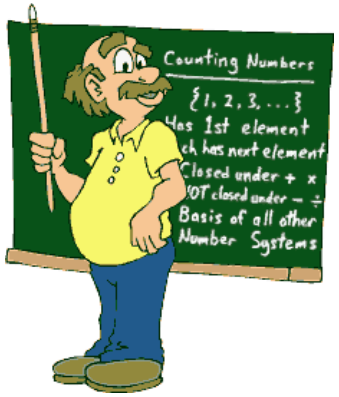
IECA

Embedded Computer Architecture

Lesson 1: Course introduction



Version: 27-10-2015, Henning Hargaard

Lecturer

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Motivation

- Microcontrollers are widely used in smaller embedded systems controlling the system functionality.

  This course gives you a basic understanding of the internal architecture of a typical microcontroller.
  It also teaches you how to program the microcontroller (in C and assembly) and how to interface it to other systems or subsystems.

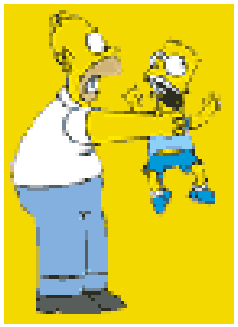
  The course gives you knowledge to use microcontrollers in various projects and to study more advanced microcontroller courses.

Learning Objectives

When the course is completed, the student is expected to be able to:

- Describe the internal architecture of a microcontroller.
- Describe processor busses and memory organization.
- Implement and test assembler programs
- Implement and test C programs.
- Explain stack usage and common principals for parameter passing.
- Implement and test drivers for basic I/O interfaces.
- Use methods for asynchronous serial communications.
- Analyze basic CPU scheduling (including interrupts).
- Use hardware timers and A/D converters.
- Describe the external interface of a CPU: I2C / SPI / UART etc.
- Use methods for program surveillance.

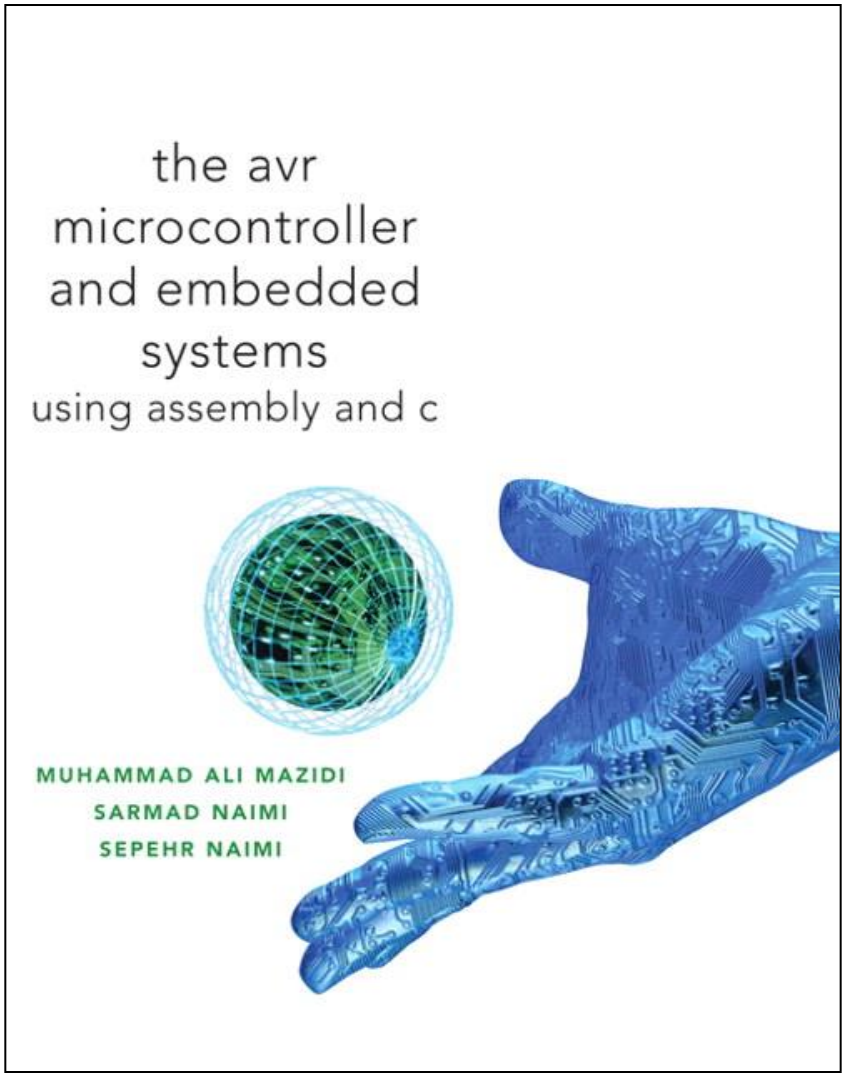
Examination: Multiple Choice, 7-scale mark.



Contents

- Atmel AVR arkitektur (Mega32).
- Atmel STK500 and AVR Studio.
- WinAVR GCC Compiler.
- Parallel ports.
- Stack and parameter passing.
- Serial communications (UART).
- Interrupts.
- Timers (Normal, CTC and PWM modes).
- A/D converting.
- Program surveillance (Reset and Watchdog).
- Intercomponent busses

Textbook



The book use the Atmel microcontroller AVR Mega32.

Starts using assembly language.

Later on programming will use the C language.

You are expected to have prepared (reading appr. 20 pages) **BEFORE** each lesson.

Tools and books

- STK500 Starter Kit + power supply + USB/seriel-adaptor (buy in the book store).
- Atmel Studio 6: Assembler + debugger + C compiler (free, available at Campusnet).
- Text book: Mazidi: ”The AVR Microcontroller and Embedded System”.
- ”Summary from the Mega32 manual” (book store).
- Databook for the Mega32 microcontroller (pdf, Campusnet).

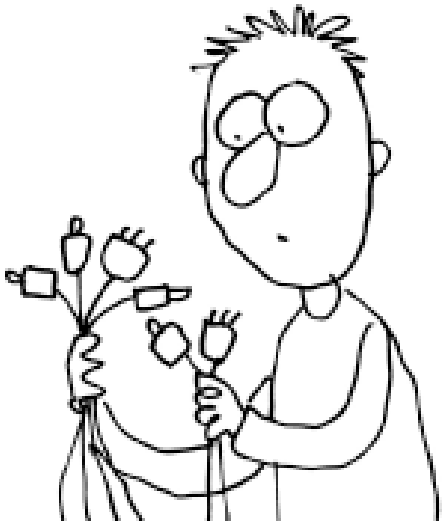
- Various manuals at Campusnet (pdf).
- LAB exercises at Campusnet (pdf).

STK500 Evaluation Board

- STK500 starter kit (sold in the IHA book store):
  Contains sockets for various types of AVR microcontrollers. Interfaces to a PC, enabling programming of the microcontroller.
  OBS : Power adaptor does not come with the kit – but can be bought in the IHA book store !
  (10 - 15V DC, 500 mA min.)

How do we laern all this ?

- Reading the text book.
- Having lessons at the class.
- **Doing LAB exercises !**



Experience tells that ”**learning by doing**” is very efficient !

End of lesson 1

Always check the IECA Blackboard site !

Questions / comments ?