

CSCI-4290/6290: Robot Motion Planning

Lecture 4: September 5, 2003

Geometric Transformations

Announcements

- Homework 1 is due on Tuesday, September 9.
- Prof. Jeff Trinkle will talk about “Complete Motion Planning for Closed Kinematic Chains” on Wednesday, September 10 at 4:00 PM in Lally 02.

Today’s Class

Today we explore ways to represent the motions of a robot for motion planning. The geometric representations of the robot must be manipulated to correspond to its translational and rotational motions.

1. Configuration space of an articulated robot (from previous class)
2. Geometric transformations in 2D and 3D for a rigid object: translation, rotation, and homogeneous transform matrices
3. Geometric transformations in 2D and 3D for articulated objects: kinematic chains and Denavit-Hartenberg parameters
4. Using quaternions to represent rotations in 3D for a rigid object.

Reading

Chapter 3, Choset et al.

Chapters 3 and 4, *Planning Algorithms* by Steven M. LaValle. Read Sections 3.1–3.3.

Chapters 2 and 3, Latombe (optional).

Additional References

Chapter 3, *Introduction to Robotics: Mechanics and Control*, second edition by John J. Craig, Addison-Wesley, 1989.

Next Class

Visibility roadmaps.