

CSCI-4290/6290: Robot Motion Planning
Lecture 24: November 22, 2005
**Proximity Queries, and
Sampling-Based Methods for Closed Kinematic Chains**

Announcements

- The course project is due on Monday, 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. Distance Queries with Swept Sphere Volumes: Stephen Meister will then describe distance computation and *collision detection* algorithms for hierarchies of swept sphere volumes. These algorithms are used in PQP.
2. PRMs for closed kinematic chains:
Chris Colasuonno will describe a PRM method to perform motion planning for *closed kinematic chains*, and a subsequent performance enhancement method.

References

Fast Proximity Queries with Swept Sphere Volumes, Eric Larsen, Stefan Gottschalk, Ming C. Lin, and Dinesh Manocha, Department of Computer Science, University of N. Carolina, Chapel Hill, TR99-018, 1999.

Fast Distance Queries using Rectangular Swept Sphere Volumes, E. Larsen, S. Gottschalk, M. Lin, and D. Manocha, IEEE Conference on Robotics and Automation, San Francisco, CA, April 2000.

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.

A Random Loop Generator for planning the motions of closed kinematic chains using PRM methods. J. Cortes, T Simeon, J.-P. Laumond. IEEE Int. Conf. on Robotics and Automation (2002).

Probabilistic motion planning for parallel mechanisms. J. Cortes, T Simeon. IEEE Int. Conf. on Robotics and Automation (2003).

Reading

Chapter 7.4, LaValle.