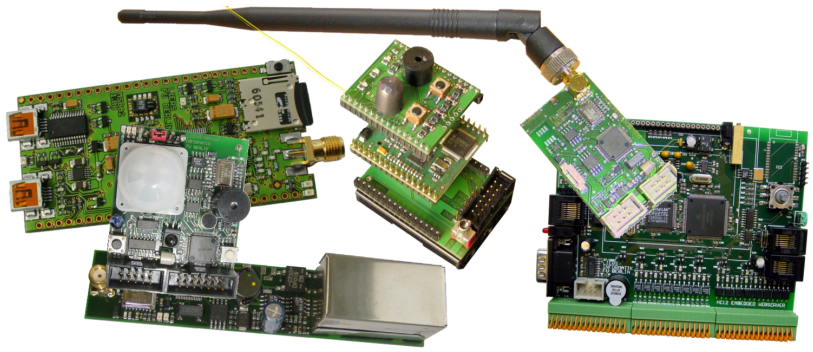


19589 - PS Telematik-Projekt: Wireless Embedded Systems

Course Introduction

Bastian Blywis

Department of Mathematics and Computer Science
Institute of Computer Science
15. April, 2009

Outline

1. About the Course
2. Course Requirements
3. Required Skills and Knowledge
4. Schedule
5. Wireless Sensor Networks
6. Task
7. Detailed Schedule
8. Equipment and Documentation
9. What you will learn

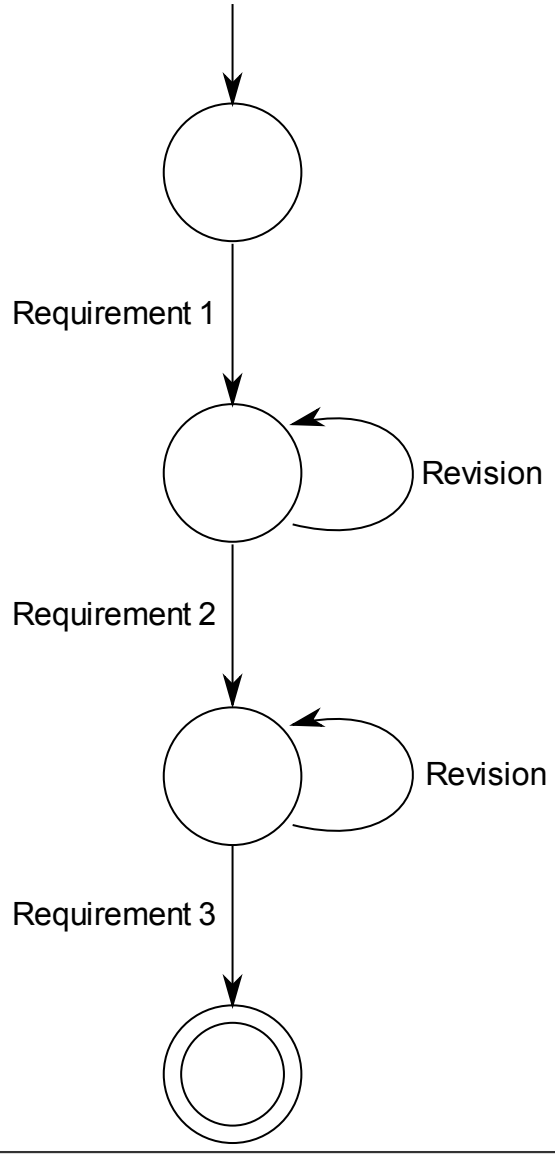
About the Course

- Prerequisite: Bachelor or Vordiplom
- Supervised lab course
- Half of work to be done outside of lab hours
- Projectseminar → Choose the type of your “Schein”
- ECTS-Credits: 10
- Task given at start of term
- Two students per team

Michael Faraday in his laboratory at the Royal Institution.
From a painting by Harriet Moore.

Course Requirements

- No exam
- No talk/presentation
- Develop software to solve task
- Evaluate software via experiments
- One written technical reports, min. 7 pages
- Mandatory attendance in lab hours
- Minimum of 150 work hours (150 h/14 ≈ 10.71 h)
- Meet deadlines
- Revision of report as necessary
- Collaborative oral exam

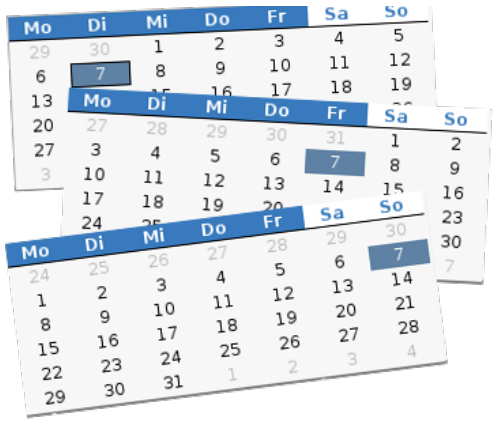


Required Skills and Knowledge

- Lecture *Telematics*
- Lecture *Mobile Communications*
- Protocols and Protocolstacks
- Basic OS related knowledge
- Programming in C
- Doxygen
- Subversion
- LaTeX2e

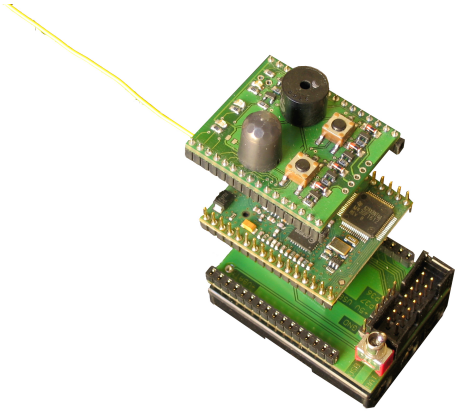
Schedule

- April 15th, 2009
  - Course introduction
  - Team forming
  - Introduction to the ScatterWeb^2 firmware
- April 22nd - July 15th, 2009
  - Supervised lab hours
- April 15th, 2009
  - Deadline for technical report and source code



Time: 14 weeks total

- Spatially distributed autonomous devices
- Equipped with various sensors
- Cooperative monitoring and computation
- Origin: military
- Embedded systems: pervasive, ubiquitous
- Wireless ad-hoc networks
- Network size: from a dozen to 10,000 nodes

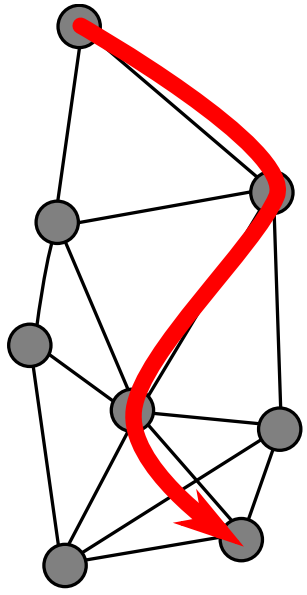


MSB-430 Wireless Sensor Node

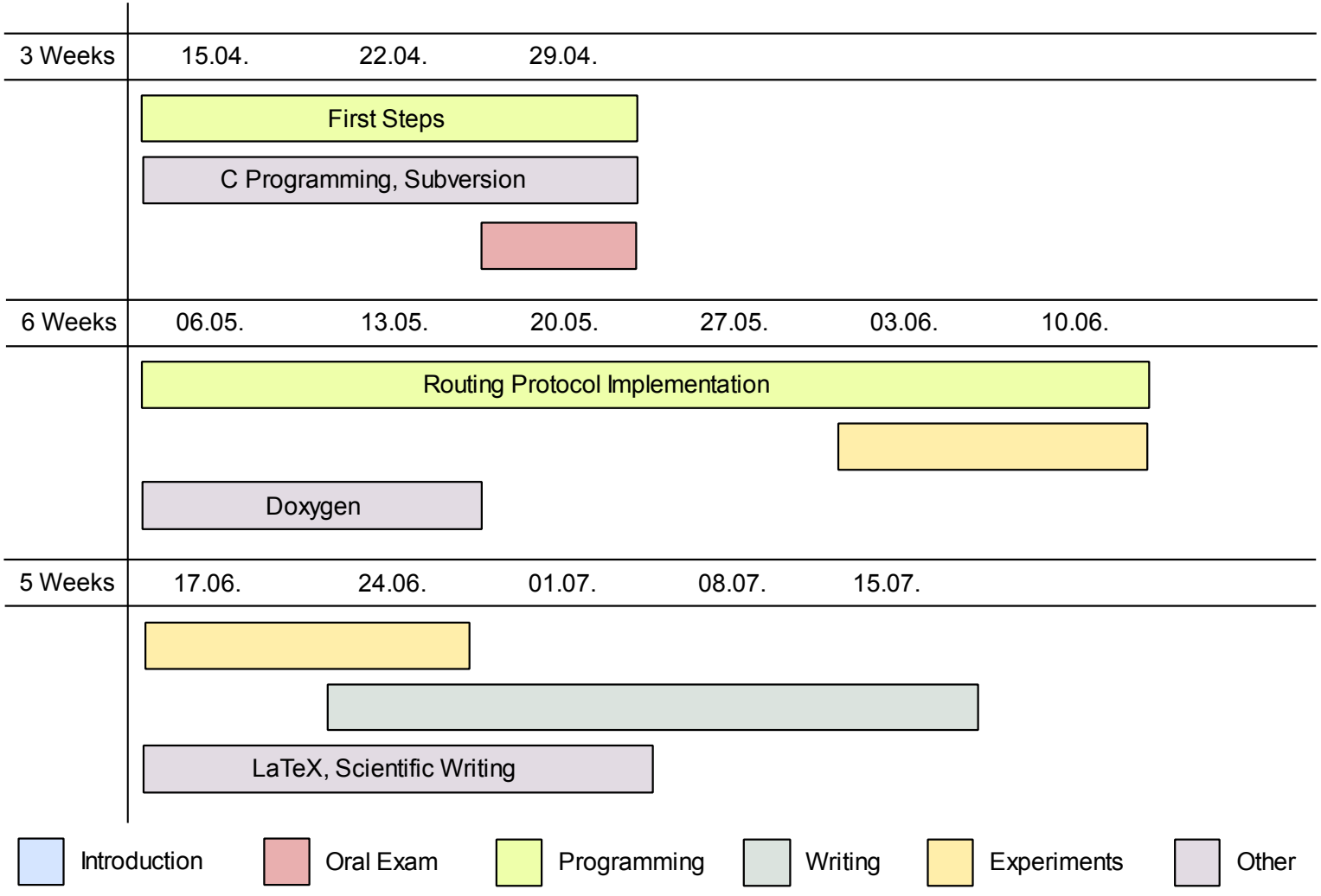
Sorry, no Linux based mesh routers this term.

Routing layer

- Implement a routing protocol (will be specified)
- Setup testbed to evaluate implementation
- Measure performance of implementation
- Write technical report containing:
  - Description of the routing protocol
  - Description of the implementation
  - Test scenario description and discussion
  - Data evaluation and discussion
- Submit source code via repository



Detailed Schedule



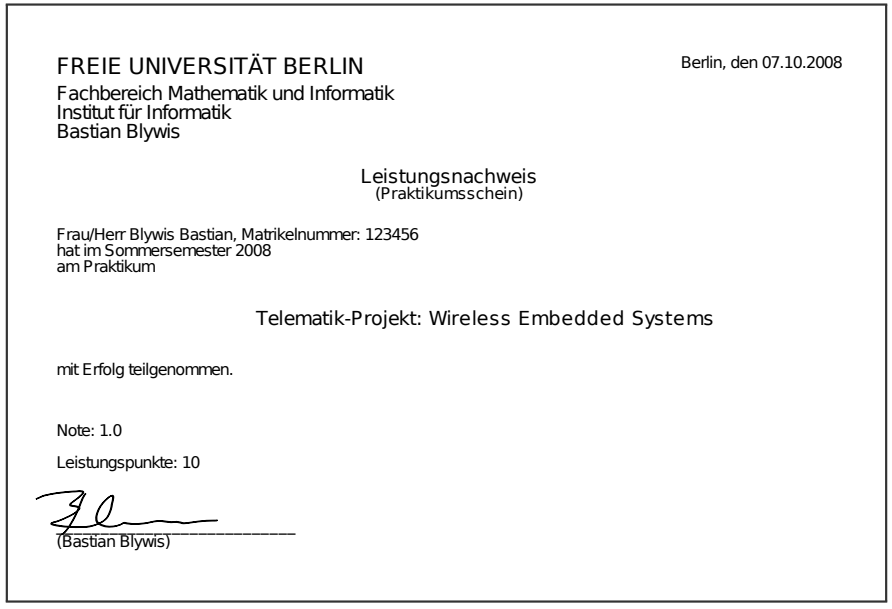
Equipment and Documentation

- Barebone ScatterWeb^2 operating system
- Open source compiler toolchain (MSPGCC)
- Sensor nodes, cables, and flash interface
  - Lent for the whole semester
  - Do not lose!!!
- Protocol specifications, introductionary documents

What you will learn

- Embedded system programming
- Routing protocol implementation
- Evaluation by experiment using test scenarios
- Technical writing

→ Preparation for your Diploma/Master thesis.



FREIE UNIVERSITÄT BERLIN
Fachbereich Mathematik und Informatik
Institut für Informatik
Bastian Blywis

Berlin, den 07.10.2008

Leistungsnachweis
(Praktikumsschein)

Frau/Herr Blywis Bastian, Matrikelnummer: 123456
hat im Sommersemester 2008
am Praktikum

Telematik-Projekt: Wireless Embedded Systems

mit Erfolg teilgenommen.

Note: 1.0

Leistungspunkte: 10

(Bastian Blywis)

The Last Slide™

Thank you for your attention.

Questions?

Tools and Documents

Tools

- Doxygen
- LaTeX
- MSPGCC
- Subversion

Documents & Papers

- Building Protocol State Machines in UML 2 (UML 2 For Dummies)
- Highly Dynamic Destination-Sequenced Distance-Vector Routing (DSDV) for Mobile Computers
- Mobile Communications Script
- RFC 3626 (OLSR)
- RFC 4728 (DSR)
- RFC 4960 (SCTP)
- ScatterWeb API

Books and Articles

Books

- The C Programming Language, 2nd Edition. Prentice Hall PTR
- Design and Validation of Computer Protocols (ISBN-13 978-013539925)
- C - kurz & gut (ISBN-13 978-3897212381)
- Latex kurz & gut (ISBN-13 978-3897212046)

Articles (online)

- ANSI C Reference Card
- The C Book
- C Elements of Style
- Everything you need to know about pointers in C
- Frequently Asked Questions in comp.lang.c (C FAQ)
- FMM - Frequently Made Mistakes [in technical writing]
- Memory Management in C

- William Strunk, Jr. - The Elements of Style [in technical writing]
- Byun - A Tool Support for Design and Validation of Communication Protocol using State Transition Diagrams and Patterns
- Darroch - Implementing Protocol State Machines
- Schmidt, et al - LaTeX2e-Kurzbeschreibung
- McKinney - TCP/IP State Transition Diagram