

Mobile Vehicle Mechanics

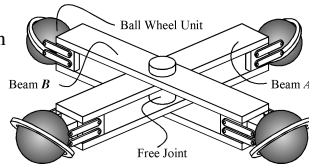
Chairs: Matt Mason, Karim A. Tahboub

Dynamics Analysis and Control of Holonomic Vehicle with a Continuously Variable Transmission

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¹Massachusetts Institute of Technology and ²Palestine Polytechnic Institute

- Ball Wheel Mechanism
- Continuously Variable Transmission
- Stability Augmentation... Optimum Power Consumption
- Adaptive Friction-Compensation Control

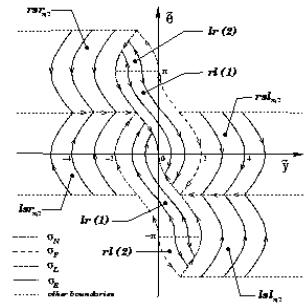


Optimal feedback control for route tracking with a bounded-curvature vehicle

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¹LAAS-CNRS, ²PARADES E.E.I.G. and ³University di Pisa

- We propose an optimal feedback control for Dubins' model of a car to follow straight routes.
- The control design is based on Pontryagin's Maximum Principle completed by global geometric arguments. The controller is then expressed within the hybrid control framework.
- Experimental results are reported, showing the real-time feasibility of the proposed approach.



Extremal Trajectories for Bounded Velocity Differential Drive Robots

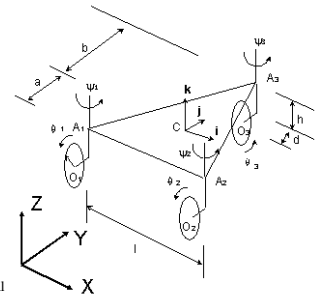
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The Kinematics for Redundantly Actuated Omni-directional Mobile Robots

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¹Hanyang University and ²Korea University

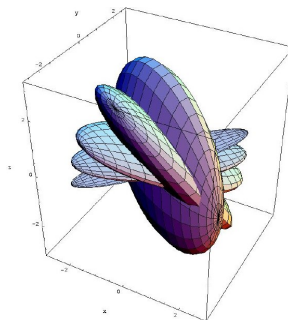
- Motivation and Problem Statement: Lack of exact kinematic modeling of omni-directional mobile robots, no analysis on employment of redundant actuation
- Techniques and Proposed Approach: Apply kinematic modeling approaches employed in Parallel Robot, load distribution method to minimize singularity, lessen actuation effort, and employ several subtasks
- Simulation Results: Load Distribution (Minimum versus Redundant Actuation), subtasks employing internal load distribution
- Conclusions: Provides the exact kinematic model, singularity analysis, its associated load distribution for redundantly actuated omni-directional mobile robot



Instantaneous Kinematics and Dexterity of Mobile Manipulators

Krzysztof Tchon and Robert Muszynski
Wroclaw University of Technology

- Kinematic dexterity evaluation of mobile manipulators patterned on the existing theory for robotic manipulators and mobile robots.
- Control system representation of the kinematics and a control-theoretic approach.
- Computation of dexterity ellipsoids for exemplary mobile manipulators.
- New tools for analysis of mobile manipulators applicable in motion planning and control.



Time Optimal Trajectories for Bounded Velocity Differential Drive Robots

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