Project Rules

HIS/Basys - Smart Sensor Networks Systems Rules

Prof. Dr. Matthias F. Wagner / M.Sc. Dipl.Inf (FH) Rainer Konrad
Research Group WSN and IOT
Summer Semester 2018

1 Introduction and Requirements

Smart Sensor Network Systems are a base technology for the *Internet of Things (IOT)* and *Cyber-Physical Systems*!
This course is a **project** with a semester workload of 150h!!! The emphasis is on practical and self-reliant work of all students. Subgroups of 4 students each have to work on an assigned project. Each group must communicate with the supervisors via a Moodle forum. Attendance of the project meetings is **mandatory**! The following has to be provided by every...

- Student:
  - An individual talk on an assigned theoretical exercise
  - Practical exercise solutions
  - Voluntary talks on various related topics
- Group:
  - A project estimation of the assigned project
  - A working final project solution
  - Weekly project reports

1.1 Registration for the Course

You need to **enrol** to the course on the **HIS platform**[1]. See section 1.3 for deadlines.

1.2 Grading Scheme

Each student will be graded based on the following factors:

- Practical exercises (2 x 10%)
- Individual talk/presentation 20 min. (20%)

[1] https://his-www.dv.fh-frankfurt.de/

- Weekly reports (6 x 5%)
- Proposal (5%)
- Project (25%)
- Voluntary talks (5%)

1.3 Course Timetable

- 3rd - 16th April 2018
  - **Registration/sign-off on the HIS platform is opened**
- 13th April 2018
  - Introduction
  - Distribute sets with nodes
  - Distribute exercise sheets
  - Assignment topics for Student presentations
- 19th April 2018
  - Practical exercise 1 submission deadline
- 20th April 2018
  - Practical exercise 1 demonstration
- 26th April 2018
  - Practical exercise 2 submission deadline
- 27th April 2018
  - Practical exercise 2 demonstration
  - Group and project assignment
- 4th May 2018
  - Project proposal demonstration
- 11th May 2018 - 6th July 2018
  - Submission of weekly reports (the last working day before each lecture)
- 22th June 2018

  - Deadline project documentation

- 25th 2018 - 6th July 2018
  - Final project presentations and examinations

2 Requirements for Individual Talks/presentations

Your talk should be lively and interesting to make the seminar as successful as possible for all participants. The audience of your talk and report are colleagues with a background in Computer Science, not lay persons. They must be able to learn from your talk and report. Both must enable a listener to get an accelerated start working in the field of the project. A few formal rules will help:

2.1 Formal Rules

- Duration of a talk 20-25 minutes
- Language: English
- Number of slides: approximately 7 to 10 slides
- Slide contents: Key words and sentences, graphical displays, pictures. **Not copies of your report!**
- Please check the visibility in large and bright rooms!
- Make sure that your equipment can interface with the beamers!
- Talks should be accompanied by a short report of at least 4 pages, to be submitted as PDF. Upper bound of pages may vary with task!
- Literature references, **wikipedia is NOT a scientific referece!**

3 Project Proposal

The newly formed subgroups have to write a project proposal:

a) Project vision

b) List of functional and non-functional requirements

c) Safety, security and reliability requirements

d) Project plan

i) Project estimation
ii) Project scheduling
iii) Project organization
iv) Responsibilities of all team members
v) Project risk analysis

e) Safety and security plan

f) Setup and description of the development environments

g) Literature references

4 Project Reports

A report deepens the understanding of the topics discussed in the talk. Reports are the most important means to transfer information in your future workplace, i.e. in a company, during a conference, in a research lab. For reports some formal rules also apply.

4.1 Weekly Reports

- Language: English
- Electronic format: PDF

4.1.1 Content

- Group name
- Topic name
- From **each** student:
  - Full name
  - Weekly progress (**everything** you have done for the project since the last lecture)
  - Expenditure of time

4.2 Final Report

- Length of report: 15 pages
- Language: English
- Electronic format: PDF

4.2.1 Content Rules

The principal structure of your report could be like:

- Group members with ID and their roles and contributions! Everybody must take responsibility for a task!
- Type and number of the SSNS set
- Table of contents
- List of figures
- List of images
- List of tables
- Introduction and Motivation
- Hardware and software used, including tools
- Elaboration
- Conclusion
- Appendix
- References
- Glossary

Please: In your own interest use an appropriate system to write the report! Your are working towards a Master of Science degree. In all natural and engineering sciences an Office product is **not** an appropriate system. A good recommendation is LaTeX! This system is used extensively in Computer Science, Physics and Mathematics. All major scientific journals accept LaTeX- code. Many good science books are written with LaTeX!
Quotations and the list of references should follow the general scientific standards. You can find them in good science books. Look into the IEEE-Guidelines for further details.

5 Final Presentation and Demonstration

The final presentation and demonstration should be 20 minutes long. It must contain :

- Technical information only (express your idea technically and not in an abstract marketing sense)

- Application Idea : overview of what you wish to achieve
- Architecture of project: hardware
- Architecture of project: software (you should show the software architecture using UML diagrams)
- Architecture: network structure
- Tool chain : all the software you used to develop your system and how you configured it.
- Results and demonstration
- Reliability : is the whole system that you've built reliable? An easy way to calculate reliability is to run your system 10 times to see how many times it failed.
- Statistics : if your system is measuring something then it makes sense to apply statistics on it. Measured values will have a mean, standard deviation and will have an error. Measured values will have a confidence interval and prognosis interval. These are just guidelines, you can choose to apply whichever statistics you wish to.

6 Project R&D

This is the main part!
The project requires a lot of activities:

- Literature research, especially in the IEEE Digital Libraries, i.e. IEEE Xplore, ACM Digital Library, but also in books, journals, etc.
- Basics of measuring science and technology
- Basics of data acquisition
- Basics of scientific data visalization and analysis
- Software installation, e.g. development system, tool chain ...
- Hardware installation
- Interface definition, e.g. USB/UART, Wifi, Bluetooth
- Wireless Sensor Networks (WSN) topology
- IEEE 802.15.4/Zigbee protocol

- IEEE 802.15.1 Bluetooth
- WSN setup
- WSN interfacing to computer or smartphone
- IT-security aspects
- **Design and operation of a running and reliable WSN with computer and/or smartphone for data visualization and analysis!**