

	Cho's Circuits and Systems Laboratory (CCSLAB)			■ Contact information		
				Professor	Email: chosta@kaist.ac.kr	Tel: 042-350-3480
				Lab.	Nano-Fab Center 304	
				Website	https://ccs.kaist.ac.kr	
■ Current state of the Lab. (in 2025 Spring Semester)						
Postdoctoral Fellows: 0 Ph.D. Students: 12 Master's Students: 8						
■ Research Areas						
▷ High-speed analog, mixed-signal and RF circuits						
<p>The high-speed analog, mixed-signal and RF circuits studied in our laboratory include clock generation, memory interface, and wireline transceiver. Representively, PLL is an essential analog and mixed-mode circuit which synthesizes system clock to the desired frequency for communication system. Recently, we are focusing on subharmonic injection locking technique for low-jitter clock multipliers applications.</p>						
▷ Low-power circuits for sensors						
<p>High performance PVT-insensitive sensors are one of our current research interests. In most applications, PVT variation degrades the performance of sensors. To relieve the trade-off between calibration cost and performance, we are currently focusing on developing related techniques for biomedical, automotive and industrial sensors.</p>						
▷ Machine learning and memory						
<p>Machine learning based on neural network has garnered great interest over the past decade as it has the potential to revolutionize various technologies for commercial and industrial use. In particular, we are interested to implement machine learning processor in analog circuit domain which is effective to achieve low-power and high-speed operation than digital domain.</p>						
						
■ Recommended courses & Career after graduation						
<p>Students are encouraged to take Circuit Theory, Electronic Circuits, Communication System, Introduction to Physical Electronics and Digital Signal Processing. Alumni are working with international major companies and research institutes such as DGIST, ETH Zurich, KAIST (Faculty), NVidia, Qualcomm, Broadcom, A*STAR, Samsung Electronics, Fairchild, MIT, Stanford, Univ. of Michigan, U. C. San Diego, MIT Sloan (MBA), and T. U. Delft.</p>						
■ Introduction to the Lab						
<p>Our group explores emerging technologies for high-performance communication and interference-tolerant sensors. Research focus is on the design of analog integrated circuits with multiple layers of system abstraction in mind, from algorithms and system architectures to circuit techniques and devices. Our main research area is wireline data interface, CMOS sensors, phase-locked loops (PLL), and low power circuit for machine learning. Recently we are also looking into power management circuit as well as reference generator.</p>						
■ Introduction to other activities besides research						
<p>We take annual/seasonal events such as strawberry party (spring season), ski camp and workshop to foster friendship. Also, members can have flexible vacation plan during the year to refresh and reinforce their motivation. We offer various opportunities to participate in international conferences.</p>						
						
■ Recent research achievements						
<p>[1] H. Choi, S.H. Cho, "A 7.5GHz Subharmonic Injection-Locked Clock Multiplier with a 62.5MHz Reference, -259.7dB FoMJ, and -56.6dBc Reference Spur," IEEE Int'l Solid-State Circuits Conference (ISSCC), 2024.</p>						
<p>[2] P. Park, J. Lee, S.H. Cho, "A PVT-Insensitive Sub-Ranging Current Reference Achieving 11.4ppm/°C from -20°C to 125°C," IEEE Int'l Solid-State Circuits Conference (ISSCC), 2024.</p>						
<p>[3] J. Oh, and S.H. Cho, "A 0.001-mm2, 1.15-11 GHz Background Quadrature Phase and Duty-Cycle Error Corrector Using a NAND-based Phase Detector in 28-nm CMOS", IEEE Solid State Circuits Letters, 2024.</p>						
<p>[4] J. Seo, M. Seok, S.H. Cho, "A 44.2-TOPS/W CNN Process With Variation-Tolerant Analog Datapath and Variation Compensating Circuit", IEEE J. Solid-State Circuits, vol. 59, no. 5, 2024.</p>						