

## SEMINAR ANNOUNCEMENT

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING  
COLLEGE OF DESIGN AND ENGINEERING

Website: <https://cde.nus.edu.sg/ece>

**Area: Integrated Circuits & Embedded Systems (ICES)**

**Host: Asst Prof Jang Moonhyung**

<b>TOPIC</b>	:	<b>Low-power, Low-noise Sensor Interface Circuits for Biomedical Applications</b>
<b>SPEAKER</b>	:	<b>Assoc Prof Jerald Yoo Associate Professor, Department of Electrical and Computer Engineering, Seoul National University</b>
<b>DATE</b>	:	<b>Wednesday, 20 August 2025</b>
<b>TIME</b>	:	<b>1:00PM to 2:30PM</b>
<b>VENUE</b>	:	<b>E1-06-09</b>

### ABSTRACT

Biomedical and healthcare applications provide attractive opportunities for the semiconductor sector. In both fields, the target is to gather data from multiple sensor nodes with minimal power consumption while maintaining low noise operation. However, designing a sensor interface circuit for such applications is challenging due to its harsh environment. Also, in such cases, the trade-off between available resources and performance among the components both in analog front-end and in the digital back-end is crucial.

This talk will cover the design strategies of sensor interface circuits. Starting from a basic op-amp, we will first explore the difficulties, limitations, and potential pitfalls in sensor interface, and strategy to overcome such issues. Low noise operation leads to two dynamic offset compensation techniques, auto-zeroing, and chopper stabilization. After that, system-level considerations for better key metrics such as energy efficiency will be introduced. Several state-of-the-art instrumentation amplifiers that emphasize on different parameters will also be discussed. We will then see how the signal analysis part impacts the analog sensor interface circuit design. The lecture will conclude with interesting aspects and opportunities that lie ahead.

### BIOGRAPHY

Jerald Yoo received the B.S., M.S., and Ph.D. degrees in Department of Electrical Engineering from the Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Korea, in 2002, 2007, and 2010, respectively. Between 2010 and 2024, he was with Massachusetts Institute of Technology ('10-'11', visiting scholar), Masdar Institute of Science and Technology, Abu Dhabi, UAE (now Khalifa university, '10-'16), and National University of Singapore ('17-'24). Since 2024, he has been with the Department of Electrical and Computer Engineering, Seoul National University, where he is currently an Associate Professor. He has pioneered research on Body-Area Network (BAN) transceivers for communication/powering and wearable body sensor network using the planar-fashionable circuit board for a continuous health monitoring system. His current research interests include biomedical circuits and systems, BAN for communication and powering, and ASIC for piezoelectric Micromachined Ultrasonic Transducers (pMUT). Dr. Yoo is an IEEE Solid-State Circuits Society (SSCS) Distinguished Lecturer (2024-2025 and 2017-2018). He also served an IEEE Circuits and Systems Society (CASS) Distinguished Lecturer (2019-2021). He is the recipient or a co-recipient of several awards, including IEEE International Solid-State Circuits Conference (ISSCC) 2020 and 2022 Demonstration Session Award (Certificate of Recognition), IEEE International Symposium on Circuits and Systems (ISCAS) 2015 Best Paper Award (BioCAS Track), ISCAS 2015 Runner-Up Best Student Paper Award and the IEEE Asian Solid-State Circuits Conference (A-SSCC) Outstanding Design Award (2005, 2021, 2024). He was the founding vice-chair of the IEEE SSCS United Arab Emirates (UAE) Chapter and is the chair of the IEEE SSCS Singapore Chapter. Currently, he serves as an Executive Committee as well as a Technical Program Committee Member of the IEEE ISSCC, ISSCC Student Research Preview (chair), IEEE Asian Solid-State Circuits Conference (A-SSCC, Emerging Technologies, and Applications Subcommittee Chair), and Steering Committee Member of IEEE Transactions on Biomedical Circuits and Systems (TBioCAS). He was an Associate Editor of IEEE Transactions on Biomedical Circuits and Systems (TBioCAS) and IEEE Open Journal of Solid-State Circuits Society (OJ-SSCS).