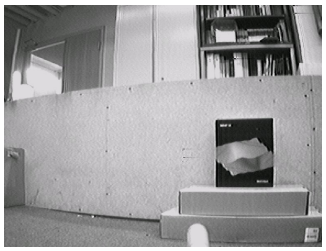
Trajectory Control
Chairs: Alessandro DeLuca, Jadran Lenarcic

Vision-Based Dynamic Estimation and Set-Point Stabilization of Nonholonomic Vehicles

F. Conticelli[1], D. Prattichizzo[2], F. Guidi[3] and A. Bicchi[3]
[1]Scuola Superiore Sant' Anna, [2]University of Siena and [3]University of Pisa

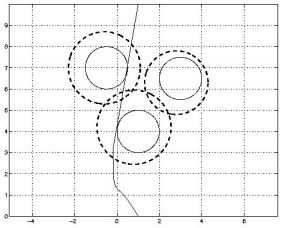
- In this paper, a nonholonomic vehicle is stabilized to a desired pose through a visual servoing technique. The control task consists in regulating the robot pose by using real-time visual data.
- The visual servoing of the nonholonomic vehicle is built through discontinuous change of coordinates and Lyapunov-based design.
- Simulations on an autonomous mobile robot are reported, that show the practicality of the proposed approach.
- Vision-based stabilization may be required in autonomous parking or docking of mobile robots.



Closed loop motion plans for mobile robots

J. M. Esposito and V. Kumar
University of Pennsylvania

- We approach sensor-based planning using a game-theoretic framework
- Rather than synthesize control laws from the space of all functions, we limit our search to specific classes of functions; namely, piecewise linear feedback and a certain type of one parameter feedback laws.
- While our min-max control laws prove optimal under the worst case scenario, the problem does not possess a saddle point solution due to the underlying topology of the problem.
- These feedback laws enable the robot to actively exploit the dynamics of the given sensor model.



Impedance Fields for Trajectory Enhancement in the Intelligent Assist Device

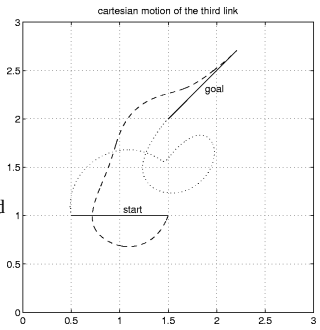
G. R. Luecke, K. L. Tan and N. Zafer
Iowa State University

- Motion Augmentation In Heavy Lift Assist Devices
- Human Force Input Controls General Motion
- Impedance Fields Guide To Target, Protect Against Collisions
- Intelligent Assist Improves Ergonomics and Safety

Motion Planning and Trajectory Control of an Underactuated Three-Link Robot via Dynamic Feedback Linearization

Alessandro De Luca and Giuseppe Oriolo
Universit di Roma "La Sapienza"

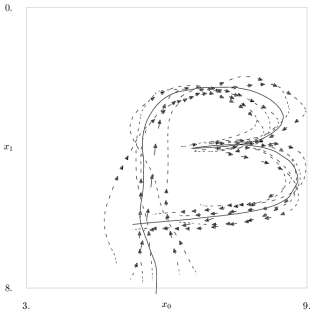
- Motion planning becomes an interpolation problem
- Exponential stabilization of the planned trajectory is straightforward



Trajectory fitting with smoothing splines using velocity information

C. Lee[1] and Y. Xu[2]
[1]Carnegie Mellon University and [2]The Chinese University of Hong Kong

- Problem: find a smooth best-fit trajectory from multiple examples
- Solution: We derive a spline smoother in phase space
- Example: trajectory fit using smoother with principal curves
- Uses: action learning, animation, and recognition



Pre-Transition Phase Control: Three Different Approaches

N. Doh, G. Jeon, W. K. Chung and Y. Youm
Pohang University of Science & Technology (POSTECH)

- Hard contact transition control
- Defining Pre-Transition Phase.
- Three different methods for pre-transition phase control.
- Increased performance, stability and robustness.