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Research interests

My research focuses on the future dynamic optical networks with flexible network functions and fast network reconfigurations. The envisioned programmable optical networks could deliver network services automatically in an on-demand approach. The flexible network resource can accommodate network requests by providing just-enough network hardware to maximize the utilisation of network resources. The margin-reduced dynamic optical network will be one of the key research themes for intelligent optical transport. To achieve this, two key research directions are explored.

Artificial Intelligence-driven optical networks

Based on the proposed SDN-based multi-layer monitoring framework, AI-based network analytics could offer novel network functions and leverage the intelligence of SDN networks. Various field trial experiments demonstrated the advantages of AI in optical networks.

Programmable multi-dimensional networks

Programmable optical hardware is one of the key enabling technologies for dynamic networks. This research will investigate programmable network architecture, reconfigurable node functions and programmable transmission equipment. Our developed architecture-on-demand synthesized optical nodes and bandwidth programmable optical transmitters provide a solid foundation for hardware-programmable optical networks. The research intends to bring programmability in multiple dimensions (i.e. TDM/WDM/SDM in optical networks). The flexibility of network hardware can adapt the capability, according to network states and network requirements, to contribute to the vision of intelligent optical transport.

Employment

Senior Lecturer in High Performance Networking & Optical Networking

School of Electrical, Electronic and Mechanical Engineering
Faculty of Engineering
1 Aug 2023 → present

High Performance Networks Group (HPN)

Faculty of Engineering
United Kingdom
1 Jan 2014 → present

Research outputs

Unified Monitoring and Telemetry Platform for Future Intelligent Optical Networks

Shen, S., Han, J., Li, H., Teng, Y., Yan, S. & Simeonidou, D., 14 Jul 2024, (Accepted/In press) *24th International Conference on Transparent Optical Networks*. Institute of Electrical and Electronics Engineers (IEEE), p. 1-5 5 p. (International Conference on Transparent Optical Networks).

NetMind: Adaptive RAN Baseband Function Placement by GCN Encoding and Maze-solving DRL

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Deep-reinforcement-learning-based RMSCA for space division multiplexing networks with multi-core fibers [Invited Tutorial]

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Field Trial Demonstration of AI-Engine Driven Cross-Domain Rerouting and Optimisation in Dynamic Optical Networks
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Deployment of VNF Service Chains with Grooming and Resilience in Elastic Optical Networks
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DRL-based RMSCA for SDM Networks with Core Switching in Multi-Core Fibres
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DRL-Driven Intelligent Access Traffic Management for Hybrid 5G-WiFi Multi-RAT Networks
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Suspect fault screen assisted graph aggregation network for intra-/inter-node failure localization in ROADM-based optical networks
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DRL-Based Long-Term Resource Planning for Task Offloading Policies in Multi-Server Edge Computing Networks

Li, H., Assis, K., Yan, S. & Simeonidou, D., 18 Jul 2022, In: IEEE Transactions on Network and Service Management. 19, 4, p. 4151 - 4164

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A Programmable ROADM System for SDM/WDM Networks

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ANN-Based Multi-Channel QoT-Prediction over a 563.4-Km Field-Trial Testbed

Gao, Z., Yan, S., Zhang, J., Mascarenhas, M., Nejabati, R., Ji, Y. & Simeonidou, D., 3 Feb 2020, (E-pub ahead of print) In: *Journal of Lightwave Technology*. 38, 9, p. 2646-2655 10 p.

Hardware-Efficient ROADM Design with Fiber-Core Bypassing for WDM/SDM Networks

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Fully SDN-enabled all-optical architecture for data center virtualization with time and space multiplexing

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Activities

International Conference on Optical Communications and Networks (ICOON 2021)

Shuangyi Yan (Participant)
24 Aug 2021

ECOC 2018

Shuangyi Yan (Participant)
23 Sept 2018

Opto-Electronics and Communications Conference & Photonics in Switching and Computing 2019 (Event)

Shuangyi Yan (Advisor)
1 Feb 2018 → 31 Jul 2019

IEEE Asia Communications and Photonics Conference 2017

Shuangyi Yan (Participant)
13 Oct 2017