

CSCI-4965/6963: Robot Motion Planning  
Lecture 3: September 6, 2001  
**Geometric Transformations**

## **Announcements**

Homework 1 will be handed out on Monday, September 10, will be due on Monday, September 17.

## **Today's Class**

In the last class, we looked at geometric representations of stationary obstacle regions. Today we explore some 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. Introduction to Configuration space
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

## **Reading**

Chapter 2, *Motion Strategy: Algorithms and Applications* by Steven M. LaValle. Available on the course web page.

Chapters 2 and 3, Latombe (optional).

## **Additional References**

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

## **Next Class**

Configuration space representation.