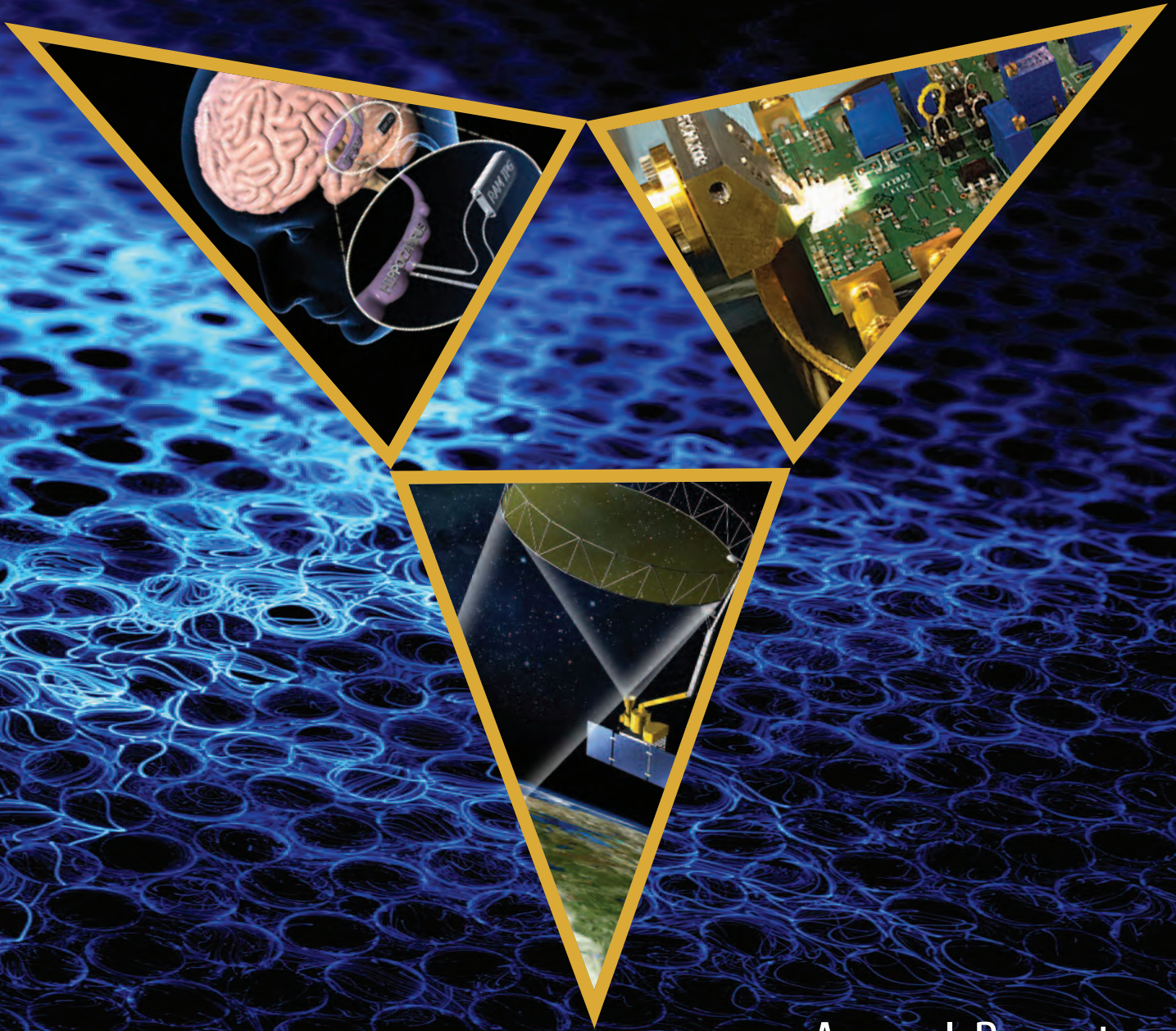


UCLA

Henry Samueli School of Engineering and Applied Science

Electrical Engineering



Annual Report
2013-2014

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Message from the Chairman

Professor M. -C. Frank Chang

I am pleased to share with you highlights of our activities for academic year 2013-2014. Our faculty, students, and alumni continue to push innovation by developing state-of-the-art technology while making a positive impact on society and giving back to the electrical engineering community and beyond.

The legacy of our department is carried on by distinguished alumni. Two of our alums were recently recognized for their contributions in both academia and industry — Dr. Dariush Divsalar (Ph.D. 1978) received the IEEE Alexander Graham Bell Medal “for fundamental contributions to the theory and practice of channel codes that transformed deep space and other forms of wireless communications”. Broadcom Co-Founder Dr. Henry T. Nicholas, III (B.S. 1982, M.S. 1985, Ph.D. 1998) received the 2014 IEEE Frederik Philips Award for “exemplary leadership and entrepreneurial vision in the commercialization of communications semiconductors that enable ubiquitous broadband connectivity”.

Our faculty also received various recognitions from professional societies and academies. Among those, Distinguished Professors Chan Joshi and Alan Willson were elected to the National Academy of Engineering — the highest professional distinction accorded to an engineer in the United States. Professor Stanley Osher was awarded the Gauss Prize, the highest honor in applied mathematics awarded every four years. Professor Ali Sayed received the EURASIP Athanasios Papoulis Award for his contributions to signal processing education. Three professors were elevated to the status of Fellow by international societies: Suhas Diggavi (IEEE), Aydogan Ozcan (OSA; SPIE), and Bahram Jalali (SPIE). For his illustrious career and contributions to UCLA Electrical Engineering, Professor Tatsuo Itoh was honored with a special departmental symposium in May 2014.

Additionally, Associate Professor Mona Jarrahi received the 2013 Presidential Early Career Award for Scientists and Engineers (PECASE). Assistant Pro-

fessor Rob Candler was awarded the National Science Foundation’s CAREER Award, the federal agency’s most prestigious award in support of junior faculty. Professor John Villasenor was named a member of the Council on Foreign Relations (CFR), the non-profit organization specializing in foreign policy and international affairs, and Professor Diana Huffaker was named a Distinguished Lecturer by IEEE.

Highlights in research include a US\$15 million DARPA-funded collaboration between Professors Dejan Markovic, Ali Sayed and colleagues from the UCLA David Geffen School of Medicine to develop a wireless, implantable brain device to restore memory function. This innovative device stands to improve the quality of life for both civilians and military personnel. Professor Yahya Rahmat-Samii’s recent antenna research has contributed to space missions since 2001 and are part of NASA’s upcoming RapidScat and SMAP missions.

Our pursuit of excellence and innovation is made possible only with the support of our friends, sponsors, and industrial partners. David Mong (B.S. 1984) donated US\$5 million towards the building of Engineering VI, which will house facilities for research and administration as well as the Dr. William M.W. Mong Memorial Learning Center named in honor of Mong’s father. Professor

Oscar Stafsudd and his wife Jacquie have pledged a portion of their estate to establish the Jacqueline Stafsudd and Oscar M. Stafsudd, Jr. Fund to provide student scholarships and projects. Qualcomm and MediaTek USA Inc. both established two fellowships each for doctoral students to conduct novel research, as part of the department’s Fellow-Mentor-Advisor framework, and five student fellows were selected for the second year of the Broadcom Foundation Integrated Circuits Fellowship Program.

To all of our friends, alumni, collaborators and customers in industry, government and academia — we offer our deepest gratitude for your continuous support and guidance.



Alumnus David Mong Makes Largest Single Gift from Asia to UCLA

UCLA HSEAS receives US\$5 Million for new building Engineering VI

The UCLA Henry Samueli School of Engineering and Applied Science has received a US\$5 million gift from Hong Kong-based philanthropist and businessman David Mong. The gift, the largest single donation UCLA ever has received from Asia or from an alumnus based outside of the U.S., supports construction of the Engineering VI building, which, when complete, will be the school's new 150,000 square-foot anchor for engineering innovation.

In recognition of the gift, a 250-seat facility within Engineering VI will be named the Dr. William M. W. Mong Memorial Learning Center. The name is in honor of Mong's father, a leader in education, public service and international relations and the founder of Hong Kong-based Shun Hing Group.



"UCLA Engineering has embarked on a major upgrade to our educational and research facilities, and David Mong's extraordinary contribution will play a critical role in educating generations of UCLA engineers,"

David Mong contributed to Engineering VI, currently under construction

said Vijay K. Dhir, Dean of UCLA Engineering. "It is wonderful to have dedicated alumni such as Mr. Mong invest in the future of the school that gave them their starts."

"As a UCLA Engineering alumnus, I am pleased to support the construction of the Dr. William M. W. Mong Memorial Learning Center within Engineering VI," David Mong said. "We hope that in the years and decades ahead, Dr. Mong's legacy will continue to impact lives for the better—far and wide."

In addition to the learning center, the building will house three federally funded centers in the fields of nanoelectronics and sustainable energy; state-of-the-art laboratories for research into new materials for use in industrial and commercial applications; information science and technology labs; faculty and administrative offices; and the entrepreneurial arm of the engineering school, the Institute for Technology Advancement.

Work on the \$130 million project—which also has received financial support from other private donors and the Department of Commerce's National Institute of Standards and Technology—began in 2012. The first phase of construction is scheduled for completion in 2015. The second phase, which will incorporate the Dr. William M. W. Mong Memorial Learning Center, is in the planning stages.

David Mong, who received his bachelor's degree in Electrical Engineering from UCLA in 1984, is vice chairman of the Shun Hing Group. Founded by William Mong in 1953, the Shun Hing Group started as the authorized distributor in Hong Kong and Macau of electronic products made by Panasonic. Shun Hing was an early champion of the use of electrical goods to ease the traditional burdens of domestic life in Hong Kong, and became famous for helping to develop and market rice cookers sold in Asia and around the world. The firm also has an active charitable arm, the Shun Hing Education and Charity Fund.

"We owe our very existence to the communities that sustain our business and we never forget that social responsibility is a cornerstone of our corporate responsibilities," David Mong said.

—by Bill Kisliuk



Professor Stafsudd Donates US\$1 Million for Electrical Engineering Undergraduates

Professor Oscar M. Stafsudd is a true Bruin with blue and gold running through his veins. UCLA is his second home, where he received his bachelor's and master's degrees in physics in 1959 and 1961, respectively, and his doctorate degree in physics with a specialization in spectroscopy in 1967. In March 1967, he was appointed assistant professor at the Electrical Engineering Division. In 1972, Professor Stafsudd was promoted to associate professor and in 1980, to full professor.

Early in his career, he had a fascination for crystal growth and lasers. He delved into research to develop new kinds of lasers and laser materials. Interests in solid state physics (semi-conductors) led to research on low-cost efficient solar cells and infrared detector systems. His current research, in collaboration with Professor Warren Grundfest, is in the area of biomedical imaging utilizing new technologies in fast temporal fluorescence and real-time Raman imaging.

Students call Professor Stafsudd a walking encyclopedia with interesting stories. He has a strong memory for just about anything from movies, travel, general facts, history, and of course, his love for fast cars.

Professor Stafsudd began his technical career working as a research physicist for the Rockwell Science Center and later Hughes Research Laboratories where his wife, Jacquie, joined him. Jacquie is a Bruin too, getting her bachelor's degree in physics where the two of them first met.

In the spirit of gratitude, Professor Stafsudd and Jacquie signed a deed pledging 25% of the residual from their estate to the Jacqueline Stafsudd and Oscar M. Stafsudd, Jr. Fund in the UCLA Henry Samueli School of Engineering and Applied Science. The fund is intended to play a vital role in supporting undergraduate scholarships and research at the discretion of the chair of the Electrical Engineering Department. The current value of

the pledged asset is at least US\$1 million.

"We are grateful for the opportunities that have been given to us and our children by UCLA—the excellent education that has made possible our successful technical careers. This is our way of expressing our gratitude," shares Professor Stafsudd. "Our hope is that others who have also been blessed by their association with UCLA will consider supporting this school."

At a recent conference the couple attended, they were asked to share their passion in life. When Professor Stafsudd's turn came, he answered, "My school." This simple statement comes clearly from a deep devotion and love for an institution, for a second home, which has sheltered him and has been a witness to his life. It is a noble gesture to offer back the richness of one's life to help nurture future generations.

Thank you Professor and Mrs. Stafsudd for a transformative gift that will definitely impact more Bruin families of blue and gold!

Professor Oscar Stafsudd and his wife Jacquie have pledged 25% of their estate to undergraduate research and scholarships



Alumnus Dariush Divsalar Receives IEEE Alexander Graham Bell Medal

Dariush Divsalar's contributions have led to many inventions in communications

Adjunct Professor Dariush Divsalar is the 2014 IEEE Alexander Graham Bell Medal recipient for fundamental contributions to the theory and practice of channel codes that transformed deep space and other forms of wireless communications. Since 2010, he has renewed his research collaboration with UCLA Electrical Engineering, including Professor Richard Wesel, Professor Lara Dolecek, and their students. These research collaborations have been very fruitful and produced many contributions to the field of coding and communications. The results were published in many IEEE journal and conference papers in recent years.

Professor Divsalar received the Ph.D. degree in electrical engineering from UCLA in 1978. Professor Divsalar's innovative contributions to communications systems have provided advancements leading to more reliable and efficient transmission and reception of data for wireless networks and deep space communications. Professor Divsalar's channel coding innovations have led to state-of-the-art technology and represent the most advanced high-performance coding schemes standardized for space communications today.

Channel codes are used to protect data transmission and storage in the presence of errors. Perhaps best known for his work on understanding turbo codes, which were the first practical codes to closely approach channel capacity, Professor Divsalar optimized and standardized turbo codes for space applications. He also co-invented a new class of protograph-based low-density parity-check (LDPC) codes for efficient information transfer over noisy channels. Known as Accumulate Repeat Accumulate codes, the technique is based on accumulators, puncturing, and a precoder to further improve performance. These new codes are themselves an enhanced version of Repeat Accumulate codes previously co-invented by Professor Divsalar. These new protograph-based LDPC codes have become Consultative Committee for Space Data Systems (CCSDS) international standards and are being used in NASA missions.

Professor Divsalar also co-invented multiple symbol differential detection, and trellis coded modulation schemes for interleaved fading channels. He contributed

significantly to bandwidth-efficient coded modulation, with work that paved the way to trellis coded modulation design for wireless fading channels that became the basis of the modern approach of bit-interleaved coded modulation. This is an integral component of today's WiFi and 4G wireless systems.

Divsalar also co-invented the parallel partial interference cancellation scheme for multiuser systems, analyzed it, and showed its superiority in improving code division multiple access (CDMA), which was an important building block of multiple access communications systems. Professor Divsalar's latest discoveries are impacting the use of wireless, deep space, and free-space optical communications for high-speed data links.

A recipient of the NASA Exceptional Engineering Achievement Medal (1996), Professor Divsalar is currently a senior research scientist with the Jet Propulsion Laboratory in Pasadena, where he has been involved with developing state-of-the-art technology for advanced deep-space communications systems and future NASA space exploration since 1978.

Starting in 1986, he has taught graduate courses in communications and

coding at Electrical Engineering Departments at UCLA and at California Institute of Technology. Professor Divsalar has published more than 250 papers, co-authored the book *An Introduction to Trellis Coded Modulation with Applications*, contributed to three other books, and holds 22 U.S. patents. The IEEE Communication Society selected one of his papers for inclusion in the book *The Best of the Best: Fifty Years of Communications and Networking Research*, containing the best 56 key research papers ever published in the Society's 50-year history.

Professor Divsalar was a co-recipient of the 1988 Best Paper Award of the IEEE Transactions on Vehicular Technology. He was also a co-recipient of the joint paper award of the IEEE Information Theory and IEEE Communication Theory societies in 2008. He has received over 50 NASA Tech Brief awards for his innovations. He became a Fellow of IEEE in 1997 for contributions to the analysis and design of coding and modulation techniques for satellite, mobile, and deep-space communication systems.



Alumnus Henry T. Nicholas, III Receives 2014 IEEE Frederik Philips Award

Broadcom co-founder recognized for leadership and commercializing system-on-chip

The creativity, vision, and technical expertise of Henry T. Nicholas, III drove one of the most successful innovators of communications semiconductor technology to bring broadband connectivity to the masses. The IEEE selected Dr. Nicholas for the 2014 Frederik Philips Award “for exemplary leadership and entrepreneurial vision in the commercialization of communications semiconductors that enable ubiquitous broadband connectivity.”

Working out of a spare room in his apartment with a \$5,000 investment, Dr. Nicholas co-founded Broadcom Corporation with Professor Henry Samueli in 1991. Under Dr. Nicholas’ direction, Broadcom pioneered the broadband communications semiconductor industry by being the first to introduce semiconductor solutions for broadband access over cable TV networks. He created and drove an environment that thrived on and rewarded invention, resulting in products such as Gigabit Ethernet, 802.11g WiFi, and digital cable modems. Broadcom is a world leader in offering integrated circuit system solutions, with annual revenues of over US\$8 billion. According to company estimates, 99.98% of Internet traffic today crosses at least one Broadcom chip.

“I have known Nick for over 30 years, first as a colleague when we both worked at TRW, then as a graduate student when I served as his Ph.D. thesis advisor, and then as a partner when we founded Broadcom,” says Professor Samueli. “As President and CEO of Broadcom, Nick grew the company from a two-person startup to become one of the fastest growing semiconductor companies in history.”

Henry T. Nicholas, III received a Bachelor of Science degree in Electrical Engineering from UCLA, after attending the United States Air Force Academy in Colorado. Nicholas also earned his Master’s and Ph.D. degrees in Electrical Engineering from UCLA. His doctoral dissertation

on “Architectures, Optimization Techniques, and VLSI Implementations for Direct Digital Frequency Synthesizers” became the basis for the development of the chip that launched Broadcom.

After graduating from UCLA in 1987, Dr. Nicholas worked at TRW, where he met Professor Henry Samueli. Nicholas later moved to PairGain Technologies as director of Microelectronics, before starting Broadcom Corporation with Professor Samueli.

“Nick had a unique talent to draw out the very best in the people who worked for him. He has an amazing breadth of skills and had a deep understanding of every aspect of Broadcom’s business including the technology issues, the financial issues, the marketing and sales issues, and the manufacturing issues,” adds Professor Samueli. “Nick is one of the most driven individuals I have

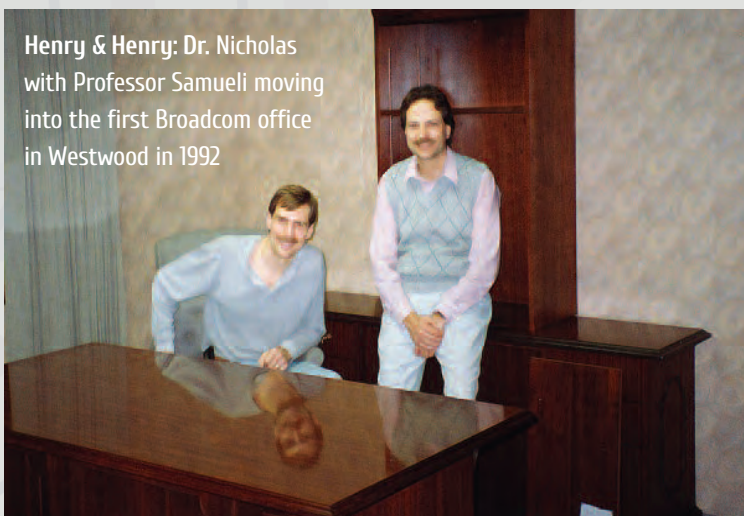
ever met. He is indeed a force to be reckoned with. Congratulations on this well-deserved award.”

An IEEE Member, Dr. Nicholas is now retired from Broadcom. In 2006, he founded The Henry T. Nicholas, III Foundation to improve the quality of life through investments in victim’s rights, education, youth sports, technology, medical research, and national defense.

— by Henry Samueli / IEEE



Henry & Henry: Dr. Nicholas with Professor Samueli moving into the first Broadcom office in Westwood in 1992



Professors Joshi and Willson Elected to National Academy of Engineering

Two faculty members from the UCLA Henry Samueli School of Engineering and Applied Science elected to the National Academy of Engineering, among the highest professional distinctions that can be awarded to engineers in the U.S.

Chandrashekhhar Joshi, distinguished professor of electrical engineering, and **Alan N. Willson, Jr.**, distinguished professor emeritus of electrical engineering and holder of the Charles P. Reames Chair in Electrical Engineering, were among 67 new members elected to the NAE for their outstanding contributions to engineering research, practice or education.

Chandrashekhhar Joshi was recognized by the academy for “contributions to the development of laser and beam-driven plasma accelerators.” Joshi is known as the founder of the experimental field of plasma accelerators. At UCLA in the 1980s, he established the first group that proposed



to significantly shrink the size and cost of particle accelerators by using charged density waves in plasmas (or ionized gas) using powerful laser pulses or particle beams.

Joshi’s UCLA group remains at the forefront of its field, and the lab has nurtured many students and researchers who have gone on to form their own research teams. In addition to

plasma accelerators, Joshi has advanced the understanding of nonlinear optics of plasmas, laser fusion and basic plasma physics.

“This is a great honor,” Joshi said. “I have been fortunate to have spent my research career at UCLA with supportive colleagues and staff and to have had continuous support from the Department of Energy. I have worked with many generations of brilliant students and researchers whose effort is being recognized by this election to the National Academy of Engineering.”

Joshi has received numerous previous awards for his work, including the American Physical Society’s James Clerk Maxwell Prize and Excellence in Plasma Physics Award, the IEEE’s Particle Accelerator Science and Technology Award, the USPAS Prize for Accelerator Physics and Technology, and the AAC Prize for Advanced Accelerator Concepts. He is a fellow of the American Physical Society, IEEE and the Institute of Physics. He is also the recipient of the Distinguished Engineering Educator Award from the Engineers’ Council.

Alan N. Willson, Jr. was recognized by the academy for “contributions to the theory and applications of digital signal processing.” Among other accomplishments, Willson has played an important role in the field of circuits and systems. He and his students have been



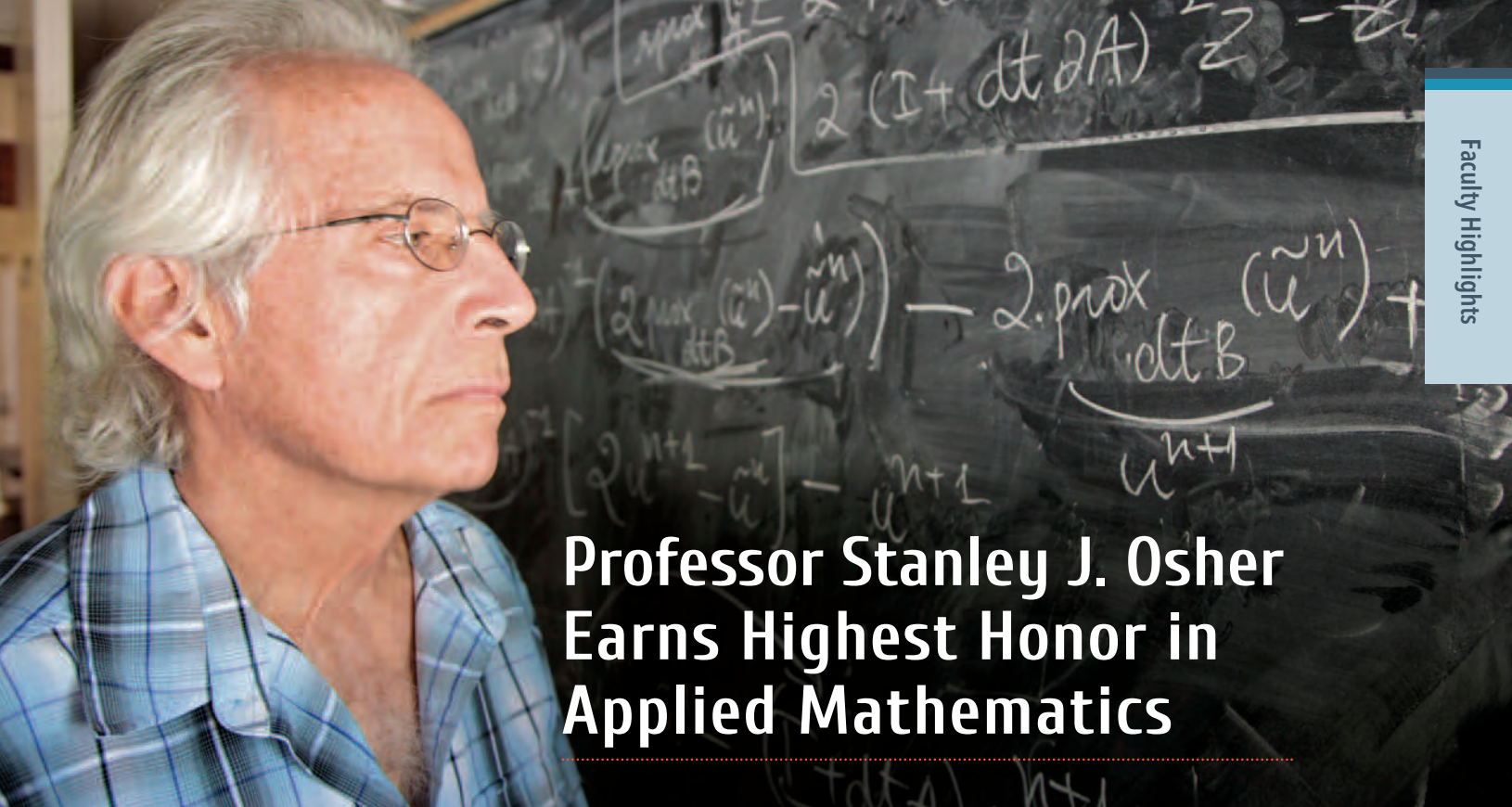
responsible for cutting-edge research in theory and application of digital signal processing (including very large scale integration, or VLSI, implementations), digital filter design and nonlinear circuit theory.

Willson received his Ph.D. in electrical engineering from Syracuse University in 1967. He worked first for IBM and then at Bell Laboratories before joining the UCLA faculty in 1973. He was named full professor in 1976 and, while continuing his teaching and research, served as the School of Engineering’s assistant dean for graduate studies from 1977 to 1981 and associate dean from 1987 to 2001.

He retired from full-time teaching last year but is continuing his affiliation with UCLA through a three-year appointment as research professor.

Among the many notable honors Willson has received are the Vitold Belevitch Award from the IEEE Circuits and Systems Society, the IEEE Leon K. Kirchmayer Graduate Teaching Award, and the George Westinghouse Award from the American Society for Engineering Education. He is the only person to have twice received the W.R.G. Baker Prize Paper Award for best paper published in all IEEE journals, transactions and magazines. He holds numerous patents through his company Pentomics, and has contributed valuable technology to industrial clients.

— by Matthew Chin and Bill Kisliuk



Professor Stanley J. Osher Earns Highest Honor in Applied Mathematics

Stanley J. Osher, UCLA professor at Electrical Engineering, Mathematics and former director of Applied Mathematics, is the third person ever to be awarded the prestigious Gauss Prize, the highest honor in applied mathematics.

A UCLA professor since 1977, Osher received the award during the opening ceremony of the International Congress of Mathematicians in Seoul, South Korea. The prize, named for 19th century mathematician Carl Friedrich Gauss, was first awarded at the 2006 congress. (The event is held every four years.)

The citation honoring Professor Osher mentions that his “influential contributions to several fields in applied mathematics and his far-ranging inventions have changed our conception of physical, perceptual, and mathematical concepts, giving us new tools to comprehend the world.”

Professor Osher pioneered in a wide range of fields and the mathematical techniques that have been highly influential. The results of his research have improved MRI scans and medical image analysis, advanced computer chip design, helped law enforcement agencies combat crime, enhanced computer vision, provided new ways to forecast weather and identify the source of earthquakes, and even revolutionized computer modeling for the design of supersonic jets.

“I am truly honored to have been awarded the third Carl Friedrich Gauss prize,” Osher said. “The previous winners were two of my scientific heroes. I am grateful to the UCLA administration and to my colleagues in the mathematics department for their support in building up applied mathematics, and to many of my colleagues outside of the department for the incredibly pleasant

interdisciplinary research atmosphere that exists here.”

“I’d also like to thank my sister, Sondra Jaffe, for convincing me that we could both join the middle class by becoming mathematicians in the post-Sputnik era.”

Osher has created innovative numerical methods to solve partial differential equations, and analyzed algorithms and their underlying partial differential equations. He also produced a new method for accurately describing how objects change shapes — predicting how, for example, a drop of oil floating in water will morph based on currents in the water, including what would happen if the drop of oil divided in two or merged with another drop of oil.

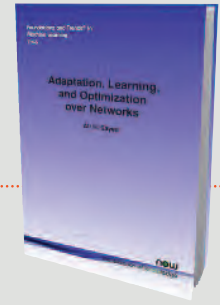
The recipient of many previous awards, Osher was elected in 2005 to the National Academy of Sciences, and in 2009 to the American Academy of Arts and Sciences. He has been an Alfred P. Sloan Fellow and a Fulbright Fellow, and was selected to give a plenary address at the 2010 International Conference of Mathematicians and the John von Neumann Lecture at the 2013 meeting of the Society for Industrial and Applied Mathematics.

Professor Osher was among the top 1 percent of the most frequently cited scholars in both mathematics and computer science between 2002 and 2012. His research was the subject of the three-day “Osher Fests” at UCLA in 2002 and 2012.

Osher also is the director of special projects at UCLA’s NSF-funded Institute for Pure and Applied Mathematics, where he has organized and participated in numerous workshops and programs. He has said of his own research, “I write the algorithms that make the computers sing. I’m the Barry Manilow of mathematics.”

— by Stuart Wolpert

Professor Ali H. Sayed Receives Multiple Recognitions



Professor Ali H. Sayed, who directs the UCLA Adaptive Systems Laboratory (www.ee.ucla.edu/asl), continues to garner outstanding recognitions from various societies for his research and educational accomplishments. An accomplished researcher and a prolific author, he is the author or co-author of six books and over 440 scholarly publications. He is recognized internationally for his leadership in the broad area of statistical signal processing. His research involves several areas of inquiry including adaptation and learning, network science,

in Electrical Engineering to receive this recognition; the other two are Professors Tatsuo Itoh and Stanley Osher. Researchers on the list have published influential articles that are ranked among the top one percent of the most cited works in their fields, earning them the mark of exceptional impact. The study assessed papers indexed between 2002 and 2012.

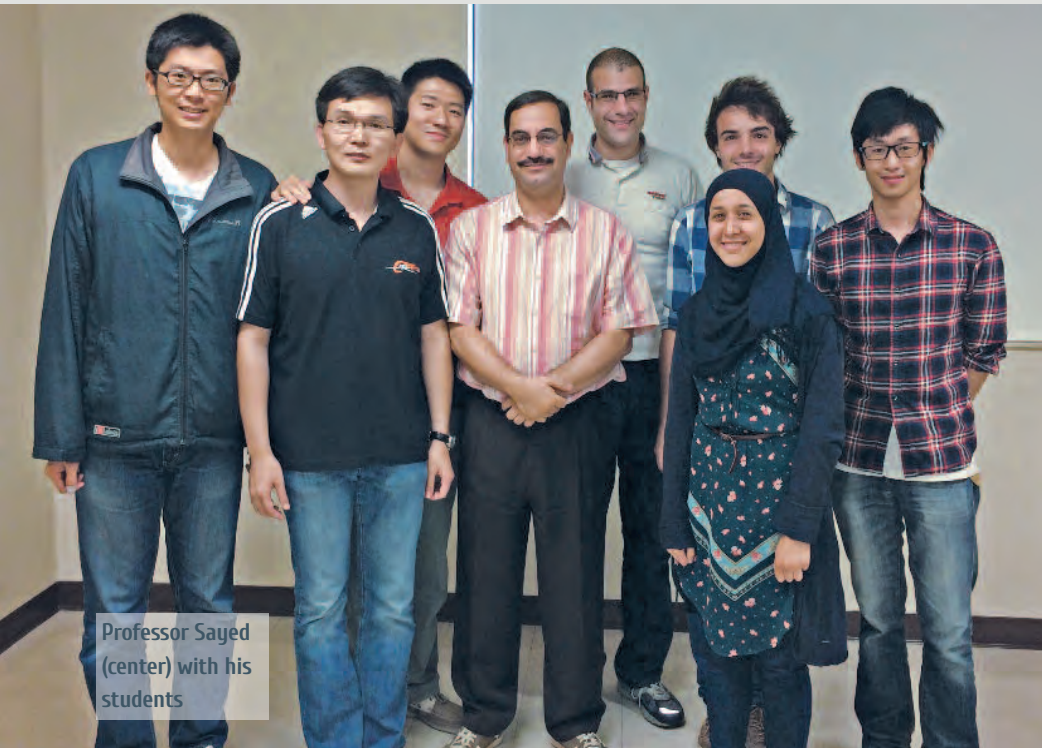
In 2014, he was also awarded the Athanasios Papoulis Award from the European Association for Signal Processing for his “fundamental contributions to the advancement of research and education in adaptive and statistical signal processing.” The award honors scientists whose work has had a major impact on signal processing education.

In 2013, he was awarded the Meritorious Service Award from the IEEE Signal Processing Society for his “exemplary service to and leadership in the Signal Processing Society.” Despite an active research schedule, Professor Sayed has been diligent in serving the Signal Processing community in various capacities. Among other roles, he served as Editor-in-Chief of the *IEEE Transactions on Signal Processing* (2003–2005), General Chairman of ICASSP 2008, and Vice-President of Publications of the IEEE Signal Processing Society (2009–2011). He also served as member of the Board of Governors (2007–2011), Awards Board (2005), Publications Board (2003–2005), Conference Board (2007–2011), Technical Directions Board (2008–2009), and Long Range Planning Committee (2007–2009) of the same society.

Professor Sayed’s work has been recognized with several other recent awards including the 2013–2015 Leverhulme Visiting Professorship Award (United Kingdom) and the 2012 Technical Achievement Award from the IEEE Signal Processing Society for his “fundamental contributions to adaptive and statistical signal processing.” He was also elevated in 2012 to the grade of Fellow by the American Association for the Advancement of Science (AAAS), publisher of the journal *Science*. He has also been awarded several Best Paper Awards from IEEE, including most recently in 2012.

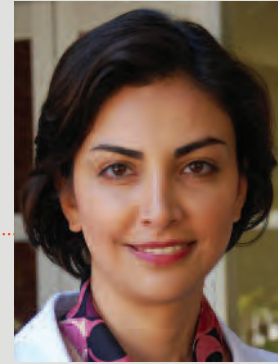
information processing theories, and biologically-inspired designs. He has published authoritative textbooks on the subject of adaptation and learning, which are now used as references at many institutions worldwide: *Fundamentals of Adaptive Filtering* (2003) and *Adaptive Filters* (2008). The first textbook was recognized for its quality and awarded the 2005 Terman Award by the American Society of Engineering Education. He has also recently published the monograph *Adaptation, Learning, and Optimization over Networks* (2014).

In 2014, Sayed was recognized by Thomson Reuters as a Highly Cited Researcher, one of three faculty members



Professor Sayed (center) with his students

Professor Mona Jarrahi Receives Presidential Early Career Award



Associate Professor Mona Jarrahi received the 2013 Presidential Early Career Award for Scientists and Engineers (PECASE). This is the highest recognition presented by the President of the United States to young scientists in the early stages of their independent research careers for their exceptional achievements in their research which keeps the country in the forefront of science and technology in the global arena.

PECASE was established by President Bill Clinton in 1996 and is organized by the Office of Science and Technology Policy within the Executive Office of the President. Awardees are selected for their pursuit of innovative research at the frontiers of science and technology and their commitment to community service as demonstrated through scientific leadership, public education or community outreach.

“The impressive achievements of these early-stage scientists and engineers are promising indicators of even greater successes ahead,” President Obama said in announcing the awards. “We are grateful for their commitment to generating the scientific and technical advancements that will ensure America’s global leadership for many years to come.”

Professor Jarrahi’s research focuses on ultrafast electronic

and optoelectronic devices and integrated systems for terahertz/millimeter-wave sensing, imaging, computing, and communication systems by utilizing novel materials, nanostructures, quantum well structures, electromechanical structures, as well as innovative nano-plasmonic concepts. The pioneering research conducted by Professor Jarrahi and her outstanding achievements have received significant attention from scientific and industrial communities, and have been recognized by numerous prestigious awards including the Early Career Award in Nanotechnology from the IEEE Nanotechnology Council; Outstanding Young Engineer Award from the IEEE Microwave Theory and Techniques Society; Booker Fellowship from the United States National Committee of the International Union of Radio Science; Grainger Foundation Frontiers of Engineering Award from National Academy of Engineering; Young Investigator Awards from the Army Research Office, the Office of Naval Research, and the Defense Advanced Research Projects Agency; Early Career Award from the National Science Foundation; the Elizabeth C. Crosby Research Award from the University of Michigan; and best-paper awards at the International Microwave Symposium and International Symposium on Antennas and Propagation.

Photo: White House Press Release



Professor Jarrahi (5th from the right, front row) at the White House

Professor Robert N. Candler Receives the NSF CAREER Award

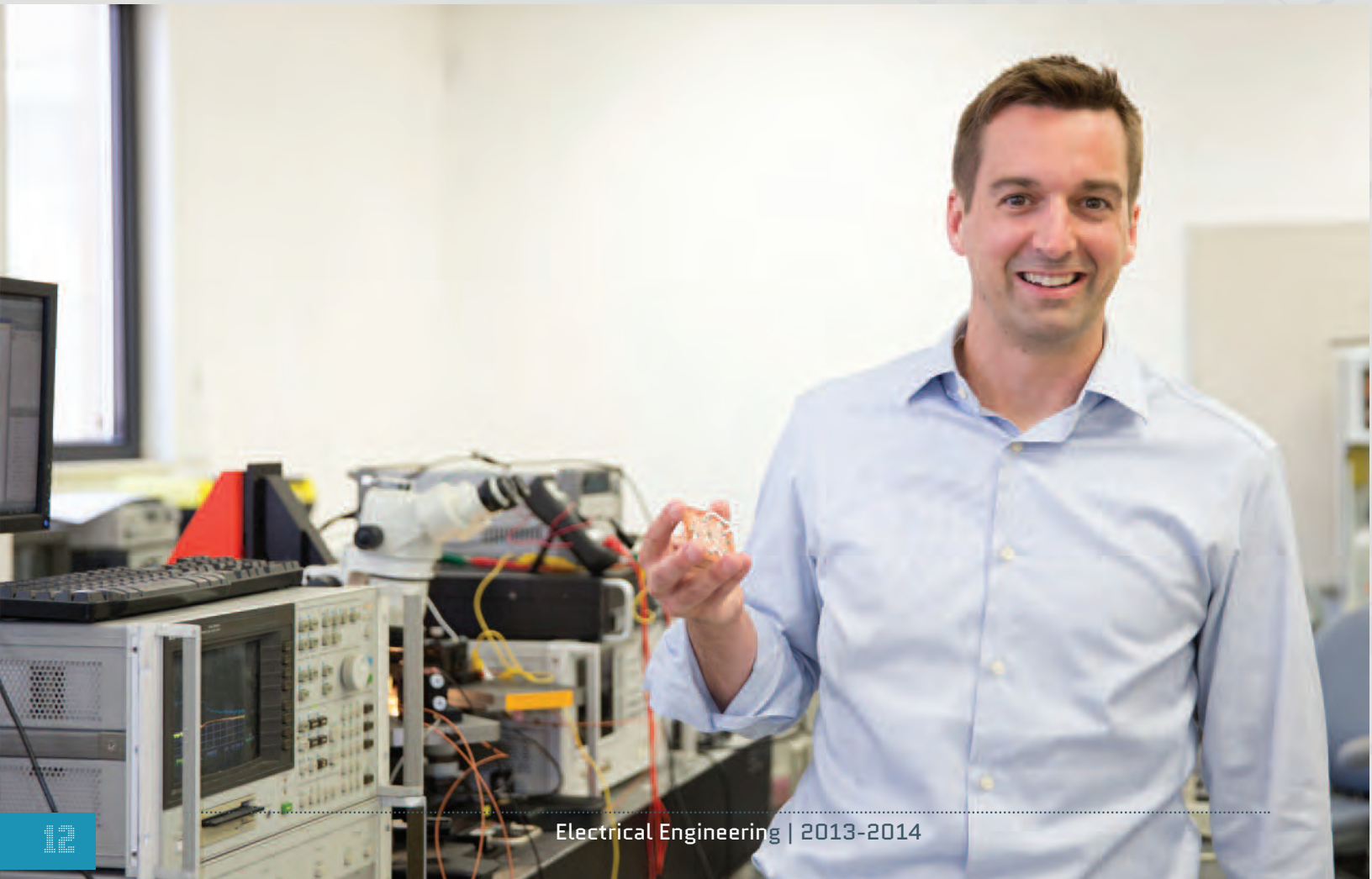
Assistant Professor Robert N. Candler received the National Science Foundation CAREER award for his work on microscale magnetic devices for next generation free electron lasers. The free electron laser (FEL) is a special class of laser that is capable of producing a very high brightness light over a wide range of photon energy. It operates by accelerating a beam of electrons using quadrupole optics, and converting the electron energy into coherent radiation with the use of the magnetic field of an undulator.

These coherent x-rays can be used in phase contrast imaging, which offers up to 1000x better resolution of soft tissue compared to conventional x-ray imaging. These x-rays can also be used for atomic scale imaging at ultrafast timescales for investigation of fundamental molecular structure in chemistry and biology.

Current FELs can produce high energy, coherent x-

rays by injecting high energy electron beams into conventional undulators. However, there is currently only one x-ray free electron laser in the United States, and it is longer than one kilometer. The system is heavily oversubscribed, and potentially high-impact experiments languish as they wait in line for access.

Professor Candler is pursuing an alternative approach to create FELs by miniaturizing the quadrupoles and undulators. This is possible due to recent advances in microscale 3D electromagnets, which will enable miniaturization of the entire FEL system to meter-scale, much smaller than the current kilometer-scale facilities. By creating a new state of the art in high-strength quadrupoles and intense-field, short-period undulators, Professor Candler aspires to create an x-ray free electron laser with unmatched brightness among small-scale light sources.



UCLA Electrical Engineering Plays Key Role in DARPA "Neuroprosthesis" Research

Professors Markovic and Sayed participate in a US\$15 Million project to restore memory function in victims of brain injury

The UCLA Henry Samueli School of Engineering and Applied Science has been tapped by the Defense Advanced Research Projects Agency (DARPA) to play a key role in an innovative project aimed at developing a wireless, implantable brain device that could help restore lost memory function in individuals who have suffered debilitating brain injuries and other disorders. The four-year effort, to be led by UCLA's Program in Memory Restoration and funded by up to \$15 million from DARPA, will involve a team of experts in neurosurgery, electrical engineering, neurobiology, psychology and physics who will collaborate to create, surgically implant and test the new "neuroprosthesis" in patients.

This ambitious, first-of-its kind project at UCLA builds on a 2012 research by Professor Itzhak Fried, from the David Geffen School of Medicine and lead investigator on the project, demonstrating that human memory can be strengthened by stimulating the brain's entorhinal cortex, a region involved in learning, memory and Alzheimer's disease.

Dejan Markovic, Associate Professor of Electrical Engineering, will lead a group of UCLA HSSEAS researchers developing technology to stimulate and record the activity of single neurons and of small neuronal populations. Electrical Engineering Professor Ali H. Sayed's research group will develop adaptive signal processing techniques to detect and suppress artifacts to enable the reliable recording of neuro-physiological signals. DARPA will provide US\$4.5 million over four years for the UCLA Electrical Engineering effort, contingent on researchers meeting a series of technical milestones. UCLA partners include the Lawrence Livermore National Laboratory and Stanford University.

Memory is the process by which neurons in certain brain regions encode, store and retrieve information. Various illnesses and injuries can disrupt this process, causing mem-

ory loss. Traumatic brain injury, which has affected more than 270,000 military members since 2000, as well as millions of civilians, is often associated with such memory deficits. Currently, no effective therapies exist to address the long-term effects of these injuries on memory.

In a key part of the project, the research team will stimulate and record neuron activity in patients who already have brain electrodes implanted as part of epilepsy treatment. Researchers will use this information to develop computational models and determine how to intervene with electrical stimulation to help restore memory function. The models will be transformed into therapeutics using technology developed by Markovic's team.

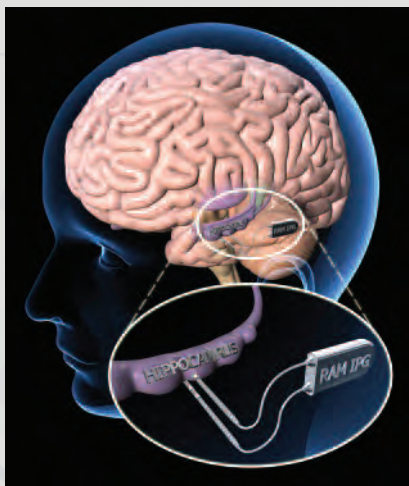
Professor Markovic said the goal is to create miniature wireless neural sensors that are far more sophisticated—much smaller and with much higher resolution—than those that exist today. The sensors will track and modulate neural activity with very precise spatial and temporal resolution, allowing the device to continuously update and modulate patterns of stimulation to optimize

therapy and restore memory function.

"We are developing ultra-low-power electronics in order to measure activity of specific areas of the brain, perform neural signal analysis and wirelessly transmit that information to an outside device in close proximity to the implants," Markovic said. "The implants and the outside device will talk to each other. The goals are to provide better therapy for people with neurological dysfunction and help those with epilepsy and brain injury to enhance and restore memory."

During the second phase of the program, Professor Itzhak Fried will implant the device in patients with traumatic brain injury in clinical trial. The DARPA initiative aimed at developing these implantable brain devices, Restoring Active Memory (RAM), supports President Obama's BRAIN initiative.

—by Bill Kisliuk



Ultra low power electronics to be developed at UCLA will be implanted in memory loss patients to restore memory functions



Dejan Markovic and Ali H. Sayed

EE Department Holds Special Symposium Dedicated to Professor Tatsuo Itoh

May has always been a special month for Professor Tatsuo Itoh as he was born in May many years ago. May of 2014 was even more special for two reasons. The first reason was that *IEEE Transactions on Terahertz Science and Technology* published its May issue with an article titled “Terahertz Pioneer: Tatsuo Itoh ‘Transmission Lines and Antennas: Left and Right’” to pay a special tribute to Professor Itoh as one of the significant contributors to Terahertz Science and Technology. In this nine-page article, the author mentioned “I was struck as much by his ability to tackle almost any problem in microwave engineering, as his capacity and willingness to help any student or colleague who felt the need to call on his



services. The sum total of Professor Itoh’s contributions, both professional and technical, are so over the top, one feels more like he represents an entire department, rather than a single individual...”

The second reason May 2014 was special is that the Electrical Engineering Department held a full-day special symposium on May 29: “Microwave Electronics—the Past, Current

and Future” to honor Professor Itoh’s distinguished achievement as an educator and researcher in Microwave Engineering and Electronics. The symposium was held in the UCLA Engineering Shannon Room and was attended by more than 40 invited international scholars, engineers and UCLA faculty and students. In the symposium, Dean Vijay Dhir delivered a welcome speech to the attendees and presented an honorary plaque to Professor Itoh. The Department Chair, Professor Frank Chang, provided an introduction of the Department as well as an overview of Professor Itoh’s significant contributions to the Department.

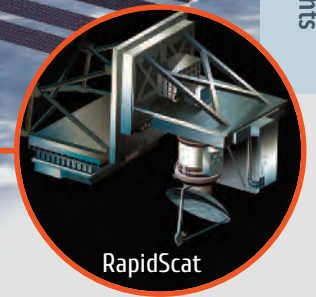
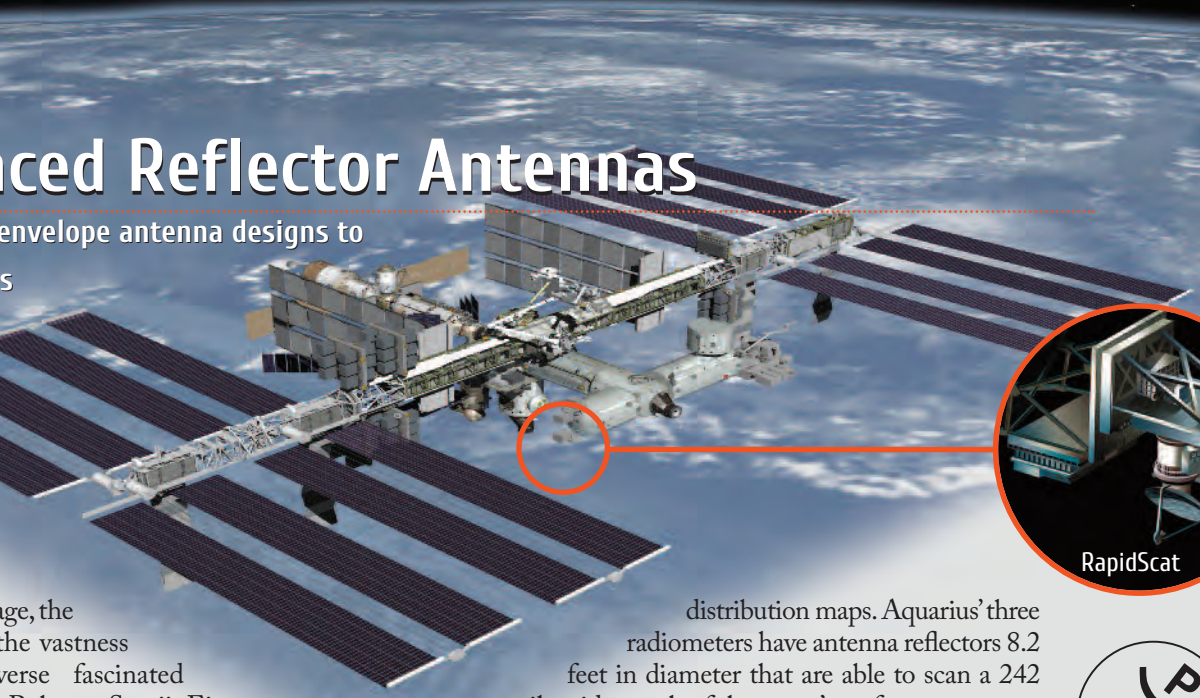
The symposium was followed by ten technical presentations delivered by internationally renowned scholars in the field of microwave engineering. The guest speakers were representatives of the group of 78 Ph.D.’s and many more post-doc and former students who studied under Professor Itoh’s supervision. Among them were Professor Samir El-Ghazaly, National Science Foundation ECCS Division Director; Professor Jenshan Lin, Chief Editor of *IEEE Transactions on Microwave Theory and Techniques*; Dr. Allen Tran, Vice President of Engineering of Qualcomm; and others.

The symposium organizer, Professor Ethan Wang, said in the symposium that this is a long overdue event to honor one of our most distinguished colleagues. The attendees considered the special symposium a good practice and they expressed their sincere appreciation to the Department’s strong support of this event.



Advanced Reflector Antennas

From back of envelope antenna designs to space missions



From an early age, the cosmos and the vastness of the universe fascinated Professor Yahya Rahmat-Samii. Einstein's postulate that the speed of light is the ultimate speed, and Maxwell's discovery that all electromagnetic phenomena—including light—could be captured in four simple mathematical equations profoundly excited him. Two major outcomes of Maxwell's equations were: (a) light is an electromagnetic wave, and (b) time varying currents radiate electromagnetic waves. The latter conclusion highlights the importance of antennas. Like Van Gogh used brushes to create paintings, electromagnetic scientists paint the radiation of electromagnetic waves with their antennas.

Four representative examples demonstrate how simple back of envelope reflector antenna concepts have evolved into the main antenna components for some of the most fascinating space missions.

WMAP (Wilkinson Microwave Anisotropy Probe) is a NASA Explorer mission that launched June 2001 to make fundamental measurements of cosmology—the study of the properties of the universe as a whole. WMAP has been stunningly successful, producing our new Standard Model of Cosmology. The antenna consisted of two doubly shaped offset Gregorian reflector systems operating at frequencies ranging from 20 GHz to 100 GHz and supporting five corrugated feed horns. With two other JPL colleagues, Professor Rahmat-Samii provided the initial antenna design for this Princeton/NASA Goddard mission. This has been one of NASA's most successful missions, providing detailed maps of the electromagnetic radiation from the dawn of the universe, the Big Bang. WMAP's data stream has ended.

Aquarius — The spacecraft's mission is a joint program between the NASA and Argentina's space agency, CONAE. Aquarius was launched in June 2010, with sensors at 408 miles above Earth in a sun-synchronous, polar orbit. Aquarius' objective is to provide insight into the effect of salt on the Earth's weather and climate systems by making the first space based observations of variations in salinity and creating global ocean salinity

distribution maps. Aquarius' three radiometers have antenna reflectors 8.2 feet in diameter that are able to scan a 242 mile wide swath of the ocean's surface.

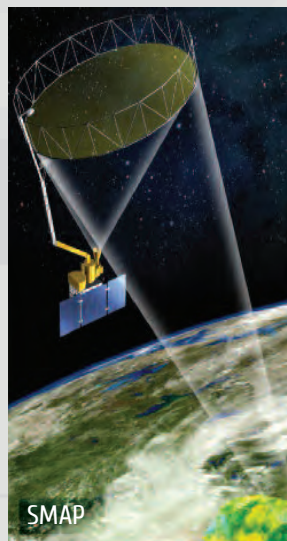
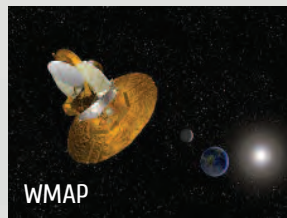
RapidScat is an Earth observation mission to be deployed in September 2014. The entire science of remote sensing has allowed mankind to better understand the weather, land and oceanic interactions for much improved weather forecasts. RapidScat is a mission that is planned to attach a scatterometer antenna system to the side of the International Space Station, providing data about scattering characteristics of ocean surface wind speed and direction. Professor Rahmat-Samii provided the initial dual beam and dual polarization reflector antenna design. This antenna was subsequently optimized at JPL and its scatterometer operates at the Ku band.

SMAP — NASA's Soil Moisture Active and Passive mission aims to better understand the role of soil moisture and salinity of oceans on weather prediction and other related observation, requiring high resolution microwave images. The L-band frequency (1.4 GHz) is one of the key frequencies for both radar and radiometer observations. This is perhaps one of the most challenging antenna designs that Professor Rahmat-Samii has been involved in. He provided the initial design of the antenna concept for this mission consisting of a large rotating offset mesh deployable reflector antenna. The antenna was subsequently developed by JPL and industrial partners resulting in a sophisticated 6-meter offset mesh parabolic reflector antenna. The mission is scheduled to launch in January 2015.

It has been extremely rewarding to Professor Rahmat-Samii to observe how simple back of envelope concepts evolved into very sophisticated antenna designs with the goal of enriching the knowledge of the universe, the solar system and most importantly the Earth. Professor Rahmat-Samii feels very lucky to be part of these amazing scientific activities. He was so fascinated by a typical reflector antenna shape that he designed the winning **IEEE Antennas and Propagation Society** logo, using a rendition of the reflector shape. It now appears on all publications related to the IEEE Antennas and Propagation Society. All images are available on NASA websites



IEEE Antennas and Propagation Society logo



Professor John Villasenor Named CFR Member

In early 2014, Professor John Villasenor was named a member of the Council on Foreign Relations (CFR). As explained on CFR's web site, their members are "a group unmatched in accomplishment and diversity in the field of international affairs," and include "top government officials, renowned scholars, business executives, acclaimed journalists, prominent lawyers, and distinguished nonprofit professionals."



Villasenor was selected based on his work at the intersection of technology and policy. Villasenor's engineering research has addressed areas including cybersecurity, communications systems, networking, and signal processing. In addition to performing traditional engineering

research, Villasenor has been very active in the broader technology policy dialogue. He is a nonresident senior fellow at the Brookings Institution in Washington, DC and has written for *the Atlantic*, *Billboard*, *the Chronicle of Higher Education*, *Fast Company*, *Forbes*, *the Huffington Post*, *the Los Angeles Times*, *Scientific American*, *Slate*, and *the Washington Post*. In addition, he has provided congressional testimony on several occasions.

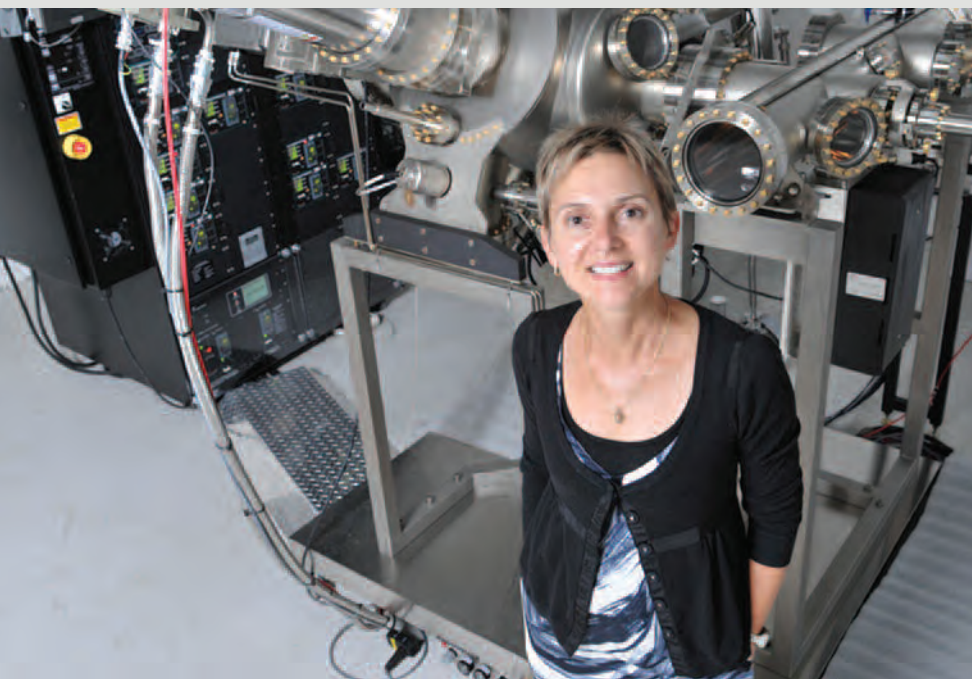
Professor Suhas N. Diggavi Elected Fellow of IEEE

Professor Suhas Diggavi was elected Fellow of the Institute of Electrical and Electronics Engineers (IEEE) for "contributions to wireless networks and systems."

Professor Diggavi was honored for his contributions to the theory and practice of wireless network communications and network data compression. Research in wireless communications has several decades of storied history, but the understanding of information flow over wireless networks has been quite limited. The difficulty is due to the broadcast nature of wireless which causes complicated signal interactions. Professor Diggavi has recently developed a new approach to make significant progress in understanding wireless network information flow, resolving several longstanding open questions in wireless network information flow and network data compression. His work on wireless networks has been recognized with several awards including the 2013 IEEE Information Theory and Communications Societies Joint Best Paper award, the 2006 IEEE Donald Fink Prize Paper award and the 2013 ACM Mobihoc best paper award.



Professor Diana L. Huffaker Named 2015 Distinguished Lecturer by IEEE



Diana Huffaker, professor of electrical engineering in UCLA's Henry Samueli School of Engineering and Applied Science, has been selected by IEEE as a 2015 distinguished lecturer in the area of photonic devices. In this role, she will help lead the Photonics Society in technical developments that will shape the global community through lecture and networking at various society and technical council meetings.

Huffaker's research interests are in the broad study of directed and self-assembled nanostructure solid-state epitaxy, optoelectronic devices, including solar cells, and III-V/Si photonics. She is the director of the Integrated NanoMaterials Core Lab, in the California NanoSystems Institute, which explores a "bottom-up" approach and novel devices architecture using nanomaterial and organic/inorganic interfaces to realize new device functionality.

Professor Aydogan Ozcan Elected Fellow to OSA and SPIE

Professor Aydogan Ozcan has been elected Fellow of The Optical Society (OSA) and The International Society for Optical Engineering (SPIE) for his seminal contributions to computational imaging, sensing and holography technologies, and instrumentation impacting bio-photonics and its applications to telemedicine and global health. OSA and SPIE are the leading professional societies in optics and photonics fields.

Ozcan's research on computational photonics, biomedical imaging, sensing and diagnostics techniques has resulted in several high impact publications as well as patents, which are currently licensed by the start-up company Holomic LLC, that Ozcan founded.

Professor Ozcan also received several other major awards including the Presidential Early Career Award for Scientists and Engineers (PECASE), which is the highest honor bestowed by the United States government on science and engineering professionals in the early stages of their independent research careers. Professor Ozcan received this prestigious award for developing innovative optical technologies and signal processing approaches that have the potential to make a significant impact in biological science and medicine; addressing public health needs in less developed countries; and service to the optical science community including mentoring and support for underserved

minority undergraduate and graduate students.

Professor Ozcan also received the 2013 SPIE Bio-Photonics Technology Innovator Award, the 2011 Army Research Office (ARO) Young Investigator Award, 2011 SPIE Early Career Achievement Award, the 2010 NSF CAREER Award, the 2009 NIH Director's New Innovator Award, the 2009 Office of Naval Research (ONR) Young Investigator Award, the 2009 IEEE Photonics Society Young Investigator Award and the MIT's Technology Review TR35 Award for his seminal contributions to near-field and on-chip imaging, and telemedicine based diagnostics.

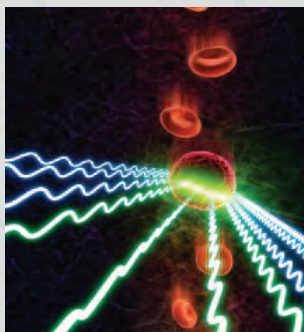


Professor Bahram Jalali Elected Fellow of SPIE

Professor and Northrop Grumman Endowed Opto-Electronic Chair in Electrical Engineering Bahram Jalali was elected Fellow of the Society of Photo-Optical Instrumentation Engineers in 2014 "for achievements in silicon photonics, opto-electronics and optical measurement science." Professor Jalali has led innovative research in the vast field of photonics with applications to biomedical solutions and communications that is bound to put current standards in the past.

Recently, he and his research team received great interest from peers in academe and industry for the anamorphic stretch transform (AST) technique in data compression which redefined optics and real-time to compress data in a more effective way that surpasses widely used standards such as JPEG and JPEG 2000 in terms of image quality and compression factor. The AST causes sharp features to be stretched more than course features.

Rooting from their time stretch technology to create



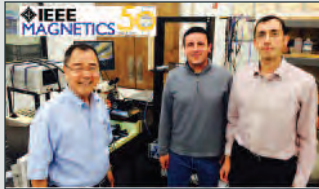
the world's fastest camera, the team developed a high-throughput flow-through imaging system for real-time detection of rare cells at an exceptional rate of 100,000 cells per second, twice as fast as the latest automated microscopes. The technology provides an advantage in terms of volume sample and runtime while providing high-sensitivity, specificity and statistical accuracy. In collaboration with the Bioengineering Department, the device showed a promising role in an accurate early detection of cancer in the blood and on monitoring efficacy of drug and radiation therapy.

Professor Jalali holds a joint appointment in the Bioengineering Department. His laboratory performs multi-disciplinary research and development in the fields of silicon photonics and real-time instruments for biomedical, communication and defense applications. In research, his mission is to solve critical problems faced by industry through revolutionary approaches that enable revolutionary advances in performance.



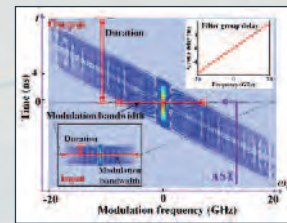
Best Paper Awards

Highlighting recent papers recognized in journals and conferences

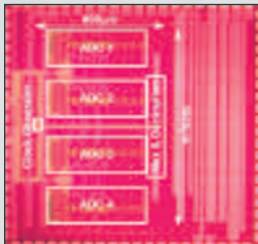


▶ “*Voltage-Induced Dynamics in Nanoscale Magnetic Tunnel Junctions: Higher-order Anisotropy Contributions to Ferromagnetic Resonance and Switching*” by **Juan G. Alzate** with co-authors **Dr. Pedram Khalili, Pramey Upadhyaya, Dr. Sergiy Cherepov, Dr. Jian Zhu, Dr. Jordan Katine, Dr. Juergen Langer, Dr. Berthold Ocker, Professor Ilya N. Krivorotov** and **Professor Kang Wang** received the Best Student Presentation Award from the IEEE International Magnetics Conference (Intermag 2014), in Dresden, Germany on May 4-8, 2014.

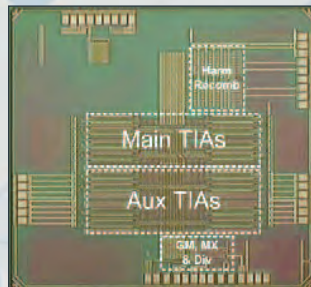
▶ “*Anamorphic Transform and its Application to time-bandwidth compression*” by **Dr. Mohammad Asghari** and **Professor Bahram Jalali** received the 2013 Best Paper Award from IEEE International Symposium on Signal Processing and Information Technology.



▶ “*An 8-Bit 4-GS/s 120-mW CMOS ADC*” by **Professor Behzad Razavi** and postdoctoral scholar **Hegong Wei** with UCLA alumni **Peng Zhang** and **Bibhu Datta Sahoo** was awarded the 2013 IEEE Custom Integrated Circuits Conference Best Paper Award.

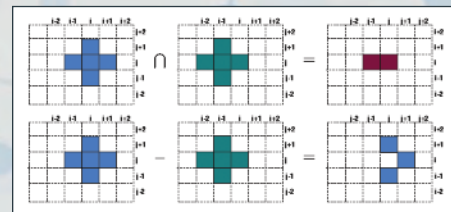


▶ “*A Blocker-Tolerant, Noise-Cancelling Receiver Suitable for Wideband Wireless Applications*” by **David Murphy, Amr Hafez, Ahmad Mirzaei, Mohyee Mikhemar, Hooman Darabi, Professors M. -C. Frank Chang** and **Asad Abidi** received the 2012 IEEE Journal of Solid-State Circuits Best Paper Award. The Award was presented at 2014 IEEE International Solid-State Circuits Conference.

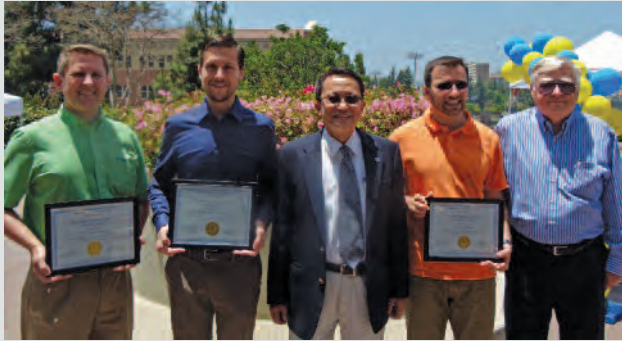


▶ “*Quantize-map-forward Relaying: an Experimental Study*” by **Professors Christina Fragouli** and **Suhas Diggavi** with co-authors, **Melisa Duarte, Ayan Sengupta** and **Siddhartha Brahma** was selected for the 2013 ACM Symposium on Mobile Ad Hoc Networking and Computing (Mobihoc) Best Paper Award.

▶ “*Polyhedral-Based Data Reuse Optimization for Configurable Computing*” by **Louis-Noel Pouchet, Peng Zhang, P. Sadayappan** and **Professor Jason Cong** was awarded Best Paper at the 21st ACM/SIGDA International Symposium on Field Programmable Gate Arrays (FPGA '13). The paper was published on ACM Press, February 2013.



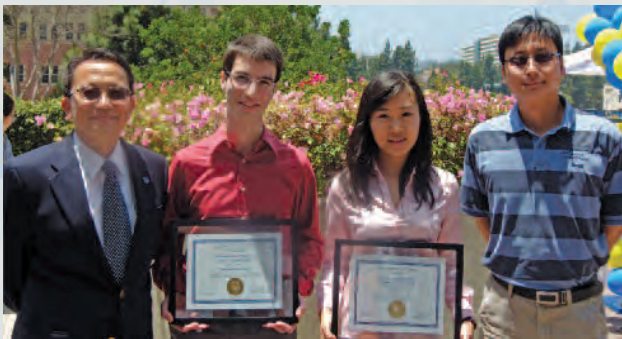
2013-2014 Outstanding Student and Teaching Awards



Henry Samueli Excellence in Teaching Awards were given to **Arthur Densmore** (Lab course), **Richard Dorrance** (Graduate course), and **Mostafa Majidpour** (Lecture course). They are pictured with Chairman M. -C. Frank Chang and the Vice Chair for Undergraduate Affairs Oscar Stafsuud.



Outstanding Ph.D. Dissertation in Signals & Systems
Harish Arsikere; Advisor: **Abeer Alwan**



Chairman M. -C. Frank Chang is pictured with the Outstanding M.S. Research in Circuits & Embedded Systems winner **Mark Gottscho**, Outstanding M.S. Research in Physical & Wave Electronics winner **Zhi Yao**, and Ms. Yao's advisor **Ethan Wang**.



Outstanding Ph.D. Dissertation in Physical & Wave Electronics
Arthur Densmore, Advisor: **Yahya Rahmat-Samii**



The Outstanding Bachelor of Science Degree Recipient **Tiancheng Zhao**, pictured with Chairman M. -C. Frank Chang

The Christina Huang Memorial Prize recipient **Jingtao Xia** and Chairman M. -C. Frank Chang



Outstanding Ph.D. Dissertation in Circuits & Embedded Systems
Fang-Li Yuan; Advisor: **Dejan Markovic**

Alumni Board

The mission of the Alumni Advisory Board is to provide critical and supportive advice to the UCLA Electrical Engineering Department in enhancing its leadership role in education and research.



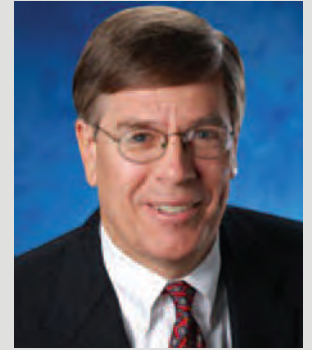
Sharon Black
*Special Projects
 Program Director
 Raytheon*



William Goodin
*Retired Associate Director
 of Alumni Relations
 UCLA HSSEAS*



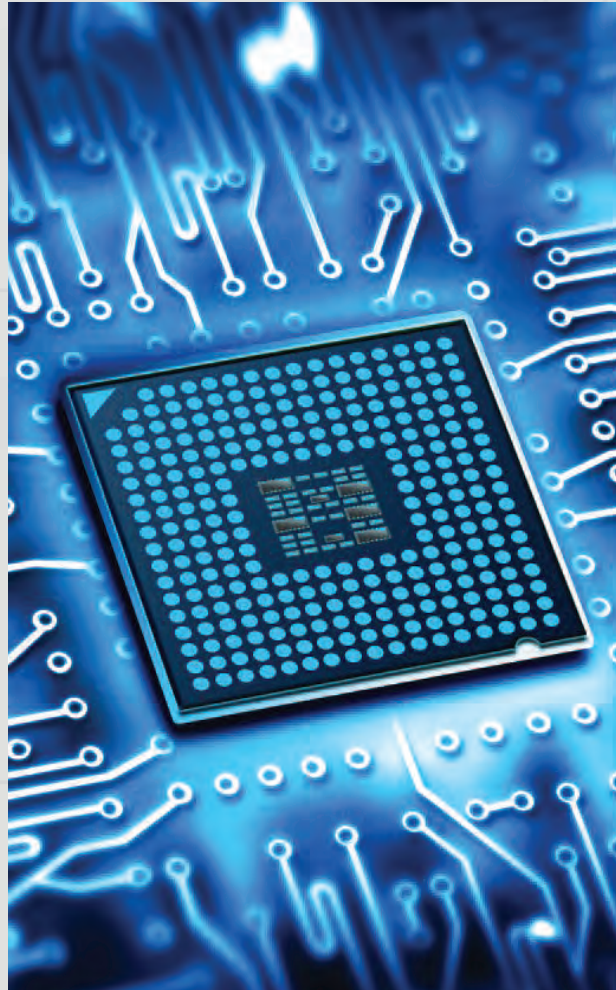
Leonard Bonilla
*Retired Program Manager
 Raytheon*



Robert Green
*Attorney
 Christie, Parker, and Hale, LLP*



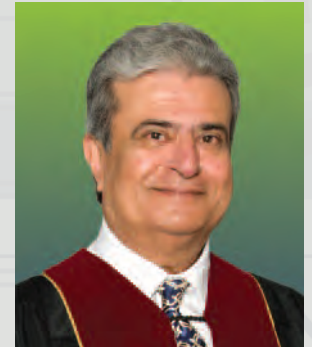
David Doami
*Director, Program Manager
 Northrop Grumman*



Vicky Gih
*Design Engineer & Product
 Lead
 Northrop Grumman*



Daniel Goebel
*Senior Research Scientist
 Jet Propulsion Laboratory*

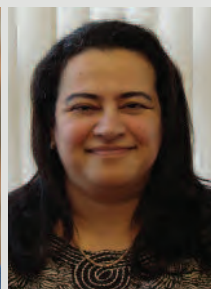


Asad Madni
*EE AAB Chair
 President, COO and CTO (Retired)
 BEI Technologies, Inc*

Department Faculty



Abidi



Alwan



Arisaka



Cabric



Candler



Chang

Asad A. Abidi

Distinguished Chancellor's Professor

Ph.D., University of California, Berkeley, 1981

🔧 Circuits and Embedded Systems

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

- ▶ National Academy of Engineering, 2007
- ▶ IEEE Donald O. Pederson Award in Solid-State Circuits, 2007
- ▶ Fellow, IEEE, 1996

Abeer A. H. Alwan

Professor

Ph.D., Massachusetts Institute of Technology, 1992

🔊 Signals and Systems

Speech processing, acoustic properties of speech sounds with applications to speech synthesis, recognition by machine and coding, hearing aid design, digital signal processing.

- ▶ Distinguished Lecturer, ISCA, 2010-2011
- ▶ Fellow, IEEE, 2008
- ▶ Fellow, Acoustical Society of America, 2003

Katsushi Arisaka

Distinguished Professor

Ph.D., University of Tokyo, Japan, 1985

🌀 Physical and Wave Electronics

High energy and astro-particle experiments, Kaon rare decays and CP violation, ultra high energy Cosmic ray, Hadron Collider experiment.

- ▶ UCLA Distinguished Teaching Award, 2010

Danijela Cabric

Associate Professor

Ph.D., University of California, Berkeley, 2007

🔧 Circuits and Embedded Systems

🔊 Signals and Systems

Wireless communications system design; cognitive radio networks; VLSI architectures of signal processing and digital communication algorithms; performance analysis and experiments on embedded system platforms.

- ▶ NSF CAREER Award, 2012
- ▶ Okawa Foundation Research Grant Award, 2009
- ▶ Samueli Fellow, 2008

Robert N. Candler

Assistant Professor

Ph.D., Stanford University, 2006

🌀 Physical and Wave Electronics

MEMS and NEMS devices, micro/nanoscale technology development, magnetics, and the interface of physical microsystems with biology.

- ▶ NSF CAREER Award, 2014
- ▶ Northrop Grumman Excellence in Teaching Award, 2012
- ▶ ARO Young Investigator Program Award, 2012

M.-C. Frank Chang

Distinguished Professor and Chairman

Wintek Professor of Electrical Engineering

Ph.D., National Chiao-Tung University, Taiwan, R.O.C., 1979

🔧 Circuits and Embedded Systems

🌀 Physical and Wave Electronics

High speed electronics including ultra high speed/frequency devices and integrated circuits for radio, radar and imaging system applications.

- ▶ Academia Sinica, 2012
- ▶ National Academy of Engineering, 2008
- ▶ IEEE David Sarnoff Award, 2006



Chui



Cong



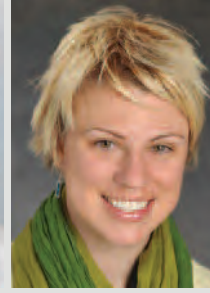
Christofides



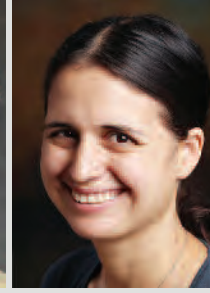
Daneshrad



Diggavi



Dolecek



Fragouli

Chi On Chui

Associate Professor

Ph.D., Stanford University, 2004

🔌 Physical and Wave Electronics

Bioelectronics and Medical Devices, Heterogeneous Integration, IC Manufacturing, and Semiconductor Devices.

- ▶ von Liebig Entrepreneurism Center Regional Healthcare Innovation Challenge Award, 2011
- ▶ HSSEAS Northrop Grumman Excellence in Teaching Award, 2011
- ▶ IEEE Electron Devices Society Early Career Award, 2009

Jingsheng Jason Cong

Chancellor's Professor

Ph.D., University of Illinois at Urbana-Champaign, 1990

🔌 Circuits and Embedded Systems

Synthesis of VLSI circuits and systems, programmable systems, novel computer architectures, nano-systems, and highly scalable algorithms.

- ▶ ACM/IEEE A. Richard Newton Technical Impact Award in Electric Design Automation, 2011
- ▶ Fellow, Association for Computing Machinery, 2008
- ▶ Fellow, IEEE, 2000

Panagiotis D. Christofides

Professor

Ph.D., University of Minnesota, 1996

🔌 Signals and Systems

Control of nonlinear, hybrid and distributed parameter systems, networked control, model predictive control, fault detection and fault-tolerant control, and process control applications.

- ▶ Fellow, American Association of Advancement of Science, 2013
- ▶ Fellow, International Federation of Automatic Control, 2011
- ▶ Fellow, IEEE, 2009

Babak Daneshrad

Professor

Ph.D., University of California, Los Angeles, 1993

🔌 Circuits and Embedded Systems

🔌 Signals and Systems

Wireless communication systems, High performance VLSI architectures and testbeds for wireless systems.

Suhas N. Diggavi

Professor

Ph.D., Stanford University, 1998

🔌 Signals and Systems

Information theory with applications to wireless and sensor networks, network data compression and storage, network secrecy, machine learning and large scale data analysis algorithms.

- ▶ Fellow, IEEE, 2013
- ▶ IEEE Information Theory Society & Communications Society Joint Paper Award, 2013
- ▶ IEEE Donald G. Fink Prize Paper Award, 2006

Lara Dolecek

Assistant Professor

Ph.D., University of California, Berkeley, 2007

🔌 Signals and Systems

Information and probability theory, graphical models, combinatorics, statistical algorithms and computational methods with applications to high-performance complex systems for data processing, communication, and storage.

- ▶ Intel Early Career Award, 2013
- ▶ NSF CAREER Award, 2012
- ▶ David J. Sakrison Memorial Prize, UC Berkeley, 2007

Christina Fragouli

Associate Professor

Ph.D., University of California, Los Angeles, 2000

🔌 Signals and Systems

Network coding, wireless networks, security.

- ▶ Distinguished Lecturer, IEEE Information Theory Society, 2011-2013
- ▶ European Research Council Starting Investigator Grant, 2009
- ▶ Zonta Award, 2008



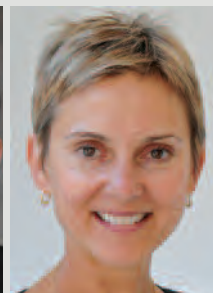
Grundfest



Gupta



He



Huffaker



Itoh



Jalali



Jarrahi

Warren Grundfest

Professor

M.D., Columbia University, 1980

⚙️ Physical and Wave Electronics

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

- ▶ Pierre Galletti Award AIMBE, 2014
- ▶ Fellow, SPIE, 1996
- ▶ Fellow, American Institute for Medical & Biological Engineering, 1996

Puneet Gupta

Associate Professor

Ph.D., University of California, San Diego, 2007

🔧 Circuits and Embedded Systems

CAD techniques to enable design aware manufacturing. VLSI physical design for manufacturability, robustness and low-power. Software and architecture methods to mitigate hardware variability and reliability issues.

- ▶ IBM Faculty Award, 2012
- ▶ ACM/SIGDA Outstanding New Faculty Award, 2010
- ▶ NSF CAREER Award, 2009

Lei He

Professor

Ph.D., University of California, Los Angeles, 1999

🔧 Circuits and Embedded Systems

Modeling and simulation, programmable logic and reconfigurable computing, and embedded and cyber-physical systems for applications such as health care, electric vehicle and smart grid.

- ▶ HSSEAS Northrop Grumman Excellence in Teaching Award, 2005
- ▶ IBM Faculty Award, 2003
- ▶ NSF CAREER Award, 2000

Diana L. Huffaker

Professor

Ph.D., University of Texas at Austin, 1994

⚙️ Physical and Wave Electronics

Directed and self-assembled nanostructure solid-state epitaxy, optoelectronic devices including solar cells and III-V/Si photonics.

- ▶ Fellow, The Optical Society, 2013
- ▶ Fellow, IEEE, 2008
- ▶ Fellow, DoD National Security Science and Engineering Faculty Fellow, 2008

Tatsuo Itoh

Distinguished Professor

Northrop Grumman Professor in Microwave Electronics

Ph.D., University of Illinois at Urbana-Champaign, 1969

⚙️ Physical and Wave Electronics

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

- ▶ National Academy of Engineering, 2003
- ▶ Fellow, IEEE, 1982

Bahram Jalali

Professor

Northrop Grumman Endowed Opto-Electronic

Chair in Electrical Engineering

Ph.D., Columbia University, 1989

⚙️ Physical and Wave Electronics

Silicon photonics, biophotonics, real-time instruments for biomedical and communication applications.

- ▶ R.W. Wood Prize, The Optical Society, 2008
- ▶ Fellow, The Optical Society, 2004
- ▶ Fellow, IEEE, 2003

Mona Jarrahi

Associate Professor

Ph.D., Stanford University, 2007

⚙️ Physical and Wave Electronics

Terahertz optoelectronic devices and systems, microwave photonics, and ultrafast electro-optics.

- ▶ IEEE Nanotechnology Council Early Career Award in Nanotechnology, 2014
- ▶ IEEE Microwave Theory and Techniques Outstanding Young Engineer Award, 2014
- ▶ Presidential Early Career Award for Scientists and Engineers, 2013



Joshi



Kaiser



Laub



Liou



J.M. Liu



W. Liu



Markovic

Chandrashekar J. Joshi

Distinguished Professor

Ph.D., Hull University, England, 1979

Ⓢ Physical and Wave Electronics

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

- ▶ National Academy of Engineering, 2014
- ▶ James Clerk Maxwell Prize (APS), 2006
- ▶ Fellow, IEEE, 1993

William J. Kaiser

Professor

Ph.D., Wayne State University, 1984

Ⓢ Circuits and Embedded Systems

Development of networked embedded computing for linking the Internet to the physical world. Distributed and wearable systems for advancing the quality and international accessibility of healthcare through Wireless Health.

- ▶ Co-Director, UCLA Wireless Health Institute since 2008
- ▶ UCLA Gold Shield Faculty Prize, 2009
- ▶ Brian P. Copenhaver Award, 2005

Alan J. Laub

Distinguished Professor

Ph.D., University of Minnesota, 1974

Ⓢ Signals and Systems

Numerical linear algebra, numerical analysis, high-end scientific computation, and computer-aided control system design, especially algorithms for control and filtering.

- ▶ Life Fellow, IEEE, 1986
- ▶ Third Millennium Medal, IEEE, 2000
- ▶ Control Systems Technology Award, 1993

Kuo-Nan Liou

Distinguished Professor

Ph.D. New York University, 1970

Ⓢ Physical and Wave Electronics

Electromagnetic scattering by ice crystals and aerosols, satellite remote sensing, radiative transfer, and climate modeling.

- ▶ Roger Revelle Medal, American Geophysical Union, 2013
- ▶ Quadrennial Gold Medal, International Radiation Commission, 2012
- ▶ National Academy of Engineering, 1999

Jia-Ming Liu

Professor

Ph.D., Harvard University, 1982

Ⓢ Physical and Wave Electronics

Nonlinear optics, ultrafast optics, semiconductor lasers, photonic devices, nonlinear laser dynamics, photonic microwaves, graphene photonics, topological insulators, nanophotonic imaging, and biomedical photonics.

- ▶ Fellow, IEEE, 2008
- ▶ Guggenheim Fellow, 2006
- ▶ Fellow, American Physical Society, 2003

Wentai Liu

Distinguished Professor

Ph.D., University of Michigan, 1983

Ⓢ Physical and Wave Electronics

Neural prosthesis for central/spinal cord/visceral nervous systems, bioelectronics sensor/actuator, bio-signal processing, brain-machine interface, personalized learning, wireless/wired transceiver, computer vision and image processing, timing/clock optimization

- ▶ National Chiao-Tung University (Taiwan) Honorary Doctorate Degree Award, 2013
- ▶ NSF Inventor of the first FDA approved Retinal Prosthesis, 2013
- ▶ Alcoa Foundations Distinguished Research Achievement Award, 2000

Dejan Markovic

Associate Professor

Ph.D., University of California, Berkeley, 2006

Ⓢ Circuits and Embedded Systems

Power/area-efficient digital integrated circuits for communication and healthcare applications, design with post-CMOS devices, design optimization methods and supporting CAD flows.

- ▶ NSF CAREER Award, 2009
- ▶ David J. Sakrison Memorial Prize, UC Berkeley, 2007



Mori



Osher



Otis



Ozcan



Pamarti



Pottie



Rahmat-Samii

Warren Mori

Professor

Ph.D., University of California, Los Angeles, 1987

⚡ Physical and Wave Electronics

Advanced accelerator concepts, advanced light sources, inertial confinement fusion, nonlinear optics of plasmas, plasma physics, and massively parallel computing.

- ▶ Fellow, IEEE, 2007
- ▶ Fellow, American Physical Society, 1995

Stanley J. Osher

Professor

Ph.D., Courant Institute, New York University, 1966

⚡ Signals and Systems

Innovative numerical methods for applications ranging from image science to control to electromagnetics to computational physics and beyond.

- ▶ Carl Friedrich Gauss Prize, 2014
- ▶ Fellow, American Academy of Arts and Sciences, 2010
- ▶ National Academy of Sciences, 2005

Thomas Otis

Professor

Ph.D., Stanford University, 1994

⚡ Signals and Systems

Cellular and molecular aspects of neural signaling

- ▶ Associate Editor, Journal of Neurophysiology, 2011-2014
- ▶ McKnight Technology Award, 2009
- ▶ Fellow, Centre National de la Recherche Scientifique, 2007,

Aydogan Ozcan

Chancellor's Professor and HHMI Professor

Ph.D., Stanford University, 2005

⚡ Physical and Wave Electronics

Photonics and its applications to nano and biotechnology.

- ▶ Presidential Early Career Awards for Scientists and Engineers Award, 2012
- ▶ NSF CAREER Award, 2010
- ▶ NIH Director's New Innovator Award, 2009

Sudhakar Pamarti

Associate Professor

Ph.D., University of California, San Diego, 2003

⚡ Circuits and Embedded Systems

Mixed-signal IC design: wireless / wireline communication applications, digitally-assisted analog / RF circuit design, delta-sigma modulation, quantization noise theory.

- ▶ NSF CAREER Award, 2010

Gregory J. Pottie

Professor

Ph.D., McMaster University, Canada, 1988

⚡ Signals and Systems

Wireless communications, modeling and reliable inference in sensor networks with application to wireless health.

- ▶ Fulbright Senior Scholar, 2009
- ▶ Fellow, IEEE, 2005
- ▶ Allied Signal Award for Outstanding Faculty Researcher in HSSEAS, 1998

Yahya Rahmat-Samii

Distinguished Professor

Northrop Grumman Professor of Electrical Engineering/Electromagnetics

Ph.D., University of Illinois at Urbana-Champaign, 1975

⚡ Physical and Wave Electronics

Personal communications, medical, miniaturized, fractal, reflectors, remote sensing, satellite and radio astronomy antennas; electromagnetic band gap, meta-materials, reflectarrays and frequency selective structures, computational and optimization techniques, modern antenna measurements and diagnostics.

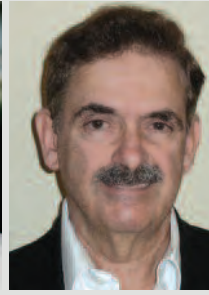
- ▶ UCLA Distinguished Teaching Award, 2011
- ▶ IEEE Electromagnetics Award, 2011
- ▶ National Academy of Engineering, 2008



Razavi



Roychowdhury



Rubin



Samueli



Sarrafzadeh



Sayed



Soatto

Behzad Razavi

Professor

Ph.D., Stanford University, 1992

Circuits and Embedded Systems

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.

- ▶ IEEE VLSI Circuits Symposium Best Student Paper Award, 2012
- ▶ IEEE Custom Integrated Circuits Conference Best Invited Paper Award, 2012
- ▶ IEEE Donald O. Pederson Award in Solid-State Circuits, 2012

Vwani P. Roychowdhury

Professor

Ph.D., Stanford University, 1989

Signals and Systems

Internet-scale information processing; data mining and machine learning; complex networks; quantum and bio-inspired computation; nonlinear systems; physics of computation; complexity theory and cryptography; adaptive systems.

Izhak Rubin

Distinguished Professor and Area Director

Ph.D., Princeton University, 1970

Signals and Systems

Telecommunications and computer communications systems and networks; public safety networks; mobile cellular and ad hoc wireless networks; vehicular networks; heterogeneous networks; optical nets; satellite networks; queueing systems; C4ISR systems and networks; network simulations, analysis and design; traffic modeling/engineering.

- ▶ Life Fellow, IEEE, 1987

Henry Samueli

Professor

Ph.D., University of California, Los Angeles, 1980

Circuits and Embedded Systems

Digital signal processing, communications systems

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

- ▶ Marconi Society Prize and Fellowship, 2012
- ▶ Fellow, American Academy of Arts and Sciences, 2004
- ▶ National Academy of Engineering, 2003

Majid Sarrafzadeh

Professor

Ph.D., University of Illinois at Urbana-Champaign, 1987

Circuits and Embedded Systems

Embedded and reconfigurable computing; health analytics; design and analysis of algorithms.

- ▶ Co-Director, UCLA Wireless Health Institute, since 2008
- ▶ Co-Founder, four Startups, since 2000
- ▶ Fellow, IEEE, 1996

Ali H. Sayed

Professor

Ph.D., Stanford University, 1992

Signals and Systems

Adaptation and learning, network science, information-processing theories, distributed processing, biologically-inspired designs.

- ▶ Athanasios Papoulis Award, 2014
- ▶ Technical Achievement Award, IEEE Signal Processing Society, 2012
- ▶ Frederick E. Terman Award, 2005

Stefano Soatto

Professor

Ph.D., California Institute of Technology, 1996

Signals and Systems

Estimation theory, control theory, video, image and signal processing, computer vision, robotics.

- ▶ Fellow, IEEE, 2013
- ▶ Okawa Foundation Research Grant Award, 2001
- ▶ David Marr Prize, 1999



Speyer



Srivastava



Stafsudd



Streit



Tabuada



Tu



Vandenberghe

Jason L. Speyer

Ronald and Valerie Sugar Distinguished Professor in Engineering

Ph.D., Harvard University, 1968

✂ Signals and Systems

Stochastic and deterministic optimal control and estimation with application to aerospace systems; guidance, flight control, and flight mechanics.

- ▶ National Academy of Engineering, 2005
- ▶ Life Fellow, IEEE, 2005
- ▶ Fellow, American Institute of Aeronautics and Astronautics, 1985

Mani B. Srivastava

Professor

Ph.D., University of California, Berkeley, 1992

📡 Circuits and Embedded Systems

✂ Signals and Systems

Embedded and cyber-physical systems; distributed and participatory sensing; mobile, wearable, and pervasive computing; wireless networks; power & energy-aware systems; energy harvesting technologies; applications in mHealth, green buildings, and smart grids.

- ▶ Fellow, IEEE, 2008
- ▶ Okawa Foundation Research Award Grant, 1998
- ▶ NSF CAREER Award, 1997

Oscar M. Stafsudd

Professor and Vice Chair

Ph.D., University of California, Los Angeles, 1967

🔊 Physical and Wave Electronics

Mid-infrared lasers for applications in materials processing, dentistry, and surgery; ceramic laser media for high power laser systems; Raman imaging and time dependent fluorescent imaging for medical applications (cancer/ wounds); infrared detectors.

- ▶ HSSEAS Lockheed Martin Excellence in Teaching Award, 2011
- ▶ Fulbright Fellowship, 1986

Dwight C. Streit

Distinguished Professor

Ph.D., University of California, Los Angeles, 1986

🔊 Physical and Wave Electronics

Solid-state electronics, millimeter-wave devices and circuits, electronic materials, heterogeneous integration.

- ▶ National Research Council Lifetime Associate, 2008
- ▶ Northrop Grumman Distinguished Innovator, 2008
- ▶ National Academy of Engineering, 2001

Paulo Tabuada

Professor and Vice Chair

Ph.D., Technical University of Lisbon, Portugal, 2002

✂ Signals and Systems

Modeling, analysis, and control of cyber-physical systems. Control and systems theory.

- ▶ George S. Axelby Outstanding Paper Award, 2011
- ▶ Donald P. Eckman Award, 2009
- ▶ NSF Career Award, 2005

King-Ning Tu

Distinguished Professor

Ph. D., Harvard University 1968

🔊 Physical and Wave Electronics

VLSI processing and reliability, and 3D IC packaging technology.

- ▶ TMS John Bardeen Award, 2013
- ▶ Fellow: American Physical Society, 1981, The Metallurgical Society, 1988, Materials Research Society, 2010
- ▶ Humboldt Award, 1996

Lieven Vandenberghe

Professor

Ph.D., Katholieke Universiteit Leuven, Belgium, 1992

✂ Signals and Systems

Optimization, systems and control theory, signal processing.

- ▶ HSSEAS TRW Excellence in Teaching Award, 2002
- ▶ NSF CAREER Award, 1998
- ▶ Robert Stock Award, K.U. Leuven, 1993



van der Schaar



Villasenor



K. L. Wang



Y. E. Wang



Wessel



Williams



Wong

Mihaela van der Schaar

Chancellor's Professor

Ph.D., University of Technology, Eindhoven, The Netherlands, 2001

✕ Signals and Systems

Engineering economics and game theory, multi-agent learning, online learning, decision theory, network science, multi-user networking, big data and real-time stream mining, multimedia.

- ▶ Fellow, IEEE, 2010
- ▶ Editor in Chief, IEEE Transactions on Multimedia, 2011-2013
- ▶ NSF CAREER Award, 2004

John D. Villasenor

Professor

Ph.D., Stanford University, 1989

✕ Signals and Systems

Cybersecurity, wireless mobile devices and systems, cloud computing, digital currencies and emerging payment methods, supply chain and infrastructure security, digital privacy, medical imaging, intellectual property.

Kang L. Wang

Distinguished Professor

Raytheon Company Professor of Electrical Engineering

Ph.D., Massachusetts Institute of Technology, 1970

⊗ Physical and Wave Electronics

Nanoelectronics, spintronics and nanomagnetism; interacting complex nanoscale systems; nanoscale science, devices and quantum systems; nonvolatile electronics and low dissipation devices; MBE; optoelectronics and solar cells.

- ▶ Semiconductor Industry Association Award, 2009
- ▶ Semiconductor Research Corporation Technical Excellence Award, 1995
- ▶ Fellow, IEEE, 1992

Yuanxun Ethan Wang

Associate Professor

Ph.D., University of Texas at Austin, 1999

⊗ Physical and Wave Electronics

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.

Richard D. Wesel

Professor and Associate Dean

Ph.D., Stanford University, 1996

✕ Signals and Systems

Communication theory, information theory, and channel coding, feedback communication systems, information storage systems including coding for Flash memory systems, binary and non-binary low-density parity check codes, turbo codes, coded modulation systems, cooperative data exchange, and network optimization.

- ▶ HSSEAS TRW Excellence in Teaching Award, 2000
- ▶ Okawa Foundation Research Grant Award, 1999
- ▶ NSF CAREER Award, 1998

Benjamin S. Williams

Associate Professor and Area Director

Ph.D., Massachusetts Institute of Technology, 2003

⊗ Physical and Wave Electronics

Terahertz and mid-infrared lasers and devices; low-dimensional semiconductor nanostructures for -opto-electronics; sub-wavelength photonics, plasmonics, and meta-materials.

- ▶ NSF CAREER Award, 2012
- ▶ DARPA Young Faculty Award, 2008

Chee Wei Wong

Associate Professor

Ph.D., Massachusetts Institute of Technology, 2003

⊗ Physical and Wave Electronics

Ultrafast, nonlinear, quantum and precision optical measurements in mesoscopic and nanoscale systems. Microwave photonics, silicon nanophotonics, ultrafast and low-temperature spectroscopy, low-dimensional materials, high-dimensional quantum entanglement, cavity quantum electrodynamics, ultrahigh-Q oscillators and stabilization, precision sensing, and electronic-photon integration.

- ▶ Fellow, The Optical Society, 2013
- ▶ NSF CAREER Award, 2008
- ▶ DARPA Young Faculty Award, 2007



Woo



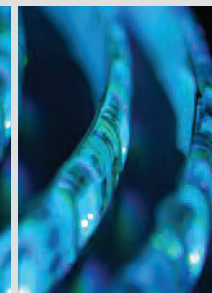
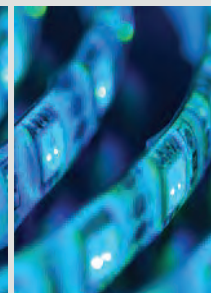
Yang



Yao



Zhang



Jason C. S. Woo

Professor and Vice Chair

Ph.D., Stanford University, 1987

🔌 Physical and Wave Electronics

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

- ▶ Fellow, IEEE, 2005

C.-K. Ken Yang

Professor and Area Director

Ph.D., Stanford University, 1998

🔌 Circuits and Embedded Systems

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.

- ▶ Fellow, IEEE, 2011
- ▶ IBM Faculty Development Fellowship, 2003–2005
- ▶ Northrop Grumman Outstanding Teaching Award, 2003

Kung Yao

Distinguished Professor

Ph.D., Princeton University, 1965

🔌 Signals and Systems

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

- ▶ Journal of Communications and Networks, Best Paper Award, 2011
- ▶ IEEE Joint Information Theory/Communication Theory Societies Best Paper Award, 2008
- ▶ Life Fellow, IEEE, 1994

Lixia Zhang

Professor Jonathan B. Postel Chair in Computer Science

Ph.D., Massachusetts Institute of Technology, 1989

🔌 Circuits and Embedded Systems

Internet architecture design, large scale distributed systems, network security and resilience.

- ▶ IEEE Internet Award, 2009
- ▶ Fellow, Association for Computing Machinery, 2006
- ▶ Fellow, IEEE, 2006

New Books by Faculty

Numerous textbooks for graduate and undergraduate instruction are authored by our electrical engineering faculty.

A. Ozcan



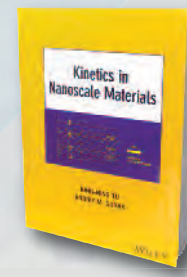
J. Cong



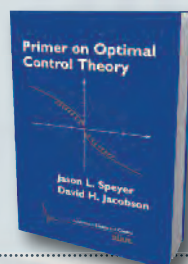
D. Markovic



K. -N. Tu



J. Speyer



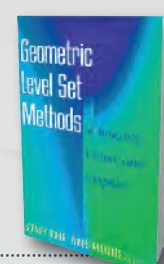
S. Soatto



A. Sayed



S. Osher



UCLA IEEE Club Members Experience Hands-On Robotics

The UCLA IEEE (Institute of Electrical and Electronics Engineers) is one of the largest engineering-focused clubs at UCLA. In addition to our corporate infosesions, workshops, and events aimed to help students in career building and professionalism, UCLA IEEE is known for the challenging, educational, but still fun projects that allow students to get a true hands-on experience in electrical engineering that classroom lectures do not offer.

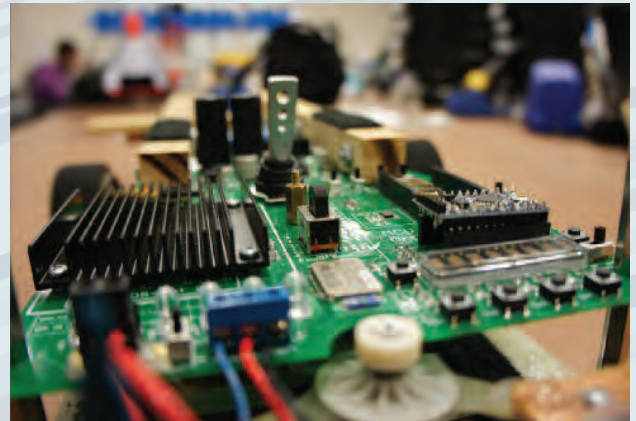
The **OPS (Open Project Space)** program is geared towards first and second-year students, aimed at teaching the fundamentals of hands-on electrical engineering. Our computer science-focused analogy, **C3 (Code, Create, Compete)**, allows computer science majors to join in on the fun with their own customized projects. For more advanced students who want a challenging robotics experience, the **Micromouse** and **Natcar** projects are perfect choices to build something crazy. Outside of these structured programs, students are also free to innovate and imagine up independent projects, which IEEE sponsors and helps to create.

The UCLA IEEE club is located on the second floor of Boelter Hall with its own lab space in the Student Creativity Center. The lab currently has a 3D printer and a mini-CNC mill that students can use for a small fee. Our lab is stocked with parts for anybody to use, whether they are part of the electrical engineering, computer science, or any other major. Come check us out at Boelter 2730D!

<http://iee.ucla.edu> or general@iee.ucla.edu

2013-2014 honors awarded to UCLA IEEE:

- ▶ Region 6 Exemplary Student Branch Award
- ▶ Region 6 Outstanding Large Student Branch
- ▶ Region 6 Micromouse Competition, First Place
- ▶ Region 6 Micromouse Competition, Second Place
- ▶ Region 6 Micromouse Competition, Third Place
- ▶ All America Micromouse Competition, Second Place
- ▶ All America Micromouse Competition, Third Place
- ▶ UCSD Natcar Competition, Third Place
- ▶ UCLA Natcar Competition, First Place
- ▶ UCLA Natcar Competition, Second Place
- ▶ IEEE Student Professional Awareness Venture (S-PAVe)
- ▶ IEEE Global Website Competition, Fourth Place



Hands-On Robotics:
Natcar (top) and Micromouse (bottom) are
projects in which UCLA IEEE club members can participate

HKN Celebrates 30th Year at UCLA and Honors Professor Alan Willson, Jr.

Eta Kappa Nu (HKN) is a unique organization dedicated to encouraging and recognizing excellence in the electrical and computer engineering fields. Through a variety of service programs and leadership training, student members develop lifelong skills that earmark them for prominent positions in industry and academia. In order to be eligible for membership, students must be either in the top fourth of their junior standing class or top third of their senior standing class. For UCLA's HKN Iota Gamma chapter, the 2013-2014 academic year was a year to celebrate legacy and inspire growth. For its 30th year at UCLA, HKN chose to grow even further in membership, service, and industry connection.

In Fall 2013, HKN welcomed Professor Benjamin Williams as its newest faculty advisor. With his wise guidance, the chapter's President Duymong Nguyen and student officer board inducted a total of 69 students and one faculty member during the year, bringing the total chapter membership to 206. The chapter attributes this success to the student officers who continue to go above and beyond in serving the community.

In Winter 2014, HKN launched its first annual Emerge Career Fair, the first on-campus career fair at UCLA to focus solely on up-and-coming industry in the electrical and computer engineering fields. External Vice President Priscilla Lok spearheaded the event, recruiting twelve innovative companies

to scout UCLA talent. Over 200 students attended, and the fair alone raised over US\$3,000 for the chapter to continue providing free student services.

To round off an amazing year, HKN held a banquet to celebrate the chapter's 30 years of success. The occasion provided an opportunity

to present the 2014 HKN Distinguished Service Award to Professor Alan Willson, founding faculty advisor for the Iota Gamma Chapter and member of Eta Kappa Nu for 55 years. Professor Willson is a Distinguished Professor Emeritus and the Charles P. Reames Chair in Electrical Engineering at UCLA. The award was presented to Professor Willson by Professor S.K. Ramesh, Dean, College of Engineering and Computer Science, California State University, Northridge, and member of the IEEE-HKN Board of Directors.

In addition, the chapter was recognized for its eighth Outstanding Chapter Award in a row for 2012-2013. Tammy Chang, former HKN student officer, was also recognized as the recipient of the 2014 Alton B. Zerby and Carl T. Koerner Outstanding Student Award.

For the next year, HKN plans to expand its tutoring and project services in UCLA's newly remodeled Student Creativity Center to further reach the broader UCLA Engineering community. The chapter thanks Professor Williams, Professor M. -C. Frank Chang, alumni advisor Dr. William Goodin, and IEEE branch advisor Dr. Mike Briggs for their continued support.



Professor Willson receives award for 55 years of service (top) and the Emerge Career Fair (bottom), which focused on electrical and computer engineering

The Electrical Engineering Department Overview

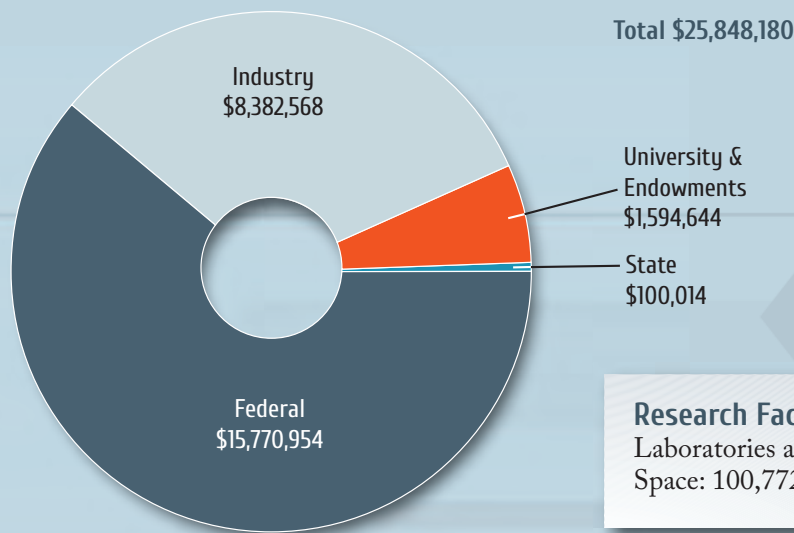
Faculty and Staff

Ladder Faculty	45 FTEs
Courtesy Appointments	12
Emeriti Faculty	13
Adjunct	10
Lecturers	10
Staff	44

Recognitions

Society Fellows	47
NAE Members	13
NAS Members	3
National Medal of Science	1
National Academy of Inventors	2
Marconi Prize	1

Research Funding for 2013-2014



Research Facilities

Laboratories and Research Groups: 40
Space: 100,772 square feet

Research Centers

The Electrical Engineering Department contributes to the following Research Centers:

California NanoSystems Institute (CNSI)	Impact +
Center for Development of Emerging Data Storage Systems (CoDES2)	Institute for Cell Mimetic Space Exploration (CMISE)
Center for Engineering Economics, Learning & Networks	Institute for Digital Research and Education (IDRE)
Center for Excellence in Green Nanotechnology	Institute for Pure and Applied Mathematics (IPAM)
Center for High Frequency Electronics (CHFE)	Institute for Technology Advancement (ITA)
Center for Systems, Dynamics and Controls (SyDyC)	Joint Institute for Regional Earth System Science and Engineering (JIFRESSE)
Center for Translational Applications of Nanoscale Multiferroic Systems (TANMS)	Nanoelectronics Research Center (NRC)
Expedition into Hardware Variability-Aware Software	Public Safety Network System (PSNS)
Function Accelerated nanoMaterial Engineering (FAME)	Water Technology Research Center (WaTer)
Functional Engineered Nano Architectonics Focus Center (FENA)	World Institute of Nanotechnology (WIN)
	Wireless Health Institute

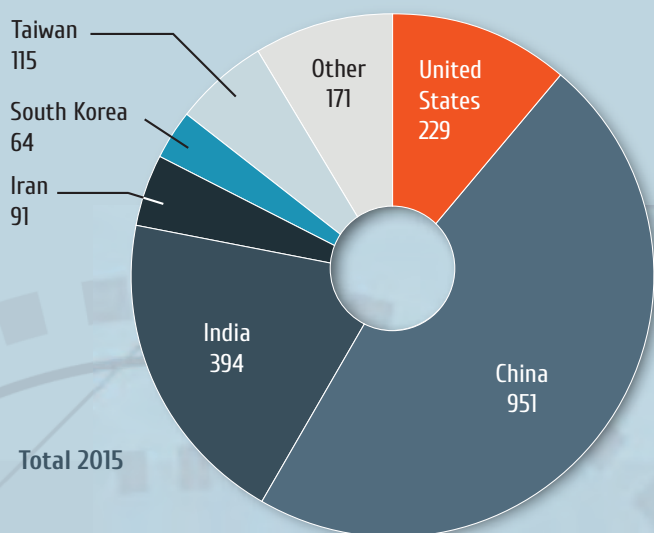
Undergraduate Students

Students Enrolled	682
Applicants	1735
Admitted	430
New Students Enrolled	141
Average Incoming GPA	4.467 (weighted) 3.924 (unweighted)

Graduate Students

Students Enrolled	508
Applicants	2015
Admitted	405
New Students Enrolled	179
Median Incoming GPA	3.77

Graduate Applicants for Fall 2014



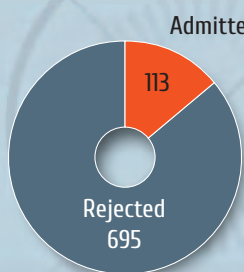
Graduate Student Fellowships (in US\$)

Department Fellowships	793,172
Non-resident Tuition for Teaching Assistants	327,210
Qualcomm Fellowship	282,892
Dissertation Year Fellowship	107,124
NRT matching funds	105,714
Dean's GSR Support	97,517
Faculty Unrestricted Fellowships	69,657
Samueli Fellowship	65,413
Broadcom Fellowship	56,940
IGERT Fellowship	56,940
Eugene Cota Robles Fellowship	51,510
Graduate Opportunity Fellowship	48,390
Sandia Excellence in Science & Technology Fellowship	39,418
Ph.D. Preliminary Exam Top Score Fellowships	38,836
Howard Hughes Medical Institute Research Fellowship	37,637
Dean's Fellowship & Camp Funds	29,000
IBM Fellowship	25,413
Guru Krupa Fellowship	17,000
Dr. Ursula Mandel	15,000
Raytheon Fellowship	11,968
Northrop Grumman Fellowship	3,314
Intel Fellowship	3,314
Malcolm Stacey Memorial Fellowship	3,132
Conference Travel	2,630
Total	\$2,289,141

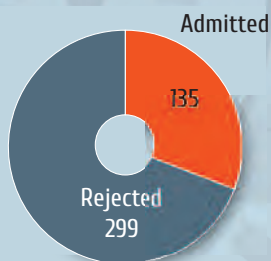
Graduate Students Admitted

Total 405 Admitted

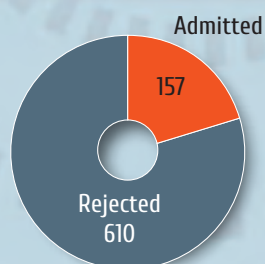
Circuits & Embedded Systems



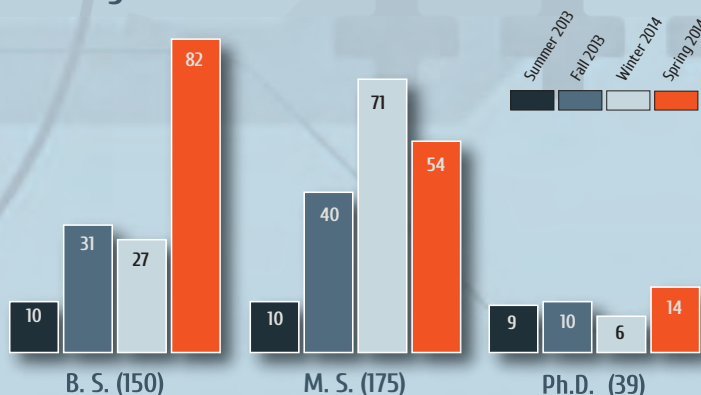
Physical & Wave Electronics



Signals & Systems



Degrees Conferred in 2013-2014



Industrial Affiliates Program

The Electrical Engineering Department is dedicated to initiating and forging partnerships with industry, in which both the school and the companies involved benefit from the exchange of technology innovations and talent. The Industrial Affiliates Program (IAP), initiated in 1981, provides a variety of services that include:

- Nurturing the talent pipeline between UCLA and IAP members
- Providing access to UCLA intellectual capital
- Exploring collaborative research opportunities
- Providing access to state-of-the-art research facilities
- Enhancing industry visibility on campus

The department also serves as an invaluable consulting resource to our affiliate members. In turn, a company's participation in IAP provides essential program enhancement and aid to students with a portion of the membership fees being applied towards laboratory, instructional and other equipment needs. More details are available at the IAP website:

<http://www.ee.ucla.edu/people/industry>



Our Thanks to Affiliate Members for their Support

Administration

M. -C. Frank Chang, *Department Chairman*
 Oscar M. Stafsudd, *Vice-Chair, Undergraduate Affairs*
 Paulo Tabuada, *Vice-Chair, Graduate Affairs*
 Jason C. S. Woo, *Vice-Chair, Industry Relations*

Area Directors

C.-K. Ken Yang, *Director, Circuits and Embedded Systems*
 Benjamin Williams, *Director, Physical and Wave Electronics*
 Izhak Rubin, *Director, Signals and Systems*

ABET Committee

M. -C. Frank Chang, *Department Chairman*
 Asad Madni, *Alumni Advisory Board Chair*
 Oscar M. Stafsudd, *Professor and Vice-Chair, Undergraduate Affairs*
 Jason C. S. Woo, *Professor and Vice-Chair, Industry Relations*

Centers Directors and Committees Chairs

Yuanxun Ethan Wang, *Director, Center for High-Frequency Electronics*
 Robert N Candler, *Director, Nano-Electronics Research Facility*
 William J. Kaiser, *Chair, Tenure Committee*
 Suhas Diggavi, *Chair, Recruitment Committee*
 Asad A. Abidi, *Chair, Non-Tenure Committee*
 Chandrashekar J. Joshi, *Chair, Courses and Curriculum Committee*

Annual Report 2013-2014

Editors/Coordinators

M.-C. Frank Chang, *Professor & Chairman*
 Jacquelyn T. Trang, *Chief Administrative Officer*

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