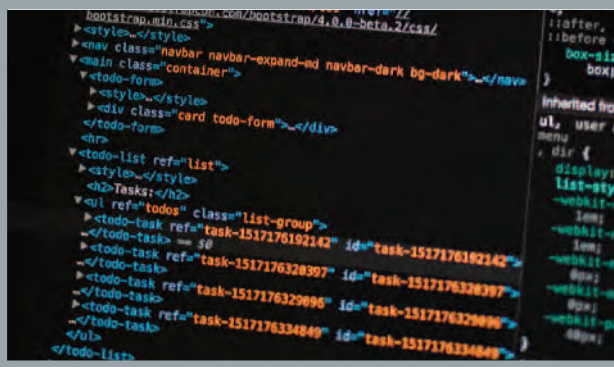
ANNUAL REPORT

ELECTRICAL AND COMPUTER ENGINEERING



2017-2018

UCLA

UCLA Electrical and Computer Engineering:

ENGINEERING CHANGE

Change is a constant feature of our technological age. We often think of the high pace of change as being unique to our era, but innovations from 1820-1920 arguably created a larger change in the manner of living in industrial societies than the past century. In 1820, the fastest information could move was by ship. By 1900 there was a global digital communications network: the telegraph. The fundamentals of electricity generation and distribution were known and the grid was beginning to rapidly spread. Broadcast radio was established before 1920 and took off soon afterward. In the United States, more people lived in cities than on the land. The basic pattern of modern life was established.

Chair Gregory Pottie

Now we are nearing a new inflection point in the economy due to advances in information technology and processing. The supply chain is about to undergo a massive transformation that will automate it from resource extraction through manufacturing to final distribution. It is the latest instance of the replacement of manual labor by machines. At the same time, many routine cognitive tasks will also be automated. This brings up the very serious question of the future of work, when physical wants are mainly satisfied by the products of machine labor. A desirable outcome is that a larger fraction of the population will be involved in creation of new products and services. With the reduced barrier to market entry enabled by the web, embedded products and the Maker movement, we are already moving in this direction. What changes in college education are required for this to be supported more broadly?

One possible answer to this question is for engineers to be better informed of what the liberal arts have to offer, and for students of the liberal arts to be better informed of engineering methods and how technology progresses. This mutual understanding will enable incorporation of societal concerns in the development of products, better political decisions concerning regulation of technology, and innovation in the arts and other creative industries. This is also the obvious approach for an immediate future in which embedded devices are strongly shifting the focus of products towards intelligent objects and environments that interact with people. Cultural understanding will increasingly be a requirement of product design, with design teams that are more diverse in the disciplines represented than is common today. For such teams to be effective, all the members must understand at least the basics of what the other team members do. However, driven by the current job market, the fraction of college students pursuing degrees in the liberal arts is at a record low. Meanwhile, the structure of most engineering undergraduate degrees has barely changed in the past 40 years, except for incorporation of some additional design experiences. We largely train students as we were trained, with mismatches to imminent societal needs in both liberal arts and engineering degree programs. In the past year, with support from a planning grant from the Teagle Foundation, we have been engaged in a lively cross-campus discussion on what changes we should implement to advance a vision that would prepare all of our students for this interdisciplinary future.

We are also engineering change in our research programs. Among the highlights, *Prof. Xiang "Anthony" Chen* is directly engaged with human-computer interfaces, while *Prof. Achuta Kadambi* is pioneering new approaches to computational vision. *Prof. Ankur Mehta* has reimagined how to design and build robots for everyday use. *Prof. Mona Jarrahi* is advancing THz technology, developing efficient and linear devices that will greatly expand the practical applications. Faculty have also received multiple prestigious honors for their contributions over many years of research. *Prof. Ali Sayed* was elected to the National Academy of Engineering for contributions in adaptive signal processing. *Prof. Stanley Osher* was also elected to the NAE, for his research in computational vision and compressed sensing. *Profs. Subrumanian Iyer, Henry Samueli, Eli Yablonovitch* and *Alan Willson* were elected the National Academy of Inventors for their innovations in integrated circuits. *Prof. Kang Wang* received the JJ Ebers Award of IEEE Electron Devices Society and the 2018 Magnetism Award and Neel Medal, for his discovery of the Majorana fermion, a key to quantum computing. *Prof. Frank Chang* was awarded the JJ Thompson Medal for Electronics for many contributions in RF circuits.

The UCLA ECE Department is thus playing a leading role in engineering change both through our research and teaching programs. I look forward to another exciting year.

Annual Report 2017-2018

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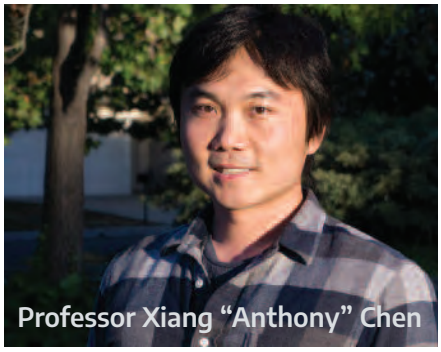
New Faculty

Xiang "Anthony" Chen Enables Interaction with an Ecosystem of Devices

Interactive computing technology is becoming increasingly ubiquitous. Advances in processing, sensing, and displays have enabled devices that fit into our palms and pockets, are wrist-worn or head-mounted, or are embedded as smart clothing. Soon, many of us may carry not one smart device, but two, three, or even more on a daily basis. Assistant Professor Xiang "Anthony" Chen studies, designs, and builds user interface systems that enable people to interact with an ecosystem of devices, from wearables, mobiles and appliances to 3D printers.

Interacting with Small Devices

To expand the limited screen space of mobile and wearable devices, Professor Chen instrumented a depth camera on top of a commercial smart phone, thus enabling sensing a user's finger positions in mid-air. Now users can perform an in-air gesture before landing the finger on the screen. The in-air gestures, such as drawing a circle in-air, triggers the touch to open a context menu, similar to a "right-click" action.


Professor Xiang "Anthony" Chen

Smart watches are even smaller than phones, posing greater challenges for interactive tasks such as text entry. Professor Chen developed *Swipeboard*—a target-agnostic technique for typing on a 12mm x 12mm screen. Instead of having to tap regular QWERTY keys (targets), Swipeboard uses a two-step gesture: first swiping to a region of the keyboard, then a second swipe selects a specific key. In a study, users achieved 20 words per minute using *Swipeboard* on a watch-size interface.

Professor Chen and colleagues developed a type of tiny projector using LED and films, that can be attached to the sides of a smartwatch to project additional information directly onto the user's skin.

Interacting with an Internet of Things

As devices are getting smaller, they are also becoming increasingly ubiquitous in our everyday lives. To make devices work together, Professor Chen developed *Duet* — an interactive platform that turns a watch into an integral part of a phone. With the watch acting as a peripheral sensor, the joint-system can, for example, detect which part of a user's hand is touching the phone's screen by correlating the watch's orientation with the touch events, yielding an extended set of hand-part based touch gestures.

Generalizing to a broader Internet of Things (IoT), Professor Chen developed a system that allows users to connect to an appliance by simply taking its picture. In another IoT project, Professor Chen developed a way for users to 'conduct' different devices' performance, such as appropriating a phone as a clicker for a presentation running on a laptop. Users simply swipe the phone screen and control the slidedeck. The system automatically makes the association, without having to do any programming.

Interacting with Fabrication Machines

Professor Chen's work allows users to harness fabrication machines to express their creativity. For example, one project enables everyday users with off-the-shelf 3D printers to produce soft strands hair-like structures that go beyond the default rigid plastic feel. In another project, using generative methods, a tool allows users to create a sketch, which is then automatically transformed into a functional robot leg.

New Faculty Achuta Kadambi

Giving Robots the Gift of Sight

Assistant Professor Achuta Kadambi is on a quest to give the gift of sight to machines. He does this by building computational imaging systems that tightly couple imaging hardware (electrical engineering) and computer algorithms (computer sciences). If successful, computational imaging has the potential to unleash a new era of superhuman robotics.

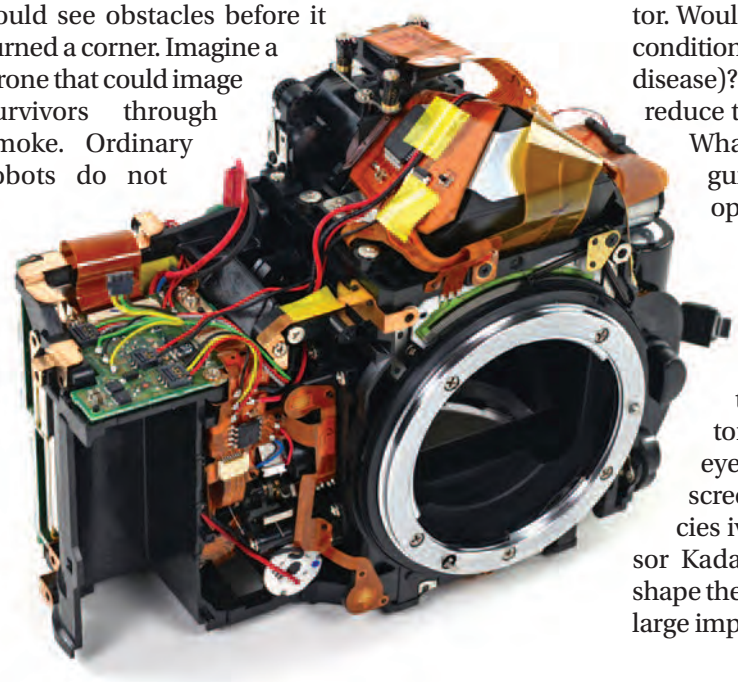
Pillar I: Computational Imaging

The Kadambi Lab is interested in forming images in seemingly impossible scenarios. For instance, might it be possible to see through opaque scattering media like biological tissue? Is it possible to see around corners? Can cell phone cameras guarantee images that are sharp and in focus? Can we create cameras that can acquire 4-dimensional imagery? Specific focus areas include light field imaging, time of flight imaging, polarization, and coherent optics. These constructs are parsed using signal processing and numerical methods like convex optimization and machine learning.

Pillar II: Computational Robotic Imaging

Inspired by the diversity of animal eyes, we believe that vision systems will evolve with the needs of robots. Imagine if a self-driving car had a vision system that could see obstacles before it turned a corner. Imagine a drone that could image survivors through smoke. Ordinary robots do not have high-performance imaging on board. Extraordinary robots will have specialized imaging systems that adapt to complex tasks, like rescuing survivors hidden in the smoke of a wildfire. We are particularly interested in the intersection between computer vision, control theory, and optics to advance robotic intelligence.

Professor Achuta Kadambi



Pillar III: Computational Health Imaging

We study how advanced imaging systems can impact the needs of healthcare. Imagine if superhuman cameras could see details that are invisible to a human doctor. Would it be possible to more accurately diagnose conditions like tuberculosis (the most deadly infectious disease)? Is it possible to use computational imaging to reduce the cost of X-ray procedures to a few dollars? What sort of an artificial vision system should guide surgical robots? This pillar draws from optics, machine learning, and bioengineering.

Impact

Professor Kadambi's goal is to have significant societal impact. Kadambi's lab intends to deploy drones with advanced eyes that will help rescue human lives in wildfires, tornadoes, and other natural disasters. Robotic eyes with advanced imaging can be used to screen tumors and detect other forms of malignacies ivisible to the human eye. Ultimately, Professor Kadambi's investigations have the potential to shape the future of electrical engineering, while having large impact in society.

Professors Christina Fragouli, Paulo Tabuada and Suhas Diggavi

Awarded $ 3.6 Million to Secure Smart Campuses

A reserch consortium consisting of UC Riverside, UCLA, UCSD and UCSB along with Los Alamos National Laboratory, was awarded $ 3.6 million for the three-year project "Securing smart campuses: a holistic multi-layer approach" through the 2018 UC Laboratory Fees Research Program. The vision for this project is to build security and privacy for "smart campuses", that present a microcosm of smart cities and more generally of human cyber-physical systems.

The collaborative project, co-led by UC Riverside and UCLA (specifically Professor Christina Fragouli, Professor Paulo Tabuada and Professor Suhas Diggavi), aims to develop a holistic framework to enhance the security, privacy and safety of campus operation, building on the team's expertise in CPS security, information & wireless security, software & hardware security and privacy-preserving machine learning.

Professors Suhas Diggavi, Mani Srivastava & Paulo Tabuada

Awarded a Collaborative Research Alliance (CRA)

UCLA Professors Suhas Diggavi, Mani Srivastava, and Paulo Tabuada are part of a four-institution consortium that has been awarded a ***Collaborative Research Alliance (CRA) on Internet of Battlefield Things (IoBT)*** by the Army Research Laboratory. The CRA is being funded $ 25 million for an initial 5-year period (with UCLA's share being approximately $ 4 million), and will have a potential extension for another 5-years for a total of $ 67.6 million. The CRA will develop the scientific foundations of a next-generation Internet of Battlefield Things (IoBT) that is intended to enable new, predictive battlefield analytics and services. UCLA will lead the research area on autonomic IoBTs to enable intelligent services, and also engage in research on cyber-physical security, distributed analytics, and mathematical foundations of composable and adaptable IoBTs. Besides UCLA, the consortium includes the University of Illinois at Urbana Champaign, as the lead institution, the University of Massachusetts at Amherst and the University of Southern California. The alliance also includes Carnegie Mellon University, SRI International and the University of California, Berkeley as subawardees.

Distinguished Adjunct Professor Asad M. Madni Receives Major Recognitions

The AIMBE inducted Professor Madni to its College of Fellows (left), and at NASEM event with Nobel laureate physicist Adam Riess, CEO of Fulgent Genetics Ming Hsieh and Taj Madni

On June 15, 2018, ***The Institute of Electrical & Electronics Engineers (IEEE)*** Board of Directors named Professor Asad M. Madni as the recipient of the *2019 IEEE Frederik Philips Award*, for outstanding accomplishments in the management of research and development resulting in effective innovation in the electrical and electronics industry, "for leadership in and pioneering contributions to the development and commercialization of sensors and systems for aerospace and automotive safety."

The letter from IEEE President, James Jefferies, states: "For nearly a century, the IEEE Awards Program has paid tribute to technical professionals whose exceptional achievements and outstanding contributions have made a lasting impact on technology, society, and the engineering profession. Each year the IEEE Awards Board recommends a select group of recipients to receive IEEE's most prestigious honors, so you can feel justifiably proud. Congratulations on your achievements, which honor both you and IEEE." Past recipients include Gordon Moore, co-founder of Intel and Arun Netravali, chief scientist of Lucent Technologies.

Professor Madni was one of 20 distinguished leaders invited by National Academy of Sciences President Marcia McNutt, National Academy of Engineering President C. D. Mote, Jr., and National Academy of Medicine President Victor J. Dzau to honor U.S. 2017 Nobel Prize recipients Barry Barish (Physics), Joachim Frank (Chemistry), Michael Rosbash (Physiology and Medicine), Kip Thorne (Physics), and Michael Young (Physiology and Medicine) at a reception on Capitol Hill on April 18, 2018. U.S. Senators Lamar Alexander and Christopher Coons co-hosted the event. The ceremony recognized the scientists for their significant contributions to their fields as well as to the advancement of human knowledge. Among the invited distinguished leaders were Adam Riess (2011 Nobel Prize in Physics), Erling Norrby (The Royal Swedish Academy of Science), Norm Augustine (Retired Chairman & CEO of Lockheed Martin) and Ming Hsieh (Philanthropist & CEO of Fulgent Genetics).

On April 9, 2018, The American Institute for Medical & Biological Engineering (AIMBE) inducted Professor Madni to its College of Fellows "for seminal contributions to the development and commercialization of sensors and systems for biomedical instrumentation and aerospace and automotive safety."

Election to the AIMBE College of Fellows is among the highest professional distinctions accorded to a medical and biological engineer. The College is comprised of the top two percent of engineers and its membership honors those who have made outstanding contributions to "engineering and medicine research, practice, or education" and to "the pioneering of new and developing fields of technology, making major advancements in traditional fields of medical and biological engineering, or developing/implementing innovative approaches to bioengineering education."

Professor Mona Jarrahi Receives the Inaugural Watanabe Excellence in Research Award

Associate Dean Harold Monbouquette (left) delivers the award to Professor Mona Jarrahi

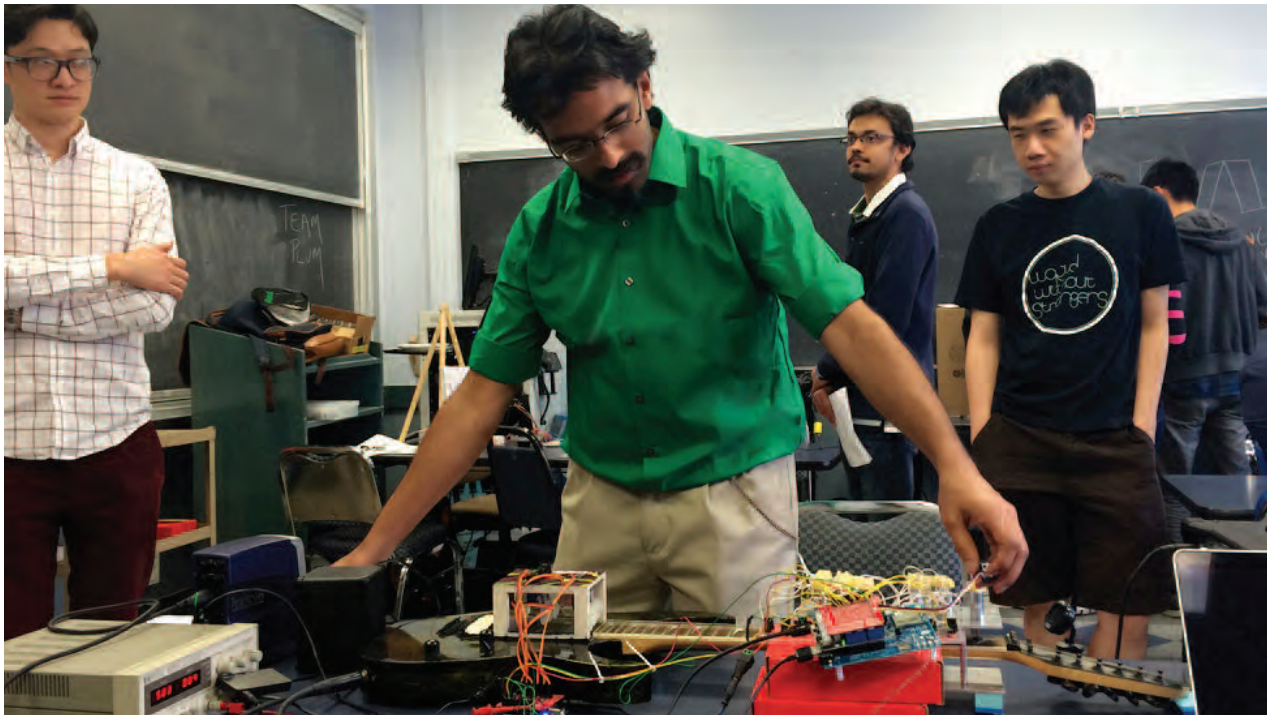
The Watanabe Excellence in Research Award recognizes research contributions of one of the faculty members at the *UCLA Samueli School of Engineering* each year. The award recognizes innovation in pursuing critical research that addresses a major societal challenge and engaging graduate and undergraduate students in the research program.

Professor Jarrahi's research is focused on ultrafast electronic and optoelectronic devices and integrated systems for terahertz sensing, imaging, and communication systems.

Although unique potentials of terahertz waves for chemical identification, material characterization, biological sensing, and medical imaging have been recognized for quite a while, the relatively poor performance, higher costs, and bulky nature of current terahertz systems continue to impede their deployment in field settings. Professor Jarrahi's research group is currently investigating the use of novel materials, nanostructures, quantum structures, as well as innovative nano-plasmonic and optical concepts to address the performance limitations of existing terahertz systems. In this regard, they have already made significant contributions, advancing the state-of-the-art terahertz devices and systems.

Professor Jarrahi's scientific achievements have been recognized by several prestigious awards including the *Presidential Early Career Award for Scientists and Engineers*; *Friedrich Wilhelm Bessel Research Award* from Alexander von Humboldt Foundation; *Moore Inventor Fellowship* by Betty and Gordon Moore Foundation; *Kavli Fellowship* from the National Academy of Sciences, *Grainger Foundation Frontiers of Engineering Award* from the National Academy of Engineering; *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 National Committee of the International Union of Radio Science; *Lot Shafai Mid-Career Distinguished Achievement Award* from the IEEE Antennas and Propagation Society; *Popular Mechanics Breakthrough Award*; *Early Career Award* from the National Science Foundation; *Young Investigator Awards* from the Office of Naval Research, Army Research Office, and Defense Advanced Research Projects Agency; the *Elizabeth C. Crosby Research Award* from the University of Michigan; *Distinguished Alumni Award* from Sharif University of Technology; and best-paper awards at the International Microwave Symposium, International Symposium on Antennas and Propagation, and International Conference on Infrared, Millimeter, and Terahertz Waves.

Professor Ankur Mehta receives NSF CAREER Award to Bring Robots to Everyone



Ankur Mehta, assistant professor of Electrical and Computer Engineering at the UCLA Samueli School of Engineering , has received a *National Science Foundation CAREER award*, the agency's highest honor for faculty members at the start of their research and teaching careers.

The grant will support his research that aims to democratize robotics — making robots available to everyone, everywhere.

Thanks to the ubiquity of personal computers, powerful smart phones with intuitive apps, and a variety of smart and connected devices, the ability to solve problems that need computational power is now broadly available. However, similar capabilities to build automation to address tasks in the physical world lags far behind. Mehta aims to change that paradigm, ultimately making robots as pervasive as computers are today.

Professor Ankur Mehta with student Tsang-Kai Chang

The new grant will support the development of on-demand creation of custom robots through user-friendly tools that someone without a technical background can use. In addition, the research will include exploring new algorithms for users to control these robots individually and in swarms.

In short, Professor Mehta's goal is for everyone to be able to say, for any personal physical task that needs to be solved, "There's a robot for that."

This is Mehta's second NSF grant for democratizing engineering. In 2016, he received a grant for a computational approach to customizing design, which aims to build resources for people without the technical know-how of a domain expert to create their own custom objects.

Professor Mehta joined UCLA in 2015 and directs the ***Laboratory for Embedded Machines and Ubiquitous Robots (LEMUR)*** He received his Ph.D. from UC Berkeley and was a postdoctoral scholar at MIT's Computer Science and Artificial Intelligence Laboratories.

Reza Rofougaran Honored as Alumnus of the Year

Reza Rofougaran was honored as *Alumnus of the Year* at the 2018 UCLA Engineering Awards Dinner recognizing the very best of the school's alumni, students and faculty. The annual celebration was held in March 3 at the Meyer & Renee Luskin Conference Center on the UCLA campus.

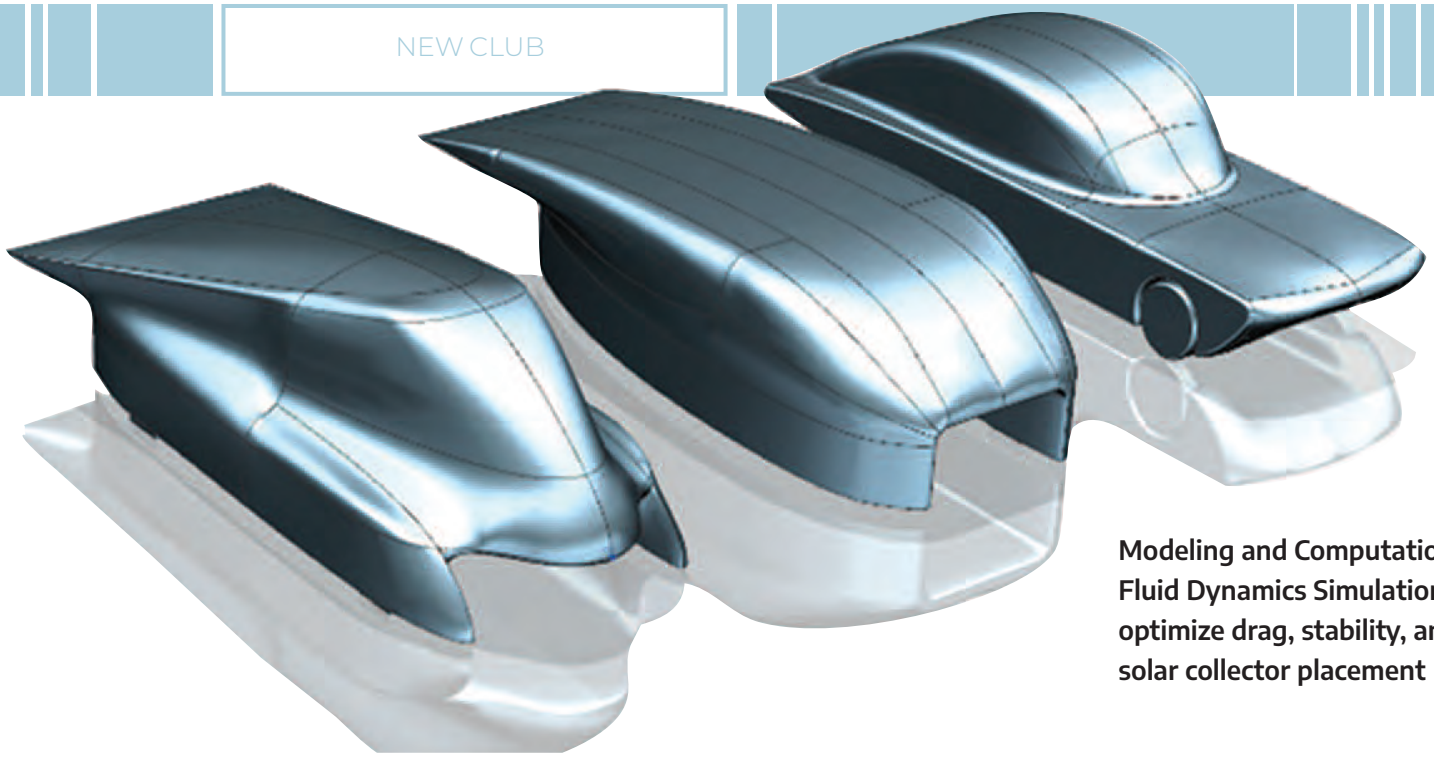
"These individuals are trailblazers," said Jayathi Murthy, Dean of the UCLA Samueli School of Engineering. "They set new standards for what it means to be really good at what you do."

Reza Rofougaran 1986, M.S. 1988, Ph.D. 1998, is a pioneering figure in the wireless communications industry and a prolific inventor. After earning his doctorate in electrical engineering under Professor Asad Abidi, Rofougaran and his sister Maryam Rofougaran 1992, M.S. 1995, co-founded Innovent Systems. They built the world's first CMOS Bluetooth transceiver, an important milestone in wireless communications.

"He was the first to conceive the idea of a single chip radio that would handle interconnectivity," said Abidi, in a video tribute shown before Dean Murthy presented the award. "We would not have smart phones, we would not have WiFi chips in our computers, we would not have this mobile access that everybody in the world relies upon today. It has revolutionized everything."

This innovation attracted the attention of Broadcom, which acquired the company in 2000. Today Rofougaran is the co-founder and CTO of Movandi, a venture-backed startup working to harness the potential of millimeter-wave for 5G communications. Rofougaran has become one of the world's most prolific inventors, with more than 800 patents issued to his name.

Professor Abidi, Reza Rofugaran with his family, his sister Maryan Rofougaran and Professor Henry Samueli



Modeling and Computational Fluid Dynamics Simulation to optimize drag, stability, and solar collector placement

New Solar Car Club

Professor Dwight Streit and a group of students from the solar car team met with Northrop Grumman Aerospace Systems recently. The company is making space and equipment available to the students to enable them to build the first UCLA solar car. This includes their *Fablab* which is a well-equipped maker space for Northrop Grumman employees. It also includes space in their composites manufacturing building to actually assemble the car. Lisa S. Jones, director of microelectronics technology, is the key person at the company and she facilitated the approvals for the project.

Dwight Streit, director of UCLA Engineering's Institute for Technology Advancement.

This is UCLA's first solar car and first attempt to participate in the World Solar Challenge. The team is hoping to compete in the following events:

- Formula Sun Grand Prix qualifying event, Motorsport Park, Hastings, Nebraska.
- American Solar Challenge, which starts in Omaha, Nebraska and ends in Bend, Oregon.
- World Solar Challenge, a 3,022 km race across the Australian Outback.

The 30 members of the UCLA Bruin Solar Car are students from UCLA and Santa Monica College, from all majors, mostly from engineering but also from math, science and business programs.

The group is currently designing and building the first test-mule. The first sketches were done using Siemens NX, which the Siemens donated to the team. The Solar Car project currently also have support from Teledyne, Spectra Labs, and several other companies.

The faculty leading the project are Professors Dwight Streit and Ali Mosleh, both from UCLA, with support from Professor Tram Dang (SMC) and Professor Greg Pottie (UCLA).

The Mechanical Team is responsible for desiging the chassis, steering, suspension and interior design. The current goal is to build a simple single occupant model for the test mule. The results from this prototype will then be modified to accomodate a multi-occupant vehicle.

The Electrical Team is responsible for system architecture and design, specifications and purchase of solar cells, maximum power point trackers, batteries, motors, and controllers. The team is designing and building some microelectronics at UCLA and will interface with Mechanical Team.

WATT

WATT's Professional Networking Night

UCLA WATT (*Women Advancing Technology through Teamwork*) is the UCLA chapter of *IEEE-WIE (Women in Engineering)*. WATT's goal is to create a space to support minorities within the Electrical and Computer Engineering community, particularly women. WATT uses electrical engineering as a common interest in order to build a community of confident, socially aware engineers.

WATT provides mentorship, technical, professional, outreach, advocacy and wellness, and social events. The HogWATTs mentorship program, inspired by J.K. Rowling's *Harry Potter*, matches up first- and second-year students with upperclassmen who guide them through their time at UCLA, be it academically *in RavenCapacitor*, technically in *HufflePower*, socially in *GryffInductor*, or professionally in *SlytherOhm*.

The technical and professional workshops serve as opportunities for members to build their technical skills in tinkering workshops such as the *WATTches*, where students get to build watches with an Adafruit Neopixel Ring, and network in professional events like *Dinner with Intel* and *Resume Workshop with Google*.

Representing minorities in the field of *STEM (science, technology, engineering and mathematics)* is extremely important, and we have the privilege of doing outreach events at nearby grade schools teaching students how fun Electrical Engineering is. We kicked off the *Big Sister Little Sister* Program at Archer School for Girls in 2018, with weekly classes and mentoring girls interested in pursuing a career in engineering.

WATT is also unique in its focus on advocacy and mental health. WATT holds workshops that pertain to social issues such as imposter syndrome and LGBTQ+ issues, and workshops related to depression and anxiety, productivity, and self-defense workshops. Educating students at UCLA is the first step in destigmatizing mental health and bringing awareness when working in more diverse environments. Not only does WATT provide a space to learn and grow academically, technically, and professionally, but it also provides a safe space to socialize and create friendships.

ECEGAPS

Electrical and Computer Engineering Graduate Student and Post-Doc Society (ECEGAPS) is an organization that aims to provide a social and professional community for Electrical and Computer Engineering graduate students and post-docs. We also hope to be able to act as a medium for the members' social, cultural, academic, and professional objectives.

Through our *Weekly Socials* we have established an informal environment for people to meet and talk. They have become a staple in the lives of many of our Department's students wishing to take a short break and catch up with others. We have also invited multiple companies to hold small info sessions, giving both the recruiters and students a unique networking opportunity. We took an active part in organizing this year's inaugural *Afternoon with Industry* event, bringing together students, faculty and industry representatives for networking, poster sessions and interviews. We also continue to maintain the *ECE Graduate Resume Book*, available to the Department's corporate partners. We hope to continue with these activities and offer new ones in the future.

If you would like additional information or want to become a sponsor for ECEGAPS, please email *ecechair@seas.ucla.edu* for details.

STUDENT AWARDS

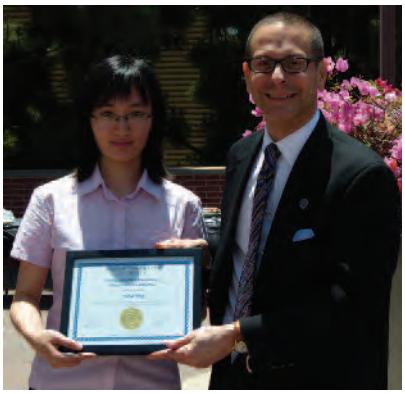
The Chair of the Electrical and Computer Engineering Department, **Greg Pottie**, delivers the Student Awards.

Hannaneh Hojaiji (left), the Christina Huang Memorial Prize recipient and Outstanding Bachelor of Science, **Pavan Holur** (right).

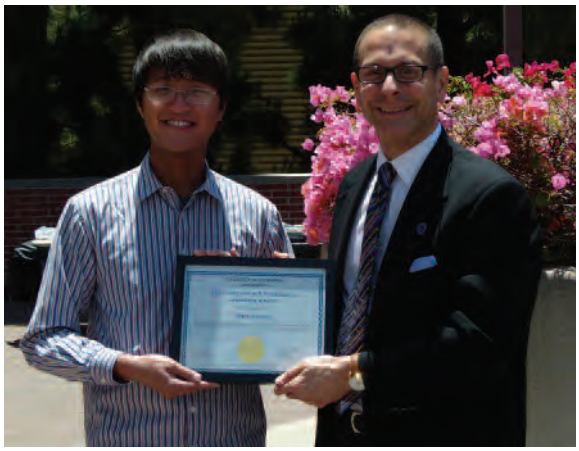
The Henry Samueli Excellence in Teaching Award for a design course recipient **Xu Zhang**.

Irina Alam (left), Outstanding Master's Thesis Award in Circuits & Embedded Systems , with her advisor Puneet Gupta and Chair Greg Pottie; **Zhuyun "Maggie" Xiao** (right), Outstanding Master's Thesis Award in Physical & Wave Electronics.

Jordan Budhu received the Henry Samueli Excellence in Teaching Award for a lecture course.



Jinghui Yang (left), Outstanding Ph.D. Dissertation in Physical & Wave Electronics, *Chip-Scale Architectures for Precise Optical Frequency Synthesis* ; **Clayton Schoeny** (right), Outstanding Ph.D. Dissertation in Signals & Systems, *Coding for Future Large-Scale Data Systems.*



Gary Yeung, the recipient of the Henry Samueli Excellence in Teaching Award for a graduate course.

STUDENT CENTERS

UCLA HKN

The UCLA Iota Gamma Chapter of Eta Kappa Nu (HKN) is the electrical and computer engineering honor society dedicated to encouraging excellence through scholarship, service, leadership, and character. The Iota Gamma Chapter currently has around 150 members and continues to grow. HKN aims to serve the ECE community under the guidance of Professor Benjamin Williams, providing tutoring and hosting various events throughout the year.

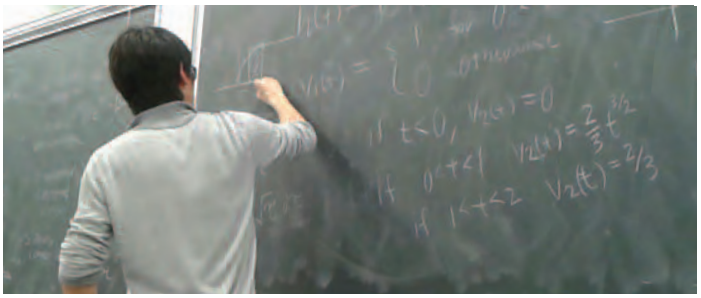
The events are split into technical events and social events. The technical events include a quarterly professor lunch, corporate infosessions, and our workshop series on MATLAB and Verilog. The social events include board game nights, movie nights, and KBBQ outings. One of the main events that HKN co-hosts with the IEEE branch is the annual ECE Department Town Hall, where students can provide feedback on the current curriculum.

UCLA IEEE Student Chapter

UCLA Institute of Electrical and Electronics Engineers (IEEE) is one of the largest engineering-focused clubs at UCLA. In addition to our corporate infosessions, workshops, and events aimed to help students in career building and professionalism, UCLA IEEE is known for the challenging, educational, and fun projects that allow true hands-on experience outside the classroom.

The Open Project Space program focuses on 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 advanced students who want a challenging robotics experience, the Micromouse and Natcar projects are oportunities to build something crazy. Students are also free to come up with independent projects.

IEEE hosts several large events open to the engineering community, such as an annual fair showcasing local startups, as well as an all-day professional development workshop.



TRANSFERS AND TRANSITIONS FOR COMMUNITY COLLEGES

The distinguishing feature of the engineering profession is an organized approach to design: how to systematically apply scientific, mathematical and business concepts to economically produce products of use to people. Yet many engineering programs postpone design until very late in the curriculum, focusing the early years on scientific and mathematical concepts without the payoff of creative hands-on application of that knowledge. While 4-year schools are now awakening to this problem and offering design threads through the whole program, it is very difficult for community colleges to offer even a broad set of engineering lecture courses, let alone labs and design courses demanding specialized space. The resource constraints are daunting: 1) very often, a single part-time instructor is responsible for all engineering courses; and 2) colleges lack funds for reserving space to serve a small community of students. In consequence, students either become discouraged from lack of materials in their areas of interest, or arrive at 4-year colleges with few courses in their major, lengthening time to degree.

With the financial support of the Office of Naval Research in a new contract with PI Prof. Greg Pottie, we are creating a network to remedy this problem. Elements include: 1) creation of on-line modules making up the difference between standard community college courses and UCLA requirements; 2) development of "student-owned" labs, making use of embedded technology in any seminar-type room; 3) exploration of hybrid labs that combine virtual/simple labs with workshop-type visits to UCLA facilities; 4) creation of a network of instructors to share instructional materials; 5) development of a bridge program for transfer students to ease the transition and provide mutual support and 6) forging of partnerships between UCLA engineering student organizations and organizations at partner colleges. The goal is to provide a comprehensive approach to reduce barriers between 2- and 4-year schools. This effort is timely in California, funding arrangements for community colleges are undergoing a transition that will favor students graduating with "certificates" that will reduce the time to degree upon transfer to 4-year schools. A collaborative effort among the community college, Cal State and UC systems is now underway to help define these certificates. This will be a major topic of discussion at the next California Engineering Liaison Council (ELC) meeting to be held at UCLA on Nov. 15-16.

Our goal is to broaden the availability of engineering courses in the community college system to reduce time to degree, increase retention in engineering, and foster a diverse engineering workforce that reflects all California communities, and of course, to persuade the outstanding transfer students to come to UCLA!

MEMBERS OF NATIONAL ACADEMIES

Distinguished Chancellor's Professor Asad A. Abidi

National Academy of Engineering, 2007 for his contributions to the development of MOS integrated circuits for RF Communications.

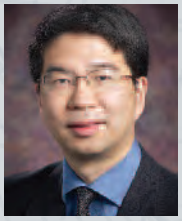
Distinguished Adj. Professor Asad M. Madni

National Academy of Engineering, 2011
National Academy of Inventors, 2015
Former President, COO and CTO of BEI Technologies Inc. He is a Fellow of the NAI, IEEE, IEE, IET, AAAS, NYAS, SAE, IAE, AIAA, RAeS and AIMBE.

Distinguished Professor Mau-Chung Frank Chang

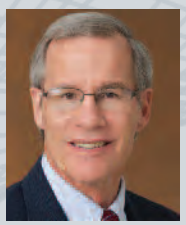
National Academy of Engineering, 2008
National Academy of Inventors, 2015, for his contributions in development and commercialization of III-V-based heterojunction bipolar transistors (HBTs) and field-effective transistors (FETs) for RF wireless communications.

Distinguished Chancellor's Professor Jason Cong



National Academy of Engineering in 2017, for pioneering contributions to application-specific programmable logic via innovations in field-programmable gate array synthesis.

Adjunct Professor Dan Goebel



National Academy of Engineering, 2015
National Academy of Inventors, 2016
Senior Research Scientist, NASA's Jet Propulsion Laboratory. For contributions to low-temperature plasma sources for thin-film manufacturing, plasma materials interactions, and electric propulsion.

Distinguished Professor Tatsuo Itoh

National Academy of Engineering, 2003
National Academy of Inventors, 2013
"for seminal contributions in advancing electromagnetic engineering for microwave and wireless components, circuits, and systems."

Distinguished Professor Chandrashekhar Joshi

National Academy of Engineering, 2014. Founder of the experimental field of plasma accelerators. He is also a Fellow of the American Physical Society, IEEE and the Institute of Physics.

Professor Kuo-Nan Liou

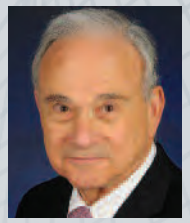
National Academy of Engineering, 1999. Director of the Joint Institute for Regional Earth System Science and Engineering. Nobel Peace Prize, 2007, shared with Intergovernmental Panel on Climate Change.

Professor C. Kumar Patel
National Academy of Sciences, 1974
National Academy of Inventors, 2012
Made numerous contributions in gas lasers, nonlinear optics, molecularspectroscopy, pollution detection and laser surgery.

Distinguished Professor Yahya Rahmat-Samii
National Academy of Engineering, 2008
For his contributions to the design and measurement of reflector and hand-held device antennas.

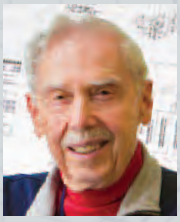
Professor Behzad Razavi
National Academy of Engineering, 2017
For contributions to low-power broad-band communication circuits. He is the director of the Communication Circuits Laboratory.

Professor Jason Speyer
National Academy of Engineering, 2005
For "the development and application of advanced techniques for optimal navigation and control of a wide range of aerospace vehicles."



Professor Dwight Streit
National Academy of Engineering, 2001
For "contributions to the development and production of heterojunction transistors and circuits."

Distinguished Professor Emeritus Gabor Temes
National Academy of Engineering, 2015
For his "contributions to analog signal processing and engineering education."



NATIONAL ACADEMY OF ENGINEERING 2018

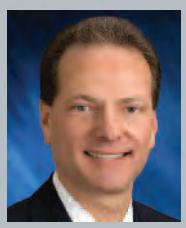
Professor Stanley Osher
National Academy of Engineering, 2018
National Academy of Sciences, 2005
For contributions to imaging, computer vision, and graphics including level-set methods and efficient compressed sensing.

Distinguished Professor Ali Sayed
National Academy of Engineering, 2018
For contributions to the theory and applications of adaptive signal processing.

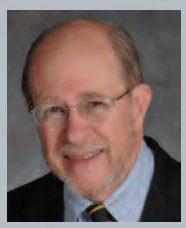
NATIONAL ACADEMY OF INVENTORS 2018

Distinguished Chancellor's Professor Subramanian Iyer
National Academy of Inventors, 2018
He is also a fellow of IEEE and the American Physical Society.

Professor Henry Samueli
National Academy of Inventors, 2018
National Academy of Engineering, 2003
He is co-founder of Broadcom and Recipient of the Marconi Prize, 2012, and UCLA Medal, 2010.



Professor Emeritus Alan N. Willson, Jr.
National Academy of Inventors, 2018.
National Academy of Engineering, 2014
For contributions to the theory and applications of digital signal processing.



Professor Eli Yablonovitch
National Academy of Inventors, 2018.
National Academy of Engineering, 2003
National Academy of Sciences, 2003
He's a foreign member of the Royal Society of London.

CIRCUITS AND EMBEDDED SYSTEMS

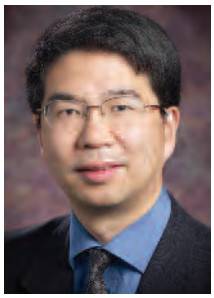
Design Automation for Computer Systems

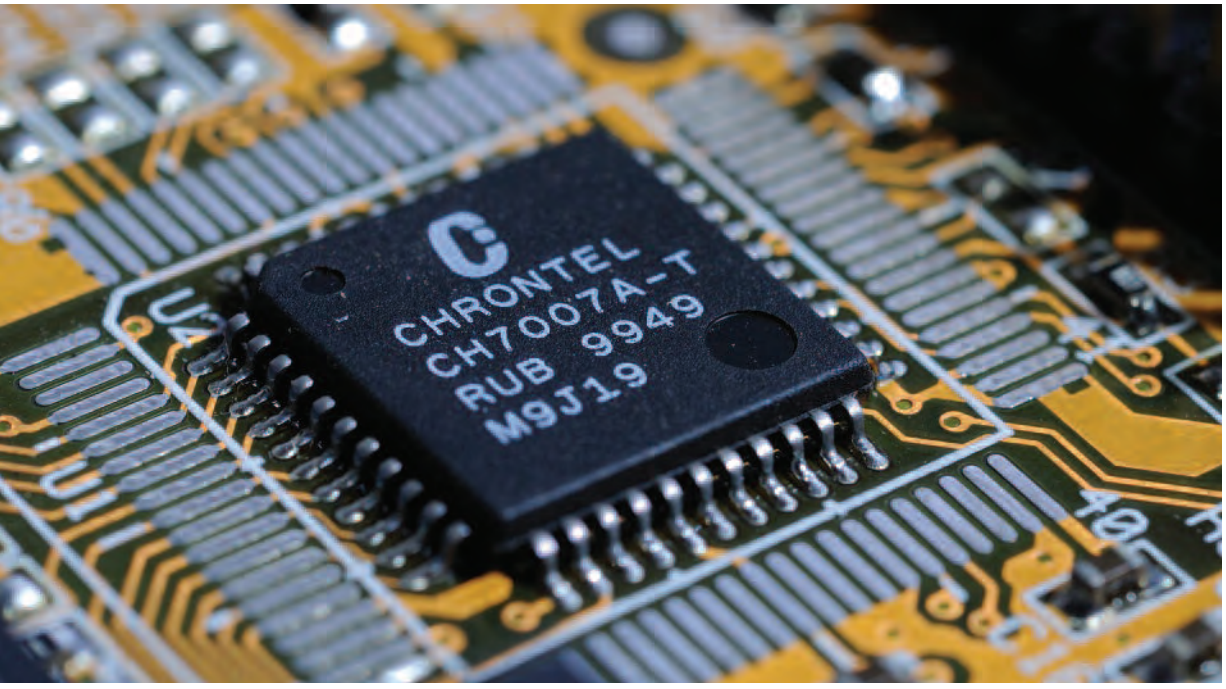
We investigate methodologies and algorithms for the design of complex systems, including circuits and semiconductor technologies, robots, cyberphysical and energy systems, and the Internet of Things.

The effects of nanoscale semiconductor technologies span the entire hardware-software stack, and we investigate how technology changes in devices as well as semiconductor fabrication influence design (especially layout). We study digital, mixed-signal, and FPGA-based configurable integrated circuits in the context of emerging challenges of energy efficiency, security, reliability, variability and manufacturability. We also explore architecture and system software techniques to mitigate variability and reliability challenges of increasingly unpredictable circuit fabric.

Robotics and cyberphysical systems is a rapidly growing field that spans a range of engineering disciplines. We study how such a broadly scoped area can be rigorously codified, inventing representations for the formal definition and analysis of interdisciplinary design. With an eye towards manufacturability, we investigate methods of encapsulating engineering principles and distilling them into design automation algorithms.

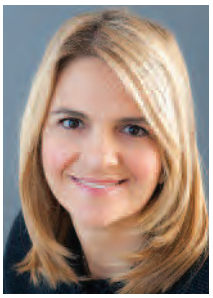
Our research seeks to dramatically reduce cost, increase proliferation, and promote the democratization of design of hardware-software systems.





Faculty Pictured
Jason Cong
Puneet Gupta
Ankur Mehta

Also
M.-C. Frank Chang
Lei He




Faculty Pictured
Danijela Cabric
Babak Daneshrad
Subramanian S. Iyer
Dejan Markovic

Energy-Efficient Digital Architectures and Circuits

We are focusing on digital integrated circuit optimization in the power-area-performance space, its application to emerging health care and communication algorithms, and the investigation of design principles with post-CMOS devices. This includes advanced communication algorithms such as those found in future cognitive radios and new advances in biomedical applications.

Also
Jason Cong
Lei He
Ali Sayed
C.-K. Ken Yang

Emeriti Faculty
Rajeev Jain
Gabor Temes
Alan Willson

Neuroengineering

We address challenges that limit our ability to obtain information as well as our ability to process it in incredibly small and low-power form factors, to advance technology for science, therapy and global health. Our work brings together low-power data processing, biosignal interfaces, communication, and energy aspects to push the limits of biosignal transducer systems, where the energy, size and processing requirements are often several orders of magnitude more challenging than in conventional applications. The cross-disciplinary nature of our work naturally stimulates collaboration across the areas of signal processing, circuits and systems, and devices, as well as interactions at the biological and engineering levels.

Jason Cong
Dejan Markovic

Communication Circuits

We develop integrated circuits for data communications spanning the entire gamut of data rates, ranges, and communication media: from wireless to wired, from PCB traces to plastic waveguides, from intra-chip to long haul links, from cellular to space communications, from VHF to terahertz frequencies, and from low power links to multi-Gb/s links. Our focus is on CMOS electronics and our faculty members are pioneers in this field. We address the fundamental challenges posed by noise, device nonlinearity, and variability in affecting communications in harsh environments, employing theoretical analysis, creative circuit design, and algorithmic digital correction techniques. The recent focus has been on enabling true software defined radios, mm-wave and terahertz applications.






Faculty Pictured
Asad Abidi
Wentai Liu
Sudhakar Pamarti
Behzad Razavi
Henry Samueli
C.-K. Ken Yang

Also
M.-C. Frank Chang
Y. Ethan Wang

Sensor Information Acquisition, Processing and Applications

Sensory information is foundational to modern electronic computing systems across a myriad of application domains such as health, energy, environment, and communications. Our research is developing innovative technologies for the entire waveform-to-decision pathway through which sensor information flows, often in real-time, distributed and resource-constrained settings. In work, we are developing (i) high-sensitivity and low-power transducers and A/D converters for capturing and digitizing sensor signals; (ii) high-performance hardware-software platforms for processing sensor data; and (iii) efficient algorithms and protocols for processing sensor data to derive rich inferences under power, processing, and security constraints in networked settings. Moreover, the results of our research are being applied to real systems in various applications.

Faculty
Robert Candler
Sam Emaminejad
William Kaiser
Aydogan Ozcan
Asad Madni
Gregory Pottie
Mani Srivastava





Embedded and Mobile Computing and Cyber-Physical Systems

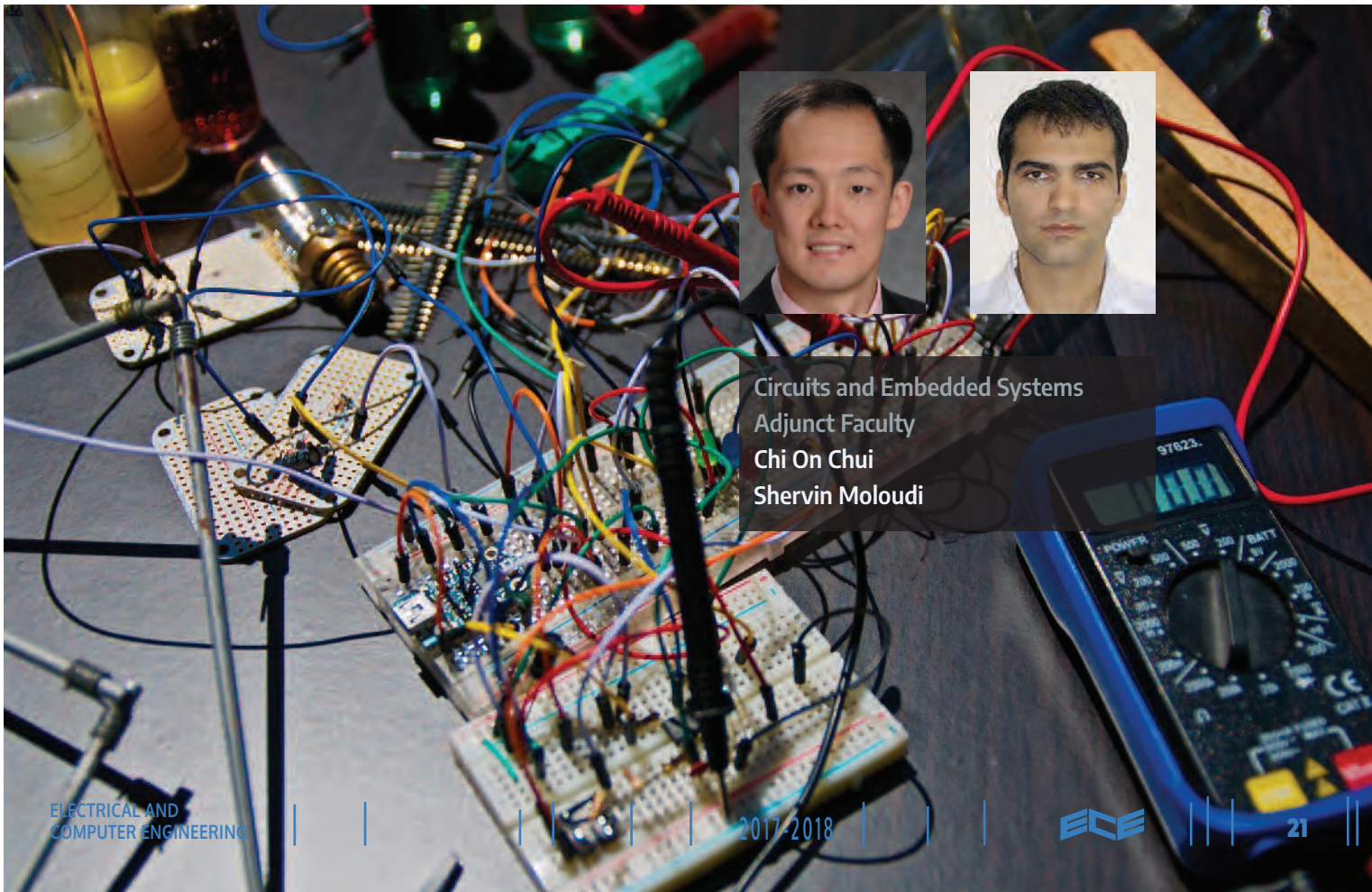
We focus on foundational hardware and software technologies and architectures for computing and communication capabilities necessary for emerging embedded, mobile, and cyber-physical systems. Such systems are found in emerging application domains of critical socio-economic importance, such as robotics, mobile health, sustainable built environments, smart electrical grids, smart water networks, and transportation systems. Our research addresses the fundamental capabilities needed by these systems such as energy efficiency, real-time performance, location awareness, precise time synchronization, adaptation to variations, secure operations, etc., and also develops novel implementation methods spanning the entire system stack from application and operating system software down to the processor, datapath, memory, and I/O hardware.

Faculty Pictured

Xiang "Anthony" Chen
Lei He
William Kaiser
Majid Sarrafzadeh
Mani Srivastava

Also

Suhas Diggavi
Puneet Gupta
Ankur Mehta
Paulo Tabuada



Circuits and Embedded Systems Adjunct Faculty

Chi On Chui
Shervin Moloudi

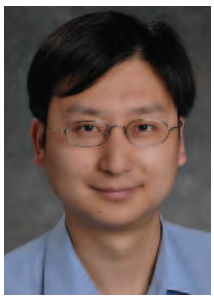
PHYSICAL AND WAVE ELECTRONICS

Electromagnetics

Electromagnetics embodies all aspects of science and engineering topics stemming from Maxwell's equations, describing the behavior of electric and magnetic fields and their interactions with electric charges and currents. The science of electromagnetics underlies nearly all modern electric, computation, and communications technology. Both our coursework and research address theoretical, computational, optimization, design and measurement aspects of electromagnetic devices for a variety of applications, including wireless communications, satellite, space and ground systems, medical and sensor applications, multi-function antennas and metamaterials in frequencies ranging from microwaves and millimeter waves to terahertz.





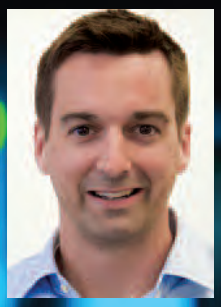
Faculty Pictured
Aydin Babakhani
M.-C. Frank Chang
Tatsuo Itoh
Kuo-Nan Liou
Yahya Rahmat-Samii
Y. Ethan Wang

Also
Robert Candler
Mona Jarrahi
Warren Mori
Aydogan Ozcan
Benjamin Williams
Chee Wei Wong

Emeritus Faculty
Frederick Schott

Nanoelectronics, Devices and Heterogeneous Integration

In the area of nanoelectronics and solid-state devices, UCLA is at the forefront of research. Major research efforts are ongoing for the synthesis and design of advanced materials, such as two-dimensional semiconductors, topological insulators, and magnetic oxides — both their fundamental properties and their applications to ultra-scaled logic and memory devices. We also have extensive activities in the design and fabrication of ultra-scaled devices on both silicon and compound semiconductors, such as power and RF transistors, spin-based switches and memory elements, tunnel FETs, and other novel devices that are suitable for applications that go beyond conventional scaling. Another major thrust is the development of neuromorphic (i.e., brain-inspired) devices and nanosystems for computation and information processing. Nanoelectronic devices are under investigation for use as sensors for compact biomedical sensing tools. This area also includes the development of Micro- and Nano-Electro-mechanical Systems (MEMS and NEMS). In addition, we investigate new methods of interconnecting heterogeneous devices for a more holistic interpretation of Moore's law. Many of these research activities take place in collaboration with other research groups, both within and outside ECE, on circuit/system/device co-design and co-optimization. The nanoelectronics research in the department is supported by advanced commercial simulation tools for device analysis, a state-of-the-art nano-fabrication facility, and device characterization equipment with capability from DC to over 100GHz.







Faculty Pictured
Robert Candler
Sam Emaminejad
Mona Jarrahi
Dwight Streit
Kang Wang
Chee Wei Wong
Jason C. S. Woo
Also
Aydin Babakhani
Chi On Chui
Subramanian S. Iyer
Emeriti Faculty
Fred G. Allen
Harold Fetterman
Dee Son Pan
King-Ning Tu

Photonics

Photonics deals with the generation, detection, and manipulation of light — specifically how it can be harnessed to provide useful functions. For example, nearly all of the information on the internet is transported by encoding it onto signals of infrared light carried on optical fibers. Many unknown materials can be identified by studying how light interacts with them (i.e., by scattering, absorbing, phase shifting, or polarizing some incident photons). The name "photonics" emphasizes the importance of quantum mechanical properties of light and its interaction with matter. Many topics in photonics research involve development and/or use of lasers. Our research program encompasses topics such as how light interacts both with matter on the nanoscale and in plasmas, as well as new ways to generate, detect, and control light in underdeveloped spectral regions. Applications under investigation include the diverse topics of solar energy generation, lensless microscopy for cell-phone based telemedicine, high energy laser wakefield particle accelerators, ultra-high frame rate imaging, silicon photonics, biomedical imaging, and use of stabilized lasers for ultra-high precision measurements — just to name a few.







Faculty Pictured
Katsushi Arisaka
Warren Grundfest
Bahram Jalali
Jia-Ming Liu
Aydogan Ozcan
Benjamin Williams
Also
Mona Jarrahi
Chan Joshi
Chee Wei Wong
Emeriti Faculty
Harold Fetterman
Oscar Stafsudd
(above)

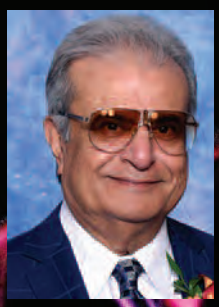


Faculty Pictured
Chan Joshi
Warren Mori

Emeritus Faculty
Francis F. Chen

Plasma Electronics

Plasma Electronics covers a wide spectrum of activities that include electro-dynamics of charged particles in external fields, non-linear optics of plasmas, high energy-density plasmas, laser-plasma interactions, basic plasma behavior, computer simulations of laboratory and space plasmas and fusion plasmas. The applications being studied are plasma-based charged particle accelerators, free electron lasers, other plasma-based radiation sources, laser-fusion, astrophysical plasmas, plasma propulsion, gas lasers and plasmas for lighting. There are opportunities to do experimental, theoretical and computer simulations research in all these areas. Close collaborations exist with national laboratories at Livermore and SLAC and UCLA's state-of-the art laboratories including the Neptune Laboratory that houses the world's most powerful CO2 laser. The research group also has the Dawson II computational cluster for research on inertial confinement fusion, plasma accelerators and astrophysical plasmas.

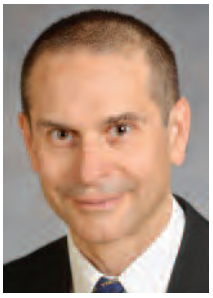
Physical & Wave Electronic Adjunct Faculty
Dan Goebel
Asad M. Madni
Zachary Taylor
Eli Yablonovitch

SIGNALS AND SYSTEMS

Communications and Networking

UCLA has a tradition in Communications and Networking research. For example, the first Internet packets were sent from UCLA and the Viterbi Algorithm was developed here. In an increasingly interconnected and online world, our research encompasses computer networks, social networks, wireless networks, on-chip networks and biological networks. Our work spans from fundamental questions in communications networking, autonomous vehicular networks, multimedia telecommunications, coding theory, algorithms, resource allocation, game theory, network economics, information theory and security to applications in mobile computing, sensors and embedded systems, distributed control systems, media distribution, green computing, intelligent cities, smart grid, cognitive radios, emergency networks and mobile health.






Faculty Pictured
Christina Fragouli
Ali Mosleh
Gregory Pottie
Izhak Rubin

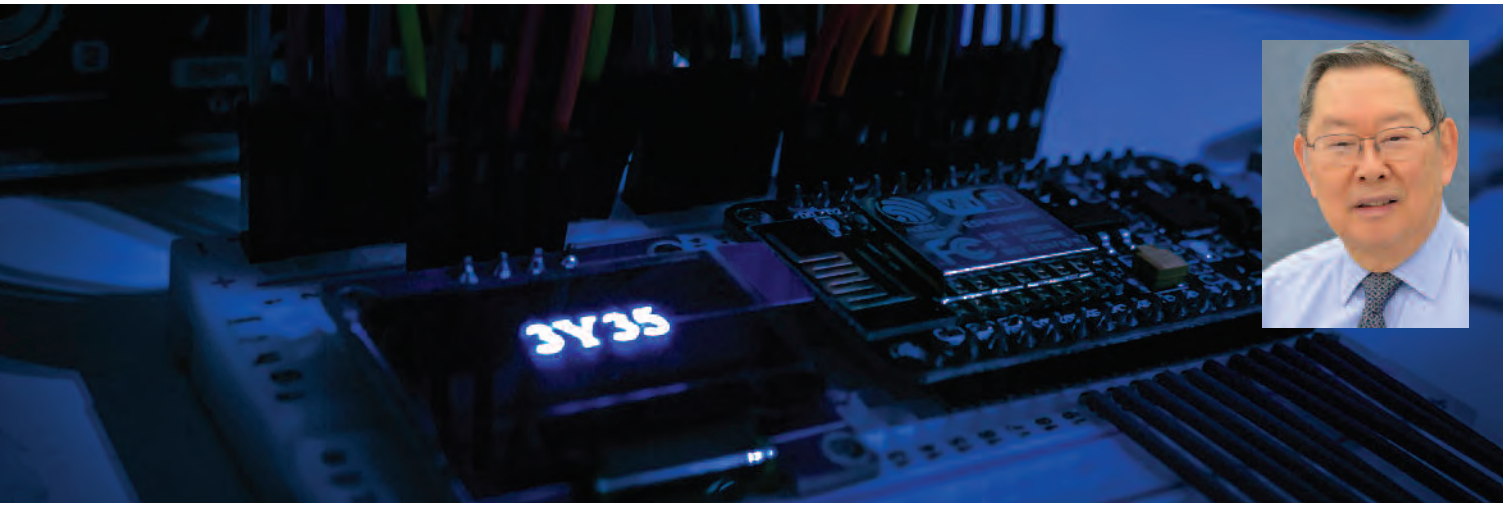
Ali H. Sayed
Lixia Zhang

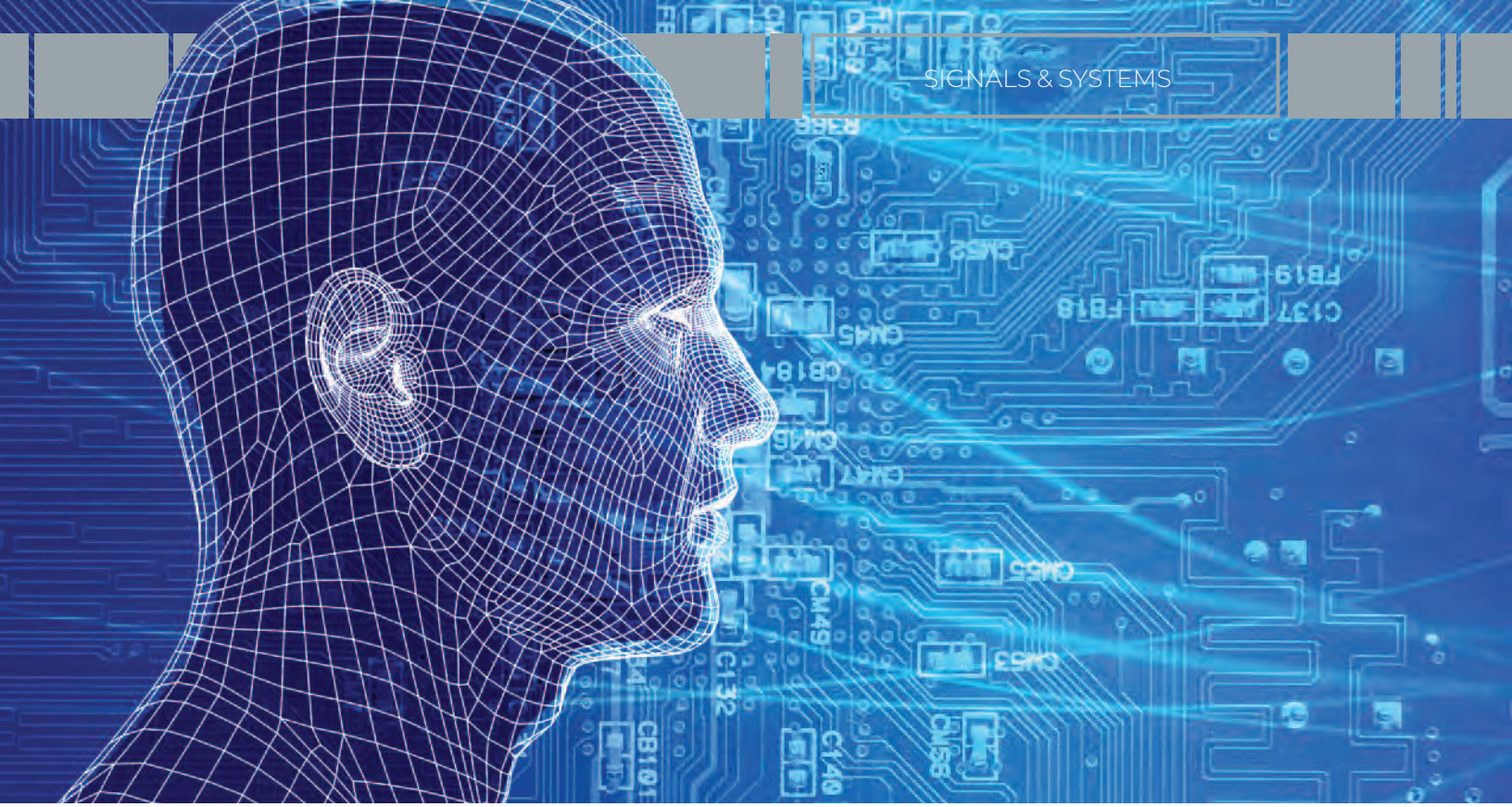
Also
Danijela Cabric

Babak Daneshrad
Suhas Diggavi
Asad M. Madni
Ankur Mehta
Mihaela van der Schaar

Mani Srivastava
Paulo Tabuada
John Villasenor
Richard D. Wesel

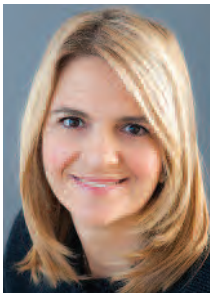
Emeriti Faculty
Nhan Levan
Paul K.C. Wang
Donald Wiberg
Kung Yao (below)

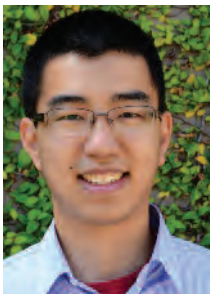




Signal Processing and Machine Learning

We rely on signals to interact with the physical and virtual world. A challenge today is how to collect, analyze, store, and process large data in an efficient and scalable manner. Our signal processing research targets the inference, visualization, representation, and learning of a broad spectrum of signals related to media (including speech, video and social media), sensors (for medical, military, space, process control or environmental applications), communications and control networks (wireless and utility networks), and adaptive arrays (such as acoustic and radar). This applies to problems ranging in scale from the microscopic to Big Data. Research contributes to disciplines descended from both Electrical Engineering and Computer Sciences roots, such as machine learning, statistical signal processing, stochastic modeling, graphical models, information theory, adaptation and learning algorithms, inference over networks, distributed signal processing, data analysis and distributed optimization.



Faculty Pictured

Abeer Alwan
Danijela Cabric
Lara Dolecek
Achuta Kadambi
Jonathan Kao
Stefano Soatto
Fabien Scalzo
John Villasenor

Also

Allie Fletcher
Lei He
Suhas Diggavi
Bahram Jalali
William Kaiser
Asad M. Madni
Gregory Pottie
Vwani Roychowdhury
Ali H. Sayed
Mihaela van der Schaar
Mani Srivastava
Paulo Tabuada
Lieven Vandenberghe

Emeriti Faculty

Rajeev Jain
Alan Willson
Kung Yao

Control and Decision Systems

Control and decision systems research aims to develop the mathematical principles explaining how complex systems can behave correctly in uncertain environments. One key program strength is in cyber-physical systems that network together collaborating computational elements with physical elements. We work in improving their functionality, autonomy, and adaptability, analyze their performance and ensure their secure operation. Applications include autonomous vehicles, transportation networks, medical systems, robotics coordination, smart buildings, smart power grids, and smart manufacturing. Another strength is in the intersection of economics with control engineering.

Faculty Pictured
Panagiotis Christofides
Mihaela van der Schaar
Jason L. Speyer

Paulo Tabuada
Also
Suhas Diggavi
Achuta Kadambi

Ankur Mehta
Ali Mosleh
Izhak Rubin
Ali H. Sayed

Lieven Vandenberghe
Emeritus Faculty
Alan Laub (above)

Signals & Systems
Adjunct Faculty
Ezio Biglieri
Dariush Divsalar
Allie Fletcher
Asad M. Madni
Ingrid Verbauwhede

Information, Computation and Optimization Theory

Information theory research develops the fundamental limits of compression, encryption, and channel coding of data in a variety of networks, storage media and communications systems. Application areas include new types of storage systems and more efficient and secure networks. Computation theory research characterizes the fundamental complexity of problems and the types of algorithms that can be used to solve them efficiently and/or approximately. Optimization theory research studies how minimizing cost functions inherent in problems spanning from economics to broad swaths of engineering can be formulated and efficiently solved.





Faculty Pictured
Suhas Diggavi
Stanley Osher
Vwani Roychowdhury
Lieven Vandenberghe
Richard D. Wesel
Also
Lara Dolecek
Christina Fragouli
Ankur Mehta
Izhak Rubin
Ali H. Sayed
Mihaela van der Schaar
Paulo Tabuada
Emeritus Faculty
Stephen Jacobsen

The Electrical and Computer Engineering Department

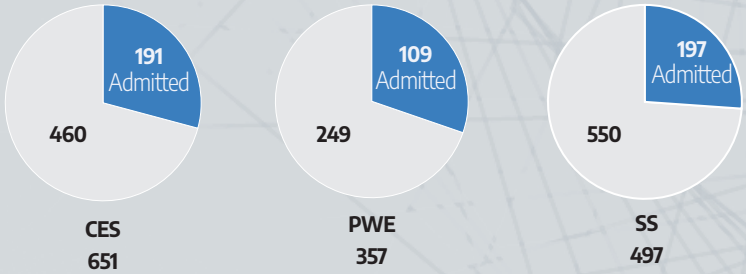
Research Centers

The Electrical and Computer Engineering Department contributes to the following Research Centers:

- Anderson School of Management – Easton Technology Management Center (ETMC)
- California NanoSystems Institute (CNSI)
- Center for Design-Enabled Nanofabrication (C-DEN)
- Center for Development of Emerging Data Storage Systems (CoDES2)
- Center for Domain-Specific Computing (CDSC)
- Center for Engineering Economics, Learning and Networks (CEELN)
- Center for Heterogeneous Integration and Performance Scaling (CHIPS)
- Center for High Frequency Electronics (CHFE)
- Center of Excellence for Green Nanotechnologies (CEGN)
- Function Accelerated nanoMaterial Engineering (FAME)
- Institute for Digital Research and Education (IDRE)
- Institute for Pure and Applied Mathematics (IPAM)
- Institute for Technology Advancement (ITA)
- Integrated Systems Nanofabrication Clean Room (ISNCR)
- Interconnected & Integrated Bioelectronics Lab (I^2BL)
- Joint Institute for Regional Earth System Science and Engineering (JIFRESSE)
- Nanoelectronics Research Facility (NRF)
- Public Safety Network Systems (PSNS)
- Translational Applications for Nanoscale Multiferroic Systems (TANMS)
- Variability Expedition, Variability-Aware Software for Efficient Computing with Nanoscale Devices (VE)
- Water Technology Research Center (WaTer)
- Western Institute for Nanoelectronics (WIN)
- Wireless Health Institute (WHI)

Graduate Students Admitted Fall 2017

Total Admitted: 496
Total Applicants: 1756



Faculty and Staff

Ladder Faculty	47
Courtesy Appointments	14
Emeriti Faculty	13
Adjunct Faculty	9
Lecturers	9
Post-Doc	55
Staff	46

Recognitions

Society Fellows	49
NAE Members	18
NAS Members	3
National Academy of Inventors	8
Marconi Prize	1

Graduate Student Fellowships

Department Fellowships	$1,558,494
Non-resident Tuition for Teaching Assistants	442,992
Broadcom Fellowship	225,027
Dean's GSR Support	170,000
Graduate Opportunity Fellowship	152,527
Dissertation Year Fellowship	139,126
Eugene Cota Robles Fellowship	83,838
Faculty Unrestricted Fellowships	69,906
Samueli Fellowship	57,062
Guru Krupa Fellowship	56,668
Kalosworks	49,838
National Science Foundation (NSF)	46,000
Microsoft Fellowship	44,819
IBM	30,000
Dean's Fellowship & Camp Funds	29,000
Living Spring	28,779
Graduate Dean's Scholar Award	23,000
Mediatek	18,141
PhD Preliminary Exam Top Score Fellowships	18,139
Living Rocks	13,339
Qualcomm Fellowship	10,845
IEEE	10,000
H.J. Orchard Memorial Fellowship	7,386
HSSEAS MS Online TA NRT Support	5,034
Raytheon Fellowship	4,819
GEM	4,000
TOTAL:	**$3,298,779**

Fall 2017

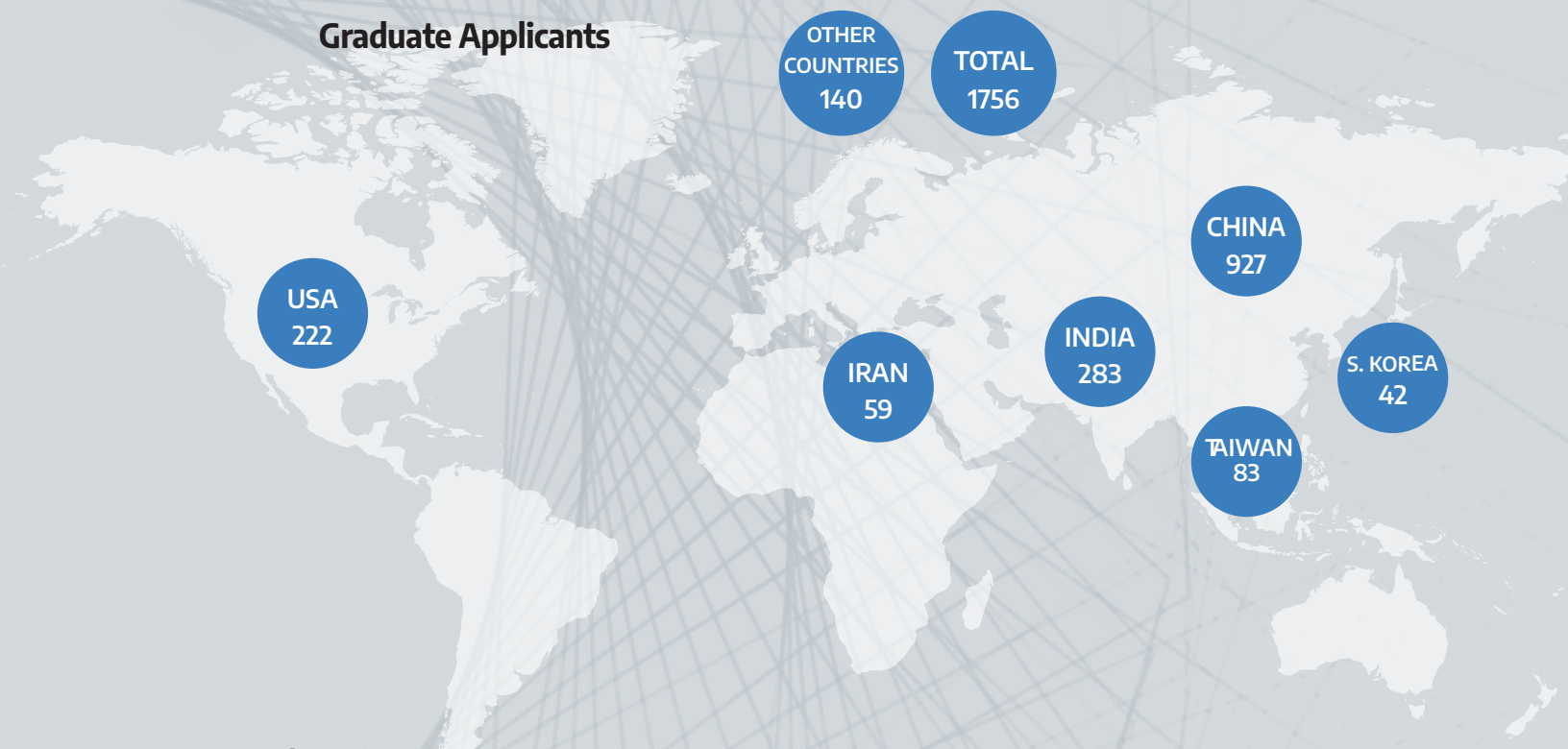
Undergraduate Students

Students Enrolled	625	
Applicants	1444	
Admitted	330	
New Students Enrolled	115	
Average Incoming GPA	4.42	(weighted)
	3.94	(unweighted)

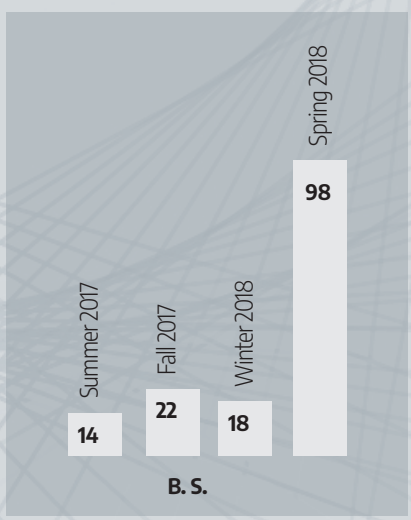
Graduate Students

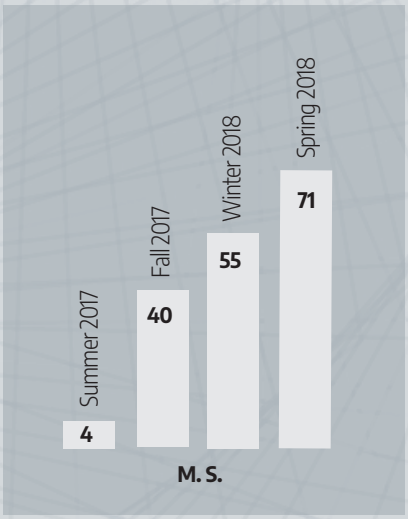
Students Enrolled	588
Applicants	1756
Admitted	497
New Students Enrolled	252
Median Incoming GPA	3.78

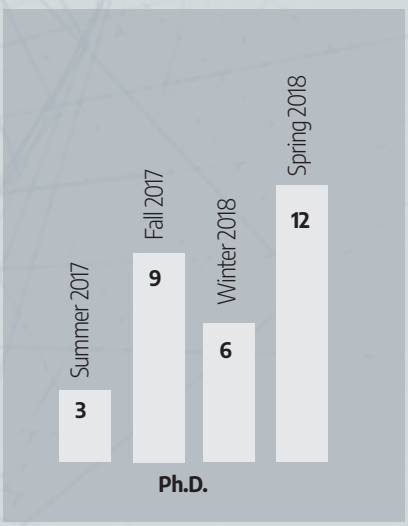
Graduate Applicants



Degrees Conferred in 2017-2018







Alumnae Advisory Committee

Thanks to the leadership of Professor Abeer Alwan and our accomplished alumnae, a new and vibrant organization has been created. The UCLA ECE Alumnae Advisory Committee aims to educate and enable female students of all ages to pursue academic and career opportunities in electrical and computer engineering. The key mission of the committee is to unite alumnae to support one another, and to foster a community of outreach and development for girls interested in science and technology, from the time they start elementary school through university and beyond.

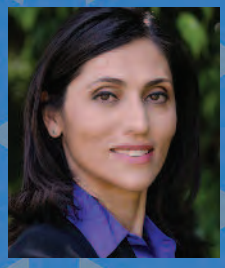
Grace King
Co-chair
Attorney with
Deloitte

Ani Garabedian
Co-chair
Northrop Grumman
Communications
Systems Engineering

Kelsey Curtis
Chair of the Subcommittee on Student Mentoring
Engineer at Infineon Technologies

Melissa Erickson
Chair of the Bay Area Chapter
Sr. Technical Program Manager at Amazon Lab126

Sonia Hingorany
Chair of the Seattle Chapter
Amazon, North American Transportation Group



Maryam Rofougaran
Chair of the Orange County Chapter
co-CEO of Movandi Corporation

Rozi Rofougaran
Chair of the subcommittee on Fund Raising and Industrial Liaisons
Engineer Ethertronics Inc,

Caitlin Gomez
Co-Chair of the Subcommittee on K-12 Outreach
Radiation Oncologist

Jenny Ji
Co-Chair of the Subcommittee on K-12 Outreach
Captain at USAF

Guadalupe Zaragoza
Co-Chair Subcommittee for Alumnae Networking
Engineer at Raytheon

Judy Gilmore
Co-Chair Subcommittee for Alumnae Networking
Engineer at Advanced Concept Technologies

Wenrui Yang
Chair of the San Diego Chapter
Engineer at Qualcomm

Alumni Advisory Board

New Board Member: Leticia Solis

The AAB provides advice to assist the Department in enhancing its leadership role in education and research. The Board organizes the Distinguished Alumni Lecture Program, offering insights from the field or guidance on launching and funding a business and protecting intellectual property rights.

Heba A. Armand
Group Product Manager, Avery Consumer Products

Phil Bangayan
Director of Marketing
NBC/Universal

Sharon **Black**
GPS & Navigation Systems Director
Raytheon

Leonard Bonilla
Retired Program Manager
Raytheon

David Doami
Director Programs
Northrop Grumman

Ani Garabedian
Northrop Grumman Communications Systems Engineering

Kevin Geary
Deputy Director of Sensors and Electronics at HRL Laboratories

Dan Goebel
Adjunct Professor and Senior Research Scientist at Jet Propulsion Laboratory

Ray (Ramon) Gomez
Retired Sr. Technical Director
Broadcom

William Goodin
UCLA Engineering Retired

Robert Green
Attorney
Lewis Roca Rothgerber Christie, LLP

Grace King
Attorney with Deloitte

Asad M. Madni
ECE AAB Chair
President, COO and CTO (Retired)
BEI Technologies, Inc.

Erica Skoglund
Texas Instruments
HP Worldwide Account Manager

Leo Szeto
Founder
Codeate, Inc.

ELECTRICAL AND COMPUTER ENGINEERING PARTNERSHIPS

The Electrical and Computer Engineering Department has been forging new partnerships with industry over the past year with its Electrical and Computer Engineering Partnerships (ECEP) program. The program tightly couples academic education and research with the needs of industry by working directly with partners in nurturing our pipelines of talent both at the undergraduate and graduate levels. We enhance visibility to our student activities with industry through open houses and research reviews, and we propagate industry needs with our students through hands-on projects, material in courses, industry lecturers, and collaborative research opportunities. ECEP also provides linkages for partners to access UCLA's state-of-the-art facilities. These activities are possible through the support of our partners. More details are available at the ECEP website:
https://www.ee.ucla.edu/industry

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Broadcom Fellowships 2018-2019

BROADCOM FOUNDATION

Broadcom Foundation Fellowships promote research related to novel design of integrated circuits, novel device structures, methods to enhance IC functionality, and the exploration of advanced VLSI for emerging applications. The current students awarded the Broadcom Fellowships are:

Student	Advisor	Proposal Title
Usama Anwar	Markovic, D.	Wireless Power Transfer System for Next-Generation Neural Implants
Shi Bu	Pamarti, S.	Wideband High-Resolution Area-Efficient Frequency-Channelized ADC Using Sharp, Highly Programmable Filter with Ring-Oscillator-Based Integrators
Li-Yang Chen	Yang, K.	Chip-Scale Sub-Millimeter High Resolution Pulsed LIDAR
Mahmoud Elhebeary	Yang, K.	An Ultra-Low-Power Wake-Up Receiver for WSNs
Goutham Ezhilarasu	Iyer, S.	Integration of High Density Inorganic mLED Arrays on FlexTrate for Optogenetics and Display Applications
Szu-Yao Hung	Pamarti, S.	Digital Spur Calibration of Wideband Multi-Output Clock Generator
Weiyu Leng	Abidi, A.	Power Supply for Next-Generation Wideband Envelope-Tracking TX
Seyyed Hossein Razavi	Razavi, B.	An RF Channel Selection Receiver for 5G Applications
Kejian Shi	Abidi, A.	In-Band TX/RX Isolation under User Interaction Using Dual-Feed Antenna and Tunable Electrical Balance Duplexer
Yan Zhang	Chang, F.	Compact Low-Noise Multi-Band and Ultra-Wide-Band LO Generation at mm-Wave Frequencies
Jia Zhou	Chang, F.	CMOS Bio-Sensor for Large-Scale Broadband Sensing and Manipulation of Individual Cells

UCLA SAMUELI SCHOOL OF ENGINEERING

ELECTRICAL AND COMPUTER ENGINEERING

Administration

Gregory J. Pottie	Department Chair
Abeer Alwan	Vice-Chair, Undergraduate Affairs
Mona Jarrahi	Vice-Chair, Graduate Affairs
C.-K. Ken Yang	Vice-Chair, Industry Relations
Puneet Gupta	Vice-Chair, Computer Engineering

Area Directors

Sudhakar Pamarti	Director, Circuits and Embedded Systems
Christina Fragouli	Director, Signals and Systems
Y. Ethan Wang	Director,Physical and Wave Electronics

ABET Committee

Abeer Alwan	Professor and Vice-Chair, Undergraduate Affairs
Asad M. Madni	Alumni Advisory Board Chair
Gregory J. Pottie	Department Chair
C.-K. Ken Yang	Professor and Vice-Chair, Industry Relations

Center Directors and Committee Chairs

Robert N. Candler	Director, Nano-Electronics Research Facility
Suhas Diggavi	Chair, Recruitment Committee
Warren Mori	Chair, Tenure Committee
Sudhakar Pamarti	Chair, Non-Tenure Committee
Lieven Vandenberghe	Chair, Courses and Curriculum Committee
Y. Ethan Wang	Director, Center for High-Frequency Electronics

ANNUAL REPORT 2017-2018

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Jacquelyn T. Trang	Chief Administrative Officer

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Assistant Professor Achuta Kadambi
Professor Asad M. Madni
Assistant Professor Ankur Mehta
Professor Gregory J. Pottie
Professor Mani Srivastava
Professor Dwight Streit
Professor Paulo Tabuada

2017-2018

UCLA Samueli School of Engineering

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