

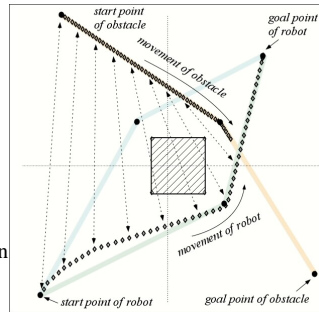
# Sensing and Motion Planning

## Chairs: Vladimir Lumelsky, Shin'ichi Yuta

### Modeling Motion Uncertainty of Moving Obstacles for Robot Motion Planning

J. Miura and Y. Shirai  
Osaka University

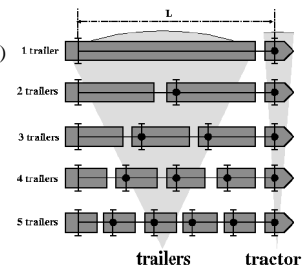
- Probabilistic Model of Obstacle Motion
- Velocity Uncertainty and Path Ambiguity of Obstacle
- Observation Uncertainty of Robot
- Decision-Theoretic Robot Motion Planning



### Manipulative Difficulty Index of a Mobile Robot with Multiple Trailers in Pushing and Towing with Imperfect Measurement

W. Li, T. Tsubouchi and S. Yuta  
University of Tsukuba

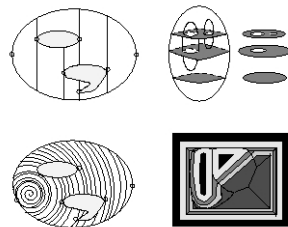
- Manipulative Difficulty Index(MDI)
- MDI Evaluation Examples
- Stochastic Linear Feedback Controller
- Line Following for Tractor-trailer System



### Exact Cellular Decompositions in Terms of Critical Points of Morse Functions

H. Choset, E. Acar, A. A. Rizzi and J. E. Luntz  
Carnegie Mellon University

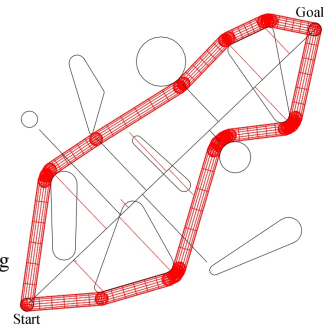
- Exact Cellular Decomposition in Terms of Critical Points
- Morse Functions and Critical Points
- Different Decomposition Patterns for Different Functions
- A Frame Work for Motion Planning Algorithms



### Real-Time Generation of Collision-Free Paths for a Mobile Sphere

E. J. Bernabeu and J. Tornero  
Universidad Politecnica de Valencia

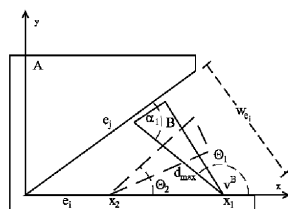
- Path Planning of a Mobile Sphere
- Hough Transform Application. Minimum Volume Locus
- Generation of 3D and Several 2D Paths in Real Time
- Linear Complexity for Generating Several 2D Paths



### On Relating the Disconnectedness of a Contact Formation to the Geometric Properties of its Constituent Objects

D. Johnston and J. Xiao  
University of North Carolina - Charlotte

- Configurations of the same contact formation may be disconnected.
- Disconnectedness depends on the geometry of contacting objects.
- For polygons, some necessary geometrical conditions are presented for disconnectedness.
- The results are useful for quickly checking if a CF has disjoint configurations.



### Deformable Volumes in Path Planning Applications

E. Anshelevich, S. Owens, F. Lamiroux and L. Kavraki  
Rice University

- PRM extended to a class of three-dimensional deformable volumes (with full 3D bending)
- Paths consisting of minimal-energy deformations
- Mass-Spring Representation of the deformable volumes
- Path planning for an elastic pipe/wire: an extended example

