

APPENDIX A. BIOGRAPHIES OF PANEL MEMBERS

Roger T. Howe (Panel Chair)

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Prof. Roger T. Howe received the B.S. degree in physics from Harvey Mudd College, Claremont, California, in 1979 and the M.S. and Ph.D. degrees in electrical engineering from the University of California at Berkeley in 1981 and 1984. He was on the faculty of Carnegie-Mellon University during the 1984-85 academic year and was an assistant professor at the Massachusetts Institute of Technology from 1985-87. In 1987, he joined the Department of Electrical Engineering and Computer Sciences at the University of California at Berkeley, where he is now a professor, as well as a Director of the Berkeley Sensor & Actuator Center. In 1997, he was appointed a professor in the Department of Mechanical Engineering.

His research interests include micro-electromechanical system (MEMS) design, micromachining processes, and massively parallel assembly processes. He served as co-general chairman of the 1990 IEEE Micro Electro Mechanical Systems Workshop (MEMS 90) and as general chairman of the 1996 Solid-State Sensor and Actuator Workshop at Hilton Head, South Carolina. He is an editor of the IEEE/ASME *Journal of Microelectromechanical Systems*. He was elected an IEEE Fellow in 1996 “for seminal contributions to microfabrication technologies, devices, and micro-electromechanical systems.” He is co-recipient with Richard S. Muller of Berkeley of the 1998 IEEE Cleo Brunetti Award “for leadership and pioneering contributions to the field of micro-electromechanical systems.” He is the co-author, with Prof. C.G. Sodini of MIT, of *Microelectronics: An Integrated Approach*, Prentice Hall, 1997, an undergraduate textbook.

Mark Allen

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Dr. Mark G. Allen received three bachelor degrees from the University of Pennsylvania in 1983: the B.A. in chemistry, the B.S.E. in chemical engineering and the B.S.E. in electrical engineering. Following this, he received the S.M. and Ph.D. degrees in microelectronic materials from the Massachusetts Institute of Technology in 1986 and 1989 respectively. He joined the faculty of the Georgia Institute of Technology after a postdoctoral appointment at M.I.T.

Dr. Allen participates in the Microsystems Research Center and the Packaging Research Center. His main research focus is in micro-electromechanical systems (MEMS), which is defined as the use of microfabrication techniques to create mechanical structures in silicon and other materials, potentially in addition to electronic devices.

His work has received local, national, and international attention in both the popular press and in engineering trade publications. Specific research projects that have recently received media attention are 1) magnetically actuated microrelays, smaller than a dime, that have potential use in automobile electronics, test equipment, and other areas where low actuation voltages are required and 2) drug delivery via microneedles, tiny chips

containing arrays of tiny needles, each thinner than a human hair, that can potentially be put on the skin for one-time injections and possibly left on the skin for continuous release of a medication under the control of a microprocessor.

Dr. Allen served as a visiting professor at the Swiss Federal Institute of Technology during the summers of 1994 and 1998.

Andrew A. Berlin

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Andrew Berlin is a Sector Director at Intel Research and a Principal Engineer in the Microsystems Department of Intel's Technology and Manufacturing Group. Berlin manages a newly formed biotechnology research initiative that is chartered to create biomedical diagnostic chips based in part on MEMS technology. The first project in that effort, Precision Biology, is focused on creating chips capable of performing bio molecular detection with single-molecule resolution. Prior to joining Intel, Berlin led a major MEMS research program at the Xerox Palo Alto Research Center, and was one of the early PIs in DARPA's MEMS program.

Berlin received S.B., S.M., and Ph.D. degrees from the Massachusetts Institute of Technology, where his research activities included development of active structural enhancement technology, in which computation is used to augment the physical characteristics of a material. In the late 80's, Berlin was a lead designer of the Hewlett-Packard/MIT Supercomputer Toolkit, one of the first VLIW parallel processors, which was designed to provide high-performance computing power for use within scientific instruments.

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Elliot Hui received the B.S. degree in physics and the B.S. degree in electrical engineering from the Massachusetts Institute of Technology in 1994 and the Ph.D. degree in electrical engineering from the University of California at Berkeley in 2002. His doctoral research focused on assembly and molding processes for three-dimensional microfabrication of silicon and polymer structures. His current research interests involve the application of MEMS technology to liver tissue engineering.

David J. Monk

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Dave Monk received his B.S. in chemical engineering from the University of Iowa in 1989. During that time, he worked at Rockwell International doing research with polyimide interlayer dielectrics for a silicon-on-silicon multichip module development project. He received his Ph.D. in chemical engineering in 1993 from the University of California, Berkeley, through joint work between chemical engineering and the Berkeley Sensor & Actuator Center in electrical engineering and computer science. His research emphasis there was modeling the sacrificial layer etching process for surface micromachining.

Dave joined Motorola in 1993 and worked for the first three years in the Packaging Technology Center within Motorola SPS's Sensor Products Division. His work during that time focused on media compatible packaging of pressure sensor devices. He also has led projects on tungsten silicide electronic trimming for pressure sensors, low-pressure sensors for washing machine applications, and the recent development of a CMOS integrated, surface-micromachined, absolute pressure sensor for tire pressure monitoring applications. This most recent project developed into a microsystem effort that included a MEMS-based pressure sensor, a temperature sensor, CMOS interface ASIC, MCU, and RF transmitter/receiver chipset for the tire pressure monitoring application. Currently, Dave manages a development group that includes system engineering, transducer design, ASIC design, CAD, test development, and package development for MEMS-based products (inertial and pressure sensors) within Motorola's Sensor Products Division.

Dave has been active in the MEMS/MST academic community as a participant in the technical committees for the International Conference on Solid-State Sensors and Actuators (Transducers '99 in Sendai), the Solid-State Sensors and Actuators Workshop (Hilton Head '96 and '98), MEMS 2001 in Las Vegas, and the IMAPS Sensor Division (1995 through present). He has published more than 50 technical conference papers, 10 refereed journal papers, and has six issued patents in the MEMS/MST field.

Khalil Najafi

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Khalil Najafi (an IEEE Fellow since 2000) received the B.S., M.S., and the Ph.D. degrees in 1980, 1981, and 1986, respectively, all in electrical engineering from the Department of Electrical Engineering and Computer Science, University of Michigan, Ann Arbor. From 1986-1988 he was employed as a research fellow, from 1988-1990 as an assistant research scientist, from 1990-1993 as an assistant professor, from 1993-1998 as an associate professor, and since September 1998 as a professor and as the director of the Solid-State Electronics Laboratory, Department of Electrical Engineering and Computer Science, University of Michigan. His research interests include micromachining technologies, solid-state micromachined sensors, actuators, and MEMS; analog integrated circuits; implantable biomedical microsystems; hermetic micropackaging; and low-power wireless sensing/actuating systems.

Dr. Najafi was awarded a National Science Foundation Young Investigator Award from 1992-1997, was the recipient of the Beatrice Winner Award for Editorial Excellence at the 1986 International Solid-State Circuits

Conference, of the Paul Rappaport Award for co-authoring the best paper published in the IEEE Transactions on Electron Devices, and of the Best Paper Award at ISSCC 1999. In 1994 he received the University of Michigan's "Henry Russel Award" for outstanding achievement and scholarship, and was selected as the "Professor of the Year" in 1993. In 1998 he was named the Arthur F. Thurnau Professor for outstanding contributions to teaching and research and received the College of Engineering's Research Excellence Award. He has been active in the field of solid-state sensors and actuators for more than eighteen years and has been involved in several conferences and workshops dealing with solid-state sensors and actuators, including the International Conference on Solid-State Sensors and Actuators, the Hilton-Head Solid-State Sensors and Actuators Workshop, and the IEEE/ASME Micro Electromechanical Systems (MEMS) Workshop. Dr. Najafi is the editor for *Solid-State Sensors for IEEE Transactions on Electron Devices*, associate editor for the *IEEE Journal of Solid-State Circuits*, and an associate editor for the *Journal of Micromechanics and Microengineering*, Institute of Physics Publishing.

Mineo Yamakawa

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Dr. Mineo Yamakawa is a staff research scientist at the Biotechnology Research Group, currently a part of the Microsystems (MEMS) Group of Intel Corporation, located in California's Silicon Valley. He was a key core group member working to create a new bio-project at Intel with his molecular biophysics and medical research background as well as his business/product engineering management background. He is serving in an Intel Research Council AIM Steering Committee, one of Intel's organizations funding academic research projects and consortium, as well as co-chairing its Health Subcommittee.

Dr. Yamakawa received his B.Engineering in applied physics from Waseda University, Tokyo, Japan, and his Ph.D. in physiology and biophysics from the University of Oklahoma Health Sciences Center. He was a Muscular Dystrophy Association's Postdoctoral Research Fellow at the University of Pennsylvania when he joined the team to develop a series of novel "caged" nucleotides for molecular reaction kinetics using laser photolysis combined with digital signal processing for the studies of muscle contractions at molecular level. While he was developing high-resolution, ultra-sensitive transducers to measure and analyze the small force generated by isolated single smooth muscle cells, he subsequently joined the team to initiate the molecular "structure-function" studies (molecular genetics-physiology/biophysics) using *Drosophila* (fruit-fly) genetic mutants at the University of Vermont. He joined Intel as a senior software development engineer for Intel-branded consumer product development, and he was an engineering manager at the Connected Product Division, the organization developing, delivering, and servicing various Intel-branded consumer products all over the world before he joined an Intel research team.

Dr. Yamakawa is a member of academic and industrial organizations, including American Association for the Advancement of Science (AAAS), the Association of Computing Machinery (ACM), the American Chemical Society (ACS), the Association for Laboratory Automation (ALA), the American Physical Society (APS), and the Institute of Electrical and Electronics Engineers (IEEE).