**Description**

The use of software for the control of automated machines created possibilities that were simply unthinkable before. Moore’s law, stating that computing power roughly doubles every eighteen months at comparable or even reduced cost, has led to an explosion of the amount of software used in modern mechatronic machines. This explosion, however, not only led to unprecedented levels of performance and possibilities, it also confronts machine builders with an increasingly difficult maintenance and design problem.

This project wants to improve this situation and provide support for a system engineering approach for the realization of embedded and real-time software.

The project will follow a pragmatic approach and start from MDA as a model based engineering methodology. Although MDA has originally been introduced as an engineering methodology for business software development, we are convinced that the ideas behind it are also valid in a context of mechatronics. Major ambitions of the project are

(i) to start an MDA development at the system level, using SysML as a modeling formalism and, after some model transformations,

(ii) successfully deploy MDA for the development of hard real-time and embedded software.

The latter will probably require other modeling formalisms and model transformations than those that are used in a business software context. To this extent, the project will draw up an inventory of existing and emerging software and system engineering methodologies and modelling formalisms and determine their strengths and weaknesses in an embedded and real-time context. A ‘best of breed’ selection of modeling formalisms and model transformations will be selected and guidelines for their application in an MDA way of thinking will be derived. Additionally, the project will try to integrate the acquired knowledge in a comprehensive supportive toolchain. Although the emphasis of the project is on the system engineering approach and on the toolchain or on the OROCOS middleware, an effort will be made to make the toolchain compatible with at least (but not exclusively) the OROCOS middleware.