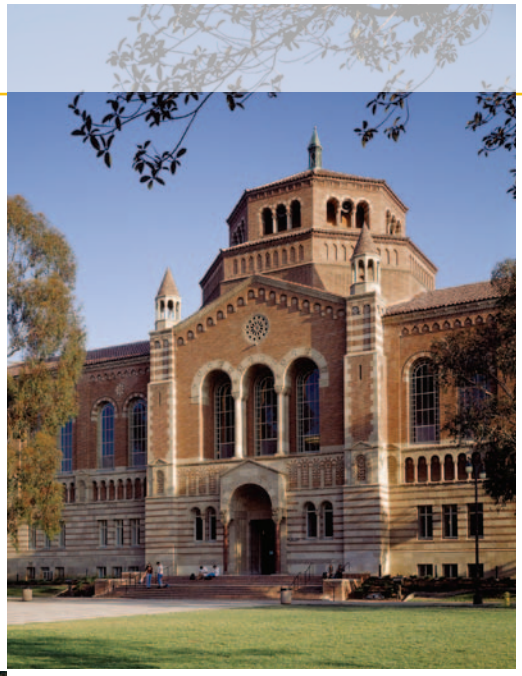


UCLA
Electrical
Engineering Department

UCLA

ANNUAL REPORT 2004-2005

Royce Hall and the Shapiro Fountain.

From the Department Chairman

We are proud to share with you in this report news about our activities and achievements during the academic year 2004-2005. The Electrical Engineering Department at UCLA is a vibrant academic environment that has been contributing steadily and proudly to the advance of knowledge in the field. The department will continue to position itself to assume leadership roles in several strategic areas of fundamental importance to the future of electrical engineering. The field is at a significant crossroad, where interactions among the various disciplines of electrical engineering, basic sciences, biology, and information technology are converging closer to each other with far reaching consequences to society, everyday life, and electrical engineering itself. In view of this synergy, several trends have emerged in recent years that elevate the complexity of sensing, analysis, and processing of information:

- The rate at which information needs to be communicated is increasing steadily to rates not imagined before. Vast volumes of information need to be processed and communicated reliably and quickly.
- The scales at which the operations of sensing and information processing need to be performed are shrinking. Sensor and actuator dimensions are becoming smaller in response to advances in micro-, bio-, and nanotechnologies.
- The complexity of the systems under study is increasing. Complex systems are shifting the emphasis from the study of stand-alone systems to the study of complex intertwined systems or "systems of systems." Modeling, which has always been at the core of electrical engineering, is again playing a prominent role in helping researchers model and understand complex physical and biological phenomena, and in establishing deeper ties between electrical engineering and physical, mathematical, and computational sciences.
- Research challenges are emerging from manipulations at the nano- and molecular scales, from the convergence of electronics and biology, and from linking the virtual world to the physical world. New application frontiers are being explored, e.g., in biological and environmental sciences, with substantial economic, scientific, and social impacts.

While the department is already a recognized leader in several subjects contributing to these trends, the department will continue to pursue a proactive approach in order to maintain a competitive edge in this emerging reality. Success will depend on pursuing a dynamic strategic plan for the coming years and on engaging all department constituencies including faculty, lecturers, students, staff, industry, and alumni.

Ali H. Sayed
Department Chairman

Overview

Faculty and Staff

Ladder Faculty:	44
Joint Faculty:	3
Emeritus Faculty:	6
Adjunct Faculty:	8
Lecturers:	24
Research Staff:	40

Recognitions

Society Fellows:	25
NAE members:	4
NAS members:	2
National Medal of Science	1

Publications

Books:	2
Book Chapters:	13
Journal Articles:	185
Conference Papers:	238
Patents:	10

The Nanoelectronics Research Center.

Research Facilities

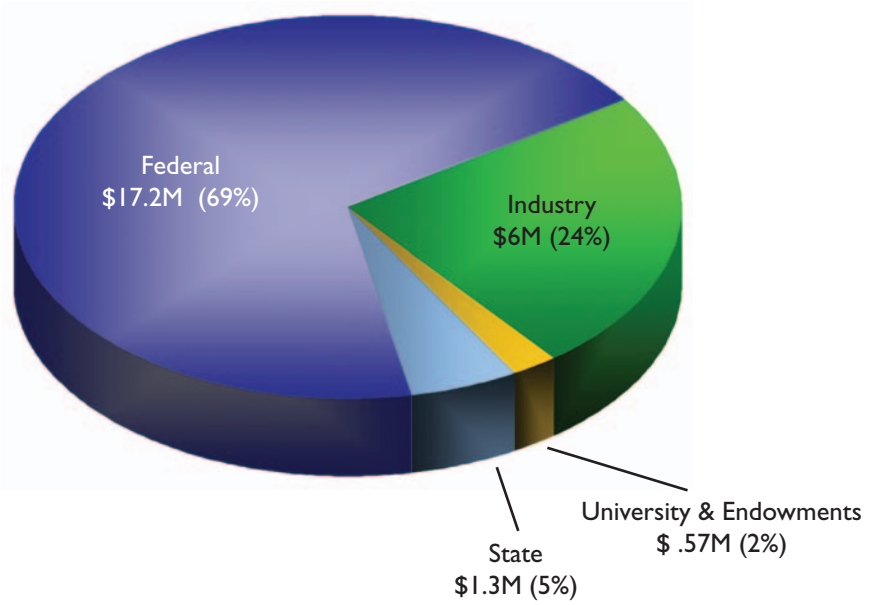
Department contributes to 7 Research Centers:

Flight Systems Research Center
Center for High Frequency Electronics
Nanoelectronics Research Center
Functional Engineered Nano Architectonics Focus Center (FENA)
California NanoSystems Institute (CNSI)
Center for Embedded Networked Sensing (CENS)
Institute for Cell Mimetic Space Exploration (CMISE)

Laboratories and Research Groups: 26

Space: 103,385 sq. ft.

Research Funding 2004-2005 ($25M)



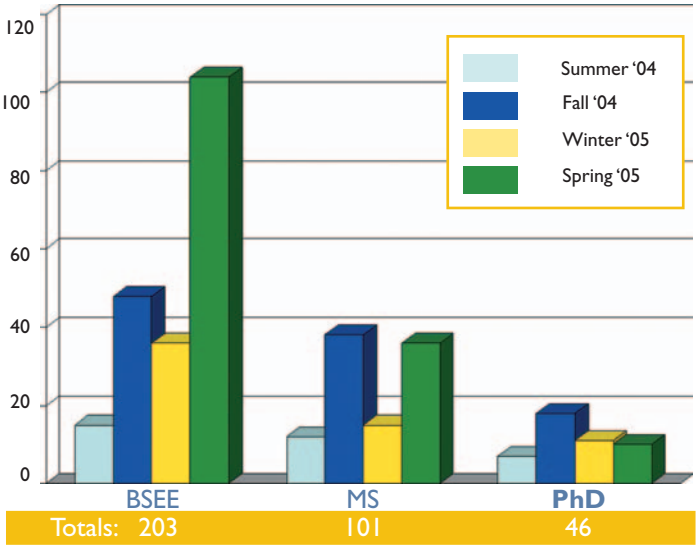
Undergraduate Students

Students Enrolled:	612
Applicants:	1004
Admitted:	369
New Students Enrolled:	116
Acceptance Rate:	36.7%
Average Freshman GPA:	3.74/4.0

Graduate Students

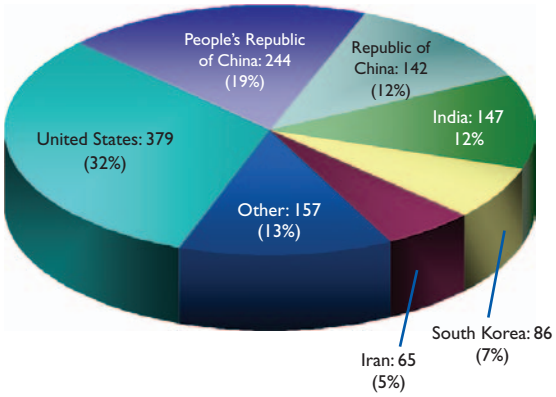
Students Enrolled:	423
Applicants (MS and PhD):	1200
Admitted:	295
New Students Enrolled:	125
Acceptance Rate:	24.6%
Average GPA:	3.84/4.0

EE Degrees Conferred 2004-2005



Graduate Applicants for Fall 2004

Countries with over 5% of 1200 total applicants



Department Fellowships

Combination Fellowships	$364,882
Full Fellowships	$359,399
Non-Resident Tuition Support	$352,656
Intel Fellowship	$ 37,000
Raytheon Fellowship	$ 30,000
CNID/CNSI Fellowship	$ 23,707
Rockwell Fellowship	$ 13,471
Malcolm Stacey Memorial Scholarship	$ 6,000
Total	**$1,187,115**

The Microsystems and Nanosytems Laboratory and the Neuro Engineering Technology (NET) Program

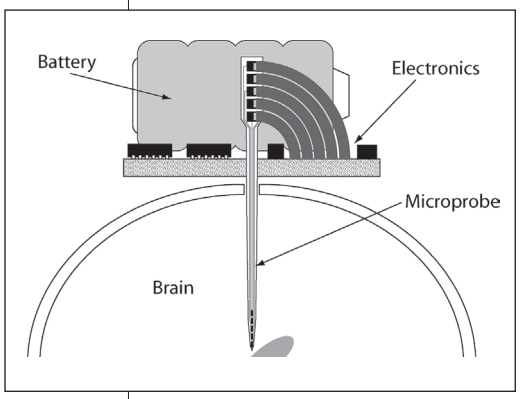
Brain-Computer Interfaces

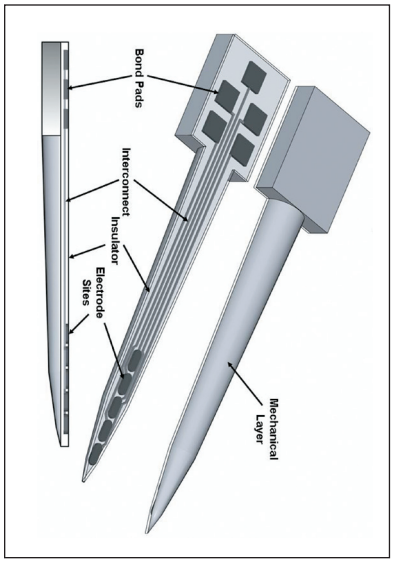
Professor Jack W. Judy, Director

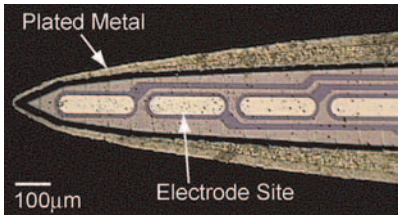
Brain research is a field that advances methodically for years, and then, unexpectedly, advances with tremendous leaps. In order to quicken the pace of neuroengineering-enabled breakthroughs, Prof. Judy's laboratory is currently involved with several neuro-engineering research collaborations, ranging from the development and applications of technologies to advanced fundamental neuroscience, to research and development of devices of immediate clinical relevance that address serious brain disorders. These collaborative research projects aim at:

1. Improving the neural-electronic interface. Appropriately tailored deep-brain stimulation (DBS) can reduce or eliminate some of the major symptoms of essential tremor and some of the symptoms of Parkinsonian-related diseases. Many believe that DBS could also be adapted to address depression and other emotional disorders, metabolism and morbid obesity, and other serious health issues.
2. Developing new, more capable, brain-computer interfaces (BCI) that transform neural signals into electronic signals that control a computer or a machine or other physical device (e.g., robotic appendage). We seek to miniaturize the large desktop BCI systems into tiny implanted or head-mounted systems that can amplify, filter, wirelessly communicate, network, and digital-signal process brain signals into electronic control signals.
3. Addressing the clinically important need for hydrocephalus shunts that do not clog. Our approach is to exploit the advances in magnetic microactuator technology made in Prof. Judy's MEMS lab, by integrating a ferromagnetic microactuator into an otherwise normal hydrocephalus shunt. By using external magnetic fields, the implanted MEMS device can be driven to mechanically dislodge obstructing material from the shunt orifice.

Prof. Jack W. Judy also leads a group of faculty fromseveral departments of UCLA to design and offer the first formal graduate-level neuroengineering training (NET) program in the world. The UCLA NET program is a collaboration between the Biomedical Engineering and the Neuroscience interdepartmental graduate programs.





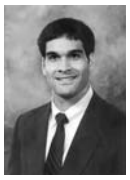


Schematics and images of a prototype deep-brain stimulator designed to reduce some of the symptoms of Parkinsonian-related diseases.

The Image Communication Laboratory

Faster Communications for Interplanetary Spacecraft

Professor John D. Villasenor, Director

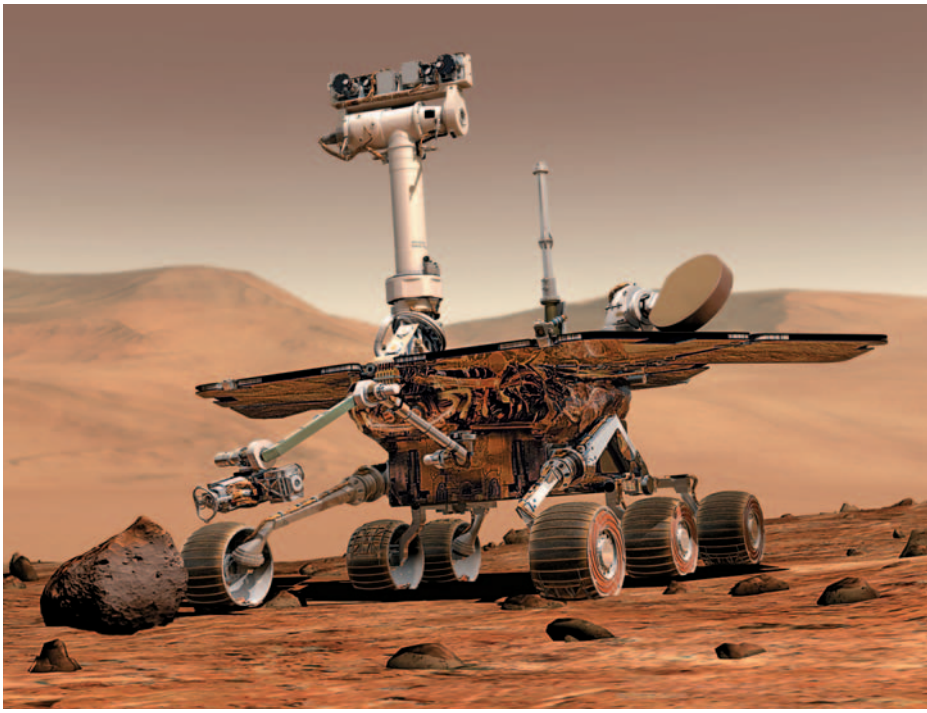


Over the last several decades, NASA has launched a succession of unmanned probes that have explored the moon, the inner and outer planets, comets, and asteroids. Collectively, these missions have added immensely to our knowledge of the solar system and to many of the process that have shaped our own planet. While these missions have been as diverse as the interplanetary bodies they have explored, they all share one common theme – the need to transmit data reliably over the vast distances from the spacecraft back to receiving stations here on Earth.

Professor John Villasenor and the researchers in his laboratory have been working in collaboration with Dr. Chris Jones, a researcher at NASA's Jet Propulsion Laboratory in Pasadena, CA, on methods that can lead to faster data transmissions -- and therefore an even richer return of information -- from future interplanetary missions. As Dr. Jones, who earned his Ph.D. in communications at UCLA, explains, "The transmission environment for these spacecraft is uniquely challenging. The distances are enormous, and the rapid changes in velocity that can occur during critical phases, such as a descent to the surface of Mars, cause rapid frequency shifts in the radio signal."

Dr. Dong-U Lee, a staff researcher in the laboratory elaborates: "Traditionally, the portion of a radio receiver that acquires the signal is treated completely separately from the portion that does the channel decoding, which aims to correct errors introduced during transmission. In our work we are throwing that assumption away. Some of the newer and most intriguing channel decoders are iterative, meaning that each block of signals is processed multiple times. We're taking information from the channel decoder, and feeding it back to the 'upstream' sections of the radio receiver that determine the exact time of arrival of the signals."

While the work is still in a relatively early stage, the results so far suggest that such joint processing can improve the system performance by a dB or more. This can correspond to an improvement in signal reliability in the range of one order of magnitude (i.e. a factor of 10), which leads directly to significantly improved quality of images and other data.



Future generations of Mars Rovers will include improved signal transmission using methods developed by the Image Communications Laboratory.

The Speech Processing and Auditory Perception Laboratory

Developing New Testing Tools for Teachers: Automated System Enables Consistency and Fairness in Scoring

Professor Abeer Alwan, Director

Preschool and elementary teachers at several Los Angeles area schools may soon have more time available for teaching, while still meeting national and state-mandated educational priorities. Experts in engineering and education at UCLA and other universities are developing a child-friendly testing system that measures and analyzes children's reading and pronunciation skills over time. They are working closely with elementary school teachers in the community to design an effective assessment system. Initial efforts will focus on five- to eight-year-old native speakers of American English and non-native speakers of Mexican backgrounds. "To date, no one has tracked the development of early speech in this group of non-native English speakers," explains Prof. Alwan, "and yet more than 60% of the students in some Los Angeles schools are native speakers of Spanish."

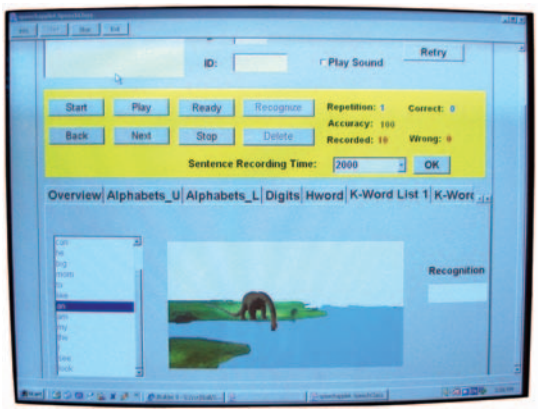
The Technologically Based Assessment of Language and Literacy (TBALL) project will allow researchers to tackle several fundamental research issues. For instance, the project's acoustic and pronunciation modeling algorithms must address not only variablility in speech from child to child, but also for a single child over time. It is also more difficult for computers to recognize children's speech because of their different acoustic characteristics, including higher pitch and resonant frequency. The team is devising age-appropriate ways of displaying information to capture a child's attention and elicit responses. They are also determining what criteria are appropriate to use in scoring the children.

TBALL builds on a rich history of collaborative activities between engineering and education at UCLA. The project draws on the expertise of researchers in electrical engineering, computer science, and education at UCLA as well as electrical engineering, linguistics and neuroscience at the University of Southern California and education at UC Berkeley.

TBALL members (from left): Eva Baker, Margaret Heritage, Abeer Alwan, Markus Iseli, Christy Boscardin, Xiaodong Cui, and Hong You.

"Currently, a teacher has a series of flash cards or a testing sheet and shows the child an image or word and asks him or her to say it aloud," explains Prof. Alwan. "Then he manually scores the child's pronunciation. There is little consistency in scoring from teacher to teacher, and the test offers only minimal assessment of a child's skill level." The TBALL team hopes to create consistency in scoring pronunciation, fluency, and comprehension levels across classrooms through their automated system. Information derived from the project will also aid educators in determining which teaching methods are most effective with children of varying backgrounds.

The TBALL teams will receive more than $3 million under a collaborative research grant from the National Science Foundation to support their research.



Screen-shot of prototype TBALL software.

The University of California Wireless Research & Development Laboratory

Wideband Radio Testbeds

Professor Michael P. Fitz, Director

The University of California Wireless Research and Development (UnWiReD) Laboratory is pushing the state of the art in multiple antenna radio (MAR) systems theory and experimentation, using both narrowband and wideband testbeds that provide an efficient means for validating theory and testing implementation ideas.

The UnWiReD narrowband MAR testbed has field tested many advanced algorithms and found some interesting results, including performance comparison between spatial multiplexing and space-time coding, performance comparison between coherent space-time coding, non-coherent and differential space-time coding, and performance impact of antenna geometry. It supports 4 KHz of bandwidth in the 220MHz land mobile communication frequency band, and will work in a high mobility environment of up to 70 mph.

The UnWiReD wideband testbed is being used to evaluate competing ideas that have been proposed for the next generation of 802.11 wireless LAN. On-air spectral efficiencies of greater than 8 bits/sec/Hz have been achieved using powerful MIMO OFDM (orthogonal frequency division multiplexing) coding and modulation techniques developed at UCLA.

Novel implementation of simultaneous channel sounding and packet data communications affords: (a) fair evaluation of packet error performance from competing schemes in typical environments and on a realistic hardware implementation; (b) knowledge of the distortion's characteristics; and (c) calculation of the achievable channel capacity via channel sounding measurements.

The wideband testbed is fully controllable over the internet and is outfitted with two positioning robots, allowing long experiments to be run remotely and with very little oversight by the test engineer. Remote testing has successfully been performed from locations in Italy, Sweden, and San Francisco while the testbed was located at UCLA.

Other current areas of research include:

- Creation of a real-time, software-defined radio testbed for the emerging Dedicated Short Range Radio (DSRC) standard (802.11p). The prototype will be the first real-time, wideband testbed for the lab.
- Channel estimation, focusing on a reduced complexity algorithm for practical implementation and on performance validation in a realistic deployment.
- A new paradigm for peak-average-power-ratio (PAPR) reduction in MAR environments has been proposed, which offers improved PAPR without any loss in bandwidth efficiency or increase in the complexity of the receiver.
- Reduced complexity multiple antenna front-end detection.

The UnWiReD wideband radio testbed is composed of two multi-antenna radios (far left and right) and two positioning robots (middle) – all of which are remotely controllable over the internet.

Two Interdisciplinary Research Center Highlights

Center for Embedded Sensing Networks

CENS is pursuing fundamental science and engineering research needed to create scalable, robust, adaptive, sensor/actuator networks including both Embedded Networked Sensing (ENS) technology research and ENS applications research. ENS-facilitated education and outreach activities are intertwined with the technology and application development.

Research is focused on four experimental application drivers: habitat monitoring for bio-complexity studies, spatially-dense seismic sensing and structure response, monitoring and modeling contaminant flows, and detection and identification of marine microorganisms. To support this scope, CENS continues to combine the expertise of faculty from diverse engineering disciplines with the expertise of biological, environmental and earth scientists. During the lifetime of the Center, we will pursue additional opportunities for applying the technology to other natural and engineered systems.

CENS is a $40M NSF Center directed by Prof. Deborah Estrin of the UCLA Computer Science Department. EE Professors Michael P. Fitz, Jack W. Judy, William J. Kaiser, Gregory J. Pottie, Mani B. Srivastava, John D. Villasenor, and Kung Yao contribute the resources of their respective laboratories and research groups to these exciting goals. The UCLA Electrical Engineering Department is proud to be a partner in the research and education projects of the Center for Embedded Network Sensing.

CENS researchers conducting experiments for bio-complexity study in the San Jacinto mountains of the James Reserve near Riverside, California.

Center on Functional Engineered Nano Architectures

FENA is part of the Focus Center Research Program initiated by the Semiconductor Research Corporation in an effort to expand pre-competitive, cooperative, long-range applied microelectronics research at US universities. The SRC established the Microelectronics Advanced Research Corporation (MARCO) as a wholly-owned subsidiary to manage and coordinate the FCRP Program. Funding to FENA is channeled through MARCO by sponsoring members of the Seminconductor Industry Association, members of the U.S. semiconductor equipment, materials, software and services industry, and the U.S. Department of Defense.

UCLA Electrical Engineering Professor and Director of FENA, Kang L. Wang.

FENA, a multi-million dollar funded Center, seeks to create and explore the next generation of nanoscale semiconductor technology to the borders of ultimate CMOS and beyond: inventing heterogeneous interfaces of new nanosystems, enabling a combination of biological and molecular functions, and revolutionizing paradigms of information processing and sensing. These new nanostructured materials will provide the basis for the creation of new applications of monolithically integrated (CMOS, molecular and biomolecular) nanosystems.

FENA has 28 distinguished principal investigators from broad areas such as Materials Science, Chemistry, Electrical Engineering, Bio Engineering, Mathematics, Applied Physics, and Computer Engineering, from 11 of America's most elite research universities. The UCLA EE Department's Professor Kang L. Wang has the honor of directing this endeavor.

Endowed Chairs

Northrop Grumman

Professor Tatsuo Itoh
Northrop Grumman Chair
in Microwave and Millimeter
Wave Electronics

Professor Eli Yablonovitch
Northrop Grumman Chair
in Optoelectronics

Professor Tatsuo Itoh, Northrop Grumman Chair in Microwave and Millimeter Wave Electronics, and a pioneer in electromagnetic engineering for micorwave and wireless components, heads the UCLA EE Dept. Microwave Electronics Laboratory. The laboratory has been engaged in a number of research projects ranging from theoretical investigation to practical implementation of various microwave-related topics.

Under the ARO MURI, the laboratory is working on enhancing the capability of retrodirective array for automatic target tracking and communication. Prof. Itoh's group has accomplished several unique capabilities previously unavailable, including a retrodirective array that can be reconfigured from the retrodirective mode to a direct conversion receiver/transmitter. More recently, full duplex communication capability has been added. The latest development is a smart retrodirective array that rejects eavesdropping and provides denial of unauthorized access.

A 60GHz retrodirective array.

Under the ONR MURI, the laboratory has spearheaded the research and development of microwave applications of metamaterial structures. Unlike other research efforts in the world working on this subject, Prof. Itoh and his group have invented a uniquely different approach that provides low loss broadband capability. They have developed many microwave components with unusual or unique capabilities, including an electronically controlled antenna with 180 degree coverage and a variable radiation pattern, a very compact directional coupler, dual band circuits for high power high efficiency amplifiers, etc. A spin-off project is the development of small antennas for wireless communication (ten times smaller than conventional antennas).

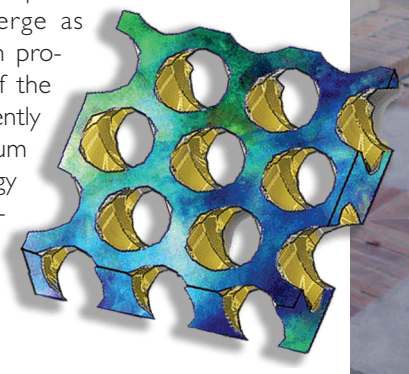
Professor Eli Yablonovitch, Northrop Grumman Chair in Optoelectronics and a pioneer in the field of opto-electronics and photonic bandgap research, heads the UCLA EE Dept. Optoelectronics Group, which is focused on the future of electronics and optoelectronics.

Among the technological changes that will be forthcoming in the near future are:

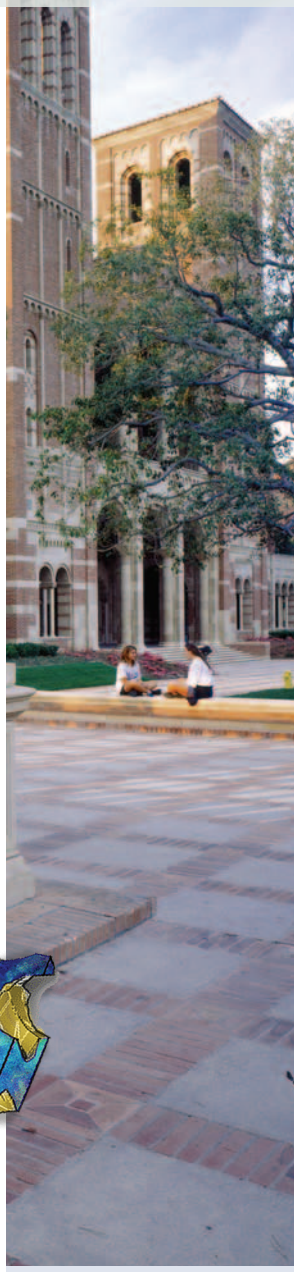
1. The full integration of optics and electronics in silicon chips. This is being accomplished in part by the incorporation of two-dimensional photonic crystal concepts into silicon design. An example of a three dimensional photonic crystal is in Figure 1, which is the electromagnetic analog of a conventional crystal for electrons.

2. New paradigms for very-short-distance intra-chip communications will have to be developed, before we can create nano-electronics. Current signaling schemes consume too many joules per bit, dissipating the advantage of going to the Nanoscale. A new short distance communications paradigm must emerge, so that the energy efficiency of nano-storage and nano-logic will be matched by equally efficient communications.

3. After the culmination of the current semiconductor roadmap, quantum information processing will emerge as dominant information processing technology of the 21st century. It is currently unclear which quantum information technology will emerge as dominant, but the Yablonovitch group is emphasizing semiconductor hosts for the qubits.



Example of a 3-D photonic crystal – the electromagnetic analog of a conventional crystal for electrons.



Distinguished ALUMNI

DR. RONALD SUGAR

Dr. Ronald Sugar is chairman, chief executive officer, and president of Northrop Grumman Corporation, a Los Angeles-based global defense company. Dr. Sugar graduated *summa cum laude* in electrical engineering from UCLA in 1968, where he also received a master's degree and a Ph.D. in the same field.

Dr. Sugar joined Northrop Grumman following its 2001 acquisition of Litton Industries Inc., where he served as president, chief operating officer, and as a member of the board of directors. Prior to joining Litton, he was president and chief operating officer of TRW Space and Information Systems.

Dr. Sugar currently serves as a director of Chevron Corporation, vice chairman of the Aerospace Industries Association, trustee of the Association of the United States Army, a member of the National Academy of Engineering, a fellow of the American Institute of Aeronautics and Astronautics and of the Royal Aeronautical Society. He earlier was appointed by the President of the United States to the National Security Telecommunications Advisory Committee. Dr. Sugar also is a national trustee of the Boys & Girls Clubs of America and a director of the Los Angeles Philharmonic Association.

UCLA has honored Dr. Sugar as Engineering Alumnus of the Year in 1996. In 2004 he received the Neil Jacoby Award from UCLA's Dashew International Center, and in 2005 he received the UCLA Alumni Association's Award for Professional Achievement.

"UCLA's School of Engineering has always been an extraordinary institution, and I am thankful that it is part of the Southern California community." Sugar says. "As CEO of Northrop Grumman, a company that relies on top engineering talent as its lifeblood, I am proud that my company shares a mutually beneficial relationship with UCLA. We have hired many graduates at the same time that we have funded scholarships and student and faculty programs." Northrop Grumman has also endowed three chairs in Electrical Engineering, and UCLA receives matching funds from the Northrop Grumman Foundation when employees make donations to the university.

"Perhaps the best part of all," Sugar concluded, "is that I can glance out my office window and see the Westwood campus, serving as a daily reminder of how fortunate I am to be an engineering graduate of UCLA."

DR. LINDA KATEHI

Dr. Linda P.B. Katehi holds a named chair as Purdue's first John A. Edwardson Dean of Engineering. This position includes the engineering schools on all Purdue campuses throughout the state of Indiana.

After receiving her BSEE from the National Technical University of Athens, Greece, in 1977, Linda P. B. Katehi came to UCLA's Electrical Engineering Department for graduate work, earning an MSEE in 1981 and a PhD in 1984.

"UCLA gave me the opportunity to come to the U.S. and educate myself in electromagnetics," she recalls. "It was very unique opportunity at that point in my life. The experience changed my life substantially. The environment was great—relaxed but very challenging, very invigorating. I made great friends and had an excellent advisor. My experience at UCLA helped me in developing my style as a faculty member and in mentoring my own students."

After graduating from UCLA, Katehi joined the faculty of the EECS Department of the University of Michigan, Ann Arbor, as an assistant professor, achieving the rank of professor in 1994. She served in many administrative positions, including director of graduate programs in the College of Engineering (1995-96), elected member of the College Executive Committee (1996-98), associate dean for graduate education (1998-99), and associate dean for academic affairs (1999-2001). In 2002, Katehi joined Purdue as the John A. Edwardson Dean of Engineering and professor of electrical and computer engineering, where her emphases have included increasing interdisciplinary research efforts, implementing a comprehensive master facilities plan, and promoting diversity within the engineering faculty and student body.

Katehi's numerous awards and distinctions include membership as fellow in IEEE; the IEEE AP-S W. P. King Best Paper Award for a Young Engineer (1984); the IEEE AP-S S. A. Schelkunoff Best Paper Award (1985); the NSF Presidential Young Investigator Award (1987); the URSI Booker Award (1987); the Humboldt Research Award (1994); the IEEE MTT-S Microwave Prize (1996); the IMAPS Best Paper Award (199); the IEEE Third Millennium Medal (2000); the IEEE Marconi Prize (2000); and the IEEE MTT-S Distinguished Educator Award (2002).

National Academy of Engineering Members


Tatsuo Itoh

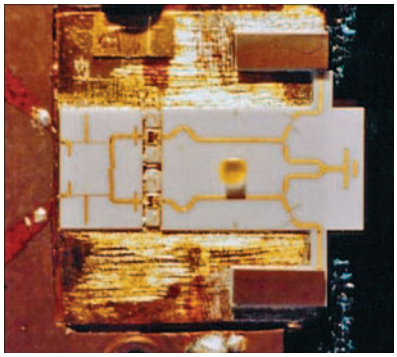

C. Kumar Patel


Henry Samueli


Eli Yablonovitch

Tatsuo Itoh

Tatsuo Itoh has pioneered a research area in interdisciplinary electromagnetics beyond traditional electromagnetic engineering. His NAE citation reads "For seminal contributions in advancing electromagnetic engineering for microwave and wireless components, circuits and systems." In his early career, he developed a number of numerical methods for microwave problems. Based on one of the methods, he then developed the first CAD program package for design of E-plane filters for millimeter wave systems such as radio, radar and remote sensors. More recently, his effort has been directed to coherently combining solid state devices and electromagnetic circuits for improved cost effectiveness and system performance. Out of this effort, he has developed the first global simulator for the RF frontend, dealing with antennas, passive and active microwave circuits at the same time. He has also created the Active Integrated Antenna scheme in which the antenna is not only a radiating element but also serves as a circuit element for the RF front end, particularly at millimeter wave frequencies.


A self-oscillating subharmonic mixer invented by Prof. Itoh's Microwave Electronics Laboratory.

C. Kumar Patel

Prof. Patel holds a joint professorship with the Electrical Engineering Department and the Physics Department at UCLA. Until March 1993, he was executive director of the Research, Materials Science, Engineering and Academic Affairs Division at AT&T Bell Laboratories. During his career at AT&T, which began in 1961, he made numerous seminal contributions in several fields, including gas lasers, nonlinear optics, molecular spectroscopy, pollution detection and laser surgery. He is a member of both the National Academy of Sciences and the National Academy of Engineering, and has received numerous honors, including the National Medal of Science, for his invention of the carbon dioxide laser, a major scientific and technological breakthrough that continues to be an important tool in manufacturing, medical treatment, scientific investigation and materials processing. He has also received the Lomb Medal of the Optical Society of America, the Franklin Institute's Ballantine Medal, the Pake Prize of the American Physical Society and the Coblentz Society's Coblentz Prize. He co-chaired the American Physical Society study of the science and technology of directed energy weapons. He also is past president of the American Physical Society, and past vice chancellor of research at UCLA.

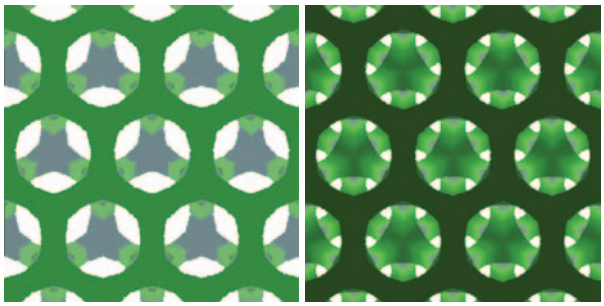
National Academy of Engineering Members

Henry Samueli

Prof. Samueli has been recognized by the National Academy of Engineering for his "pioneering contributions to academic research and technology entrepreneurship in the broadband communications system-on-a-chip industry." Dr. Samueli has over 25 years of experience in the fields of digital signal processing (DSP) and communications systems engineering. He is widely recognized as one of the world's leading experts in the field of broadband commuications circuits. He received his BS, MS and PhD degrees in electrical engineering from UCLA. Since 1985, Dr. Samueli has been a professor in the Electrical Engineering Department, where he has supervised advanced research programs in DSP and broadband communications. Well known as the co-founder of Broadcom Corporation in 1991, Samueli continues to contribute his expertise and support of both the Department and the School, which was named in his honor in October 2000.

Eli Yablonovitch

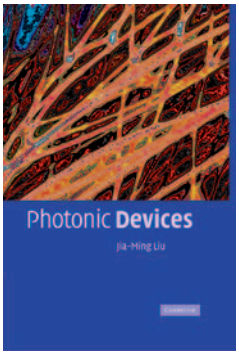
Eli Yablonovitch has been elected as a member of the NAE "for introducing photonic bandgap engineering and applying semiconductor concepts to electromagnetic waves in artificial periodic structures". An integral component of these accomplishments is the photonic crystal. Prof. Yablonovitch explains, "Photonic crystals are being used as one of the design paradigms for forthcoming photonic integrated circuits. In addition, they lead to the smallest electromagnetic cavities with the highest Q-factors, and are now used in many quantum information devices. Interestingly, these photonic crystal structures that were discovered by analogy with semiconductors are now recognized to occur in Nature, and are responsible for some of the brilliant colors in the animal world, including peacock feathers, and parrots." Prof. Yablonovitch is also a member of the National Academy of Sciences.



Two basic views of the photonic bandgap structure (color-enhanced). Left: top view, half structure. Right: top view, full structure.

Royce Hall viewed from the Shapiro Fountain.

Recently Published Textbooks



Photonic Devices

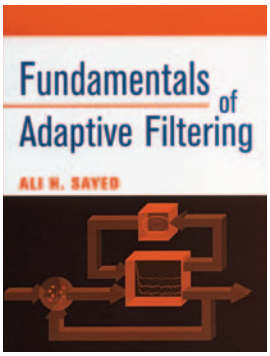
Jia-Ming Liu *Cambridge University Press, 2005*

Photonic devices lie at the heart of the communications revolution, and have become a large and important part of the electronic engineering field. With this in mind, Prof. Liu has put together a unique textbook covering every major photonic device, and striking a careful balance between theoretical and practical concepts. The book assumes a basic knowledge of optics, semiconductors and electromagnetic waves. Many of the key background concepts are reviewed in the first chapter. Devices covered include optical fibers, couplers, electro-optic devices, magneto-optic devices, lasers and photodetectors. Problems are included at the end of each chapter and a solutions set is available. The book is ideal for senior undergraduate and graduate courses, but being device driven it is also an excellent engineers' reference.

Convex Optimization

Stephen Boyd and Lieven Vandenberghe *Cambridge University Press, 2004*

Convex optimization problems arise in a wide variety of application areas, including engineering design, statistics and data analysis, finance, and network design and operation. New numerical methods can solve these optimization problems very effectively, provided their special form is recognized and exploited. The book Convex Optimization, co-authored by Prof. Vandenberghe, is meant to give the applied mathematician, engineer, computer scientist, or data analyst the background needed to recognize and solve convex optimization problems. It covers the basic theory and algorithms of convex optimization, and illustrates the applications with examples from different fields. It is used as a graduate textbook for convex and nonlinear optimization courses at UCLA, Stanford University, and several other institutions.



Fundamentals of Adaptive Filtering *(2005 Terman Award)*

Ali H. Sayed *John Wiley and Sons, 2003*

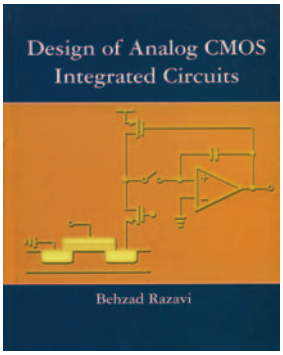
This graduate-level textbook offers a comprehensive and up-to-date treatment of adaptive filtering. Special emphasis is placed on geometric constructions, energy conservation arguments, system-theoretic arguments, and linear algebraic formulations. It illustrates extensive commonalities that exist among different classes of adaptive algorithms and even among different filtering theories. The book also provides a uniform treatment of the subject matter, addressing some existing limitations, providing additional insights, and detailing extensions of current theory.

The book is self-contained, with careful attention given to appendices, problems, examples, and a variety of practical computer projects. Each chapter includes concepts that reinforce the principles covered, bibliographic notes for further study, numerous problems that vary in difficulty and applications, computer projects that illustrate real-life applications, and several helpful appendices.

Design of Analog CMOS Integrated Circuits

Behzad Razavi *McGraw-Hill, 2000*

This textbook deals with the analysis and design of analog CMOS integrated circuits from a modern perspective, emphasizing issues that the designer faces as device dimensions and supply voltages scale down. Since its introduction, Design of Analog CMOS Integrated Circuits has become the "bible" of analog CMOS design, and has been adopted for teaching by numerous universities around the world. Due to its popularity, this textbook as been translated twice into Chinese (one for China and one for Taiwan), and also into Japanese.



Awards

FACULTY AND STUDENT AWARDS

Faculty Awards

M.-C. Frank Chang is the recipient of the **IEEE 2006 David Sarnoff Award** for "developing an industry-standard manufacturing process and monitoring methods to produce highly reliable GaAs Heterojunction Bipolar Transistor (HBT) Power Amplifiers with in-process predictability, and for leadership in successfully transferring these technologies from research to production." The IEEE David Sarnoff Award is presented to an individual or team for exceptional contributions to electronics. In the evaluation process, the following criteria are considered: singular outstanding achievement, originality, recent impact within five years and the quality of the nomination. The award consists of a bronze medal, certificate and honorarium.

Yahya Rahmat-Samii has been chosen to receive the **Booker Gold Medal** from the International Union of Radio Science (URSI). URSI is the largest international scientific body on all aspects of radio science. Rahmat-Samii was selected for his contributions to reflector antenna design and practice, near-field measurements and diagnostic techniques, handheld antennas and human interactions, genetic algorithms in electromagnetics, and the spectral theory of diffraction.

Ali H. Sayed has been awarded the **2005 Frederick Emmons Terman Award** by the American Society of Engineering Education (ASEE). The Terman Award is bestowed annually upon an outstanding young electrical engineering educator in recognition of the educator's contributions to the profession. The award is sponsored by the Hewlett-Packard Company and consists of a $5,000 honorarium, a gold-plated medal, a bronze replica, a presentation scroll and reimbursement of travel expenses for the awardee to attend the ASEE Frontiers in Education Conference, where the award is presented. The recipients of this award must meet the following requirements: (1) Be the principal author of an electrical engineering textbook published prior to June 1 of the year in which the author becomes 40 years of age and judged by peers to be outstanding by virtue of its original contribution to the field. (2) Have outstanding achievements in teaching, research, guidance of students and related activities. (3) Be an electrical engineering educator under 45 years of age on June 1 of the year in which the award selection is made. (4) Be a full-time member of a college faculty and actively engaged in

IEEE Recognitions

Gregory J. Pottie and **Jason C.S. Woo** were elected Fellows of the IEEE in January 2005. Prof. Pottie received his honor "for contributions to the modeling and applications of wireless sensor networks". Prof. Woo was recognized for "contributions to nanoscale silicon on insulator and bulk metal oxide semiconductor device physics and technology."

Ken Yang has been awarded the 2005 Institute of Electrical and Electronics Engineers (IEEE) Outstanding Branch Counselor and Advisor Award, which recognizes the unusual and dedicated efforts of Student Branch Counselors and

UCLA Awards

William J. Kaiser has been awarded the UCLA 2005 Brian P. Copenhaver Award for Innovation in Teaching with Technology. Kaiser was chosen for his development and instructional use of Individualized Interactive Instruction (3I), a tool to facilitate a new level of student-insructor interaction. 3I provides real-time feedback into the instruction process, enabling the instructor to target areas of deficiency for the whole class while giving students a private mechanism to convey their understanding to the instructor.

Henry Samueli has been chosen as UCLA's 2005 Edward A. Dickson Alumnus of the Year. The Alumnus of the Year Award is given for special and outstanding service to UCLA, and is awarded to individuals who have brought great honor and distinction to the University.

Powell Library.

Best Paper Awards

The paper, "Demonstration of 11dB Fiber-to-Fiber Gain in a Silicon Raman Amplifier," by Dr. Ozdal Boyraz and **Prof. Bahram Jalali**, has been selected as the Best Paper of the IEICE Electronics Express (ELEX) for the year 2004. This paper originally appeared in Electronics Express, vol. 1, no. 14, pp. 429-434.

The paper, "Percolation Search in Power Law Networks: Making Unstructured Peer-To-Peer Networks Scalable," by **Prof. Vwani Roychowdhury** and researchers Oscar Boykin and Nima Sarshar, received the Best Paper Award at the 4th IEEE International Conference on Peer-To-Peer Computing, held August 25-27, 2004 in Zurich, Switzerland.

Student Awards

Dr. Ozdal Boyraz, Chancellor's Post-doctoral Award recipient

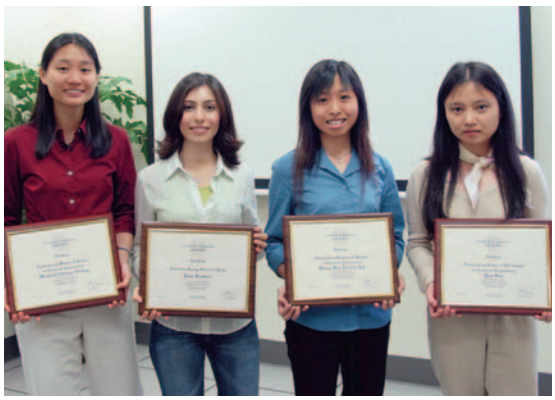
Dr. Ozdal Boyraz, a member of **Prof. Bahram Jalali's** Optoelectronics Circuits and Systems Laboratory, has won the Chancellor's Postdoc Award for demonstration of the first silicon laser. The Chancellor's Award for Postdoctoral Research honors accomplished UCLA postdoctoral fellows for their outstanding research.

A research demonstration on SOS, a new operating system for sensor networks with dynamic module reconfiguration capabilities, was declared co-winner of the Best Demonstration Award at the ACM/IEEE Conference on Information Processing in Sensor Networks. The demonstration was presented by graduate students Simon Han, Ram Kumar and Roy Shea from **Prof. Mani B. Srivastava's** Networked and Embedded Systems Laboratory.

At the recent IEEE MTT-S International Microwave Symposium held on June 12-16, graduate student Catherine (Katie) Allen, of **Prof. Tatsuo Itoh's** group, won Second Place in the Student Paper Competition, among 153 contestants. She presented "Design of Ring Resonator Mode Spacing and Bandwidth Using the Phase Response of Composite Right/Left Handed Transmission Lines." Katie is an NSF Fellowship holder at UCLA. She also won the Student Paper Competition at the same symposium two years ago.

Kris Tiri, David Hwang, Alireza Hodjat, Bo-Cheng Lai, Shenglin Yang, Patrick Schaumont, graduate students in **Prof. Ingrid Verbauwhede's** Embedded Security Laboratory, won 3rd place in the Operational Category of the 42nd DAC/ISSCC Student Design Contest for their project, "A Side-Channel Leakage Free Coprocessor IC in 0.18µm CMOS for Embedded AES-based Cryptographic and Biometric Processing".

Kris Tiri, Bo-Cheng Lai, and Shenglin Yang with Prof. Ingrid Verbauwhede receiving their awards for the DAC student design contest.



Outstanding Students Margaret Chiang, Roja Bandari, Thriven Lai, and Yan Han.

In late May of each school term, students from the department are recognized and awarded for their oustanding scholarship. Recipients of the Outstanding Students of the Year Awards for 2004-2005 are: **Thriven Lai** (BS), **Margaret Chiang** (MS) and **Yan Han** (PhD). Also, **Roja Bandari** was awarded the Christine Huang Memorial Prize.

Asad A. Abidi

CMOS RF design, high speed analog integrated circuit design, data conversion, and other techniques of analog signal processing.
Fellow, IEEE, 1996

Mau-Chung Frank Chang

High-speed semiconductor (GAAs, InP, and Si) devices and integrated circuits for digital, analog, microwave, and optoelectronic circuit applications.
Fellow, IEEE, 1996

Babak Daneshrad

Digital VLSI circuits: wireless communication systems, high-performance communications integrated circuits for wireless applications.

Lei He

Computer-aided design of VLSI circuits and systems, interconnect modeling and design, power-efficient computer architectures and systems, and numerical and combinatorial optimization.

William J. Kaiser

Development of distributed networked, embedded computing for linking the Internet to the physical world; applications for this technology include distributed systems for factory automation, biomedical research, healthcare, space science, security, and defense.
Fellow, American Vacuum Society (American Institute of Physics), 1990

William H. Mangione-Smith

Computer architecture and micro-architecture design and evaluation, compiler technology for low power and high performance.

Sudhakar Pamarti

Mixed-signal IC design, signal processing and communication theory, especially the design of highly integrated wireless and wireline communication systems with particular emphasis on lowering cost and power consumption; design, silicon IC implementation, and verification of mixed-signal blocks.

Behzad Razavi

Analog, RF, and mixed-signal integrated circuit design, dual-standard RF transceivers, phase-locked systems and frequency synthesizers, A/D and D/A converters, high-speed data communication circuits.
Fellow, IEEE, 2003

CIRCUITS AND EMBEDDED SYSTEMS AREA

13	Faculty
74	MS students
87	PhD students
34	Journal Articles
75	Conference Papers
7	Book Chapters
8	Patents

Vwani P. Roychowdhury

Models of computation: parallel systems, quantum information processing, nanoscale and molecular electronics, statistical algorithms for large-scale information processing, combinatorics and complexity and information theory, bioinformatics, cryptography.

(Prof. Roychowdhury is also in the Signal Processing area.)

Henry Samueli

Digital signal processing, communications systems engineering, and CMOS integrated circuit design for applications in high-speed data transmission systems.

Fellow, IEEE, 2000
Fellow, American Academy of Arts and Sciences, 2004
Member, National Academy of Engineering, 2003

Mani B. Srivastava

Mobile and multimedia networked computing systems, design and synthesis of DSP systems, and low-power systems.

Ingrid Verbauwhede

VLSI architecture design, circuit design and design methodologies for programmable and application-specific integrated circuits (ASICs) and systems-on-a-chip.

Chi-Kong Ken Yang

High-speed data and clock recovery circuits for large digital systems, low-power, high-performance functional blocks and clock distribution for high-speed digital processing, and low-power high-precision capacitive sensing interface for MEMS.

Harold R. Fetterman

Optical millimeter wave interactions, femtosecond evaluation of high-frequency devices and circuits, solid state millimeter wave structures and systems, biomedical applications of lasers.

Fellow, IEEE, 1990

Fellow, Optical Society of America, 1980

Warren S. Grundfest

Lasers for minimally invasive surgery, magnetic resonance-guided interventional procedures, laser lithotripsy, micro-endoscopy, spectroscopy, photodynamic therapy, optical technology, biologic feedback control mechanisms.

Fellow, SPIE, 1996

Tatsuo Itoh

Microwave and millimeter wave electronics, guided wave structures, low power wireless electronics, integrated passive components and antennas.

Fellow, IEEE, 1982

Member, National Academy of Engineering, 2003

Bahram Jalali

RF photonics, fiber optic integrated circuits, and Datacom systems.

Fellow, IEEE, 2003

Fellow, Optical Society of America, 2004

Chandrashekhar J. Joshi

Laser fusion, laser acceleration of particles, nonlinear optics, high-power lasers plasma physics.

Fellow, IEEE, 1993

Fellow, Institute of Physics (U.K.), 1998

Fellow, American Physical Society, 1990

Jack W. Judy

MEMS, microsensors, micro-actuators, microsystems and micromachining; magnetism and magnetic materials; neuro-engineering and neuro-silicon interfaces; distributed sensors, actuators, and information.

Jia-Ming Liu

Ultrafast optics and electronics, opto-electronics and semiconductor lasers, nonlinear optics, and optical-wave propagation.

Fellow, American Physical Society, 2003

Fellow, Optical Society of America, 1990

Warren B. Mori

Laser plasma interactions, advanced accelerator concepts, advanced light sources.

Fellow, American Physical Society, 1995

Dee-Son Pan

New semiconductor devices for millimeter- and submillimeter-wave generation and amplification, transport in small geometry semiconductor devices, generic device modeling.

PHYSICAL ELECTRONICS AREA

18	Faculty
68	MS students
102	PhD students
113	Journal Articles
95	Conference Papers
1	Book
1	Book Chapter

C. Kumar Patel

Condensed matter physics, especially the structure and dynamics of "interesting systems," broadly defined; spectroscopic techniques and detection methods; development of new laser systems.

National Medal of Science, 1996
Member, National Academy of Enginering, 1978
Fellow, IEEE, 1975
Member, National Academy of Engineering, 1974

Yahya Rahmat-Samii

Satellite, personal communications, microstrip, fractal, remote sensing, and radio astronomy antennas; electromagnetic bandgap structures; computational and optimization techniques, measurement and diagnostic techniques.

Fellow, IEEE, 1985

Oscar M. Stafsudd

Quantum electronics, especially IR lasers and nonlinear optics; solid-state IR detectors.

Chand R. Viswanathan

VLSI devices and technology, thin oxides; reliability and failure physics of MOS devices; process-induced damage, low frequency noise; low temperature device behavior, thin oxide characterization, and device modeling.

Life Fellow, IEEE, 1995

Kang L. Wang

Nanoelectronics and optoelectronics, MBE and superlattices, microwave and millimeter electronics/optoelectronics, quantum computing.

Fellow, IEEE, 1992

Yuanxun (Ethan) Wang

High performance antenna array and microwave amplifier systems for wireless communication and radar; numerical modeling techniques; fusion of signal processing and circuit techniques in microwave system design.

Jason C.-S. Woo

Solid state technology, CMOS and bipolar device / circuit optimization, novel device design, modeling of integrated circuits, VLSI fabrication.

Fellow, IEEE, 2005

Ming C. Wu

MEMS, micro-opto-electromechanical systems (MOEMS), free-space integrated optics, high-speed optoelectronics, microwave photonics, high-power photodetectors, and mode-locked semiconductor lasers.

Fellow, IEEE, 2002

Eli Yablonovitch

Optoelectronics, high speed optical communications, nanocavity lasers, photonic crystals at optical and microwave frequencies, quantum computing and communication.

Member, National Academy of Engineering, 2003
Member, National Academy of Sciences, 2003
Fellow, IEEE, 1992
Fellow, American Physical Society, 1990
Fellow, Optical Society of America, 1982

Abeer A. Alwan

Speech processing, acoustic properties of speech sounds with applications to speech synthesis, recognition by machine and coding, hearing aid design, digital signal processing.
Fellow, Acoustical Society of America (American Institute of Physics), 2003

A.V. Balakrishnan

Laser beam distortion in atmospheric turbulence, control design for smart structures, and flight systems applications of adaptive contro, nonlinear aeroelasticity and wind power.
Life Fellow, IEEE, 1966

Michael P. Fitz

Statistical communication theory, especially physical layer communications theory for mobile wireless communications, with emphasis on coding, demodulation, synchronization, and equalization techniques.

Stephen E. Jacobsen

Operations research, mathematical programming, non-convex programming, applications of mathematical programming to engineering and economic systems.

Rajeev Jain

Embedded hardware/software design for signal processing systems-on-a-chip; CAD tools for design of high-performance signal processing architectures and development of ASICs for spread-spectrum modems and image compression.
Fellow, IEEE, 1999

Nhan Levan

Control systems, especially stability and stabilizabilty and errors in dynamic systems; signals analysis; theory and application of wavelets.

Fernando Paganini

Robust and optimal control, distributed control of sensors and actuator arrays, distributed networks, power systems.

Gregory J. Pottie

Communication systems and theory, with applications to personal communications, channel coding and wireless sensor networks.
Fellow, IEEE, 2005

Izhak Rubin

Telecommunications and computer communications systems/networks; mobile wireless, optical, multimedia IP, ATM, satellite, and CATV networks; queueing systems, C3 systems/networks, network simulations and analysis, traffic modeling/engineering.
Fellow, IEEE, 1987

ADJUNCT PROFESSORS

N.G. Alexopoulos
Elliott Brown
Charles Chien
Giorgio Franceschetti
Bijan Houshmand
Brian Kolner
J.N. Schulman
Ming C. Wu

PROFESSORS EMERITI

Fred G. Allen
Francis F. Chen
Robert S. Elliott
F.W. Schott
Donald M. Wiberg
Jack Willis

IN MEMORIAM

Richard E. Mortensen
(1935-2004)

Professor emeritus Richard E. Mortensen passed away in October 2004 at the age of 69. He had enjoyed a long and productive career at the UCLA Henry Samueli School of Engineering and Applied Science from 1965 to 1991.

Mortensen received his BS and MS in electrical engineering simultaneously from MIT in 1958. He received his PhD in 1966 from UC Berkeley. His dissertation, "Optimal Control of Continuous-time Stochastic Systems," was recognized by the control systems community as one of the pioneering works on stochastic control theory.

Dr. Mortensen was well known for his keen intellect and his contributions to stochastic, nonlinear control systems, and was knowledgeable on a broad range of subjects. His book, Random Signals and Systems, was published in 1987. His most recent work focused on the development of load models for electric power systems. He was a brilliant researcher and deep thinker, with a dichotomy of interests, some in the mathematical theory of control, and others in the meaning of life. He expressed disappointment that so much work on control theory was used in advancing military objectives. He was a fervent advocate of peace, and of protection of wildlife throughout the world. He retired in 1991 as professor emeritus to further these latter interests. He will be missed.

Ali H. Sayed

Adaptive and statistical signal processing, distributed processing, filtering and estimation, signal processing for communications, wireless networks, algorithms for large-scale structured computations.

Fellow, IEEE, 2001

Lieven Vandenberghe

Optimization in engineering, applications in systems and control, circuit design, and signal processing.

John D. Villasenor

Communications, signal and image processing, joint source and channel coding, lattice vector quantization, wavelet filter design, wireless multimedia communications, and low complexity image and video coding architectures and algorithms.

Paul K.C. Wang

Control systems, nonlinear distributed-parameter system theory with applications to micro-optoelectromechanical systems, microrobots and microspacecraft.

Richard D. Wesel

Communication theory with a particular interest in coded modulation including trellis codes and turbo codes for applications including mobile wireless communication systems, multiple antenna systems, and satellite communication systems.

Alan N. Willson, Jr.

Theory and application of digital signal processing including VLSI implementations, digital filter design, nonlinear circuit theory.

(Prof. Wilson is also in the Circuits and Embedded Systems area.)

Fellow, IEEE, 1978

Kung Yao

Communication theory, signal, acoustic, and array processing, wireless communication systems, sensor networks, chaos system theory, and VLSI and systolic algorithms and architectures.

Fellow, IEEE, 1994

SIGNALS AND SYSTEMS AREA

16	Faculty	68	Conference Papers
77	MS students	1	Book
94	PhD students	5	Book Chapters
38	Journal Articles	3	Patents

Graduates 2004-2005 MASTER OF SCIENCE DEGREES

Commencement, June 2005.

Andreas Mantik Ali: *Comprehensive*
[Prof. K. Yao, Advisor]

Parouir Patrick Apoyan: *Comprehensive*
[Prof. I. Rubin, Advisor]

Atul Chandrakant Apte:
Comprehensive [Prof. A.H. Sayed, Advisor]

Shadnez Asgari: *Comprehensive*
[Prof. K. Yao, Advisor]

Joseph Cheney Bardin: "Local Oscillator Distribution Using a Commercial Geostationary Satellite" [Prof. T. Itoh, Advisor]

Jatin Bhatia: "Calibration of QAM Test-Bed and Its Performance in Packet Mode Transmission over Wireless Channels"
[Prof. B. Daneshrad, Advisor]

Robert M Bilotta: "Spiral Antennas and Antenna Arrays for THZ Frequencies"
[Prof. E. Brown, Advisor]

Bartosz Jan Bortnik: "Frequency Conversion Using Serrodyne Modulation in Electro-optic Polymer Modulators
[Prof. H.R. Fetterman, Advisor]

Diane M. Budzik: *Comprehensive*
[Prof. W. Kaiser, Advisor]

Steven Michael Butt: "Capitalizing on Workload Predictability in a Graphic Processor System for Reduced Power Consumption" [Prof. W.H. Mangione-Smith, Advisor]

John Carek: "Improvement in Bandwidth OG Predistortion Linearization through Adaptive Equalization" [Prof. B. Jalali, Advisor]

Henry Man Chan: *Comprehensive*
[Prof. C. Joshi, Advisor]

Chieh-Feng Chang: *Comprehensive*
[Prof. J.M. Liu, Advisor]

Pak Sam Chang: "The Design, Fabrication and Optical Properties of Multilayer Quarter Wave Stacks with Quantum Dots As Cavity Layer" [Prof. M. Wu, Advisor]

Saeed Chehrazi: "Noise in Passive FET Mixers" [Prof. A. Abidi, Advisor]

Cheuk Wing Cheung: "An Exploration of Active PN Junction Inductor"
[Prof. D.S. Pan, Advisor]

Margaret Chiang: "Synchronization of Mutually Coupled Systems"
[Prof. J.M. Liu, Advisor]

Edmond Ho-Ming Chung:
Comprehensive [Prof. M.P. Fitz, Advisor]

Rosemary Teresa Diaz: "Lidar Detection Using Coherently Locked Dual Frequency Optical Source" [Prof. J.M. Liu, Advisor]

Alexandre Dupuy: "Practical Scheme for Envelope Delta-Sigma Modulated (EDSM) Microwave Power Amplifers"
[Prof. T. Itoh, Advisor]

Shane Erickson: *Comprehensive*
[Prof. W.H. Mangione-Smith, Advisor]

Benjamin Ettori: *Comprehensive*
[J. Villasenor, Advisor]

Brian Kwanshih Foo: *Comprehensive*
[Prof. I. Rubin, Advisor]

Jay Edward Fahlen: "Exploring Methods for Producing Relativistic Protons and Ions"
[Prof. W. Mori, Advisor]

Yi Fan: "Systematic Incremental Design Method and Implementation for Embedded Software" [Prof. I. Verbauwhede, Advisor]

Shahin Farshchi: "A Tiny OS-Enabled Mica2-Based Wireless Neural Interface"
[Prof. J.W. Judy, Advisor]

Timothy Satoru Fujishige: "Analysis, Design, and Application of the Composite Right/Left-Handed Transmission Line"
[Prof. T. Itoh, Advisor]

Jason Matthew Gordon: "Multi-Sensor Module for Networking Informechanical Systems (NIMS)" [Prof. W. Kaiser, Advisor]

Raymond Guan: *Comprehensive*
[Prof. J.W. Judy, Advisor]

Sabiha Hasan: "IP Packet Normalizer Architecture and Design"
[Prof. W.H. Mangione-Smith, Advisor]

Ziad A. Hussein: *Comprehensive*
[Prof. Y. Rahmat-Samii, Advisor]

David Derchin Jea: "Data Mules in Sensor Networks" [Prof. M.B. Srivastava, Advisor]

Nanbo Jin: "Parallel PSO/FDTD Optimization in Electromagnetic Applications"
[Prof. Y. Rahmat-Samii, Advisor]

Shu-Ting Hsu: "Two-Dimensional Scanning Micromirrors for Endoscopic Optical-Coherence-Tomography Imaging"
[Prof. M. Wu, Advisor]

Min-Wook Kang: "Miniaturized MIM CRLH Transmission Line Structure and Application to Backfire-to-Endfire Leaky Wave Antenna" [Prof. T. Itoh, Advisor]

Shinta Kasai: *Comprehensive*
[Prof. H.R. Fetterman, Advisor]

Adil Kidwai: "Analog Predistortion Linearization Using an Tive CMOS Polynomial Generator" [Prof. B. Jalali, Advisor]

Taewook Kim: "Analysis of Duty Cycle Correction for High-Speed Delay Locked-Loop (DLL)" [Prof. M.C.F. Chang, Advisor]

Anthony Lai: "Theory and Design of Composite Right/Left-Handed Metamaterial-Based Microwave Lenses"

Iman Allen Lalehparvar:
Comprehensive [Prof. R. Wesel, Advisor]

Francis Lau: *Comprehensive*
[Prof. F. Paganini, Advisor]

Joo-Young Lee: "Molecular Beam Epitaxy for Nano-hetero-epitaxy and Size Dependent Hall Mobility" [Prof. K.L. Wang, Advisor]

Silu (Michelle) Lee: *Comprehensive*
[Prof. G. Pottie, Advisor]

Sherwey Alan Liang: "A Comparison between Custom Designed and Fully Synthesized Quadrature Direct Digital Frequency Synthesizers in 0.18mM CMOS"
[Prof. A.N. Willson, Advisor]

Chao-Liang Lin: *Comprehensive*
[Prof. T. Itoh, Advisor]

Ming-Ta Lin: "A Digital Equalizer for 10 GSAMPLES/S Data Link Using Parallel FIR Implemenation" [Prof. C.K.K. Yang, Advisor]

Andy Chao Yao Liu: *Comprehensive*
[Prof. R. Wesel, Advisor]

Daniel Ning Liu: *Comprehensive*
[Prof. M.P. Fitz, Advisor]

MASTER OF SCIENCE DEGREES

Xiong Liu: "A New Interpolated Timing Recovery Method"
[Prof. A.N. Willson, Advisor]

Zhang Liu: *Comprehensiv*
[F. Paganini, Advisor]

Cassio Guimaraes Lopes: *Comprehensive* [Prof. A.H. Sayed, Advisor]

Wei Lu: "Some Results on Linear and Nonlinear Plasma Wake Excitation: Theory and Simulation Verification"
[Prof. W. Mori, Advisor]

Yi Lu: "MEMS Actuated Ingaasp/INP Microring Optical Switch" [Prof. M. Wu, Advisor]

Mathieu Morris: *Comprehensive*
[Prof. A.N. Willson, Advisor]

Kwing Fei Ng: *Comprehensive*
[I. Rubin, Advisor]

Vincent Hyxuan Ngo: "Inductance of Silicon PN Junction" [Prof. D.S. Pan, Advisor]

Abdul Bashar Mohammad Nuruzzaman: "Ultra Wideband Waveform Generation and Detection Using Time Elasticity"
[Prof. B. Jalali, Advisor]

Aaron Takami Ohta: "Optical Control of Cells and Microparticles Using Direct Imaging" [Prof. M. Wu, Advisor]

Tetsuya Ono: "Nano-Scale Imaging of Swnts-Based PNA Structures by Atomic Force Microscopy" [Prof. K.L. Wang, Advisor]

Jason William Ostrander: *Comprehensive* [Prof. R. Wesel, Advisor]

Ravi Indu Patel: *Comprehensive*
[Prof. J.W. Judy, Advisor]

Anthony Marcus Petrucelli: *Comprehensive* [Prof. T. Itoh, Advisor]

Shiva Portonovo: *Comprehensive*
[Prof. E. Yablonovitch, Advisor]

Varun Raghunathan: "Raman-Based Amplification and Wavelength Conversion in Silicon Waveguides" [Prof. B. Jalali, Advisor]

Yothin Rakvongthai: *Comprehensive*
[Prof. G. Pottie, Advisor]

Natarajan Ramachandran: "Design of a High Frequency CMOS Analog FIR Filter for Memory Compensation in Predistortion Linearization" [Prof. B. Jalali, Advisor]

Subal Sahni: "Characterization of Germanium Photodetectors, Fabricated on Silicon at Low Temperatures (Less than 450 Degree Celsius) for Integrared Photonics Applications" [Prof. E. Yablonovitch, Advisor]

Daniel Joseph Salce: *Comprehensive* [Prof. M.B. Srivastava, Advisor]

Erlando P. San Miguel: *Comprehensive*
[Prof. K. Yao, Advisor]

Hohyun Shim: Joint Design of Routing, MAC, and Timing SYNC for Ultra-Low Duty Cycle Sensor Networks"
[Prof. M.B. Srivastava, Advisor]

Yen-Liang Shue: A 630-MHZ Quadrature Direct Digital Frequency Synthesizer in 0.25-mM CMOS" [Prof. A. Alwan, Advisor]

Robert Sinn: *Comprehensive*
[Prof. Y.E. Wang, Advisor]

Ryan James Speelman: "Hardware Accelerated Simulation Tool (HAST)"
[Prof. W. Kaiser, Advisor]

Chieh Sung: "Guiding of a High-Power CO_2 Laser Beam in a Hollow Waveguide"
[C. Joshi, Advisor]

King Ho Tam: *Comprehensive*
[Prof. L. He, Advisor]

Justin Tsai: *Comprehensive*
[Prof. R. Wesel, Advisor]

Chun-Ching Tsan: *Comprehensive*
[Prof. V.P. Roychowdhury, Advisor]

Chintan Pravin Turakhia: *Comprehensive* [Prof. I. Rubin, Advisor]

Michail Tzoufras: "The Role of Space Charge on the Threshold of Weibel Instability" [Prof. W. Mori, Advisor]

Chad Richard Vandenbosch: *Comprehensive* [Prof. C. Joshi, Advisor]

Daniel James Vasquez: "Wireless Zero-Power Ferromagnetic MEMS Magnetometer"
[Prof. J.W. Judy, Advisor]

Ashutosh Verma: "Multi-Processor Architecture for Low Power Wireless Sensor Networks" [Prof. W. Kaiser, Advisor]

Sridhar Sesha Vermuri: "Scheduling for Energy Aware Wireless Sensor Applications"
[Prof. G. Pottie, Advisor]

Anitha Vijayakumar: "Robust Cooperative Localization Using VOR for a Mobile Platform" [Prof. M.B. Srivastava, Advisor]

Tyan-Lin Wang: *Comprehensive*
[Prof. W. Mori, Advisor]

Xiaokai Wang: *Comprehensive*
[Prof. G. Pottie, Advisor]

Isaak John Woldeit: *Comprehensive*
[Prof. G. Pottie, Advisor]

Raymond Wong: "A Novel Resonant Based Topology for the Design of a 60GHZ Receiver in 0.13 P-CMOS"
[Prof. M.C.F. Chang, Advisor]

Hui-Chun Wu: "Performance Optimized Antenna for MIMO Communication Systems"
[Prof. Y.E. Wang, Advisor]

Winston Wu: "Medical Embedded Device for Individualized Care (MEDIC)"
[Prof. W. Kaiser, Advisor]

Chih-Wei Yao: "A 625 MHZ to 10 GHZ Clock Multiplier for Narrow Loop-Bandwidth Applications" [Prof. A.N. Willson, Advisor]

Haruhisa Yamamoto: *Comprehensive*
[Prof. W.H. Mangione-Smith, Advisor]

Alexander Caleb Yee: *Comprehensive*
[Prof. H.R. Fetterman, Advisor]

Lisa Joy Yee: *Comprehensive*
[Prof. R. Wesel, Advisor]

Onesun Yoo: "Node Localization Technique in Ad Hoc Wireless Sensor Networks Using Semidefinite Programming Relaxation"
[Prof. L. Vandenberghe, Advisor]

Hao Yu: *Comprehensive*
[Prof. L. He, Advisor]

Paulus Yulianto: *Comprehensive*
[Prof. A.V. Balakrishnan, Advisor]

Joe M. Zendejas: "MEMS-Controlled Reconfigurable Frequency Selective Surfaces"
[Prof. J.W. Judy, Advisor]

Lu Zhou: *Comprehensive*
[Prof. I. Rubin, Advisor]

Graduates 2004-2005 DOCTOR OF PHILOSPHY

Commencement, June 2005.

Aliazam Abbasfar: "Design of Turbo-Like Codes for High Speed Decoding" [Prof. K. Yao, Advisor]

Jaione Tirapu Azpiroz: "Analysis and Modeling of Photomask Near-Fields in Sub-Wavelength Deep Ultraviolet Lithgraphy" [Prof. E. Yablonovitch, Advisor]

Arash Behzad: "Impact of Power Controlled Medium Access Control on the Performance of Ad Hoc Wireless Networks" [Prof. I. Rubin, Advisor]

Young Hyun Cho: "Deep Content Inspection for High Speed Computer Networks" [Prof. W.H. Mangione-Smith, Advisor]

Katherine Andrea Comanor: "Convex Optimization Methods for Robust Classification" [Prof. L. Vandenberghe, Advisor]

Xianwen Fang: "Non-Linearity of LDMOS-Based RF Power Amplifiers for Wireless Communications" [Prof. D.S. Pan, Advisor]

Mario Furtado: "Codoped Erbium Laser Crystals" [Prof. O.M. Stafsudd, Advisor]

Yan Han: "Photonic Time-Stretched Analog-to-Digital Conversion" [Prof. B. Jalali, Advisor]

David Delchi Hwang: "System Architectures and VLSI Implementations of Secure Embedded Systems" [Prof. I. Verbauwhede, Advisor]

Thomas Jung: "Demonstration of Monolithic Optical Injection Locking for Directly Modulated RF Photonic Links" [Prof. M. Wu, Advisor]

Jaehoon Kim: "Implanted Antennas for Medical Wireless Communication: Characterizations, Designs and Performance Evaluations" [Prof. Y. Rahmat-Samii, Advisor]

Cenk Kose: "Universal Trellis Codes and Concatenated Trellis-Coded Modulations for the Compound Linear Vector Gaussian Channel" [Prof. R. Wesel, Advisor]

Gautam Kulkarni: "Physical Layer Aware Design of Network Protocols and Scheduling Algorithms in Wireless Networks" [Prof. M.B. Srivastava, Advisor]

Ming-Chang Lee: "Tunable Optical Microresonators Using Micro-Electro-Mechanical-System (MEMS) Technology" [Prof. M. Wu, Advisor]

Fei Li: "Modeling, Circuits and Architectures for Power-Efficient FPGAs" [Prof. L. He, Advisor]

Li Li: "Structured Model Reduction and Control for Interconnected Systems" [Prof. F. Paganini, Advisor]

Yue Xing Li: "Exploration of Mixed Tunneling and Avalanche Breakdown Effects on Novel Inductive Design Component" [Prof. D.S. Pan, Advisor]

Zhan Li: "Antenna Designs for Handset Applications: Multiple Antennas Integration and Interaction with the Human Head" [Prof. Y. Rahmat-Samii, Advisor]

I-Hsiang Lin: "Dual-Band Microwave Components Using Composite Right/Left-Handed Transmission Lines" [Prof. T. Itoh, Advisor]

Yin-Lung Lu: "Front-End Circuit Design for Wireless Broadband Communication System Applications" [Prof. M.C.F. Chang, Advisor]

Majeid Manteghi: "Ultra-Wideband (UWB) and Impulse Radiating Antennas (IRAS)" [Prof. Y. Rahmat-Samii, Advisor]

Sagi Varghese Mathai: "Development of a Monolithically Integrated Downconverting Balanced Electroabsorption Mixer Receiver for 1.55 Micron Analog Fiber Optic Links" [Prof. M. Wu, Advisor]

Sanjeev Srinivasa Murthy: "High-Speed, High-Power Distributed Photodetectors" [Prof. M. Wu, Advisor]

Adithyaram Narasimha: "Low Dispersion, High Spectral Efficiency, RF Photonic Transmission Systems and Low Loss Grating Couplers for Silicon-On-Insulator Nanophotonic Intergrated Circuits" [Prof. E. Yablonovitch, Advisor]

Sivatharan Natkunanathan: "Signal Classification and Identification for Wireless Integrated Networked Sensors" [Prof. G. Pottie, Advisor]

Hung Dang Nguyen: "The Development of Interdigitated Angular-Vertical-Comb-Drive Actuators for Microelectromechanical Systems (MEMS)" [Prof. M. Wu, Advisor]

Christian Oberli: "Overhead-Efficient Algorithms for Acquisition, Channel Estimation and Tracking in MIMO-OFDM Systems" [Prof. B. Daneshrad, Advisor]

Ameesh Niranjan Pandya: "On Fundamental Limits of Scalable Sensor Networks" [Prof. G. Pottie, Advisor]

Jaekwan Park: "Advanced MOSFET Structures for Deep Sub-100NM ULSI" [Prof. J.C.S. Woo, Advisor]

Jiyong Park: "Active Integrated Millimeter-Wave Front-Ends for Multimedia Wireless Communications" [Prof. T. Itoh, Advisor]

Wibool Piyawattanametha: "Surface and Bulk Micromachined Two Dimensional Angular Vertical Comb Actators Scanner for Endoscopic Ultrahigh Resolution Optical Coherence Tomograpy Imaging" [Prof. M. Wu, Advisor]

Aditya Ramamoorthy: "Generalized ACE Codes and Information Theoretic Results in Network Coding" [Prof. R. Wesel, Advisor]

Raghu Mysore Rao: "Performance Analysis of MIMO-ODFM Systems" [Prof. B. Daneshrad, Advisor]

Patrick Robert A Schaumont: "Domain-Specific Codesign for Embedded Security" [Prof. I. Verbauwhede, Advisor]

Rahul Singh: "The Design, Fabrication, and Characterization of an Ultrasonic Crack Detection System for Human Teeth" [Prof. E. Brown, Advisor]

Paulo Silveira Da Motta: "Micromachined Deep-Brain Stimulation Probe for Parkinson's Disease Research" [Prof. J.W. Judy, Advisor]

Qicheng Sun: "A 1GHZ CMOS GPRML Analog Front-End Circuit for Magnetic Recording Channel" [Prof. A. Abidi, Advisor]

Ashitosh Swarup: "Linear Quadratic Gaussian Differential Games with Different Information Patterns" [Prof. L. Vandenberghe, Advisor]

Kris J.V. Tiri: "Design for Side-Channel Attack Resistant Security ICS" [Prof. I. Verbauwhede, Advisor]

Jui-Che Tsai: "MEMS-Based Wavelength-Selective Switches" [Prof. M. Wu, Advisor]

Jingming Wang: "A Recursive Least-Squares ASIC for Broadband 8x8 Multiple-Output Wireless Communication" [Prof. B. Daneshrad, Advisor]

Zhikui Wang: "Congestion Control with Scalable Stability Analysis and Implementation" [Prof. F. Paganini, Advisor]

Len Yip: "Array Signal Processing for Source DOA Estimation and Source Localization in a Distributed Senor Network" [Prof. K. Yao, Advisor]

Waleed Younis: "Efficient Receivers for Space-Time Block-Coded Transmissions over Broadband Channels" [Prof. A.H. Sayed, Advisor]

Kyung-Wan Yu: "K-Band Receiver Front-End Using A 0.18μM CMOS Technology" [Prof. M.C.F. Chang, Advisor]

Jun Yuan: "Gate and Source/Drain Engineering for Nanoscale MOSFET Applications" [Prof. J.C.S. Woo, Advisor]

Publications

Journal Articles

Circuits & Embedded Systems

K.M. Lepak, M. Xu, J. Chen, and Lei He, "Simultaneous Shield Insertion and Net Ordering for Capacitive and Inductive Coupling Minimization," *ACM Transactions on Design Automation of Electronic Systems*, vol. 9, no. 3, pp. 290-309, July 2004.

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F. Newberg, D. McIntire, B. Schiffer, S. Valoff, and W.J. Kaiser, "A Modular Low-energy Wireless Sensing and Processing Platform with an Open Software Framework for Unattended Ground Sensor Applications," *IEEE Transactions on Consumer Electronics*, vol. 50, no. 4, pp.1222-1231, November 2004.

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A. Willson, G. Temes, and A. A. Abidi, "In Memoriam," *IEEE Transactions on Circuits and Systems I: Regular Papers*, vol. 51, no. 12, pp. 2341-2344, December 2004.

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S. Megerian, F. Koushanfar, M. Potkonjak, and M.B. Srivastava, "Worst and Best-case Coverage in Sensor Networks," *IEEE Transactions on Mobile Computing*, vol. 4, no. 1, pp. 84-92, January-February 2005.

X. Jiang, M.F. Chang, "A 1-GHz Signal Bandwidth 6-bit CMOS ADC with Power-Efficient Averaging," *IEEE Journal of Solid-State Circuits*, vol. 40, no. 2, pp. 532-535, February 2005.

K. Chong, Y.H. Xie, K.W. Yu, D. Huang, and M.F. Chang, "High-Performance Inductors Integrated on Porous Silicon," *IEEE Electron Device Letters*, vol. 26, no. 2, pp. 93-95, February 2005.

V. Raghunathan, C.L. Pereira, M.B. Srivastava, and R.K. Gupta, "Energy-aware wireless Systems with Adaptive Power-Fidelity Tradeoffs," *IEEE Transactions on Very Large Scale Integration (VLSI) Systems*, vol. 13, no. 2, pp. 211-225, February 2005.

D. Fu, and A.N. Willson, "Trigonometric Polynomial Interpolation for Timing Recovery," *IEEE Transactions on Circuits and Systems I*, vol. 52, no. 2, pp. 338-349, February 2005.

T.S. Kaplan, J.F. Jensen, C.H. Fields, and M.F. Chang, "A 2-GS/s 3-bit Delta Sigma-Modulated DAC with Tunable Bandpass Mismatch Shaping," *IEEE Journal of Solid-State Circuits*, vol. 40, no. 3, pp. 603-610, March 2005.

J. Xiong and L. He, "Extended Global Routing with RLC Crosstalk Constraints," *IEEE Transactions on Very Large Scale Integration (VLSI) Systems*, vol. 13, no. 3, pp. 319-329, March 2005.

T.-C. Hu, M.F. Chang, N. Weimann, J. Chen, and Y.-K. Chen, "Surface Roughness in Sulfur Ion-Implanted InP with Molecular Beam Epitaxy Regrown Double-Heterojunction Bipolar Transistor Layers," *Applied Physics Letters*, vol. 86, pp. 143508/1-3, April 2005.

G. Memik and W.H. Mangione-Smith, "Precise Instruction Scheduling," *Journal of Instruction-Level Paralellism*, vol. 7, April 2005.

S. Zhou and M.F. Chang, "A CMOS Passive Mixer with Low Flicker Noise for Low-Power Direct-Conversion Receiver," *IEEE Journal of Solid-State Circuits*, vol. 40, no. 5, pp. 1084-1093, May 2005.

E. Grayver, J.F. Frigon, A.M. Eltawil, A. Tarighat, K. Shoarinejad, A. Abbasfar, D. Cabric, and B. Daneshrad, "Design and VLSI Implementation for a WCDMA Multipath Searcher," *IEEE Transactions on Vehicular Technology*, vol. 54, no. 3, pp, 889-902, May 2005.

D. Cabric, A.M. Eltawil, H. Zou, S. Mohan, and B. Daneshrad, "Wireless Field Trial Results of a High Hopping Rate FHSS-FSK Testbed," *IEEE Journal on Selected Areas in Communications*, vol. 23, no. 5, pp. 1113-1122, May 2005.

L. He, A.B. Kahng, K.H. Tam, and J. Xiong, "Design of Integrated-circuit Interconnects with Accurate Modeling of Chemical-Mechanical Planarization," *Proc. SPIE*, vol. 5756, pp. 109-119, May 2005.

J. Chen and L. He, "Piecewise Linear Model for Transmission Line with Capacitive Loading and Ramp Input," *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems*, vol. 24, no. 6, pp. 928-937, June 2005.

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F. Xu, G. Zhong, and A.N. Willson, Jr., "Analysis and VLSI Realization of a Blind Beamforming Algorithm," *Journal of VLSI Signal Processing,* vol. 40, no. 2, pp. 159-174, June 2005.

Physical Electronics

S.K. Kim, K. Geary, W. Yuan, H.R. Fetterman, et al., "Stress-Induced Polymer Waveguides Operating at Both 1.31 and 1.55 mu μm Wavelengths," *Electronics Letters*, vol. 40, no. 14, pp. 866-868, 8 July 2004.

V. Raghunathan, R. Claps, D. Dimitro-poulos, and B. Jalali, "Wavelength Conversion in Silicon Using Raman Induced Four-wave Mixing," *Applied Physics Letters*, vol. 85, pp.34-36, 5 July 2004.

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J.-A. Paik, S-K. Fan, H. Chang, C-J. Kim, M.C. Wu, and B. Dunn, "Development of Spin Coated Mesoporous Oxide Films for MEMS Structures," *Journal of Electroceramics*, vol. 13, no. 1-3, pp.423-429, July 2004.

P. Muggli, B.E. Blue, C.E. Clayton, S. Deng, F.-J. Decker, M.J. Hogan, C. Huang, R. Iverson, C. Joshi, T.C. Katsouleas, S. Lee, W. Lu, K.A. Marsh, W.B. Mori, et al., "Meter-Sacle Plasma-Wakefield Accelerator Driven by a Matched Electron Beam," *Physical Review Letters*, vol. 93, no.1, pp. 014802/1-4, 2 July 2004.

Y. Zhang, F.A. Baron, K.L. Wang, and Z. Krivokapic, "Complimentary Single-electron/Hole Action of Nanoscale SOI CMOS Transistors.," *IEEE Electron Device Letters*, vol. 25, no. 7, pp.492-494, July 2004.

S. Tong, F. Liu, A.Khitun , K.L. Wang, and J.L. Liu, "Tunable Normal Incidence Ge Quantum Dot Mid-infrared Detectors," *Journal of Applied Physics*, vol. 96, no. 1, pp.773-776, 1 July 2004.

S.S. Suryagandh, M. Garg, and J.C.S. Woo, "A Device Design Methodology for Sub-100-nm SOC Applications Using Bulk and SOI MOSFETs," *IEEE Transactions on Electron Devices*, vol. 51, no. 7, pp. 1122-1128, July 2004.

Journal Articles

Circuits & Embedded Systems

K.M. Lepak, M. Xu, J. Chen, and Lei He, "Simultaneous Shield Insertion and Net Ordering for Capacitive and Inductive Coupling Minimization," *ACM Transactions on Design Automation of Electronic Systems*, vol. 9, no. 3, pp. 290-309, July 2004.

M. Badaroglu, G. Van der Plas, P. Wambacq, I. Balasubramanian, K. Tiri, I. Verbauwhede, et al., "Digital Circuit Capacitance and Switching Analysis for Ground Bounce in ICs with a High-ohmic Substrate," *IEEE Journal of Solid-State Circuits*, vol. 39, no.7, pp. 1119-1130, July 2004.

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T-H. Lin, W.J. Kaiser, and G.J. Pottie, "Integrated Low-power Communication System Design for Wireless Sensor Networks," *IEEE Communications Magazine*, vol.42, no.12, pp.142-50, December 2004.

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X. Jiang, M.F. Chang, "A 1-GHz Signal Bandwidth 6-bit CMOS ADC with Power-Efficient Averaging," *IEEE Journal of Solid-State Circuits*, vol. 40, no. 2, pp. 532-535, February 2005.

K. Chong, Y.H. Xie, K.W. Yu, D. Huang, and M.F. Chang, "High-Performance Inductors Integrated on Porous Silicon," *IEEE Electron Device Letters*, vol. 26, no. 2, pp. 93-95, February 2005.

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D. Fu, and A.N. Willson, "Trigonometric Polynomial Interpolation for Timing Recovery," *IEEE Transactions on Circuits and Systems I*, vol. 52, no. 2, pp. 338-349, February 2005.

T.S. Kaplan, J.F. Jensen, C.H. Fields, and M.F. Chang, "A 2-GS/s 3-bit Delta Sigma-Modulated DAC with Tunable Bandpass Mismatch Shaping," *IEEE Journal of Solid-State Circuits*, vol. 40, no. 3, pp. 603-610, March 2005.

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T.-C. Hu, M.F. Chang, N. Weimann, J. Chen, and Y.-K. Chen, "Surface Roughness in Sulfur Ion-Implanted InP with Molecular Beam Epitaxy Regrown Double-Heterojunction Bipolar Transistor Layers," *Applied Physics Letters*, vol. 86, pp. 143508/1-3, April 2005.

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E. Grayver, J.F. Frigon, A.M. Eltawil, A. Tarighat, K. Shoarinejad, A. Abbasfar, D. Cabric, and B. Daneshrad, "Design and VLSI Implementation for a WCDMA Multipath Searcher," *IEEE Transactions on Vehicular Technology*, vol. 54, no. 3, pp, 889-902, May 2005.

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The Department gratefully acknowledges the UC Atkinson Archives
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Annual Research Review, Fall 2004

The EE Annual Research Review is traditionally a day of intensive review of the latest cutting-edge technology researched and developed by our faculty, post-doctorates and researchers, and graduate students. It also provides excellent opportunities to network with faculty, graduate students, industry, and government representatives.

Michael P. Fitz, Chairman of the 2004 Annual Research Review.

This past year's Research Review offered several parallel sessions representing the UCLA EE areas (circuits and systems, physical electronics, and signals and systems), and a poster session with over 50 contributors. As always, the event was well attended by local industry representatives.

The Plenary session featured Professors K.L. Wang, Alwan Abeer, and William J. Kaiser giving overviews of the latest developments in at FENA, in the Networked Infomechanical Systems program, and in speech processing research in the Speech Processing and Auditory Perception Laboratory.

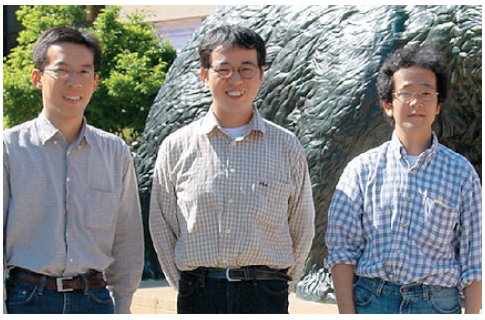
The guest speaker for the evening banquet was Dr. Firouz Michael Naderi, manager of NASA's Mars Exploration Program. His talk on "Six Intense Minutes and a Lifetime of Memories: The Landing of NASA's Mars Exploration Rovers" highlighted the engineering complexities and the human drama of the MER mission, with special focus on the six minutes of entry into the Martian space, descent throu the Martian thin atomosphere, and the bounced landing on its surface.

From left to right: HSSEAS Dean, Vijay Dhir, ARR Guest Speaker Dr. Firouz Michael Naderi, and former EE Dept. Chairman Yahya Rahmat-Samii at the ARR evening banquet.

Industrial Affiliates Program

The Department has a close relationship with industry, in which both the school and the companies involved benefit from the exchange of information and talent. Much of our research is funded by grants or contracts with industry, and the result of this collaboration has impacted the quality and diversity of the programs of study and has contributed significantly to the direction of research and development in the private sector.

A company's participation in the Industrial Affiliate Program provides essential program enhancement and aid to Electrical Engineering students, with a portion of the funds held in reserve for laboratory, instructional, and other equipment needs. More details are available at the Industrial Affiliates Program website, http://www.ee.ucla.edu/~iap.



IAP Fellows Koji Takinami with Matsushita/Panasonic (Prof. Abidi, faculty liason), Kimikazu Sano with NTT (Prof. Jalali, faculty liason), and Koji Fujii with NTT (Prof. Srivastava, faculty liason).

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