FRIDAY 08:30 – 12:30

Integrated Sensing and Communications: Fundamentals, State-of-the-Art and the Road Ahead

SF01
EuRAD

Chair: Maria-Sabrina Greco[1]
Co-Chair: Christos Masouros[2]
[1]University of Pisa, [2]UCL

Room: Juliana 1

The emergence of applications such as smart cities, urban security, smart mobility, and infrastructure monitoring, demands next-generation networks with multi-functional capabilities beyond communication to address 6G KPIs like ultrahigh data rates, precise localization, low latency, and energy efficiency, while aligning with the UN's Sustainable Development Goals. Spectrum congestion has been a major bottleneck in the network design, and for more than a decade, spectrum sharing, co-existence and dynamic spectrum licensing has been the prevalent paradigm. The proposed Short Course overviews the emerging wireless technology of Integrated Sensing and Communications (ISAC), that is shifting the paradigm from co-existence to co-design. The timeliness of this Short Course is underlined by the global push by academia, industry, and standards bodies to incorporate ISAC into 6G and beyond. Delegates will benefit from insights into ISAC's foundational principles, practical implementation strategies, and how it underpins emerging applications like intelligent transportation, WiFi sensing, and perceptive mobile networks. It offers a comprehensive view of how ISAC technologies can address spectrum congestion, improve sustainability, and create new opportunities in wireless network design, appealing to researchers, industry professionals, and early-stage scholars. The Short Course will cover the below content

- Motivation: emerging wireless applications demanding ISAC and the potential for a sustainable provision
- Signalling design: Sensing/Communication-Centric ISAC Designs
- Signalling design: Joint waveform design for ISAC, beamforming ISAC designs, pareto framework, and hardware efficient ISAC
- Network level ISAC design and optimization
- Distributed ISAC: Synchronisation issues and solutions
- Security challenges and opportunities for ISAC, and state of the art secure ISAC techniques
- Cognitive sensing techniques for ISAC
- MIMO Radar cognitive beamforming
- Experimentation and proof-of-concept results

PROGRAMME

Short course Part A

Christos Masouros[1]
[1]University College London

Short course Part B

Maria-Sabrina Greco[1]
[1]University of Pisa