Applications of Sensing
Chairs: Fraichard Thierry, Katsushi Ikeuchi

Vision-Guided Autonomous Stair Climbing
Yalin Xiong and Larry Matthies
Jet Propulsion Laboratory

- Autonomous Navigation in Urban Environment

- Visual Recognition and Servoing

- Climbing Multi-flight Stairs Autnomously

- Robust in Various Lighting Conditions

Robust Localization for 3D Object Recognition Using Local EGI and 3D Template Matching with M-Estimators
Kentaro Kawamura[1], Kiminori Hasegawa[2], Osamu Yamashita[1], Yoichi Sato[2] and Katsushi Ikeuchi[2]
[1]Kyushu Electric Power Co., Inc. and [2]The University of Tokyo

- Develop a system which automatically aligns a robot with respect to an object

- Estimate object pose via segmentation-based method

- Evaluate pose using 3D template matching algorithm

- Our resulting system achieves a wide degree of convergence for object localization

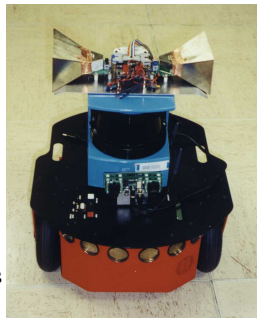### Development of image stabilization system for a remote operation of walking robots
R. Kurazume and S. Hirose
Tokyo Institute of Technology

- Need for an image stabilization system for a remote operation of walking robots.

- Combination of template matching with high speed camera and gyro sensors using MMX instruction set.

- Image stabilization experiments and body attitude control using 3-axis attitude estimation from images.

- Fast and low cost image stabilization system is developed, and the performance of attitude control using images is almost same as the case using an attitude sensor.

A Comparison of Four Fast Vision Based Object Recognition Methods
Markus Ehrenmann, Despina Ambela, Peter Steinhaus and Ruediger Dillmann
Universitat of Karlsruhe

- Programing by Demonstration requires robust and fast object recognition

- Outline of four methods (Pattern Mat., PCA, Graph Mat. and GHT)

- Analysis and Comparison

- Drawbacks/advantages can be used to cope with specific requirements

Robot-mounted through-wall radar for detecting, locating, and identifying building occupants
David G. Falconer, Robert W. Ficklin and Kurt G. Konolige
SRI International

- Detect and locate people moving behind building walls

- Mount pulse-Doppler radar on robot platform; develop signal prcessing software

- Building inhabitants detected and their activities classified

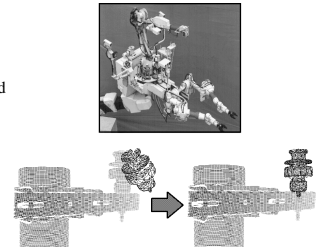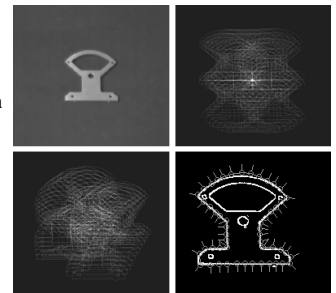- Higher-power, lower-frequency radars needed for outdoor operations

Observing the Load Dynamic of an Overhead Crane with Minimal Sensor Equipment
Claudio Altafini[1], Ruggero Frezza[2] and Johann Galic[3]
[1]Royal Institute of Technology, [2]Universita di Padova and [3]ADtranz

- Sensorless reconstruction of the load dynamics

- Estimation of the load torque on the traslational drive

- Application as back-up system

- Swing angle is observable