

2006 9th IEEE International Workshop on Advanced Motion Control

**Istanbul, Turkey
27-29 March 2006**

Volume 1 of 2



IEEE Catalog Number:
ISBN:

06TH8850
0-7803-9511-5

**Copyright © 2006 by The Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republications permission, write to IEEE Copyrights Manager, IEEE Operations Center, 445 Hoes Lane, Piscataway, New Jersey USA 08854. All rights reserved.

IEEE Catalog Number:	06TH8850
ISBN:	0-7803-9511-5
Library of Congress:	2005932838

Additional Copies of This Publication Are Available from:

IEEE Service Center
445 Hoes Lane
Piscataway, NJ 08854
IEEE Service Center
445 Hoes Lane
Piscataway, NJ 08854
Phone: (800) 678-IEEE
(732) 981-1393
Fax: (732) 981-9667
E-mail: customer-service@ieee.org

Table of Contents

Human Adaptive Mechatronics Interaction and Intelligence.....	1
Fumio Harashima, Satoshi Suzuki	
On the Study of Human-Robot Collaboration: A Position Paper	9
Illah Nourbakhsh	
A Control System with High Speed and Real Time Communication Links	12
Tianjian Li, Yasutaka Fujimoto	
LMI-based H_2-H_∞ Stability Analysis and Control of Networked Control Systems with Randomly Time-varying long delays.....	18
Changhong Wang, Qinghua Li, Qiyong Wen, Weinan Xie	
Passive Teleoperation Control with Varying Time Delay	23
Changlei Zhang, Yeedong Lee, Kil To Chong	
Design of Gain-Scheduling Controller Based on Interpolation of Loop Shaping H_∞ Controller	29
Yuki Maekawa, Kazuhiro Yubai, Junji Hirai	
Open Architecture Hierarchical Predictive Control for Saturation Avoidance	33
M. Susanu, D. Dumur	
Comparative Analysis of Two Adaptive Controls based on Geometric Principles of Identification and the Extension of the Modified Renormalization Transformation	39
Jozsef K. Tar, Imre J. Rudas, Kazuhiro Kosuge	
Model Predictive Controller Combined with LQG Controller and Velocity Feedback to Control the Stewart Platform.....	44
Esmaeil Shahrak Nadimi, Thomas Bak, Roozbeh Izadi-Zamanabadi	
Position Control of a Stewart-Gough Platform Using Inverse Dynamics Method with Full Dynamics	50
A. Ghobakhloo, M. Eghtesad, M. Azadi	
New Synthesis Design of Reliable Robust Tracking Controllers Using LMI	56
Fu-Zhong Wang, Georgi M. Dimirovski, Yuan-Wei Jing, Si-Ying Zhang	
Takeoff and Landing Control using Force Sensor by Electrically-Powered Helicopters.....	62
Akira Shimada, Masanori Fujita	
An Integrated Environment for the Modeling and Simulation of Mechatronics Devices	66
J.M. Rosario, D. Dumur	
Gravity Estimation and Compensation of Grasped Object for Bilateral Teleoperation.....	72
Koichi Nishimura, Kouhei Ohnishi	
Contact State Determination for Robotic-Based Cylindrical Pair Height Adjustment under Dynamic Conditions.....	78
P.I. De Waas Tilakaratna, B. Shirinzadeh, G. Alici	
Modal System Design of Multi-Robot Systems by Interaction Mode Control	84
Seiichiro Katsura, Kiyoshi Ohishi	
A Fundamental Study on Reconfigurable Robot System Construction with Central- and Local Intelligence	90
Nobuyasu Miwa, Kazuhiro Yubai, Junji Hirai	

Motion Control Design of a Manufactory Plant by Dedicated Software	94
Alessandro De Carli , Oreste Marinelli	
Control Design for Self Servo Track Writer using Estimation of the Head Position	99
Norihiro Nakamura, Nobutaka Bando, Yoichi Hori	
Vibration Control Above The Nyquist Frequency in Hard Disk Drives.....	103
Takenori Atsumi, Atsushi Okuyama, Shinsuke Nakagawa	
Accurate Friction Compensation for Precision Stage using Synchronous Piezoelectric Device Driver.....	109
Truong Ngoc Minh, Kiyoshi Ohishi, Masasuke Takata, Seiji Hashimoto, Kouji Kosaka, Hiroshi Kubota, Tadahiho Ohmi	
Fast and Precise Positioning of Ball Screw-driven Table System using Minimum Jerk Control-based Command Shaping	115
Kazuaki Ito, Masafumi Yamamoto	
On-line Measurement and Compensation of Geometrical Errors for Cartesian Numerical Control Machines	120
Francesco Biral, Paolo Bosetti	
A New Direct Deformation Sensor for Active Compensation of Positioning Errors in Large Milling Machines	126
Francesco Biral, Paolo Bosetti, Roberto Oboe, Francesco Tondini	
New Robust Feedforward Tracking Control Structure for Optical Disk Recording System	132
Kiyoshi Ohishi, Daiichi Koide, Toshimasa Miyazaki, Toru Hayano, Haruki Tokumaru, Isao Shibutani	
Reduction of external vibration in hard disk drives using adaptive feed-forward control with single shock sensor ...	138
Kazuaki Usui, Masashi Kisaka, Atsushi Okuyama, Masaki Nagashima	
Controller Switching Strategy for Constrained Systems and Its Application to Hard Disk Drives.....	143
A. Okuyama, T. Yamaguchi	
R/W Gap Delay Estimation for Self-servo Track Writing	149
J.N. Teoh, C. Du, G. Guo, L. Xie	
Vibration Suppression Multirate Seeking Control of Hard Disk Drives	153
Hiroshi Fujimoto, Keisuke Fukushima, Shinsuke Nakagawa	
Rejection of Repeatable Runout in Hard Disk Drives Using Mixed-Radix Algorithm	159
Motohiro Kawafuku, Atsushi Okuyama, Noriyuki Ishida, Masahito Kobayashi, Hiromu Hirai	
Robust Force Sensorless Control in Motion Control System.....	165
Atsushi Kato, Kouhei Ohnishi	
A Controller Design Method Based on Functionality.....	171
Toshiaki Tsuji, Kouhei Ohnishi, Asif Sabanovic	
High Performance Force Control for Cooperative of Null Space and Task Space Motion in Redundant Manipulator.....	177
Toshihiro Makinouchi, Toshiyuki Murakami	
A Control Strategy of Null Space Motion Using Passivity of PID Controller	183
Tsuyoshi Shibata, Toshiyuki Murakami	
High Precise Position Control of a Novel Electromagnetic Actuator Using Sensorless Detection.....	189
Wang Xiaoming, Lei Tao, Huang Xuyan	

Absolute Stabilization of Multi-Mass Resonant System by Phase-Lead Compensator Based on Disturbance Observer.....	194
Seiichiro Katsura, Kouhei Ohnishi	
Advanced Motion Control by Multi-Sensor based Disturbance Observer.....	200
Kouhei Irie, Seiichiro Katsura, Kiyoshi Ohishi	
Motion Control of Electric Vehicle Based on Cornering Stiffness Estimation with Yaw-moment Observer	206
Hiroshi Fujimoto, Naoki Takahashi, Akio Tsumasaka, Toshihiko Noguchi	
Skid Prevention for EVs based on Back-EMF Observer and its Implementation to IPM Motor Driven EV	212
Xiaoxing Liu, Takashi Koike, Yoichi Hori	
Time Delay Compensation by Communication Disturbance Observer in Bilateral Teleoperation Systems.....	218
Kenji Natori, Toshiaki Tsuji, Kouhei Ohnishi	
Evaluation of Error Bound for a DT Sliding Mode Control with Disturbance Observer.....	224
E. Y. Erdem, K. Abidi, A. Sabanovic	
Improvement of Disturbance Suppression Based on Disturbance Observer	229
Mariko Mizuochi, Toshiaki Tsuji, Kouhei Ohnishi	
PID + Rule - Based Variable Structure Control of Active Magnetic Bearings for High Speed Rigid Rotors	235
Fuat Gürleyen	
Plant Behaviour Dictation using a Sliding Mode Model Reference Controller.....	243
Cagdas Denizel Onal, Asif Sabanovic	
Collision Avoidance Maneuver for an Autonomous Vehicle	249
M. Durali, G. Amini Javid, A. Kasaiezadeh	
Coordinated Task Manipulation by Nonholonomic Mobile Robots.....	255
Nusrettin Gulec, Mustafa Unel, Asif Sabanovic	
A Voice Command System for Autonomous Robots Guidance.....	261
Mohamed Fezari, Mounir Bousbia-Salah	
Experimental Study of Wheeled Forms for Lunar Rover on Slope Terrain	266
Kojiro Iizuka, Yoshinori Sato, Yoji Kuroda, Takashi Kubota	
Managing the Dynamics of a Potential Field-Guided Robot in a Cluttered Environment	272
Ahmad A. Masoud	
Semi-Decentralized Control of Multi-Agent Systems Based on Redundant Manipulator Optimization Methods.....	278
Nasser Sadati, Ehsan Elhamifar	
Real-time Collision-free Path Planning for Robot Manipulator Based on Octree Model.....	284
Lu Wu, Yoichi Hori	
Development of a Snake-like Robot	289
J. Bezgovsek, I. Grabec, P. Muzic	
Mobile Robot Navigation in an Unknown Environment.....	295
A. Jazayeri, A.Fatehi, H. Taghirad	

Optimal Motion Planner of Mobile Manipulators in Generalized Point-to-Point Task.....	300
M. Haddad, T. Chettibi, S. Hanchi, H. E. Lehtihet	
High-Speed Motion Control of Inverted Pendulum Robots.....	307
Akira Shimada, Naoya Hatakeyama	
Walker with Hand Haptic Interface for Spatial Recognition	311
H.Hashimoto, A.Sasaki, Y.Ohyama, C.Ishii	
Improvement of Performance in Bilateral Teleoperation by using FPGA	317
Ena Ishii, Hiroaki Nishi, Kouhei Ohnishi	
Realization of Virtual Force Sensation through Bilateral Teleoperation	323
Hideyuki Kobayashi, Kouhei Ohnishi	
Free Allocation of Actuator against End-Effector by Using Flexible Actuator.....	329
Koichiro Tsuji, Yujiro Soeda, Hiroyuki Nagatomi, Masaki Kitajima, Yasuhide Morikawa, Soji Ozawa, Toshiharu Furukawa, Toshikazu Kawai, Ohnishi Kouhei	
Decoupled Haptic Transmission by Multilateral Control	334
Toshiyuki Suzuyama, Seiichiro Katsura, Kiyoshi Ohishi	
Human Walking Assist Control on Level Ground.....	340
Naoki Hata, Yoichi Hori	
Integrated Motion Control of a Wheelchair in the Longitudinal, Lateral and Pitch Directions	344
Sehoon Oh, Naoki Hata, Yoichi Hori	
Power-Assist Motion of an Electric Wheelchair for a Caregiver	350
Yukiko Kaida, Toshiyuki Murakami	
Study on parameters identification of dynamic equation of human lower limb for improved estimation of muscular tensions	356
Shohei Oda, Noboru Okuyama, Satoshi Komada, Junji Hirai	
Comparison of Real Environmental Models for Reproduction of Force Sensation in Bilateral Motion Control.....	362
Tomoyuki Shimono, Seiichiro Katsura, Kouhei Ohnishi	
An Extraction Method of Environmental Surface Profile Using Planar End-Effectors	368
Ryogo Kubo, Kouhei Ohnishi	
Assist Control and its Tuning Method for Haptic System	374
Satoshi Suzuki, Fumio Harashima, Keiichi Kurihara	
Cellular Neural Network Based Deformation Simulation with Haptic Force Feedback.....	380
Y. Zhong, B. Shirinzadeh, G. Alici, J. Smith	
A Study of Energy-Saving Shoes for Robot considering 3D Motion	386
Hideaki Minakata, Susumu Tadakuma	
A Study of CPG Based Walking Utilizing Swing of Arms	392
Keiichi Osaku, Hideaki Minakata, Susumu Tadakuma	
Discussion on limitations for the 3D fast biped walking.....	397
Atsuo Kawamura, Chi Zhu, Yusuke Takasu, Masamichi Ozeki	

Biped Robot Reference Generation with Natural ZMP Trajectories	403
Okan Kurt, Kemalettin Erbatur	
Control of Spring Actuator and Its Application to Biped Robot.....	411
Sota Murai, Yasutaka Fujimoto	
Position and Attitude Control of a Spherical Rolling Robot Equipped with a Gyro.....	416
Toshiaki Otani., Takateru Urakubo, Satoshi Maekawa, Hisashi Tamaki, Yukio Tada	
A Method of Deciding Force Feedback Gain against External Force for Biped Robot	422
Motomi Ikebe, Kouhei Ohnishi	
Stability on Orientation Motion of Biped Walking Robot aiming at a Target Object	428
Yosuke Asano, Atsuo Kawamura	
Free Gait for Quadruped Robots with Posture Control.....	433
Hiroshi Igarashi, Tamotsu Machida, Fumio Harashima, Masayoshi Kakikura	
Impulsive control for a thirteen-link biped	439
Yannick Aoustin, David Tlalolini Romero, Christine Chevallereau, Sebastien Aubin	
Tip Position Control of a Flexible-Link Arm	445
A. Arisoy, M. Gökasan, O.S. Bogosyan	
Fault-Tolerant Control of Flexible Arm Based on Dual Youla Parameter Identification	451
T. Sakuishi, Y. Izumikawa, K. Yubai, J. Hirai	
Funnel-Control with Integrating Prefilter for Nonlinear,Time-varying Two-Mass Flexible Servo Systems	456
C.M. Hackl, H. Schuster, C. Westermaier, D. Schröder	
Adaptive switching control method for active vibration isolation.....	462
Zhou Shuo, Li Yuntang, Meng Guang, Ding Han	
A Joint Design Method for Achieving Robust Performance -Experimental Study in 2-mass System-	468
N. Wakayama, K. Yubai, J. Hirai	
A Robotic Gripper based on Conducting Polymer Actuators	473
Gürsel Alici, Nam N. Huynh	
Towards Improving Positioning Accuracy of Conducting Polymer Actuators.....	479
Gürsel Alici and Nam N. Huynh	
Stick-Slip Based Micropositioning Stage for Transmission Electron Microscope.....	485
O. Holub, M. Spiller, Z. Hurak	
Microsystems and System-on-Chip Integration applied to Inertial Measuring System Development.....	489
Xavier Fitó, Francesc Lleixa, Guo Yi, Carles Ferrer	
Object tracking in the GI tract: A novel microcontroller approach	495
K. Arshak, F. Adepoju	
Soft Microcontact Printing with Force Control using Microbiotic Assembly based Templates.....	501
Afshin Tafazzoli, Metin Sitti	

Performance of Driving Method of Piezoelectric Actuator by Using Current Pulse	507
K. Furutani, K. Iida	
Modelling and Control of IRST MEMS microphone	513
D. Cattin, A.Faes, B.Margesin, R.Oboe	
Special Class of Positive Definite Functions for Formulating Adaptive Micro/Nano Manipulator Control	518
Hwee Choo Liaw, Denny Oetomo, Gursel Alici, Bijan Shirinzadeh	
Adaptive Space Vector Modulator for Three-Level NPC PWM Inverter-Fed Induction Motor	524
Wojciech Kolomyjski, Mariusz Malinowski, Marian P. Kazmierkowski	
Magnetic Levitation Control and Spiral-Linear Transformation System for Spiral Motor.....	530
Tsutomu Kominami, Yasutaka Fujimoto	
Thrust Characteristic of Spiral Motor Using FEM Analysis and Compensation for Thrust Fluctuation.....	536
Hyuk-jin Kwon, Yasutaka Fujimoto	
Commutation Torque Ripple of Four-Switch Brushless DC Motor Drives, Part I: Analysis.....	542
A. Halvaei Niasar, H. Moghbelli, A. Vahedi*	
Commutation Torque Ripple of Four-Switch, Brushless DC Motor Drives, Part II: Controllability and Minimization.....	548
A. Halvaei Niasar, H. Moghbelli, A. Vahedi	
Speed Sensorless Variable Structure and Event Driven Torque Control of PMSM	554
A. Poli, E. Urlep, K. Jezernik	
AC Servo Motor Position Sensorless Control using Mechanical Springs.....	560
Akira Shimada, Yu Kishiwada, Michiyo Arimura	
Active Estimation of the Initial Phase for Brushless Synchronous Motors	564
Jérémy Malaizé ,Jean Lévine	
MRAS-based Adaptive Speed Estimator in PMSM Drives	570
H. Madadi Kojabadi, M. Ghribi	
Non-holonomy in IM Torque Control.....	574
B. Grear, P. Cafuta, G. Stumberger, H.R. Cortes, A.M. Stankovic	
Robots in the Wild: Observing Human-Robot Social Interaction Outside the Lab	580
Selma Sabanovic, Marek P. Michalowski, Reid Simmons	
Predictive Control of an Electromagnetic Suspension System Based on Locally Linear Model Tree and Subset Selection	586
Iman Mohammadzaman, Atiye Sarabi Jamab	
Vehicle Stabilizing Control Using Small EV Powered only by Ultra Capacitor	592
Kiyotaka Kawashima, Toshiyuki Uchida, Yoichi Hori	
Robust Design of Body Slip Angle Observer with Cornering Power Identification at Each Tire for Vehicle Motion Stabilization	597
Yoshifumi Aoki, Zhao Li, Yoichi Hori	
Optimum Traction Force Distribution for Stability Improvement of 4WD EV In Critical Driving Condition.....	603
Peng He, Yoichi Hori	

Cooperative Control of Full Electric Braking System With Independently Driven Four Wheels	609
Taizo Sakamoto, Kuniaki Hirukawa, Tsutomu Ohmae	
Multi-Objective Evolutionary Design of Fuzzy Logic Controllers for Car Parking Problem	614
Joon-Yong Lee, Min-Soeng Kim, Ju-Jang Lee	
In-wheel Motor Design for Electric Vehicles.....	620
K. Cakir, A. Sabanovic	
Vision-based Tracking Control using Mark Recognition	626
Shunsuke Nara, Daisuke Miyamoto, Satoru Takahashi	
A New Method for Uncalibrated Visual Servoing	631
M. Bonkovic, A. Hace, K. Jezernik	
Visual Tracking and Control of a Moving Overhead Crane Load.....	637
Yasuo Yoshida, Koji Tsuzuki	
Visual Servo of Active Camera and Manipulator with Simple On-line Calibration for Estimated Image Feature	643
Itsushi Kinbara, Satoshi Komada, Junji Hirai	
Visual Servo System For Controlling Tension Of Non-Linear-Elastic Web Deformation.....	648
M.A. Ayub, M.R. Jackson	
Robust Control of Rotary Cranes Based on Pole Placement Approach	654
Naoki Uchiyama, Shoji Takagi, Shigenori Sano	
Robust Control of Two 5 DOF Cooperating Robot Manipulators.....	660
Mohammad Azadi, Mohammad Eghtesad, Amir Ghobakhloo	
Combined Adaptive-Robust and Neural Network Control of RLED Robot Manipulators Using Backstepping Design	666
H. Jafarian, M. Eghtesad, A. Tavasoli	
Trajectory Optimization of Mechanical Hybrid Systems Using SUMT	672
Kerim Yunt, Christoph Glocker	
A Nonlinear PID Servo Controller for Computer Hard Disk Drives.....	679
Muhammad A. Hawwa, Ahmad A. Masoud	
Robust Maximum Principle.....	684
V. G. Boltyanski	
An Adaptive Output Feedback Tracking Control of Robot Manipulator via Fuzzy Logic Based Compensation.....	688
Turker Sahin, Emre Eroglu, Erkan Zergeroglu	
Self-adaptive robot control using Fuzzy Logic.....	694
I.Rojas, H.Pomares, J.Gonzalez, L.J.Herrera, A.Guillen, O.Valenzuela	
Is fuzzy logic a practical choice in resource constrained embedded control systems implemented using general- purpose microcontrollers?	699
Ricardo Bautista, Michael J. Pont	
Fuzzy Model Based Nonlinear Control of an Active Oscillation Suppression System Comprised of Mechanically Flexible Elements and Triple Configuration of U-Shaped Electromagnets.....	705
K. Erkan, T. Koseki	

Nonlinear speed control of a dc motor drive system with online trained recurrent neural network.....	711
Khaled Nouri, Rached Dhaouadi, Naceur Benhadj Braiek	
Soft-Computing techniques for the development of adaptive helicopter flight controller	716
I.Rojas, H.Pomares, J.Gonzalez, L.J.Herrera, A.Guillen, F.Rojas	
Model Reference Adaptive Sliding Mode Control of Uncertain Systems Subject to Input Nonlinearity	722
Wen-long Song, Jun Cao	
Experimental Investigation of a SMC High Precision Control.....	728
Khalid Abidi, Asif Sabanović	
A Discrete-Time Periodic Adaptive Control Approach for Time-Varying Parameters with Known Periodicity	734
Khalid Abidi, Xu Jian-Xin	
A Sliding Mode Approach to Visual Motion Estimation.....	740
Eray Dogan, Burak Yilmaz, Mustafa Unel, Asif Sabanovic	
Discrete-time Sliding Mode Control of High Precision Linear Drive using Frictional Model.....	746
Shahzad Khan, Asif abanović	
Three Tips from a Social Psychologist for Building a Social Robot.....	751
L. R. Caporael	
Comparing Human Robot Interaction Scenarios Using Live and Video Based Methods: Towards a Novel Methodological Approach.....	757
Sarah Woods, Michael Walters, Kheng Lee Koay, Kerstin Dautenhahn	
A Spatial Model of Engagement for a Social Robot.....	763
Marek P. Michalowski, Selma Sabanovic, Reid Simmons	
Social Robots for Children: Practice in Communication-Care	769
Hideki Kozima, Cocoro Nakagawa	
Study on Direct Torque Control of Permanent Magnet Synchronous Motor in Electric Vehicle Drive	775
Xu Jiaqun, Ouyang Minggao, Tang Renyuan	