

CSCI-4290/6290: Robot Motion Planning
Lecture 21: November 14, 2003
**Nonholonomic Motion Planning,
and PRMs for Closed Kinematic Chains**

Announcements

- Revised project proposals are due today (from some students).
- Course project is due on Wednesday, December 3; demos on December 4 and December 5.

Today's Class

1. Multilevel path planning for nonholonomic robots using semiholonomic subsystems:
Chad Helm will continue our discussion of *nonholonomic motion planning* by describing a complete planner for tractor-trailer robots with multiple trailers.
2. PRMs for closed kinematic chains:
Jonathan Morgan-Leamon will describe a PRM method to perform motion planning for *closed kinematic chains*, and a subsequent performance enhancement method.

References

Multilevel path planning for nonholonomic robots using semiholonomic subsystems by S. Sekhavat, P. Svestka, J.-P. Laumond, M.H. Overmars. *International Journal of Robotics Research*, Vol. 17, No. 8, pages 840-857, August 1998.

Nonholonomic motion planning: Steering using sinusoids, Richard M. Murray and S. Sastry, *IEEE Transactions on Automatic Control*, volume 38, number 5, pages 700–716, 1993.

Randomized path planning for linkages with closed kinematic chains, J. Yakey, S. M. LaValle, and L. E. Kavraki, *IEEE Transactions on Robotics and Automation*, 17(6):951–958, December 2001.

A Kinematics-Based Probabilistic Roadmap Method for Closed Chain Systems, Li Han and Nancy M. Amato, Proceedings of the Workshop on Algorithmic Foundations of Robotics (WAFR'00), March 2000.

Next Class

Multiple robot path coordination, and motion planning in dynamic environments.