

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: Professor Massimo Alioto

Research Seminar

TOPIC	:	Beyond Digital Logic: Open Challenges and Research Opportunities in Analog, Mixed-Signal, and System-Level IGZO Electronics
SPEAKER	:	Dr. Marco Privitera
DATE	:	Thursday, September 17, 2026
TIME	:	5:00 pm to 6:00 pm
VENUE	:	E3-06-03 TUTORIAL ROOM

ABSTRACT

As flexible IGZO technologies mature beyond simple digital circuits, an important research question is how to transform them into complete electronic systems capable of sensing, processing, communicating, and managing energy directly on flexible substrates. Achieving this objective requires advances not only in digital design, but particularly in analog, mixed-signal, RF, sensing, and power-management circuits, where the intrinsic properties of a-IGZO TFTs introduce both significant limitations and unconventional design opportunities.

This seminar will discuss the main open challenges in the development of analog and mixed-signal circuits using IGZO plastic technologies. Topics will include unipolar circuit design, limited intrinsic gain and device speed, variability and mismatch, passive-component integration, precision references, data converters, oscillators and frequency-generation circuits, sensor interfaces, power management, and wireless communication. Particular attention will be given to circuit and system architectures that exploit the characteristics of flexible electronics rather than attempting to reproduce conventional CMOS solutions directly.

Finally, the seminar will outline possible future research directions toward increasingly autonomous flexible systems, including heterogeneous integration, energy harvesting, distributed sensing, low-power wireless interfaces, flexible sensor platforms, and co-design between devices, circuits, architectures, and applications. These challenges naturally create opportunities for collaborations spanning semiconductor devices, circuit design, EDA methodologies, sensing, communications, materials, and application-oriented research.

BIOGRAPHY



Marco Privitera (Member, IEEE) was born in Italy in 1997. He received the M.Sc. degree (summa cum laude) and the Ph.D. degree in electronic engineering from the University of Catania, Italy in and 2021 and 2024, respectively, where is currently a research Fellow and co-teaching Basic of Electronics for bachelor's degree courses. In 2023-2024 he joined the Green-IC research group within the National University of Singapore (NUS), Singapore, as Visiting Ph.D. student and in 2025-2026 as visiting researcher. In 2023, he received the IEEE-CAS Pre-Doctoral Award and in 2025 Best PhD Thesis Award from SIE (Società Italiana di Elettronica). He is/was Technical Program Committee member of IEEE international conferences (e.g., DCIS, PRIME, ICECS, MCSoc). He co-authored more than 30 publications in international journals and conference proceedings. His current research interests include power management integrated circuits, data communication, ultra-low power and ultra-low voltage analog blocks for energy harvesting and flexible circuit design.