

Department of Electrical Engineering
Presents a Faculty Candidate Seminar on

**Energy-Efficient Neuromorphic On-Device
Intelligence for AIoT**

by

Dr Chang GAO

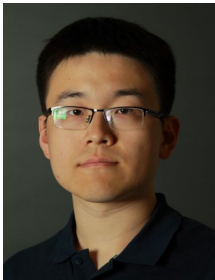
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Abstract

As the Artificial Intelligence of Things (AIoT) transforms our digital landscape, the fusion of edge computing and communication networks creates an urgent need for more efficient data processing solutions. Modern systems face the dual imperatives of minimizing latency and power consumption—critical not just for user experience but for environmental sustainability. Our research leverages neuromorphic computing's brain-inspired principles to address these challenges to have delivered three generations of dynamically sparse delta neural network accelerators, DeltaRNN, EdgeDRNN, and Spartus, achieving over 40× speedup in speech recognition while maintaining power efficiency and accuracy. Building on these neuromorphic principles, we extend our research to eye tracking for extended reality and radio frequency (RF) signal processing, specifically targeting non-linearity correction in wideband RF power amplifiers crucial for emerging 6G and WiFi 7 technologies. Through OpenDPD, the first open-source digital pre-distortion (DPD) framework, we enable systematic training and benchmarking of AI-based DPD algorithms. Additionally, our mixed-precision AI-DPD approach (MP-DPD) reduces power consumption by 3× in processing near-GSps-level data rate RF signals. Looking ahead, we envision these advances helping to create ultra-efficient, intelligent edge devices that seamlessly integrate with next-generation communication networks.

Biography



Dr. Chang Gao has been appointed as Assistant Professor in the Department of Microelectronics at TU Delft since August 2022. He earned his PhD from the Institute of Neuroinformatics at the University of Zurich and ETH Zurich in March 2022. His research bridges neuromorphic computing with real-world applications, focusing on brain-inspired algorithm-hardware co-design for edge AI systems. His innovative work spans audio processing, robotic control, and high-speed video and RF signal processing for extended reality and wireless communication. Dr. Gao's contributions to the field have garnered recognition, including the 2022 Mahowald Early Career Award in Neuromorphic Engineering and a Marie Skłodowska-Curie Postdoctoral Fellowship. His work on dynamically sparse delta neural network hardware accelerators earned him recognition as a 2023 MIT Technology Review Innovator Under 35 in Europe. Most recently, he was named a Dutch Research Council (NWO) Veni 2024 Laureate.

Date : 23 December 2024 (Monday)
Time : 2:30pm – 3:30pm
Language : English
Online (Zoom) : <https://cityu.zoom.us/j/82001602731>
(Zoom ID: 820 0160 2731)

**** ALL ARE WELCOME ****