

Safety Critical Control Systems Design

Content

This lab course is addressed to students who have successfully achieved their Vordiplom. During this course, we will deal with simple control engineering problems and the implementation of basic safety methods.



To be more precise, you will have to implement a freight elevator. In order to do this, a direct current motor that is dependent on the input at a control console must be triggered and controlled. The design must take into account basic safety methods (emergency off-state, safety switches, warm restart protection, fail safe,...).

For the implementation, we will provide 12 microcontroller-boards and 12 electric motors with an encoder output for rotational speed measurement. In the second half of the lab course, the design shall be transferred to another hardware platform. The respective hardware consists of ATMEL FPSLIC-chips that contain a microcontroller as well as a FPGA. The challenge here is a sophisticated distribution of functionalities on these two components considering functional and safety critical aspects (HW/SW codesign).

In order to facilitate the entry into this topic, we will arrange a two-day introductory course before the actual lab course starts. It will take place during the last week of the semester holidays (30.03. and 31.03.2006 from 8:30-13:00 each).

The prerequisite for participation is basic knowledge in the C programming language. Previous knowledge in microcontrollers and FPGAs is not required. However, you must attend the introductory course and be willing to get familiar with the topic. The FPGAs will be programmed in VHDL. Previous knowledge in this language is beneficial but is not required either.

Compared to the course Programming of embedded hardware, we will mostly focus on working with microcontrollers.

Additionally, the lab course will take place in line with an experiment where the effects of different architectures are analyzed. The attendance of this very experiment is no prerequisite for the attendance of the practical course as such.

At the end of the course, you'll have to prepare a documentation of two pages on the implemented functionality. We will provide a template for the documentation.

Schedule

- Introduction course: 30. & 31.03 2006 from 8:30-13:00Uhr each in room 2323 (attendance is a must)
- weekly schedule: Mo 16:00 - 19:00 Uhr (4 SWS) room 2323
- Capacity: 24
- Language: German (knowledge of the english language is however indispensable for reading the documentations)

Links

- [FAQ Embedded Hardware](#)
- Slides with a detailed step by step description of the design flow using WINAVR along with the AVR Studio can be found [here](#) (501kB). A short overview can be found [here](#) (10kB).
- [Introduction to Microcontrollers](#) (slides introductory course)
- [Download](#) Slides Microcontroller Basics
- [Download](#) Slides Introduction Timer
- [Download](#) Slides Introduction Interrupts
- [Download](#) WORD template documentation
- [Programming Microcontrollers extended](#)
- [Campus](#)

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