Design of Automatic Machinery

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Outline

• **Learning outcomes**
  • Course structure (Theory + Lab.)
  • Didactic material

• **Engineering tools**
  • CAD/CAE for the virtual prototyping of automatic machineries

• **Exam: Project-based learning**
  • Industrial case study
**LAB activity:** Develop methods and tool for **Virtual Prototyping** of automatic machines.

- **Avoid** (when possible) sequential design approaches & **tools** which are conceived for particular design problems.
- **Integrate** multi-disciplinary design tools (Also extensive use of the capabilities of commercial software).
Learning outcomes

“To provide, by means of theoretical concepts and project-based learning, the knowledge of those engineering methods required to develop a project of industrial automation: from functionality identification to the integrated design of both mechanical structure and sensory-actuation subsystem. The course is composed of lectures and lab exercises (by means of a dedicated CAD/CAE software tool)”

- **Interdisciplinary knowledge**
- **Synthesis, rather than analysis**

Generalities

- Machine architecture
- Functional Structure
- Productive parameters

Continuous Machine

Intermittent Machines
Learning outcomes

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Specific Issues

- Automatic feeding systems and related selection criteria
- Actuation system and related dimensioning

Selection and sizing of the actuation system
Learning outcomes

Essential Info:

- **6 CFU** (50% theory + 50% lab.)
- LAB: SW for integrated design!
- Continuous interaction is welcome ...

Exam:

- oral exam (3 exercises) + lab. report
- OK for exams upon request (within the limits of UNI rules)
- Possibility to integrate lab project / thesis
- Possibility for thesis abroad

Didactic material:

- BOOK (under development) is available
- For advanced CAE: video tutorials are available
Software tools:
Virtual prototyping tools

CAD/CAE for integrated design

PTC CREO

1. Kineto-Dynamic Analysis/Optimization
2. Structural design
3. Sizing of the actuation system
Software tools:
Virtual prototyping tools

1. Most advanced Simulation tool for computing motion of complex systems
2. Simulates flexible bodies during motion
3. Embedded structural design/optimization during motion
4. Simulates the actuation and control system (via Matlab integration)

CAD/CAE for integrated design
RecurDyn
http://www.functionbay.org/
Project-based learning

“CASE study taken from industry“

- Design of a sub-group of an automatic machine for packaging
- Solved via CAD/CAE tools, exactly as done in industry

WE WILL START WITH A SEMINAR FROM THE TECHNICAL DIRECTOR OF A MAJOR COMPANY

Speaker: Ing. Fulvio Pastore
G.D Spa - www.gidi.it
Possibilities for Master Thesis

Applied research @ Uni Genova or Abroad

- Integrated Design of Compliant Mechanisms.
- Integrated Design of NON-conventional Actuation Systems.
Master Thesis in Medical Robotics

www.medicalsmin.org