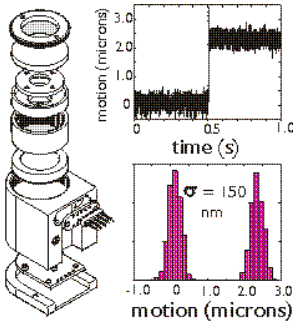
# Sensing Strategies and Control 1
## Chairs: Ralph Hollis, Guillaume Morel

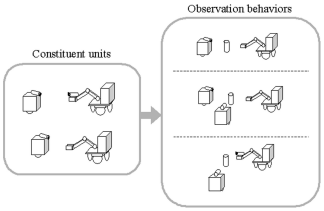
### Optical Coordination Sensor for Precision Cooperating Robots
Wing-Choi Ma, Alfred A. Rizzi and Ralph L. Hollis
Carnegie Mellon University

- Sensor for precise mutual calibration of two robots
- Optical sensor on one robot, LEDs on the other
- Resolutions of 150 nm (1 sigma) achieved
- Allows fast calibration for executing cooperative tasks




### Generation of Observation Behavior in Distributed Robotic System
T. Kaga and T. Fukuda
Nagoya University

- A study on the generation of observation behaviors for object recognition considering various components of heterogeneous robots
- A proposal of a method of autonomous positioning for active sensing by predicting sensory inputs of the next step.
- Simulation results suggest that robots are capable of generating observation behaviors in order to decrease sensing errors.



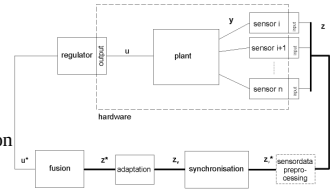

### Self-learning Vision-guided Robots for Searching and Grasping Objects
M. C. Nguyen and V. Graefe
Bundeswehr University Munich

- Motivation: Conventional vision-based robots for grasping objects typically require, on the one hand, quantitatively correct models of the robots own characteristics and of the relevant parts of environments; on the other hand, the grasped object must be visible in both images, i.e., the robots work space is merely limited to the available initial fields of view of cameras. Such systems do not make use of available potentials of the robot and, thus, reduces its efficiency.
- Techniques and Proposed Approach: Direct transition from image data to motion control commands. If the grasped object is invisible in an image, a search motion is initiated. The principle of the object search is the conversion of passive
- Experimental Results: The paper describes a method that allows a calibration-free vision-guided manipulator learning to control its joints to grasp a variety of different shaped objects that may be located anywhere and in nearly arbitrary orientation in the robots 3-D space.
- Conclusion: The robot can learn the gain coefficients relating image motions to control word commands based on either the detected object or on the natural inhomogeneity of the robot's surroundings without the need of special landmarks. With the object search the robot can make use of its available potentials and, thus, increasing its efficiency.


Fig. 1: Objects used in experiments

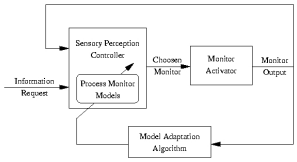
### System Architecture for Synchronizing, Signal Level Fusing, Simulating and Implementing Sensors
C. Robl and G. Farber
Technische Universitat Munchen

- System architecture for signal-level sensor fusion
- Sensor models and sensor synchronization
- Sensor adaptation: Offset correction, integration, differentiation
- Simulation and real sample application




### An Adaptive Sensory Perception Controller for Robotic Systems
T. Celinski and B. McCarragher
The Australian National University

- Control of Perception Improved Through Adaptation
- Perception Model Adaptation Based on Radial Basis Functions
- Applicable to Multi-Sensory Systems
- Contribution: Adaptive Perception Controller




### Visually Guided coordination for Distributed Precision Assembly
Michael L. Chen, Shinji Kume, Alfred A. Rizzi and Ralph L. Hollis
Carnegie Mellon University

- Modular Distributed Precision Assembly
- Visually-guided Agent Coordination
- High-bandwidth Distributed Control
- Experimental Evaluation