Advanced Robotics and Intelligent Control
Avancerad robotik och intelligenta styrsystem

ELAD16
Jorge Solis, Ph.D.
Associate Professor (Docent)
Syllabus

Learning Outcomes
Upon the completion of the course, students will be able to
- Describe fundamental issues related to advanced robotics and intelligent control systems
- Design and implement intelligent control algorithms
- Program an advanced robotic platform

Content and form of Instruction
Different advanced robotic platforms and intelligent control algorithms will be covered in lectures. Then, those concepts are illustrated through mandatory laboratory exercises where an intelligent control system on an advanced robotic platform has to be designed.

The course content includes fundamental topics on:
- autonomous robots, service robots, bio-robotics, and haptics
- advanced control, and artificial intelligent algorithms for robotic platforms
Syllabus

Course literature

Course website
http://www.kau.se/en/avdelningen-for-fysik-och-elektroteknik/courses/elad16

Additional Reference literature
Syllabus

Examination
The structure of the examination is as follows.
1. One written exam*.
2. One project assignment (see below), pass or fail.

*During the written exam, the course literature (without notes) is allowed.

Course Project
As for the course project, each team (usually composed by two or three students) is required to state a real-world problem, to propose a complete, systematic solution of the problem and to implement into an advanced robotic platform for embedded control system design which includes an ARM microprocessor, DC motors and different digital/analog sensors. A complete report for each team should be prepared where it describes the problem, the proposed methods, their implementation, and the experimental results. The report should be clearly written (using a word processor) in such a way that a reader may be able of reproduce the work from its content. The target readers are students with similar background as the course participants.

Presentation and Demonstration
The course is ended with a presentation (approximately 20 minutes) and demonstration of the course project. The oral presentations should describe the problem, the methods proposed, their implementation, and the experimental results. A Windows XP PC with Acrobat Reader and Microsoft PowerPoint and video projector will be available.
Course Content

• **1st Part: Advanced Robotics**
  – Elemental Practice with MiniWay
  – Autonomous Robots and Service Robots
  – Bio-Robotics and Haptics
  – Advanced Practice with MiniWay

• **2nd Part: Intelligent Control Systems**
  – Neural Networks and Fuzzy Logic
  – Genetic Algorithms
  – Force & Vision Control
  – Haptic Rendering
  – Advanced Practice with Falcon Novint

• **3rd Part: Project Presentation and Demonstration**
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