin High School, "My Regrets and Joys as a Computer Engineering Student," June 16, 2023

(107) IEEE Solid-State Circuits Society (SSCS) Distinguished Lecture, organized by IEEE SSCS Beijing Chapter and Peking University, "SRAM-based In-Memory Computing Hardware: Analog vs Digital and Macros to Microprocessors," May. 30, 2023

(106) IEEE Solid-State Circuits Society (SSCS) Distinguished Lecture, organized by IEEE SSCS Beijing Chapter and Peking University, "Review, Survey, and Benchmark of Recent Digital LDO Voltage Regulators," May. 31, 2023

(105) Hanyang University ERICA, "Emerging Semiconductor Technology and Future," May 19, 2023

(104) Semibrain, "iMCU: A 730-μJ/Classification Digital In-Memory Computing-based Microcontroller Unit for Edge TinyML," May 16, 2023

(103) Korea Foundation of Advanced Studies (KFAS), Dream Lecture 65, "My Regrets and Joys as a Computer Engineering Student," May 13, 2023

(102) KAIST EE Colloquium, "Review, Survey, and Benchmark of Recent Digital LDO Voltage Regulators," May 11, 2023

(101) KAIST PIM Semiconductor Design Research Center, AI PIM Semiconductor Lectures, "iMCU: A 730-μJ/Classification Digital In-Memory Computing-based Microcontroller Unit for Edge TinyML," Apr. 28, 2023

(100) Apple, ”SRAM-based In-Memory Computing Hardware for Energy-Efficient AI: Analog and Digital Approaches,” Apr. 25, 2023

(99) IEEE Solid-State Circuits Society (SSCS) Distinguished Lecture, organized by IEEE SSCS Singapore Chapter and Institute of Microelectronics, ASTAR, ” SRAM-based In-Memory Computing Hardware: Analog vs Digital and Macros to Microprocessors,” Apr. 17, 2023

(98) IEEE Solid-State Circuits Society (SSCS) Distinguished Lecture, organized by IEEE SSCS Singapore Chapter and Institute of Microelectronics, ASTAR, ”Review, Survey, and Benchmark of Recent Digital LDO Voltage Regulators,” Apr. 17, 2023

(97) Ajou University, 50th Anniversary Seminar Series on AI Semiconductor ”Silicon-based Integrated Circuits Design Recent Trends,” Apr. 13, 2023

(96) Chey Institute, ”Scientific Innovation Series 17: Emerging Semiconductor Technology and Future,” Mar. 24, 2023 /hrefYouTubehttps://youtu.be/dSnXNkrHDh0

(95) Chey Institute & The Center for Strategic and International Studies (CSIS), ”Cooperation on Scientific Innovation, Supply Chains, and Geopolitical Risk in Northeast Asia,” Mar. 9, 2023

(94) Samsung Electronics (Foundry Business Unit), ”SRAM-based IMC Hardware for Deep Convolutional Neural Networks,” Mar. 8, 2023

(93) Sogang University, ”Energy-Efficient AI Hardware,” Jan. 25, 2023

2022

(92) Korea AI Summit 2022, ”Energy-Efficient AI Hardware,” Dec. 14, 2022

(91) Samsung Foundry, ”Review, Survey, and Benchmark of Recent Digital LDO Voltage Regulators,” Dec. 12, 2022

(90) Postech, ”SRAM-based In-Memory Computing Hardware for Energy-Efficient AI: Analog and Digital Approaches,” Nov. 18, 2022

(89) The Institute of Semiconductor Engineers, ”ISSCC 2023 Preview and Recent Trends in Digital Circuits,” Nov. 16, 2022

(88) Samsung SAIT, ”SRAM-based In-Memory Computing Hardware for Energy-Efficient AI: Analog and Digital Approaches,” Nov. 9, 2022

(87) Samsung Future Technology Center Neuromorphic Workshop, ”Spiking Neural Network with Biological Power Efficiency: Progress, Challenges, and Potential Directions,” Oct. 10, 2022

(86) SKKU Semiconductor Research Center Seminar, ”SRAM-based In-Memory Computing Hardware for Energy-Efficient AI: Analog and Digital Approaches,” Sep. 29, 2022

(85) KAIST Electrical Engineering Seminar Series, ”SRAM-based In-Memory Computing Hardware for Energy-Efficient AI: Analog and Digital Approaches,” Aug. 19, 2022

(84) Seoul National University eTec-Talk, ”SRAM-based In-Memory Computing Hardware for Energy-Efficient AI: Analog and Digital Approaches,” Aug. 17, 2022

(83) Hanyang University Electrical Engineering Seminar Series, ”SRAM-based In-Memory Computing Hardware for Energy-Efficient AI: Analog and Digital Approaches,” Aug. 16, 2022

(82) BK21 GooGE SDG seminar series, ”TinyML: Sub-Microwatt Keyword Spotting VLSI Systems,” Aug. 2, 2022

(81) Summer Annual Conference of IEIE (Institute of Electronics and Information Engineers), ”TinyML: Sub-Microwatt Keyword Spotting VLSI Systems,” Jun. 29, 2022

(80) SRC/TxACE eSeminar, "Sub-microwatt, Noise-tolerant, End-to-End Keyword Spotting Systems featuring Analog Feature Extraction and Digital Spike Neural Network," Jan. 21, 2022

(79) Feed Your Brain, Central Texas IEEE SSCS + CAS Chapter Educational Webinar, Sub-Microwatt End-to-End Keyword Spotting Chip that is Robust to Background Noise," Jan. 20, 2022

2021

(78) Peking University and SSCS Beijing Chapter, "Sub-Microwatt End-to-End Keyword Spotting Chip that is Robust to Background Noise," Dec. 22, 2021

(77) Emerging Technologies in Electrical and Computer Engineering Talks at Seoul National University Summer 2021, "IC Design for End-to-End Keyword Spotting Task: How to Reduce Power Consumption but Make It Robust to Background Noise?," Aug. 19-20, 2021

2020

(76) IDEC (IC Design Education Center) Congress, Daejeon, Republic of Korea, "Recent Advances in AI/ML Hardware," July., 2020, *Plenary talk*

(75) Rice University, "Enabling Artificial Intelligence in an Internet-of-Thing Device," Feb. 2020

2019

(74) University of California Los Angeles, "Enabling Artificial Intelligence in an Internet-of-Thing Device," Nov. 2019

(73) Massachusetts Institute of Technology (MIT), "Enabling Artificial Intelligence in an Internet-of-Thing Device," Nov. 2019

(72) International Workshop on Highly Efficient Neural Processing (HENP), in conjunction with ESWEEK 2019, "Sub-Milliwatt and Sub-Microwatt Hardware Architecture for Embedded Intelligent Systems," Oct. 2019

(71) Arizona State University, "Emerging Deep Learning Chip Architecture" Oct. 2019

(70) Chey Institute for Advanced Study (CIAS) Scientific Innovation Conference 2019, "Emerging Chip Architecture for Deep Learning," Aug. 2019

(69) Seoul National University, "Emerging Deep Learning Chip Architecture" Aug. 2019

(68) Samsung Electronics, Memory Business, 2019, "Recent Hardware Advances for Accelerating Deep Learning," Aug. 2019

(67) Samsung Research, "Ultra-Low-Power Computing Hardware Design in the Era of AI and ML," Jun., 2019

(66) Korea Smart Factory Development Conference, Seoul, South Korea, "Smart Factory for Small and Medium Enterprises," Jun. 2019, *Plenary talk*

(65) Semiconductor Research Corporation (SRC) TxACE eSeminar, "EDAC and DCDC-Converter Co-Design for Addressing Robustness Challenges in Emerging Architecture," Dallas, TX USA, May 2019

(64) Workshop on Energy-Secure System Architectures (ESSA), in conjunction with the 12-th IEEE International Symposium on Hardware Oriented Security and Trust (HOST 2019), McLean, VA USA, "Blacklist Core: Machine-Learning Based Dynamic Operating-Performance-Point Blacklisting for Mitigating Power-Management Security Attacks," May, 2019

(63) Maryland College Park Circuit and Systems (CAS) Chapter, "Ultra-Low-Power Computing Hardware Design in the Era of AI and ML," May 2019

(62) AI Edge Workshop on Solid-State Circuits: from Memory to Computation, National Tsing Hua University, Hsinchu, Taiwan, "Cases for Analog Mixed Signal Computing Integrated Circuits for Deep Neural Networks," Apr. 2019

(61) International Symposium on VLSI Design, Automation, and Test (VLSI-DAT), Special Session, Hsinchu, Taiwan, Cases for Analog Mixed Signal Computing for Deep Neural Networks, Apr 2019

(60) National Chiao Tung University, Institute of Electronics, Hsinchu, Taiwan, "Ultra-Low-Power Computing Hardware Design in the Era of AI and ML," Apr. 2019

(59) Cornell University, EDS Seminar Series, "Ultra-Low-Power Computing Hardware Design in the Era of AI and ML," Mar. 2019

(58) Northeast Regional Conference, "Recent Advances in AI and ML Hardware Design," Mar. 2019

(57) University of California Berkeley, Berkeley Wireless Research Center (BWRC) Seminar Series "Ultra-Low-Power Computing Hardware Design in the Era of AI and ML," Mar. 2019

(56) Apple, Cupertino, CA, US, "Recent Advances in AI and ML Hardware Design," Mar., 2019

(55) Columbia DSI/TRIPODS Deep Learning Workshop, "Recent Advances in AI and ML Hardware Design," Mar. 2019

2018

(54) International Conference on Computer-Aided Design (ICCAD), Special Session, Introduction of the recent advances on analog-mixed-signal circuit design automation, San Diego, CA, USA, Nov. 2018

(53) University of Minnesota, "Toward Ultra-Low-Power Computing in the Era of Artificial Intelligence," Oct. 2018

(52) Oregon State University, "Toward Ultra-Low-Power Computing in the Era of Artificial Intelligence," Oct. 2018

(51) Stanford University, SystemX/EE310, "Toward Ultra-Low-Power Computing in the Era of Artificial Intelligence," Oct. 2018

(50) KFAS Workshop for Young Scientists, Seoul, Republic of Korea, "Tips for Solid-State Circuits Research," August 2018

(49) *TEDxKFAS*, Seoul, Republic of Korea, "The Future of AI is Small," August 2018, $>$ *1,000 participants*, webpage, press, video

(48) Scientific Innovation, Icheon Sub Forum, Seoul, Republic of Korea, "The Future of AI is Small," August 2018

(47) Intel CRL, Hillsboro, OR, USA, "Toward Ultra-Low-Power Computing in the Era of Artificial Intelligence," July 2018

(46) Huawei, Shanghai, "Toward Ultra-Low-Power Computing in the Era of Artificial Intelligence," July 2018

(45) Southeast University, Nanjing, China, "Toward Ultra-Low-Power Computing in the Era of Artificial Intelligence," July 2018

(44) Fudan University, Shanghai, China, "Toward Ultra-Low-Power Computing in the Era of Artificial Intelligence," July 2018

(43) Shanghai Jiao Tong University, Shanghai, China, "Toward Ultra-Low-Power Computing in the Era of Artificial Intelligence," July 2018

(42) SK Hynix, "Toward Ultra-Low-Power Computing in the Era of Artificial Intelligence," May 2018

(41) Samsung LSI, "Toward Ultra-Low-Power Computing in the Era of Artificial Intelligence," May 2018

(40) Samsung SAIT Analog Circuit Workshop, "The Roles of Analog and Mixed-Signal Circuits in AI and ML Hardware," May 2018

(39) California Institute of Technology, Electrical Engineering Seminar Series, "Toward Ultra-Low-Power Computing in the Era of Artificial Intelligence," Apr. 2018

(38) IBM TJ Watson Research Center, "Machine Learning with Less Resources," Apr., 2018

(37) Qualcomm, "Recent Advances in Ultra-Low-Power VLSI Circuits: ," Apr., 2018

(36) IEEE Custom Integrated Circuits Conference (CICC), Panel, What Can/Should Analog Circuit Designers Do to Ride on the Wave of Machine Learning? A panelist with Boris Murmann (Stanford), Edgar Sanchez-Sinencio (TAMU), Vivek De (Intel), San Diego CA, USA, Apr., 2018

2017

(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) Massachusetts Institute of Technology (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

2016

(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 $\times$ 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

2015

(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

2014

(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

2013-2010

(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 University, 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

Media Featuring

(2) Chosun Ilbo, Mar. 24, 2025, Link

(1) IEEE Spectrum, Feb. 24, 2025, Link

Services

Activity	Beginning	Ending
Computer Engineering Program, Chair	2023	present
Computer Engineering Program Committee, Member	2012	2022
EE Computing Labs Committee, Chair	2018	2022
EE Teaching Labs Committee, Member	2018	2022
EE PhD Monitoring and Advising, Member	2020	2022
EE Ext. Comm. and Website, Member	2020	2022
EE Distinguished Lecture Committee, Member	2018	2019
EE Computing Committee, Chair	2013	2017

Professional Services

Editorial work

(7) Associate Editor - IEEE Transactions on Circuits and Systems for Artificial Intelligence (TCAS-AI), 2024-present

(6) Associate Editor - IEEE Transactions on Very Large Scale Integration (VLSI) Systems, 2015-2023

- Selected as one of the five highest-performing associate editors: 2021

(5) Associate Editor - IEEE Solid-State Circuits Letters (SSCL), 2017-2022

(4) Guest Editor - IEEE Journal of Solid-State Circuits (JSSC), the special issue of 2019 IEEE International Solid-State Circuits Conference (ISSCC), 2019

(3) Guest Editor - IEEE Solid-State Circuits Letter (SSCL), the special issue of 2019 IEEE International Solid-State Circuits Conference (ISSCC), 2019

(2) Associate Editor - IEEE Transactions on Circuits and Systems I: Regular Papers, 2014-2016

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(1) Reviewer - IEEE Journal of Solid-State Circuits, IEEE Transactions on Very Large Scale Integration Systems, IEEE Transactions on Circuits and Systems I and II, IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems, IEEE Journal on Emerging and Selected Topics in Circuits and Systems (JETCAS)

Conference Organization and Technical Program Committee

(15) Forum Committee, IEEE International Solid-State Circuits Conference (ISSCC), 2026

(14) Program committee, member, IEEE European Solid-State Circuits Conference (ESSCIRC), 2022-2024

(13) Technical program committee, Digital Circuits (DCT), IEEE International Solid-State Circuits Conference (ISSCC), 2019-2023
- Journal publication chair (2020),
- Session co-chair (2021), tutorial coordinator (2021),
- Demo co-chair (2022), two forum committee members (2022), one-panel organizer (2022),
- Session chair (2023)

(12) Technical program committee, a member in Emerging Models of Computation (DES5), ACM/IEEE Design Automation Conference (DAC), 2020-2023

(11) Program committee, member, TinyML Research Symposium, 2021

(10) Technical program committee, member, vice chair (2021), Reliability Circuits, IEEE International Reliability Physics Symposium (IRPS), 2018-2021

(9) Technical program committee, member, Student Research Preview (SRP), IEEE International Solid-State Circuits Conference (ISSCC), 2018-2019

(8) Technical program committee, member, Power Management, IEEE Custom Integrated Circuits Conference (CICC), 2017-2019

(7) Technical program committee, member, Digital Circuits and Technology, ACM/IEEE International Symposium on Low Power Electronics and Design (ISLPED), 2013-2018

(6) Student Design Contest Co-Chair, ACM/IEEE International Symposium on Low Power Electronics and Design (ISLPED), 2013-2014

(5) Technical program committee, member, Subthreshold Circuits - IEEE SOI-3D-Subthreshold Microelectronics Technology Unified Conference (S3S), 2014-2019

(4) Technical program committee, member, Digital Design, IEEE International Conference on Computer Design (ICCD), 2013 and 2015-2018

(3) Technical program committee, member, Computing Systems, IEEE International Conference on Computer Design (ICCD), 2017

(2) Registration Co-Chair, IEEE International Conference on Computer Design (ICCD), 2015-2017

(1) Technical program committee member, Digital Design, IEEE/ACM International Conference on VLSI Design (VLSID), 2013, 2016, 2017

Workshop, Forum, Panel Organizations

(12) A panel in the 2023 TxACE Symposium, ”AI vs. AC: Will Artificial Intelligence’s Expanding Energy Appetite Leave Enough to Keep Our Air Conditioners Running?” a panel organizer and moderator

(11) A panel in the 2022 IEEE International Solid-State Circuits Conference (ISSCC), Shifting Tides of Innovation - Where is Cutting Edge Research Happening Today?, Organizers with Alicia Klinefelter

(10) A forum in the 2022 IEEE International Solid-State Circuits Conference (ISSCC), Pushing the AI Efficiency Frontier: New Devices, Architectures, and Tools, Committee member with Drs. Rangha Venkatesan, Alicia Klinefelter, Kea-Tiong Tang, Ru Huang, Shidhartha Das

(9) A forum in the 2022 IEEE International Solid-State Circuits Conference (ISSCC), Computer Systems Under Attack - paying the performance price for protection, Committee member with Drs. Massimo Alioto, Sanu Mathew, Dong Uk Lee, and Rabia Yazicigil Kirby

(8) A special session in 2019 Great Lakes Symposium on VLSI (GLSVLSI), Recent Advances in Near and In-Memory Computing Circuit and Architecture for Artificial Intelligence and Machine Learning, Introduction of the recent advances in near and in-memory computing circuits and architectures for artificial intelligence and machine learning, Co-organize with Prof. Tinoosh Mohasen, Washington, D.C., USA, May 2019

(7) A special session in 2018 IEEE Biomedical Circuits and Systems Conference (BioCAS), Low-Power On-Chip Machine Learning, Discuss the recent advances in low-power on-chip machine learning, Co-organize with Profs. Zhengya Zhang and Naresh Shanbhag, Cincinnati OH, USA, Aug., 2018

(6) A forum in 2018 IEEE Custom Integrated Circuits Conference (CICC), The Next Waves of Machine/Deep Learning Hardware, Discuss the emerging trends and directions on deep learning hardware design, co-organize 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)

(5) panel discussion in 2017 Custom Integrated Circuits Conference (CICC), Bio-Inspired Learning and Inference Systems: What Works Well and What Didn’t. Discuss the successes and challenges in bio-inspired learning and inference systems design. 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

(4) Columbia Integrated System Laboratory (CISL) Seminar Series, organizing more than 30 seminars, 2013-2017

(3) 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

(2) 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

(1) 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

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Prof. Harish Krishinawamy; sponsored by IEEE EDS/SSCS and Columbia University; Apr. 11, 2014

Proposal and Award Panel

(6) Department of Energy (DOE)
(5) Samsung HumanTech Award
(4) National Science Foundation
(3) National Science Foundation Small Business Innovation Research (SBIR)
(2) Israeli Ministry of Science, Technology and Space
(1) Columbia University Office of the Executive Vice President for Research

Faculty Promotion Evaluation

(2) University of Michigan, Ann Arbor, EECS
(1) University of Macao, School of Microelectronics

Service to Professional Societies

(3) Treasurer, IEEE New York Section EDS/SSCS Chapter, 2016-present
(2) Chair, IEEE New York Section EDS/SSCS Chapter, 2014-2015
(1) Vice Chair, IEEE New York Section EDS/SSCS Chapter, 2012-2013

Current Professional Organization Membership

(2) IEEE Senior Member (2018); Member (2012); Student Member (2006)
(1) ACM Member (2019)

Consulting Record

Firm	Beginning	Ending
Korea Advanced Institute of Science and Technology	Sept. 2023	present
Korea Advanced Institute of Science and Technology	July 2019	Jan. 2020
Vitcon	Jun. 2017	May 2023
TexasLDPC	Jul. 2015	Dec. 2015

Thesis Supervised

Summary

	Total	Completed	In Progress
B.S.	10	9	1
M.S.	56	54	2
Doctoral			
As Supervisor:	24	14	10
As Reader:	30	30	0
Postdoctoral	7	5	2

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Current Research Group

(12) Jieyu Li, Postdoctoral Research Scientist, July/8/2025-present
(11) Linfang Wang, Postdoctoral Research Scientist, Sep/1/2024-present
(10) Chuan-Tung Lin, MS/PhD, Sep/2020-Dec/2025 (estimated)
(9) Mao Li, MS/PhD, Jan/2021-Dec/2025 (estimated)
(8) Jinho Park, Ph.D., Sep/2022-Dec/2027 (estimated)
(7) Rentao Wan, Ph.D., AMS computing hardware, Jan/2023-Dec/2027 (estimated)
(6) Yichen Xu, Ph.D., Jan/2023-Dec/2027 (estimated)
(5) Da Won Kim, Ph.D., Sep/2023-Sep/2028 (estimated)
(4) Shahreer Ahmed Al Hossain, MS/Ph.D., Sep/2024-Sep/2029 (estimated)
(3) Mosom Jana, Ph.D., Sep/2024-Sep/2029 (estimated)
(2) Zichen Qian, Ph.D., Sep/2025-Sep/2030 (estimated)
(1) Nikhilesh Rajput, Ph.D., Sep/2025-Sep/2030 (estimated)

Postdoctoral Associates

(7) Jieyu Li, Postdoctoral Research Scientist, Ph.D. from Shanghai Jia-Tong University (SJTU), May/1/2025-present
(6) Linfang Wang, Postdoctoral Research Scientist, Ph.D. from Institute of Microelectronics of Chinese Academy of Sciences, Sep/1/2024-present
(5) Seunghyun Moon, Postdoctoral Research Scientist, Ph.D. from Postech, South Korea, Sep/1/2023-Jan/15/2025
    - Joined Konkuk University as an assistant professor, Seoul, Republic of Korea, 2025
(4) Jaehan Park, Postdoctoral Research Scientist, Ph.D. from Postech, South Korea, Mar/15/2023-Sep/31/2024
    - Awards: Postdoctoral fellowship (NRF, Republic of Korea)
    - Joined Cirrus Logic Inc., Austin, TX, 2024
(3) Jonghyun Oh, Postdoctoral Research Scientist, Ph.D. from Seoul National University, Sep/1/2021-Mar/15/2023
    - Joined Apple Silicon Engineering Group, 2023
(2) Min-Seong Choo, Postdoctoral Research Scientist, Ph.D. from Seoul National University, Dec/15/2020-Jan/15/2022
    - Joined as an assistant professor, Hanyang University, ERICA campus, Republic of Korea, 2022
(1) Minhao Yang, Postdoctoral Research Scientist, 2016-2018
    - Joined as a scientist, EPFL, Lausanne, Switzerland, 2018
    - Joined as an assistant professor, Télécom Paris at Institute Polytechnique de Paris, 2023

Doctoral Thesis, Supervisor

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(24) Nikhilesh Rajput, Hardware security, Sep/2025-Aug/2030
(23) Zichen Qian, All-analog computing hardware, Sep/2025-Aug/2030
- Award: Wei Family Private Foundation (2025-2026)
- Award: EE Award: Student Excellence Award in Electronics, Circuits, and Physics

(22) Shahreer Ahmed Al Hossain, TBD, Sep/1/2024-Sep/1/2029 (estimated)
- Awards: Higgins Fellowship (2024)

(21) Mosom Jana, All-analog computing hardware, Sep/1/2024-Sep/1/2029 (estimated)
(20) Da Won Kim, In-memory computing circuits, Sep/1/2023-Sep/1/2028 (estimated)
(19) Rentao Wan, Analog datapath digital control architecture, Jan/1/2023-Dec/31/2027 (estimated)
- Awards: (i) Master of Science Award of Excellence US, May 2023; (ii) MS EE Honor student US, May 2022; (iii) Nikola Tesla Electrical Engineering Scholar; (iv) Best poster award in the 2024 Cognisense center review
- Internships: Apple Inc. (2025 summer)

(18) Yichen Xu, Digital and digitally-assisted integrated power management, Jan/1/2023-Dec/31/2027 (estimated)
- Awards: Master of Science Award of Excellence (2024)
- Internship: Intel (2025 summer)

(17) Jinho Park, Hardware and algorithms for sensor fusion and test-time adaptation; advising, Sep/2022-Aug/2027 (estimated)
- Dissertation title:
- Awards: (i) Kwanjeong Educational Foundation Scholarship
- Internship: Apple (2024 summer)
- First employment:

(16) Mao Li, Physical attack detection and mitigation, Jan/2021-Dec/2025 (estimated)
- Dissertation title:
- Awards:
- Internship: Nvidia (2024 summer), Mediatech (2025 summer)
- First employment:

(15) Chuan-Tung Lin, AI-capable microcontroller architecture and circuits, Sep/2020-Aug/2025 (estimated)
- Dissertation title:
- Awards: (i) Best lightning talk award in the 2024 Cognisense Center review
- Internship: Nvidia (2024 summer), IBM TJ Watson Research Center (2025 Summer)
- First employment:

(14) Zhaoqing Wang, High-voltage power management hardware with adaptivity, Sep/2020-Dec/2024 (estimated)
- Dissertation title: High-Voltage and Adaptive Digital Power Management IC
- Internship: Apple (2024 summer)
- First employment: Apple, Silicon Engineering Group

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(13) Paul X. Huang, Low-power digital accelerators for HPC and AI, Jan/2020-Dec/2024 (estimated)
- Dissertation title: Hardware Accelerator Design for Scientific Computing and Machine Learning Workloads
- First employment: Google, TPU Architecture Team, Sunnyvale CA

(12) Bo Zhang, In-memory computing for AI; Sep/2018-Dec/2023
- Dissertation title: Energy-Efficient Hardware Design for Machine Learning with In-Memory Computing
- Awards: (i) IBM PhD Fellowship, Sep/2022-May/2023 and Sep/2023-Dec/2023
- First employment: TSMC (San Jose, CA, USA)

(11) Dewei Wang, Neuromorphic machine-learning hardware; Jan/2019-May/2023
- Dissertation title: Algorithm-Hardware Co-design for Ultra-Low-Low Per Machine Learning and Neuromorphic Computing
- Internship: Meta
- First employment: Apple, Silicon Engineering Group

(10) Ashish Shukla, Super-conducting digital mixed-signal circuits; Jan/2019-Dec/2022
- Dissertation title: Serial Biasing Technique for Rapid Single Flux Quantum Circuits
- Internships: Hypres
- First employment: Intel, Advanced Design Group (Hillsboro, OR, USA)
- Awards: (i) Best Student Paper in Electronics - First Place: for the presentation entitled ”60-GHz Single Flux Quantum (SFQ) Pulse Transfer Circuits for Serial Biasing” at the 2022 Applied Superconductivity Conference

(9) Dongkwun Kim, Integrated multi-output power converter; Sep/2017-Dec/2021
- Dissertation title: Energy-Efficient Power Management Architectures for Emerging Needs from the Internet of Things Devices to Data Centers
- Internships: IBM (two times)
- First employment: Apple, Silicon Engineering Group (Cupertino, CA, USA)
- Awards: i) Columbia University Presidential Fellow

(8) Teng Yang, Thermal and aging sensing; Co-advising with Prof. Peter R. Kinget, Jan. 2012-Oct. 2021
- Dissertation title: In-situ and In-field temperature and transistor BTI sensing techniques with microprocessor level implementation
- Internship: IBM
- First employment: Intel Advanced Design Group (Hillsboro, OR, USA)

(7) Pavan Kumar Chundi, On-chip machine learning; Sep/2016-Apr/2021
- Dissertation title: Algorithm Hardware Co-Design of Neural Networks for Always-On Devices
- Internship: Intel CRL
- First employment: Nvidia, Design Methodology Group (Santa Clara, CA, USA)

(6) Sung Justin Kim, Integrated and distributed regulators; Jan/2017-Dec/2020

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- Dissertation title: Integrated and Distributed Digital Low-Drop-Out Regulators with Event-Driven Controls and Side-Channel Attack Resistance
- Internship: Apple
- First employment: Apple, Silicon Engineering Group (Cupertino, CA, USA)

(5) Zhewei Jiang, Low-power machine-learning hardware; Sep/2015-May/2020
- Dissertation title: Algorithm-Hardware Co-Design For Local/Edge Computing
- Internship: Global Foundry
- First employment: Bell Labs (Holmdel, NJ, USA)
- Awards: i) Wei Family Private Foundation Fellowship (2015-2020); ii) Mater of Science Award of Excellence (2015); iii) William L. Everitt Student Awards of Excellence (2013)

(4) Joao Pedro Cerqueira, Energy-efficient digital processors, Sep. 2014-Aug. 2019
- Dissertation title: Ultra-Low Leakage, Energy Efficient Digital Integrated Circuit and System Design
- Internship: Apple
- First employment: Apple Silicon Engineering Group (Cupertino, CA, USA)
- Awards: i) 2017 Qualcomm Innovative Fellowship; ii) 2015-2018 Lemann Foundation Fellowship; iii) 2014-2018 Science without Boarders doctoral fellowship

(3) Doyun Kim, Integrated voltage regulator with event-driven control, Sep. 2013-Dec. 2018
- Dissertation title: Fully Integrated Digital Low Drop-Out Regulator Design based on Event-Driven PI Control
- First employment: Facebook Hardware Design Labs; Samsung Electronics (South Korea)

(2) Jiangyi Li, low-power circuits, Jan. 2013-Apr. 2018
- Dissertation title: Very-Large-Scale-Integration Circuit Techniques in Internet-of-Things Applications
- Internship: Apple
- First employment: Apple Silicon Engineering Group (Cupertino, CA, USA)
- Awards: i) Tesla Scholarship

(1) Seongjong Kim, adaptive silicon, Jan.2012-Dec.2016
- Dissertation title: Variation-Tolerant and Voltage-Scalable Integrated Circuits Design
- Internship: Intel
- First employment: Intel Circuit Research Labs (CRL); Synthiant (LA, CA, USA)
- Awards: i) Catalyst Foundation Student, ii) IEEE SSCS Student Travel Grant

B.S. Thesis and Research Supervising

(10) Jayden Lee-Sin, LLM for Hardware Design, Sep/2025-present

(9) Zichen Qian, All-analog in-memory-computing hardware, Sep/2023-Aug/2024
- Award: EE Award: Student Excellence Award in Electronics, Circuits, and Physics
- Paper publication in ASP-DAC

(8) Brad Wayne Sears, Block floating point unit, Sep/2021-Dec/2021

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(7) Austin Ebel, AI hardware using spiking neurons, May/2021-Dec/2021
(6) Jay Mok, In-DRAM computing, 2019
(5) Saarthak Sarup, Neural network memory capacity, 2018, Ph.D. student at Stanford Univ.
    - Paper publication in ArXiv
(4) Harrison Liew, FPGA chip architecture, 2017, a Ph.D. student at UC-Berkeley
(3) Andreas Hoffman, Energy-efficient motor control, 2014, Innsbruck
(2) Christopher Hong, Ultra-low-power processor, 2013, Bloomberg
(1) Kyung Min Lee, Ultra-low-power processor, 2013, Cornell

M.S. Thesis and Research Supervising

(56) Andi Li, HBM memory systems, June/1/2025-present
(55) Baoqi Zhu, Integrated power management, June/1/2025-present
(54) Zhijie Zhan, Neural network quantization, Jan/1/2024-May/31/2024, Nvidia
(53) Kyungmin Baek, Circuits for stacked voltage domains, Sep/1/2023-Aug/31/2024
(52) Kevin Lee, In-memory-computing hardware for AI and ML, Sep/1/2023-May/31/2024
(51) Zhengpeng Zhu, MS, Spike neural networks, Sep/2023-May/2024
(50) Daniel Jang, MS, Silicon photonics wireline circuits, Sep/2019-Dec/2023, Omnivision
(49) Yunze Yang, MS, Physical attack detection and mitigation, Sep/2021-Dec/2022
(48) Jeongwook Lee, Cryogenic-temperature digital processor circuits and devices, Sep/2021-Dec/2022, Samsung (Austin, TX)
(47) Rentao Wan, MS, AMS computing, Jan/1/2022-Dec/31/2022, Columbia PhD program
(46) Yichen Xu, MS, Digital LDO, Sep/1/2021-Dec/31/2022, Columbia PhD program
    - Paper publication in TVLSI
(45) Jerry Maojing Lin, MS, IMC based FFT architecture, Sep/1/2021-May/31/2022
(44) Anhang Li, MS, Hacking detection circuits, Sep/1/2021-May/31/2022, Univ of Michigan PhD program
(43) Jinwoo Choi, MS, CNN training for the IMC SRAM-based accelerator, Sep/1/2021-Dec/23/2021
(42) Wei Fan, AI embedded systems, *MS EE Honors*, June/2021-Aug/31/2021
(41) Yunran Zhou, MS, Neuromorphic event-driven hardware architecture, *MS EE Honors*, Jan/1/2021-Aug/30/2021, Qualcomm
(40) Ayushparth Sharma, MS, Ultra-low-power and resilient microprocessor; Sep/2019-May/2021, Qualcomm
(39) Wenrui Zhang, MS, Brain-computer interface system design, Dec/31/2020
(38) Yidong Jian, MS, Multi-core microcontroller architecture, Dec/31/2020
(37) Xiaofu Pei, MS, In-memory computing circuits, Dec/31/2020, Ambarella
(36) Yi Zhang, MS, Advanced EDAC technique, Nov/15/2020
(35) Yuchan Hsueh, MS, Power management IC with security features, Dec/31/2019
(34) Paul Huang, MS, Hybrid Continuous Discrete Computing, Dec/31/2019, Columbia PhD program

(33) Xuyang Liu, MS, Hybrid Continuous Discrete Computing, Dec/31/2019
(32) Dewei Wang, Neuromorphic event-driven hardware architecture, 2018, Columbia PhD program
(31) David Zuo, Event-driven neural networks, 2018, Qualcomm
(30) Ajay Kumar Sidhar, Memory capacity monitoring, 2018, Apple
(29) Yucan Liu, Event-driven neural networks, 2018, Snowflake
(28) Gautham Harinarayan, In-RRAM computing, 2018
(27) Varun Ahalawat, In-DRAM computing, 2018, Qualcomm
(26) Blayne Kettlewell, Custom FPGA design and implementation, 2017, Magnetic Ins.
(25) David Yu, Custom FPGA design and implementation, 2017, Startup
(24) Tom Cheng, Custom FPGA design and implementation, 2017
(23) Sung Justin Kim, Hybrid comparator circuits, 2017, Columbia PhD program
- Paper publication in the ISLPED

(22) Yuxiang Chen, Clock domain crossing, 2017, Micron
(21) Song Wang, Neural signal compression systems, 2017, Intel
(20) Simarpreet Chawla, Neural signal compression systems, 2017, Qualcomm
(19) Sheng Zhang, Embedded AI for chip security, 2017, TSMC
- Paper publication in the ISLPED

(18) Shijian Chi, Occupancy sensing systems, 2017
(17) Chuanjun Shan, Occupancy sensing systems, 2017
(16) Yini Zhou, Fine-grained thermal monitoring, 2016, Broadcom
(15) Zhewei Jiang, Low-power cognitive computing, 2015, Columbia PhD program
- Paper publication in the DAC

(14) Zhenyu Zhu, Ultra-low-power processor, 2014, Cavium
(13) Beinuo Zhang, Low-power cognitive computing, 2014, Oracle
- Paper publication in the ISLPED

(12) Cong Zhu, Low-power floating point unit design, 2014, Oracle
(11) Jiachen Li, Crosstalk noise analysis, 2014, Oracle
(10) Hongsen Yu, On-chip SRAM design, 2013, Marvell
(9) Zhe Cao, Pipeline and parallel architecture, 2013, Marvell
(8) Jiangyi Li, Aging monitoring technique, 2013, Columbia PhD program
- Paper publication in the DAC

(7) Artem Lakoviev, OFET design flow, 2013, Argo-Logic
(6) Jian Liu, Asynchronous pipeline design, 2012, Qualcomm
- Paper publication in the ASYNC

(5) Hongtao Li, Active decoupling capacitor design, 2012, LSI
(4) Junyan Gao, Digital differential analyzer, 2012, SanDisk
(3) Kevin Kuo, Design flow exploration, 2012, Qualcomm
(2) Changzhuo Chen, Temperature sensor design, 2012, CAS
(1) Masayuki Pak, Power grid integrity analysis, 2012, Sony

Doctoral Thesis, As Reader (On Thesis Committee)

Non-Columbia Ph.D. Thesis Committee

(30) Giorgio Cristiano (Taekwang Jang's group at ETH Zurich), Committee, Circuit design for IoTs and In-Memory Computing, 4/5/2024

(29) Jin-O Seo (Sunghwan Cho's group at KAIST), Committee, A Variation-Tolerant Convolutional Neural Network Processor with Energy-Efficient Analog Computation, 11/28/2022

(28) Juan Sebastian Piedrahita Giraldo (Verhelst's group at KU Leuven), Committee, Embedded Machine Learning for Efficient Keyword Spotting, 7/7/2021

Columbia Ph.D. Thesis Committee

(27) Tom Repetti (Kim's group), Committee, Designing, Implementing, and Programming a Massively Multithreaded Spatial Accelerator Architecture, Feb/2/2023

(26) Ziyi Zhu (Bergman's group), Committee, High-Performance Silicon Photonic Interconnected Systems, Apr/22, 2022

(25) Zhaowen Wang (Kinget's group), Committee, Efficient and High-Performance Clocking Circuits for High-Speed Data Links, Feb/4 2022

(24) Mohammad Khorshidian (Krishwanamy's group), Committee, Advances in Linear Periodically Time Variant Circuits: From High-Performance Filters to Magnetic-Free Inductorless Nonreciprocal Components, Jan/27, 2021

(23) Aravind Nagulu (Krishwanamy's group), Committee, Surpassing Fundamental Limits through Time Varying Electromagnetics, Dec/14, 2021

(22) Sohail Ahasan (Krishwanamy's group), Committee, Architectures and Integrated Circuits leveraging Multi-phase Clocking of Passive Mixers for Applications in RF, MM-wave and Electro-optical Systems, Oct/8, 2021

(21) Ali Binaie (Krishwanamy's group), Committee, LO-Based Analog Signal Processing in Integrated Circuits and Systems: From RF to Optics, Aug/13. 2021

(20) Yudong Zhang (Kinget's group), Committee, Design of Power-Efficient Optical Transceivers and Design of High-Linearity Wireless Wideband Receivers, Apr. 2021

(19) Nathan C. Abrams (Bergman's group), Committee, Development of Silicon Photonic Multi-Chip Module Transceivers, Jul. 2020

(18) Shravan Nagam (Kinget's group), Committee, High-Performance Sub-Sampling Phase Detector based Ring-Oscillator PLLs, Feb. 2020

(17) Chengrui Le (Kinget's group), Committee, Design Techniques for Highly Integrated Hybrid-Switched-Capacitor-Resonant PowerConverters for LED Lighting Applications, Feb. 2020

(16) Sarthak Kalani (Kinget's group), Committee, Voltage and Time-Domain Analog Circuit Techniques for Scaled CMOS Technology., Oct. 2019

(15) Vivek Mangal (Kinget's group), Committee, Energy-Detecting Receivers for Wake-Up Radio Applications, Sep. 2019

(14) Zheng Shou (Chang's group), Committee, Deep Learning for Action Understanding in Video, Apr. 2019

(13) Andrea Lottarini (Kim's group), Committee, Design Space Exploration of Accelerators for Warehouse Scale Computing, 2019, Google

(12) Kevin Tien (Shepard's group), Committee, Integrated Inductor-based DCDC Converter, 2018, IBM

(11) Linxiao Zhang (Krishwanamy's group), RF/Analog Spatial Equalization for Integrated Digital MIMO Receivers, 2017

(10) Jeffrey Chuang (Krishwanamy's group), RF Mixed-signal Phase-Locked Loop (PLL) for Broadband radio, 2017

(9) Jahnavi Sharma (Krishwanamy's group), CMOS Synthesizers for Emerging RF-to-Optical Applications, 2017

(8) Ning Guo (Tsividis's group), Investigation of Energy-Efficient Hybrid Analog Digital Approximate Computation in Continuous Time, 2016, Startup

(7) Yu Chen (Tsividis's group), Digital Signal Processing with Signal-Derived Timing: Analysis and Implementation, 2016, Apple

(6) Sharvil Patil (Tsividis's group), Energy-Efficient Time-based Encoders and Digital Signal Processors in Continuous Time, 2016, Analog Devices

(5) Fabio Carte (Kymissis's group), Low-Temperature Monolithic Integration for Silicon and Organic Electronics, 2015, IBM TJ Watson

(4) Chun-Wei Hsu (Kinget's group), Challenges and Solutions for High-Performance Analog Circuits with Robust Operation in Low Power Digital CMOS, 2015, Analog Dev.

(3) Jayanth Kuppambatti (Kinget's group), Mixed-Signal Design Techniques in Scaled CMOS, 2014, Startup

(2) Christos Vezyrtzis (Tsividis's group), Continuous Time DSP, 2013, IBM TJ Watson

(1) John Sarik (Kymissis's group), Systems for Pervasive Electronics and Interfaces, 2013

Visiting and Remote Ph.D. students

(10) Sangsoo Jung (Jeon's group, SNU), visiting Ph.D. student, Seoul National University (SNU), Jan/1/2024-May/31/2024

(9) Hyuk-Jin Lee (Cho's group, KAIST), visiting Ph.D. student, Korea Advanced Institute of Science and Technology (KAIST), Jan/1/2022-July/30/2022

(8) Jieyu Li (W. He's group, Shanghai Jiao Tong University), Ph.D., remote supervising, Variation tolerance digital processor, Apr/1/2019-Mar/15/2025

(7) Pangi Park (Cho's group, KAIST), visiting Ph.D. student, Korea Advanced Institute of Science and Technology (KAIST), Jan/25/2021-July/25/2021

(6) Jin-O Seo (S.H. Cho's group, KAIST), visiting Ph.D. student, Analog-mixed-signal computing, Feb/2020-May/2019

(5) Manho Kim (H.J. Lee's group, SNU), visiting Ph.D., Seoul National University, In-memory-computing DRAM architecture, Sep/2019-Dec/2019

(4) Peiye Liu (BUPT), visiting Ph.D. student, Memory-efficient neural architecture search, 2017-2019

(3) Tianchan Guan (Zeng's group, Fudan Univ.), visiting Ph.D. student, Scalable synaptic memory model, 2015-2018, Alibaba

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(2) Chuxiong Lin (W. He's group, Shanghai Jiao Tong University), Ph.D., remote supervising, Ultra-low-power digital circuits, Jul/1/2018-present

(1) Wei Jin (W. He's group, Shanghai Jiao Tong University), visiting Ph.D., Ultra-low-voltage sequencing circuits, 2014-2016, Huawei

Visiting Research Scholoar

(3) Soobong Jang, Visiting Research Professor, Mar.2019-Apr.2020, Director, Samsung Electronics, Suwon, Republic of Korea

(2) Hyuk-jae Lee, Visiting Senior Research Scientist, Sep.2018-Dec.2018, Professor, Seoul National University, Seoul, Republic of Korea

(1) Weiwei Shan, Visiting Associate Research Scientist, 2017-2019, Associate Professor, Southeast University, Nanjing, China

Teaching

At Columbia University

Total semester: 22 (2024 Fall);

Teaching Innovations

2025 Spring	ELENE6350	Created the version that focuses on the digital processors and power management integrated circuits (PMIC)
2024 Spring	EECSE6321	One of the student project teams successfully taped out a microcontroller unit (MCU) in a 65-nm CMOS process, ArXiv, YouTube
2021 Fall	CSEEW4823	Offer to CVN students
2018 Spring	CSEEW4823	Significantly updated it with a new set of lecture slides, lab sessions, and a final project
2016 Fall	EECSE6322	Newly created
2012 Spring	EECSE6321	Newly created after more than 10 years of absence in the department curricula

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Term	Subject Number	Title	Role
2025 Fall	CSEEW4823	Advanced Logic Design	Lecturer
2025 Spring	ELENE6350	VLSI Design Lab	Lecturer
2024 Fall	CSEEW4823	Advanced Logic Design	Lecturer
2024 Spring	EECSE6321	Advanced Digital Electronic Circuits	Lecturer
2023 Fall	CSEEW4823	Advanced Logic Design	Lecturer
2022 Spring	EECSE6321	Advanced Digital Electronic Circuits (also via CVN)	Lecturer
2021 Fall	CSEEW4823	Advanced Logic Design (also via CVN)	Lecturer
2021 Spring	EECSE6321	Advanced Digital Electronic Circuits	Lecturer
2020 Fall	CSEEW4823	Advanced Logic Design	Lecturer
2020 Spring	EECSE6321	Advanced Digital Electronic Circuits	Lecturer
2019 Fall	CSEEW4823	Advanced Logic Design	Lecturer
2019 Spring	EECSE6321	Advanced Digital Electronic Circuits	Lecturer
2018 Fall	CSEEW4823	Advanced Logic Design	Lecturer
2018 Spring	CSEEW4823	Advanced Logic Design	Lecturer
2017 Fall	EECSE6322	VLSI Arch. for DSP and ML	Lecturer
2017 Spring	EECSE6321	Advanced Digital Electronic Circuits	Lecturer
2016 Fall	EECSE6322	VLSI Arch. for DSP and ML	Lecturer
2016 Spring	EECSE6321	Advanced Digital Electronic Circuits	Lecturer
2015 Fall	ELENE6920	VLSI Arch. for DSP and ML	Lecturer
2015 Spring	EECSE6321	Advanced Digital Electronic Circuits	Lecturer
2014 Fall	ELENE6920	VLSI Arch. for DSP and ML	Lecturer
2014 Spring	EECSE6321	Advanced Digital Electronic Circuits	Lecturer
2013 Spring	EECSE6321	Advanced Digital Electronic Circuits	Lecturer
2012 Spring	EECSE6321	Advanced Digital Electronic Circuits	Lecturer

Outside Columbia University

Short courses (More than a day)

(8) Logic Design for Computers with Verilog, five days, four hours per day. Host: Sogang University, Jun 30-July 4, 2025

(7) Fundamentals of Computing Systems. Five days, six hours per day. Host: Seoul Science High School, Jan 6-11, 2025

(6) SRAM-based In-Memory Computing Hardware. Two days, two hours per day. Host: Samsung Electronics, DS University, Online, Sept. 25-26, 2023

(5) Emerging Building Blocks in Digital System-on-Chips; advanced course introducing four emerging building blocks for digital system-on-chips (SoC): (1) SRAM-based in-memory computing (IMC) macros and accelerators, (2) analog-mixed signal (AMS) computing hardware, (3) spike/time-based computing hardware, and (4) digital low-drop-out (DLDO) voltage regulators. Three days, five hours per day. Host: Seogang University, Dep. of Electrical Engineering and The Institute of Semiconductor Engineers, Korea, July 24-28, 2023

(4) Emerging Building Blocks in Digital System-on-Chips; advanced course introducing four emerging building blocks for digital system-on-chips (SoC): (1) SRAM-based in-memory computing (IMC) macros and accelerators, (2) analog-mixed signal (AMS) computing hardware, (3) spike/time-based computing hardware, and (4) digital low-drop-out (DLDO) voltage

regulators. Three days, five hours per day. Host: Architectures Circuits Research Center (ACRC), Technion, Israel, June 19-21, 2023

(3) Near/Sub-Threshold Voltage Circuits and Architectures for Digital Processors, Introductory course focusing on state-of-the-art circuit and architecture techniques for ultra-low-power (μW and sub-μW) digital VLSI design, Seven lectures, three hours per lecture. Host: Prof. Weifeng He, Shanghai Jiao Tong University, Shanghai, China, July 2018

(2) Near/Sub-Threshold Circuits and Architectures for Microprocessors, 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 the Global Initiative of Academic Network (GIAN), Five lectures, three hours per lecture, assignments, and an exam, Indian Institute of Technology, Madras, India, Jan., 9-13, 2017

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

Tutorials (less than a day)

(9) Lecturer, IEEE ISOCC, Tutorial, "Review and Comparisons of Recent SRAM-based In-Memory Computing Hardware," Aug 19, 2024

(8) Lecturer, IEEE CICC, Educational Session, "SRAM-based In-Memory Computing Hardware: Analog vs Digital and Macros to Microprocessor," Apr. 21, 2024

(7) Coordinator, On-Chip Interconnects: Basic Concepts, Designs, and Future Opportunities by Yvain Thonnart (CEA-LIST), 2-hour tutorial, IEEE International Solid-State Circuits Conference (ISSCC), San Francisco, CA, USA, Feb. 2021

(6) Lecturer, Analog-Mixed-Signal Computing (AMS) Hardware, two one-hour lectures in 2020 Korea Advanced Institute of Science and Technology (KAIST) E-Seminar, July 2020

(5) Lecturer, Basics of Digital Low-Dropout (LDO) Integrated Voltage Regulators, two one-hour lectures in 2020 Korea Advanced Institute of Science and Technology (KAIST) E-Seminar, July 2020

(4) Lecturer, Basics of Digital Low-Dropout (LDO) Integrated Voltage Regulators, 2-hour tutorial in IEEE International Solid-State Circuits Conference (ISSCC), San Francisco, CA, USA, Feb. 2020

(3) Lecturer, Emerging Topics in Analog-Hybrid All-Programmable Embedded Computing, Introduction of the recent advances on analog, mixed-signal, hybrid analog-digital, and RF computing technologies, 2-hour session in 2018 Embedded Systems Conference (ESC) Minneapolis, Co-organize with Profs. Arjuna Madanayake (The University of Akron) and Soumyajit Mandel (Case Western Reserve University), Minneapolis, MN, USA, Nov. 2018

(2) Lecturer, Towards Energy-Efficient Intelligence in Power/Area-Constrained Hardware, 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

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(1) Lecturer, Variation-Adaptive Design in Near/Sub-Threshold Voltage Digital Computing Hardware, Introduce recent and important techniques to design computing hardware in near/sub-threshold digital circuits for creating 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

Outreach Efforts

(12) Seoul Science High School, “Enabling AI in an IoT Device,” Oct., 2019

(11) Seoul Science High School, “The Future of AI is Small,” Oct., 2018

(10) KSEA Youth Science and Technology Leadership Camp “Internet-of-Things X Machine-Learning,” Aug., 2018

(9) Seoul Science High School, “Internet-of-Things X Machine-Learning,” Oct., 2017

(8) Seoul Science High School, “Internet-of-Things X Machine-Learning,” Oct., 2016

(7) Math Minds, “Introduction to Circuits”, Jun., 2016

(6) Booker T Washington Middle School 54, “Introduction to Circuits”, May, 2016

(5) Seoul Science High School, “Introduction to Modern Integrated Circuit Design”, Oct., 2015

(4) Society of Women Engineers (SWE), “Engineering Exploration Experience (EEE)”, Mar. 2015

(3) Columbia University Outreach Office and Seoul Science High School, “Introduction to Modern Integrated Circuit Design,” Oct., 2014

(2) 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

(1) Columbia University Outreach Office and Seoul Science High School, “Introduction to Engineering”, Oct. 2013