

SYSTEMS SIGNALS

Newsletter of the Institute for Systems Research at the University of Maryland and Harvard University

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New and Noteworthy at ISR

New FAA research center involves ISR faculty



ISR Professor Michael Ball (l) arrives in Berkeley, Calif., for the opening of NEXTOR. With him is MIT Professor Thomas Magnanti.

Professor Michael Ball (BMGT/ISR) and Associate Professor Michael Fu (BMGT/ISR) are two of four UMCP faculty members heading the University of Maryland's efforts in the new Federal Aviation Administration-sponsored National Center of Excellence in Aviation Operations Research (NEXTOR). The University, along with MIT, the University of California at Berkeley and Virginia

Polytechnic Institute, recently won the competitive bid to establish the center.

The core of the research will concentrate on improving air traffic management and aviation operations, including fundamental aspects of Free Flight, models and assessment of performance, and system development and design methodology.

This is an extremely dynamic field, encompassing a wide variety of disciplines including operations research, control, economics and computer science.

ULVAC Japan donates semiconductor equipment


ULVAC Japan has donated an ERA-1000 cluster tool system valued at \$1,000,000 to ISR Director Gary Rubloff (MNE/ISR) this fall for use in semiconductor research in the new Laboratory for Advanced Materials Processing (LAMP). The lab will be studying semiconductor processes with the goal of developing in-

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Meet ISR Director Gary W. Rubloff

Dr. Gary W. Rubloff is the new Director of the Institute for Systems Research.

Dr. Rubloff succeeds Dr. Steven I. Marcus, who led the ISR for the past five years. Dr. Marcus continues his association with the ISR as professor with a joint Electrical Engineering Department/ISR appointment.

In addition to his responsibilities as ISR Director, Dr. Rubloff has a joint appointment in ISR and the Department of Materials and Nuclear Engineering. His research is concentrated in materials processing, chemical sensing, simulation and optimization/control.



Dr. Gary W. Rubloff

"The challenges and opportunities for systems research and education are what led me to the ISR," Dr. Rubloff says. "The ISR is widely regarded as a premier contributor to the systems field. My previous collaborations with the ISR have been the most satisfying of my career."

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ISR Is Distinguished and Distinctive

I am very enthusiastic and genuinely honored to serve as the new director of the Institute for Systems Research.

I began collaborations with the ISR several years ago in order to couple to the systems expertise crucial to my research interests in semiconductor manufacturing. Indeed, working in ISR was a determining factor in my decision to come to the University of Maryland as a faculty member.

I also recognized that the ISR's strengths, and the related interests of its larger environment at Maryland, were well suited to my other interests in education and in technology-related public policy issues. I am delighted now for the opportunity to lead ISR's pursuit of excellence and accomplishment in a broadening array of challenges which demand its systems perspective.

The ISR is a profoundly distinctive and highly distinguished entity. It is particularly distinctive because it is the leader in defining, developing,

and highlighting the systems engineering perspective, which increasingly pervades the most challenging of technical subjects facing our society.

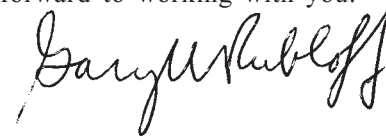
Work in ISR is intrinsically and highly cross-disciplinary, involving departmental activities across the College of Engineering and beyond; exploiting and advancing methodologies of systems analysis, synthesis and design; and applying them to problems from the manufacturing of microchips to the organization of world-wide satellite and terrestrial communications, from the interactions of humans with computers and the neurological systems of animals to control systems for robotic machines.

The ISR is highly distinguished due to the outstanding quality of its people and their accomplishments. This precedent began with the vision of its founding director, John Baras, and has become a sustained tradition under the leadership of Steve Marcus, my immediate predecessor as director. I am grateful to them and to

all those who have developed ISR's excellence.

In a basic sense, I have two goals as director. First, I intend to continue and to enhance ISR's tradition of excellence. Second, I hope to guide us in building on this excellence as we move into a new era of even greater accomplishment for ISR. The unique systems skills and perspective of the ISR, together with its successful experience as an NSF ERC, provide a substantial platform to address new challenges in engineering, in education, and in their relation to broader problems of our society.

In addition, ISR is held in high regard by leaders and colleagues in the College of Engineering and in the University, who look to us as a primary driver and facilitator of cross-disciplinary research and education. We have every reason to succeed, and I enthusiastically look forward to working with you.



Rubloff is New ISR Director

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"The intellectual vitality of systems issues is long lasting and profound," Dr. Rubloff explains. "Most—if not all—of the important issues our society faces are substantially systems issues, and the perspective and skills mix which society demands of our students in their future careers increasingly requires systems thinking."

From 1993-96 Dr. Rubloff was Associate Director of the National Science Foundation Engineering Research Center for Advanced Electronic Materials Processing, and Professor of Electrical and Computer Engineering at North Carolina State University. His research focused on real-time process sensing, simulation, optimization, and control.

Dr. Rubloff spent 20 years (from 1973 to 1993) at IBM Research, Yorktown Heights, N.Y., in a variety of research and management positions in its Physical Sciences, Silicon Technology, and Manufacturing Research Departments. He pursued research ranging from fundamental surface physics/chemistry to semiconductor growth and interfaces to manufacturing.

Dr. Rubloff received his Ph.D. in Physics from the University of Chicago in 1971 and held a postdoctoral position at Brown University. He is the founding chairman of the American Vacuum Society's Manufacturing Science and Technology Group, has published over 130 papers, holds 15 patents,

and is a Fellow of the American Physical Society and the American Vacuum Society.

Dr. Rubloff also has pursued an active civic life. For more than 11 years he was a member of the board of education of the Katonah-Lewisboro School District in New York; he was a member of a Community Development Advisory Group for the U.S. Department of Housing and Urban Development, and he has been active in many local preservation, planning, housing and transportation issues.

Dr. Rubloff's e-mail address is rubloff@isr.umd.edu. His phone number is 301-405-2949.



New and Noteworthy

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situ process monitoring and control techniques. The lab is shared by Dr. Rubloff; Dr. Aris Christou, chair of the Materials and Nuclear Engineering Department; and Dr. R. Ramesh, Associate Professor in the Materials and Nuclear Engineering Department and Associate Director of UMCP's new NSF Materials Research Science and Engineering Center.



Industry participants note a point at the ISR's Neural Network Club meeting in College Park.

Neural Network Club meeting

Close to 40 industry representatives learned about the latest research advances at the annual Neural Network Club meeting on Sept. 20 in College Park.

Hosted by Professor Thomas McAvoy (ChE/ISR), the topics included control in the score space, an update on the artificial nose, ASPECT—a neural net tool for inferential sensing, process control research at the University of California Santa Barbara, predictive fault detection, and experience in modeling industrial plants with neural networks. Other topics were nonlinear PCA software, an update on projects in wastewater, detecting independent events, batch to batch optimization, plantwide control and sensor fault detection.

Open discussions and software demonstrations were an important part of the meeting.

Attendees came from Air Products, AspenTech, Bethlehem Steel, BFGoodrich, BP, Chevron, Dupont, EXXON Chemical, Fisher Controls, LTV Steel, Mitsubishi Kasei, Mobil,

Neuralware, Pavilion, Praxair, Rhone Poulenc and UOP.

ISI uses ISR facilities for MatrixX training

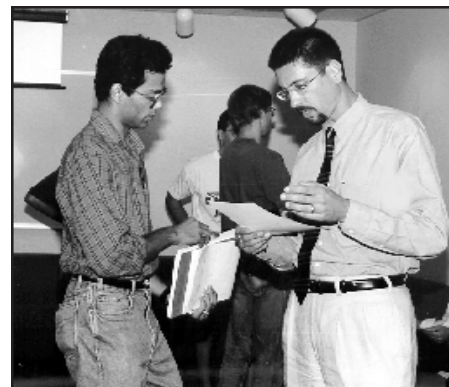
Integrated Systems, Inc., used ISR's computing laboratory facilities September 10–12 to train NASA Goddard Space Flight Center engineers on its MatrixX software. ISI's Tim Magisus and Keld Petersen explained the tool's capabilities in analysis, design, modeling, simulation, documentation implementation, software implementation and hardware integration and testing. The NASA engineers worked in guidance control, software design and testing, hybrid dynamic simulators, controls and soft-

ware, code, controls design and analysis, and simulators.

BFGoodrich recruits ISR students

BFGoodrich's Dr. Mark Shmorhun and Dr. Digen Butala interviewed ISR students on August 29 for positions designing systems for future aerospace and chemical products/processes.

Shmorhun also gave a seminar highlighting BFGoodrich career opportunities and research interests. He advised the students on modern career paths in companies like his,



Dr. Mark Shmorhun of BFGoodrich (r) advises a student about his resume.

noting that many engineers now start as contract employees. After a certain point, Shmorhun said, "there comes an expectation on engineer's value. You have to find the place where you will fit."

"It's a real different time" for new employees, he said. Shmorhun noted that many engineers move from company to company: "Your employment will not be static by any means."

ISR teaches systems engineering short courses at NASA Goddard

ISR faculty members presented a series of four short courses on systems engineering at the NASA Goddard Space Flight Center this summer. Eighteen NASA engineers attended each of the two- to three-day courses.

Associate Professor Mark Austin (CE/ISR) taught both Introduction to Systems Engineering and Introduction to State-of-the-Art Computer-Aided Systems Engineering Tools. Professor John Baras (EE/ISR) taught Systems Engineering Principles, and Associate Professor Michael Fu (BMGT/ISR) and Professor Mark Shayman (EE/ISR) co-taught System Modeling and Analysis.

ISR opens labs for Technology and Innovation Open House

ISR was a key participant in the University of Maryland at College Park's second annual Technology and Innovation Open House on Thursday, Oct. 17. The open house was sponsored by the University's Office of Technology Liaison, Graduate Studies and Research, and promoted the university's national reputation as a premier scientific research and technology transfer institution, highlighting university and industry partnerships.

ISR labs and centers hosted demonstrations and discussions of research efforts for industry guests throughout the day.

Prabhakar, Augustine, Glendening Launch Gemstone Distinguished Lecture Series



NIST Director Arati Prabhakar

National Institute of Standards and Technology (NIST) Director Arati Prabhakar, Lockheed Martin CEO Norman Augustine and Maryland Governor Parris Glendening gave their perspectives on technology and society to more than 100 freshmen honors students in three Gemstone Distinguished Lectures this October.

The lecture series is part of the University of Maryland's groundbreaking new Gemstone program. Beginning the freshman year, participating honors students form interdisciplinary teams that undertake multi-year research projects investigating technology-based solutions to social challenges. They also take a series of courses examining the implications of technology from sociological, political, historical and economic perspectives.

Prabhakar's speech focused on the relationship between technology and society.

"As I look at issues important to society, technology plays a large role," Prabhakar said. "Technology quite literally creates our civilization."

"The business of technology is the business of change," Prabhakar said. "My fascination with technology is the alchemy it creates. It is the

process of turning technology into products and services into profits and jobs. That's the process that draws me to technology."

Prabhakar said that technology is "the one tool a company can grab and basically obliterate the competition with. We see around us today how technology created opportunities and changed what we thought was possible."

In his lecture, Norman Augustine stressed the growing interdependence of science, technology, economics, politics and business—and the need for today's students to be versed in all of these areas.

Augustine stressed the importance of combining both depth and breadth in professional skills. "People interested in surviving in the next century need to have a broad base," he said, "whether they are going on to a liberal arts or technical career."

To illustrate his point, Augustine told about a survey he conducted of the managers of recent engineering hires at Lockheed Martin. When asked to grade the new employees, the managers reported that their math and science skills were fine but their presentation, interpersonal and financial skills were lacking.

Augustine said he considers this a major problem because today's engineering projects reverberate in arenas far outside the scientific community.

"The decisions we have to make today involve not just science and technology, but economics and politics and business," Augustine said. "The age when you could do an engineering project just because you could do it is over. In the next century we will need people who can cross over from arts to technology."

Augustine praised the Gemstone program for combining all the ingredients he would identify for undergraduate education. "Gemstone is breaking a mold," he said. "I think it is setting a new standard. You are crossing fields with people who are not used to interacting at all. If you think that I am kind of a salesperson for the program, it is because I am excited about it."

Maryland Governor Parris Glendening's speech illustrated both the promises and limitations of technology in solving real-world problems.

"There is a great emphasis on science and technology to solve problems, and there is an immense potential," Glendening said. "But

