MISSION STATEMENT

The Computer Science Department strives for excellence in creating, applying, and imparting knowledge in computer science and engineering through comprehensive educational programs, research in collaboration with industry and government, dissemination through scholarly publications, and service to professional societies, the community, the state, and the nation.
Message from The Chair

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Departmental Diversity Program

Alumni Advisory Board

Industrial Affiliate Program

Grace Hopper Celebration
As the new chair of UCLA’s Computer Science Department, I am exceptionally pleased to take part in this year’s annual report. The Department has been “home” to me for nearly 40 years, and as a faculty member, research center director, and now as Department chair, I very much look forward to continuing my participation in the future of the Department, its academic and scientific challenges and rewards, and its continuing evolution—which takes many forms, as noted below.

Research. During 2014-2015, the Department received awards from federal and state agencies, industry, and other organizations for new research. Many of these awards are uniquely significant—both in scientific scope and funding: for example, an NSF Frontier award for an Encrypted Functionalities Center ($5M); an NSF/Intel InTrans award to extend research previously funded under the Expeditions in Computing program ($3M); and the NIH Center for Biomedical Real-Time Health Evaluation for Pediatric Asthma ($6.5M).

Faculty. We are pleased that our six new faculty members chose to pursue their teaching and research goals here at UCLA, bringing with them extensive education and scientific backgrounds, coupled with enormous talent and enthusiasm. We extend a warm welcome to each of them.

MESSAGE FROM THE CHAIR

Intelligence plus character – that is the goal of true education:  

_ Martin Luther King_

Awards. During 2014-2015, our faculty received numerous best-paper awards at key conferences, invitations as keynote speakers and distinguished lecturers, and many honors and awards from academia, industry and scientific societies. The latter includes Judea Pearl’s election to the National Academy of Sciences, Demetri Terzopoulos’s election to Fellow of the Royal Society of London, and Leon Alkalai’s election to JPL Fellow.

Students. The Department currently hosts 856 BS students in its CS and CS&E programs, 253 MS students, and 144 Ph.D. students. I’m pleased to report that approximately 60% of the Department’s recently graduated Ph.D. students are now engineers and researchers at leading industrial institutions such as Intel, Microsoft, Google, and Synopsys, to name a few; 30% have gone on to postdoctoral positions at major universities and laboratories such as Harvard, MIT, Yale, and UCLA; and 10% now have faculty positions at universities such as Purdue, Northwestern and CSU-Northridge.

Facilities. On the cover of this year’s annual is an illustration of the Department’s future home—the 90,000-square-foot Phase II Engineering VI building. The new facility will house a technology-enabled 250-seat learning center, faculty and student offices, labs for research on advanced materials for healthcare and industrial applications, and even an alumni center. Most of the Department’s faculty, staff and graduate students will relocate to Engineering VI in 2017.

I want to thank all of you for your support, and I look forward to my continuing relationship with the extraordinary faculty, staff and students of the UCLA Computer Science Department.

Mario Gerla  
Chair, Computer Science Department  
December 2015

NEW FACULTY

_Miryung Kim_
Tools for developing and evolving large-scale software systems

_Raghu Meka_
Complexity theory, pseudo-randomness, algorithms, learning, probability, data mining

_Ameet Talwalkar_
Scalability and ease-of-use in statistical machine learning, with applications in computational genomics

_Fei Sha_
Intelligent and autonomous systems, robotics, computing systems and networks for large-scale machine learning

_Guy Van den Broeck_
AI, machine learning, automated reasoning, and statistical relational learning

_Sriram Sankararaman_
Statistical machine learning, big data, biology and population, medical genomics
## DEPARTMENT OVERVIEW: FALL 2015

### MASTER’S DEGREE

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<th>Category</th>
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### FACULTY AND STAFF

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Applicants = number of applicants for Fall 2015  
Admits = number of applicants offered admission for Fall 2015  
Enrolled = number of applicants newly enrolled for Fall 2015  
Degrees Awarded = number awarded during academic year 2014-2015  
Students Enrolled = number enrolled Fall 2015
Faculty Awards and Honors 2014-2015

Leon Alkalai
Elected JPL Fellow (2014) for extraordinary technical and institutional contributions to JPL over an extended period of time.
Leon heads up the Lunar Robotic Exploration Program Office at NASA’s JPL. He is a former adjunct professor in the Computer Science Department and continues to contribute as a lecturer. He is a member of the International Academy of Astronautics.

Tyson Condie
Okawa Research Grant (2014) and NSF Faculty Early Career Development (CAREER) Award (2014) for research on “Towards a Big Data Application Server Stack.”
Named to Symantec Term Chair in Computer Science (2015)
Tyson joined the Computer Science Department in 2012 after working at Microsoft as a principal scientist in the Cloud and Information Services Lab, and as a research scientist at Yahoo! Research.

Jason Cong
ICCAD Ten-Year Retrospective Most Influential Paper Award (2014) for 2004 paper “A Thermal-Driven Floorplanning Algorithm for 3D ICs.”
Distinguished Alumni Achievement Award (2014) from Department of Computer Science, University of Illinois at Urbana-Champaign.
ASPDAC Ten-Year Retrospective Most Influential Paper Award (2015) for 2005 paper “Thermal-Driven Multilevel Routing for 3-D ICs.”
Google Faculty Research Award (2015) which recognizes world-class faculty who are pursuing research in areas of mutual interest.
Jason has been with the Computer Science Department since 1990. He is a Chancellor's Professor and director of the Center for Domain-Specific Computing and the VAST Laboratory. He is an IEEE and ACM Fellow.

Milos Ercegovac
Medal of Ecole Normale Superieure de Lyon (2015) for contributions to the field of computer arithmetic, and a long-lasting collaboration with faculty and students at ENS.
Milos is a Distinguished Professor with the Computer Science Department and has been a member of the faculty since 1975. He is an IEEE Fellow.

Mario Gerla
ACM SIGMOBILE Outstanding Contribution Award (2015) for pioneering contributions to mobile computing, communications and wireless networking.
Mario has been a department faculty member since 1977. He is a Distinguished Professor and the current department chair. He heads the Center for Autonomous Intelligent Networks and Systems and is an IEEE Fellow.

Miryung Kim
Okawa Research Grant (2015) to support work titled “Toward Interactive Debugging of Big Data Analytics.”
Miryung joined the Computer Science Department faculty in 2014. Prior to that, she was a faculty member at the University of Texas at Austin for five years.

Leonard Kleinrock
SIGMOBILE Outstanding Contributions Award (2014) for pioneering contributions to the first multi-hop packet switched radio network which formed the foundation for modern wireless networks.
Edward A. Dickson Emeritus Professorship Award (2015) for many contributions to the field of computer science since retirement.
BBVA Foundation Frontiers of Knowledge Award (2015) for seminal contributions to the theory and practical development of the Internet.
UCLA Engineering Lifetime Achievement Award (2015).
Leonard is a Distinguished Professor with awards that include the 2008 National Medal of Science presented by President George W. Bush. He has been with the department since 1963, and it was here that he and his research team played a key role in the creation and development of the Internet. He is a member of the Internet Hall of Fame, an IEEE and ACM Fellow, and a recipient of the Dan David, Draper, and Ericsson prizes.

Stanley Osher
Gauss Prize (2014), the highest honor in applied mathematics, awarded by the International Congress of Mathematicians.
Top 1% on list of “Highly Cited Papers” (2014) published by Thomson Reuters Corporation. Identifies authors/researchers who are among the world’s best in their fields.
Stanley became a member of the Computer Science Department faculty in 2006 (joint appointment with Department of Mathematics). He is a member of the American Academy of Arts and Sciences, the National Academy of Sciences, the Society of Industrial and Applied Mathematics, and the American Mathematical Society.
Judea Pearl

Election to National Academy of Sciences (2014) in recognition of distinguished and continuing achievements in original research.

Honorary Doctor of Science and Technology (2014), Texas A&M University.


Judea joined the Computer Science Department in 1970. His many achievements include induction into the Artificial Intelligence Hall of Fame and an ACM Turing Award. He is a member of the American Academy of Arts and Sciences, National Academy of Engineering, National Academy of Sciences, and is an IEEE, AAAI, and Cognitive Science Society Fellow.

Amit Sahai

NSF Frontier Award (2014) for establishing the Center for Encrypted Functionalities for research on using mathematics to hide secrets in software.

Amit joined the Computer Science Department in 2004 after four years on the faculty at Princeton University. He is a Sloan Research Fellow and a recipient of the Pazy Memorial Award.

Alexander Sherstov

Alfred P. Sloan Research Fellowship (2014), awarded to early-career scholars who represent the most promising scientific researchers working today.

Northrop Grumman Excellence in Teaching Award (2014) which acknowledges excellence of contribution and leadership in engineering science education.

Alexander joined the Computer Science Department faculty in 2012 after a two-year postdoctoral fellowship at Microsoft Research.

Ameet Talwalkar

Google Faculty Research Award (2015), whose aim is to identify and support world-class, full-time faculty at top universities who are pursuing research in areas of mutual interest.

Ameet joined the Computer Science Department in 2015; this followed an NSF postdoctoral fellowship in the AMPLab at UC Berkeley. He is a technical advisor for Databricks and a Samueli Fellow at UCLA.

Demetri Terzopoulos

Elected Fellow of the Royal Society of London (2014), which is an independent scientific academy of the UK and the Commonwealth, dedicated to promoting excellence in science and a fellowship of many of the world’s most eminent scientists. It is the oldest scientific academy in continuous existence.


ICCV Helmholtz Prize (2014) from IEEE Computer Society for fundamental contributions in computer vision research.

Demetri joined the Computer Science Department in 2005 after serving on faculties at New York University and the University of Toronto. He is a Distinguished Professor and Chancellor’s Professor, the recipient of an Academy Award for Technical Achievement, a Fellow of the Royal Societies of London and Canada, an ACM and IEEE Fellow, a Guggenheim Fellow, and a member of the European Academy of Sciences.

Lixia Zhang


Lixia has been with the Computer Science Department since 1995. She is an IEEE and ACM Fellow, and a recipient of the IEEE Internet Award.
Research Centers

CENTER FOR DOMAIN-SPECIFIC COMPUTING (CDSC)

**Director:** Jason Cong, Computer Science (UCLA)  
**Associate Director:** Vivek Sarkar, Computer Science (Rice University)

**Original CDSC Team:** UCLA: Jens Palsberg, Miodrag Potkonjak, and Glenn Reinman (CS); Frank Chang (EE); Luminita Vese (Math); Denise Aberle, Alex Bui, Aichi Chien, Wm. Hsu (Geffin School of Medicine); **Rice University:** Richard Baraniuk (E&CE); **UCSB:** Tim Cheng (E&CE); **Ohio State University:** Saday Sadayappan (CS&E)

**InTrans Team:** UCLA: Glenn Reinman, Eleazar Eskin (CS); Frank Chang (EE); Luminita Vese (Math); Alex Bui, William Hsu (Geffin School of Medicine); **Oregon Health & Science University:** Paul Spellman; **Rice University:** Vivek Sarkar

The Center for Domain-Specific Computing (CDSC) was funded in 2009 by NSF’s Expeditions in Computing program for the purpose of developing high-performance, energy-efficient, customizable computing to revolutionize the way computers are used in healthcare and other important applications. The Center began as a joint effort between UCLA’s computer science, electrical engineering, mathematics, and radiological sciences departments, in collaboration with the computer science and engineering departments of Rice University, UC Santa Barbara, and Ohio State University.

The Center is now focused on the 2014 NSF/Intel Innovation Transitions (InTrans) award which extends efforts previously funded under the Expeditions in Computing program. InTrans awards are designed to extend the life of the most high-impact NSF-funded research and help great ideas transition from lab to practice. The goal of this new phase for the Center is to extend the customized computing technology to big-data analytics with scale-up and scale-out architectures. Medical imaging and patient-specific cancer treatments are selected as the test applications because of healthcare’s significant impact on the national economy and quality of life. The InTrans team is made up of UCLAs computer science, electrical engineering, mathematics and radiological sciences departments, Rice University’s electrical & computer engineering department, and Oregon Health and Science University.

CENTER FOR ENCRYPTED FUNCTIONALITIES (CEF)

**Director:** Amit Sahai (UCLA)  
**Pls:** Allison Bishop, Dan Boneh, Susan Hohenberger, Amit Sahai, and Brent Waters  
**External Collaborators:** Boaz Barak, Yuval Ishai, Yael Kalai

The Center for Encrypted Functionalities is a collaborative effort between UCLA, Columbia University, Stanford University, Johns Hopkins University, and the University of Texas-Austin that tackles the deep and far-reaching problem of general-purpose software obfuscation. The goal of obfuscation is to enable software that can keep secrets: software that makes use of secrets, but such that these secrets remain hidden even if an adversary can examine the software code in its entirety and analyze its behavior as it runs. Secure obfuscation could enable a host of applications — from hiding the existence of critical vulnerabilities introduced by human error, to hiding cryptographic keys within software.

The Center, headquartered at UCLA, was established by an NSF Secure and Trustworthy Cyberspace (SaTC) Frontier Award, one of only two awarded in 2014 based on initial breakthrough research by Sahai, Waters, and collaborators.
CENTER FOR INFORMATION & COMPUTATION SECURITY (CICS)

Director: Rafail Ostrovsky (rafail@cs.ucla.edu); Associate Director: Amit Sahai (sahai@cs.ucla.edu)

The Center for Information & Computation Security (CICS) was founded in UCLA's Henry Samueli School of Engineering and Applied Science in the fall of 2003 under the direction of Professor Rafail Ostrovsky. The following year, Professor Amit Sahai joined the team to serve as associate director. The Center’s mission is to promote all aspects of research and education in cryptography and computer security.

Since its inception, the Center has raised significant amounts of federal, state and private-sector funding, including international collaboration with Israel through multiple Binational Science Foundation grants. It has also attracted multiple international visiting scholars.

The Center explores and develops many critical areas of information and computation security: 1) state-of-the-art cryptographic algorithms, definitions, and proofs of security; 2) software obfuscation; 3) novel cryptographic applications such as new electronic voting protocols and identification, encryption, data-rights management schemes, privacy-preserving data mining, searching on encrypted data, and searching with privacy; 4) security mechanisms underlying a clean-slate design for a next-generation secure Internet; 5) novel biometric-based models and tools, such as encryption and identification schemes based on fingerprint scans; 6) interplay of cryptographic and security with other fields, including:

- Bioinformatics
- Cyber-physical Systems
- Algorithms
- Complexity Theory
- Networks
- Communication Complexity
- Machine Learning
- Compiler and Language Design
- Operating Systems
- Hardware Design
- Distributed Computing

CENTER FOR AUTONOMOUS INTELLIGENT NETWORKS AND SYSTEMS (CAINS)

Director: Professor Mario Gerla; Lead Sponsors: Office of Naval Research (ONR) and National Science Foundation (NSF)

Scientific Board: UCLA: Babak Daneshrad, Leonard Kleinrock, Izhak Rubin, Mani Srivastava, John Villasenor; ONR: Clifford Anderson

Partnerships:
Center of Automated Control for Large Complex Systems, Bologna, Italy

Industrial Members:
U.S.: Boeing Phantom Works; Northrop Grumman; Raytheon
Italy: Boella Research Lab (Torino); Univ. of Bologna, Selex (Finmeccanica)

Collaborations: Much of our research is conducted in collaboration with several U.S. and international institutions.

Autonomous agent-based systems (U. of Trento, Italy) Mobile sensor platforms (Instituto Boella, Torino, Italy)
Network coding and multicast (MIT, IBM) Homeland defense systems (Finmeccanica Group, Italy)

MIMO and MAC research (Boeing Phantom Group)

The Center for Autonomous Intelligent Networks and Systems (CAINS) was established in 2001 with the participation of various laboratories in the computer science and electrical engineering departments of UCLA’s Henry Samueli School of Engineering and Applied Science. The Center's mission is to serve as a forum for intelligent agent researchers and visionaries from academia, industry and government, with an interdisciplinary focus on fields such as engineering, medicine, biology and social sciences. Information and technology is exchanged through seminars, short courses and joint research programs. Our current research focus is:

- Video network transport
- Vision-based localization
- Vehicular networks
- Underwater network
- Dynamic unmanned backbone
- Mobile sensor platforms
- Social networks
- Ad hoc multi-hop networking
Research Centers

UCLA WIRELESS HEALTH INSTITUTE (WHI)

**Directors**
- Biomedical (Ben Wu, Executive director)
- Medicine (Bruce Dobin)
- Electrical Engineering (William Kaiser)
- Computer Science (Majid Sarrafzadeh)

Wireless health is by far the most comprehensive merging of medicine and technology yet conceived. No prior field has so broadly addressed the urgent needs of healthcare quality, healthcare delivery, and individual patient needs with matching technology solutions. And at no prior time has the cost of physiological monitoring devices been lower or the accessibility of wireless networks been more universally ubiquitous. The Wireless Health Institute recognizes this and brings all elements of wireless health together with fundamental new measurement principles: wireless biomedical devices and instruments, signal processing, sensor fusion, and information technology.

Our wireless health system begins first with wireless sensors that are worn by patients, appear in handheld instruments, or are installed in a patient's home or clinic room. Next, data from wearable wireless sensors and instruments are conveyed by wireless networking to both handheld devices and to the global Internet. Finally, algorithms hosted on both smartphone handheld devices and centralized enterprise computing deliver subject condition recognition and tracking, and guidance to users and caregivers.

Among its many programs, WHI seeks to 1) predict and reduce readmission by using end-to-end monitoring systems for congestive heart failure patients; 2) prevent child obesity through active gaming — that is, by integrating exercise activity and health information into the video games; and 3) reduce HbA1c diabetes in high-risk patients with an in-home monitoring system that measures blood sugar using a Bluetooth-enabled glucose meter.

SCALABLE ANALYTICS INSTITUTE (ScAi)

**Team**
- Carlo Zaniolo (director), Wei Wang (co-director), John Cho, Tyson Condie

From its inception in 2013, the Scalable Analytics Institute’s thrust has been to pursue advances in data science. The Institute was designed as a center of excellence for faculty—currently, Professors John Cho, Tyson Condie, Wei Wang, and Carlo Zaniolo. The position of ScAi director is changed on a rotational basis, with Dr. Zaniolo serving as the current director and Dr. Wang as co-director.

An important research focus of ScAi is developing analytics tools to discover hidden patterns in complex data and to build predictive models on data harvested from clinics, genomics, medicine, social media, and other heterogeneous sources.

This effort is led by Dr. Wang, who also serves as a core member of the NIH Big Data to Knowledge (BD2K) efforts at UCLA. These research efforts at the application level are matched at the system level by a large effort led by Drs. Condie and Zaniolo to develop the next-generation systems for big data analytics. The main research efforts address i) design of declarative language for machine learning (ML); ii) parallelization of ML programs on diverse platforms, including Apache Spark, Hadoop and multicore systems; and iii) development of debugging tool kits and programming environments for complex analytics. Current research by Drs. Tyson and Wang to create an infrastructure for predictive analytics on social media data will provide a first testbed for these advances.

While Dr. Cho is addressing the explosion of data and web applications with research on models that help us understand the behavior of users and their big data, and allow us to transform large quantities of “data” into meaningful “information,” Dr. Zaniolo is pursuing applications made possible by the emergence of new semantic web resources, such as knowledge-bases harvested from Wikipedia.
BIOMEDICAL REAL-TIME HEALTH EVALUATION FOR PEDIATRIC ASTHMA (BREATHE)

Pls: Alex Bui, Majid Sarrafzadeh, and Frank Gilliland

The National Institute of Health’s (LA) PRISMS Center (Pediatric Research using Integrated Sensor Monitoring Systems) is a leader in the development and application of mobile health (mHealth) technologies. In collaboration with the PRISMS Center, our research under the National Institute of Health BREATHE grant is motivated by the following question: Is it possible to predict ahead of time, for a specific asthma patient, the potential for exacerbation and thus mitigate—if not prevent—that event? Any system with this ability must integrate the growing array of available physiologic and environmental data from sensors, and place such data into context to elucidate the patient’s state and specific situation. The system must be able to act sufficiently quickly on sensed data to make timely recommendations, and end-user compliance with system usage must be high to effect change.

Our answer lies in the Biomedical REAL-Time Health Evaluation for Pediatric Asthma (BREATHE) platform, which provides an extensible framework for the deployment of data collection protocols, secure data collection from sensors to a mobile device, integration of additional contextual information, and real-time analysis. Importantly, usability is a central consideration in the design of BREATHE, reflected in an iterative design/evaluate/refine process. To successfully develop BREATHE, we must have three closely coordinated efforts: 1) an integrated sensing from the device to the cloud, which establishes APIs for automatically gathering information from a device and local sensors, communicating with sensors and the coordinating data center; 2) integrating and visualizing clinical, environmental, and sensor data, which focuses on combining data acquired from the data center with contextual information (e.g., regional air quality, elements from the patient’s electronic health record, etc.) with a real-time processing and analysis infrastructure; and 3) a real-time asthma and air pollution project (Asthma APP), which develops a framework for evaluating system performance and real-world field testing of the platform for self-management and early interventions. BREATHE takes advantage of contemporary and open standards for secure networking and device management, mHealth toolkits, and mobile UIs from which open collaboration can occur. Together, these efforts can change how we interact with pediatric asthma patients and their caregivers to gain a better understanding of the disease and achieve more personalized care through detailed, objective measurements of an individual’s daily activities and surroundings. Further, BREATHE will enable the testing of many hypotheses about environmentally related chronic pediatric illnesses.
RDoQ: AN IMPLEMENTATION OF NIMH’S STRATEGIC RESEARCH DOMAIN CRITERIA FRAMEWORK

Medical diagnosis, like biology, has long rested on taxonomies, and on explicit decision trees for classification. These taxonomies are rigid and of a “one size fits all” concept. This is the opposite of personalized medicine. For example, in neuropsychiatry, the prevalent taxonomy classified children as having an attention deficit if they had six out of a possible nine symptoms of inattention. A child’s classification of ADHD can have huge consequences, and this so-called “Chinese menu” approach to its diagnosis has had an enormous impact on our population.

Last year, the American Psychiatric Association published a revised Diagnostic and Statistical Manual (DSM-5), but the National Institutes of Mental Health (NIMH) rejected it as lacking validity, with only a limited connection with modern scientific literature. In NIMH’s strategic plan, the Research Domain Criteria (RDoC) ontology is presented as an alternative. The stakes involved in this argument are huge, as the DSM had been, for many years, a cornerstone of the country’s health system.

The RDoC ontology defines vocabularies for domains of behavior and for units of measurement. The domains are essentially categories of behavior linked to specific brain regions, and the units are specific quantitative measurements (phenotypes) that can be used for diagnosis. In this way, the subjective categories and symptoms of DSM are replaced by more objective terms linked to current research. However, RDoC is still in an early state of development, and is specified only in English.

A team headed by Professor Stott Parker and supported by the National Institutes of Health has developed RDoQ, an implementation of RDoC, but using a new kind of taxonomy called a quantology. A quantology is an ontology-like vocabulary, but instead of “is a” and “intersects with,” relations have quantitative association measures.

RDoQ has permitted a detailed analysis of RDoC and a checking of its vocabulary for validity against other points of reference. For example, RDoQ permits direct comparison of RDoC and the DSM. Explicit overlap between RDoC and DSM-IV constructs is shown on the right. Labels on the columns of the table are categories of the DSM, and on the rows are categories of RDoC. The figure shows associations (in this case literature-based co-occurrence) between concepts, highlighting specific differences in coverage.

This analysis has suggested new extensions to RDoC, and opens it up for consideration of new domains and units. RDoQ also suggests quantitative resolutions of the differences between taxonomies and dimensional models that have been at the heart of the controversy with DSM-5. In these ways, it is bridging the enormously important differences between these systems.

THYROSIM

The Biocybernetics Laboratory, headed up by Professor Joe DiStefano, has released its first Internet app – a novel, user-friendly simulation tool for research and education in endocrinology (http://biocyb1.cs.ucla.edu/thyrosim/). The THYROSIM interface – shown in the adjacent figure – connects researchers, teachers, clinicians and patients to a computer simulation model of human thyroid hormone (TH) regulation. Only pictures, graphs and familiar clinical science language and quantitative ideas are used with the app interface – no higher math is required. This is offered as a globally accessible tool for research and teaching that focuses on the dynamic regulation of this multi-feedback system in health and disease, as well as a tool for patient education.

The mathematically complex and physiologically based model implemented in THYROSIM is widely published and validated, and is the result of several decades of Professor Joe DiStefano’s student research efforts.
UCLA COMPUTER SCIENCE DEPARTMENT FACULTY LEAD THE BEYOND NP INITIATIVE

A new computational paradigm has emerged in computer science over the past few decades, which is exemplified by the use of SAT solvers to tackle a large number of real-world problems. According to this paradigm, a significant research and engineering investment is being made towards developing highly efficient solvers, such as SAT solvers. The cost of this investment is then amortized as these solvers are systematically used to tackle a broader class of problems, in contrast to developing dedicated algorithms for each encountered problem. SAT solvers, for example, are now routinely used to solve problems in many domains, including planning, design, and scheduling, in addition to software and hardware verification.

The phenomenon surrounding SAT solvers is part of a bigger picture, which is centered around the notion of a complexity class. Intuitively, a complexity class is a set of computational problems that have a certain level of difficulty. The most difficult problems in a complexity class are said to be complete for that class. Therefore, if one has a way to solve these complete problems efficiently, then one can also solve all other problems in the complexity class efficiently via a systematic technique known as reduction. Over the history of computer science, the complexity class NP has perhaps received the most attention, both theoretically and practically. Indeed, the Boolean satisfiability problem targeted by SAT solvers is NP-complete, and so are a very large number of practical problems that are routinely reduced to SAT solving.

Professor Adnan Darwiche has recently initiated and is spearheading a new initiative, called Beyond NP, which aims to consolidate, disseminate and promote research that advances this emerging computational paradigm, while focusing on solvers that reach beyond the complexity class NP. There, we find many real-world problems related to, for example, optimization, probabilistic reasoning, and planning. The Beyond NP initiative has been crystallized through two first steps: 1) a community website, beyondnp.org, which was launched in the summer of 2015, and 2) the first workshop on Beyond NP, which will take place at the 30th AAAI Conference on Artificial Intelligence in February, 2016. The community website is hosted at UCLA and will act as a news and information aggregator for research on developing solvers that reach beyond NP, including a catalog of open-source solvers, repositories of corresponding benchmarks, and news on related academic activities. The first Beyond NP workshop is geared towards unifying and promoting research areas that advance the design of solvers that reach Beyond NP, and it is attracting worldwide experts on Beyond NP solvers.

Professor Guy Van den Broeck is on the steering committee of the Beyond NP initiative and has been contributing significantly to its evolution. Professors Darwiche and Van den Broeck are also known for their major contributions towards Beyond NP solvers, including state-of-the-art knowledge compilers and model counters, which reach a large class of Beyond NP problems.
LIXIA ZHANG

Lixia Zhang’s career path has been astonishing – especially considering that her first paid job was, as a teenager, driving a farm tractor in Northern China during the Cultural Revolution, when high schools and colleges were closed. Fortunately, things progressed from there to a Ph.D. from MIT in 1989 (a feat she attributes to hard work, good luck, and great help from many great people), followed by a research position at Xerox’s Palo Alto Research Center, and in 1995, a faculty position at UCLA.

Almost as unusual as that career path, Lixia learned how to carry out networking research not only from reading classic research papers, but more so from reading the famous *Feynman Lectures on Physics* series, which she says “taught me not only physics, but how to look at problems and conduct research.” Her favorite quotation from Feynman (above) guides her research efforts.

At Xerox PARC these efforts led to well-known results in TCP traffic dynamics analysis, reliable multicast design, Internet integrated services support, and the development of RSVP, a widely used Internet standard protocol. Her work at UCLA began with the adaptive web caching (AWC) project – the development of a global-scale web caching system funded by DARPA, and the Internet Distance Map Service (IDMaps) project funded by NSF. Much of her subsequent research focused on the resiliency and security issues in the global routing system and the Domain Name System (DNS), and on understanding the system-level challenges in deploying cryptographic protections in global-scale open systems such as the Internet. Lixia coined the term *middlebox*, referring to the new components that were not in the original IP architecture, but popped up in many places in the 1990s (web proxies, firewalls, NAT boxes). Much to her surprise, the word was quickly picked up by the community and is now used everywhere.

Lixia’s career goal is to help the Internet grow. In keeping with that goal, since 2010 she has been leading a multi-campus NSF-funded research project on the development of a new Internet architecture called Named Data Networking (NDN). Following Feynman’s instructions, the design of NDN is based on three decades of experience with the strengths and limitations of the existing Internet architecture. NDN has attracted attention from both the research community and industrial companies around the world, and recently appeared on Gartner’s influential Hype Curve for Networking & Communications. But according to Lixia, NDN is only at the end of its beginning stage; experimental validation of a new network architecture, again following Feynman’s instructions, takes a large amount of effort and time. She hopes to see NDN become more visible in the next five years.

Lixia has been recognized for her work and has received numerous awards: these include the IEEE Internet Award, UCLA Jonathan B. Postel Chair in Computer Science, Xerox Excellence in Science and Technology Award, Okawa Foundation Research Award, and multiple best-paper awards. She is an ACM and IEEE Fellow, and is even currently featured on the four of diamonds in a playing card deck of *Notable Women in Computing*. Lixia has been selected by ICANN for its Identifier Technology Innovation Panel, and has served on the Internet Architecture Board, the Asia Future Internet Forum Board, and several editorial boards of IEEE and ACM.
Programs & Annual Events

THE JON POSTEL DISTINGUISHED LECTURER SERIES (2015-2016)

This series is dedicated to the memory of Dr. Jon Postel—an alumnus of UCLA's Computer Science Department, a gentle man, and a brilliant and dedicated scientist who made many key contributions to the formative days of the ARPANET. Each year the Computer Science Department hosts a series of lectures by world-renowned scientists in academia and industry, covering a broad range of topics that are timely and relevant to today's high-technology world.

ALON HALEVY
Google
Structured Data in Web Search Results
*Norman E. Friedmann Distinguished Lecture
Thursday, February 4, 2016

MICHAEL JORDAN
UC Berkeley
Computational Thinking, Inferential Thinking and Big Data
Thursday, April 7, 2016

JACK DONGARRA
University of Tennessee
Architecture-aware Algorithms and Software for Peta- and Exascale Computing
Thursday, May 12, 2016

ERIC HORBVITZ
Microsoft Research
Data, Inference, and Decisions in Support of People and Society
Tuesday, May 17, 2016

Lectures will be held in 3400 Boelter Hall at 4:15 p.m. and will be preceded by a reception.
For further information, visit www.cs.ucla.edu
MIRYUNG KIM Ph.D. 2008 (University of Washington)

Miryung Kim joined the faculty of UCLA's Computer Science Department as an associate professor in 2014. Prior to this, she was a faculty member at the University of Texas at Austin for five years. Her research focuses on software engineering—specifically on software evolution. Miryung designs software analysis algorithms and development tools to make it easier to develop and evolve large-scale software systems. Her research is data-driven and is motivated by the real-world challenges in the software industry. She conducts user studies with professional engineers, carries out statistical analysis of open-source project data, and uses the resulting insights to design novel software engineering tools.

During her academic career, Miryung received an NSF CAREER award, a Microsoft Software Engineering Innovation Foundation Award, an IBM Jazz Innovation Award, a Google Faculty Research Award, and an Okawa Foundation Research Grant.

FEI SHA Ph.D. 2007 (University of Pennsylvania)

Fei Sha will formally join UCLA's Computer Science Department's faculty as an associate professor in January 2016. His research interest is statistical machine learning, and his objective is to advance principled statistical methods and algorithms, driven by real-world applications for building intelligent and autonomous systems—as well as understanding intelligence. His many other areas of interest include computer vision, speech and language processing, robotics, and more recently, computing systems and networks for large-scale machine learning.

Fei's background includes a postdoctoral research position at the University of California, Berkeley, a research scientist position at Yahoo!, and an appointment as a faculty member in the Department of Computer Science at USC. His many honors include an Alfred P. Sloan Research Fellowship and the Army Research Office’s Young Investigator Award.

GUY VAN DEN BROECK Ph.D. 2013 (Katholieke Universiteit Leuven, Belgium)

Guy Van Den Broeck joined UCLA's Computer Science Department as an assistant professor in 2015. Previously, he was a postdoctoral researcher at UCLA’s Automated Reasoning Lab and at KU Leuven’s Artificial Intelligence Lab. His 2013 Ph.D. dissertation received the ECAI Dissertation Award and a prize from IBM Belgium.

Guy’s research interests are in AI, machine learning, logical and probabilistic automated reasoning, and statistical relational learning. He also studies applications of reasoning in other fields such as (probabilistic) databases and programming languages. As co-organizer of the Internal Workshops on Statistical Relational AI, Guy aims to further the unification of logic and probability, and the development of high-level reasoning and learning algorithms. His work has received best-paper awards and honorable mentions at key artificial intelligence venues, including UAI, AAAI, and IJCAI.
SRIRAM SANKARARAMAN Ph.D. 2010 (University of California, Berkeley)

Sriram Sankararaman joined the UCLA Computer Science Department in 2015 as an assistant professor; he also holds a joint appointment with the Department of Human Genetics. Prior to joining UCLA, he was a post-doctoral fellow in the Department of Genetics at Harvard Medical School and was affiliated with the Broad Institute at Harvard and MIT.

Sriram’s research interests lie at the interface of computer science, statistics, and biology. Those interests include statistical machine learning, big data, computational biology, and population and medical genomics. He has been developing and applying machine learning algorithms to the understanding of evolutionary processes, the genetics of complex phenotypes, and genomic privacy. Sriram is the recipient of a 2014 NIH K99/R00 Pathway to Independence Award, a 2014 Simons Research Fellowship, a 2012 Harvard Science of the Human Past Fellowship, and a 2004 Berkeley fellowship.

AMEET TALWALKAR Ph.D. 2010 (Courant Institute, New York University)

Ameet Talwalkar became an assistant professor in UCLA’s Computer Science Department in 2015. Prior to joining UCLA, he was an NSF postdoctoral fellow in the AMPLab at UC Berkeley. His research addresses scalability and ease-of-use issues in the field of statistical machine learning, with applications in computational genomics.

Ameet led the initial development of the MLib project in Apache Spark, is a coauthor of the graduate-level textbook “Foundations of Machine Learning” (MIT Press 2012), and teaches a MOOC on edX called “Scalable Machine Learning.”

RAGHU MEKA Ph.D. 2011 (University of Texas at Austin)

Raghu Meka joined the UCLA Computer Science Department in 2014 as an assistant professor with interests in complexity theory, pseudorandomness, algorithm design, learning theory, and data mining. Prior to joining UCLA, he spent two years as a postdoctoral fellow at the Institute for Advanced Study, Princeton, and at DIMACS, Rutgers; he then spent a year as a researcher at Microsoft Research in Silicon Valley.

Raghu is a recipient of the Bert Kay Best Dissertation Award, the Dean’s Excellence Award, and an MCD fellowship at UT Austin. He is currently organizing LATS, the department’s theory seminar.
ARTIFICIAL INTELLIGENCE

The computational study of intelligent behavior. This includes research in logical and probabilistic reasoning, causality, heuristic search and combinatorial optimization, natural language processing, neural networks, and artificial life.

Adnan Darwiche
Professor, Ph.D.
(Stanford 1993)
Probabilistic and logical reasoning and its applications, including diagnosis, planning, and system design and analysis.

Michael Dyer
Professor, Ph.D.
(Yale 1982)
Processing and acquisition of natural language through symbolic, connectionist and genetic algorithm techniques.

Richard Korf
Professor, Ph.D.
(Carnegie Mellon Univ. 1983)
Problem-solving, heuristic search, planning and parallel processing in artificial intelligence.

Judea Pearl
Emeritus Professor, Ph.D.
(Polytechnic Institute of Brooklyn 1965)
Artificial intelligence and knowledge representation, probabilistic and causal reasoning, nonstandard logics, and learning strategies.

Fei Sha
Associate Professor, Ph.D.
(Univ. Pennsylvania 2007)
AI, machine learning, statistical methods and algorithms, computer vision/speech/language processing, and robotics.

Ameet Talwalkar
Assistant Professor, Ph.D.
(Courant Institute, NY Univ. 2010)
Scalability and ease-of-use issues in the field of statistical machine learning, with applications in computational genomics.

Guy Van den Broeck
Assistant Professor, Ph.D.
(Katholieke Univ., Leuven, Belgium 2013)
Machine learning, logical and probabilistic automated reasoning, and statistical relational learning.

Jennifer Wortman Vaughan
Adjunct Assistant Professor, Ph.D.
(Univ. Pennsylvania 2009)
Machine learning, learning theory, incentive design, and social computing.
COMPUTER SYSTEM ARCHITECTURE & CAD

The study of the structure and behavior of computer systems; development of new algorithms and computing structures to be implemented in hardware, firmware, and software; development of tools to enable system designers to describe, model, fabricate and test highly complex computer systems.

Jason (Jingsheng) Cong
Chancellor’s Professor, Ph.D.
(UI at Urbana Champaign 1990)
Computer-aided design of VLSI circuits, computer architecture and reconfigurable systems, fault-tolerant designs of VLSI systems, design and analysis of algorithms.

Milos Ercegovac
Distinguished Professor, Ph.D.
(UI at Urbana Champaign 1975)
Computer arithmetic and hardware-oriented algorithms, design of digital and reconfigurable systems.

Miodrag Potkonjak
Professor, Ph.D.
(UC Berkeley 1991)
Complex distributed systems, including embedded systems, communication designs, computer-aided design, ad hoc sensor networks, computational security, electronic commerce, and intellectual property protection.

Glenn Reinman
Associate Professor, Ph.D.
(UC San Diego 2001)
Processor architecture design and optimization, speculative execution, profile-guided optimizations, techniques to find and exploit instruction-level parallelism.

Ani Nahapetian
Adjunct Assistant Professor, Ph.D.
(UC Los Angeles 2007)
Hardware-based system security, mobile and wireless health systems, embedded systems, and algorithms for reconfigurable computing.

Majid Sarrafzadeh
Distinguished Professor, Ph.D.
(UI at Urbana Champaign 1987)
Health analytics, wearable and mobile systems, embedded systems.

Yuval Tamir
Associate Professor, Ph.D.
(UC Berkeley 1985)
Computer systems, parallel and distributed systems, software systems, computer architecture, dependable systems, virtualization, cluster computing, multicore architectures, interconnection networks and switches, transactional memory.
Faculty

COMPUTATIONAL SYSTEMS BIOLOGY
An integrative approach to understanding biological systems, with research areas that span systems biology, bioinformatics, genomics, computational biology, and biomedical engineering.

Joseph DiStefano III
Distinguished Professor, Ph.D.
(UC Los Angeles 1966)
(Also Prof. of Medicine and Biomedical Engineering)
Integrative, data-driven systems biology and multi-level dynamic biosystems modeling. Focus on disease (cancer, HCV, diabetes, neuroendocrine) process dynamics and optimal therapies. Internet-based intelligent software for life sciences research.

Eleazar Eskin
Associate Professor, Ph.D.
(Columbia 2002)
Computational biology and bioinformatics, and specifically, analysis of human variation and its relation to complex disease.

Christopher Lee
Professor, Ph.D.
(Stanford 1993)
Information metrics for statistical inference, bioinformatics analysis of high throughput genomics data, graph databases for bioinformatics and genomics, scalability principles of scientific data sharing, integration and mining. (Joint appointment with Chemistry and Biochemistry Departments)

D. Stott Parker
Professor, Ph.D.
(UI at Urbana Champaign 1978)
Knowledge-based modeling and databases, stream processing, logic programming, rewriting, and systems for constraint processing.

Sriram Sankararaman
Assistant Professor, Ph.D.
(UC Berkeley 2010)
Statistical machine learning, big data, computational biology, population and medical genomics.

Fabien Scalzo
Assistant Professor in Residence, Ph.D.
(University of Liege, Belgium 2008)
Development of computational methods to address neurocritical care problems with a focus on medical imaging, machine learning, biomedical informatics and engineering, big data analysis.
GRAPHICS & VISION

The synthesis and analysis of images by computer. Graphics—rendering, motion capture, and geometric, physics-based and artificial life modeling/animation for the movie and game industries. Vision—texture, shape, motion and illumination, 3D reconstruction from images, object recognition, real-time vision/control for autonomous vehicles, visual sensor networks and surveillance, and medical image analysis.

Stanley Osher
Professor, Ph.D.
(New York Univ. 1966)
Image science, scientific computing, level set methods. (Joint appointment with Mathematics Department)

Alan Yuille
Professor, Ph.D.
(Cambridge 1976)
Computer vision, Bayesian statistics, and pattern recognition. (Joint appointment with Statistics and Psychology Departments)

Stefano Soatto
Professor, Ph.D.
(Caltech 1996)
Computer vision, robotics, autonomy, machine learning, augmented reality, medical imaging

Song-Chun Zhu
Professor, Ph.D.
(Harvard 1996)
Computer vision, statistical modeling and computing, machine learning. (Joint appointment with Department of Statistics)

Demetri Terzopoulos
Distinguished Professor and Chancellor’s Professor, Ph.D.
(MIT 1984)
Computer graphics, computer vision, medical image analysis, computer-aided design, artificial intelligence/life.
INFORMATION & DATA MANAGEMENT

The development of models, techniques and tools to improve the functionality, performance and usability of database management and Web systems that provide enabling technology for our information society—including Web search engines, digital libraries, big data, data mining, distributed databases, data stream management systems, and information systems for medicine and science.

Alfonso Cárdenas  
Emeritus Professor, Ph.D.  
(UC Los Angeles 1969)  
Database management, distributed heterogeneous and multimedia (text, image/picture, voice) systems, information systems planning and development methodologies, medical informatics, legal and intellectual property issues, and software engineering.

Tyson Condie  
Assistant Professor, Ph.D.  
(Univ. of California, Berkeley 2011)  
Large-scale data analytics, distributed systems, Internet-scale query processing and optimization, declarative language design and implementation.

Richard Muntz  
Emeritus Professor, Ph.D.  
(Princeton 1969)  
Distributed and parallel database systems, temporal data models and query processing, knowledge discovery in database systems, and computer performance evaluation.

Junghoo (John) Cho  
Associate Professor, Ph.D.  
(Stanford 2002)  
Internet search engines, database systems, information management systems, and digital libraries. Development of new algorithms and techniques to manage large-scale data on the Internet.

Wei Wang  
Professor, Ph.D.  
(UC Los Angeles 1999)  
Big data, data mining, bioinformatics and computational biology, and databases.

Wesley Chu  
Distinguished Professor Emeritus Ph.D.  
(Stanford 1966)  
Distributed processing, distributed database systems, and intelligent information systems.

Carlo Zaniolo  
Professor, Ph.D.  
(UC Los Angeles 1976)  
Knowledge-based systems, database systems, non-monotonic reasoning, spatio/temporal reasoning, and scientific databases.
**NETWORK SYSTEMS**

The study and design of distributed and often mobile systems—including computers, vehicles, people, and sensors interconnected by a communications network. Also included are the applications that run on these systems and protocols that make the various network components work together and perform well, and to optimize performance and studies of the wired or wireless network itself.

**Deborah Estrin**  
Adjunct Professor, Ph.D.  
(MIT 1985)  
Wireless sensing systems, Internet architecture and protocols, with particular attention to environmental sensing applications.

**Mario Gerla**  
Distinguished Professor, Ph.D.  
(UC Los Angeles 1973)  
Performance evaluation, design and control of distributed computer communication systems, and high-speed computer networks (B-ISDN and optical).

**Van Jacobson**  
Adjunct Professor, M.S.  
(University of Arizona 1972)  
TCP/IP network performance and scaling. Content-centric networking.

**Leonard Kleinrock**  
Distinguished Professor Emeritus, Ph.D.  
(MIT 1963)  
Queueing theory, networking (including packet switching, packet radio, local area (LAN), broadband, and peer-to-peer), nomadic computing and intelligent agents.

**Songwu Lu**  
Professor, Ph.D.  
(UI at Urbana Champaign 1999)  
Wireless networking, mobile computing, network security, sensor networks, network middleware.

**Giovanni Pau**  
Adjunct Professor, Ph.D.  
(University of Bologna 1998)  
Mobile computer network environments, wired and wireless networks. Distributed systems, Internet information systems, replication, peer-to-peer, overlay networks.

**Peter Reiher**  
Adjunct Professor, Ph.D.  
(UC Los Angeles 1987)  
Network security, operating system security, distributed systems, and file systems.

**M. Y. “Medy” Sanadidi**  
Adjunct Professor, Ph.D.  
(UC Los Angeles 1982)  
Congestion control and adaptive multimedia streaming in heterogeneous networks; analytic modeling of computer and communications systems.

**Mani B. Srivastava**  
Professor, Ph.D.  
(UC Berkeley 1992)  
Low-power and energy-aware embedded systems, wireless sensor and actuator networks, mobile and wireless computing and networking, pervasive computing. (Joint appointment with Electrical Engineering Department)

**Lixia Zhang**  
Professor, Ph.D.  
(MIT 1989)  
Internet architecture, principles of network protocol designs, security and resiliency in global-scale systems.
SOFTWARE SYSTEMS
A broad array of ongoing research that spans the entire spectrum of software systems—including programming language design and implementation, software engineering, operating systems, and embedded systems.

Rajive Bagrodia
Emeritus Professor, Ph.D. (Univ. Texas, Austin 1987)
Wireless networks, mobile computing and communications, network simulation and analysis, parallel and distributed computing.

Paul Eggert
Senior Lecturer SOE, Ph.D. (UC Los Angeles 1980)
Software design and engineering, programming language design and implementation, and software internationalization.

Alan Kay
Adjunct Professor, Ph.D. (Univ. of Utah 1969)
Object-oriented programming, personal computing, graphical user interfaces.

Miryung Kim
Associate Professor, Ph.D. (Univ. Washington 2008)
Software analysis algorithms and development tools to make it easier to develop and evolve large-scale software systems.

Todd Millstein
Associate Professor, Ph.D. (Univ. Washington 2003)
Programming languages and language design, compilation, software model checking, formal methods, and software engineering.

Rupak Majumdar
Adjunct Professor, Ph.D. (UC Berkeley 2003)
Formal verification and control of reactive, real-time, hybrid, and probabilistic systems; software verification and programming languages; game theoretic problems in verification; logic and automata theory.

Carey Nachenberg
Adjunct Assistant Professor, M.S. (UC Los Angeles 1995)
Anti-virus and intrusion detection technology. Automatic identification of new/unknown malicious software.

Peter S. Pao
Adjunct Professor, Ph.D. (Univ. of Michigan 1975)
System engineering, knowledge management and technology networking. (Joint appointment with Anderson School of Management)

Jens Palsberg
Professor, Ph.D. (Univ. of Aarhus, Denmark 1992)
Compilers, embedded systems, programming languages, software engineering, and information security.

David Smallberg
Senior Lecturer SOE, M.S. (UC Los Angeles 1978)
Computer science education, programming languages, generic programming, student software analysis.
COMPUTER SCIENCE THEORY

The use of simple and concise mathematical models to investigate computational questions and issues—including research in centralized, parallel and distributed models of computation; optimal approximate and randomized online algorithms; complexity, cryptography, games, auctions and mechanism design theory.

**Eliezer Gafni**
Professor, Ph.D.  
(MIT 1982)
Distributed algorithms, mathematical programming with application to distributed routing and control of data networks, and computer science theory.

**Sheila Greibach**
Emeritus Professor, Ph.D.  
(Harvard 1963)
Algorithms and computational complexity, complex program schemes and semantics, formal languages and automata theory and computability.

**Rafail Ostrovsky**
Professor, Ph.D.  
(MIT 1992)
All aspects of theory of computation, especially cryptography and security, distributed algorithms, high-dimensional search, and routing and flow control in communication networks.

**Amit Sahai**
Professor, Ph.D.  
(MIT 2000)
Theoretical computer science, primarily foundations of cryptography and computer security.

**Raghu Meka**
Assistant Professor, Ph.D.  
(Univ. Texas at Austin 2011)
Complexity theory, pseudorandomness, algorithm design, learning theory, and data mining.

**Alexander Sherstov**
Associate Professor, Ph.D.  
(University of Texas at Austin, 2009)
Theoretical computer science with an emphasis on computational complexity theory, learning theory and quantum computing.
EMERITI FACULTY

Algirdas Avižienis  
Emeritus Professor, Ph.D.  
(UI Urbana-Champaign 1960)  
Computer system architecture,  
fault-tolerant computing.

Jack Carlyle  
Emeritus Professor, Ph.D.  
(UC Berkeley 1961)  
Communication, computation theory,  
algorithms and complexity.

Allen Klinger  
Emeritus Professor, Ph.D.  
(UC Berkeley 1966)  
Image and pattern analysis, database  
systems, computer education.

Leon Levine  
Senior Lecturer, M.S.  
/MIT 1949/  
Computer methodology.

Lawrence McNamee  
Emeritus Professor, Ph.D.  
(Univ. Pittsburgh 1964)  
Computer graphics, discrete simulation,  
digital filtering, computer-aided design.

David Rennels  
Emeritus Professor, Ph.D.  
(UC Los Angeles 1973)  
Computer systems architecture,  
fault-tolerant computing.

Jacques Videl  
Emeritus Professor, Ph.D.  
(Univ. of Paris 1961)  
Pattern recognition, neural networks,  
fuzzy systems and genetic search.
IN MEMORIUM

Thelma Estrin, Emerita Professor

A trailblazer in biomedical engineering and a true role model for all women in science, Thelma Estrin passed away in February 2014 at the age of 89. With B.S., M.S. and Ph.D. degrees from the University of Wisconsin, her subsequent career path was remarkable in its diversity: researcher in the Electroencephalography Department of N.Y’s Columbia Presbyterian Hospital; scientist at the Weizmann Institute of Science in Israel where she and her husband (Gerald Estrin, also a professor in UCLA’s CS Department) worked on WEIZAC, the first large-scale computer outside of the U.S. or Western Europe; director of the UCLA Brain Research Institute's Data Processing Lab; full professor at UCLA’s School of Engineering & Applied Science; first woman to join the Aerospace Corporation’s board of trustees; and director of NSF’s division of Electrical, Computing & System Engineering. Thelma was a Fellow of IEEE, the American Academy of Arts and Sciences, and a Founding Fellow of the American Institute for Medical & Biological Engineering. During her lifetime, she received numerous awards, including an Achievement Award from the Society of Woman Engineers, a Superior Accomplishment Award from NSF, and an Outstanding Engineer of the Year Award from the California Institute for the Advancement of Engineering.

Michel Melkanoff, Emeritus Professor

In December 2014 we lost a highly esteemed friend and colleague—Michel (Mike) Melkanoff—an outstanding teacher, one of the founding members of the Computer Science Department, and the Department chair from 1969 to 1972. Mike’s no-nonsense kind of focus, coupled with his humor, charm and dedication, made him a great chair in the early days of the UCLA School of Engineering. Born in Russia, Mike received his B.S. from New York University and his M.S. and Ph.D. from UCLA. Always multifaceted, he held teaching positions in physics, computer science, and mechanical, aerospace and nuclear engineering—and even in library sciences. He saw the future of CAD in industry long before others, and headed up the Institute for Manufacturing and Automation Research—a collaborative effort with other universities, corporations and government agencies. He also established the university’s Manufacturing Engineering Program and directed it for many years. Today, we know that data management and computer automated manufacturing have changed every corner of the world.
## Contracts & Grants 2014-2015

### FEDERAL AND STATE: CONTRACTS & GRANTS

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<tr>
<th>Agency</th>
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<th>Faculty</th>
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<td>CAREER: Towards a Big Data Application Server Stack</td>
<td>Tyson Condie</td>
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<tr>
<td>National Science Foundation</td>
<td>Scaling Machine Learning to Massive Datasets – A Logic Based Approach</td>
<td>Tyson Condie</td>
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<td>National Science Foundation</td>
<td>Synthesis for Application-Specific Processor Networks</td>
<td>Jason Cong</td>
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<td>Learning Probability Distributions over Structured Spaces</td>
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<td>National Science Foundation</td>
<td>Sentential Decision Diagrams</td>
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<td>National Science Foundation</td>
<td>Private ID of Relatives &amp; Private GWAS: First Steps in New Field of Cryptogenomics</td>
<td>Eleazar Eskin</td>
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<td>National Science Foundation</td>
<td>Meta-analysis Reinterpreted Using Causal Graphs</td>
<td>Eleazar Eskin</td>
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<td>University of California, Berkeley</td>
<td>An Integrated Molecular Approach to Understand Variation in Iron Metabolism</td>
<td>Eleazar Eskin</td>
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<td>Stanford University</td>
<td>Genetic Regulation of Gene Expression and its Impact on Phenotypes</td>
<td>Eleazar Eskin</td>
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<td>University of Southern California</td>
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<td>Eleazar Eskin</td>
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<td>US/Israel Binational Sci Foundation</td>
<td>Methods for Preprocessing Population Sequence Data</td>
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<td>University of Chicago</td>
<td>Genetic Regulation of Gene Expression and its Impact on Phenotypes</td>
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<td>University of Southern California</td>
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<td>National Science Foundation</td>
<td>Closing Loop Between Traffic/Pollution Sensing &amp; Vehicle Route Control</td>
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<td>Vehicular Network Operating on Cognitive Network</td>
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<td>CAREER: Analysis and Automation of Systematic Software Modifications</td>
<td>Miryung Kim</td>
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<td>Cooperative, Trusted Software Repair for Cyber Physical System Resiliency</td>
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<td>Investigating SW Modifications in Collaborative Development Environment</td>
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<td>Applied Historiography in ARPANET-Era Management and Innovation</td>
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<td>National Science Foundation</td>
<td>Symposium on Combinatorial Search - 2015</td>
<td>Richard Korf</td>
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<td>Identify Design and Operational Loopholes in Cellular Network Protocols</td>
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<td>Systematic Analysis of Protocol Implementations</td>
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<td>PetaBlox: Large-Scale Software Analysis and Analytics Using Datalog</td>
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<td>Uncertain Multi-Modal Information Integration</td>
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<td>Facets: Exploiting Semantic Equivalence of Files to Improve Storage Systems</td>
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<td>AIR Technology Translation-Non-invasive Monitoring Nutrition Necklace: NIMON Necklace</td>
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<td>National Institute of Health</td>
<td>Biomedical REAL-Time Health Evaluation for Pediatric Asthma (BREATHE)</td>
<td>Majid Sarrafzadeh</td>
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### Industry and Other Organizations: Contracts & Grants

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<td>Department of Defense</td>
<td>Restoring Bladder Function with Transcutaneous Simulations</td>
<td>Majid Sarrafzadeh</td>
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<td>National Institute of Health</td>
<td>Bridging Research, Innovation, Training &amp; Education Solutions for Minority Health</td>
<td>Majid Sarrafzadeh</td>
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<td>National Inst. of Mental Health</td>
<td>Improving Health/Nutrition: Indian Women with AIDS &amp; Their Children</td>
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<td>Modeling, Analysis and Active Inference of Representations: Sensing-Action Systems</td>
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<td>Provable Correct Decision Making for Networks of Humans &amp; Unmanned Systems</td>
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<td>Improving Health/Nutrition: Indian Women with AIDS &amp; Their Children</td>
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<td>Nonparametric Representations for Integrated Inference, Control, and Sensing</td>
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<td>Bounded Rationality Autonomy Using Neuromorphic Decision and Action Models</td>
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<td>National Science Foundation</td>
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<td>National Institute of Health</td>
<td>Mining the Social Web to Monitor Public Health and HIV Risk Behaviors</td>
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<td>National Institute of Health</td>
<td>Fast and Robust Methods for Large-Scale Genotype Phenotype Association Study</td>
<td>Wei Wang</td>
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<td>National Institute of Health</td>
<td>A Community Effort to Translate Protein Data to Knowledge: An Integrated Platform</td>
<td>Wei Wang</td>
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<td>National Science Foundation</td>
<td>1) Named Data Networking (NDN) and 2) Smart Home Networking via NDN</td>
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### Industry Support From Industry

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<td>Intel Corporation</td>
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<td>Tyson Condie</td>
<td>Focus Ventures</td>
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<td>Bally Gaming</td>
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<td>Silicon Valley Community Foundation</td>
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<td>FutureWei Technologies</td>
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<td>Sandia National Labs</td>
<td>Peter Reicher</td>
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</table>
Student Life at UCLA

UCLA is located in Westwood—one of the most beautiful areas of Los Angeles. The Computer Science Department is one of seven departments within the Henry Samueli School of Engineering and Applied Sciences. Currently housed in Engineering IV’s Boelter Hall, with a move to the new Engineer VI building slated for 2017, it remains conveniently close to the Ackerman Student Union and the John Wooden Fitness Center in the heart of UCLA’s tree-laden campus. Most students live in Westwood Village in student housing or apartment buildings within a one-mile radius of UCLA. The Village offers shops, restaurants, and theaters. Some of our students live in nearby communities like Culver City or Santa Monica, and others commute from other areas of Los Angeles or beyond. Public transportation and ample parking on campus provide many options for getting to and from school. Finally, UCLA is just six miles from the ocean, so if our students need a temporary change of scenery, they can easily catch a bus to one of Southern California’s sparkling beaches.

UNDERGRADUATE PROGRAM

The Computer Science Department is home to over 800 undergraduate students. Along with our strong academic foundation, we offer opportunities for undergraduates to interact with the Department in unique ways to balance their academic quest. Student members of the ACM (Association for Computing Machinery) explore their interests on campus and work on projects related to their pursuits, while also conducting infosessions for fellow undergrads. Our UCLA chapter of Upsilon Pi Epsilon, an international honor society for computing and information disciplines, provides information on internships and opportunities for graduate school workshops. Further, the Department offers classes and research programs that are grounded in real-world problems existing in science and industry, thus giving undergraduates an experience of “life as a graduate student.”

The Department offers a bachelor of science degree in both computer science (CS) and computer science and engineering (CS&E). The key difference between the CS and CS&E degrees is that the latter is designed to accommodate those students who desire a strong foundation in computer science, but who also have a strong interest in computer system hardware. The CS&E program is accredited by the Computing Accreditation Commission and the Engineering Accreditation Commission of ABET (http://www.abet.org). The CS program is accredited by the Computing Accreditation Commission.

Undergraduate Program Advisory Board

The Undergraduate Advisory Board meets annually to review our undergraduate program and refine the department’s goals. Chaired by David Smallberg, the advisory board comprises the following representatives from industry, academia, alumni, and our own student organization leaders.

Leon Alkalai
Ned Bader
Joseph Bannister
Peter Blankenship
Jon Canan
Jason Cong
Paul Eggert
Leana Golubchik
Ryan Kastner
Richard Korf
Pekka Kostamaa
Laurie Leyden
Bruce McIntire
JPL/Caltech
IBM
Aerospace Corporation
Northrop Grumman
Microsoft
UCLA Faculty
UCLA Faculty
USC
UCSD
UCLA Faculty
Teradata
UCLA Staff
Raytheon

Richard Muntz
David Nguyen
Ross Niebergall
Nima Nikzad
Joseph Ou-Yang
Frank Pearce
Dave Rennels
John Rosati
Mike Sievers
David Smallberg
Fay Wu
Christina Yang
Ben Zamanzadeh
UCLA Faculty Emeritus
UCLA Undergrad (LUG President)
Raytheon
Scripps Translational Science Institute
IBM
Blizzard
UCLA Faculty Emeritus
Trilennia Group LLC
JPL/Caltech
UCLA Faculty
UCLA Undergrad (ACM President)
UCLA Undergrad (UPE President)
DataPop
GRADUATE PROGRAM

Graduate students at UCLA have access to a friendly, cooperative, vibrant community. The Computer Science Graduate Student Committee (CSGSC) organizes events that include an annual fall picnic and a popular weekly “tea time” with gourmet food and informal conversation. There are also many funding opportunities for graduate students in the form of teaching assistantships or graduate research positions, and these positions offer salary, healthcare, and tuition remission.

Our approachable faculty and close-knit student body will help students find a good fit for their interests and abilities. And, because of the Department’s academic and industrial affiliations, the relationships formed here promote opportunities for postdoctoral research and faculty positions at respected academic institutions, and internships and employment at exciting technology companies.

2015 Graduate Awards (advisors in parenthesis)

Industry
Muhuan Huang (Cong) Cisco Systems Outstanding Graduate Student Research Award
Chien-Ju Ho (Vaughan) Google Outstanding Graduate Student Research Award
Khaled Refaat (Darwiche) Northrop-Grumman Outstanding Graduate Student Research Award
Nabil Alshurafa (Sarrafzadeh) Symantec Outstanding Graduate Student Research Award
Lisa Gai (Eskin) Microsoft Research Graduate Women’s Scholarship
Prabhanjan Ananth (Ostrovy & Sahai) Simons Award in Theoretical Computer Science

Associations
Andrew Wong (Darwiche) National Physical Science Consortium Fellowship
Steven Holtzen (Chu) National Physical Science Consortium Fellowship

UCLA
Nabil Alshurafa (Sarrafzadeh) CS Department Outstanding Ph.D. Graduate
Zhanin Xu (Terzopoulos) CS Department Outstanding Master’s Graduate
Lisha Li (Talwalkar) Eugene Cota-Robles Fellowship
Christopher Wu (Talwalkar) Graduate Dean’s Scholarship Award
Divya Gupta (Sahai) Dissertation Year Fellowship
Farhad Hormozdiari (Eskin) Dissertation Year Fellowship

2014 Graduate Awards (advisors in parenthesis)

Industry
Lap Fai *Craig* Yu (Terzopoulos) Cisco Systems Outstanding Graduate Student Research Award
Elias Barienboim (Pearl) Google Outstanding Graduate Student Research Award
Sunghoon Lee (Sarrafzadeh) Northrop-Grumman Outstanding Graduate Student Research Award
Lesani Mohsen (Palsberg) Symantec Outstanding Graduate Student Research Award

Associations
Samuel Tarin (Parker) National Physical Science Consortium Fellowship
Lap-Fai (Craig) Yu (Terzopoulos) WAGS/UMI Innovation in Technology Award

UCLA
Elias Barienboim (Pearl) CS Department Outstanding Ph.D. Graduate
Elias Barienboim (Pearl) HSSEAS E. K. Rice Outstanding Doctoral Student Award
Joachim Valente (Soatto) CS Department Outstanding Master’s Graduate
Lisa Gai (Eskin) Eugene Cota-Robles Fellowship
Hao Yu (Cong) Graduate Dean’s Scholarship Award
Bin Bi (Cho) Dissertation Year Fellowship
Chien-Ju Ho (Cong) Dissertation Year Fellowship
Guan-Hua Tu (Lu) Dissertation Year Fellowship
James Wendt (Potkonjak) Dissertation Year Fellowship
Emanuel Rivera-Castro (Korf) Graduate Opportunity Fellowship Program
Nicolas Langley (Reiher) Graduate Opportunity Fellowship Program
Theano Stavrinos (Zhang) Graduate Opportunity Fellowship Program
Cory Bradford-Watts (Dyer) Graduate Opportunity Fellowship Program
# Doctoral Student Placement 2014-2015

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<th>Affiliation</th>
<th>Position</th>
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<tr>
<td>Alexander Afanasyev</td>
<td>UCLA Internet Research Lab</td>
<td>Postdoc Scholar</td>
<td>Lixia Znang</td>
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<tr>
<td>Jong Hoon Ahnn</td>
<td>Samsung</td>
<td>Staff Software Engineer</td>
<td>Miodrag Potkonjak</td>
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<td>Nabil Alshurafa</td>
<td>Northwestern U., Preventive Medicine</td>
<td>Assistant Professor</td>
<td>Majid Sarrafzadeh</td>
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<td>Fabio Angius</td>
<td>Bloomberg LP</td>
<td>Database/Infrastructure Engineer</td>
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<td>Elias Bareinboim</td>
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<td>Assistant Professor</td>
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<td>Bin Bi</td>
<td>Microsoft Research Internet Services Ctr</td>
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<td>Junghoo Cho</td>
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<td>Nicholas Williams Brown</td>
<td>Northeastern University</td>
<td>Lecturer</td>
<td>Joseph DiStefano</td>
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<td>Young Chul Cha</td>
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<td>Applied Research</td>
<td>Junghoo Cho</td>
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<td>Kung-Hua Chang</td>
<td>OpenMail</td>
<td>Data Scientist</td>
<td>Stott Parker</td>
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<td>Suming Chen</td>
<td>Google</td>
<td>Software Engineer</td>
<td>Adnan Darwiche</td>
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<td>Mani Srivastava</td>
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<td>Twitter</td>
<td>Software Engineer</td>
<td>Rajive Bagrodia</td>
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<td>Nathaniel Conos</td>
<td>Synopsys</td>
<td>Sr. R&amp;D Engineer</td>
<td>Miodrag Potkonjak</td>
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<td>Damek Davis</td>
<td>Cornell University</td>
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<td>Stefano Soatto</td>
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<td>Mahdi Eslamimehr</td>
<td>SAP</td>
<td>Post Doc Researcher</td>
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<td>Charles Fleming</td>
<td>Xi’an Jiaotong-Liverpool U.</td>
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<td>Nicholas Furlotte</td>
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<td>Yoox</td>
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<td>Ian Ku</td>
<td>Orange</td>
<td>IP Network Researcher</td>
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<td>Abishek Kumarasubramanian</td>
<td>Google</td>
<td>Software Engineer</td>
<td>R. Ostrovsky / A. Sahai</td>
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For current information on past students, please see the faculty advisor’s web page.
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<tr>
<td>Michael Le</td>
<td>IBM Research T.J. Watson</td>
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<td>Seung Hyun Pan</td>
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<td>Milos Ercegovac</td>
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<td>Jeremi Sudol</td>
<td>IPPLEX</td>
<td>Co-founder &amp; Sr. Tech Staff</td>
<td>Stefano Soatto</td>
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<td>Yu-Ting Yu</td>
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<td>Kai Zeng</td>
<td>AMPlab</td>
<td>Postdoc Researcher</td>
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Departmental Diversity Program

The Computer Science Department and its faculty members strive for diversity within the department’s student population. We do this by engaging in a number of outreach activities in order to attract a greater number of women and members of underrepresented groups to our undergraduate and graduate programs, and by further providing excellent opportunities once these students join the department. Some of these diversity activities are described below.

• We are working with the Graduate School of Education & Information Studies and the Los Angeles Unified School District (LAUSD) to increase the number of women and underrepresented students in computer science. For example, as part of the AP Readiness program, LAUSD students (predominantly from underrepresented groups) and teachers participate in weekend AP computer science enrichment sessions.

• Faculty members Alfonso Cardenas and David Smallberg co-lead in collaboration with the School’s Center for Excellence in Engineering and Diversity (CEED) on the NSF-funded FOCUS program (Frontier Opportunities in Computing for Underrepresented Students). The goal is to increase the participation, retention and performance of URM students pursuing baccalaureate degrees in computing disciplines. FOCUS encourages and fosters current and potential community college underrepresented transfer students through summer courses, bridge programs, school-year seminars, and support programs. NSF funding for this program concluded in 2013. The FOCUS website provides highlights and the accomplishments/outcomes report. http://www.cs.ucla.edu/focus/index.html

• CEED is committed to the development, recruitment, retention, and graduation of underrepresented engineering and computing students. Its support includes an intensive Computing Immersion Summer Experience to better prepare incoming underrepresented freshman and transfer students for university-level computer science courses and to expose them to research and industry. It supports student chapters of the American Indian Science and Engineering Society, the National Society of Black Engineers, and the Society of Latino Engineers and Scientists. http://www.ceed.ucla.edu/about

• We have supported a number of women and underrepresented graduate students under the DOE-sponsored GAANN fellowship program and the National GEM Consortium.

• Several of the department’s “centers” have received funding for programs and partnerships that focus on increasing diversity in the field of computer science. For example, the Center for Domain-Specific Computing has an educational component with an emphasis on attracting underrepresented students at all levels through partnerships with campus organizations focused on diversity.
COMPUTER SCIENCE DEPARTMENT
ALUMNI ADVISORY BOARD

Mission Statement: To promote the communication, growth, and shared activities of the UCLA Computer Science Department alumni, faculty and students. The Board has represented several generations of the department’s alumni since its inception in the fall of 1969. Composed of leaders in education and industry, it also reflects the major fields of computer science.

The Board meets on a quarterly basis, and, in accordance with its mission, is involved in a number of activities—including the department’s Annual Research Review, the career panel and job interview workshop for graduating students, the Rose Bowl pre-game tailgate party for UCLA’s homecoming football game, and several other activities that are posted on the department’s alumni website (http://www.cs.ucla.edu/csd/people/alumni).

Alumni Advisory Board Members

James Anhalt, III
Lead Software Engineer, Blizzard Entertainment, Inc.

John Busch
Vice President and Senior Fellow, SanDisk Corp.

Alfonso Cardenas (Alumni Advisory Board Faculty Chair)
Professor, UCLA Computer Science Department

Milos Ercegovac
Professor, UCLA Computer Science Department

Eytan Elbaz
Chairman and cofounder, Scopely and Deep Dive Media

Tim Ford
Lead Software Engineer, Blizzard Entertainment, Inc.

William Goodin (Alumni Advisory Board Chair)
Associate Director of Alumni Relations, UCLA SEAS

Jacquelyn Leong
Technical Lead, Amgen

Andrew Louie
Founder and CEO, Hexaflex Strategies

Michael Parker
Lead Developer, Ad Hoc Labs, Inc.

David Smallberg (Alumni Advisory Board Faculty Vice Chair)
Senior Lecturer SOE, UCLA Computer Science Department

Sze Ki Pat (Alumni Advisory Board Vice Chair)
Sr. Staff Software Engineer, MySpace

Maria H. (Lolo) Penedo
NGMS Technical Fellow, Northrop Grumman Corp.

John Rosati
Founder and Managing Director, THR Associates

James Winchester
Owner, Avionic Products, Inc.

Ben Zamanzadeh
VP of Engineering, DataPop
INDUSTRIAL AFFILIATE PROGRAM MEMBERS

The Computer Science Department maintains close ties with industry, collaborating on state-of-the-art research and engaging in mutually beneficial exchanges of technology. The Department’s Industrial Affiliate Program facilitates these goals while providing many benefits to its Affiliates through its two levels of membership. Benefits include invitations to our Internship Day and Tech Forum events, access to in-house reports and technical publications, recruiting assistance, and interactions with faculty members in areas of interest. For additional details, see www.cs.ucla.edu/about/industrial-affiliate-program/

Multinational financial services corporation. Faculty Liaison: Prof. Rafail Ostrovsky

20th-largest mobile telecom company in the world. Faculty Liaison: Prof. Songwu Lu

Premier developer/publisher of entertainment software. Faculty Liaison: Prof. Demetri Terzopoulos

Bloomberg

Provider of recruiting services for R&D high-tech customers. Faculty Liaison: Prof. Milos Ercegovac

Hardware, software & services to create IT solutions. Faculty Liaison: Prof. Songwu Lu

Online social networking service with over 1.18 billion monthly active users. Faculty Liaison: Prof. Milos Ercegovac

Google

Developer of world’s largest search engine. Faculty Liaison: Prof. John Cho

Leader in electronic design automation (EDA). Faculty Liaison: Prof. Jason Cong

Provider of systems and technologies—from under sea to outer space. Faculty Liaison: Prof. Mario Gerla

Mentor Graphics

State-of-the-art wireless communication technologies. Faculty Liaison: Prof. Jens Palsberg

U. S. Department of Energy research and development laboratory. Faculty Liaison: Prof. Peter Reiher

World’s largest information technology company. Faculty Liaison: Prof. Stefano Soatto

Qualcomm

Leading developer of electronics, motion pictures, and music. Faculty Liaison: Prof. Stefano Soatto

Helping customers secure and manage information. Faculty Liaison: Prof. Tyson Condie

Leader in data warehousing and analytic technologies. Faculty Liaison: Prof. Carlo Zaniolo

Sony

Symantec

Viasat

Innovative satellite communications products. Faculty Liaison: Prof. Lixia Zhang
Thanks to the efforts of Professor Miryung Kim, Mario Gerla (Department chair), Jens Palsberg (former chair), William Goodin (Alumni Advisory Board chair), staff members Cassandra Franklin and Laurie Leyden, and our Industrial Affiliate program, the Computer Science Department was able to send 19 young women to attend the 2015 Grace Hopper Celebration of Women in Computing Conference. These conferences are presented by the Anita Borge Institute in partnership with the Association of Computing Machines (ACM); this year’s conference was held 14–16 October in Houston, Texas.

This is the largest technical conference for women in computing and results in collaborative proposals, networking and mentoring for junior women, and increased visibility for the contributions of women in computing. Conference presenters are leaders in their respective fields, representing industry, academia and government, while special sessions focus on the role of women in today’s technology fields and offer career workshops. The following are just a few quotes from our enthusiastic participating students:

**Grace Hopper introduced me to new opportunities I can pursue in computer science along with the diverse community of women excelling in those fields. The experience was a huge confidence boost and I was even able to secure a summer internship through the conference.**

**GHC inspired me to work harder, collaborate more, encourage others, and have fun with computer science. It was a huge learning experience.**

**I had a great time at GHC this year! It was so inspiring seeing that tens of thousands of women share the same interests as me. I also had the opportunity to network with a lot of companies and have gotten some interviews from people I talked to at the conference career fair. Thank you for the opportunity to go!**