

Transforming Abstract Behavior Models of Control Paths

Motivation

Within the automotive industry, mapping of functionalities is increasingly carried out via electronics nowadays. This causes an increasing complexity concerning software development for embedded systems. One approach for facing this complexity is model-based software design. Models of the software system are enhanced to program code step-by-step. Design errors can be detected and corrected at an early stage using these models. In order to develop model-based software, it is required to have models of the environment and the affected systems that comply to the software models. In the case of currently applied models, developers are merely able to check whether the system as a whole consisting of control systems fulfills the defined requirements at a very late development stage. This approach implies the disadvantage of correcting detected errors with a high effort. In the framework of the BMBF project ZAMOMO a modeling hierarchy with four layers is being developed that enables the application of behavior models at an early development stage. The starting point is the static view of the behavior which is refined consistently.

Task

Your task during this diploma thesis is to develop consistent refinements that are supposed to be applied within the hierarchy layers. This specifically requires the assessment of mathematical characteristics of signal functions that exist in the area of control engineering. These characterizations must be ordered concerning their detail of characterization. Based on this arrangement, you must then define model transformations of a hierarchy layer.

Goal

A first goal during this thesis is to enable consistent refinements within a hierarchy layer (internal refinement). Further optional goals are investigations on whether and in what way the internal refinements can be combined with external refinements and to what extent these models can be transformed the other way round, i.e. to coarse them.

Fields of Study

- Computer science, electrical engineering, mechanical engineering

Preliminary Knowledge

You should have some preliminary knowledge in one of these fields:

- Dynamic systems (Control Engineering)
- Formal models
- Model-based SW engineering

Tutor

- [Dr. rer. nat. Jacob Palczynski](#)

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