COM-413

Real-time networks

Decotignie Jean-Dominique

Cursus	Sem.	Type
Computer science	MA2	Opt.
Energy Management and Sustainability	MA2, MA4	Opt.
SC master EPFL	MA2, MA4	Opt.

Language of teaching	English
Credits	3
Session	Summer
Semester	Spring
Exam	Oral
Workload	90h
Weeks	14
Hours	**2 weekly**
Lecture	2 weekly
Number of positions	

Summary

At course completion, the student will be able to analyse the real-time properties of a communication network; and will also be able to create a new solution either balancing the tradeoffs between the different design parameters or composing building blocks. Applications to multimedia, transports,

Content

1. Introduction (hierarchy in communications, motivation for networks, types of applications)
2. Requirements (delay, jitter, predictability, topology, cost, etc.)
3. Communication systems architecture and its influence on temporal behavior(OSI model, communication models, real-time paradigms : Time-Triggered vs. Event-Triggered, interworking)
4. Fieldbusses and how real-time performance assessment : FIP and CAN as examples
5. Ethernet, industrial Ethernet and real-time Ethernet
6. Wireless communications and their impact on real-time guarantees
7. IEEE 802.11 and IEEE 802.11e
8. Bluetooth, IEEE 802.15.4 (ZigBee) and wireless sensor networks
9. Real-time in wireless sensor networks

Keywords

real-time, networking, wireless, wireless sensor networks, medium access control, quality of service

Learning Prerequisites

Required courses

none

Recommended courses

real-time systems, protocols

Important concepts to start the course

Protocols and real-time system background

Learning Outcomes

By the end of the course, the student must be able to:

- master real-time techniques in wired and wireless networking
- modelling of quality of service requirements
- deep knowledge of real-time medium access control techniques

- exercize the real-time garantee evaluation techniques
- capability to design a new real-time solution

Transversal skills

- Communicate effectively, being understood, including across different languages and cultures.

Teaching methods

Ex cathedra + student presentations + exercises

Expected student activities

Learning the course material, reading, presentation and discussion of a scientific paper as an introduction to research

Assessment methods

Mid-term presentation 50% and final exam 50%

Supervision

Office hours	No
Assistants	No
Forum	Yes

Resources

Bibliography

See course URL

Websites

- http://lamspeople.epfl.ch/decotignie/
- http://moodle.epfl.ch

Moodle Link

- http://moodle.epfl.ch/course/view.php?id=10761