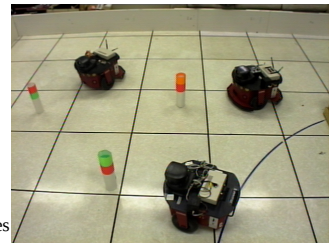
# Localization
## Chairs: George Bekey, Gamini Dissanayake

### Collective Localization: A distributed Kalman filter approach to localization of groups of mobile robots

S. I. Roumeliotis and G. A. Bekey
University of Southern California

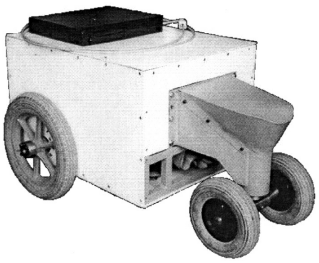
- Improved localization accuracy for teams of mobile robots
- Distributed multi-robot sensor fusion schema - Kalman filtering
- Reduced position uncertainty for the case of 3 mobile robots
- Shared group knowledge appears as position estimates inter-dependencies



### Algorithms and Architectures for Acoustic Localization based on Microphone Array in Service Robotics

E. Mumolo[1], M. Nolich[1] and G. Vercelli[2]
[1]University of Trieste and [2]University of Genoa

- Surveillance and transportation tasks in indoor environments
- Cross-correlation and Neural Networks approaches using a 4 element Linear Microphone Array
- Real-time operation with a distributed architecture
- Absolute localization error with a true speaker is below 50cm



### Extracting Topology-Based Maps from Gridmaps

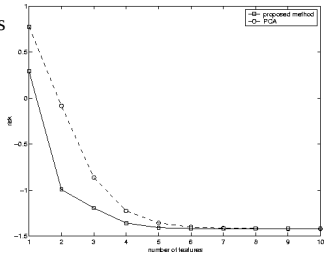
E. Fabrizi[1] and A. Saffiotti[2]
[1]Universit di Roma Tre and [2]Orebro University

- New type of maps
- Represent the topology induced by the shape of the free space
- Extracted by image processing from fuzzy occupancy grids
- Extraction is fast and robust

### Supervised Linear Feature Extraction for Mobile Robot Localization

N. Vlassis[1], Y. Motomura[2] and B. Krose[1]
[1]University of Amsterdam and [2]Electrotechnical Laboratory

- WHAT? Extract 'task-relevant' features from sensor measurements
- WHY? Because PCA and related methods are task-irrelevant
- HOW? By Supervised Projection Pursuit optimizing Mutual Information
- RESULT? Improved average robot localization performance




### Bayesian estimation and Kalman filtering: A unified framework for Mobile Robot Localization

S. I. Roumeliotis and G. A. Bekey
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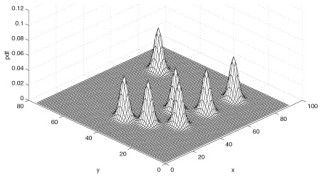
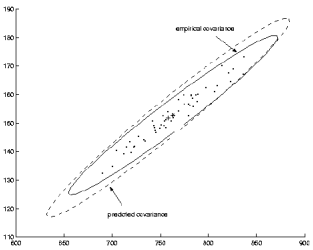
- Filter out odometric error & reduce landmark related uncertainty
- Bayesian decision making & Kalman filter estimation
- Global localization in an office environment
- Optimal fusion of proprioceptive and exteroceptive measurements



### Computing the Sensory Uncertainty Field of a Vision-based Localization Sensor

A. Adam, E. Rivlin and I. Shimshoni
Technion - Isreal Institute of Technology

- Sensor accuracy varies with place
- Goal: obtain a performance map
- Method of prediction
- Statistical validation