



UNIVERSITÀ
DEGLI STUDI
FIRENZE

DINFO
DIPARTIMENTO DI
INGEGNERIA
DELL'INFORMAZIONE

Networked Control Systems: Robustness and Resilience

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June 19, 20, 21, 22, 2017

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Recent advances in sensing, communication and computing allow cost effective deployment in the physical world of large-scale networks of sensors and actuators, enabling fine grain monitoring and control of a multitude of physical systems and infrastructures. Networked Control Systems (NCS) lie at the intersection of control, communication and computing.

The close interplay among these fields renders independent design of the control, communication, and computing subsystems a risky approach, as separation of concerns does not constitute a realistic assumption in real world scenarios.

Modern NCS, a.k.a. Cyber-Physical Systems (CPS), raise significant engineering challenges because of their scale, their need to bridge physical and software domains, and their need to operate efficiently, securely and reliably.

This class aims at illustrating innovative methods and tools for three critical sub-problems: Robustness/resilience, security and efficient resource allocation.

Tentative schedule:

- **June 19, 14:30-17:30, Aula Caminetto**
Introduction to NCS: Motivation, preliminaries, examples, first principles vs. data-driven methods for modeling, how to incorporate communication into dynamical models.
- **June 20-21, 14:30-17:30, Aula Caminetto**
Robust/resilient NCS: Estimation/control in lossy networks, cyber, physical and cyber-physical attack models, passive vs. active detection, attack detectability/identifiability, correction (resilient estimation and control).
- **June 22, 14:30-17:30, Aula Caminetto**
Design of NCS with resource constraints: Sensor scheduling/placement, event-based estimation and control.

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