

CSCI-4290/6290: Robot Motion Planning  
Lecture 5: September 9, 2003  
**Geometric Transformations, Quaternions**

## Announcements

- Homework 1 is due today. Solutions to Questions 5 and 6 are to be submitted at the beginning of class on Friday, September 12.
- 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

In the last class, we looked at geometric transformations for rigid objects in 2D and 3D. Today we look at geometric transformations for articulated robots, and a representation of the rotational motion of an object in 3D using quaternions.

1. Geometric transformations in 2D and 3D for articulated objects: kinematic chains and Denavit-Hartenberg parameters
2. Using quaternions to represent rotations in 3D for a rigid object.
3. Introduction to Visibility graphs

## 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.