Specification of Abstract Robot Skills in Terms of Control System Behaviours

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Abstract

Robotic systems possess diverse effectors and receptors influencing their capabilities. For this reason description of robot tasks in a human-understandable form, being strict and abstracting the hardware limitations at the one hand, yet enabling straightforward transformation into robot actions at the other, has been elusive. Herein we propose a method of specification of tasks in terms of abstract object-level relations. This approach imposes the introduction of manipulation primitives modifying those relations by influencing object parameters. To narrow the scope of research in this paper we focus on one of the most elementary robot skills: grasping. We decompose the robot control system using the embodied agent-based methodology, define a set of required behaviors and express the skill as a sequence of those behaviours. To enable the future automatic translation from specification to code, we developed a formal specification of the introduced concepts.

Biography

Tomasz Kornuta is a sr. applied research scientist with the ability to drive research into novel directions and experience in team leadership. With 7+ years in academia and 9+ years in industry, I have developed strong analytical & problem solving skills along with deep expertise in robotics, visual perception and machine learning. At the end, I am a fan of robotics, AI, design patterns and MOOCs.