

CSCI-4290/6290: Robot Motion Planning
Lecture 19: November 7, 2003
**Molecular Docking,
and Continuous Curvature Paths**

Announcements

- Final Course project proposal is due today.

Today's Class

In today's class, we will see an application of motion planning to molecular biology, and an extension of nonholonomic motion planning for car-like robots.

1. Molecular docking: Yogi Girdhar will describe an application of motion planning to *molecular docking* for drug design. A major challenge is that biological molecules have an extremely large number of degrees of freedom.
2. Continuous curvature path planning: Eric Griffith will discuss a method to generate *continuous curvature paths* for car-like robots with upper-bounded curvature derivative. So these paths can be followed without the robot having to stop to reorient its wheels.

References

Molecular Docking: A Problem with Thousands of Degrees of Freedom, M. Teodoro, G. N. Phillips Jr., and L. E. Kavraki, 2001 IEEE International Conference on Robotics and Automation (ICRA 2001), pp. 960-966, Seoul, Korea, May 2001.

A Motion Planning Approach to Flexible Ligand Binding. A.P. Singh, J.C. Latombe, and D.L. Brutlag. 7th Int. Conf. on Intelligent Systems for Molecular Biology (ISMB), AAAI Press, Menlo Park, CA, pp. 252-261, 1999.

From Reeds and Shepp's to Continuous-Curvature Paths, Th. Fraichard and A. Scheuer. Accepted to IEEE Transactions on Robotics and Automation. Revised in June 2003.

From Reeds and Shepp's to continuous-curvature paths, Th. Fraichard and A. Scheuer and R. Desvigne, International Conference on Advanced Robotics, pages 585-590, Oct 1999, Tokyo, Japan.

Next Class

Kinodynamic planning, collision detection, and multiple robot coordination.