The Department of Electrical Engineering’s strength and continuing growth cannot be attributed to one single factor. I hope that this document helped you understand some of the many components that are at work. The faculty, the staff, and last, but not least, the students, have all helped build the program to what it is today and, more importantly, are what will drive it to further success in the future. We must also not forget the major role played by others in collaboration with the department, both within the university and in the engineering community, here in Arizona, the U.S., and internationally.

I look forward to continued growth and recognition of the department both at home and abroad.

Peter E. Crouch
Dean, College of Engineering and Applied Sciences
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### MESSAGE FROM THE DEAN

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## Faculty Honors

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## FEATURE STORY

Electrical Engineering and the Biosciences: Designing the Future
Dear Friends and Colleagues:

It is with great pleasure that we publish this year’s Annual Report for the Department of Electrical Engineering at Arizona State University. This year has been a period of consolidation after several years of rapid growth in terms of new faculty. It is also a year of great change at ASU with the end of one era of leadership under President Lattie Coor and the inauguration of Dr. Michael Crow as ASU’s 16th president. The change in leadership portends a change in the role of the Electrical Engineering Department from not only a leading research department on campus, but to one engaged in the Arizona community on many levels.

The department is very proud of the accomplishments of new faculty that have joined over the past few years, whose excellence is evidenced by the high number of National Science Foundation CAREER award recipients among the junior faculty. There have been seven CAREER awards granted to new faculty in the department since 1997, which places ASU 19th of all universities in the country in terms of numbers of CAREER awardees over the past four years, with electrical engineering leading this prodigious effort. The research productivity of the department as a whole reached a record high in 2001/2002 with fiscal year expenditures in excess of $9 million, due to the strong ongoing contribution from the microelectronics and power areas as well as the emergence of new growth areas in wireless communications, embedded systems, and biotechnology related research.

A particular success was the kick off of the Connection One Center focused on wireless circuits and systems, funded through a successful NSF Industry/University Research Center proposal in 2002, which was made possible by the strong support of industrial...
partners, such as Motorola, Philips, Texas Instruments, and Intel. New industry partnerships have also been established through the creation of the Center for Embedded Inter-Networking Technologies (CEINT) at ASU involving the Computer Science and Engineering and Electrical Engineering departments.

Research in biology, bioengineering, and biomedical-related areas by electrical engineering faculty and affiliates has grown dramatically over the past few years through collaboration and involvement with the recently established Department of Bioengineering at ASU. Biological science and engineering is a strong focus of the new ASU administration, through the establishment of the state-supported Arizona Bio-Design Institute. Due to the rapid emergence of activity in the biotechnology areas, this year’s feature story highlights efforts by electrical engineering faculty in this arena.

The department continues to hold steady in the number of undergraduate electrical engineers enrolled in the program, and over the past year, we have broadened the scope of senior-year specializations to include computer engineering and bioengineering related tracks. We have continued to recruit several national merit scholar students per year into the undergraduate program as part of ASU’s record growth in national merit scholars led by the Barrett Honor College. Graduate enrollment reached a record high with approximately 700 students enrolled, and record numbers of graduates supported on research and teaching assistantships this year due to the increased research funding.

We are looking optimistically toward the future, despite a number of challenges this year, which include budget concerns driven by the recent economic recession impacting both our state and industry support. In 2003 we will undergo our first ABET accreditation visit under the new EC2000 criterion, which the department has been preparing for over the past five years, and we feel we are strongly positioned to succeed.

Sincerely,

Stephen M. Goodnick
Chair, Electrical Engineering
Heydt Achieves Regents' Professor Status

Gerald Heydt, director of the Power Systems Engineering Research Center, became one of five new ASU Regents' professors and the third Regents’ professor in the Department of Electrical Engineering.

Heydt joined ASU as the director of the National Science Foundation Center for the Advanced Control of Energy and Power Systems in 1994 after nearly 25 years on the faculty at Purdue. Since then, he has garnered several high-profile awards, including being named the IEEE Power Engineering Society Power Engineering Educator of the Year in 1995, being elected to the National Academy of Engineers in 1997, and being elected to the Peer Review Committee of the NAE in 1998.

In addition to his research, Heydt has gained national recognition for his mentoring. One of his students placed third in the 1997 IEEE Best Student Paper contest. The next year, another of his students placed second in the Best Student Paper contest, and in 1999, his teaching earned him a mentorship appreciation award from the ASU Preparing Future Faculty Program. Most recently, Heydt and student co-author H. Ni placed second in the IEEE student poster/paper contest held at the 2001 Winter Power Meeting for their presentation “Wide Area Satellite Measurements for Robust Power System Stabilizer Architecture.”

Despite previous recognition, Heydt says achieving the rank of Regents’ professor came as a surprise: “I did know that I was nominated, and I thought that I would never attain that rank.” He then adds, “I feel that this honor is at a par with the National Academy [of Engineers] in my career. It is a real responsibility—and I hope that I can live up to it.”

Heydt says that he has already found that Regents’ Professor status affords new opportunities, which he hopes will translate into larger research grants and programs. Heydt cites a number of things that have helped him to reach this level in his career: “my interaction with IEEE has been very motivational,” he says. “Another interaction that has helped me a great deal has been my work at the National Science Foundation in 1989-90, and subsequent interaction with that agency. Industry support, too, has been a big part of whatever success I might have—companies like SRP locally have really made a difference. Several of these companies have had the foresight of supporting higher education very vigorously, and this has been the foundation of my research.”

To students who may be interested in power engineering, Heydt says, “this field has a strong professional camaraderie” and there is “almost a fellowship among power engineers.”

“If a student devotes quality time to the professional organizations and to the profession, there will be a payback that may be slow to realize, but very important in one’s overall career.”

“I would also advise trying to keep sight of the practical and the applied—not to say abandon theory, but do not pursue theory for theory’s sake. Applications are where the professional satisfaction occurs.”
Tylavsky Earns Faculty Award

Daniel Tylavsky, associate professor, received a faculty award form the College of Extended Education for substantive contributions to ASU’s off-campus and distance-learning programs. The award acknowledges sustained support of programs scheduled in a non-traditional format and contributions to student learning as an instructor and mentor.

Assistant Professors Win CAREER Awards

Antonia Papandreou-Suppappola and Cihan Tepedelenlioglu won prestigious National Science Foundation CAREER Awards for their work in signal processing and wireless communications, respectively. The award recognizes promising young scientists and engineers and provides a total of $350,000 in research funding through December 2006.

“The award is giving me the opportunity to continue doing research in current wireless communication problems,” Papandreou said. “The funding supports two doctoral students per year for five years, so it will lead to new graduates and publications in this area.”

Tepedelenlioglu said that he was “very pleasantly surprised” to win “because the NSF CAREER proposal was the first proposal I wrote after coming to ASU.” He hopes to use his funding “to establish a strong research program in signal processing for wireless communications here at ASU.”

Papandreou and Tepedelenlioglu continue the Department of Electrical Engineering’s recent history of CAREER Awards. Other CAREER recipients in the past five years include Tolga Duman, 2000; Dragica Vasileska, 1999; Lina Karam, 1999; Jeffrey Capone, 1999; and Bruce Kim, 1997.

Spanias and Painter Write Best Paper

Andreas Spanias, professor, and Ted Painter, an ASU graduate now with Intel, won the 2002 IEEE Donald G. Fink Prize for their paper titled “Perceptual Coding of Digital Audio” published in the Proceedings of IEEE (Vol. 88, No. 4, April 2000, 451-513). The annual IEEE-wide field series award recognizes an outstanding paper across all societies. The paper was nominated by the speech processing technical committee of the IEEE Signal Processing Society.
Professors Receive Grants for Semiconductor Research

The Semiconductor Research Corporation awarded grants to three ASU professors for their semiconductor research. Martha McCartney from the Center for Solid State Electronics received $67,000, and Samir El-Ghazaly and David Ferry each received a $50,000 grant.

IEEE FELLOWS

As the department’s expertise grows, so does its number of IEEE Fellows:

Constantine Balanis
Peter Crouch
Samir El-Ghazaly
Richard Farmer
David Ferry
Ravi Gorur
Gerald Heydt
George Karady
Sayfe Kiaei
Joseph Palais
Sethuraman Panchanathan
Dieter Schroder

The IEEE Board of Directors confers the Grade of Fellow upon members of extraordinary qualifications and experience in IEEE designated fields who have made important individual contributions to one or more of these fields. The total number selected in any one year does not exceed one-tenth percent of the total voting membership.

Palais Becomes IEEE Life Fellow

Joseph Palais, professor and Associate Chair for Graduate Studies, became an IEEE Life Fellow. IEEE reserves the grade for members with long-standing contributions to the organization.

Kiaei Named IEEE Fellow

IEEE selected Sayfe Kiaei, director of the Telecommunications and Mixed Signals Research Center, as a 2002 IEEE Fellow for his contributions in integrated circuits with analog and digital circuits on the same chip.

Kiaei is the third ASU professor to become an IEEE Fellow in the last two years. He joins Samir El-Ghazaly and Sethuraman Panchanathan who became IEEE Fellows in 2001.
ARCS, Intel Recognize Doctoral Students

Richard Metzger, Stephen Ramey, and Deana Delp were among 16 graduate students from ASU named 2002 ARCS Scholars by the Phoenix chapter of the Achievement Rewards for College Scientists Foundation, which awards $6,000 scholarships to assist graduate research in the sciences. This is the second consecutive year that ARCS has recognized Metzger.

In addition to their ARCS scholarships, Metzger and Ramey also won Graduate Academic Scholarships, which cover resident tuition for graduate students with outstanding academic records.

Besides the ARCS scholarship, Deana Delp also won the Intel Foundation Graduate Fellowship Award, which includes one year of tuition and fees, a 12-month stipend, and provides Delp with an Intel mentor and an Intel PC. “I was honored to submit my nomination to Intel on behalf of ASU and feel privileged to have been selected” Delp said, adding that the fellowship will enable her to complete her degree during the 2002-2003 academic year.

“In addition to the fellowship money I have been assigned a mentor from Intel who will bring practical industrial insight to my research,” said Delp whose research focuses on control systems and semiconductor manufacturing capacity analysis with cost considerations. “The fellowship will also provide wonderful contacts in the semiconductor industry.”

When asked about her future plans, Delp said, “I would like to continue with a career involving research, either in academia or in the semiconductor industry.”

University Graduate Scholarships Awarded

Matthew Gilbert, James Dankert, Daniel Garcia, Tito Dardon, and Win Ly won three-year merit packages through the University Graduate Scholars Program. In addition to a three-year research or teaching assistantship provided by the department, the scholarship includes a stipend enhancement of $4,000 plus a tuition waiver.

Win Ly and Seth Wilk also received awards from the Integrative Graduate Education and Research Training program. IGERT is a National Science Foundation program intended to produce scientists who are well prepared for a broad spectrum of multidisciplinary career opportunities in industry, government, and academia.

Desai Lands Dean’s Scholarship

Jennifer Desai won the Dean’s Graduate Scholars Award for the 2002-2004 academic years. The scholarship provides exceptional new Ph.D. students with $5,000 each year and is renewable for an additional two years subject to satisfactory performance. In addition, the student receives a research assistantship within the department.
Barker Wins New Sandia Fellowship

Joy Barker, a fourth-year doctoral student, won the new Arizona State University Excellence in Engineering through Diversity Fellowship for the 2002-2004 academic years. The fellowship, which was established by Sandia National Laboratories beginning with the 2002-2003 academic year, includes a $10,000 stipend and full tuition waiver to support a student in the College of Engineering and Applied Sciences.

“In making this pledge, we hope to strengthen our partnership with ASU to encourage a new generation of engineers who can contribute to engineering and high technology in areas of national interest and critical need,” said J. Leonard Martinez, vice president of manufacturing systems, science, and technology at Sandia.

Barker, who says her research goals are “to investigate the transport properties of GaN and GaN Heterostructures, specifically, to compare the velocity-field characteristics of different GaN structures,” will spend next summer working in Sandia’s New Mexico cleanroom where she hopes to fabricate and test many devices.

“The fellowship gives me more access to Sandia resources, material, equipment, and knowledge,” Barker said. “They have some of the best people in the GaN field, so now I have access to a huge pool of information.” Barker hopes to incorporate the data she gathers into her dissertation, which she plans to complete in 2004.

Tektronix Donation Improves Undergraduate Lab

Tektronix donated over $570 thousand in equipment to update undergraduate lab facilities. The donation includes the following equipment, which is being used in 20 new lab stations:

- 20 oscilloscopes
- 20 function generators
- 20 spectrum analyzers
- 20 high-DC power supplies
- 20 digital multimeters

Students in EEE 425, EEE 433, and EEE 455 began using the equipment in fall 2002.

Graduate College Supports Master’s Students

Maria Medina and Mitchell Medina have each been appointed research assistants as part of the Graduate College Support Program. The research assistantships provide an out-of-state tuition waiver and stipend. In addition, both students also won Graduate Academic Scholarships, which will cover the resident portion of their tuition.
## Industry Advisory Council

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<th>Name</th>
<th>Title and Company</th>
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<tr>
<td>Ben Adamo</td>
<td>Vice President &amp; General Manager, Philips</td>
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<td>Semiconductors</td>
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<td>Patrick N. Caldwell</td>
<td>Director, Operations, Raytheon Electronic Systems</td>
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<td>Jeff Capone</td>
<td>CEO and Vice President of Engineering, Aligo, Inc.</td>
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<td>Gary E. Dillon</td>
<td>Sr. Engineer/Manager, Integrated Storage Microcode, IBM</td>
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<td>Joseph W. Jackson</td>
<td>Director, Retrofit Systems Engineering, Honeywell</td>
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<td>Mike Johnson</td>
<td>Vice President, Advanced Research and Development, AMD</td>
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<td>Ron Jost</td>
<td>Director of Wireless Communications, Office Secretary of Defense, Department of Defense</td>
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<td>Eric C. Maas</td>
<td>Director, Technology Strategy and Strategic Alliances, Wireless Systems Subscriber Group, Motorola</td>
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<td>Wally Meinel</td>
<td>Group Manager, Texas Instruments</td>
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<td>Robert Melchor</td>
<td>CEO, Three-Five Systems</td>
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<td>Gopal Nair</td>
<td>Gemtech Systems LLC</td>
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<td>Paul Narula</td>
<td>Vice President Corporate Relations, AG Communication Systems</td>
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<td>Kent L. Olsen</td>
<td>Manager, Instruments Business Unit, Tektronix</td>
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<td>Mark Phelps</td>
<td>Sr. Product Development Manager, Medtronic</td>
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<td>Kevin Stoddard</td>
<td>Control Systems Division Manager, EES Business Units, Brooks Automation</td>
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<td>Bill Twardy</td>
<td>Research Programs Manager, Salt River Project</td>
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<td>Peter Zdebel</td>
<td>Vice President and Chief Technical Officer, ON Semiconductor</td>
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<td>Tom Zipperian</td>
<td>Unit Director, Mesa Microfabrication, Sandia National Laboratories</td>
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ASU is beginning a major new initiative in the biosciences through the creation of the AZ BioDesign Institute (www.azbio.org), which will focus research on the intentional manipulation of biological systems. AZ BioDesign includes overlapping institutes in related fields such as the biosciences, biotechnology, and nano-technology and integrates disciplines such as genomics and bioinformatics.

The Department of Electrical Engineering is home to a number of researchers who participate in a broad range of projects related to bioscience and medical systems. To foster collaboration among the various groups, the department has supported cross-disciplinary centers, such as the System Sciences and Engineering Research Center and the Telecommunications Research Center. These centers have conducted workshops and seminars on the application of systems and controls in the biosciences and serve as focal points for obtaining cross-disciplinary infrastructure grants across ASU.
An example of this cross-disciplinary approach is the ongoing “Advanced Neural Implants and Control” project, a collaborative effort spanning two colleges and three research centers, which won a three-year, $6.25 million grant from the Defense Advanced Research Projects Agency in 2000. Headed by Professor of Bioengineering Jiping He, an affiliated faculty the Department of Electrical Engineering, this interdisciplinary research team includes Frank Hoppensteadt, Bruce Kim, Ying-Cheng Lai, Jun Shen, and Jennie Si from electrical engineering as well as faculty members from computer science, biology, mathematics, bioengineering, and chemical and material engineering.

“Our first objective is to develop new implant technologies that optimize information transmission across the tissue/device interface,” the group says. “Our second objective is to optimize information processing between the external world and the neural system that is accessed through the neural interface.”

The group accomplishes these goals in a number of ways. “We do signal processing,” Hoppensteadt says of his and Lai’s work. “The goal is to extract signals in real time that can be used to drive a function, such as a prosthetic device.”

“The bioengineers have provided us with neural recordings from monkey brains, and we are supposed to make sense out of the data,” says Lai, an expert in random signal analysis. “So far, we have developed procedures based on linear stochastic and nonlinear models to detect the interactions between neurons from different regions of the brain in a quantitative way.”

Kim is making unique polymer-based MEMS electrodes for neural implants, which are designed to reduce damage when inserted into the brain. “Since the brain moves, it is a big challenge to make the electrodes to adapt to the live brain,” Kim says. “Our challenges are to make MEMS electrodes that are strong, small, and water repellent.”

The group has made several polyimide electrodes and is now trying to build benzocyclobutene-based electrodes because they require less curing time than polyimide electrodes. “We have done an experiment to make sure that BCB is bio compatible,” Kim says. “This new electrode structure is useful for inserting the electrode into the brain without breaking.”
The researchers believe that their research will make a significant impact in a number of areas, including advanced medical technologies for treating neurological injuries and disease, advanced biomaterials and micro-devices, and neural control strategies and algorithms. For instance, Shen is designing and developing MEMS-based microprobes that can be manipulated remotely with an external magnetic field and applied in a number of areas.

Hardware devices that interface with various biological systems are also being explored elsewhere in the department. A number of departmental research centers are involved with patenting devices that are motivated by bioscience problems, such as brain structures, metabolic pathways in cells, and genetic control circuits and many consult with industries that develop and use these types of devices.

For instance, in addition to her contributions to the DARPA project, Si recently completed a collaborative project with bioengineering that was funded by the National Institute of Health. The project, titled “Cortical Control of Neural Prosthesis,” attempted to use cerebral cortical activity to generate a control signal that would move a prosthetic arm quickly, accurately and gracefully, producing anthropomorphic movements with a minimum of effort from the subjects.

In January 2003, Si will begin a project for the National Science Foundation that attempts to meet the unique challenges that space solar-powered systems present for designers of sophisticated and adaptable robotic systems capable of complex mission assignments in the difficult environment of space. Drawing on computer science, neurophysiology, psychology, and bioengineering, Si and bioengineer Patrick Rousche (University of Illinois, Chicago) will create an “animal-in-the-loop” robotic architecture that uses rats equipped with multi-electrode arrays in the sensory regions of their brains to replace the traditional sensing mechanisms of robotic systems. In doing so, Si and Rousche hope to “better understand exactly how and why mammals are such good processors of sensory input and how we might apply their strategies to robotic systems.”

In a related area, Michael Kozicki, co-founder of Axon Technologies Corporation, and Trevor Thornton are researching biochips with potential applications in such diverse fields as medical diagnostics, discovery and testing of drugs, forensics, agriculture, and biological warfare. These biochips rely on a combination of microfabrication and bioanalysis techniques, which reduce operating costs and allow analysis of smaller samples. In turn, this technology could not only assist in DNA analysis, but could also provide fast, cost-effective detection of microbes, disease cells, and harmful or therapeutic chemicals.
According to Kozicki, biochip technology has applications in “everything from Homeland security to food safety.”

The work in the biochip area is partly funded by the National Science Foundation as well as the Semiconductor Research Corporation and involves collaborations with faculty and students in the Department of Physics and Astronomy and the Department of Chemistry and Biochemistry. “It is this multidisciplinary approach that makes the work fun and exciting,” says Thornton.

Nongjian Tao’s group is integrating biomolecules into nanostructured devices with an aim at hybrid bioelectronic devices such as biosensors. The DOE nanotechnology program is funding one of their current efforts, which is to detect the molecular recognition events at a single-molecule level. A major challenge of the project is to find a practical method to “wire” individual molecules to the outside world. In collaboration with Motorola, the research team has recently developed several techniques to fabricate nanoelectrodes and nanowires. Using these nanoelectrodes and nanowires, they are able to “wire” single molecules into an electronic device, which allows them to detect both the electronic and mechanical responses of the molecules triggered by molecular recognition.

A parallel effort in Tao’s group is to understand the interfaces between biomolecules and solid surfaces, which is a basic requirement in the design of hybrid bioelectronic devices. In collaboration with Trevor Thornton, they have been studying the interactions of proteins with solid surfaces modified with surfactants and lipid layers, using techniques such as Surface Plasmon Resonance, Atomic Force Microscopy and MOSFETs.

Faculty members involved in bioscience collaboration:

- **David Allee** (medical electronics)
- **Douglas Cochran** (acoustics, speech, and signal processing)
- **David Ferry** (quantum dot design of neurocomputers)
- **Stephen Goodnick** (cellular neural networks in nanocircuits)
- **Frank Hoppensteadt** (biologically inspired analog circuits, modeling brain structures using electronic circuits)
- **Lina Karam** (image processing and compression, human perception)
- **Bruce Kim** (microsystem development)
- **Michael Kozicki** (biohybrid systems, biophotonic integrated systems)
- **Ying-Cheng Lai** (applied chaotic dynamics, control theory, computational biology)
- **Andrea Papandreou-Suppappola** (signal processing, time-frequency signal and system analysis)
- **Armando Rodriguez** (design and control of robotic systems)
- **Jennie Si** (cortical information processing, modeling in animal brains)
- **Nongjian Tao** (molecular electronics in chemical and biological sensors, interfaces between biological molecules and solid-state materials)
- **Trevor Thornton** (interfacing between self-assembled molecular monolayers and conventional silicon transistors)
SSERC SPECIAL FACILITIES

VISUALIZATION LABORATORY: The Center for Systems Science and Center for Solid State Electronics Research jointly sponsor the Visualization Lab. In the lab, students can create 2-D and 3-D computer images and incorporate them into presentations, which can be transferred onto videotape. Students can also capture images from video. These tasks are completed with the aid of a Macintosh computer using software such as Macromind Director and Spyglass.

ELECTROMECHANICAL SYSTEMS DESIGN LABORATORY (ESDL): The Center for Systems Science in conjunction with the Department of Mechanical and Aerospace supports ESDL. The laboratory provides students and faculty with a state-of-the-art Modeling, Simulation, Animation, and Real-Time Control (MoSart) capability. By emphasizing research and interactive education in the context of Flexible Autonomous Machines Operating in Uncertain Environments (FAME), the laboratory provides an infrastructure for analyzing and designing advanced electromechanical systems, robotic automation and manufacturing systems, and aerospace systems. The laboratory serves multidisciplinary initiatives involving students and faculty from the following departments: electrical engineering, mechanical and aerospace engineering, chemical and materials engineering, and mathematics.

CENTER MISSION
- Build bridges between departments and centers in the College of Liberal Arts and Sciences and College of Engineering and Applied Sciences;
- Foster an intellectual climate for interdisciplinary work at ASU;
- Provide access for undergraduate and graduate students to research activities at ASU;
- Develop and implement new models for strengthening ASU’s contributions to large industry and small business in the greater Phoenix area;
- Become a focal point for attracting international experts to ASU for meetings, workshops, conferences, and recruitment;
- Conduct seminars and workshops that foster development of core funding and provide access for our students and faculty leaders in science, engineering, and industry;
- Instill curiosity, integrity, and a commitment to service through mentoring activities with students and beginning faculty;
- Work toward preparing students for jobs in Arizona.

RESEARCH FOCUS AREAS
SSERC participates in the DARPA project: Advanced Neural Implants and Control, 2000; the NSF IGERT project: Musculoskeletal and Neural Adaptation in Form and Function, 2000; the NSF SCREMS project: Scientific Computing Research Environments for Mathematical, 1999; the DOD/EPRI project: Innovative Technologies for Defense Against Catastrophic Failures of Complex Interactive Networks, 1999; and other ongoing projects supported by external agencies.

CONTROL THEORY: Semiconductor manufacturing control, stochastic models and large databases; FAB scheduling.

NEUROENGINEERING AND NEUROSCIENCE: Sensory motor control, synaptic organization and dynamic properties of networks, dynamical systems in neurosciences, neurocomputation.

MATHEMATICAL BIOLOGY: Biotechnology (chemostats, microbial ecology, pharmaceuticals); population biology (epidemics, demographics, genetics).

COMPUTATIONAL SCIENCE AND ENGINEERING: Modeling, analysis of dynamical systems, simulation of dynamical systems, visualization.
The Telecommunication Research Center is a multidisciplinary research center that includes researchers from electrical engineering, computer science and engineering, and materials, electronics, and bioengineering. The TRC is an ASU Board-of-Regents-approved center with research focused on information technology; wireless and wireline communications; networking; antennas; radio-frequency, mixed-signal analog/digital electronics; embedded systems; and multimedia and bioinformatics.

In the past year, the TRC has implemented a number of improvements:

- The Distributed Media and Arts Laboratory: An ambitious interdisciplinary research community at ASU that focuses on the parallel development of media hardware, software, content, and theory. The DMA lab is a joint effort of the Herberger College of Fine Arts and the College of Engineering and Applied Sciences. (http://dma.asu.edu)
- Connection One: A communications circuit and systems center supported by the National Science Foundation, industry, the state of Arizona, and CEAS. The center focuses on all aspects of educational and research programs entailing wireless and wireline communications, radio-frequency integrated circuit design, mixed-signal analog/digital integrated circuits for communications, and related system areas. (http://www.connectionone.org/)
- A new wireless lab: A lab for radio-frequency, mixed-signal, and transceiver design and testing.
- A new systems analyst: A technical position that provides centralized support for the UNIX system within the TRC and adds new computing tools such as CAD, CADENCE, and ADS.

Other TRC research centers include the Advanced Helicopter Electromagnetic Industrial Associates sponsored by several industrial members and the Department of Defense. In addition, the TRC is an active participant in the Embedded System Consortium, a newly established consortium within CEAS supported by Intel and Motorola.

Industrial partners, including Texas Instruments, ON Semiconductors, Philips, Motorola, Intel, Primarion, National Semiconductor, and government agencies, such as the National Science Foundation, DARPA, the Navy, and the Army, support the TRC’s major research activities:

- Mixed-signal electronics and communication circuits
- Wireless transceiver design
- Radio-frequency and high-frequency wireless system design
- Computational electronics and electromagnetics
- Neurosystems
- Wireless communications and smart antennas
- Multimedia: speech and audio processing, vocoders, image/video processing
- Digital signal processing: adaptive filters, array signal processing, time-frequency representations, detection and estimation, sensors, signal processing for communications

**Executive M.S. Program:** The TRC is also developing an Executive Master of Science program in communication circuits and systems to accommodate full-time, industrial employees. This will be a two-and-a-half-year program with a practical focus and options in hardware, software, or a joint program with the business department to combine the MBA with a telecom program for business managers.
Center Highlights and Major Accomplishments
The center is organized into four main areas: materials and device modeling, low-power analog circuit design, low-power digital circuits and systems design, and physical design of low-power circuits and systems.

The center’s research ranges from semiconductor material and basic device issues to device/circuit design and modeling; data-dependent algorithm design; energy-efficient code generation; memory design; dynamically reconfigurable, mixed-signal, lower-power systems; substrate noise coupling; hot carriers, MOSFET noise; and dynamic power management techniques. Analog-to-digital converters, incorporating correlated double sampling and swing reduction to improve performance and reduce power consumption at low-power supply voltages typical of deep sub-micron CMOS processes, have been designed and fabricated. The development of high-level transformations includes those at the algorithm level and system level (memory, bus interface, etc.). Four faculty members at ASU and four faculty members from the University of Arizona together with 20 graduate students carry out this research.
The center’s mission is to conduct research, to develop technology, and to provide educational programs that will engender international leadership in solid-state electronics. This mission is accomplished in several ways:

- The provision of critical resources and infrastructure;
- The support and education of quality students;
- The support of renowned and high-promise research faculty and staff in multidisciplinary environments;
- The transfer of technology to the commercial sector.

Center highlights and major accomplishments:
The center was established at Arizona State University in 1981 as part of the first Engineering Excellence Program. The center provides critical resources and infrastructure for research and education in solid-state electronics in the form of 30 laboratories covering 30,000 square feet, which are administered and maintained by a complement of 12 staff. The center’s 30 active faculty, 10 post-doctoral researchers, and more than 70 graduate students are drawn from various disciplines, including electrical engineering, chemical engineering, bio-engineering, materials science, mechanical engineering, and industrial, management, and systems engineering.

The center’s 4,000 square-foot class M3.5 cleanroom and associated processing facilities contain a wide range of equipment for advanced semiconductor processing. In addition to our five established interdisciplinary microelectronics research areas (nanostructures, MBE and optoelectronics, materials and process fundamentals, low-power electronics, focused ion beam technology), we have significant new thrusts in MEMS, molecular electronics, wide bandgap materials, environmentally benign processing, manufacturing and controls, and biotechnology. In recent years, CSSER researchers have developed a number of significant technologies, including methods for semiconductor substrate and gate oxide characterization, integrated lasers, quantum device structures and simulators, interconnect methods and dielectrics, and low-voltage, non-volatile memory devices.
PSERC is a National Science Foundation Industry/University Cooperative Research Center that is addressing challenges in the new electric power industry as it restructures to a competitive business environment. Finding innovative and efficient solutions to those challenges requires an unprecedented level of expertise, communication, and cooperation between the university and industry. Through collaboration, PSERC

- seeks innovative solutions to challenges in creating a power system with decentralized, market-based decision-making
- stimulates productive interchange of ideas among university and industry professionals
- leverages research funding from universities and industrial members
- facilitates access to highly experienced faculty and superior quality students
- prepares current and future professionals for the new power industry.

PSERC academic researchers at multiple universities across the U.S. specialize in power systems, applied mathematics, nonlinear systems, power electronics, control theory, computing, operations research, economics, industrial organization, and public policy. They provide research services and products that add value to industry and that support efficient and effective provision of electricity services while meeting environmental requirements.

**PSERC Research**

Industry restructuring and technology change is creating new challenges for the operations, security and reliability of the power system, for the physical and institutional structures, and for delivery of economical and environmentally acceptable electricity services. PSERC’s research program focus is on helping the next generation electric power system evolve into a competitive, high-performance component of the nation’s infrastructure. Its research program is divided into three research stems.

**Research Stem 1: Markets**

The electric power industry is in transition toward a market-oriented structure with decentralized decision-making by a wide-ranging group of market participants. The research under this stem emphasizes the design and analysis of market mechanisms, computational tools and institutions that facilitate efficient coordination, investment, and operations while recognizing the economic and technical characteristics of power systems.

**Research Stem 2: Transmission and Distribution**

The power delivery infrastructure is critical to achieving efficiency, safety, security, and reliability in electricity supply. Improvements in this infrastructure could be achieved through innovations in software, hardware, materials, sensors, communications, and operating strategies. Therefore, a central goal of this research stem is the improvement of transmission and distribution systems through the application of technological advances.

**Research Stem 3: Systems**

Restructuring is leading to large and complex operational entities (such as Independent System Operators or Regional Transmission Organizations) while small-scale, dispersed generation technologies are increasing their penetration in power systems. The challenge is to develop new operations frameworks and approaches that will effectively cope with the growing complexity of a restructured industry. Systems research concentrates on operation of such complex, dynamic systems in general and power systems in particular.

Additional information on PSERC is available at http://www.pserc.wisc.edu/index_about.html
James T. Aberle received the B.S. and M.S. degrees in electrical engineering from Polytechnic Institute of New York (now Polytechnic University) in 1982 and 1985, respectively, and the Ph.D. in electrical engineering from the University of Massachusetts in 1989. From 1982 to 1985, he worked on the development of wide-band, phased-array antennas at Hazeltine Corporation, Greenlawn, New York. He joined the ASU faculty in 1989 and is currently an associate professor.

Research Interests: Computational electromagnetics, smart and advanced antennas, electromagnetic properties of natural and artificial materials, microwave circuits, and radar cross-section analysis and control.

Honors and Distinctions: IEEE Senior Member; NASA-ASEE Summer Faculty Fellow, 1993.


Professor Allee conducts research in ultra-small device fabrication and in low-voltage, low-power analog CMOS circuit design for analog-to-digital conversion and telemetry. The targeted applications are medical electronics and portable communication products where it is often desirable to place the entire mixed-signal system on a single chip. Current projects include cyclic, pipelined, and delta-sigma converters, along with low-power, low-noise, voltage-controlled oscillators using chip transformers. He is a founding member of the Center for Low Power Electronics (funded by the NSF, industry, and the state of Arizona), the Whitaker Center for Neuromechanical Control, and is the manager of the Focused Ion Beam User Facility. He has published over 35 refereed journal articles and publications at technical conferences and has conducted three invited talks at international conferences.

Research Interests: Ultra-small device fabrication, mixed-signal circuit design for analog-to-digital conversion and telemetry.

Honors and Distinctions: Young Faculty Teaching Excellence Award, 1994-1995; two patent applications filed; AEA Faculty Development Fellowship, Stanford University, 1984-1989; Voorheis Honor Scholarship, University of Cincinnati, 1979-1984.


Rajapandian Ayyanar joined the ASU faculty as an assistant professor in August 2000. He received the B.E. in electrical engineering from P.S.G. College of Technology, India, in 1989; the M.S. in power electronics from the Indian Institute of Science in 1995; and the Ph.D. in power electronics from the University of Minnesota in 2000. He has published 19 journal and conference papers, is a member of IEEE, and is the co-author of one patent.

Research Interests: Novel topologies and new control techniques for switch-mode power conversion, especially DC-DC converters, digital PWM techniques for motor drives.

Honors and Distinctions: Dr. Ayyanar directed the senior design project “42VDC to 14VDC Bi-directional converter for the architecture of future automobiles” by Robert A. Chavez, Lawrence Dovala, and Casey O’Dell, which won the Senior Design Prize in Fall 2000.


AFFILIATE PROFESSORS ADD BREADTH

Several professors from other departments are formally affiliated with the Department of Electrical Engineering. Their duties as affiliates are primarily in research advising and student mentoring. They contribute a breadth of research opportunities beyond that provided by the regular faculty.

Sandwip Dey, Department of Chemical and Materials Engineering

Jiping He, Department of Bioengineering

Nathan Newman, Department of Chemical and Materials Engineering

Sethuraman Panchanathan, Department of Computer Science and Engineering

Constantine A. Balanis
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Phone: 480-965-3909
Ph.D.: Ohio State University, 1969

Constantine Balanis joined the ASU faculty in 1983 and is now a Regents’ Professor of electrical engineering. He has published nearly 100 journal papers, 150 conference papers, and numerous scientific reports. He also has published two textbooks: one on antennas and the other on advanced engineering electromagnetics.

Research Interests: Computational electromagnetic methods (FDTD, FEM, MoM, GO/GTD/UTD, PO/PTD) for antennas, scattering, lightning, and high-intensity radiated fields (HIRF); smart/adaptive antennas for wireless communications; and electromagnetic wave multipath propagation.

Honors and Distinctions: Regents’ Professor, IEEE Fellow, IEEE Third Millennium Medal, ASU School of Engineering Graduate Teaching Excellence Award, ASU College of Engineering Distinguished Achievement Award, IEEE Region 6 Individual Achievement Award, IEEE Phoenix Section Special Professionalism Award.

Selected Publications:

Jonathan Bird
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E-mail: bird@asu.edu
Phone: 480-965-7421
Ph.D.: University of Sussex, 1990

After obtaining his Ph.D. in 1990, Jonathan Bird spent five years at RIKEN, a Japanese government laboratory before joining the ASU faculty in 1997. Professor Bird has co-authored more than 140 refereed publications in international journals and his work is widely referenced in the specialist literature.

Research Interests: Fabrication and characterization of semiconductor nanostructures with emphasis on studies of their quantum-transport characteristics.

Honors and Distinctions: Fellow, Institute of Physics; Senior Member, IEEE; visiting research fellow of the Japan Society for the Promotion of Science, University of Tsukuba, Japan.

Selected Publications:
Chaitali Chakrabarti
Office: GWC 418
E-mail: chaitali@asu.edu
Phone: 480-965-9516
Ph.D.: University of Maryland, 1990

Chaitali Chakrabarti received her B. Tech. in electronics and electrical communication engineering from the Indian Institute of Technology, Kharagpur, India, and her M.S. and Ph.D. degrees in electrical engineering from the University of Maryland, College Park. She has been at ASU since 1990 where she is now an associate professor. She is a member of the Center for Low Power Electronics and Connection One and conducts research in various aspects of low-power system design.

Research Interests: VLSI architectures and algorithms for media processing; low-power system design, including memory design and compilation; CAD tools for VLSI.


Selected Publications:


Douglas Cochran
Office: GWC 414
E-mail: cochran@asu.edu
Phone: 480-965-8593
Ph.D.: Harvard University, 1990

Douglas Cochran joined the ASU faculty in 1989. He holds Ph.D. and S.M. degrees in applied mathematics from Harvard University and degrees in mathematics from UCSD and MIT. Before coming to ASU, he was a senior scientist at BBN Laboratories, served as a consultant to Motorola and the Australian Defense, Science, and Technology organization. He is associate editor of IEEE Transactions on Signal Processing and was general co-chair of the 1999 IEEE International Conference on Acoustics, Speech, and Signal Processing. Professor Cochran is currently on leave working as a program manager for the Applied and Computational Mathematics Program, a division of the DARPA Defense Sciences Office.

Research Interests: Signal processing, harmonic analysis, detection theory.

Honors and Distinctions: CEAS Teaching Excellence Award, 1996-1997; IEEE Senior Member.

Selected Publications:


During his 20 years in the aerospace industry, Dr. Diaz has worked on many aspects of the interaction between electromagnetic waves and materials from lightning protection on the space shuttle through the design of microwave lenses and high-temperature, broadband radomes for radar missiles to the design and manufacture of radar-absorbing structures for Stealth applications. He is an associate professor in electrical engineering, the associate director of the Consortium for Meteorology of Semiconductor Nanodefects, and holds ten patents ranging from the design of broadband radomes to the amplification of magnetic fields.

Research Interests: Optical scattering of subwavelength objects in complex environments, analytic theory of natural and artificial media, combined computational mechanics and electromagnetics.

Honors and Distinctions: 1994 Association of Interamerican Businessmen Award to Distinguished Young Executives in the Professional Category for Excellence in Engineering, San Juan, Puerto Rico.

Selected Publications:

Tolga Duman received the B.S. from Bilkent University, Turkey, in 1993 and the M.S. and Ph.D. degrees from Northeastern University, Boston, in 1995 and 1998, respectively, all in electrical engineering. He has been with the Department of Electrical Engineering of ASU since August 1998 as an assistant professor.

Research Interests: Digital communications, wireless and mobile communications, channel coding, turbo codes and turbo-coded modulation systems, coding for magnetic recording channels, and coding for wireless communications.


Selected Publications:

Samir El-Ghazaly joined ASU in 1988 after working at several universities and research centers, including the College of Engineering at Cairo, Egypt and the Centre Hyperfrequences et Semicon-duteurs au Lycée de Lille I in France. He has done research at NASA’s Jet Propulsion Lab inPasadena, CA, and CST-Motorola, Inc.

Research Interests: Microwave circuits, microwave and millimeter-wave semiconductor devices and passive components, wireless RF circuits, semiconductor device simulations, analysis of microwave transmission lines, ultra-short pulse propagation, electromagnetics, wave-device interactions, numerical techniques applied to microwave-integrated circuits.


Selected Publications:
Elbadawy Elsharawy
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Ph.D.: University of Massachusetts, Amherst, 1989

Richard G. Farmer
Office: ERC 513
E-mail: aargf@asu.edu
Phone: 480-965-4953
MSEE: Arizona State University, 1964

David K. Ferry
Office: ERC 187
e-mail: ferry@asu.edu
Ph. D.: University of Texas, Austin, 1966

Elbadawy Elsharawy joined ASU in 1989 where he is currently an associate professor. Dr. Elsharawy also has two important patents in his portfolio: “Stacked Microstrip Antenna for Wireless Communications,” U.S. patent 5,945,950, and “Heterojunction Bipolar Transistor Having Wide-Band Gap,” U.S. patent 5,912,481.

Research Interests: Microwave circuits, applied electromagnetics, anistrophic Microwave circuits, electronic packaging, and cellular phone antennas.

Honors and Distinctions: Senior Member of IEEE, MIT-13 Technical Committee member, and an elected member of Commissions A and D, National URSI.

Selected Publications:


Richard Farmer has over 48 years of electric power industry experience. He has been an adjunct professor at Arizona State University since 1966. He has co-authored a book on the application of series capacitors in power systems and has written over 35 industry papers.

Research Interests: Extra-high voltage (EHV) project planning and interaction of turbine generators with EHV transmission systems.

Honors and Distinctions: IEEE Fellow, NSPE Engineer of the Year, IEEE Power System Engineering Distinguished Service Award, IEEE Third Millennium Medal, IEEE Power System Dynamic Performance Committee Distinguished Service Award.

Selected Publications:


David Ferry joined ASU in 1983, following stints at Texas Tech University, the Office of Naval Research, and Colorado State University. He has published more than 500 articles, books, and chapters and has organized many conferences.

Research Interests: Transport physics and modeling of quantum effects in submicron semiconductor devices, electron beam lithography for ultra-submicron quantum functional devices.

Honors and Distinctions: Regents’ Professor at ASU; IEEE Cledo Brunetti Award, 1999; fellow of both the American Physical Society and IEEE; ASU Graduate Mentor Award, 2000; IEEE Engineer of the Year, 1990, Phoenix Section; outstanding research awards at Texas Tech University and Colorado State University.

Selected Publications:


Stephen Goodnick came to ASU in Fall 1996 as Department Chair. Prior to that, he was a professor of electrical and computer engineering at Oregon State University from 1986 to 1996. He has also been a visiting scientist at the Solar Energy Research Institute and Sandia National Laboratories and a visiting faculty at the Walter Schottky Institute, Munich, Germany; the University of Modena, Italy; the University of Notre Dame; and Osaka University, Japan. He is currently Vice President (2002-2003) and President (2003-2004) of the Electrical and Computer Engineering Department Heads Association (ECEDHA). Dr. Goodnick has published over 130 refereed journal articles, books, and book chapters.

Research Interests: Transport in semiconductor devices, computational electronics, quantum and nanostructured devices and device technology, high-frequency and optical devices.

Honors and Distinctions: Alexander von Humboldt Research Fellow, Germany, 1986; Senior Member, IEEE, 1990; College of Engineering Research Award, Oregon State University, 1996; Colorado State University College of Engineering Achievement in Academia Award, 1998; IEEE Phoenix Section Society Award for Outstanding Service, 2002.

Selected Publications:

Ravi Gorur joined the ASU faculty in 1987. He teaches in the areas of electric power engineering, high-voltage engineering, and power electronics.

Research Interests: Insulating materials and systems for outdoor applications, non-ceramic insulators, electric field calculations, underground cable systems, dielectric fluids, high-voltage testing techniques and computer-aided design.


Selected Publications:

Edwin Greeneich joined the faculty in 1982 after spending 11 years in industry. He is the author of Analog Integrated Circuits, a co-author of Ultra Large-Scale Integrated Microelectronics, and a contributing author to the Circuits and Filters Handbook and the Encyclopedia of Physics. He has also published dozens of articles in technical journals.

Research Interests: Low-power, high-frequency analog integrated circuits using bipolar and MOSFET technologies.

Honors and Distinctions: Senior Member of IEEE, Phi Beta Kappa, Tau Beta Pi,Eta Kappa Nu, Who’s Who in Technology Today.

Selected Publications:
Bob Grondin received the B.S., M.S., and Ph.D. degrees in electrical engineering from the University of Michigan. He spent 1981 to 1983 as a post-doctoral research fellow at Colorado State University and joined the faculty of electrical engineering at ASU in 1983. He is currently an associate professor and serves as Director of Student Academic Services in the College of Engineering and Applied Sciences.

**Research Interests:** Solid-state and physical electronics: the physics of high-speed devices and ultrafast phenomena in semiconductors.

**Honors and Distinctions:** NSF Presidential Young Investigator, 1985; Presidential Young Investigators Award, 1985; IEEE Outstanding Student Branch Advisor, 1986.

**Selected Publications:**

Gerald Thomas Heydt is from Las Vegas, Nevada. He holds the B.E.E.E. degree from the Cooper Union in New York and the M.S.E.E. and Ph.D. degrees from Purdue University. He spent approximately 25 years as a faculty member at Purdue, and in 1994, he took the position of Director of the NSF Center for the Advanced Control of Energy and Power Systems at ASU. He has industrial experience with the Commonwealth Edison Company, Chicago; E.G. & G. in Mercury, Nevada; and with the United Nations Development Program. In 1990, he served as the program manager of the National Science Foundation program in power systems engineering. He is the author of two books in the area of power engineering. Dr. Heydt is also vice-chair of the IEEE Power Engineering Society—Power Engineering Education Committee.

**Research Interests:** Power engineering, electric power quality, distribution engineering, transmission engineering, computer applications in power engineering, power engineering education.

**Honors and Distinctions:** Fellow of the IEEE; member of the United States National Academy of Engineering; Edison Electric Institute Power Engineering Educator Award, 1989; IEEE Power Engineering Society Power Engineering Educator of the Year, 1995.

**Selected Publications:**

Walter Higgins joined the faculty in 1967. His primary background was in the area of control systems with experience in the aerospace industry, i.e., guidance, control, and navigation systems. He teaches in the areas of controls, circuits, microprocessors, and digital design.

**Research Interests:** Digital control and simulation, computer-aided control systems design, microprocessor applications, and real-time computing with graphical programming languages such as LabVIEW, computers in education.

**Honors and Distinctions:**Eta Kappa Nu, AIAA Senior Member.

**Selected Publications:**
Keith Holbert joined the faculty in 1989 and is presently the Associate Chair for Undergraduate Studies. He is a registered professional engineer and has published over 40 journal and conference papers.

Research Interests: Process monitoring and diagnostics, sensor fault detection, instrumentation development, fuzzy logic, spacecraft charging, and radiation effects on electronics.

Honors and Distinctions: Tau Beta Pi; Teaching Excellence Award from ASU College of Engineering, 1997; IEEE Senior Member.

Selected Publications:

Joseph Y. Hui joined ASU as ISS Chair Professor in 1999. He received his B.S., M.S., and Ph.D. degrees from MIT and has held research and teaching positions at Bellcore, Rutgers University, and the Chinese University of Hong Kong before joining ASU. He is the founder of IXTech and IXSoft, Inc.

Research Interests: Wireless networks, gigabit wireless communications, ATM switching and routing, teletraffic analysis, coding and information theory, space-time communications.

Honors and Distinctions: ISS Chair Professor; IEEE Fellow, 1996; HKIE Fellow, 1998; NSF Presidential Young Investigator, 1990; IEEE William Bennett Prize Paper Award, 1984; Henry Rutgers Research Fellow, 1989.

Selected Publications:
Youngjoong Joo joined the ASU faculty as an assistant professor in January 2001. He received the B.S. and M.S. in electrical engineering from Korea University in 1988 and 1990, respectively, and the Ph.D. in electrical engineering from the Georgia Institute of Technology in 1999. He has published 11 journal and conference papers.

Research Interests: Design of sub-micron CMOS analog and mixed-signal circuits, smart camera systems and high-speed optical transceivers.

Selected Publications:


George Karady received his B.S.E.E. and Ph.D. degrees in electrical engineering from Technical University of Budapest. He was appointed as Salt River Chair Professor at ASU in 1986. Previously, he was with EBASCO Services where he served as chief consulting electrical engineer, manager of electrical systems, and chief engineer of computer technology. He was electrical task supervisor for the Tokomak Fusion Test reactor project in Princeton.

Research Interests: Power electronics, high-voltage engineering, and power systems.

Honors and Distinctions: Fellow of IEEE, chairman of IEEE WG on Non-Ceramic Insulators, WG on Power Electronic Equipment. He also chairs the Award Committee of the IEEE PES Chapters and Membership Division and is serving as a secretary of the IEEE Phoenix Section. In 1996, Dr. Karady received an Honorary Doctoral Degree from Technical University of Budapest, in 1999 the IEEE Third Millennium Medal, and in 2002 IEEE Power Engineering Society Working Group Recognition Award as the chair of WG that prepared IEEE Standard 1313-2.

Selected Publications:


Lina Karam received the B.E. in electrical engineering from the American University of Beirut in 1989 and the M.S. and Ph.D. degrees in electrical engineering from the Georgia Institute of Technology in 1992 and 1995, respectively. She is currently an associate professor in the Department of Electrical Engineering at ASU. She worked at Schlumberger Well Services and in the Signal Processing Department at AT&T Bell Labs during 1992 and 1994, respectively.

Research Interests: Image and video processing and compression, multidimensional signal processing, error-resilient source coding, digital filter design, and human visual perception.

Honors and Distinctions: Society of Women Engineers Outstanding Graduate Student Award, 1994; Georgia Tech Graduate Student Senate Presidential Citation Award, 1994; NSF CAREER Award, 1998. She is an associate editor of the IEEE Transactions on Image Processing and an elected member of the IEEE Circuits and Systems Society's Technical Committee.

Selected Publications:


Sayfe Kiaei  
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Phone: 480-727-7761  
Ph.D.: Washington State University, 1987

Bruce Kim  
Office: ERC 563  
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Ph.D.: Georgia Institute of Technology, 1996

Michael N. Kozicki  
Office: ERC 107  
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Phone: 480-965-2572  
Ph.D.: University of Edinburgh, UK, 1985

Dr. Kiaei is a professor and the director of the Telecommunications Research Center. He recently formed Connection One, a new National Science Foundation research center that focuses on communication circuits and systems. Before joining the ASU faculty in January 2001, he was a senior member of technical staff with the Wireless Technology Center and the Broadband Operations at Motorola. He was also an associate professor at Oregon State University where he helped establish the industry-university Center for Design of Analog/Digital ICs (CDADIC) and served as its co-director for ten years. He has published over 100 journal and conference papers and holds several patents. He is a member of the IEEE Circuits and Systems Society, the IEEE Solid State Circuits Society, and the IEEE Communication Society. Dr. Kiaei currently has over 10 Ph.D. and M.S. students researching RF and mixed-signal ICs and has funding from DARPA, JPL, Motorola, Texas Instruments, Intel, and Philips.

Research Interests: Wireless transceiver design, RF and mixed-signal ICs.

Honors and Distinctions: Carter Best Teacher Award, IEEE Darlington Best Paper Award, IEEE Fellow, and the Motorola 10X Design Award.

Selected Publications:

Bruce Kim joined the ASU faculty as an associate professor in August 2000 after teaching at Michigan State and Tufts Universities. He received the B.S. from the University of California-Irvine in 1981 and the M.S. from the University of Arizona in 1985, both in electrical engineering. He completed the Ph.D. in electrical and computer engineering at the Georgia Institute of Technology in 1996. He has published 37 journal and conference papers and holds one patent.

Research Interests: MCM substrate testing, defect simulation of analog circuits, and microsystem development.

Honors and Distinctions: Professor of the Year, Corporate Leaders Program, ASU, 2001; IEEE Computer Society Certificate of Appreciation, 1999; NSF/IEEE Award for educational Internet-based modules, 1999; Best paper of the session, IEEE Multi-Chip Module Conference, 1998; NSF CAREER Award, 1997; Best Paper Candidate, IEEE 46th ECTC Conference, 1996; Outstanding Poster Award for NSF/PRC First Annual Review, 1995; Outstanding Poster Award for IAB Meeting at Georgia Tech, 1995.

Selected Publications:

Professor Kozicki joined ASU in 1985 from Hughes Microelectronics. He is involved in the development of new materials, processes, and device structures for “next generation” integrated circuits and systems. He is also the holder of several key patents in the emerging field of “integrated ionicics,” in which solid-state ionic devices are used in conjunction with other integrated components to create hybrid electronic circuits for the storage and control of information in electronic and optical form. He is researching nanoscale and molecular devices and his interests in this area include biomimetic materials in electronics. He has published extensively on solid-state electronics and has developed undergraduate and graduate courses in this area. Dr. Kozicki is also a founder of Axon Technologies Corp., an ASU spin-off company involved in the development and licensing of solid-state ionic technologies.

Research Interests: Silicon integrated-circuit processing, integrated-solid-state ionicics, low-energy non-volatile memories, interconnect systems, optical switches, microfluidics, molecular and nano-electronic integrated systems.

Honors and Distinctions: Honorary Faculty Fellow University of Edinburgh, Chartered Engineer (UK/EC), IEEE Phoenix Section Outstanding Educator Award, College of Extended Education Outstanding Faculty Award, Nominee for Lemelson-MIT Prize for Invention and Innovation, Semiconductor International Editor’s Choice Award, Golden Key National Honor Society Outstanding Professor Award, College of Engineering and Applied Sciences Teaching Excellence Award, Institution of Electrical Engineers Younger Members Premium.

Selected Publications:
Ying-Cheng Lai joined the ASU faculty in 1999. Prior to that, he was an associate professor of physics and mathematics at the University of Kansas. He has authored or co-authored approximately 170 papers, including over 135 published in refereed journals. In the past five years, he has given about 50 invited seminars and colloquia worldwide.

Research Interests: Applied chaotic dynamics, quantum chaos, nonlinear optics, signal processing, and computational biology.

Honors and Distinctions: Fellow of the American Physical Society since 1999; AFOSR/White House Presidential Early Career Award for Scientists and Engineers, 1997; NSF Faculty Early Career Award, 1997; Undergraduate Teaching Award in Physics, University of Kansas, 1998; Institute for Plasma Research Fellowship, University of Maryland, 1992; Ralph D. Myers Award for Outstanding Academic Achievement, University of Maryland College Park, 1988.

Selected Publications:

Darryl Morrell joined the ASU faculty in 1988. His research centers on applications of stochastic decision and estimation theory to engineering problems. He is currently investigating target detection, localization, and identification using configurable sensors. Other areas of interest include information theory, communication system analysis and simulation, signal and data compression, and the epistemic foundations of decision theory. At a graduate level, he has taught courses in information theory, estimation and detection, stochastic filtering, probability and stochastic processes, and error correcting codes. At the undergraduate level, he has taught courses in circuit analysis, probability theory, communication systems, signals and systems, and technical design and communication. He has also been actively involved in the implementation of ABET’s EC2000 at the college and department level.

Research Interests: Stochastic decision theory, sensor scheduling, particle filtering, target tracking.

Honors and Distinctions: Phi Kappa Phi, Tau Beta Pi, Sigma Xi.

Selected Publications:

Joseph Palais joined the faculty in 1964 and is now the Associate Chair for Graduate Studies. He has published a book on fiber optics, contributed chapters to seven books, written over 40 research articles in refereed journals, and presented many papers at scientific meetings. He has presented over 150 short courses on fiber optics.

Research Interests: Fiber optic communications, holography, and distance education.

Honors and Distinctions: IEEE Life Fellow, IEEE EAB Achievement Award, IEEE Phoenix Achievement Award, University Continuing Education Association Conferences and Professional Programs Faculty Service Award.

Selected Publications:
George Pan joined the faculty in 1995 as a professor and the director of the Electronic Packaging Laboratory. He has written three book chapters, published over 36 research articles in refereed journals, and presented 62 papers at international conferences. He has presented short courses on wavelets in electromagnetics at Moscow State University, the University of Canterbury, CSIRO in Sydney, IEEE Microwave Symposium ’96, Beijing University, and the Chinese Aerospace Institute.

Research Interests: Computational electromagnetics, high-speed electronics packaging, cardiac output instrumentation, rough surface scattering.

Honors and Distinctions: IEEE Senior Member; Outstanding Paper Award; Government Microcircuit Applications Conference, Nov. 1990.

Selected Publications:

Antonia Papandreou-Suppappola joined the ASU faculty as an assistant professor in August 1999. Before that, she held a Navy-supported research faculty position at the Department of Electrical and Computer Engineering at the University of Rhode Island. She has published over 50 refereed journal papers, book chapters and conference papers.

Research Interests: Signal processing for wireless communications, integrated sensing and processing, time-frequency signal and system processing, and detection and estimation theory.

Honors and Distinctions: National Science Foundation CAREER Award.

Selected Publications:

Antonia Papandreou-Suppappola joined the ASU faculty as an assistant professor in 2000. He received the Dipl.-Ing. in electrical engineering from FH Dieburg, Germany, in 1994; the M.S. in electrical engineering from the University of Pennsylvania in 1996; and the Ph.D. in systems engineering from the University of Pennsylvania in 1998. He has published 25 journal and conference papers.

Research Interests: Multimedia streaming in wireless environments, traffic characteristics of encoded video, and Metro WDM networks.


Selected Publications:
Armando Antonio Rodriguez
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Phone: 480-965-3712
Ph.D.: Massachusetts Institute of Technology, 1990

Prior to joining the faculty in 1990, Armando Rodriguez worked at MIT, IBM, AT&T Bell Laboratories, and Raytheon Missile Systems. He has also worked at Elgin Air Force Base and Boeing Defense and Space Systems. He has published more than 100 technical papers in refereed journals and at conferences. Dr. Rodriguez has given over 35 invited presentations at international and national forums, conferences, and corporations. He currently serves as an associate editor on the IEEE Control Systems Society Conference Editorial Board.

Research Interests: Control of nonlinear distributed parameter systems; approximation theory; sampled data control; modeling, simulation, animation, and real-time control (MoSART); control of dynamical systems; control of flexible autonomous machines operating in an uncertain environment (FAME); and control of semiconductor, aerospace, and robotic systems.

Honors and Distinctions: AT&T Bell Laboratories Fellowship; Boeing A.D. Welliver Fellowship; CEAS Teaching Excellence Award; IEEE International Outstanding Advisor Award, White House Presidential Excellence Award for Science, Mathematics, and Engineering; ASU Faculty Fellow; ASU Professor of the Year Finalist.

Selected Publications:


Ronald J. Roedel
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Ph.D.: UCLA, 1976

Professor Roedel joined the faculty in 1981 and is now Associate Dean of the College of Engineering and Applied Sciences. He has always striven for balance between research and teaching activities. Recently, he has become involved in curriculum reform issues, active-learning strategies, and technology-enhanced education. On the research side, he has been involved in semiconductor research for more than 25 years, first with silicon, then with compound semiconductor materials, and now with silicon again. He is the author or co-author of 35 publications and has roughly 50 presentations, two book chapters, and two patents in the fields of semiconductor characterization and engineering education. He is a member of ASEE, IEEE, and the Electrochemical Society.

Research Interests: Semiconductor materials and devices with a special interest in modeling devices made from large bandgap materials, engineering pedagogy with a special interest in distance learning.

Honors and Distinctions: ASU College of Engineering Teaching Excellence Award three times; NSF Presidential Young Investigator Award, 1984; and, most recently, the ASU Parents Association Professor of the Year Award.

Selected Publications:


Dieter K. Schroder
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Phone: 480-965-6621
Ph.D.: University of Illinois, 1968

Dieter Schroder joined the ASU faculty in 1981 after 13 years at the Westinghouse Research Labs. He has published two books, 136 journal articles, eight book chapters, 130 conference presentations, edited eight books, holds five patents, and has graduated 56 M.S. students and 25 Ph.D. students.

Research Interests: Semiconductor devices, defects in semiconductors, semiconductor material and device characterization, electrical/lifetime measurements, low-power electronics, device modeling, MOS devices.


Selected Publications:


Jun Shen joined the faculty in 1996 after six years of experience with Motorola’s Phoenix Corporate Research Labs. He is the author or co-author of over 50 refereed articles and many other conference publications. He is also the inventor or co-inventor of 25 issued U.S. patents.

Research Interests: Physics or organic research interests:

Jun Shen
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E-mail: jshen@asu.edu
Phone: 480-965-8133
Ph.D.: University of Notre Dame, 1992

Jenni Si received her B.S. and M.S. degrees from Tsinghua University, Beijing, China, and her Ph.D. from the University of Notre Dame, all in electrical engineering. She joined the ASU faculty in 1991 where she is currently a professor.

Research Interests: Learning algorithms and adaptive systems; management and optimization of semiconductor manufacturing processes; cortical information processing and modeling in animal brains, brain-machine interface.

Honors and Distinctions: Listed in many Marquis Who’s Who publications; NSF/White House Presidential Faculty Fellow, 1995; Motorola Excellence Award, 1995; NSF Research Institution Award, 1993; past associate editor of IEEE Transactions on Automatic Control; associate editor of IEEE Transactions on Semiconductor Manufacturing and Neural Networks; one of the ten students who received the highest honor at Tsinghua University in Beijing, China, 1994.

Selected Publications:


Brian Skromme joined the ASU faculty in 1989, where he is presently an associate professor in solid-state electronics. From 1985 to 1989, he was a member of the technical staff at Bellcore. He has written over 90 refereed publications in solid-state electronics.

Research Interests: Compound semiconductor materials and devices, especially wide bandgap materials for optoelectronic, high-frequency, high-power, and high-temperature applications; optical characterization of semiconductor materials; development of GaN and SiC-based materials and devices.

Honors and Distinctions: Eta Kappa Nu; Young Faculty Teaching Award, 1990-1991 School Year; Golden Key National Honor Society Outstanding Professor Award, 1991; listed in Who’s Who in Science and Engineering.

Selected Publications:


Andreas Spanias joined the ASU faculty in 1988. He has published 38 journal and 84 conference papers. He has also contributed three book chapters in speech and audio processing. He has served as associate editor of the IEEE Transactions on Signal Processing and as the general co-chair of the 1999 International Conference on Acoustics, Speech and Signal Processing (ICASSP-99). He is currently the vice president for the IEEE Signal Processing Society. He and his former Ph.D. student Ted Painter received the prestigious 2002 IEEE Donald G. Fink Prize Paper Award for their IEEE Proceedings paper entitled “Perceptual Coding of Digital Audio.”

Research Interests: Digital signal processing, multimedia signal processing, speech and audio coding, adaptive filters, signal processing for the arts.

Honors and Distinctions: 2002 IEEE Donald G. Fink Prize Paper Award from the IEEE Board of Directors for the IEEE Proceedings paper “Perceptual Coding of Digital Audio;” IEEE Senior Member; Intel Advanced Personal Communications Division—Central Logic Engineering Award, 1997; Natural Data Types Committee Award, 1996; Intel Corporation Award for Leadership and Contributions, 1993.

Selected Publications:


Nongjian Tao joined the ASU faculty as a professor of electrical engineering and an affiliated professor of chemistry and biochemistry in August 2001. Before that, he worked as an assistant and associate professor at Florida International University. He received the B.S. in physics from Anhui University in 1984 and the Ph.D. in condensed matter physics from Arizona State University in 1988. He holds two patents, has published over 90 refereed journal articles and book chapters, and given over 50 invited talks at international conferences and universities.

Research Interests: Molecular electronics, nanostructured materials and devices, chemical and biological sensors, interfaces between biological molecules and solid materials, and electrochemical nanofabrications.

Honors and Distinctions: Member of the American Chemical Society, the American Physical Society, and the Electrochemical Society; Excellence in Research Award, Florida International University, 2000; Excellence in Research Award, Florida International University, 1996.

Selected Publications:


Cihan Tepedelenlioglu joined the ASU faculty as an assistant professor in July 2001. He received the B.S. from the Florida Institute of Technology in 1995, the M.S. from the University of Virginia in 1998, and the Ph.D. from the University of Minnesota in 2001, all in electrical engineering. He has published a number of journal and conference papers and works as a part of the Telecommunications Research Center to establish collaborative projects between the signal processing faculty and the communication faculty.

Research Interests: Wireless communications, statistical signal processing, estimation and equalization algorithms for wireless systems, filterbanks and multirate systems, carrier synchronization for OFDM systems, power estimation and handoff algorithms, space-time coding.

Honors and Distinctions: NSF CAREER Award, 2001.

Selected Publications:


Nanostructures, Research Interests:电阻。这体现在我们对量子化的单电子闸的演示中，该闸被用于对位移的敏感测量。Trevor Thornton in 1998 having spent eight years at Imperial College in London and two years as a member of the technical staff at Bell Communications Research, New Jersey. He invented the split-gate transistor, which was used to demonstrate the quantization of the ballistic resistance.

Research Interests: Nanostructures, molecular electronics, short gate length MOSFETS, and the micropower applications of sub-threshold FETs.

Honors and Distinctions: Recipient of ASU Co-Curricular Programs Last Lecture Award, 2001.

Selected Publications:

Konstantinos Tsakalis joined the ASU faculty in 1988 and is now an associate professor. He received the M.S. in chemical engineering in 1984, the M.S. in electrical engineering in 1985, and the Ph.D. in electrical engineering in 1988, all from the University of Southern California. He holds several patents and has published over 50 journal and conference papers.

Research Interests: Applications of control, optimization, and system identification theory to semiconductor manufacturing and chemical process control.

Honors and Distinctions: Licensed chemical engineer, Technical Chamber of Greece; IEEE member; Sigma Xi.

Selected Publications:

Daniel Tylavsky is internationally known for applying computation technology to the analysis and simulation of the large-scale power-system generation/transmission problems. He also is an avid educator who uses team/cooperative learning methods in graduate and undergraduate education and is a pioneer in the use of mediated classrooms. He has been responsible for more than 2.8 million dollars in research funding for both technical and educational research projects. He is a member of several honor societies and has received numerous awards for his technical work as well as for work with student research.

Research Interests: Electric power systems, numerical methods applied to large-scale system problems, parallel numerical algorithms, new educational methods and technologies.

Honors and Distinctions: Senior Member of IEEE, IEEE-PES Certificate for Outstanding Student Research Supervision (three times), six awards for outstanding research from the IEEE-IAS Mining Engineering Committee.

Selected Publications:
Dragica Vasileska joined the ASU faculty in August 1997. She has published 56 articles in refereed journals (nine more in press), six book chapters, and 25 articles in conference proceedings in the areas of solid-state electronics, transport in semiconductors, and semiconductor device modeling. She has also given numerous invited talks. She is a member of IEEE, the American Physical Society, and Phi Kappa Phi.

Research Interests: Semiconductor device physics, semiconductor transport, 1-D to 3-D Research Interests: Semiconductor device physics, semiconductor transport, 1-D to 3-D

Honors and Distinctions: NSF CAREER application to real device structures. NSF CAREER application to real device structures.

Dragica Vasileska joined the ASU faculty in August 1997. She has published 56 articles in refereed journals (nine more in press), six book chapters, and 25 articles in conference proceedings in the areas of solid-state electronics, transport in semiconductors, and semiconductor device modeling. She has also given numerous invited talks. She is a member of IEEE, the American Physical Society, and Phi Kappa Phi.

Research Interests: Semiconductor device physics, semiconductor transport, 1-D to 3-D Research Interests: Semiconductor device physics, semiconductor transport, 1-D to 3-D

Honors and Distinctions: NSF CAREER application to real device structures. NSF CAREER application to real device structures.

Junshan Zhang joined the ASU faculty as an assistant professor in August 2000. He received the B.S. in electrical engineering from HUST, China, in 1993; the M.S. in statistics from the University of Georgia in 1996; and the Ph.D. in electrical engineering from Purdue University in 2000. He is active as a journal referee and has published a dozen journal and conference papers. He has been the chair of the IEEE Communications and Signal Processing Phoenix Chapter since January 2001.

Research Interests: Wireless communications and networking, including cross-layer design of wireless networks, CDMA, wireless communication theory, multiuser detection, radio resource allocation, and information theory.

Honors and Distinctions: Member of IEEE and ASEE.

Selected Publications:
THE DEPARTMENT OF ELECTRICAL ENGINEERING ANNUAL REPORT

This publication is written, designed, and produced by the ASU College of Engineering and Applied Sciences for distribution to selected alumni, industry partners, and academic friends worldwide.

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CEAS Marketing
The Department of Electrical Engineering’s strength and continuing growth cannot be attributed to one single factor. I hope that this document helped you understand some of the many components that are at work. The faculty, the staff, and last, but not least, the students, have all helped build the program to what it is today and, more importantly, are what will drive it to further success in the future. We must also not forget the major role played by others in collaboration with the department, both within the university and in the engineering community, here in Arizona, the U.S., and internationally.

I look forward to continued growth and recognition of the department both at home and abroad.

Peter E. Crouch
Dean, College of Engineering and Applied Sciences