Frontiers in Analog and Mixed-Signal IC Innovation for Ultra-Low-Power Applications

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IEEE Circuits and Systems Society Distinguished Lecture

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Event Information:

Date: **April 29**
Time: **10:00 AM – 11:00 AM** (Pacific Time)
Location: **Virtual** (Zoom)
Zoom Meeting Link:
https://csus.zoom.us/j/81584619837
Meeting ID: 815 8461 9837

Abstract:

Power-constrained applications such as wearable and implantable devices demand extreme energy efficiency without compromising performance, robustness, or reliability. In these systems, analog and mixed-signal integrated circuits (ICs) play a vital role in interfacing with the physical world, acquiring signals, enabling edge-level data processing, and wirelessly transmitting data, while operating under strict power, area, and thermal constraints.

Circuit designers face new trade-offs between precision, speed, and power efficiency. This talk will explore recent advances in low-power analog and mixed-signal circuit architectures tailored for energy-limited environments, including innovations in high-precision front-end interfaces, high-current stimulation drivers, and ultra-low-power backscatter communication. The discussion will then extend to system-level optimization strategies that enhance energy-efficient operation in power-constrained devices. Practical examples will be presented to illustrate how low-power IC solutions can unlock new opportunities for the next generation of resource-aware systems.

Bio

Dr. Yaoyao Jia is an Associate Professor and Silicon Labs Endowed Faculty Fellow in Electrical Engineering at the University of Texas at Austin. She received her Ph.D. in Electrical Engineering from Georgia Tech in 2019. Her research focuses on analog and mixed-signal integrated circuits, power management ICs, energy harvesting systems, and low-power data radios for wearable and implantable devices. She is the recipient of the NSF CAREER Award, Intel Rising Star Faculty Award, IEEE BioCAS Young Professional Top Contributor Award, and the IEEE TBioCAS Best Associate Editors Award. Dr. Jia serves on the technical program committees of IEEE BioCAS and IEEE CICC and is an Associate Editor for IEEE JSSC, IEEE TBioCAS, and Neuroelectronics.