RASOUL MOJTAHEDZADEH received his BSc in Electronics Engineering from K.N.Toosi University of Technology (Iran) and received his MSc in Systems, Control and Robotics from Royal Institute of Technology (KTH, Sweden) in 2011. During 2011 to 2015, he was enrolled as a Ph.D student at the Center for Applied Autonomous Sensor Systems, Örebro University, Sweden. His main research interests lie in the filed of applied artificial intelligence, in the search of AI solutions for robotic problems.

In most robotic applications involving manipulation of objects the safety in the object selection is an essential task. For example, in order to clean and rearrange bookshelves, cupboards and cabinets a service robot is primarily required to autonomously unload the stacked objects safely. People normally choose and remove an object from a pile such that other objects stay motionless, and this is to prevent the other objects from falling down or toppling over. In industry, logistic processes often deal with piles of objects which may come in random configurations . Looking at a pile of objects with an arbitrary configuration, people are usually able to employ their experience and knowledge to select a set of safe-to-remove candidates from the pile such that removing the selected objects preserves the stability of the pile. This dissertation presents and evaluates methods for algorithmic safe object selection to empower robotic manipulation platforms to autonomously unload piles of objects. Starting from low-level perception and moving on to complex analysis of the possibly noisy and incomplete data to extract a high-level meaningful interpretation of the environment represents a multitude of challenges that this dissertation attempts to address.

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From 3D Perception to Object Selection

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