CONNECT, SFI Research Centre for Future Networks & Communications

A World Leading SFI Research Centre

Science Foundation Ireland sfi For what's next

CONNECT Centre for Future Networks

CONNECT is the Science Foundation Ireland Research Centre for Future Networks and Communications. Its mission is to research and develop innovative solutions for the communications challenges facing society today. The Internet of Things, 5G/6G networks and future communications services are the Centre's main areas of focus.

Over 300 CONNECT researchers across 10 Higher Education Institutes are supported by €90 million of funding from the Science Foundation Ireland Research Centres Programme, the European Regional Development Fund and industry partners.

Research Areas

CONNECT focuses on six research themes looking to the next generation of networks:

- Dependable Networks: Low-latency services, such as Connected Autonomous Vehicles (CAV) and Mixed Reality (MR), leveraged by edge computing, and exploiting recent advances in data analytics for the design and operation of dependable networks.
- Sustainable IoT: Scalable integrated energy harvesting, storage, and power management, for sustainable IoT edge networks. Low-power IoT platforms based on reconfigurable, software-defined sensing, computation, and communications to support long-term network operation. New security and resiliency mechanisms.
- Link Performance: Multi-Gbps wireless and wireline data transmission, flexible mmWave communications, enabled through converged photonic networking. Signal processing operations for multi-dimensional data structures. Molecular communications and interfaces for the Internet of Bio-Nano Things.
- Customised Networks: Virtualisation and dynamic resource sharing, resource characterisation, provisioning, and isolation. Monitoring customised networks. Embedded trust and security mechanisms.
- Data-driven Optimisation and Management: Predictive power of Machine Learning (ML) and Artificial Intelligence (AI) techniques to effect configuration changes before adverse conditions arise. Metrics of users' experience of network. Apply in distributed, resource-constrained contexts.
- The New Operators: Intelligent dynamic management and provision of network slices across a combination of independent radio access networks. Recommendations on a policy and regulatory environment and financial framework for new operators.

CONNECT researchers have vast expertise in test and experimentation in these areas.

Research Programmes

CONNECT's researchers tackle issues of particular interest to industry. Their work includes the development of:

- Energy-efficient networks, and ultra-low-power smart sensors, and storage
- Programmable network substrates for multi-stakeholder ecosystems
- Extreme-sharing systems for Cloud-RAN architectures
- Network-aware, high performance and mm-wave radio transceiver architectures for 5G
- Quality-of-experience management for sparse, bursty data networks

CONNECT leads the ENABLE research programme which investigates ways of connecting communities to smart urban environments through the Internet of Things.

Facilities

- Pervasive Nation – Ireland's Internet of Things testbed using a Low Power Wide Area Network (LPWAN)
- Ireland's largest public data centre at TSSG in Waterford Institute of Technology
- OpenIreland - Ireland's Open Networking Testbed which enables researchers to perform end-to-end research across heterogeneous network domains, including mobile networks, optical networks and cloud computing resources
- Indoor/outdoor wireless testbeds for cellular, Cloud-RAN and SDR at Trinity College Dublin
- RadioSpace - a national facility for the development and testing of new radio technologies for the Internet of Things and 5G, based in Maynooth University

Industry and Commercialisation

CONNECT works with a wide range of industry partners on targeted projects in the areas of Internet of Things, future cellular (5G and beyond), next-generation broadband, software-defined networks and cloud-based services. CONNECT's expert researchers are dedicated to delivering outstanding results at the pace and standard demanded by industry. Several spin out companies have emerged from CONNECT research in recent years.

HOST INSTITUTION

Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

PARTNER INSTITUTIONS

MTU · DCU · Maynooth University · Trinity College Dublin · Tyndall · UCC · University College Dublin, An Coláiste Ollscoile, Baile Átha Cliath · University of Limerick, Ollscoil Luimnigh · Waterford Institute of Technology

Industry partners include:

- Accuflow
- Accessgreen
- Aeronet Global
- Ampleon
- Analog Devices
- Arris
- ARUP
- Benetel
- BlueMetrix
- Canguru
- CISCO
- Civic Integrated Solutions
- Cork City Council
- Cork County Council
- Dell EMC
- DenseAir
- Digital Canopy Technologies Ltd
- Dublin City Council
- Dun Laoghaire Rathdown Co. Co.
- Equal1 Laboratories
- Ericsson
- ESB
- Google
- Granahan McCourt
- Huawei
- IBM
- Intel
- Johnson Controls
- Kyron Street
- MACOM
- McKesson
- Nexalus
- Nokia
- Nonlinear Systems
- Predictive Control Systems
- Rambus
- Real Wireless
- Rivada Networks
- Routematch
- S3 Group
- Seagate
- Silent Sensors
- Softbank
- Synopsys
- Taoglas
- TrackNStop
- Trasna
- UTRC
- VMWare
- Westire Technology Ltd
- Xilinx
- Zeto

Education and Public Engagement:

Technology is changing the world at a rapid pace. It is vital that the public feels empowered to engage with the issues this raises. Consequently, CONNECT has a strong commitment to education and public engagement. A key focus of this outreach is 'STEAM' - using the Arts and creative practices in the traditional formula of science, technology, engineering and mathematics. CONNECT's initiatives includes the Academy of the Near Future, which introduces students and upskillers to the technology at the heart of smart cities.

Key Contacts

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Professor Dan Kilper is the Director of CONNECT at Trinity College Dublin. Starting at Bell Labs, he has had a leading role in global R&D initiatives spanning industry, academia, and government labs. His research is aimed at solving fundamental and real-world problems in communication networks, addressing interdisciplinary challenges for smart cities, sustainability, and digital equity.

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