

Evaluation of Model-Based Code Generation for Embedded Systems-Mature Approach for Development in Evolution

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Abstract : Model-based development approach is gaining more support and acceptance. Its higher abstraction level brings simplification of systems' description that allows domain experts to do their best without particular knowledge in programming. The different levels of simulation support the rapid prototyping, verifying and validating the product even before it exists physically. Nowadays model-based approach is beneficial for modelling of complex embedded systems as well as a generation of code for many different hardware platforms. Moreover, it is possible to be applied in safety-relevant industries like automotive, which brings extra automation of the expensive device certification process and especially in the software qualification. Using it, some companies report about cost savings and quality improvements, but there are others claiming no major changes or even about cost increases. This publication demonstrates the level of maturity and autonomy of model-based approach for code generation. It is based on a real live automotive seat heater (ASH) module, developed using The Mathworks, Inc. tools. The model, created with Simulink, Stateflow and Matlab is used for automatic generation of C code with Embedded Coder. To prove the maturity of the process, Code generation advisor is used for automatic configuration. All additional configuration parameters are set to auto, when applicable, leaving the generation process to function autonomously. As a result of the investigation, the publication compares the quality of generated embedded code and a manually developed one. The measurements show that generally, the code generated by automatic approach is not worse than the manual one. A deeper analysis of the technical parameters enumerates the disadvantages, part of them identified as topics for our future work.

Keywords : embedded code generation, embedded C code quality, embedded systems, model-based development

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