inf334 - System Level Design

<table>
<thead>
<tr>
<th>Module name</th>
<th>System Level Design</th>
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<tr>
<td>Module code</td>
<td>inf334</td>
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<tr>
<td>ECTS credit points</td>
<td>6.0 KP</td>
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<tr>
<td>Workload</td>
<td>180 h</td>
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**Used in degree programmes**
- Master's Programme Computing Science > Mastermodule
- Master's Programme Engineering of Socio-Technical Systems > Embedded Brain Computer Interaction
- Master's Programme Engineering of Socio-Technical Systems > Systems Engineering

**Contact person**
- module responsibility
  - Kim Grüttner
  - Die im Modul Lehrenden

**Prerequisites**

**Skills to be acquired in this module**

**Professional competences:**
The students:

- Ability to describe and analyze system components and architectures using system level description languages SpecC and SystemC
- Capabilities for partitioning and parallelizing of applications

**Methodological competences:**
The students:

- Knowledge of refinement and transformation techniques for transferring an initial specification into a real implementation
- Knowledge of the phases of a system-level design flow
- Knowledge of current design methods and tools in system level design
- Knowledge about formal models of computation of specification languages
- Knowledge of current research results and trends in system level design
- Capabilities for partitioning and parallelizing of applications
- Ability to evaluate and explore design decisions
- Ability to implement a complete system design-to-implementation specification

**Social competences:**
The students:

- Implement solutions of given problems in teams
- Discuss their outcomes appropriately

**Self-competences:**
The students:

- presentation skills
- reflect their solutions by using methods learned in this course
Module contents

The ever-increasing integration densities of integrated circuits enable the implementation of increasingly powerful and complex systems. This can be on the one hand the integration of several sub-components on the same chip (system-on-chip) or on the other hand the implementation of more powerful algorithms. However, traditional design techniques are hardly able to cope with the increasing complexity of today's embedded systems. Therefore, in research and practice efforts through new methods and tools, there is a significant increase in productivity in the design process, thus closing the so-called "design productivity gap". This is achieved, for example, by a stronger abstraction, in which the behavior of components is described only at the algorithmic level and is automatically translated into hardware or software implementations by high-level synthesis techniques. The final system implementation is achieved by means of a structured refinement and exploration processes. Throughout this refinement flow, system properties (for example, timing, energy consumption, chip area and costs) are estimated on each abstraction level and guide the designer in the iterative decision process. By means of techniques such as virtual prototyping, entire systems can be simulated and verified on each refinement layer, even without the availability of a full implementation for all system components.

This module builds on the modules Embedded Systems I and II, deepens the knowledge acquired there for the design of hardware/software systems and expands them with current methods and tools. With SystemC, a language is presented that is already widely used in industry and research for the design and verification of hardware/software systems and supports several abstraction levels from clock cycle accurate hardware description, over transaction level models to process based functional specifications.

Recommended reading

Suggested reading:

Main textbooks:


Optional books:


Additional reading material posted on Stud.IP

Links

https://www.uni-oldenburg.de/informatik/ehs/lehre/vorlesungen/system-level-design/

Language of instruction

English

Duration (semesters)

1 semester

Module frequency

once a year

Module capacity

Unlimited

Modullevel

AS (Akzentsetzung / Accentuation)

Modulart

Pflicht o. Wahlpflicht / compulsory or optional

Lern-/Lehrform / Type of program

V+Ü

2 / 3
**Vorkenntnisse / Previous knowledge**
- inf200 Grundlagen der Technische Informatik,
- inf201 Technische Informatik,
- inf203 Eingebettete Systeme I,
- inf204 Eingebettete Systeme II

<table>
<thead>
<tr>
<th>Examination</th>
<th>Examination periods</th>
<th>Type of examination</th>
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<tbody>
<tr>
<td>Final exam of module</td>
<td>at the end of the lecture period</td>
<td>hands-on exercises and oral exam</td>
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<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Course frequency</th>
<th>Workload attendance</th>
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<tr>
<td>Lecture</td>
<td></td>
<td>2</td>
<td>SumSem</td>
<td>28 h</td>
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<tr>
<td>Exercises</td>
<td></td>
<td>2</td>
<td>SumSem</td>
<td>28 h</td>
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**Total attendance time for module**: 56 h