t.DMSY1 - Design of Mechatronic Systems 1

Person responsible for the course:	Hans Wernher van de Venn, vhns
Credits:	4
Valid for:	2010/2011
Last saved:	09.08.2010 15:02

Learning objectives:

Mechatronic systems develop from an integration of mechanical, electronic and information processing systems. Essential for the development of mechatronic systems is to achieve synergetic effects through an early integration of the three system components and the consideration and optimization of mutual dependencies. The spatial integration is carried out by the mechanical design, while functional integration is determined by information processing, respectively by design of the software.

The module Design of Mechatronic Systems 1 gives an introduction to the development of mechatronic systems and provides knowledge for the systematic and structured development to achieve a desired system behaviour.

Students will

- develop skills for the systematic and structured conceptual design and prototyping of mechatronic systems;
- learn to use system independent conceptual design methodology
- prototyping of mechatronic systems.
- learn about interfacing of mechanical systems using electrical, electronic, information technology, and mechanical components;
- learn how to use microcomputers for data acquisition from various sensors;
- learn to design real-time reactive systems, develop programming code to implement control algorithms;
- gain appreciation for key aspects of mechatronic systems, such as sampling effects, quantization effects, and importance of using real-time software;
- gain hands-on experiences in handling sensors and actuators using microcomputers through the lab exercises;

Course content:

In the first part of the module design principles and methodologies for mechatronic systems will be presented. The main question is: How do I find an optimal mechatronic system. In the second part of the module, the issue of functional integration by software is highlighted. By using the example of mobile systems practical integration of actuators, sensors, user interfaces, communication, monitoring and fault diagnosis is trained.

The course

- consists of an overview of topics in mechatronic system design, with a focus on issues important to mechanical and electrical engineers;
- lectures will introduce students to topics in structured, conceptual design, as well as to tools of optimization.
- will further examine issues of the design of sensor-actuator systems and the use of microprocessors;
- sensing, and measurements;
- actuation and actuator dynamics;
- analog and digital interfacing;
- designing reactive real-time systems;

- micro-processor technology and programming;
- application of basic control theory, including linearization and stability.

Previous knowledge:

The module requires basic knowledge in the fields of mechanics, electronics and computing, including programming of real-time systems.

Teaching method:

Type of lesson:	Number of lessons per week:
Lecture	14x2L
Tutorial/Practicum	7x4L
Group teaching	
Block instruction	
Seminar	

Assessment:

According to the table or as specified in writing by the lecture at the beginning of the semester!

Number	Type	Weighting
1	End of term exam	60%
1	Exam during the semester	20%
1	Further assessments	20%

Language of instruction:

Deutsch

Instruction material:

Systementwurf Rudolf Koller Konstruktionslehre für den Maschinenbau Grundlagen zur Neu- und Weiterentwicklung technischer Produkte mit Beispielen Springer-Verlag Berlin / Heidelberg 1998 ISBN 3-540-63037-6 Getriebelehre H. Kerle / R. Pittschellis Einführung in die Getriebelehre Teubner Verlag Stuttgart 1998 ISBN 3-519-06362-x Simulation / Mechatronik allgemein Isermann, Rolf Mechatronische Systeme, Grundlagen Springer-Verlag Berlin / Heidelberg 2002 ISBN 3-540-43129-2 Simulation / Mechatronik allgemein B. Heimann / W. Gerth / K. Popp Mechatronik Komponenten - Methoden - Beispiele Fachbuchverlag Leipzig (April 2001) ISBN 3-44621711-8

Comments:

-