



Bachelor / Project Thesis

Theoretical

Analysis of Modern Modeling Approaches and Simulation Tools for Qualitative Modeling of Systems

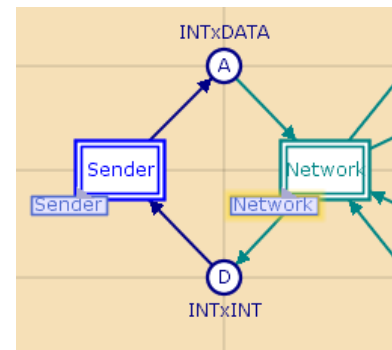
Keywords: literature research, programming, comparison of modeling approaches

General conditions:

Length: 3 Months

Preconditions:

- Engineering students,
students of information science



Content:

For most advanced control engineering related tasks, the modeling of the system to be controlled is crucial. The “classical” mathematical modeling approach involving differential equations is not suitable for every kind of systems. Qualitative description languages and modeling approaches such as Petri Nets, state automata, Bayesian networks, or state-flow models can be used to describe the behavior of systems in some of these cases.

For many of these approaches, software tools have been developed (such as CPN-Tools, SysML, or Renew), or existing computer languages from information science such as UML could be used to model systems in a control engineering context.

The goal of this thesis is to develop a comprehensive analysis of today's available qualitative modeling techniques by

- conducting a literature research regarding qualitative modeling approaches and related software tools,
- selecting 3-5 of these approaches using control engineering related criteria,
- providing a detailed description and an analysis and comparison of the advantages and disadvantages of the selected approaches, and
- realizing a simple system model by using each selected approach.

The detailed research results have to be documented and the whole work has to be demonstrated within an oral presentation.

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