

CSCI-4290/6290: Robot Motion Planning
Lecture 20: November 11, 2003
**Randomized Kinodynamic Planning,
and Collision Detection**

Today's Class

1. Randomized Kinodynamic Planning:

Shyam Sunder will describe a method for *randomized kinodynamic planning* that uses PRMs in the state-time space. Kinodynamic planning involves generating solutions that satisfy both the kinematic and dynamic constraints.

2. Distance Queries with Swept Sphere Volumes:

Eric Meisner will then describe distance computation and *collision detection* algorithms for hierarchies of swept sphere volumes. These algorithms are used in PQP.

References

Kinodynamic Motion Planning Amidst Moving Obstacles. R. Kindel, D. Hsu, J.C. Latombe, and S. Rock. Proceedings of the *IEEE International Conference on Robotics and Automation*, San Francisco, pages 537-543, April 2000.

Randomized Kinodynamic Motion Planning with Moving Obstacles. D. Hsu, R. Kindel, J.C. Latombe, and S. Rock. Workshop on Algorithmic Foundations of Robotics (WAFR'00), Hanover, NH, March 2000.

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.

V-Clip: Fast and Robust Polyhedral Collision Detection, by Brian Mirtich. *ACM Transactions on Graphics*, volume 17, number 3, pages 177-208, July, 1998.

Next Class

PRMs for closed chains, and nonholonomic motion planning.