Lab Course Microcontroller Programming

WS2011/12

Preparatory meeting, 25.07.2011

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"An-Institut" of TU München

"Ein An-Institut ist eine organisatorisch sowie rechtlich eigenständige Forschungseinrichtung, die einer deutschen Hochschule angegliedert ist. [...] Geleitet wird es oft von einem oder mehreren Professoren [...].“ (Source: Wikipedia)

Research in the area of software intensive systems
- Embedded and distributed systems, industrial automation
- Information systems

Cooperation with TU München
- We offer lab courses and lectures
- Possibility for Bachelor/Master/Diploma theses and Hiwi positions
Lab Course Microcontroller Programming: Important Facts

- Modules: IN2106, IN4083 (“Master-Praktikum”) → for Master and Diploma students
- ECTS: 10.0, 6 SWS
- Registration: via TUMonline
- Time: Thursday, 13:15 – 17:45
- Room: MI 03.05.012 (“Praktikumsraum”)
- First issue: Thursday, 20.10.2011, 13:15 – 17:45
- Website: http://www6.in.tum.de/Main/TeachingWs2011MikrocontrollerPraktikum
Lab Course Organization

- Working in **groups with 2 people each**
- Workstation with necessary software and microcontroller equipment is provided
- **Questions may be asked** during normal lab course hours and personal assistance will usually be available
- Possibility to go to lab course room during any time (you have to ask someone to open you the door however)
- Equipment (microcontroller, etc.) **can be lent** if used outside of the normal lab course hours (but you have to sign for it and pay for lost components)
- Please do **not** take lent equipment with you at home
Lab Course Exercises

□ Usually **one exercise sheet per week**, but solutions may be delivered at any later point in time
  ▪ not necessary to solve them within the respective week
  ▪ but it’s recommended

□ Mandatory and optional exercises
  ▪ Optional exercises can be solved if time and motivation permits

□ Exercises **build up to top of each other**
  ▪ In general, don’t expect to be able to solve a later exercise before solving the previous ones

□ Solutions should be sent to me via e-mail

□ Full sample solutions available as soon as all groups have delivered their solutions
Lab Course Passing Criteria

- Attendance of lab course sessions
  - Full-time attendance **not** required however, it’s fine if you’re there for some time

- Functionality and elegance of your solutions

- Quality of documentation

- If a mark is required instead of just passed/not passed, the solutions will be rated individually (please tell me in advance)
  - Solving optional exercises might give bonus points
Hardware and Software

- **Hardware:**
  - ATMEL AVR Atmega168 microcontroller (8bit, 16MHz)
  - ATMEL STK500 development board
  - Various sensors and actuators

- **Software:**
  - ATMEL AVRStudio 4
  - WinAVR compiler (avr-gcc)
  - Serial programming
Content (1)

- Introduction
  1. Digital I/O
  2. UART Communication
  3. Interrupt Handling
  4. Timers and PWM
  5. Motor Speed Control
6. DCF77 Time Signal
7. Digital Sensors
8. Liquid Crystal Displays
9. Communication Protocols
10. Analog Signal Acquisition
11. Microcontroller Periphery

<table>
<thead>
<tr>
<th>Slave Address</th>
<th>Function Code</th>
<th>Data</th>
<th>CRC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 byte</td>
<td>1 byte</td>
<td>0 up to 252 byte(s)</td>
<td>2 bytes</td>
</tr>
</tbody>
</table>

CRC: CRC Low, CRC Hi
Lab Course Dates

- 20.10.2011 ✓ Ex.01
- 27.10.2011 ✓ Ex.02
- 03.11.2011 ✓ Ex.03
- 10.11.2011 ✓ Ex.04
- 17.11.2011 ✓ Ex.05
- 24.11.2011 ✓ Ex.06
- 01.12.2011 ✓ Ex.07
- 08.12.2011 ✗ Dies Academicus
- 15.12.2011 ✓ Ex.08
- 12.01.2012 ✓ Ex.09 (1)
- 19.01.2012 ✓ Ex.09 (2)
- 26.01.2012 ✓ Ex.10
- 02.02.2012 ✓ Ex.11 (1)
- 09.02.2012 ✓ Ex.11 (2)
Things to Prepare

☐ Think about grouping

☐ Introduce yourself to the basics of microcontroller programming in C, for example at (German only): http://www.mikrocontroller.net/articles/AVR-Tutorial

☐ Invite your friends to join the lab course (12 participants max however)
Kontakt

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