

PhD project

Smooth and efficient manipulation on mobile robots using temporal integration

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Abstract

Many of the tasks performed by mobile service robots today require navigation (moving around by avoiding objects) and manipulation (interacting with the objects). Such tasks today are solved using a sequential approach. While this approach has been proven to work fine, it's not very efficient as it treats approaching motion and manipulation as two independent problems. This results in an increased amount of time to carry out such tasks making it difficult to scale them up for large environments with a need to perform a large number of actions. Ideally, the robot can use the approaching motion for the manipulation task to improve the object's perception as well as to pre-plan the manipulation for efficient execution. This can significantly speed up the whole process and enable the deployment of such robots in large environments.

To optimize and solve approaching motion (navigation) and manipulation together, an integrated strategy is required for perception, planning and control. This PhD will investigate how approaching motion can be used to optimize perception, planning and control for the manipulation task. Thus, this PhD intends to identify the requirements and methods to optimize manipulation during the approaching motion and thereby develop a novel approach for smooth and efficient manipulation on mobile robots.