Course of
"Industrial Control System Security"
2024/25

Introduction – part 1

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- **Books**

  - Fondamenti di Controlli Automatici, 4° Ed , P. Bolzern, R. Scattolini, N. Schiavoni. McGraw-Hill (Italian)

  - Modern Control Engineering, 3rd Edition, K. Ogata, Prentice Hall, (2004)

  - P. Chiacchio, F. Basile, Tecnologie informatiche per l'automazione, Mc Graw Hill, 2004

- **Slides of the lectures**

- **Prerequisites**

  - Basic classes in mathematical analysis, physics, algebra and geometry

- **Exam**

  - Written exam (also ongoing written exam)

  - Oral exam including discussion of a project report about the device of a closed-loop control system with required characteristics by using Matlab/Simulink

it.mathworks.com/academia/tah-portal/universita-degli-studi-di-napoli-parthenope-31091231.html

Università degli Studi di Napoli Parthenope

Accesso MATLAB per Università degli Studi di Napoli Parthenope

MATLAB e Simulink:

- utilizzato da oltre 100.000 aziende, dai leader del mercato alle startup
- Citati in oltre 4 milioni di pubblicazioni scientifiche

Esplora esempi reali dei risultati tecnici ottenuti dagli utenti di MATLAB e Simulink.

Ottieni MATLAB e Simulink

Entrambi sono disponibili tramite la licenza del tuo Ateneo.

Visualizza l'elenco dei prodotti disponibili

Accedi per iniziare

I dati raccolti verranno trattati secondo la nostra politica sulla privacy.

Impara le nozioni base, sviluppa le competenze

Trova il formato più adatto a te. Le risorse didattiche gratuite di MATLAB e Simulink includono corsi online interattivi, documentazione, esempi di codice e video sulle funzionalità dei prodotti.

Vedi i corsi autogestiti | Ricerca di documentazione, esempi e video

⚔ This course is an introductory course to industrial automation providing the students with the basic methods to analyze and design industrial control systems with desired characteristics.

⚔ The course is conceptually divided in four parts (after an introduction to Automation):

  ✦ Analysis of linear dynamic system in the time and frequency domains

  ✦ Key concepts in control: Negative feedback control systems, PID controllers

  ✦ Industrial sensors and actuators, Programmable Logic Controllers, Control networks

  ✦ Systems for Monitor and Supervision (SCADA) - Cybersecurity model

⚔ Laboratory activities

⚔ After the course the student will have

  ✦ The basic background on the structure of an integrated industrial control system

  ✦ Capability of modeling, analysis and monitor an industrial control system

✦ Automation is a discipline whose aim is the study of the methodologies and technologies able to reduce or completely eliminate the human intervention in applications of interest.

✦ Benefits:

  ✦ Quality

  ✦ Accuracy

  ✦ Reliability

  ✦ Repeatability

  ✦ Cost reduction

  ✦ Security

  ✦ …

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Prof. Francesco Montefusco   Industrial Control System Security, 2024/25

- Applications in most engineering domains:

  - Aerospace

  - Cars and Vehicles

  - Process industry

  - Energy storage and distribution

  - Home automation

  - Logistic
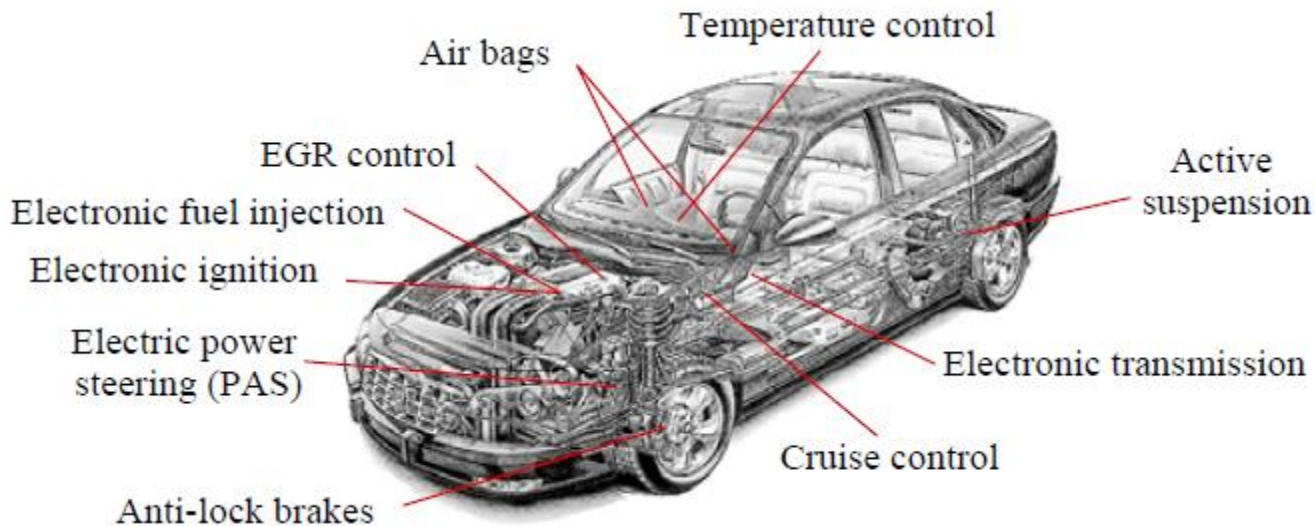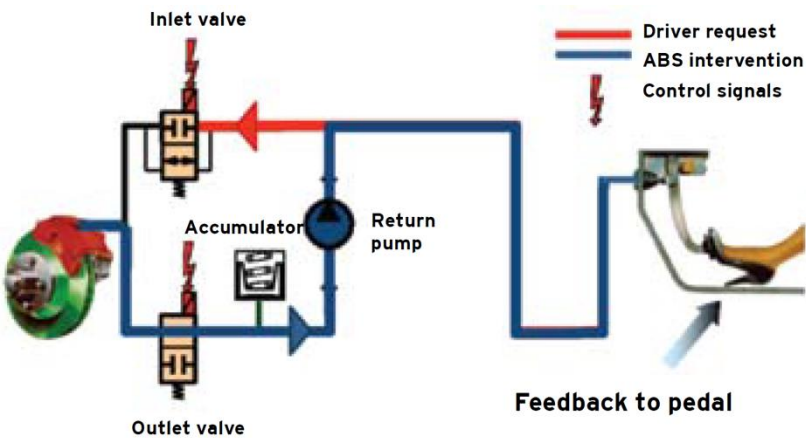
  - Biology

  - Autonomous systems and robots

  - …

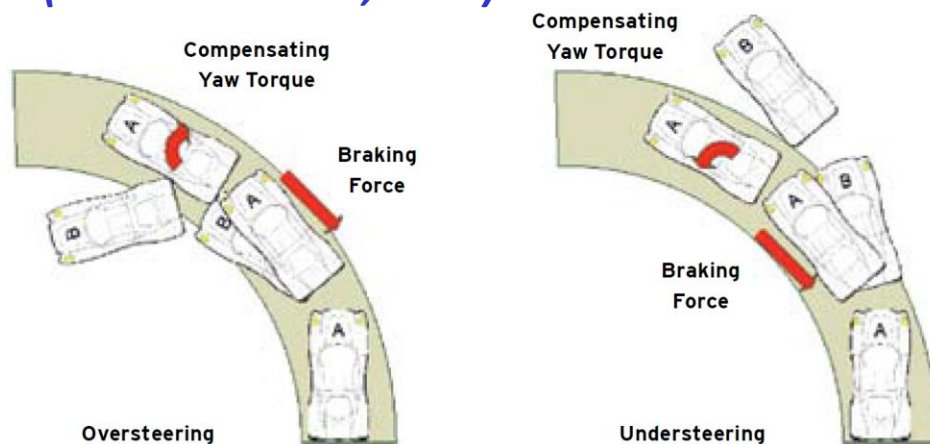**Guidance, navigation, and control (GNC)**

Temperature control
Air bags
EGR control
Electronic fuel injection
Electronic ignition
Electric power steering (PAS)
Anti-lock brakes
Active suspension
Electronic transmission
Cruise control

ABS: Antilock braking system (Bosch, 1978)

Inlet valve
Driver request
ABS intervention
Control signals
Accumulator
Return pump
Feedback to pedal
Outlet valve

ESC: Electronic Stability Control (Mercedes-Benz, 1992)

Compensating Yaw Torque
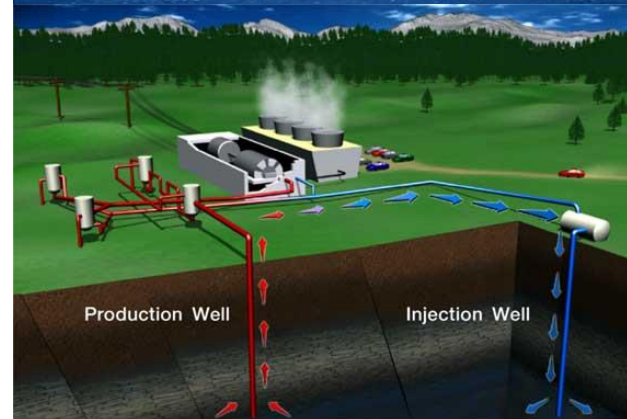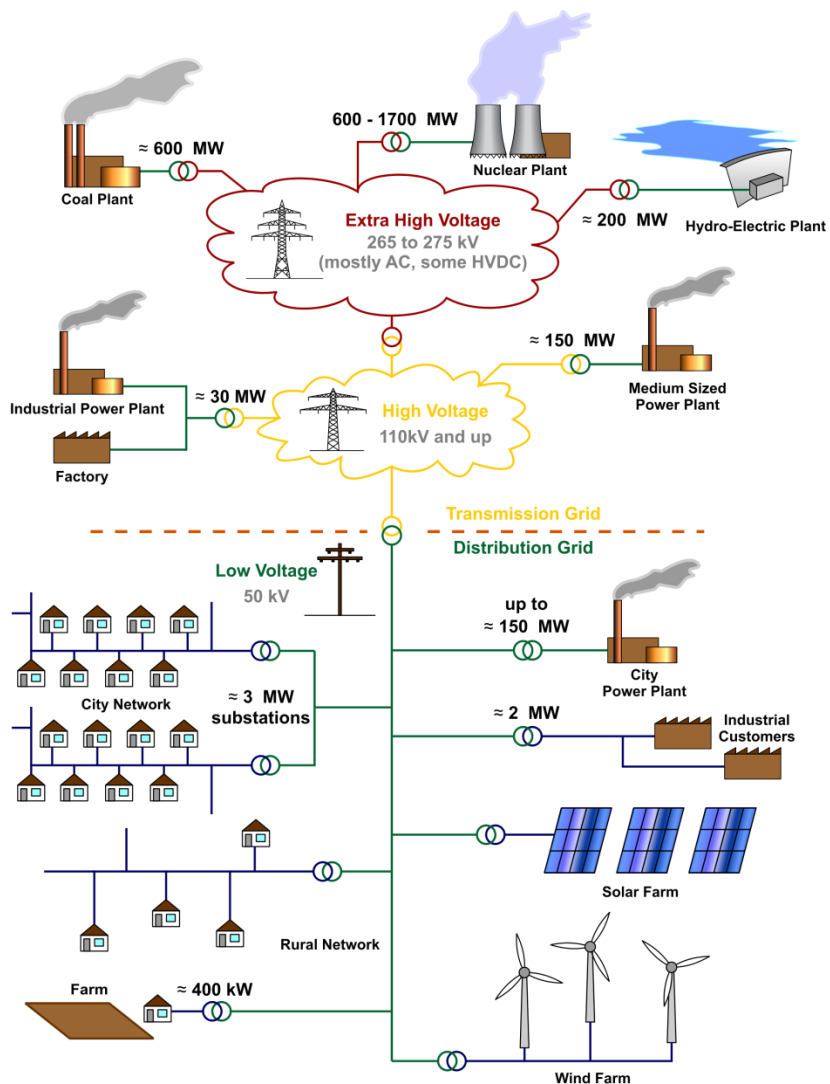Braking Force
Oversteering

Compensating Yaw Torque
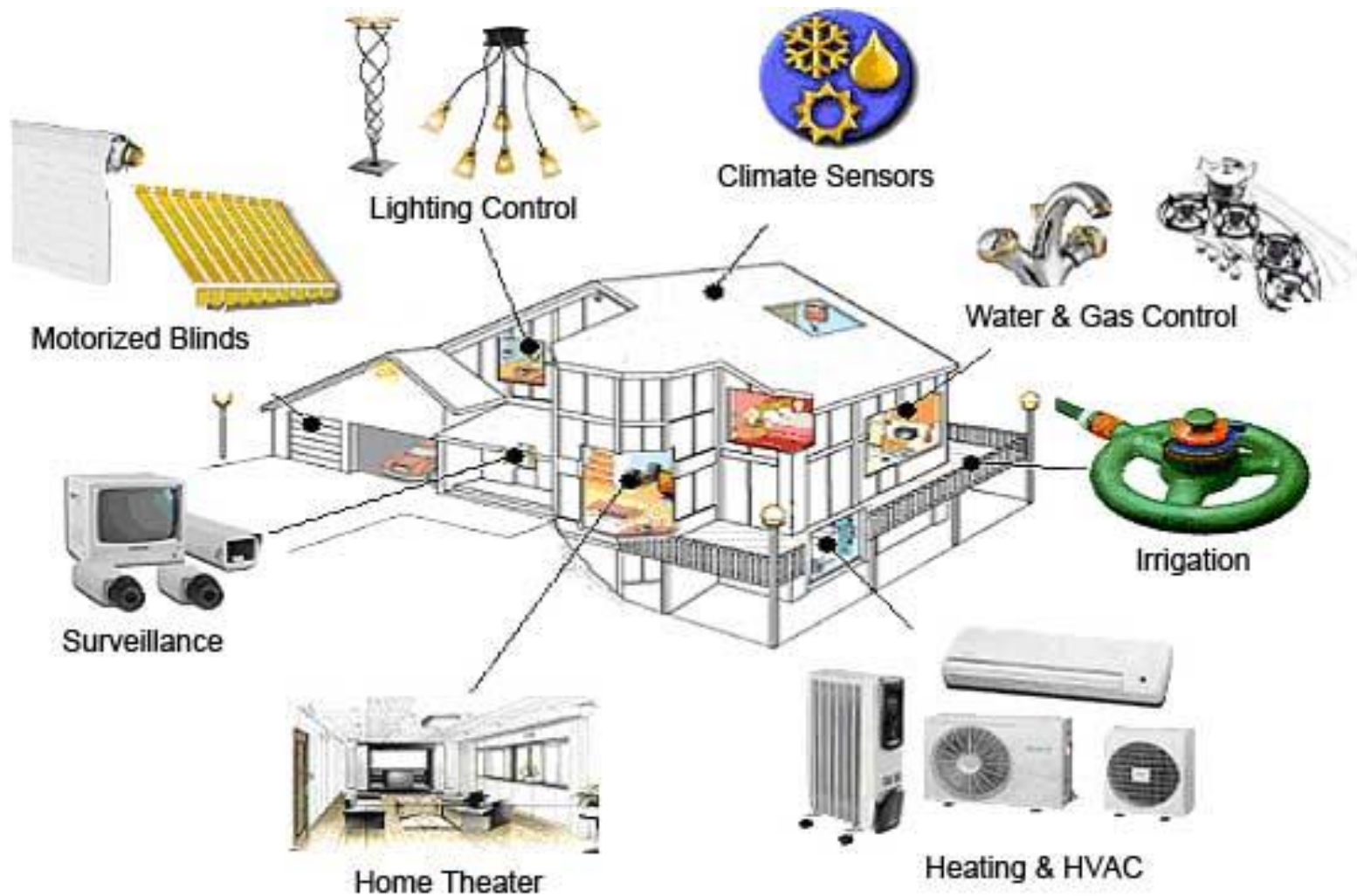Braking Force
Understeering

Energy control (power grids)

Automated storage and retrieval system

automated guided vehicle (bot)

Computer-controlled system