ATIPS LABORATORY

SEMINAR

MEMS-BASED INTEGRATED MICROSYSTEMS
FOR INERTIAL SENSING AND ALL-OPTICAL NETWORKS

Recent advances in the development of MEMS-based microsystems have not only been driven by the steady demand for miniaturization and higher performance at lower cost, but also has been impelled by the large variety of applications that are enormously affected by these systems. While advanced CMOS and MEMS fabrication processes have been the key enabling technologies of MEMS microsystems, the increasing functionality and complexity demands novel and innovative system engineering, packaging and integration approaches as well. This talk uses two examples to present how novelty and co-design at all these aspects needed for high-performance microsystems to fulfill the applications.

The first MEMS microsystem is a high precision silicon accelerometer that resolves 10 ppm of earth gravitational force while providing a direct digital output. The new generation of these inertial microsystems, including microgyroscopes, use controlled vibration and temperature micro-environments formed at chip-level to insert them in harsh-environment applications. The key to this on-going development is batch-fabricated environmentally-isolated micro-packages and wafer-level vacuum packaging technologies.

The 2nd MEMS microsystem is a large port count (>400) transparent cross-connect optical switch. In addition to novel electrostatic microactuators for actuation voltage reduction and range improvement, an integral part of this microsystem is an ultra-high density scalable robust digital control scheme implemented on a mixed-signal mixed-voltage CMOS chip. The chip also addresses the interconnect congestion problem for large port count switches by utilizing a serial digital bus.

Navid Yazdi *is currently a visiting research scientist at University of Michigan. He received the B.S. degree in 1988 from the University of Tehran, Tehran, Iran, the M.S. degree in 1993 from the University of Windsor, Windsor, Canada, and the Ph.D. degree in 1999 from the University of Michigan, Ann Arbor, all in electrical engineering. From 1998 to 2000 he was a full-time tenure-track faculty member at Arizona State University, where he established a research group focusing on integrated microsystems with several government and industry funded projects on MEMS sensors and actuators, and mixed-signal ICs. From 2000 to 2003 he was Director of Electronics at Corning IntelliSense Corporation (CISC). He joined CISC after taking a leave from Arizona State University. At CISC he created and managed the control electronics group and focused his effort on precision MEMS interface electronics and mixed-signal control ASICs for optical cross-connect and wavelength management products. Dr. Yazdi has published over 35 journal articles and refereed conference papers in the past 10 years on MEMS devices and fabrication technologies, mixed-signal ICs, and wireless microsystems.*

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the centre for microsystems engineering

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