Telecom and IoT

Semester
Fall

Presentation

Learning objectives

Wireless telecommunications and Internet of Things (IoT) systems engineering is an expertise that allows future graduates to enter this booming economic sector, particularly with the emergence of massive connected objects and the deployment of 5G networks. They will have the necessary know-how to implement next-generation network technologies with high energy and spectral efficiency. They can bring their knowledge to bear on many emerging applications, especially those related to the future smart-cities and smart-homes. They will also be able to play the role of consultant for the implementation of new networks and on the technologies to choose to interconnect devices for IoT customers.

This module provides students with the fundamentals of telecommunications and a good understanding of systems, with a focus on applications, enabling them to acquire solid skills constituting digital transmission systems, especially wireless. In addition to the classical systems massively deployed to date, advanced communication systems that are considered as niche technologies, especially in relation to IoT applications, and the main challenges for the deployment of these systems will be addressed.

Description of the programme

Basics of digital transmissions:
Information processing for telecom systems
Transmission and reception techniques
Transmission medium (channel) and associated disturbances
Transmission protocols
Multi-user systems
Smart radio, smart antennas and MIMO systems
Energy consumption of systems/networks
Quantum transmission protocols and quantum cryptography
Transmission security
Future 6G networks and tactile Internet
Non-terrestrial networks: satellite (Starlink, Oneweb, etc.), HAP and UAV
Underwater communications
Marketing study, telecom market

Applications :
Wireless transmissions: mobile telephony (especially 4G, 4G+, 5G and 5G+ networks), local (Wi-Fi), wide area (WiMAX, LPWAN) and personal (Bluetooth, Zigbee...) networks
sensor networks, "smart grids" networks,...
Wired transmissions: ADSL, carrier current,...
Satellite communications
Optical communications by fiber, wireless optics (laser communications, Li-Fi, smart lighting...)
Industrial IoT and IoT for smart environments (smart city and smart home, e-health, factories of the future)
WebService and interface with the Cloud; Fog networking...

Bibliography

[1] Goldsmith, *Wireless Communications*, Cambridge University Press, 2005.

[2] A. Lapidoth, *A Foundation in Digital Communication*, Cambridge University Press, 2009.

[3] U. Madhow, *Fundamentals of Digital Communication*, Cambridge University Press, 2008.

[4] S. Dimitrov et al., *Principles of LED Light Communications: Towards Networked Li-Fi,* Cambridge University Press, 2015.

[5] M. Sakidu, *Optical and Wireless Communications: Next Generation Networks*, CRC Press, 2002.

Teaching team

Jean-Christophe Antona

Nicolas Bertaux

Thomas Durt,

Ali Khalighi, « industrial speakers »

Total des heures		**100h**
CM	Master class	50h
TP	Practical work	10h
TD	Directed work	30h
PJ		10h

Useful info

Name responsible for EU

Lead Instructor
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