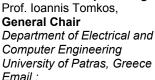# AI-Enhanced DSP and Photonic Technologies for Cloud-Scale Communication Systems

Co-located with 15th IEEE/IET *International Symposium on*
COMMUNICATION SYSTEMS, NETWORKS & DIGITAL SIGNAL PROCESSING
(CSNDSP'26)
15-17 July 2026, Edinburgk, UK

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This colloquium will explore the role of Artificial Intelligence (AI) in advancing communication systems, networks, and digital signal processing (DSP), with a particular emphasis on short-reach interconnects and cloud-scale data center networking. The exponential growth of cloud services, AI/ML workloads, and emerging high-performance applications requires innovative solutions that deliver ultra-high capacity, low latency, scalability, and energy efficiency.

Topics include AI-assisted DSP algorithms for fiber channels, machine learning for photonic device and system optimization, and intelligent resource management. The colloquium will also highlight short-reach optical link technologies, silicon photonics, co-packaged optics, and multi-core fibers, which are vital to next-generation data center and HPC systems. Both theoretical advances and experimental demonstrations are welcome, with a focus on how AI-enhanced DSP and network control can shape the future of flexible, converged, and intelligent communication infrastructures.

According to the above, the topics of primary interest include:

- AI/ML for DSP in communication systems
- Nonlinear impairment compensation and channel equalization using AI/DSP
- Intelligent resource allocation and traffic engineering in data center networks
- AI-enabled modulation, coding, and adaptive transceiver design
- High-speed short-reach optical interconnects for data centers and HPC
- DSP techniques for energy- and bandwidth-constrained short-reach links

- Silicon photonics, co-packaged optics, and optical I/O for cloud-scale systems
- Multi-core/multi-mode fiber technologies for high-capacity short-reach networks
- AI-driven photonic integration and inverse design methods
- Reliability, standardization, and testing of short-reach optical solutions
- Experimental testbeds, prototypes, and field trials for AI-optimized communication systems
- Techno-economic analysis of AI-driven infrastructures

Submission Dates

- Full paper due: 15/01/2026 • Notification of acceptance: 15/04/2026 • Camera ready paper: 15/04/2026

Paper format and submission procedure are available at https://eng.ed.ac.uk/csndsp-2026

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