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: Assoc Prof Heng Chun Huat

TOPIC	:	**High-Speed Transmitter Targeting for Optical Transceiver Applications**
SPEAKER	:	**Mr Zhang Erchong** **Graduate Student, ECE Dept, NUS**
DATE	:	**Thursday, 12 November 2026**
TIME	:	**4:00PM-5:00PM**
VENUE	:	**E4-04-05 (E-Cube 1)**

ABSTRACT

As data-center switches and artificial intelligence training clusters scale toward next-generation Ethernet and optical link standards, the per-lane data rate of optical transceivers is rapidly advancing into the multi-hundred-gigabit regime using four-level pulse amplitude modulation (PAM-4). On the transmit side of an optical link, the high-speed electrical transmitter (TX) and modulator driver play a decisive role in serializing parallel data streams, pre-compensating channel impairments, and delivering clean, wide-swing multi-level waveforms to electro-optic modulators.

This seminar offers a tutorial overview and interactive discussion on the architectural evolution, design methodologies, and key circuit bottlenecks of high-speed optical transmitter ICs. We will first review the two major paradigms in modern transmitter design: digital DSP-based DAC transmitters versus analog/mixed-signal direct-multiplexing transmitters, and trace the development of conventional multiplexing topologies.

We will then examine the core physical pain points encountered when pushing symbol intervals down to just a few picoseconds, including the heavy power overhead of high-frequency clock distribution, stringent timing skew and duty-cycle constraints at the final selector, and severe parasitic loading at the high-speed output summing node. Finally, building upon these industry challenges, we will briefly introduce our recent architectural explorations on phase-interleaved multiplexing and broadband equalization to foster open technical discussion.

BIOGRAPHY

Zhang Erchong is currently pursuing the Ph.D. degree in the Department of Electrical and Computer Engineering, National University of Singapore (NUS), under the supervision of Assoc. Prof. Heng Chun Huat and Dr. Gao Yuan. His current research focuses on high-speed wireline and optical transmitter architectures, broadband equalizers, and millimeter-wave mixed-signal integrated circuits.

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