

# CSCI-4290/6290: Robot Motion Planning

Lecture 4: September 9, 2005

## Geometric Transformations

### Announcements

- Questions 1–4 of Assignment 1 are due at the beginning of class today.
- Prof. Bruce Donald from Dartmouth will talk about “Algorithmic Challenges in Structural Molecular Biology and Proteomics” on Monday, September 12 at 4:00pm in DCC 337 (Refreshments at 3:30 pm).

### 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. Geometric transformations in 2D and 3D for a rigid object: translation, rotation, and homogeneous transform matrices
2. Geometric transformations in 2D and 3D for articulated objects: kinematic chains and Denavit-Hartenberg parameters

### Reading

Chapter 3, Choset et al.

Chapters 3 and 4, LaValle.

### Additional References

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

### Next Class

Quaternions for 3D rotations; Visibility roadmaps.