

CSCI-4290/6290: Robot Motion Planning  
Lecture 23: November 21, 2003  
**Real-time Motion Planning,  
and Manipulation Planning**

## Announcements

- The course project is due on Wednesday, December 3. Demos will be scheduled on December 4 and December 5.
- You should create a web page for your project and make your project report available there. Your report should consist of a summary of what you did, along with illustrative figures.

## Today's Class

1. Real-time Motion Planning:

Kartik Babu will talk about *real-time motion planning*. He will describe two approaches for fast motion planning, with and without nonholonomic constraints and dynamics constraints.

2. Manipulation Planning:

Arjun Arumbakkam will talk about *manipulation planning*, where a robot arm is used to move objects by grasping them. Manipulation planning here is viewed as motion planning for movable objects using sampling techniques.

## References

“Decomposition-based motion planning: A framework for real-time motion planning in high-dimensional configuration spaces”, O. Brock and L. Kavraki, In Proc. ICRA, volume 2, pages 1469-1474, 2001.

“Real time motion planning for agile autonomous vehicles,” E. Frazzoli, M. Dahleh, E. Feron, AIAA Journal on Guidance, Control and Dynamics 2002.

“Quasi-Random Algorithms for Real-Time Spacecraft Motion Planning and Coordination,” E. Frazzoli, To appear in Acta Astronautica, 2003.

“A general manipulation planner,” T. Simeon, J. Cortes, A. Sahbani, J.-P. Laumond. Workshop on Algorithmic Foundations of Robotics (WAFR 02), December 2002.

## **Reading**

Chapter 11 through 11.4, Latombe. (optional)

## **Next Class**

Assembly planning, and manipulation planning.