Open Motion Planning Library

⇒ Robotic motion planning seeks to find a solution to the problem of “Go from the start to the goal while respecting all of the robot’s constraints."

★ Sampling based motion planning

⇒ Sampling-based motion planning is a powerful concept that employs sampling of the state space of the robot in order to quickly and effectively answer planning queries

↳ especially for systems with differential constraints or those with many degrees of freedom

⇒ Sampling arises out of the need to quickly cover a potentially large and complex state-space to connect a start and goal configuration along a feasible and valid path.

⇒ Most sampling-based methods provide probabilistic completeness.

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This means that if a solution exists, the probability of finding a solution converges to one as the number of samples reasoned over increases to infinity.

⇒ Sampling-based approaches cannot recognize a problem with no solution.

⊕ Problem Statements and defination

Workspace

→ The physical space that the robot operates in.

→ It is assumed that the boundary of the workspace represents an obstacle for the robot.

State space

→ The parameter space for the robot.

→ This space represents all possible configurations of the robot in the workspace.

Free state space

↳ A subset of the state space in which each state corresponds to an obstacle free configuration of the robot embedded in the workspace.

Path

→ A continuous mapping of states in the state space.

→ A path is collision free if each element of the path is an element of the free state space.