

JONGYUP LIM

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RESEARCH INTERESTS

Analog/mixed-signal circuit design, wireless miniaturized neural recording system, energy-efficient deep learning hardware, and ultra-low power sensor node

EDUCATION

University of Michigan, Ann Arbor, USA

- Working toward Ph.D. in Electrical and Computer Engineering Sep 2016 - Present
- M.S. in Electrical and Computer Engineering Sep 2016 - Apr 2018
- Overall GPA **4.0/4.0** (Major GPA **4.0/4.0**), *Summa Cum Laude* expected

Seoul National University, Seoul, Korea

- B.S. in Electrical and Computer Engineering Mar 2010 - Feb 2016
- Overall GPA **4.14/4.30** (Major GPA **4.23/4.30**), *Summa Cum Laude*
- Department rank: 2 (*out of 170 students*)

Seoul Science High School, Seoul, Korea

- Early graduation for excellence Mar 2008 - Feb 2010

PUBLICATIONS

Conference

1. **J. Lim**, E. Moon, M. Barrow, S.R. Nason, P.R. Ratel, P. G. Patil, S. Oh, I. Lee, H. Kim, D. Sylvester, D. Blaauw, C.A. Chestek, J. Philips, and T. Jang, "A 0.19×0.17mm² Wireless Neural Recording IC for Motor Prediction with Near-Infrared-Based Power and Data Telemetry," *2020 IEEE International Solid-State Circuits Conference (ISSCC)*
2. L. Xu, T. Jang, **J. Lim**, K. Choo, D. Blaauw, and D. Sylvester, "A 0.51nW 32kHz Crystal Oscillator Achieving 2ppb Allan Deviation Floor using High-Energy-to-Noise-Ratio Pulse Injection," *2020 IEEE International Solid-State Circuits Conference (ISSCC)*
3. **J. Lim**, M. Choi, B. Liu, T. Kang, Z. Li, Z. Wang, Y. Zhang, K. Yang, D. Blaauw, H. Kim, and D. Sylvester, "AA-ResNet: Energy Efficient All-Analog ResNet Accelerator," *2020 IEEE 63rd International Midwest Symposium on Circuits and Systems (MWSCAS, invited, to be published)*
4. M. Cho, S. Oh, Z. Shi, **J. Lim**, Y. Kim, S. Jeong, Y. Chen, D. Blaauw, H. Kim and D. Sylvester, "A 142nW Voice and Acoustic Activity Detection Chip for mm-Scale Sensor Nodes Using Time-Interleaved Mixer-Based Frequency Scanning," *2019 IEEE International Solid-State Circuits Conference (ISSCC)*
5. Y. Peng, K. Choo, S. Oh, I. Lee, T. Jang, Y. Kim, **J. Lim**, D. Sylvester and D. Blaauw, "An Adiabatic Sense and Set Rectifier for Improved Maximum Power Point Tracking in Piezoelectric Harvesting with 541% Energy Extraction Gain," *2019 IEEE International Solid-State Circuits Conference (ISSCC)*
6. J. Lee, Y. Zhang, Q. Dong, W. Lim, M. Saligane, Y. Kim, S. Jeong, **J. Lim**, M. Yasuda, S. Miyoshi, M. Kawaminami, D. Blaauw and D. Sylvester, "A 6.4pJ/cycle Self-tuning Cortex-M0 IoT Processor based on Leakage-Ratio Measurement for Energy Optimal Operation across Wide-Range PVT Variation," *2019 IEEE International Solid-State Circuits Conference (ISSCC)*
7. **J. Lim**, T. Jang, M. Saligane, M. Yasuda, S. Miyoshi, M. Kawaminami, D. Blaauw and D. Sylvester, "A 224 pW 260 ppm/°C Gate-Leakage-based Timer for Ultra-Low Power Sensor Nodes with Second-Order Temperature Dependency Cancellation," *2018 Symposium on VLSI Circuits (VLSI Circuits)*

8. T. Jang, **J. Lim**, K. Choo, S. Nason, J. Lee, S. Oh, S. Jeong, C. Chestek, D. Sylvester and D. Blaauw, "A 2.2 NEF Neural-Recording Amplifier Using Discrete-Time Parametric Amplification," *2018 Symposium on VLSI Circuits (VLSI Circuits)*
9. Q. Dong, Z. Wang, **J. Lim**, Y. Zhang, Y.-C. Shih, Y.-D. Chih, J. Chang, D. Blaauw and D. Sylvester, "A 1Mb 28nm STT-MRAM with 2.8ns read access time at 1.2V VDD using single-cap offset-cancelled sense amplifier and in-situ self-write-termination," *2018 IEEE International Solid-State Circuits Conference (ISSCC)*, pp. 480–482

Journal

1. Y. Peng, K. Choo, S. Oh, I. Lee, T. Jang, Y. Kim, **J. Lim**, D. Blaauw and D. Sylvester, "An Efficient Piezoelectric Energy Harvesting Interface Circuit Using a Sense-and-Set Rectifier," in *IEEE Journal of Solid-State Circuits*, pp. 1–14, 2019 (early access).
2. J. Lee, Y. Zhang, Q. Dong, W. Lim, M. Saligane, Y. Kim, S. Jeong, **J. Lim**, M. Yasuda, S. Miyoshi, M. Kawaminami, D. Blaauw and D. Sylvester, "A Self-Tuning IoT Processor Using Leakage-Ratio Measurement for Energy-Optimal Operation," in *IEEE Journal of Solid-State Circuits*, pp. 1–11, 2019 (early access).
3. S. Oh, M. Cho, Z. Shi, **J. Lim**, Y. Kim, S. Jeong, Y. Chen, R. Rothe, D. Blaauw, H. Kim, and D. Sylvester, "An Acoustic Signal Processing Chip With 142-nW Voice Activity Detection Using Mixer-Based Sequential Frequency Scanning and Neural Network Classification," in *IEEE Journal of Solid-State Circuits*, vol. 54, no. 11, pp. 3005–3016, Nov. 2019.
4. Q. Dong, Z. Wang, **J. Lim**, Y. Zhang, M. E. Sinangil, Y.-C. Shih, Y.-D. Chih, J. Chang, D. Blaauw and D. Sylvester, "A 1-Mb 28-nm 1T1MTJ STT-MRAM With Single-Cap Offset-Cancelled Sense Amplifier and In Situ Self-Write-Termination," in *IEEE Journal of Solid-State Circuits*, vol. 54, no. 1, pp. 231-239, Jan. 2019
5. T. Jang, **J. Lim**, K. Choo, S. Nason, J. Lee, S. Oh, S. Jeong, C. Chestek, D. Sylvester and D. Blaauw, "A Noise-Efficient Neural Recording Amplifier Using Discrete-Time Parametric Amplification," in *IEEE Solid-State Circuits Letters*, vol. 1, no. 11, pp. 203-206, Nov. 2018

RESEARCH EXPERIENCE

Graduate Student Research Assistant (Advisor: Dennis Sylvester) Sep 2016 - Present

Michigan Integrated Circuits Laboratory (MICL), University of Michigan

- Designed a 0.19×0.17mm² wireless neural recording IC for motor prediction with near-infrared-based power and data telemetry (**ISSCC 2020**)
- Designed an energy efficient all-analog deep neural network accelerator in 28nm CMOS (**MWSCAS 2020 invited**)
- Designed a 224 pW 260 ppm/°C gate-leakage-based timer for ultra-low power sensor nodes with second-order temperature dependency cancellation in 55nm CMOS (**VLSI Circuits 2018**)

Academic Guest (Advisor: Taekwang Jang) Jan 2019 - Mar 2019

Energy Efficient Circuits and IoT Systems Group, ETH Zurich

- Designed a 0.19×0.17mm² wireless neural recording IC for motor prediction with near-infrared-based power and data telemetry

Undergraduate Research (Advisor: Jaeha Kim) Jan 2015 - Jul 2015

Mixed-signal IC and System Group (MICS), Seoul National University

- Designed a constant relative gain LC Digitally Controlled Oscillator (LC-DCO) with an approximate exponential capacitance tuning in 28nm CMOS technology

WORK EXPERIENCE

- Apple** Jun 2020 - Aug 2020
Engineering Intern, Display team, Cupertino, CA
- Republic of Korea Army** Apr 2013 - Jan 2015
Sergeant, Department of Intelligence and Operation, Army HQ, Republic of Korea Army
- Analyzed underground water level to detect North Korean infiltration tunnels
 - Developed a real time underground water level sounding system
- Dongbu HiTek** Jun 2012 - Aug 2012
Intern, Display Design Team TV part, R&D Center, Dongbu HiTek, Seoul, Korea
- Analyzed the critical overcurrent issue of LCD Drivers through Emission Microscopy experiment
 - Analyzed the Electro Magnetic failure of six 960-channel Source Drivers through Focused Ion Beam experiment

TEACHING EXPERIENCE

- Tutor**
- Analog Electronic Circuits, *Seoul National University* Sep 2015 - Dec 2015
 - Introduction to Electromagnetism with Practice, *Seoul National University* Sep 2012 - Dec 2012
 - Advanced Mathematics, *the Korment Knowledge Sharing, Kwangshin High School, Seoul, Korea* Jan 2012

HONORS & AWARDS

- KEF Overseas Scholarship** Sep 2016 – Aug 2020
Kwanjeong Educational Foundation, Seoul, Korea
- Four-year support during Ph.D. program
- Honor Society** Apr 2012 - Present
SNU Tomorrow's Edge Membership (STEM), Seoul National University College of Engineering
- An academic honor society for students who are qualified as future global leaders
 - Contributed to diverse academic and international exchange, voluntary service, and leadership activities
- The First Prize in KorMent: the Mentoring for the Next Generation Leaders** Apr 2012
Korea Student Aid Foundation, Seoul, Korea
- Selected as KorMent Star and reported on the newsletter at April, 2012
- Presidential Science Scholarship** Mar 2010 - Feb 2016
Korea Student Aid Foundation, Daegu, Korea
- Full tuition fee and additional \$2,125 per semester for academic excellence
- Gold Medal in Korea Physics Olympiad** Aug 2009
The Korean Physical Society, Seoul, Korea
- Silver Medal in Korea Physics Olympiad** Aug 2008
The Korean Physical Society, Seoul, Korea

SKILLS

Tools

- HSpice, Spectre, Customsim, Finesim, DC Compiler, Innovus, Virtuoso, Calibre, Altium Designer

Programming Languages

- C/C++, Python, System Verilog/Verilog-A, Matlab