

# Introduction to Embedded Systems

## Content

Basic introduction to technologies, functions and design of embedded systems: Typical requirements, examples of product and production automation, introduction to microcontrollers, introduction to logic control with PLCs, device technology, and according tools.

## News

Date	News
03/14/2007	Grades are online. The inspection (Klausureinsicht) will be on wednesday march 21st, 1 pm in the room 2323 (exercise room).
01/30/2007	Added hardware platform selection lecture.
01/23/2007	Added FPGAs in a nutshell lecture.
01/17/2007	Major update on lecture material.
01/09/2007	Exercise 5 added.
12/13/2006	Exercise 4 added.
11/29/2006	Exercise 3 added.
11/28/2006	Added literature links.
11/21/2006	Added exercise sheets.
11/06/2006	There will be no lecture tomorrow, Tuesday 7th, because of the "Fachschaftsvollversammlung".
10/24/2006	Preleminary group assignment is finished. English group starts on October 24., German group starts on November 8th.
10/16/2006	As there will be no lecture this tuesday (17.10.), there will be no exercise this wednesday (18.10.) either. Btw: the exercise starts a little earlier (90 + 15 min.) as the time for setting up the microcontrollers has been added.

## Links

- [Forum](#)
- [Campus](#)
- [Frequently asked questions MCU](#)
- [ATmega16 Description](#)
- [All FAQs including FPGA and VHDL issues](#)

## Lecture Material

Date	Topic	Documents
2006-10-31	Organisation	<a href="#">Slides</a>
2006-10-31	Introduction	<a href="#">Slides</a>

2007-01-17	Microcontroller 1	<a href="#">Slides</a>
2007-01-17	Microcontroller 2	<a href="#">Slides</a>
2007-01-10	ADC/DAC (continued)	<a href="#">Slides</a>
2006-01-17	Microcontroller 3	<a href="#">Slides</a>
2006-01-17	Introduction to logic control	<a href="#">Slides</a>
2006-01-17	PLCs 1	<a href="#">Slides</a>
2006-01-17	PLCs 2	<a href="#">Slides</a>
2006-01-17	Function Block Diagrams 1	<a href="#">Slides</a>
2007-01-10	Function Block Diagrams 2	<a href="#">Slides</a>
2006-01-17	Instruction List	<a href="#">Slides</a>
2006-01-17	Specification and Implementation	<a href="#">Slides</a>
2006-01-23	FPGAs in a nutshell	<a href="#">Slides</a>
2007-01-09	Hardware Platform Selection	<a href="#">Slides</a>

## Exercise Material

<b>Date</b>	<b>Topic</b>	<b>Documents</b>
2007-01-09	PLC 2	<a href="#">Template file: acid dilution</a>
2006-12-13	PLC 1	<a href="#">Template File: Gas Burner</a>
2006-11-29	ADC Programming	<a href="#">lcd.h</a>
2006-11-29	ADC Programming	<a href="#">lcd.c</a>
2006-11-29	ADC	<a href="#">Exercise 3</a>
2006-11-15	Timers	<a href="#">Exercise 2</a>
2006-11-15	Interrupts	<a href="#">Exercise 2</a>
2006-11-08	General MCU Introduction	<a href="#">Exercise 1</a>

## Exercises

<b>Date</b>	<b>Topic</b>	<b>Documents</b>
2007-01-09	PLC 2	<a href="#">Exercise 5</a>
2006-12-13	PLC 1	<a href="#">Exercise 4</a>
2006-11-29	ADC Programming	<a href="#">Exercise 3</a>
2006-11-21	General introduction to ATmega16	<a href="#">Exercise 1</a>
2006-11-21	Interrupts and Timers	<a href="#">Exercise 2</a>

## Conditions for getting a certificate (Übungsschein)

Participation in the exercises on a regular basis followed by an exam at the end of the semester. During the first half of the exercises, students will work with the ATMEL [ATmega16](#) AVR microcontroller (8bit RISC). In the second half, students will learn about PLCs (Programmable Logic Controllers).

## Microcontroller Part

- The software we are using is Freeware. Since the Atmel Studio also offers a simulator (running in simulator mode as soon as no device is connected) you can experiment with it at home.
- You need [WINAVR](#) and the [AVR studio 4](#). A local copy of the WIN AVR Studio used in the lab course can be found [here](#).
- 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).
- More information can be found on [atmel.com](#) and in the according sections of Falk Salewski's Link List.

## Programmable Logic Controller (PLC) Part

- [CoDeSys](#): Softwaretool for programming & simulating PLC software

## Exercise Schedule