

# Workshop on Dynamics and Control of Micro and Nanoscale Systems

IBM Research – Zurich  
Rüschlikon, Switzerland

[www.zurich.ibm.com](http://www.zurich.ibm.com)

December 10-11, 2009

## Keynote Speakers

**Prof. Toshio Ando**

Kanazawa University  
Kanazawa, Japan

**Prof. Gary Fedder**

Carnegie Mellon University  
Pittsburgh, PA, USA

**Prof. Mervyn Miles**

University of Bristol  
Bristol, UK

**Prof. Roberto Horowitz**

University of California  
Berkeley, CA, USA

## Workshop Topics

Dynamics/Control of Nanoscale Positioning Systems  
Dynamics of Nanoscale Sensors and Actuators  
Dynamics/Control of Scanning Probe Devices

Emerging Scanning Probe Applications: Metrology

Control of Micro- and Nanomanipulators  
Control of Nanorobotic Systems  
Control Methods for Micro-/Nanoscale Drug Delivery

Emerging Nanopositioning Platforms  
Estimation and Filtering for Nanoscale Sensors  
Fast and Video-rate Scanning Probe Microscopy

Emerging Scanning Probe Applications: Nanofabrication

Control Applications in Emerging Storage Technologies  
Control of Dual-Stage Actuators in Hard Disk Drives  
Reel-to-Reel and Track Follow Servo Control for Tape Storage

For more information, please contact

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## Program December 10, 2009

8:15	Departure from Hotel Opera. Transfer by coach to IBM.	
8:45 – 9:00	Opening remarks	
9:00 – 10:00	<b>Keynote: Self-configuring CMOS microsystems</b>	<b>Gary Fedder</b> Carnegie Mellon
<b>10:00 – 10:30</b>	<b>Coffee break</b>	
10:30 – 11:00	Control design for MEMS instruments based on force feedback	Karl Astrom Lund University
11:00 – 11:30	The promise of nonlinearity in microsensors. (Utilizing and designing with nonlinearity to enhance sensitivity)	Kimberly Turner UC Santa Barbara
11:30 – 12:00	CMOS MEMS electrothermal rotary actuator for disk drives: performance and thermal analysis	Bill Messner Carnegie Mellon
12:00 – 12:30	Making microrobots move	Brad Nelson ETH Zurich
<b>12:30 – 1:30</b>	<b>Lunch</b>	
1:30 – 2:00	Track-follow control for tape storage	Angeliki Pantazi IBM Research – Zurich
2:00 – 2:30	MIMO control aspects for mechatronic systems with application to tape drive	Giovanni Cherubini IBM Research – Zurich
2:30 – 3:00	Thermo-electric sensors and phase change memory cells: Examples of nanoscale dynamics and control	Abu Sebastian IBM Research – Zurich
3:00 – 3:30	Capillary force actuation	Carl Knospe University of Virginia
<b>3:30 – 4:00</b>	<b>Coffee break</b>	
4:00 – 5:00	<b>Keynote: Dual-stage servo systems and vibration compensation in computer hard disk drives</b>	<b>Roberto Horowitz</b> UC Berkeley
5:00 – 5:30	Model predictive control of stochastic and hybrid systems	John Lygeros ETH Zurich
5:30 – 6:00	Nanobioscience by robotic manipulation	Toshio Fukuda Nagoya University
6:20	Departure from IBM. Transfer by coach to Hotel Opera	
8:00	Banquet dinner at Restaurant à l'Opéra (located in the Hotel Ambassador, across from Hotel Opera)	

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## Program December 11, 2009

8:30	Departure from Hotel Opera. Transfer by coach to IBM	
9:00 – 10:00	<b>Keynote: High-speed contact and non-contact force microscopy</b>	<b>Mervyn Miles</b> University of Bristol
<b>10:00 – 10:30</b>	<b>Coffee break</b>	
10:30 – 11:00	Non-raster methods for high-speed AFM	Sean Andersson Boston University
11:00 – 11:30	A high-accuracy atomic force microscope probe for the MIT/UNCC sub-atomic measuring machine	David Trumper Massachusetts Institute of Technology
11:30 – 12:00	A high-bandwidth actuation and sensing technique for scanning probe microscopy	Deepak Sahoo IBM Research – Zurich
12:00 – 12:30	Implementation of signal transformation method in an AFM	Reza Moheimani University of Newcastle
<b>12:30 – 1:30</b>	<b>Lunch</b>	
1:30 – 2:00	Towards quantitative atomic force microscopy	Murti Salapaka University of Minnesota
2:00 – 2:30	Higher eigenmodes in elasticity and friction sensing	Robert Stark LMU Munich
2:30 – 3:00	Nonlinear dynamics of microcantilevers in liquids in high-speed scanning applications	Arvind Raman Purdue University
3:00 – 3:30	Control and automation in nano manufacturing	Ning Xi Michigan State University
<b>3:30 – 4:00</b>	<b>Coffee break</b>	
4:00 – 5:00	<b>Keynote: High-speed AFM for dynamic visualization of biomolecular processes</b>	<b>Toshio Ando</b> Kanazawa University
5:00 – 5:30	Improving the speed of piezo-based positioning systems by mechatronic design and modern control methods	Georg Schitter TU Delft
5:30 – 6:00	Fundamental limitations and optimal control design for nanopositioning	Vasu Salapaka University of Illinois
6:00 – 6:15	Closing remarks	
6:40	Departure from IBM. Transfer by coach to Hotel Opera	