

Navigation and Mapping

Chairs: Gregory Dudek, Gaurav Sukhatme

Rover Maneuvering for Autonomous Vision-Based Dexterous Manipulation

I. A. D. Nesnas, M. W. Maimone and H. Das
Jet Propulsion Laboratory

- Problem: Autonomous rock sample acquisition and instrument placement
- Approach: Used vehicle's mobility system to compensate for limited dexterity of manipulators and used stereo vision for feedback and target tracking.
- Results: Successfully performed multiple rock sample acquisitions of selected targets from a distance of more than one meter away and instrument placement from a distance of more than five meters away.
- Conclusions: Further refinements to algorithms are needed to increase robustness and handle more challenging terrain.



Fault Detection and Identification in a Mobile Robot Using Multiple Model Estimation and Neural Network

P. Goel, G. Dedeoglu, S. I. Roumeliotis and G. Sukhatme
University of Southern California

- Automated Detection and Identification of faults in a mobile robot.
- Fault models are embedded in parallel Kalman Filter estimators. The set of residuals is processed by a backpropagation Neural Network.
- Faults are simulated on a real robot. Data collected for 8 different kinds of faults.
- Proposed scheme is able to detect and identify both sensor and mechanical failures.



On-line Construction of Iconic Maps

E. Bourque and G. Dudek
McGill University

- When creating image-based virtual reality, how do we decide which images to retain?
- Alpha-backtracking is introduced to decide when to keep images based on partial statistical knowledge.
- With minimal backtracking, the results are close to the ideal off-line case.
- Alpha-backtracking can provide favorable results when data storage must be minimized.



Obstacle Avoidance on a Legged Robot without 3D Reconstruction of the Surroundings

Y. H. Chow and Ronald Chung
The Chinese University of Hong Kong

- Legged locomotion on a ground plane
- Obstacle detection
- Obstacle avoidance
- Real-time implementation of complete system



Multiple-Goals Path Planning for Coordinate Measuring Machines

S. N. Spitz and A. A. G. Requicha
University of Southern California

Combination of Model-based and Reactive Methods in Autonomous Navigation

D. Maravall, J. de Lope and F. Serradilla
Technical University of Madrid

- Autonomous Navigation of Mobile Robots: from Map Building to Route Planning and Execution
- Combination of Model-based Navigation and Reactive Navigation Enlarges Mobile Robot's Autonomy
- Map Building Using the
- Hybrid Navigation Systems Fully Tested in Office-like Environments

