香港大學 機械工程系
Department of Mechanical Engineering
THE UNIVERSITY OF HONG KONG

SEMINAR

Thin-Film Electronics for Edge Intelligence: Gaussian–Sigmoid Transistors, Light-Driven Spikes, and Intelligent Risk Sensors

Date: 13 February, 2026 (Friday)
Time: 2:00 p.m.
Venue: Room 7-34 and 7-35
Haking Wong Building
HKU

Speaker: Professor Hocheon Yoo
Associate Professor
Department of Electronic Engineering
Hanyang University
Republic of Korea

Abstract:

Emerging applications in edge intelligence demand hardware platforms that are lightweight, adaptive, and capable of local decision-making under uncertainty. In this talk, I will present our recent efforts to explore novel functionalities in thin-film electronics for intelligent, secure, and context-aware systems. I will introduce three exploratory device platforms developed using thin-film materials and architectures: (1) Gaussian–Sigmoid transistors that enable analog activation and probabilistic inference by exploiting intrinsic variability, offering a route to hardware-level Bayesian operations; (2) photo-spike photodetectors that convert light fluctuations into asynchronous electrical spikes, serving as neuromorphic input interfaces and entropy sources for applications such as physical random number generation; and (3) UVC-based intelligent risk sensors capable of early-stage fire detection and behavioral pattern recognition for classifying fire types and potential causes. Although these platforms are at a foundational stage, they collectively demonstrate how tuning thin-film device physics can enable real-time sensing, embedded probabilistic learning, and secure edge functionality. This work highlights a new direction in thin-film electronics that moves beyond conventional signal processing toward intelligent and adaptive systems.

Biography:

Hocheon Yoo is an Associate Professor of Electronic Engineering at Hanyang University, South Korea, where he leads the We Design Devices (WeDD) Lab. He received his B.S. from Hanyang University in 2014 and his Ph.D. from POSTECH in 2018. He then conducted postdoctoral research at Northwestern University in 2019. His research focuses on the development of novel semiconductor devices for neuromorphic computing, secure hardware, and sensor-integrated AI systems. He pursues a material-device-application co-design approach, exploring how emerging materials and structures can directly enable new

forms of intelligent behavior. He is currently the Korean principal investigator of a Korea-US joint project on foundational semiconductor technologies (NRF–NSF, 2024–2027), and also leads a Korea–Canada academia–industry joint project with McGill University and 1-Material. His professional activities include:

- Program Director, Graduate School of Engineering (Working Professionals Program), Electronic Engineering (Jan 2026 – Present)
- Technical Advisor & Outside Director, Cellames (Jan 2026 – Present)
- Secretary, IMID 2026 AMD (Active-Matrix Displays) Committee
- Chair, Bio-Semiconductor Division, Korean Society for Medical and Biological Engineering (2025 - Present)
- Co-chair, Sensors & MEMS Division, Korean Conference on Semiconductors (2025 - Present)
- Secretary, Advanced Materials & Devices (AMD) Committee, Korean Information Display Society (2025 - Present)
- Committee Member, TS01. Nanoelectronics, NanoKorea (2025 – Present)
- Vice-Chair, AI Semiconductor Standardization Roadmap, Korea Semiconductor Industry Association (2024 - Present)
- Committee Member, Semiconductor Packaging Workforce Development Program (2025 – Present)
- Vice-Chair, Next-Generation Electronic Materials and Devices, GCIM (2025 - Present)
- Steering Committee Member, Department of Nanoscale Semiconductor Engineering (SK hynix track), Hanyang University (2025 – Present)
- Director of Public Relations, Institute for Nano Science & Technology, Hanyang University (2025 - Present)

ALL INTERESTED ARE WELCOME

For further information, please contact Prof. D.M. Shin at 3917 8061.