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Title :

Towards Model-Driven Software Development in Robotics: Motivation, Perspectives, Benefits, Challenges

Abstract :

Robotics experts still mostly work at the code-level when it comes to software integration for advanced robotic systems like service robots (robot companion, elder care, home health care, robot co-worker). That is even more astonishing when you look at the complexity of such systems which are expected to robustly and efficiently fulfill different tasks (multi-purpose systems) in complex and open-ended environments (domestic, outdoor, public spaces).

Compared to other high-tech industries, software development in robotics still lacks the processes and structures required to come up with a *software business ecosystem* in robotics. As in every successful business ecosystem, *separation of roles* should achieve a symbiotic coexistence based on dedicated expertise of the various stakeholders (robotics expert, application domain expert, system integrator, framework and tool developers, professional users and consumers and the robot itself). This would allow to share and lower risks and efforts, to reduce costs, development time and time-to-market, and to increase robustness and quality of products and services.

In order to achieve *separation of roles*, we need to support a black-box view of the software building blocks. A black-box view comes with explicated interfaces, properties and variation points. That is needed for system composition, proper configuration and hand-over to another role without requiring knowledge of inside details of the black-box as long as you are not responsible for that component. That can be achieved by a *model-driven software development process*.

In this talk, I will outline how we can make the step towards a software business ecosystem in robotics by means of *model-driven software development* and by means of *model-driven software system integration technologies*. I will also explain what I consider to be different in robotics compared to other domains (that is the robot itself depending on run-time exploitation of model-based variation-points in order to manage its scarce resources to face open-ended environments and to meet non-functional requirements), which perspectives and benefits a model-driven software development process for robotics provides and give insights into state-of-the-art achievements. I will also name some of the challenges still being considered as open and worth being addressed next. I will underpin my talk by examples of our real-world butler scenario (http://youtu.be/DjjNUPpj36E).