



# CECS

CENTER FOR EMBEDDED & CYBER-PHYSICAL SYSTEMS

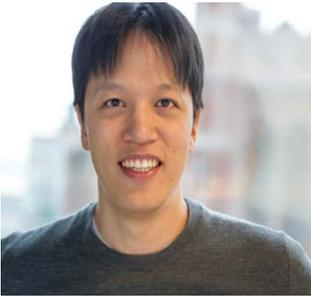
## Circuits and Systems Seminar Series

*Presents*

### "Adaptive Design: Tackling Variability Challenges in VLSI Circuits"

Professor Mingoo Seok

Department of Electrical Engineering  
Columbia University, New York, NY



**Abstract:** In this talk, we will discuss variability challenges in VLSI systems and our recent research efforts on variation-adaptive design techniques. Variability in supply voltage, chip temperature, manufacturing process, and transistor aging have imposed a large amount of pessimistic margins in clock frequency, voltage, and device size, which has severely undermined gains from various boundary-pushing efforts. We will present (1) a low-overhead, in-situ, within-a-cycle timing-error detection and correction technique that can operate at near/sub-threshold voltage, (2) ultra-compact thermal sensor circuits enabling 10-100X

denser on-chip thermal sensing, (3) self-testing circuits and frameworks for in-field & in-situ aging monitoring in pipeline and SRAM register files. Several test chip measurement results will be presented.

**Biography:** Mingoo Seok is an assistant professor in the Department of Electrical Engineering at Columbia University. He received the BS (with summa cum laude) in electrical engineering from Seoul National University, South Korea, in 2005, and the MS and PhD degree from University of Michigan in 2007 and 2011, respectively, all in electrical engineering. He was a member of technical staff in Texas Instruments, Dallas in 2011. He joined Columbia University in 2012. His research interests are various aspects of computing systems, including ultra-low-power computing systems, computing systems for machine learning, adaptive circuits and architecture, and non-conventional computing systems.

He received 1999 Distinguished Undergraduate Scholarship from the Korea Foundation for Advanced Studies, 2005 Doctoral Fellowship from the same organization, and 2008 Rackham Pre-Doctoral Fellowship from University of Michigan. He also won 2009 AMD/CICC Scholarship Award for picowatt voltage reference work and 2009 DAC/ISSCC Design Contest for the 35pW sensor platform design. He won 2015 NSF CAREER award. He has been serving as an associate editor for IEEE Transactions on Circuits and Systems I since 2013, and IEEE Transactions on VLSI Systems since 2015.

**Friday, April 22, 2016 at 3:00PM**  
**Harut Barsamian Colloquia Room (Engineering Hall 2430)**  
**Hosts: Payam Heydari**