



## **Aufgabenstellung für die Diplomarbeit**

Für: Fusheng Zhao

Studiengang: Elektrotechnik

Thema: Algorithm for Automatic Nesting of Error Propagation Models

Probabilistic error propagation analysis is one of research directions of the Institute of Automation. Our method is based on Markov chain (MC) models, which are growing extremely fast with the growth of undelaying error propagation models (EPM). This leads to serious computational issues. Application of nested EPMs is a promising and effective solution. However, automatically generated EPMs (e.g. based on Simulink models) are flat. The main task of this diploma work is development of an algorithm for automatic nesting of large, flat EPMs. The next tasks should be accomplished:

1. Structural requirements definition
2. Pre-work: deep understanding of dual-graph error propagation models and Markovian quantitative error propagation analysis, overview of existing methods for automatic nesting of graph-based models
3. Design (*UML diagrams, textual description*) and implementation (*Python*) of the algorithm for automatic nesting
4. Testing, tuning, performance benchmarking of the algorithm using self-developed and/or provided EPMs
5. Software quality verification with *pylint* or a similar tool
6. Integration of the implemented algorithm into the latest version *ErrorPro*
7. Documentation: *doxygen*-style documentation, updated *UML* diagrams
8. Optional: short video introduction

The relevant results of the other works that will be used in the SA must be clearly and fully stated in the written part using appropriate citations.

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1. Prüfer: Prof. Dr. techn K. Janschek

2. Prüfer: PD Dr.-Ing. A. Braune

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