

Einladung zum Vortrag

The four pillars of high-speed nanopositioning

von

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ABSTRACT

Nanopositioning is a key enabling technology for nanoscale science and engineering. In nanotechnology, there are applications that require positioning accuracies down to atomic-scale dimensions. Maintaining such levels of accuracy becomes extremely challenging as the positioning speed increases, with measurement noise becoming one of the key limiting factors.

In this talk I present four key technological elements which are vital for high-speed nanopositioning, and for each of these "pillars", surveys new concepts recently introduced by our group in high-speed nanopositioning which enable achieving subnanometerscale positioning even at high positioning speeds. The following concepts are presented: (1) a low-noise, high-bandwidth nanoscale sensing scheme based on the principle of magneto-resistance, (2) dual-stage nanopositioning, (3) noise-resilient feedback controllers based on hybrid control and (4) optimized scan trajectories.

BIOGRAPHICAL INFORMATION

Abu Sebastian was born in Kerala, India. He received the B. E. (Hons.) degree in Electrical and Electronics Engineering from BITS Pilani, India in 1998 and the M. S. and Ph. D. degrees in Electrical Engineering from Iowa State University in 1999 and 2004 respectively. He is currently a Research Staff Member at IBM Research-Zurich in Rueschlikon, Switzerland.

His research is focused on dynamics and control at the nanometer scale. Research interests include microcantilever-based devices and enabling technologies like nanometer-scale sensing and nanopositioning. Other research interests include emerging memory concepts such as probe-based storage, phase change memory and resistive random access memory.

Dr. Sebastian is a co-recipient of the 2009 IEEE Control Systems Technology Award and the 2009 IEEE Transactions on Control Systems Technology Outstanding Paper Award. He is a vice-chair of the IFAC technical committee on mechatronics and serves on the editorial board of the journal Mechatronics. He is a senior member of the Institute of Electrical and Electronics Engineers (IEEE) and a member of the American Physical Society (APS).

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