ROBERT KRUG received his diploma degree (MSc) in Mechatronics in Mechanical Engineering from the University of Technology in Graz, Austria in 2009. Since then he has been a doctoral student at the Center of Applied Autonomous Sensor Systems (AASS) in Örebro, Sweden. His main research interests lie in the field of dexterous robot grasping and manipulation.

In most robotic applications today, behaviors and motions are pre-programmed. In order for robots to leave the structured environments of industrial or laboratory settings and to succeed in uncontrolled scenarios, it has become clear that they need to be endowed with a sufficient level of autonomy. To purposefully interact with its environment, and as a prerequisite for any subsequent manipulation, a robot needs to be able to autonomously grasp objects in a robust manner which is the focus of this dissertation. Loosely speaking, the addressed question is where to grasp and how to grasp a given target object. To this end, aspects of grasp synthesis and hand motion planning are investigated. A central tenet in this thesis is to circumvent the curse of dimensionality, which is inherent in high-dimensional planning problems, by incorporating empirical data in analytical approaches. Most of the proposed algorithms encapsulate a notion of optimality in the context of the tackled sub-problem. Therefore, the use of tools from numerical optimization is a second central aspect in this thesis.

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