



SYSTEM SOLUTIONS

THE INSTITUTE FOR SYSTEMS RESEARCH

The
Institute for
Systems
Research

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ISR students win business strategy, engineering design contests



ISR graduate students **Rohit Kumar** (l) and **Alok Priyadarshi** (r) and their start-up company, Terplicators Inc., won the University of Maryland's Hinman CEOs Business Plan Competition this spring. They competed against five finalists for the \$20,000 prize.

The Terplicators, Inc. idea is to design software modules that will enable manufacturers to easily create molds from Computer Aided Design (CAD) and scanned data. Applications include prosthetics, plastic surgery, jewelry and toys. The three-dimensional models of heads shown in the inset photo above were created with this technology.

This company is commercializing research developed in ISR's Computer Integrated

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This spring a team of students from the Aerospace Engineering "Space Systems Design" course was awarded first place in NASA's Lunar and Planetary Institute Revolutionary Aerospace Systems Concepts—Academic Linkage (RASC-AL) competition in Cocoa Beach, Fla.

Led by ISR-affiliated Associate Professor **David Akin** (AE) and Visiting Professor Mary Bowden, the student team won the competition for their design, "Space Construction and Orbital Utility Transport: Project Scout."

Judges called their presentation "totally professional," and "unbelievably thorough." One commented, "I couldn't think of a question that hadn't already been answered in the **continued on page 2**



Director's Corner



Eyad Abed named ISR director

Professor **Eyad Abed** has been named the director of the Institute for Systems Research (ISR). He had been ISR's acting director since fall 2001. Abed, who joined the university in 1983, has an impressive record in control systems, including contributions to the control of nonlinear systems exhibiting bifurcation and chaos, singular perturbation analysis and reduced-order modeling, nonlinear stability and stabilization, linear robust stability, gas turbine jet engine dynamics and control, electric power system dynamics and control, tethered satellite control, aircraft control and radar system dynamics.

Abed is a Fellow of the IEEE and received the National Science Foundation Presidential Young Investigator Award; the O. Hugo Schuck Best Paper Award from the American Automatic Control Council; ISR's Outstanding Systems Engineering Faculty Award; the Naval Research Laboratory's Alan Berman Research Publication Award; and two teaching awards from the university. He is also on the advisory editorial board of *Nonlinear Dynamics*.

Abed earned a bachelor's degree from MIT in 1979 and his master's and Ph.D. degrees at the University of California at Berkeley in 1981 and 1982, all in electrical engineering. [ES](#)

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New patents

Professor **Christopher Davis**, **Saeed Pilevar** (his former postdoc), **Alexander Fielding** (his former Ph.D. student) and Frank Portugal were issued U.S. Patent 6,558,958 for an "optical fiber evanescent field excited fluorosensor."

Professor **Gary W. Rubloff** (MSE/ISR), along with Abdul Wajid and Carl A. Gogol, Jr. of Leybold, Inficon, Inc., was granted U.S. Patent 6,482,649 for the invention, "Acoustic Consumption Monitor." The monitor uses an acoustic cell to determine the reaction efficiency of a CVD process reactor. Determining the efficiency allows the thin film growth rate to be measured, as well as the associated rates of the products which have been exhausted from the reactor.

Professor **K. J. Ray Liu**, Research Professor **Leandros Tassioulas** and **Farrokh Rashid-Farrokhi**, an ISR alumnus, were issued U.S. Patent 6,377,812 for "combined power control and space-time diversity in mobile cellular communications." The invention achieves the optimal solution for a mobile cellular communications system uplink that minimizes the mobile power, and achieves a feasible solution for the downlink if any exist. The combination of power control and space-time diversity apply to networks with fading channels, including networks in which the number of cochannels and multipaths are larger than the number of antenna elements.

You can view these and other ISR patents at www.isr.umd.edu/ISR/patents/. [ES](#)

Terplicators

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Manufacturing Laboratory (CIM Lab). It was sponsored under Associate Professor **S.K. Gupta's** (ME/ISR) Office of Naval Research Young Investigator Award.

Alok is a graduate student of Dr.

Gupta, who is also a part of the start-up company. Alok recently took first place out of 116 competitors in Graduate Research Interaction Day (GRID), an annual event that provides a common platform for presentation of propriety research as part of a cross-disciplinary graduate research competition.

Rohit is advised by Associate Professor **Jeffrey Herrmann** (ME/ISR). [ES](#)

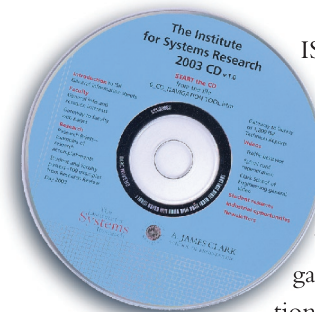
RASC-AL competition

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presentation." NASA has requested the team's Computer-Aided Design models and documentation, as they said the SCOUT concept both identifies and fills a "gaping hole" in their advanced space operations architecture.

The RASC-AL competition allows student design teams to present research design projects to peers and representatives from NASA and industry. [ES](#)

Free ISR resource



ISR's new CD contains a wealth of information on research, labs, industrial opportunities and faculty; gateways to information on the ISR web

site; *Research Briefs*—examples of ISR research accomplishments; over 100 posters from Research Review Day 2003; 1,200 ISR Technical Reports; videos; student resumes and a newsletter library. E-mail rebeccac@umd.edu and we will mail the CD promptly. [ES](#)

Abshire, La win NSF CAREER awards

Two ISR assistant professors have won the National Science Foundation's Faculty Early Career Development (CAREER) Award. The CAREER award is an important acknowledgement of promise in research, fostering the career development of outstanding junior faculty.

Richard La (ECE/ISR) was selected for his project, "Networking Modeling and Resource Allocation." La will build an integrated networking research and education program focusing on network modeling, performance evaluation and algorithm designs.



This will include developing stochastic and deterministic network models for congestion control, designing pricing schemes between end users and service providers and between domains, investigating the integration of the physical and overlaid logical network management, and designing opportunistic wireless scheduling algorithms for next generation cellular networks.

Pamela Abshire's project is "Physical Information Efficiency for Sensing, Communicating, and Computing."

Abshire notes that in physical computational efficiency, "there is no free lunch." Performance versus resource tradeoffs are everywhere, she says, placing limits on performance and efficiency.



Her idea is that to streamline technological processes, one should study and even mimic biology's highly efficient integrated systems that get the most bang for their resource buck. Abshire says these "ultimate small smart systems will revolutionize application design in microelectronics, bioengineering, nanoscience and other fields."

For example, consider a miniaturized autonomous cell clinic able to navigate the bloodstream and deliver therapy directly to damaged cells—or environmental microbots for security, monitoring and situation awareness. All are possible once scientists can pinpoint ways to boost communication and computation to use resources in the most efficient ways.

Abshire's research will lay critical groundwork for comparative analysis and application across biological and technological systems. She will study the blowfly, an insect that uses minimal energy to maximal advantage in an autonomous system where resources are precious.

Abshire has already mapped this visual process and made a comparative study of a silicon photosensor's information efficiency. She is at the forefront of devising the rigorous methodology and collecting the data necessary to analyze fundamental limits in performance and efficiency. She will work on a practical innovative microelectronic system design that uses this analysis to push limits as far as possible.

The objectives are to narrow performance gaps between empirical and theoretical silicon as well as between biology and silicon; quantify task-specific performance; enhance performance limitations and architectural tradeoffs stemming from practical noise sources; analyze and implement feedback, adaptation and learning strategies; and investigate signal representation tradeoffs. [ES](#)

Wu, Liu are PIs for anti-collusion fingerprinting project

ISR-affiliated Assistant Professor **Min Wu** (ECE/UMIACS) and Professor **K.J. Ray Liu** (ECE/ISR) are the principal investigators for a new Air Force Research Laboratory Digital Data Embedding Technologies (DDET) award.

"A Collusion-Resistant Multimedia Fingerprinting Framework for Information Forensics," will design efficient and effective digital fingerprints for text and multimedia content that can withstand collusion attacks, allow for gathering forensic evidence of guilt and identify colluders.

Digital fingerprinting identifies users who have legitimate access to content but may use it for unintended purposes, such as duplication and redistribution. For multimedia content, fingerprints are often embedded using conventional watermarking techniques typically concerned with robustness against a variety of attacks mounted by an individual.

However, the global nature of the Internet has made it easier for a group of users with differently marked versions of the same content to work together and collectively mount attacks against the fingerprints. These collusion attacks can remove an identifying fingerprint.

DDET is developing, employing and exploiting digital data embedding technologies to provide early demonstrations for potential applications to operational DoD systems. It also is enhancing existing and maturing technologies and provides a vehicle for continued development.


Co-PIs are ISR Research Associate **Z. Jane Wang** and ISR alumnus **Wade Trappe**, now an assistant professor in Rutgers University's Electrical and Computer Engineering Department and WINLAB. [ES](#)

Ephremides, Baras, La, Ulukus awarded \$1.5 million wireless networks grant

Professor **Anthony Ephremides** (ECE/ISR); Professor **John S. Baras** (ECE/ISR); Assistant Professor **Richard La** (ECE/ISR); and Assistant Professor **Sennur Ulukus** (ECE/ISR) have received a three-year, \$1.5 million National Science Foundation Information Technology Research (ITR) grant to develop “Vertical Protocol Integration In Ad-Hoc Wireless Networks.” Dr. Ephremides is the principal investigator for the project.

Design, planning, control and management of high performance networks requires an integrated approach, as opposed to the conventional method where each layer is designed and optimized independently. This project seeks to exploit inter-layer dependencies in network protocols for improved network performance. In particular, the researchers will focus on ad-hoc wireless networks, in which these interdependencies are more pronounced and the network will benefit significantly by cross-layer designs.

The main focus is on the interaction between the physical layer, the MAC layer, and the routing/transport layers. The researchers will take into account the nature of the wireless medium by detailed modeling of the transmission parameters and of the detector structure and consider both TDMA (scheduled) and CDMA media-access control mechanisms. The researchers will couple these with flow and route assignment problems and consider how the transport protocol interacts with route selection and bandwidth allocation.

In addition, the researchers will address the role of network control and management in ad-hoc wireless networks, exploiting its interaction with the layers. Finally, the researchers will consider the interaction of signal compression with rate and quality control and are mindful of the energy consumption repercussions of the joint protocol design. 

Espy-Wilson awarded grant for knowledge and speech recognition

Associate Professor **Carol Espy-Wilson** (ECE/ISR) has received a three-year, \$407,549 NSF grant to develop a robust automatic speech recognition system. This system will include acoustic parameters that target linguistic information in the speech signal and a new paradigm for recognition that integrates current speech knowledge with a powerful statistical framework.

The “Acoustic-Phonetic Knowledge and Speech Recognition” system will model early stages of speech perception, and aid in understanding and coping with variation in speech that occurs within and across speakers. Components of the system will serve as speech analysis tools for applications such as speech coding, automatic speech transcription, speech enhancement, and training aids for speech pathologists.



New REU grant funds 15 students for summer program




12-week period in the summer. Students at colleges, universities and community colleges are recruited nationwide through a process involving efforts to reach students who would otherwise not have access to a research experience.

Associate Professor **S.K. Gupta** (ME/ISR) is the principal investigator; co-PIs are Professor **Dana Nau** (CS/ISR),

Professor **Gary Rubloff** (MSE/ISR), and Professor **P.S. Krishnaprasad** (ECE/ISR). The program is directed by Educational Programs Coordinator **Lee Harper**.

ISR has received a five-year, \$688,702 NSF grant for its Research Experience for Undergraduates (REU) program.

The grant supports 15 students for a

The summer 2003 class of students under this new grant is pictured at left. These students came from colleges in Indiana, New Jersey, Florida, New York, Illinois and Arizona as well as Maryland and Washington, D.C. Their research included projects as diverse as decision management, engineering process simulation, manufacturing systems, face recognition, scalable vector graphics and combinatorial science methodologies and materials informatics. Additional projects included multi-user security in network communications and visually-guided audition for formation control in search and safety. 

ISR faculty receive \$2 million grant to analyze electronic markets for time-sensitive goods

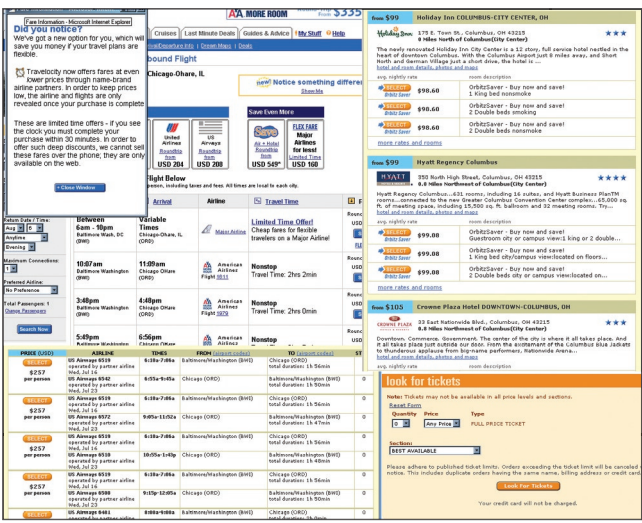
Professor G. “Anand” Anandalingam (Smith School of Business/ISR), Professor Michael Ball (Smith School of Business/ISR), Professor V.S. Subrahmanian (CS/ISR) and ISR-affiliated Assistant Professor S. Raghavan (Smith School of Business) are part of an eight-member University of Maryland team that has received a three-year, \$2 million National Science

Foundation grant to study electronic markets for “time-sensitive” goods. Professor Anandalingam is the principal investigator.

“Rapid Response Electronic Markets for Time-Sensitive Goods” is a project of the Center for Electronic Markets and Enterprises (CEME). The researchers are analyzing a variety of e-markets with particular focus on those where buyers and sellers have little time to finalize the deal. Goods that fall into this “time-sensitive” category include tickets to sporting and entertainment events, airline tickets, hotel room reservations, and airport landing time slots.

“Electronic markets are becoming an integral part of business, especially for buying and selling time-sensitive goods,” said Anandalingam. “This research will significantly advance our understanding of these e-markets at a time when online sales post rapid gains, and as firms across the board work to develop strategies that will ensure their success in the electronic marketplace.”

The project includes an investigation of wireless technologies and addresses market structure design and mechanisms



for time-sensitive-goods, as well as data delivery system design. The researchers are also studying market software agents and conducting an empirical analysis of existing markets.

CEME provides scholars and business leaders with comprehensive insight on current and potential uses of electronic markets and enterprises. A key goal is to provide an understanding of why some of these enterprises succeed, while others fail.

Other University of Maryland faculty on the research team are Hank Lucas and Louisa Raschid, both members of the Robert H. Smith School of Business’ Decision and Information Technologies department, and Lawrence Ausubel and Peter Cramton from the Department of Economics. Corporate collaborators include Avendra, GE Global Exchange and IBM.

—ISR thanks the Robert H. Smith School of Business for this information. Learn more at CEME’s web site: www.rhsmith.umd.edu/cheme/.

Rubloff is PI for new NSF International Materials Institute

ISR Professor and former Director Gary W. Rubloff (MSE/ISR) and Assistant Professor Ichiro Takeuchi (MSE) are two of the four principal investigators for a new National Science Foundation International Materials Institute (IMI).

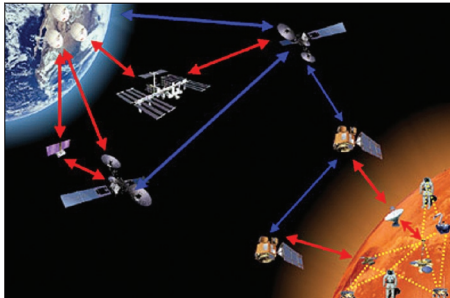
The Combinatorial Sciences and Materials Informatics Collaboratory (CoSMIC) is being funded by a five-year, \$3.5 million grant to the University of Maryland; Rensselaer Polytechnic Institute (RPI), the lead institution; and Florida International University (FIU). Maryland receives nearly half the award.

CoSMIC will develop leading-edge experimental and information-based tools for high-speed discovery and evolution of new materials and processes. Its research focus is combinatorial experimentation and materials informatics, systematic approaches that represent a profound qualitative change in how materials R&D can be practiced.

Rubloff, an expert in materials processing and control for semiconductor manufacturing, leads the Education and Research Integration emphasis. He is pursuing novel equipment design paradigms for combinatorial chemical vapor deposition with Associate Professor Ray Adomaitis (ChE/ISR) in the Laboratory for Advanced Materials Processing. Rubloff’s simulation research also is the driver for the simulation-based learning environments that are the centerpiece of CoSMIC’s educational outreach activities.

Rubloff says, “Systems methodologies are critical in meeting the rapidly growing materials challenges we see in nanotechnology, biotechnology, and the continuing advancement of microelectronics to support information technology.”

Hadjtheodosiou is NASA space communications PI



ISR Assistant Research Scientist **Michael Hadjtheodosiou** is the principal investigator for “Flexible and Secure Access for High Data Rate Space Communications,” a NASA Space Communications Project in Computing Information and Communication Technologies. Professor **John Baras** (ECE/ISR) is the co-principal investigator.

The research will evaluate alternatives for more efficient and dynamic ways to communicate with NASA missions, enabling scientists to access data “anytime, anywhere” through the Internet. It focuses on issues such as dynamic multiple access techniques for an “on-demand” operational scenario and requires modifications of the ground network that will enable more efficient access. It also looks at security, traffic analysis and QoS support issues for this architecture.

The two-year award carries a possibility of renewal for a third year. It will enhance activities already under way at the Center for Satellite and Hybrid Communication Networks related to supporting communications for NASA missions and developing a new space communication architecture for the future. [ES](#)

DURIP: High-speed modeling and simulation test bed for networked systems

Professor **John Baras** (ECE/ISR) is the principal investigator for a Defense University Research Instrumentation Program (DURIP) award from the Army Research Office. The \$264,000 award is for a high-speed modeling and simulation testbed for networked systems that

will be used by the Systems Engineering and Integration Laboratory. The DURIP program supports the purchase of state-of-the-art equipment that augments current university capabilities or develops new university capabilities to perform cutting-edge defense research. [ES](#)

Lovell researching car-following behavior

Associate Professor **David Lovell** (CEE/ISR); student Taehyung Kim; and visiting professor Yongjin Park from Daegu, Korea have received a \$143,554, two-year NSF award for “Observation and Modeling of Variability in Car-Following Behavior.”

This study observes and analyzes the car-following behavior of actual drivers, developing a model that can explain the stochastic effects across and within drivers. It also explains the effects caused by critical factors such as human, traffic, road and environmental characteristics.

This is a significant improvement over previous empirical studies, conducted sparingly by pairs of trained professional traffic engineers on closed test tracks. The results

of this project should contribute significantly to the development of more realistic microscopic car-following laws that incorporate variation across and within individual drivers.

A combination of inertial, GPS, infrared sensing, and video equipment will be used to collect the data. The lead (control) vehicle will be driven by an experimenter, but it is the behavior of the follower (random members of the driving population) that will be observed. Video will be used for manual confirmation of recorded events, as well as to record certain characteristics that might play a statistically relevant role, including human, traffic and road, and environmental parameters. [ES](#)

DARPA THOR program grant

ISR-affiliated Professor **Christopher Davis** (ECE), ISR Senior Research Scientist **Stuart Milner**, and Professor **Uzi Vishkin** (ECE/UMIACS) have received a Defense Advanced Research Projects Agency grant under its TeraHertz Operational Reachback (THOR) program.

THOR is developing optical wireless links to form an “Internet in the Sky” and allow very high rate, secure data transfer anywhere in the world without the need for installed fiber optic infrastructure.

Maryland Optics Group research-

ers will be developing 1) agile, tracking transceivers and software for node acquisition, tracking, and efficient data transfer; 2) topology control algorithms for rapidly reconfigurable networks to accommodate groups of point-to-point transmission requests during node failures and irrecoverable link failures; and 3) communication protocols to provide reliable data transfer and error correction to mitigate the effects of obscuration in the path between moving nodes. The nine-month first phase of the grant is worth \$300,000. [ES](#)

Zhang awarded NIH grant for machinable ceramics

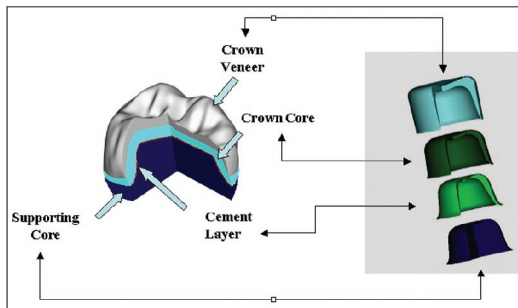
Associate Professor **Guangming Zhang** (ME/ISR) is participating in a five-year, \$5.9 million National Institutes of

Health grant, “Machinable Ceramics: Optimizing Performance and Properties.” This grant is funded through NIH’s National Institute of Dental and Craniofacial Research (NIDCR).

The program will develop fundamental understanding of damage initiation and accumulation in all-ceramic layered dental crowns as a function of materials, crown and tooth preparation design, and fabrication variables.

Dr. Zhang and Professor Dianne Rekow of the Basic Sciences and Craniofacial Biology and Orthodontics Department in the College of Dentistry at New York University are responsible for research in complex loading, crown geometry and performance.

The program is a continuation of seven years’ worth of previous NIDCR funding and teamwork on monolithic ceramic crown materials, which has resulted in more than 70 publications, plus proceedings and abstracts. Four Ph.D. dissertations have been based on the work. The strategic approach of the new work will be to move from flat layer structures with simple loads to crowns on real teeth with complex loads. [ES](#)



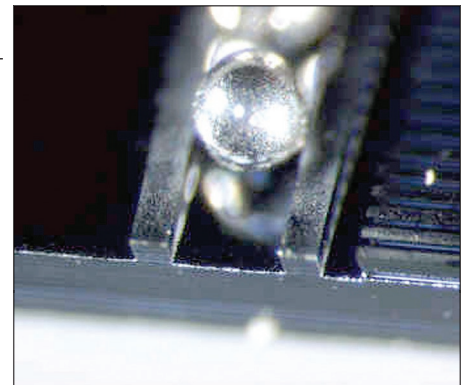
Ghodssi wins NSF micro-ball bearings grant

Assistant Professor **Reza Ghodssi** (ECE/ISR) is the principal investigator for a new three-year, \$270,000 NSF grant, “Micro-Ball Bearing Technology for Micro-Electro-Mechanical Systems.”

MEMS are not yet reliable and efficient enough for electrical and mechanical power demands in microsystems. Ball bearing mechanisms are expected to increase long-term reliability and efficiency through minimizing friction and wear, and to provide robustness and stability for moving parts while avoiding fabrication complexities. Therefore, “micro-ball bearing technology” is expected to have a pivotal impact on applications such as micro-generators, micro-pumps, and micro-coolers.

Ghodssi’s research investigates the use of micro-ball bearing technology for MEMS and micro-machinery applications. He is developing a MEMS-based electrostatically actuated micro-motor integrated with silicon micromachined bearings which house stainless-steel micro-balls as support mechanism between rotor and stator.

At right is an optical micrograph of a linear micro-ball bearing integrated in the rotor of a bottom-drive linear variable-capacitance micromotor. A stainless-steel microball with a diameter of 285 μm is sitting in a 85- μm deep, 290- μm wide silicon micromachined groove fabricated using deep reactive ion etching. [ES](#)



Ulukus receives NSF wireless networks grant

Assistant Professor **Sennur Ulukus** (ECE/ISR) has been awarded a three-year, \$235,647 grant by the National Science Foundation for her project, “Distributed Signal Design and Optimum Transmit Strategies for Wireless Networks.”

The goal of this project is to understand and determine the ultimate capacity limits of wireless communication networks, and develop techniques and algorithms

to achieve or approach them. Developing principles and guidelines for the design of future wireless networks will be an important product of this research.

Dr. Ulukus will design and develop algorithms for the physical and medium access control (MAC) layers of multiple-transmitter multiple-receiver vector multiple access networks in asynchronous and dispersive channels with inter-symbol-

interference (ISI) and fading. Dr. Ulukus and her students will study the development of feedback—and measurement-based, highly-adaptive, distributed and iterative algorithms for the construction of network-wide optimum transmit strategy ensembles. [ES](#)



Professor **K.J. Ray Liu** has been named an IEEE Signal Processing Society 2004 Distinguished Lecturer. The IEEE Signal Processing

Society elects six Distinguished Lecturers each year to represent the society by giving lectures about their research around the world. Liu also was elected an IEEE Fellow for his "contributions to algorithms, architectures and implementations for signal processing." In addition, he recently became the editor-in-chief of *IEEE Signal Processing Magazine*, the most widely read journal in the signal processing community.

ISR postdoctoral researcher **Miao Yu**, along with Professor Balakumar Balachandran (ME) and graduate student Moustafa Al-Bassiyouni, received the University of Maryland's "Invention of the Year" award in physical sciences for developing a new fiber optic sensor system for acoustic, pressure and acceleration measurements of vibration. Their system has a high sensitivity level, remote sensing capabilities, and can be miniaturized to the fiber optic diameter-level for MEMS applications. Dr. Yu's appointment is with Professor **John Baras** (ECE/ISR) and ISR affiliate faculty member **Mikhail Vorontsov** (Army Research Laboratory) in the Intelligent Optics Laboratory. She is conducting research, developing computer code and characterizing laser beam propagation in atmospheric turbulence in the conditions of strong intensity scintillations and nonlinear effects.

Associate Professor **Jeffrey Herrmann** (ME/ISR) received the 2003 Jiri Tlustý Outstanding Young Manufacturing Engineer Award. The award was given to Dr. Herrmann by the Society of Manufacturing Engineers (SME) for his

significant achievements and leadership in manufacturing engineering as a young engineer. Only 12 recipients were selected for this prestigious award in 2003.

Professor **James Hendler** (CS/ISR) has been awarded the Air Force Exceptional Civilian Service Medal. This is the Air Force's highest honorary award for civilians. It recognizes exceptionally distinguished service and accomplishments having significant service-wide scope and impact. Hendler also was appointed a member of the NASA Earth Science and Applications Advisory Committee's Technology Subcommittee. The committee is the primary technology advisory group for NASA's Earth Science Enterprise, a major mission focus area.

Assistant Professor **Sennur Ulukus**, along with Chris Rose and Roy Yates of Rutgers University, won the 2003 IEEE Marconi Paper Prize Award in Wireless Communications for the paper, "Wireless Systems and Interference Avoidance." This research appeared in *IEEE Transactions on Wireless Communications*, Vol. 1, No. 3, pp. 415-428, July 2002. The award is given by the IEEE Communications Society and will be presented at Globecom 2003 in San Francisco this December.

Professors **John S. Baras** (ECE/ISR) and **Christopher Davis** (ECE) gave research-oriented presentations at the Clark School of Engineering's first Charles and Helen White Symposium, May 14. Davis spoke eloquently on extremely short notice, pinch hitting for Bioengineering Professor William Bentley.

Professor **P.S. Krishnaprasad** (ECE/ISR), ISR Director **Eyad Abed** (ECE/ISR) and ISR Affiliated Professor **Roger Brockett** (Harvard) presented papers at a symposium honoring the 60th birthday of Professor Arthur J. Krener of the University of

California, Davis. Krener is a pioneer in nonlinear control theory and its applications. He spent a sabbatical year at ISR in 1992-93. Abed spoke on "Feedback Control of Border Collision Bifurcations," Krishnaprasad's talk was "Interacting Particles on Lie Groups," and Brockett's examined "Quantum Control."

Professor **Dana Nau** (CS/ISR), his current Ph.D. student **Tsz-Chiu Au** and former research scientist **Héctor Muñoz-Avila** (now a professor at Lehigh University) won a best research paper award at the 6th European Conference on Case-Based Reasoning. The paper is titled, "On the Complexity of Plan Adaptation by Derivational Analogy in a Universal Classical Planning Framework."

Associate Professor **Mark Austin** (CEE/ISR) and his student **Evangelos Kaisar** won a best paper award at the Sixth World Multi-Conference on Systemics, Cybernetics and Informatics (SCI 2002) and the Eighth International conference on Information Systems, Analysis and Synthesis (ISAS 2002). "Multi-Level Object-Based Analysis of Narrow Passageway Transportation Systems" was selected as one of the best papers presented in the Information Technology Applications in Transportation session.

Professor **Anthony Ephremides** recently presented a talk on "Energy-Saving Conflict Resolution in Ad Hoc Networks" as part of the Distinguished Lecture Series of the University of Illinois in Urbana. The talk was based on his joint work with student **Yalin Sagduyu**. Ephremides also spoke at Bell Labs and participated in another distinguished lecture at Notre Dame. Last fall, he was the keynote speaker at Mobicom 2002 in Atlanta. He spoke at the University of Washington in Seattle in June. In addition, Ephremides was one of only 18 University of Maryland faculty

members inducted into the first class of Fellows for the university's new Academy of Excellence in Teaching and Learning.

Professor **John Baras** and graduate students **Alvaro Cardenas** and **Vahid Ramezani** won the Best Paper Award in IT/C4ISR (Information Technology, Information Technology/Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance) at the 23rd Army Science Conference in Orlando, Fla., this past December. Their paper was titled, "On-Line Detection of Distributed Attacks From Space-Time Network Flow Patterns."

New faculty

ISR welcomes five new joint and affiliate faculty members.



Michel Cukier is a new affiliate faculty member. He is an assistant professor in the Materials Science and Engineering Department and the Center for

Reliability Engineering. His research interests are in security evaluation, intrusion tolerance, distributed system validation, fault injection, and software testing.



Xicheng (Nelson) Liu is a new research faculty member. Liu is an assistant research scientist who holds a Ph.D. from the Institute of Computer

Technology, Chinese Academy of Sciences. His research interests are in modeling, performance evaluation and management of hybrid communication networks.



Peter Sandborn is a new affiliate faculty member. An associate professor in Mechanical Engineering, he earned his Ph.D. at the University of Michigan. His interests are in electronic packaging and reliability; life cycle cost analysis of electronic systems, technology tradeoff analysis, supply chain management, parts selection and management; electronic systems environment design; and micro-electromechanical systems.



Benjamin Shapiro is a new joint appointment faculty member with Aerospace Engineering. He is an assistant professor who earned his Ph.D. at the California Institute of Technology. His research interests are in dynamics, modeling and control of micro systems.



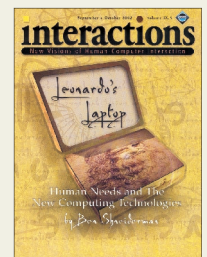
Mikhail Vorontsov of the Army Research Laboratory has joined ISR as an affiliated research professor. He directs the Intelligent Optics Laboratory. Vorontsov earned his Ph.D. at Moscow State University. His research interests are in adaptive optics, nonlinear spatio-temporal dynamics, imaging through turbulence, parallel image processing and correction, optical synergetics, optimal control theory and optical neural networks.

Faculty books

The third edition of *Building Scientific Apparatus* by Professor John H. Moore of the Department of Chemistry and Biochemistry, Professor **Christopher Davis** and Research Professor Michael A. Coplan of the Institute for Physical Science and Technology, was recently published by Westview Press. It is a practical guide for working scientists and students who design and construct scientific equipment.

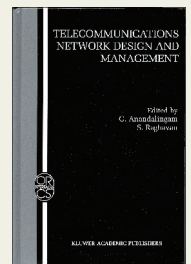
Professor **Ben Shneiderman** (CS/ISR) has written a new book, *Leonardo's Laptop*, published by MIT Press.

The book "proposes Leonardo da Vinci as an inspirational muse for the 'new computing'" and invites readers to "wonder how Leonardo would use a laptop and what applications he would create." The September 2002 issue of the Association for Computing Machinery's *Interactions* magazine (shown above) featured Shneiderman's book on the cover and included a 14-page excerpt.



Two ISR faculty members are the editors of a new book published by Kluwer academic publishers. *Telecommunications Network Design and Management* is edited by Professor **G. "Anand"**

Anandalingam (Smith School of Business/ISR) and ISR-affiliated Assistant Professor **S. Raghavan** (Smith School of Business). The book represents the state of the art in applying operations research techniques and solutions across a broad spectrum of telecommunications problems and implementation issues. [ES](#)





ISR alum **Y.C. Buno Pati** was honored at the University of Maryland's Fourth Annual Alumni Association Awards Gala this spring. Pati received the Clark School of

Engineering 2003 Distinguished Alumnus Award for his contributions to engineering and the advancement of technology. He received all three of his electrical engineering degrees from Maryland, earning his Ph.D. in 1992 under Professor **P.S. Krishnaprasad** (ECE/ISR).

Radha Poovendran, an ISR alumnus and now assistant professor in the Electrical Engineering Department at the University of Washington, won the Army Research Office's Young Investigator's Program award for "Information Assurance for Energy Constrained Wireless Sensor Networks."

Nikolaos Kanlis, who received his Ph.D. in 2002, accepted an offer from Texas A&M, Kingsville, as an assistant professor.

Hamid Jafarkhani, who received his Ph.D. in 1997, recently joined the Department of Electrical and Computer Engineering at the University of California, Irvine.

Jie Chen, who received his Ph.D. in 1998, accepted an offer from Brown University as an assistant professor.

Hua O. Wang, a 1993 Ph.D., has joined Boston University's Department of Aerospace and Mechanical Engineering as an associate professor with tenure. Prior to this, he was an assistant professor of electrical and computer engineering at Duke University and also program director for systems and control at the Army Research Office in Durham, N.C. [ES](#)

Theresa Valentine, a senior in the Materials Science and Engineering Department and ISR, has been honored with an Undergraduate



Student Research Award from AVS—The Science and Technology Society. Theresa receives \$1000 of support for equipment and supplies related to her undergraduate research "to investigate strategies for using gas analysis techniques to explore aqueous microenvironments through both simulation and experimentation." She is conducting this research in collaboration with her advisor, Professor **Gary W. Rubloff** (MSE/ISR).

Jean-Marie Lauenstein, an undergraduate student, was selected for the 2003 Barry Goldwater Scholarship. It is awarded on the basis of merit to students who have outstanding potential and intend to pursue careers in mathematics, the natural sciences or engineering.

Graduate student **Marcel Pruessner** has been awarded one of three \$15,000 ARCS Fellowships given by the Clark School of Engineering for the 2003-2004 academic year. Pruessner is a student in the MEMS Sensors and Actuators Laboratory, advised by Assistant Professor **Reza Ghodssi** (ECE/ISR). His research focuses on optical switching and III-V MEMS.

Ph.D. student **Jonathan Neumann** received the Best Student Paper Award at the Directed Energy Professional Society's fifth annual symposium. The award is in recognition of work relating to electron beam modulation in particle accelerators with application to THz sources. Neumann also received the Ralph W. Shrader Master's Degree Scholarship from the Armed Forces Communications and

Electronics Association for his research on free electron lasers. The \$3,000 award is given to reward excellence of demonstrated effort at the master's level.



Xiaobo Tan and **Michael Khbeis** from Assistant Professor **Reza Ghodssi's** ENEE 719F class won one of two best poster awards at the Spring 2003 Special Topics Symposiums of the MEMS Alliance. Their poster was titled, "Microfabrication of a Pressure Sensor Array using 3D Integration Technology." The MEMS Alliance is a networking group of companies, universities and government laboratories in the Washington, D.C., metropolitan area.

Mohith Prakash Narayanan, a junior in computer engineering, won second prize in the Washington Society for Engineers Young Engineer Prize Paper Competition. His paper is titled, "Image Compression Using Wavelet Decomposition and Vector Quantization of Subband Coefficients."

Graduate student **Linda Wasiczko** has been awarded a Selected Professions Fellowship from the American Association of University Women (AAUW) Educational Foundation, one of only 34 such fellowships among many disciplines. The Fellowship carries a stipend of \$20,000.



Wasiczko is pursuing a Ph.D., researching the effects of atmospheric turbulence and obscuration on the performance of high data rate optical wireless communication systems. She is a student of Professor **Christopher Davis**.

Ph.D. student **Sean Andersson** received a \$15,000 scholarship from the Achievement Rewards for College Scientists (ARCS) Foundation, Inc. Andersson's research is focused on the role of geometric phases in sensing and control and mobile robotics.

Graduate student **Tao Jiang's** work was recognized by Dr. Michael Andrews, the Department of the Army's Deputy Assistant Secretary

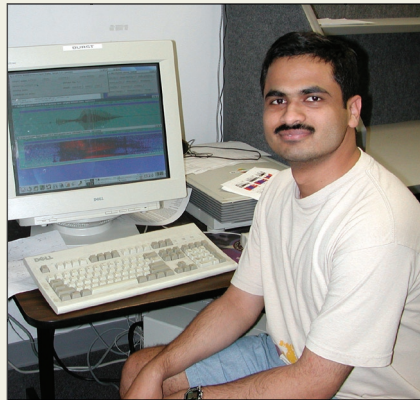


for Research and Technology and Chief Scientist. She received a special coin in recognition of her outstanding exhibit, "Trust Evidence Distribution in Ad Hoc Networks," at the 2003 Collaborative Technology Alliances (CTA) Conference. Above, John Miller, director of the Army Research Laboratory, presents Tao Jiang with the coin as Professor **John Baras** looks on.

Alireza Modafe, a Ph. D. student, was selected to receive the American Vacuum Society's (AVS) Graduate Research Award for 2002. One Graduate Research Award is given each year. The award was presented to Modafe at the AVS 49th International Symposium this past fall in Denver.

Jon Shalvi, an ISR graduating senior, won the Clark School of Engineering's Spring 2003 Engineering Honors Award for Most

Outstanding Research. His advisor is Assistant Professor **Min Wu**.



Graduate student **Om Deshmukh** won the Best Student Paper competition in Speech Communication at the 145th meeting of the Acoustical Society of America (ASA) in Nashville this April. His paper was titled, "A Measure of Aperiodicity in Speech Signals." His advisor is Associate Professor **Carol Espy-Wilson**.

Graduate student **Matthew Cheely** and Assistant Professor **Timothy Horiuchi's** (ECE/ISR) paper, "A VLSI Model of Range-Tuned Neurons in the Bat Echolocation System," was selected as the Best Paper of the Sensory Systems Track at the International Symposium on Circuits and Systems (ISCAS) 2003. It was selected from some 65 papers.

2003 ISR awards

Reza Ghodssi received the ISR Outstanding Faculty Award, **Zoltan Safar** won the George Harhalakis Outstanding Systems Engineering Graduate Student Award, **Patrick Sodre Carlos** earned the Outstanding Systems Engineering Undergraduate Student award, and **Pam White** received the ISR Outstanding Staff Award. [ES](#)

Toshiba joins ISR as sustaining partner

Toshiba Corporation has joined ISR as a sustaining partner, strengthening a collaboration that is already several years strong.

Begun in 2001, the ISR-Toshiba partnership already has produced valuable research results for the international corporation. A visiting scientists program brings Toshiba engineers to the United States to spend concentrated time in cross-disciplinary research with ISR faculty members.

Currently two Toshiba scientists are visiting ISR. Mr. Tomomi Ino, a research scientist at Toshiba Corporation's Quality Control System Technology Center in Yokohama, Japan, is working with Professor **Gary W. Rubloff** (MSE/ISR) on advanced process control systems. Mr. Yoshinori Shirasu, another research scientist, is working with Professor **Michael Ball** (Smith School of Business/ISR) on supply chain management techniques.

Toshiba also is partnering with ISR researchers in developing data mining algorithms.

We welcome Toshiba as an ISR sustaining partner and look forward to increased and continuing research opportunities in the future. [ES](#)

Honda Visiting Scientist news

Since 1999, the ISR-Honda Visiting Scientist Program has brought early career engineers from Honda Research and Development in Japan to ISR for a 14-month immersion in English language and American culture. During their time here, the engineers work with university faculty on projects suited to their mutual interests. Two Honda Visiting Scientists have been resident at ISR in the past year.

Mr. **Takeo Yokoyama** is a chassis

continued on page 12

Honda visiting scientists

continued from page 11...



designer in the motorcycle body design division of Honda R&D Co. in Japan.

Mr. Yokoyama (above) helped convert the "Excite," a Ford Explorer, for the University of Maryland's 2003 Future Truck Competition entry. He helped develop the control system that switches the hybrid engine fuel source between ethanol and electric battery. The program is led by Mechanical Engineering Professor David Holloway.

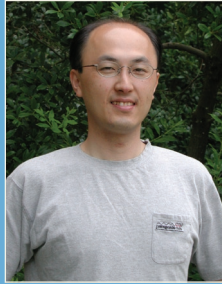
Mr. Yoshihiko Eguchi (right) is a noise-damping and exhaust systems engineer in Honda R&D's auto-



mobile body development department.

During his stay at ISR he worked

on "Turbulence and Transition in the Cardiovascular Circulation" with Mechanical Engineering Associate Professor Kenneth Kiger. This research studies the local flow characteristics of a pulsatile poststenotic channel flow with Particle Image Velocimetry (PIV).



ISR welcomed our newest Visiting Scientist from Honda, Mr. Morimichi Nishigaki (left), this July. He is an engineer inter-

ested in researching obstacle recognition using stereo images, a technology that could improve drive support and collision prevention systems for vehicles.

Learn more about the visiting scientists at www.isr.umd.edu/ISR/industry/VisitingScientistPgm.html. ☺

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