TOOL AUTOMATION FOR MODEL-BASED DESIGN OF CPSS

This PhD thesis, as part of the INtegrated Tool chain for model-based design of Cyber Physical Systems (INTO-CPS) project, explores how to automate the process of moving from a discrete abstract model to a realisation in a programming language. Automating the process between a discrete model and its realisation can reduce the risk of human error, when a validated model is manually realized in a programming language and additionally reduce the Time-To-Market for product development.

The focus of this thesis is code generation against distributed hardware architectures, enabling hardware in-the-loop (HiL), software in-the-loop (SiL) and Design Space Exploration (DSE) of Cyber Physical Systems (CPSs).

A model of a CPS is called a co-model, and consists of both discrete and continues models that are connected. This code generator will be part of tools which together enable a detailed and intelligent DSE of all models in co-simulation, which is possible by sweeping over relevant design parameters. Different models from different simulation engines will be connected using the Functional Mock-up Interface (FMI), and extending FMI with information about the design parameters will enable FMI-based co-simulation to cover large parts of the CPSs design life cycle.

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