

## ROBERTO HOROWITZ

Distinguished Professor and James Fife Endowed Chair  
Department of Mechanical Engineering  
University of California, Berkeley

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### RESEARCH INTERESTS:

Adaptive, robust, learning and nonlinear control. Robotics. Modeling, simulation and management of traffic network systems, intelligent vehicle and highways systems (IVHS) and autonomous vehicles, mechatronic systems, control of micro-electromechanical systems (MEMS).

### EDUCATION:

6/83 Ph.D. in Mechanical Engineering, University of California, Berkeley.  
Major: Dynamic Systems and Control. Minors: Design and Mathematics.

12/77 B.S. in Mechanical Engineering, University of California, Berkeley.  
Graduated with the highest honors.

### PROFESSIONAL EXPERIENCE:

7/94 - present Distinguished Professor of Mechanical Engineering, University of California, Berkeley.  
Duties include: Teaching of undergraduate and graduate courses in control theory and dynamic systems, robotics, mechatronics, programming, real time computer applications in mechanical engineering, and mechanical engineering laboratories. Research supervision of graduate students in the above mentioned areas.

12/15 - 7/21 Chair, Department of Mechanical Engineering, University of California, Berkeley.

1/11 - 6/15 Director, California Partners for Advanced Transportation Technologies (PATH), University of California, Berkeley.  
Duties include: Management of a research center with nearly 70 employees and a combined average annual budget of around \$9M. Conducting, directing and managing research. Research staff supervision. Setting and procuring programatic research and funding goals.

- 7/00 - 7/03 Vice-Chair of Graduate Study, Department of Mechanical Engineering University of California, Berkeley.
- 7/89 - 6/94 Associate Professor of Mechanical Engineering, University of California, Berkeley.
- 7/83 - 6/89 Assistant Professor of Mechanical Engineering, University of California, Berkeley.
- 7/84 - 8/84 IBM General Product Division, Magnetic Disk File Systems, San Jose, California. Responsible for evaluating research and academic developmental needs of mechanical engineers in the disk file servo product division.
- 9/82 - 6/83 Acting Assistant Professor of Mechanical Engineering, University of California at Berkeley. Responsible for teaching an undergraduate course in dynamic systems and controls and a graduate course in optimal, adaptive and stochastic control.
- 4/81 - 6/81 Acting Instructor of Mechanical Engineering, University of California, Mechanical Engineering. Responsible for teaching undergraduate course in dynamic systems.
- 9/79 - 6/80 Teaching Assistant, University of California, Berkeley, Department of Mechanical Engineering. Graduate student teaching aid in the instruction of graduate control theory courses.
- 6/78 - 8/78 Research Assistant, University of California, Biomechanics Laboratory. Analysis and optimization of six link artificial knee.
- 1/78 - 3/78 Teaching Assistant, University of California, Berkeley, Department of Mechanical Engineering. Graduate student teaching aid in the instruction of an undergraduate course in numerical methods.
- 7/77 - 9/77 Internship, Department of General Engineering, Amuay oil refinery, LAGOVEN, Venezuela.

AWARDS:

- 6/18 ASME Rufus Oldenburger Medal. Society award for lifetime achievements in automatic control.
- 7/13 ASME Fellow.
- 10/10 ASME Dynamic Systems and Control Division, Henry M. Paynter Outstanding Investigator Award.
- 7/08 -PRESENT James Fife Endow Chair in Mechanical Engineering, University of California, Berkeley.

- 11/16 Best Student Paper Award (faculty advisor) at the IEEE 19th International Conference on Intelligent Transportation Systems (ITSC),(faculty Advisor) S. Koehler, N. Mehr, R. Horowitz and F. Borrelli. “Stable hybrid Model Predictive Control for ramp metering.”
- 10/09 ASME Dynamic Systems and Control Division, Best Student Paper Award (faculty advisor) at the ASME Dynamic Systems and Control Conference, October 2009. ”Analysis of  $H_2$  Guaranteed Cost Performance.” (with R. Conway).
- 7/07 American Automatic Control Council (AACC) Best Student Paper Finalist (faculty advisor) at the American Control Conference, July 2007. ”Parametric uncertainty identification and model reduction for robust  $H_2$  synthesis for track-following in dual-stage hard disk drives.” (with R. Conway and S. Felix).
- 6/05 American Automatic Control Council (AACC) Hugo Schuck Best Application Paper Award for the paper “Mixture Kalman filter based highway congestion mode and vehicle density estimator and its application.” (with X. Sun and L. Muñoz).
- 6/05 American Automatic Control Council (AACC) Best Student Paper Finalist (faculty advisor) at the American Control Conference, June 2005. ”Topology Preserving Neural Networks that Achieve a Prescribed Feature Map Probability Density Distribution.” (with J. Choi).
- 1/97 - 3/97 Japanese Ministry of Education Foreign Researcher Award.
- 7/87 - 7/92 NSF Presidential Young Investigator Award.
- 1/84 - 9/85 IBM Young Faculty Development Award.
- 6/83 PI TAU SIGMA Excellence in Teaching Award, University of California, Berkeley.
- 1/78 - 6/82 CONICIT Venezuelan graduate fellowship.
- 12/77 B.S. with the Highest Honors, University of California, Berkeley.
- 1/75 - 12/77 GMA Venezuelan undergraduate fellowship.

#### SOCIETY MEMBERSHIP AND PROFESSIONAL ACTIVITIES

- 8/23-12/25 Member of the IEEE Intelligent Transportation Systems Society (ITSS) Board of Governors.
- 5/19-PRESENT Department of Mechanical Engineering External Advisory Board (EAB), University of Maryland.
- 11/18-11/23 Member (11/18-6/19) and Chair of the Honors Committee of the Dynamics Systems and Control Division of ASME (7/19-11/23).
- 2012 Organizing Committee member of the Join 2012 ASME Dynamic Systems and Control Conference and MOVIC.

- 2010 Executive Committee Chair of the ASME Dynamic Systems and Control Division.
- 2010 Organizing Committee member of the Join 2010 ASME Dynamic Systems and Control Conference and IFAC Symposium on Mechatronics Systems
- 2009 Program Committee member of the 2009 IFAC Symposium on Control in Transportation Systems
- 2009 Program Committee member of the 2009 IEEE Multi-conference on Systems and Control (MSC 2009)
- 2008-2010 Chair of IFAC Technical Committee 4.1.
- 2007 Program Committee member (Editor) of the 2008 IFAC World Congress.
- 2006-2011 ASME Dynamic Systems and Control Executive Committee member.
- 2006 Program Committee member of the IEEE MMM/Intermag-2007 Conference.
- 2006-2009 Honors Committee member of the Dynamics Systems and Control Division of ASME.
- 2003-2004 Program Committee member of the 2004 joint IEEE Conference on Control Applications (CCA), International Symposium on Intelligent Control (ISIC) and Computer Aided Control Systems Design (CACSD).
- 2002-2003 Publicity Chair and member of the Organizing Committee for the 2003 American Control Conference (ACC).
- 2002 USA Co-Chair of the 2002 IEEE Asian Pacific Magnetic Recording Conference.
- 2002 Member of the Advisory Panel for the Venezuelan Ministry of Science and Technology and Evaluator of their Scholarship and Research Funding Programs, January 16-20 2002.
- 2000 Program Committee member of the 2000 IEEE Asian Pacific Magnetic Recording Conference.
- 1999 Program Committee member of the 9th IFAC Symposium on Control and Transportation Systems, 2000.
- 1999 Program Committee member of the 2000 IEEE International Conference on Robotics and Automation.
- 1998-2019 Associate Editor, Journal of Information Storage and Processing Systems.
- 1998-2019 Associate Editor, Journal of Micromechatronics,VSP.
- 1998 Program Committee member of the 1998 IEEE Asian Pacific Magnetic Recording Conference.

- 1997 Program Committee member of the IEEE CIRA'97 Workshop.
- 1997 Program Committee member of the IEEE SYROCO'97 Conference.
- 1996 Program Committee member of the 1996 IEEE Asian Pacific Magnetic Recording Conference.
- 1996 Program Committee member of the 1996 IEEE International Conference on Robotics and Automation.
- 1996 Program Vice Chair of the AMC'96-MIE 4th International Workshop on Advanced Motion Control.
- 1996 Organizing Committee member of the 1996 Japan-USA Symposium on Flexible Automation.
- 1992 USA Program Vice-chair of the 1992 Japan-USA Symposium on Flexible Automation, Organized by the DSCD of the ASME.
- 1991 ASME representative and a member of the 1991 American Control Conference program committee.
- 1990 ASME representative and a member of the 1990 American Control Conference program committee.
- 7/89 - 7/92 Associate Editor of the ASME Journal of Dynamic Systems Measurement and Control
- 11/84 - 12/89 Chairman of Adaptive Control Panel of the Dynamic Systems and Control Division (DSCD).
- Member of the Institute of Electrical and Electronics Engineers (IEEE).
- Fellow of the American Society of Mechanical Engineers (ASME).
- Member of Tau Beta Pi Engineering Honor Society.
- Member of Pi Tau Sigma Mechanical Engineering Honor Society.

#### STUDENTS WHO COMPLETED THEIR PH.D. UNDER MY SUPERVISION (48)

- 2023 Ruolin Li, *Towards Smarter Transportation: A Study of the Behavior and Organization of Autonomous and Human-Driven Vehicles*. Dr. Li is an Assistant Professor in the Department of Civil and Environmental Engineering at the University of Southern California, effective Fall 2024. (ruolin.li@berkeley.edu)
- 2021 Zhi Chen, *Feedforward Learning Control For Multi Actuator Hard Drives and Freeform 3D Printers*. Spring 2021. Dr. Chen is a senior engineer at Momemta in Beijing, China. (chenzhi@berkeley.edu)

- 2020 Prateek Shah, *Joint Feedback and Feedforward Data Driven Control Design and Input Shaping Techniques for Multi Actuator Hard Disk Drives*. Summer 2020. Dr. Shah is a research engineer at Western Digital in San Jose. (prateek280@gmail.com)
- 2019 Cheng-Ju Wu, *Field Implementation of Freeway Control*. Dr. Wu is currently a control and system integration engineer. (chengju@berkeley.edu)
- 2019 Matt Wright, *Studies on Complex and Connected Transportation Networks*. Summer 2019. Dr. Wright is currently a researcher at LBNL. (wrightmatt2@gmail.com)
- 2019 Negar Zahedi Mehr, *Mobility-Efficient Smart Cities: from Human-Driven Cars to Mixed Vehicle Autonomy*. Summer 2019. Dr. Mehr is an assistant professor in the Department of Mechanical Engineering at the University of California, Berkeley. (negar@berkeley.edu)
- 2017 Omid Bagherieh, *Estimation, Identification and Data-Driven Control Design for Hard Disk Drives*. Spring 2017. Dr. Bagherieh is a research engineer at Apple. (omidba2@gmail.com)
- 2015 Fu Zhang, *Control and Self-Calibration of Microscale Rate Integrating Gyroscopes (MRIGs)*. Fall 2015. Dr. Zhang is an assistant professor in the Department of Mechanical Engineering at the University of Hong Kong (HKU). (vicfuzhang1@gmail.com)
- 2015 Behrooz Shahsavari *Direct and Indirect Adaptive Feedforward Repetitive Control of Servo Systems*. Fall 2015. Dr. Shahsavari is a Senior Manager at Apple (b.shahsavari@gmail.com).
- 2014 Donyang Su, *Modeling, Estimation and Control of Traffic*. Fall 2014. Dr. Su is a Software Engineer, Infra at Facebook (dongy.su@gmail.com).
- 2012 Ajith Muralidharan, *Tools for Modeling and Control of Freeway Networks*. Fall 2012. Dr. Muralidharan recently co-founded Aliveo AI (ajithm@gmail.com).
- 2012 Gunes Dervisoglu, *Automatic Calibration of Freeway Models with Model-Based Sensor Fault Detection*. Fall 2012. Dr. Dervisoglu is a research engineer at Apple.
- 2012 Rene O. Sánchez, *Wireless Magnetic Sensor Applications in Transportation Infrastructure*. Fall 2012. Dr. Sánchez is a Principal Engineer at Sensys Networks (renesanper@gmail.com).
- 2012 Josiah Wernow, *On the Future of Head-Based Micro-actuators in Hard Disk Drives*. Spring 2012. Dr. Wernow is a research engineer at Seagate.
- 2011 Richard Conway, *Discrete-Time  $H_2$  Guaranteed Cost Control*. Spring 2011. Dr. Conway is a research engineer at Western Digital Corporation (Richard.Conway@wdc.com)
- 2011 Jianbin Nie, *Control Design and Implementation of Hard Disk Drive Servos*. Spring 2011. Dr. Nie is a research engineer at Apple (njb.ustc@gmail.com)

- 2010 Sarah Felix, *Integration of piezoelectric sensing and control for nano-scale vibration suppression in hard disk drives*. Spring 2010. Dr. Felix is a Professor of Practice, Rensselaer Polytechnic Institute (sarahfelix@cal.berkeley.edu).
- 2008 Edgar Ergueta, *Full Sheet Control Through the Use of a Steerable Nips Mechanism*. Spring 2008. Dr. Ergueta is currently a senior research engineer at Apple (eergueta@hotmail.com).
- 2007 Stanley Kon, *High Resolution MEMS Strain Sensors for Vibration Detection on Hard Disk Drive Instrumented Suspensions*. Spring 2007. Dr. Kon is currently a senior director at Applied Materials.
- 2006 Sing Yiu Cheung, *Traffic Surveillance by Wireless Sensor Networks*. Fall 2006. (P. Variaya co-Chair). Dr. Cheng is currently a Lead Engineer at All Day Kitchens (singyiu@gmail.com).
- 2006 Rene Sánchez, *Nonlinear Control Strategies for a Steerable Nips Mechanism*. Spring 2006. Dr. Sanchez is currently Principal Mechanical Engineer - Control Systems at Multibeam Corporation (r2sanchez@gmail.com).
- 2006 Kenn Oldham, *Microdevices for Vibration Suppression in Computer Hard Disk Drives*. Spring 2006. Dr. Oldham is currently a Professor of Mechanical Engineering at the University of Michigan (oldham@umich.edu).
- 2006 Jongeun Choi, *Self-Organizing Algorithms for Controlling Network Feature Map Probability Distributions, and Synthesizing Multiple Robust Controllers*. Spring 2006. Dr. Choi is currently a Professor of Mechanical Engineering at Yonsei University in South Korea (jongeunchoi@yonsei.ac.kr).
- 2006 Xinghui Huang, *Robust Track-Following Control Design for Dual-Stage Servo Systems with a MEMS Microactuator and an Instrumented Suspension*. Spring 2006. Dr. Huang is currently a Senior Staff Engineer at Seagate (XinghuiHuang@mail.com).
- 2005 Si-Hyung (Shawn) Lim, *Opto-Mechanical Sensor Array for Physically and Chemically Induced Nanoscale Motion Detection*. August 2005 (A. Majumdar, co-advisor). Dr. Lim is currently an Assistant Professor in the School of Mechanical and Automotive Engineering at Kookmin University in South Korea (shlim@kookmin.ac.kr).
- 2005 Xiaotian Sun, *Modeling, Estimation, and Control of Freeway Traffic*. Spring 2005. Dr. Sun is currently a Software Engineer, Autonomous Driving in Nvidia (sunxt@cal.berkeley.edu).
- 2004 Gabriel Gomes, *Optimization and Microsimulation of On-ramp Metering for Congested Freeways*. Dr. Gomes is currently a research at PATH and an Instructor in the Mechanical Engineering Department at UC Berkeley (gomes@berkeley.edu).
- 2004 Laura Muñoz *Macroscopic Modeling and Identification of Freeway Traffic Flow*. Dr. Muñoz is currently a Professor at Rochester Institute of Technology (lmsma@rit.edu).

- 2003 Yunfeng Li *Dual-Stage Servo Control and Active Vibration Compensation in Magnetic Hard Disk Drives*. Dr. Yi is currently at Apple.
- 2001 Jingang Yi, *Fault Detection and Handling for Longitudinal Control*. Dr. Yi is currently a Professor in the Department of Mechanical and Aerospace Engineering at Rutgers University (jgyi@soe.rutgers.edu).
- 2001 Carlo Cloet, *A Mechatronics Approach to Copier Paperpath Design*, July 2001 (M. Tomizuka, co-advisor). Dr. Cloet Dr. Cloet is currently a Model Based Control Design Engineer at CNH, Belgium.
- 2001 Tsung-Lin (Tony) Chen, *Design Fabrication and Control of PZT-Actuated Polysilicon Suspensions for Hard Disk Drives*. Dr. Chen is currently a Professor in the Department of Mechanical Engineering, National Chiao Tung Univ. in Taiwan (tsunglin@nycu.edu.tw).
- 2000 Sungsu Park, *Adaptive Control Strategies for MEMS Gyroscopes*, Dec. 2000 Dr. Park is currently a Professor in the Department of Aerospace Engineering, Sejong University, Korea (sungsu@sejong.edu).
- 2000 Martin Krucinski, *Paper Path Control of Xerographic Machines*, Dec. 2000 (M. Tomizuka, co-advisor). Dr. Krucinski is currently a Principal Controls Software Engineer - Surgical Robotics at Medtronic, North Haven, Connecticut (martin1376@gmail.com).
- 2000 Charmaine Toy, *Emergency Vehicle Control Laws and Maneuvers for Automated Highway Systems*, May 2000 Dr. Toy is currently at Dicon Fiberoptics.
- 1997 David Horsley, *Microfabricated Electrostatic Actuators for Magnetic Disk Drives*, May 1997 (A.P. Pisano was a co-advisor). Dr. Horsley is currently an Adjunct Professor at UC Davis and Northeastern University, a Startup Founder, and an Advisor & Angel Investor (dahorsley@ucdavis.edu).
- 1997 Satinderpall Singh Pannu, *Adaptive Servo using Micromachined Accelerometers for Increased Disturbance Rejection for Magnetic Hard Disk Drives*, May 1997. Dr. Pannu is currently is currently VP of Product Research and Emerging Clinical Indications at Nevro.
- 1997 Joel F. Shields, *Control of Exercise Machines, Theory and Experiments*, December 1997. Dr. Shields is a researcher a JPL (joelfshields@yahoo.com).
- 1996 Luis Alvarez Icaza, *Automatic Highway Systems: Safe Platooning and Traffic Flow Control*, December 1996. Dr. Alvarez is a Professor in the Department of Electrical Engineering at the Universidad Autonoma Nacional de Mexico (UNAM) (alvar@pumas.iingen.unam.mx).
- 1995 Perry Y. Li, *Self-optimizing Control and Passive Velocity Field Control of Intelligent Machines*, May 1995. Dr. P. Li is a Professor in the Department of Mechanical Engineering of the University of Minnesota. (perry-li@umn.edu).



- 1995 Bo Li, *Wiener Filter Base Adaptive Control with Applications to the Design of Disk File Servos*, May 1995. Dr. Li is a Servo Engineer at HGST, a Western Digital Company.
- 1995 Patrick Cheung, *Design, Fabrication, Position Sensing and Control of Electrostatic, Surface-Micromachine Polysilicon Microactuators*, May 1995. Dr. Cheung is a Business Development Associate at CNT/Calnest, Fremont, CA.
- 1992 William Messner, *Learning Control*, December 1992. Dr. Messner is an Adjunct Professor in the Department of Mechanical Engineering, Carnegie-Mellon University (william.messner@gmail.com).
- 1992 James McCormick, *Performance Enhancements of Disk File Servos Through Adaptive Control*, December 1992. Dr. McCormick is now retired as a Senior Principal System Engineer at Medtronics, Boston, MA. area.
- 1990 Wei-Wen Kao, *Learning Control of Robot Manipulators*, Spring 1990. Dr. Kao was a Professor in the Department of Mechanical Engineering Yuan-Ze Institute of Technology, Taiwan, R.O.C. and is now COO/Asia General Manager at Eggtronic (wwkao1960@gmail.com).
- 1989 Chul Goo Kang, *Robust Deterministic Control for Robotic Manipulators*, Fall 1989. Dr. Kang is an Associate Professor in the Department of Mechanical Engineering at the Kon Kuk University, Mo-Jin-Dong Seong-Dong-Gu, Seoul, Korea.
- 1988 Jia-Yush Yen, *Identification and Control of a Computer Disk Drive Actuator*, December 1988. Dr. Yen is a Professor in the Department of Mechanical Engineering and currently the President, National Taiwan University of Science and Technology (Taiwan Tech)Taipei, R.O.C. (president@mail.ntust.edu.tw).
- 1987 Nader Sadegh, *Adaptive Control of Mechanical Manipulators: Stability and Robustness Analysis*, December 1987. Dr. Sadegh is a Professor in the School of Mechanical Engineering at Georgia Tech (nader.sadegh@me.gatech.edu).

#### SPONSORED PROJECTS, GRANTS AND RESEARCH GIFTS

- 1/23-1/28 Hong Kong Center for Construction Robotics Limited (HKCRC). UC Berkeley subaward. R. Horowitz PI, (L. Lin and Y. Ma co-PIs). Total: \$3,200,000.
- 8/21-7/26 Tsinghua-Berkeley Shenzhen Institute (TBSI). Construction Robot Learning and Compliant Control Systems. R. Horowitz PI. Total: \$265,000.
- 2/19 -1/24 NSF National Science Foundation, Transfer-to-Excellence (TTE) Research Experiences for Undergraduates (REU) Site. UCB Award ID: 045609-001. Co-PI: Roberto Horowitz (UC Berkeley). Total: \$359,952.
- 7/19- 7/23 Principal Investigator, (research gift) Track Following Controller Design for Triple-stage Actuation and Active Decoupling Vibration Rejection for Multi Actuator HDDs. IDEMA, ASRC. Research Gift. \$65,000 per year.

- 7/18-6/20 Principal Investigator, Controller Design and Active Decoupling Vibration Rejection for Multi Actuator HDDs. IDEMA, ASRC. \$80,000.
- 3/17-3/20 Principal Investigator, CPS: TTP Option: Synergy: Traffic Operating System for Smart Cities NSF. (P. Varaiya and M. Arcak co-PIs) \$1,200,000.
- 4/17-4/20 Investigator, Vehicle Dynamics and Powertrain (VD&PT) Control Architecture Based on a Predictive and Data-driven Approach. ARPA-E NEXTCAR. (F. Borrelli PI, S. Moura) \$3,300,000.
- 1/15-12/18 co-Principal Investigator, CPS: Synergy: Collaborative Research: Efficient Traffic Management: A Formal Methods Approach. NSF. (M. Arcak and C. Belta PIs). \$301,547.
- 7/14-6/17 Principal Investigator, California Partners for Advanced Transportation Technology, Program Management. Caltrans. \$4,797,496.
- 1/15-6/17 Principal Investigator, Connected Corridors – Data, Modeling and Simulation Development. Caltrans. \$420,050.
- 1/16-1/17 Principal Investigator, Data Driven, Frequency Domain Dual Stage Controller Design Western Digital Research Grant. \$60,000.
- 1/16-1/17 Principal Investigator, Adaptive Feedforward Vibration Suppression. Computer Mechanics Laboratory Grant. \$35,000.
- 3/15-2/16 Principal Investigator, Modeling and Control of HOT Lanes. Caltrans. \$113,276.
- 4/15-8/16 Principal Investigator, HOT Lane Calibration and Simulation Algorithms. Caltrans. \$252,078.
- 7/15-12/16 Principal Investigator, Triple-stage Servo Systems: Limits of Performance and Control Design. IDEMA, ASTC. \$129,152.
- 1/14-1/15 Principal Investigator, Control System with Varying Sampling Rates in Dual Actuator Systems. Computer Mechanics Laboratory Grant. \$35,000.
- 10/13-6/15 Principal Investigator, Servo Control Design and Performance-Prediction Tool. ASTC Research Grant. \$199,103.
- 7/13-6/15 co-Principal Investigator, Developing Technical Basis for California Autonomous Vehicle DMV Regulations Based on SB 1298 (S. Shladover PI). DMV Grant. \$680,000.
- 6/13-3/15 Principal Investigator, Tools for Operations Planning (TOPL5): Traffic Management, Decision Support System (P. Varaiya and A. Bayen co-PIs). CALTRANS Research Grant. \$1,266,472.
- 3/12-2/15 Principal Investigator, Innovative Transportation. Sponsor Award ID: 032807-002 CALTRANS Research Grant. \$4,611,620.

- 2/13-11/16 Principal Investigator, Design of Control System with Varying Sampling Rates in Dual Actuator Systems. Western Digital Research Grant. \$153,468.
- 6/12-11/14** Principal Investigator, Bus Rapid Transit (BRT) Toolbox: BRT Person Throughput-Vehicle Congestion Tradeoffs. (W.-W. Zhang, Project Manager) Sponsor Award ID: 033414-002. CALTRANS Research Grant. \$100,000.
- 9/11-8/12 Principal Investigator, Design of Control Systems with Time Varying Sampling Rates for Spiral Self-servo Write. Western Digital Research Grant. \$73,203.
- 7/11-6/15 Co-Principal Investigator, Research and Innovation for Traffic Operations (A. Bayen PI). CALTRANS Research Grant. \$14,971,306.
- 5/11-1/14 Principal Investigator of Sub-contract (Honeywell Prime Contractor, Burgess Johnson PI), Controls and Readout Development for Micro Rate Integrating Gyroscopes (MRIG). DARPA. Phase I-II \$277,747.
- 7/11-12/13 Principal Investigator, California Department of Transportation , Development of a California Weigh-in Motion Facility. (W.-W. Zhang, Project Manager). CALTRANS Research Grant. Sponsor Award ID: 031616-002. \$200,000.
- 1/11-12/12 Principal Investigator, Control Design for Systems with Irregular Sampling Times, Computer Mechanics Laboratory Grant. \$25,000.
- 1/11-6/14 Principal Investigator, Leadership for PATH and Administrative Support. CALTRANS. \$6,678,866.
- 6/10-6/12 Co-principal Investigator, Tools for Operations Planning (TOPL4): Real-time Operations (P. Varaiya, PI) CALTRANS Research Grant. \$1,246,806.
- 10/09-9/14 Principal Investigator, CDI Type I: Freeway Corridor Operations, Design and Implementation (P. Varaiya, coPI) NSF. \$600,000.
- 7/09-2/11 Co-principal Investigator, I-80 Freeway Corridor Monitoring and Control (P. Varaiya, PI) CALTRANS Research Grant. \$542,381.
- 06/09-09/11 Principal Investigator, Field Test Implementation of Queue Control, CALTRANS Research Grant TO6329 (P.Varaiya Co-PI), \$152,068.
- 09/09-12/14 Principal Investigator, Evaluation of Dedicated Short-Range Communication (DSRC) for Transportation Applications. (C.-Y. Chan, Project Manager). Sponsor Award ID: 028242-002. Industrial Technology Research Institute (ITRI) Research Grant, \$140,800.
- 4/09-3/10 Slider-based Micro-actuation for Computer Disk Drives, UC-Discovery Grant (Western Digital Industry Research Partner). \$67,688.
- 1/09-12/10 Principal Investigator, Microactuator Design, and Fabrication, Computer Mechanics Laboratory Grant. \$25,000.

- 10/08-10/09 Principal Investigator, Compensation of Air Flow Induced Suspension Vibration in Dual-Stage Servo Systems, Research Gift from the Information Storage Industry Consortium (INSIC). \$30,000.
- 7/08 - 6/09 Principal Investigator, Design and Prototype Fabrication of Slider-based Microactuators for Dual Stage Servo Systems, Western Digital Research Grant, \$123,091.
- 8/08 - 8/09 Principal Investigator, Operational Planning, Monitoring, and Control of Traffic Corridors, KAUST Research Grant TO6329 (P.Varaiya Co-PI), \$60,000.
- 7/08-10/09 Co-principal Investigator, Tools for Operations Planning-3 (TOPL3) (P. Varaiya, PI) CALTRANS Research Grant. \$366,206.
- 4/08-11/09 Co-Principal Investigator, Nanofabrication by Tips Coupled with Lasers (C. Grigoropolous, PI) DARPA Research Grant. \$100,000 (subproject funds).
- 1/08-12/09 Principal Investigator, Design, Fabrication and Control Electrostatic Microactuators, Computer Mechanics Laboratory Grant. \$25,000.
- 1/08-12/09 Principal Investigator, Design, Fabrication of Metal Instrumented Suspensions, Computer Mechanics Laboratory Grant. \$25,000.
- 10/07-10/08 Principal Investigator, Compensation of Air Flow Induced Suspension Vibration in Dual-Stage Servo Systems, Research Gift from the Information Storage Industry Consortium (INSIC). \$30,000.
- 11/07-10/10 Investigator. Federal Highway Administration (FHWA) Exploratory Advanced Research Project Cooperative Agreement DTFH61-07-H-00038) with Match Funding from the California Department of Transportation (Caltrans) TO6224. (PI: S. Shladover) FHWA - \$1,481,000.00
- 1/07-12/08 Principal Investigator, Design, Fabrication of Metal Instrumented Suspensions, Computer Mechanics Laboratory Grant. \$25,000.
- 1/07-10/08 Principal Investigator, Ramp Metering Design Tools and Field test Implementation of Queue Control, CALTRANS Research Grant TO6329 (P.Varaiya Co-PI), \$157,207.
- 1/07-10/08 Principal Investigator, Systems Engineering Plan Management Plan for Loop Fault Detection, CALTRANS Research Grant TO6327 (P.Varaiya, X-Y, Lu Co-PIs), \$100,000.
- 10/06-10/07 Principal Investigator, Compensation of Air Flow Induced Suspension Vibration in Dual-Stage Servo Systems, Research Gift from the Information Storage Industry Consortium (INSIC). \$30,000.
- 5/06-5/08 Co-principal Investigator, Tools for Operations Planning (TOPL), (P. Varaiya, PI) CALTRANS Research Grant TO6611. \$262,000.

- 4/06-6/07 Principal Investigator, Symposium on Control of Mechanical Systems, NSF, \$22,579.
- 1/06-12/07 Principal Investigator, Design, Fabrication of Metal Instrumented Suspensions, Computer Mechanics Laboratory Grant. \$25,000.
- 9/05-8/07 Principal Investigator, France-Berkeley Fund, Development of Intelligent Ramp Metering Strategies for Peri-Urban Traffic Control Travel Grant (C. Canudas de Witt co-PI), \$7,000.
- 10/05-10/06 Principal Investigator, Compensation of Air Flow Induced Suspension Vibration in Dual-Stage Servo Systems, Research Gift from the Information Storage Industry Consortium (INSIC). \$30,000.
- 1/05-12/06 Principal Investigator, Design, Fabrication and Control Electrostatic Microactuators, Computer Mechanics Laboratory Grant. \$25,000.
- 1/05-12/06 Principal Investigator, Design, Fabrication of Metal Instrumented Suspensions, Computer Mechanics Laboratory Grant. \$25,000.
- 10/04-10/05 Principal Investigator, Compensation of Air Flow Induced Suspension Vibration in Dual-Stage Servo Systems, Research Gift from the Information Storage Industry Consortium (INSIC). \$30,000.
- 1/04-12/05 Principal Investigator, Design, Fabrication and Control Electrostatic Microactuators, Computer Mechanics Laboratory Grant. \$25,000.
- 1/04-12/05 Principal Investigator, Design, Fabrication of Metal Instrumented Suspensions, Computer Mechanics Laboratory Grant. \$25,000.
- 8/04-5/09 SST: Control-oriented Optimal Multisensor Design and Microfabrication for Structural Vibration Suppression in Mechatronic Systems (R. White, co-PI). NSF (GOALI). \$380,000.
- 1/04-5/05 Design, Field Implementation and Evaluation of Adaptive Ramp Metering Algorithms. PATH/Caltrans Continuation funding Task Order 5503 (A. Skabardonis and P. Varaiya, Michael Zhang, co-PIs), \$234,009.
- 10/03-10/04 Principal Investigator, Compensation of Air Flow Induced Suspension Vibration in Dual-Stage Servo Systems, Research Gift from the Information Storage Industry Consortium (INSIC). \$30,000.
- 6/03-7/09 Optimal Design and Multiple-Input Multiple-Output Control Strategies for Media Handling in Copier and Printer Machines. NSF (GOALI). \$270,000.
- 1/03-12/04 Principal Investigator, Compensation of Air Flow Induced Suspension Vibration in Dual-Stage Servo Systems, Computer Mechanics Laboratory Grant. \$25,000.
- 1/03-12/04 Principal Investigator, Design, Fabrication and Control Electrostatic Microactuators, Computer Mechanics Laboratory Grant. \$25,000.

- 1/03-12/04 Principal Investigator, Design, Fabrication of Metal Instrumented Suspensions, Computer Mechanics Laboratory Grant. \$25,000.
- 10/02-10/03 Principal Investigator, Compensation of Air Flow Induced Suspension Vibration in Dual-Stage Servo Systems, Research Gift from the Information Storage Industry Consortium (INSIC). \$70,000.
- 7/02-6/03 Enhanced Coordination and Link Layer Protocols for Automated Vehicles with Vehicle Control/Communication Interactions. PATH. \$100,000.
- 3/02-3/04 Design, Field Implementation and Evaluation of Adaptive Ramp Metering Algorithms. PATH, (A. Skabardonis and P. Varaiya, Michael Zhang, co-PIs), \$427,000.
- 1/02-12/03 Principal Investigator, Compensation of Air Flow Induced Suspension Vibration in Dual-Stage Servo Systems, Computer Mechanics Laboratory Grant. \$25,000.
- 1/02-12/03 Principal Investigator, Design, Fabrication and Control of Silicon Suspensions, Computer Mechanics Laboratory Grant. \$25,000.
- 1/01-12/02 Principal Investigator, Compensation of Air Flow Induced Suspension Vibration in Dual-Stage Servo Systems, Computer Mechanics Laboratory Grant. \$25,000.
- 1/01-12/02 Principal Investigator, Design, Fabrication and Control of Silicon Suspensions, Computer Mechanics Laboratory Grant. \$25,000.
- 1/01-12/02 Principal Investigator, Design, Fabrication and Control Metal Instrumented Suspensions and Electrostatic MEMS Actuators, Computer Mechanics Laboratory Grant. \$25,000.
- 10/00-9/01 Principal Investigator, Compensation of Air Flow Induced Suspension Vibration in Dual-Stage Servo Systems. NSF, Subcontractor to a EHDR grant from the National Storage Industrial Consortium (NSIC). \$70,000.
- 7/00-7/01 Co-Principal Investigator, Real-time Estimation and Control of California Freeway Traffic. NSF, (P. Varaiya, PI). \$100,000.
- 7/00-7/03 Co-Principal Investigator, Optomechanical Uncooled Infrared Imaging System. DOD Space and Naval Warfare Systems Command (A. Majumdar, PI). \$300,000.
- 3/00-12/00 Principal Investigator, Compensation of Air Flow Induced Suspension Vibration in Dual-Stage Servo Systems. NSF, National Storage Industrial Consortium (NSIC) Research Gift. \$25,000.
- 1/00-12/00 Principal Investigator, Compensation of Air Flow Induced Suspension Vibration in Dual-Stage Servo Systems, Computer Mechanics Laboratory Grant. \$25,000.
- 1/00-12/00 Principal Investigator, Design Fabrication and Control of Silicon Suspensions, Computer Mechanics Laboratory Grant. \$25,000.

- 9/99-9/02 Principal Investigator, Integrated Macro and Micro Simulation of Automated Highway Systems (AHS), PATH. \$160,000.
- 1/98-9/00 Principal Investigator, Fault Detection and Handling in Longitudinal and Lateral Control Systems for AHS, PATH, (K. Hedrick and M. Tomizuka, coPIs). \$160,000.
- 9/98-12/99 Principal Investigator, Design of Dual-Stage Servo Systems for Magnetic Hard Disk Drives. NSF, Subcontractor to a EHDR grant from the National Storage Industrial Consortium (NSIC). \$70,000.
- 1/99-12/99 Principal Investigator, Design and Control of MEMS Microactuators, Computer Mechanics Laboratory Grant. \$50,000.
- 9/97-9/98 Principal Investigator, Design of Dual-Stage Servo Systems for Magnetic Hard Disk Drives. Research gift from the National Storage Industrial Consortium (NSIC). \$27,000.
- 9/97-12/99 Investigator, Pointing Control of Space Telescopes. NASA, (Cal State Univ. prime)(G. Leitmann, A. Packard, and K. Poolla, coPIs). \$100,000.
- 9/97-12/99 Investigator, Z-Axis Gyro, Joint Honeywell, UC-Berkeley and MIT Project. DARPA, (B. Hocker, Honeywell PI, R. Howe, B. Boser, M. Schmidt (MIT) co-I)\$1,648,000.
- 9/96-12/99 Principal Investigator, Mechatronic Design and Control of Media Handling Mechanisms for Printing Engines, NSF-GOALI, (M. Tomizuka, coPI). \$197,426.
- 1/96-7/99 Principal Investigator, Emergency Vehicle Maneuvers and Control Laws for AHS, PATH, (Sastry, coPI). \$160,000.
- 1/96-7/99 Principal Investigator, Design of Fault Tolerant Control Systems for AHS, PATH, (Sastry, PI, K Hedrick, coPI). \$280,000.
- 7/95-7/99 Principal Investigator, High-Bandwidth, High-Accuracy MEMS Micropositioners for Magnetic Disk Drives, DARPA, (L.S. Fan, co-PI, R. Howe and B. Boeser Investigators). \$5,600,000.
- 1/94-7/99 Principal Investigator, Self-Tuning Control of Disk File Servos, Computer Mechanics Laboratory Grant. \$140,000.
- 1/94-1/99 Principal Investigator, Design and Control of Silicon Electrostatic Micromotors, Computer Mechanics Laboratory Grant. \$140,000.
- 1/95-9/97 Principal Investigator, Performance Analysis of AHS Architectures, PATH, UC Berkeley/CALTRANS, (Sastry, coPI). \$300,000.
- 1997 Principal Investigator, Evaluation and Design of Disk File Servo Systems with Accelerometer Feedforward Control, IBM SUR/NSIC, \$15,000.
- 1/94-1/96 Principal Investigator, Hybrid Supervisory Control for Degraded Modes of Operation, PATH, UC Berkeley/CALTRANS, (P. Varaiya and S. Sastry, coPIs). \$314,000.

- 1994 Research Gift from Hitachi Ltd. for research in Disk File Servo Control and Microactuators, \$25,000.
- 1994 Control of Disk File Actuators, IBM SUR, (Equipment Grant), \$80,000.
- 1994 Research Gift from NTT Corporation for research in Learning Control, \$20,000.
- 3/90-3/93 Dynamic Analysis and Control of Disk File Actuators and Microactuators, DEC, \$125,000 (PVI Equipment Matching Grant).
- 7/88 - 7/90 Dynamic Analysis and Control of Disk File Actuators and Microactuators, DEC, \$75,000 (PVI Equipment Matching Grant).
- 9/88-8/89 Self Tuning Control of Disk File Actuators, IBM SUR, \$76,768.
- 87-92 Presidential Young Investigator Award, NSF, 87-92, \$312,500.
- 3/86 - 8/89 Advanced Dynamic Control for Mechanical Manipulators used in Flexible Automation, NSF, (M. Tomizuka coPI), \$267,047.
- 7/86-7/88 Controller Design for a Two Stage Actuator for Magnetic Disk File Systems, IBM SUR, \$100,000.
- 7/86 - 7/87 Utilization of Modern Control and Signal Processing Theory in Flexible Automation and Manufacturing, NSF, (D. Dornfeld and M. Tomizuka, coPI's) \$25,000.
- 7/85-7/86 Motion Control for Micro-Electronic Manufacturing, U.C. Micro Program, (D.M. Auslander and M. Tomizuka coPIs). \$282,000.
- 12/83-12/85 IBM Young Faculty Development Award, \$60,000.
- 7/84-7/85 U.C. Micro Program, Motion Control for Micro-Electronic Manufacturing (D.M. Auslander and M. Tomizuka coPIs). \$45,000.

#### INVITED LECTURES, SHORT COURSES

- 10/19 "Modeling Control and Estimation of Traffic Networks. Purdue University, Oldenburger Lecture.
- 10/19 "Data Driven Control Design in Hard Disk Drives. Purdue University, Department of Mechanical Engineering.
- 12/19 "Modeling Control and Estimation of Traffic Networks. LBNL.
- 5/2019 "Modeling Control and Estimation of Traffic Networks University of Maryland, Ford Lecture: Future of Transportation Lecture Series
- 3/2019 "Modeling Control and Estimation of Traffic Networks. University of Virginia, Department of Mechanical and Aerospace Engineering, Distinguished Lecture Series.



- 3/2019 “Modeling Control and Estimation of Traffic Networks. Department of Mechanical Engineering, Virginia Tech (Invited Lecture).
- 11/2017 “Modeling Control and Estimation of Traffic Networks. Department of Mechanical Engineering, University of Texas at Dallas. (Invited Lecture).
- 10/2018 **Rufus Oldenburger Lecture.** “Modeling Control and Estimation of Traffic Networks.” ASME Dynamic Systems and Control Conference, Atlanta, Georgia.
- 11/2017 “Modeling Control and Estimation of Traffic Networks.” Department of Mechanical Engineering, University of Texas at Dallas. (Invited Lecture).
- 9/2017 “Modeling Control and Estimation of Freeway Traffic Networks.” Department of Mechanical Engineering, University of Delaware. (Invited Lecture).
- 6/2017 “Control of Freeway Traffic” and “Mixed H<sub>2</sub>/H-infinity Data Driven Control Design in Frequency Domain.” Department of Mechanical Engineering, Yonsei University, Seoul, South Korea. (Invited Lecture).
- 5/2017 “Recent Developments in Estimation and Control of Freeway Traffic.” TECHLAV Second Annual Program, North Carolina Agricultural and Technical State University. (Invited Lecture).
- 5/2013 Modeling, Simulation, Analysis and Control of Freeway Traffic Corridors. Department of Mechanical and Aerospace Engineering, UCSD, May 29, 2013, (Invited Lecture).
- 11/2013 “Modeling, Simulation, Analysis and Control of Freeway Traffic Corridors,” Special Session on Global/Local Innovations for Next Generation Automobiles of the Tenth International Conference on Fluid Dynamics(ICFD2013), Sendai, Japan, November 25-28, 2013, (Keynote Speaker).
- 10/2012 “Modeling, Simulation, Analysis and Control of Freeway Traffic Corridors,” International Workshop on M2M Technology 2012, Taipei, Taiwan, October 24- 25, 2012, (Keynote Speaker).
- 10/2011 “Modeling, Simulation, Analysis and Control of Freeway Traffic Corridors,” Congreso Nacional de la Asociacion de Mexico de Control Automatico, Saltillo, Coahuila, Mexico, October 3-7, 2011. (Plenary Presentation).
- 10/2009 “Dual-Stage Servo Systems and Vibration Compensation in Computer Hard Disk Drives,” IBM Workshop on Dynamics and Control of Micro and Nanoscale Systems, Oct. 10-11, 2009, (Keynote speaker).
- 7/2009 “Modeling, Simulation, Analysis and Control of Freeway Traffic Corridors,” 3rd IEEE Multi-conference on Systems and Control (IEEE MSC’09), Saint Petersburg, Russia, July 8-10, 2009. (Plenary Presentation).

- 5/2007 "Dual-Stage Servo Systems and Vibration Compensation in Computer Hard Disk Drives," Department of Mechanical and Aerospace Engineering, University of California at Irvine, May 6, 2007, (Invited Talk).
- 6/2007 "Dual-Stage Servo Systems and Vibration Compensation in Computer Hard Disk Drives," Department of Micro Nano Systems, University of Nagoya, June 19, 2007, (Invited Talk).
- 11/2006 "Design and Simulation of On-Ramp Metering Freeway Traffic Control Strategies," Département d'Automatique de Grenoble, November 12, 2006, (Invited Talk).
- 3/2005 "Design and Simulation of On-Ramp Metering Freeway Traffic Control Strategies," School of Engineering, Universidad Autónoma Nacional de México (UNAM) March 20, 2005, (Invited Talk).
- 3/2005 "Dual-Stage Servo Systems and Vibration Compensation in Computer Hard Disk Drives," School of Engineering, Universidad Autónoma Nacional de México (UNAM) March 29, 2005, (Invited Talk).
- 2004 "Dual-Stage Servo Systems and Vibration Compensation in Computer Hard Disk Drives," School of Engineering, University of Tasmania, Australia September 10, 2004, (Invited Talk).
- 2004 "Control Challenges in Mechatronics Systems" School of Engineering, University of Tasmania, Australia. September 9, 2004, (Invited Talk).
- 2004 "Dual-Stage Servo Systems and Vibration Compensation in Computer Hard Disk Drives," 3rd IFAC Symposium on Mechatronic Systems, Sydney Australia. September 6-8, 2004, (Plenary Lecture).
- 2003 "Dual-Stage Servo Systems and Vibration Compensation in Computer Hard Disk Drives," Department of Mechanical Engineering, University of Minnesota. October 14, 2003, (Invited Talk).
- 2003 "Mechatronics Research at U.C. Berkeley," Symposium on Robust Process Engineering, U.C. Davis. July 21, 2003, (Invited Talk).
- 2003 "Design and Implementation of Dual-Stage Servos in Disk Drive," Department of Mechanical Engineering, UCLA. March 13, 2003, (Invited Lecture).
- 2002 "Mechatronics Research at U.C. Berkeley," Universidad Simón Bolívar, Venezuela. March 5, 2002. (Invited Talk).
- 2000 "Windage Vibration Compensation in Hard Disk Drives using Instrumented Suspensions," Hutchinson Technology Inc. (HTI). Dec. 4, 2000. (Invited lecture).
- 2000 "Windage Vibration Compensation in Hard Disk Drives using Instrumented Suspensions," Seagate. Dec. 5, 2000. (Invited lecture).

- 2000 "Design and Control of Electrostatic Microactuators and Micro-gyroscopes," Penn State, Department of Mechanical Engineering. April 25, 2000. (Invited Lecture).
- 2000 "Hierarchical Control of Automatic Highway Systems," Penn State, Department of Mechanical Engineering. April 24, 2000. (Invited Lecture).
- 2000 "Mechatronics of Electrostatic Microactuators and Micro-Gyroscopes," Proceedings of the 6th International Workshop on Advanced Motion Control (AMC2000), March 30 - April 1, 2000. (Plenary Talk).
- 1999 "Design and Control of Electrostatic Microactuators and Micro-gyroscopes," Oklahoma State University, October 27, 1999. (South Western Mechanics Lecture Series).
- 1999 "Design and Control of Electrostatic Microactuators and Micro-gyroscopes," University of Texas at Arlington, October 27, 1999. (South Western Mechanics Lecture Series).
- 1999 "Design and Control of Electrostatic Microactuators and Micro-gyroscopes," South Methodist University, October 26, 1999. (South Western Mechanics Lecture Series).
- 1999 "Control of Self-optimizing Exercise Machines," University of Houston, October 25, 1999. (South Western mechanics Lecture Series).
- 1999 "Hierarchical Control of Automatic Highway Systems," Xerox PARC Robotics Seminar Series. August 30, 1999. (Invited Lecture).
- 1999 "Design and Control of Electrostatic Microactuators and Micro-gyroscopes," School of Mechanical Engineering, Georgia Institute of Technology. January 27, 1999.
- 1999 "Hierarchical Control of Automatic Highway Systems," Control Seminar Series, The University of Michigan. November 13, 1998. (Invited Lecture).
- 1998 "Control of Self-optimizing Exercise Machines," Presented at the 1998 IFAC International Workshop on Motion Control, September 21-23, 1998, Grenoble, France. (Plenary Talk).
- 1998 "Application of Microactuators and Microaccelerometers in Disk Drives," (with R. Howe). Seagate Technologies, June 17, 1998. Minneapolis, Minnesota. (Invited Lecture).
- 1997 "MEMS for Ultra-High Density Hard Disk Drives," Third International Micromachine Symposium, Tokyo, Japan, Oct. 1997. (Invited Talk).
- 1997 "Design, Fabrication and Control of Microactuators," International Disk Drive Equipment Materials Association (IDEMA). San Jose, September 22, 1997. (Invited Lecture).
- 1997 "Automatic Highway Systems: The Smart Way to Go," Department of Mechanical and Aerospace Engineering, University of Princeton. September 26, 1997. (Invited Lecture).

- 1997 "Automatic Highway Systems: The Smart Way to Go," Presented at the 1997 IFAC Symposium on Transportation Systems, June 19, 1997, Chania, Greece. (Plenary Talk).
- 1997 "Design, Fabrication and Control of Polysilicon Microactuators," SGS Thompson, Milano, Italy, June 26, 1997. (Invited Lecture).
- 1997 "Design, Fabrication and Control of Polysilicon Microactuators," "Passive Velocity Field Control of Robot Manipulators," "Design of Control Architectures for Automated Highway Systems," Department of AMES, University of California at San Diego. April 21-23, 1997. (Invited Lectures).
- 1997 "Polysilicon Electrostatic Microactuators," in Workshop on Micromechanical Robotics (T. Fukuda and F. Arai org.), IEEE Conference on Robotics and Automation, Albuquerque, April 20, 1997.
- 1997 "Design, Fabrication and Control of Microactuators," Western Digital Disk File Servo Group, April 3, 1997, (Invited Lecture).
- 1997 "Design, fabrication and Control of Polysilicon Microactuators and Microgyros," Department of Electrical Engineering, Kobe University, March 19, (Invited Lecture).
- 1997 "Passive Velocity Field Control of Robot Manipulators and Control of Smart Exercise Machines," Department of Electrical Engineering, Hiroshima University, March 18, (Invited Lecture).
- 1997 "Passive Velocity Field Control of Robot Manipulators and Control of Smart Exercise Machines," Department of Mechanical Engineering, Kyoto University, March 17, (Invited Lecture).
- 1997 "Design, fabrication and Control of Polysilicon Microactuators and Microgyros," Department of Microsystems Engineering, Nagoya University, February 26, (Invited Lecture).
- 1997 "Design, fabrication and Control of Polysilicon Microactuators and Microgyros," Venture Business Laboratory, Nagoya University, February 24, (Invited Lecture).
- 1997 "Control of Smart Exercise Machines," Department of Microsystems Engineering, Nagoya University, February 19, (Invited Lecture).
- 1997 "Passive Velocity Field Control of Robot Manipulators," Department of Microsystems Engineering, Nagoya University, February 14, (Invited Lecture).
- 1997 "Design of Control Architectures for Automated Highway Systems," Department of Microsystems Engineering, Nagoya University, January 17, (Invited Lecture).
- 1997 "Design, fabrication and Control of Polysilicon Microactuators and Microgyros," Nagoya City Micromachine Research Committee, Nagoya Design Hall, March 11, (Invited Lecture).

- 1997 "Automated Highways, Intelligent Exercise Machines and Micromechatronics," Venezuelan Embassy in Japan, Latinoamerican Lecture Series, March 10, (Invited Lecture).
- 1997 "Design of Control Architectures for Automated Highway Systems," Tokyo Institute of Technology, Department of Control Engineering, March 10, (Invited Lecture).
- 1997 "Design of Control Architectures for Automated Highway Systems," JSME Committee on Human Friendly Mechatronics, University of Tokyo, Industrial Sciences, March 7, (Invited Lecture).
- 1997 "Design, Fabrication and Control of Polysilicon Microactuators," NTT Laboratories, March 7, (Invited Lecture).
- 1997 "Design, Fabrication and Control of Polysilicon Microactuators and Control of Smart Exercise Machines," Hitachi Mechanical Engineering Laboratories, March 6, (Invited Lecture).
- 1996 "Design and Analysis of Control Architectures for Automated Highways Systems," Department of Electrical Engineering, UC Santa Barbara, December 14, 1996, (Invited Lecture).
- 1996 "Design, Fabrication and Control of Microactuators," Quantum Disk File Servo Group, December 9, 1997, with D. Horsley and A.P. Pisano, (Invited Lecture).
- 1996 "Design, Fabrication and Control of Microactuators," University of Washington, Seattle WA, November 1996, (Invited Lecture).
- 1996 "Design, Fabrication and Control of Microactuators," Xerox Wilson Research Center Distinguished Lecture Series, Rochester, NY, October 11, 1996, (Invited Lecture).
- 1996 "Design and Analysis of Control Architectures for Automated Highways Systems," Xerox Wilson Research Center, Rochester, NY, October 10, 1996, (Invited Lecture).
- 1996 "Design, Fabrication and Control of Microactuators," Department of Mechanical Engineering, University of Illinois at Urbana-Champaign, IL, October 8, 1996, (Invited Lecture).
- 1996 "Design and Analysis of Control Architectures for Automated Highways Systems," Coordinated Science Laboratory, University of Illinois at Urbana-Champaign, IL, October 9, 1996, (Invited Lecture).
- 1995 "Polysilicon Electrostatic Microactuators, in Workshop on Micromechanical Robotics" (T. Fukuda and R. Fearing org.), IEEE Conference on Robotics and Automation, Nagoya, Japan, May 22 1995.
- 1995 "Adaptive Control of Disk File Servos and Micromechanical Actuators for Disk File Servos," Data Storage and Retrieval Systems Division, Hitachi, Ltd, Japan, May 25 1995, (Invited Lecture).

- 1995 "Design, Fabrication, Position Sensing, and Control of an Electrostatically-driven Polysilicon Microactuator," *The Magnetic Recording Conference (TMRC)*, Pittsburgh, PA, July 1995, (Invited presentation).
- 1994 "Control of Mechatronic Systems, Carnegie Mellon University," Dept. of Mech. Eng., Sept. 21 1994, (Invited Lecture).
- 1994 "Control of Mechatronic Systems," University of Pittsburgh, Dept. of Mech. Eng., Sept. 20 1994, (Invited Lecture).
- 1993 "Learning Control of Robot Manipulators," Tokyo Institute of Technology, Japan, August 1993. Invited lecture.
- 1993 "Adaptive Control of Disk File Actuators," Hitachi Mechanical Engineering Laboratory, Japan, August 1993. Invited lecture.
- 1993 "Adaptive Control of Disk File Actuators," Fujitsu Laboratories, Japan, August 1993. Invited lecture.
- 1993 "Adaptive Control of Disk File Actuators," IBM Adstar, San Jose, July 1993. Invited lecture.
- 1992 "Learning Control Applications to Mechatronics," 1992 International Conference on Motion and Vibration Control, Yokohama, Japan, September 1992. Keynote Speech.
- 1992 "Learning Control Applications to Mechatronics," Nipon Telegraph and Telephone (NTT), September 1992. Invited lecture.
- 1991 "Learning Control Applications in Robotics and in Optimal Control," Conference des Grandes Ecole (CGE)-UC Berkeley, Paris, France, May, 1991. Invited Lecture.
- 1991 "Mechatronics Research at U.C. Berkeley," Invited Lecture at the "Simposium de Actualidades Nacionales e Internacionales de la Electronica y Telecomunicacion," organized by the Ministerio de Fomento y FIVAI, April 1991, Caracas, Venezuela.
- 1991 "Learning Control of Robot Manipulators," INTEVEP, Venezuela, January 1991. Invited lecture.
- 1990 "Learning Control of Robot Manipulators," Department of Mechanical Engineering, M.I.T., November 1990. Invited lecture.
- 1990 "Design Fabrication and Control of a Linear Electrostatic Microactuator," (with Roger Howe), DEC, Shrewsbury, MA, November 1990. Invited lecture.
- 1990 "Learning Control of Robot Manipulators Parts I-II," Department of Systems Engineering, School of Physical Science, The Australian National University, Canberra, Australia, June 1990. Invited lecture.
- 1990 "Robotics Research at the University of California, Berkeley," Renault Automation Paris, France, April 1990. Invited lecture.

- 1990 "Motion Control of Robot Manipulators," Renault Automation Paris France, April 1990. Invited lecture.
- 1990 "Learning Control of Robot Manipulators," Renault Automation Paris France, April 1990.
- 1990 "Learning Control of Robot Manipulators," Politecnico University of Catalunya, Barcelona, Spain, April 1990. Invited lecture.
- 1990 "Learning Control of Robot Manipulators," Laboratoire d'Automatique de Grenoble, Grenoble, France, April 1990. Invited lecture.
- 1990 "Self Tuning Control of Disk File Servos," 2nd Storage Research Center Faculty Meeting, IBM, San Jose, January 11-12, 1990.
- 1989 "Adaptive Control of Disk File Actuators," IBM, San Jose California, August 10, 1989.
- 1989 "Adaptive Control of Disk File Actuators," IBM, San Jose California, March 7, 1989.
- 1989 "Control of Compound Disk File Actuators," IBM, Tucson Arizona, February 28, 1989.
- 1989 "A Robust Adaptive Servo," Department of Systems Engineering, School of Physical Science, The Australian National University, Canberra, Australia, July 1988.
- 1988 "Adaptive Control of Robot Manipulators," Department of Systems Engineering, School of Physical Science, The Australian National University, Canberra, Australia, July 1988.
- 1988 "Control of Compound Disk File Actuators," IBM, San Jose, March 18, 1988
- 1988 "Control of Compound Disk File Actuators," DEC, Colorado Springs, Colorado, April 15, 1988
- 1987 "Control of Compound Disk File Actuators," IBM, Tucson Arizona September 1, 1987
- 1987 "Control of Compound Disk File Actuators," IBM, San Jose, April 1, 1987
- 1985 "Servo Control for Mechanical Engineers," IBM, San Jose, California, April 18,19, 1985, with M. Tomizuka and D. M. Auslander.
- 1984 "Applications of Model Reference Adaptive Systems in Motion Control Systems," University of Minnesota, Department of Electrical Engineering, May 16, 1984.
- 1983 "Adaptive Control Systems - Design and Applications," University Extension, University of California, May 1983, with Y. Landau and M. Tomizuka.