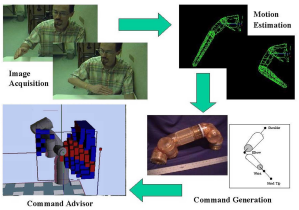
Teleoperation 2
Chairs: Claudio Melchiorri, Yasuyoshi Yokokohji

Modeling, Control and Optimization of a New Tele Robot
A. Schlotter and F. Pfeiffer
Technische Universitaet Muenchen

- Elastic multibody model of a tele robot with new kinematic concept
- Development and implementation of a model-based feedback linearization control
- Optimization of control parameters and of free and geometric prescribed trajectories
- Verification by experimental results

An Intelligent Vision-only Operator Interface for Dextrous Robots
P. Fiorini[1], G. Chalfant[1], Y. Tsumaki[2], E. Di Bernardo[1] and P. Perona[1]
[1]California Institute of Technology and [2]Tohuku University

- Provide non-contact command and feedback in dexterous teleoperation
- Visual tracking of operator's arm and kinematics visualization
- Developed an off-line demonstrator of tracking and visual feedback
- Next step: real-time vision-only operator interface.

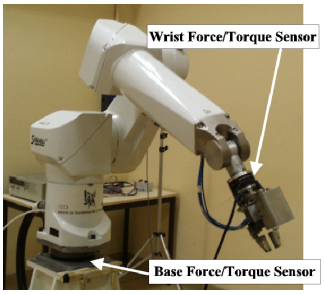


A Method for Simultaneously Increasing Transparency and Stability Robustness in Bilateral Telemanipulation
J. E. Speich, K. Fite and M. Goldfarb
Vanderbilt University

- An Introduction to Bilateral Telemanipulation Control Architectures
- Transparency and Stability in a Two-Channel Position-Force Architecture
- A Dynamic Compensator which Simultaneously Increases Transparency Bandwidth and Stability Robustness
- A Single DOF Numerical Example

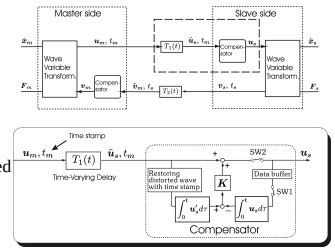
On the Use of a Base Force/Torque Sensor in Teleoperation
F. Geffard, C. Andriot, A. Micaelli[1] and G. Morel[2]
[1]CEA and [2]ENSPS- LSIIT

- Improving transparency and safety of bilateral teleoperation
- Passivity based comparison of a wrist and a base force/torque sensor solution
- Experimental tests on an industrial manipulator
- Base force/torque sensor solution better improves friction rejection



Bilateral Control with Energy Balance Monitoring under Time-Varying Communication Delay
Y. Yokokohji, T. Imaida and T. Yoshikawa
Kyoto University

- Time-varying delay degrades the performance of wave-variable-based teleoperator.
- Compensation of position drift by modifying the waveforms within the limit of energy margin.
- Compromised behavior between performance and safety was demonstrated by the simulation.
- The method is simple and easy to implement. Passivity was guaranteed even under the time-varying delay.



On the Use of Virtual Springs to Avoid Singularities and Workspace Boundaries in Force-Feedback Teleoperation
A. Rubio[1], A. Avello[1] and J. Florez[2]
[1]CEIT and [2]Universidad de Navarra

- Reaching the end of the workspace of the master or the slave robots makes teleoperation difficult for operator
- Several virtual springs exert a force to avoid the master robot to get into the proximity of a singularity or out of its workspace. The proximity to a singularity is measured by the condition number of a modified Jacobian.
- The behavior of the virtual force feedback is quite intuitive for the operator and does not have to care about the particular position of the manipulator.
- Virtual springs has proven to be very useful and can be easily implemented in any robot.