

MOTION PLANNING — EXERCISE 9

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Introduction to OMPL

1. Consider the available planners in OMPL (e.g., <https://ompl.kavrakilab.org/planners.html>). List at least three examples of the following:
 - (a) Planners that can solve the geometric motion planning problem, as defined in lecture 1.
 - (b) Planners that can solve the kinodynamic motion planning problem, as defined in lecture 1.
2. Consider the modules implemented in OMPL (e.g., https://ompl.kavrakilab.org/api_overview.html)
 - (a) How is the default nearest neighbor method implemented in OMPL? Which algorithm is used?
 - (b) OMPL supports planning with projections, which are simplifications of a state space. Explain how such a simplification could be defined for a mobile base robot (state space $SE(2)$) with a mounted manipulator arm (state space \mathbb{R}^7). Discuss how projections influence planner properties like asymptotic optimality.
 - (c) OMPL does not have any notion of a motion primitive. Explain how they could be integrated into OMPL.
3. OMPL does not have AO-x implemented.
 - (a) Explain how you could implement AO-RRT by using OMPL without modifying it. Note that OMPL does not provide write-access to the generated tree.
 - (b) Which benefit(s) would write-access to the generated tree provide?