



**Technische Universität
München**

**Fakultät für Informatik
Forschungs- und Lehrinheit Informatik VI
Robotics and Embedded Systems**

**Lab Course
“Microcontroller Programming”**

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Introduction

Content Overview

1. **Introduction:** Organizational issues, microcontroller basics, AVRStudio IDE
2. **Simple I/O:** Digital input and output, LEDs and switches
3. **Serial Communication:** Simple serial communication
4. **Interrupts:** Interrupt service routines, enhanced serial communication
5. **Timers:** Timers and timer resolution, prescalers, pulse-width modulation (PWM)
6. **Motor Speed Control:** Driving a DC motor, simple control tasks
7. **DCF77 Time Signal:** DCF77 purpose and history, signal encoding
8. **Digital Sensors:** Proprietary communication protocols, temperature sensors
9. **Liquid Crystal Display Modules:** SPI communication protocol, LCDs
10. **Analog Signal Acquisition:** Analog/digital converters (ADCs)
11. **The Modbus Protocol and Wired Sensor Nodes:** Modbus over serial line
12. **Distributed App. using the Modbus Protocol:** Acquiring data from a sensor network
13. **Microcontroller Periphery:** Simple microcontroller circuits (2 sessions)

Organizational Issues

Organizer

Name	E-mail	Room	Telephone
Michael Geisinger	geisinge@in.tum.de	03.07.042	(+49 89 289) 18111

General Conditions

- Only participants that regularly attend the lab course will receive a certificate.
- Your solutions must include appropriate documentation!
- Expect to be asked some questions about your implementation.
- Save each of the solutions to the exercises in this lab course as a separate *AVRStudio* project and send all the projects together with the answers to the questions to <geisinge@in.tum.de> (subject: “[MCP] Group <GroupNumber>, Exercise <ExerciseNumber>”).
- If you want to work beyond the regular lab course hours, fetch the hardware from room 03.07.042 office, sign your name on the list of borrowed hardware and bring the hardware back when you leave. Do not take the hardware home with you.

Materials

You can find the most recent versions of the materials for the lab course at the network share P:\. The network share Z:\ is your personal home directory where you should store files related to the exercises.

