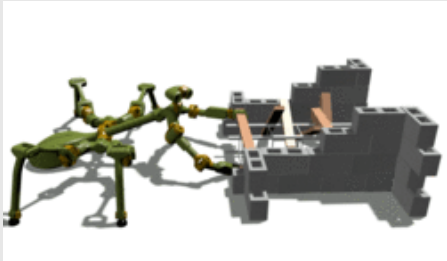
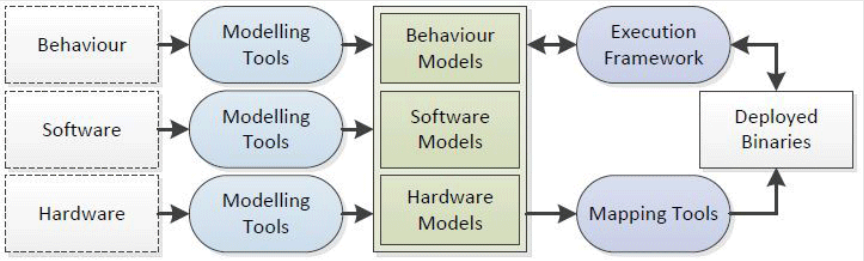
German Research Center for Artificial Intelligence

D-Rock

Models, methods and tools for the model-based software development of robots



The project D-Rock develops models and tools for the model-based software development of complex robotic systems in difficult application scenarios.



Behavior, software and hardware are mapped and run-time monitored using their respective models.

Motivation

Robots for manipulation and handling are becoming increasingly widespread in work and living environments, thanks to their improved capabilities. In order to meet even the most demanding tasks in different fields of application even more complex systems will be needed. A major challenge in robotics is to develop systems efficiently and cost effectively, which are able to deal with this complexity in a robust manner. Software plays a decisive role in the complexity of these systems. The project D-Rock is concerned with tools and methods for developing software for robots. The concepts of modularization and modeling are used to make the process manageable. While modularization enables efficient reuse of components, modeling describes how these components can be used in a given context.

Project Goals

The goal of the D-Rock project is the design and implementation of a framework and tools for the programming of robots.
The result of the D-Rock project is a set of software tools, which extends the Robot Construction Kit (Rock) Framework. The Rock framework, which has been developed at the DFKI provides tools for managing and integrating software libraries and components, which can be combined in a construction kit like manner to streamline the process of software development for robots.

The effectiveness of this approach is demonstrated on the MANTIS robot in a DARPA Robotics Challenge like scenario. MANTIS is a six-legged robot which can use its two front extremities for manipulation. It has been developed in the context of the LIMES project. The scenario is a standardized and thus comparable task, in which a door blocked by debris has to be cleared and passed. Further, the usability of the developed tools is evaluated on the basis of volunteer studies.

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