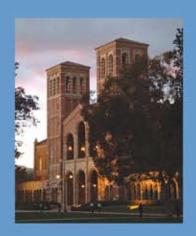Computer Science Department
Fall 2008
Annual Report

CREATING, APPLYING, AND IMPARTING KNOWLEDGE FOR

EXCELLENCE

UCLA

BIRTHPLACE OF THE INTERNET

COMPUTER SCIENCE DEPARTMENT 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.

TABLE OF CONTENTS

I am excited to share with you the progress and achievements of the UCLA Computer Science Department during the 2007-2008 academic year. The department finished this year on a high note: Leonard Kleinrock, distinguished professor, received the 2007 National Medal of Science *"for his fundamental contributions to the mathematical theory of modern data networks, and for the functional specification of packet switching, which is the foundation of Internet technology."* At the same time, our alumnus Paul Baran received the 2007 National Medal of Technology *"for the invention and development of the fundamental architecture for packet switched communication networks which provided a paradigm shift from the circuit switched communication networks of the past and later was used to build the ARPANET and the Internet."* The award ceremony was held on September 29th, 2008 at the White House (see pages 4-5 for a more detailed coverage of both awards). Additionally, it is worth noting that during this past academic year, our faculty and alumni received a total of fourteen awards and honors, as well as nine best-paper awards and patents (pages 6-7).

We continue to expand our research programs with more than thirty labs and research groups and four major research centers—including the newly established UCLA Wireless Health Institute (WHI) co-directed by Professor Majid Sarrafzadeh. WHI is formed at the convergence of personal mobile wireless devices, networked sensing, and new embedded computing systems, with the goals of advancing the quality and accessibility of healthcare, advancing specific outcomes for individuals in health and wellness, disease management, rehabilitation, and geriatric care. More details of WHI and other research centers are available on pages 8-11. During the past year, our faculty and students achieved many interesting and exciting research results, such as the design of the SmartCane System for wireless health, automatic generation of high-level models of sensor network software, radio-frequency on-chip communication for multicore processors, computer-generated autonomous pedestrians, and the solution to a two-decade-old problem in cryptography on circular-secure encryption. More details of these highlights are available on pages 12-16. The department's total research expenditure in the past academic year was over $11 million, with 37 new contracts and grants (see page 17).

With the successful addition of 16 new faculty members since 2000, the department now has 36 tenured or tenure-track faculty. In 2005 we initiated an active program to reach out to other departments on campus via faculty joint appointments. I am pleased to announce that within this past year Professor Alan Yuille from the departments of Statistics and Psychology and Assistant Professor Zhuowen Tu from the department of Neurology were selected for joint appointments in the Computer Science Department. Their profiles are featured on page 18. A complete listing of our faculty members, organized into eight research fields, can be found on pages 21-41 (with the samples of their recent publications).

The computer science (CS) and computer science and engineering (CS&E) majors continue to be the most popular degree programs in the Henry Samueli School of Engineering and Applied Sciences. For Fall 2008, the department had over 1800 applicants for both degree programs, with an acceptance rate of around 21%—among the most competitive in the school. During the 2007-2008 academic year, the department awarded 91 B.S. degrees. For the M.S. and Ph.D. programs, we had close to 750 applicants for Fall 2008, with around 100 new graduate students enrolled. During the past academic year, the department graduated 66 M.S. students and 27 Ph.D. students (a list of our Ph.D. graduates is provided on page 43).

The department's industrial affiliate program has also grown significantly in the past year, and both the department and its member companies have been enriched by the close interaction. I would like to welcome the members who joined our industrial affiliate program during the past year—Blizzard Entertainment, Cisco Systems, Juniper Networks, Mitsubishi Heavy Industries, Nokia, Teradata, and Yahoo! (a complete list of all members is available on page 48).

Finally, I want to take this opportunity to thank the department's faculty, staff, students and alumni; our federal, state and industrial sponsors; and our many other collaborators for their hard work and contributions. Their efforts have culminated in the great success we've experienced in this past year.

Jason (Jingsheng) Cong
Chair, Computer Science Department
October 2008

FACULTY AND STAFF

Ladder Faculty:	36
Joint Faculty:	6
Emeriti:	11
Adjunct:	5
Department Staff:	15.5

UNDERGRADUATE STUDENTS (07/08)

Total Students Enrolled	548
Applicants	2190
Admitted	477
Newly Enrolled	147
Avg Freshman GPA	4.30
Total B.S. Degrees Awarded (07/08)	91

GRADUATE STUDENTS (07/08)
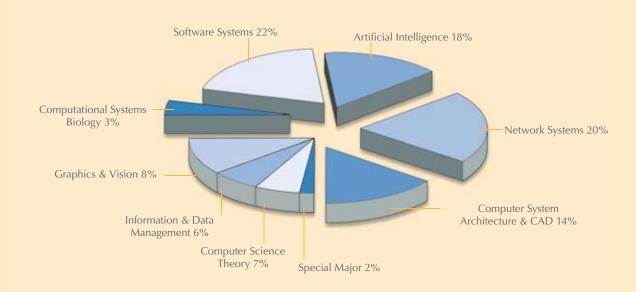
Total Students Enrolled	357
Applicants	811
Admitted	276
Newly Enrolled	136
Average GPA	3.69
Total M.S. and Ph.D. Degrees Awarded (07/08)	93

STUDENTS ENROLLED — ADMITTED 2007–2008 — NEW ENROLLED

PERCENTAGE OF GRADUATE STUDENTS PER COMPUTER SCIENCE FIELD

- Software Systems 22%
- Artificial Intelligence 18%
- Computational Systems Biology 3%
- Network Systems 20%
- Graphics & Vision 8%
- Computer System Architecture & CAD 14%
- Information & Data Management 6%
- Computer Science Theory 7%
- Special Major 2%

NATIONAL MEDAL OF SCIENCE

Leonard Kleinrock
Distinguished Professor
Recipient of the National Medal of Science

The nation's highest scientific honor, the National Medal of Science, has been awarded to the Computer Science Department's esteemed faculty member, Leonard Kleinrock. President George Bush honored Len and seven other laureates at a White House ceremony on September 29th, 2008. Len's National Medal of Science citation reads:

President George W. Bush and Professor Leonard Kleinrock during the National Medal of Science Awards.

> ...for his fundamental contributions to the mathematical theory of modern data networks, and for the functional specification of packet switching, which is the foundation of Internet technology. His mentoring of generations of students has led to the commercialization of technologies that have transformed the world.

The National Medal of Science is awarded to individuals deserving of special recognition by reason of their outstanding contributions to knowledge in the physical, biological, mathematical, or engineering sciences. The first recipient of this award was Theodore Von Karman in 1962, and subsequent recipients included many other notables with immediately recognizable names from government, academia and industry—Michael E. DeBakey, William R. Hewlett, Edward Teller, Simon Ramo, Werner von Braun, Linus Pauling, and Igor Silorsky, among others.

As a professor in the Computer Science Department since 1963, Len has continued to focus on the Internet, working on peer-to-peer network technology, wireless networks, intelligent agents, search technologies, and mobile or nomadic computing. To quote Vijay Dhir, dean of the Henry Samueli School of Engineering and Applied Sciences, "Leonard Kleinrock's pioneering contributions in laying the foundation of the Internet have helped change the very fabric of society for the better. Len's achievements have brought great distinction to the school and to UCLA, and he is very deserving of this grand honor." And here, it is worth noting that Len will be organizing the 40th anniversary celebration of the birth of the Internet to be held at UCLA on October 29, 2009.

Professor Tony Chan, Professor Leonard Kleinrock, and Scott Waugh, acting Executive Vice Chancellor and Provost, enjoy a moment together at the reception for the National Medal of Science Awards.

For Len, it's been an exciting journey from the Bronx School of Science, to CCNY for an undergraduate degree, to MIT for a master's and a Ph.D., and then on to a teaching position at UCLA. Along the way, he garnered too many honors to enumerate, but briefly: the L. M. Ericsson Prize, NAE Charles Stark Draper Prize, Marconi Prize, Okawa Prize, Lanchester Prize, ACM SIGCOMM Award, NEC Computer and Communcations Award, and IEEE Internet Award, along with five honorary doctorates, several distinguished teaching awards, prize paper awards, and memberships in the American Academy of Arts and Sciences and the National Academy of Engineering. Recognized as one of the founding fathers of the Internet, in 1999 Len made the *Los Angeles Times* list of "50 People Who Most Influenced Business This Century," and in 2006 he appeared in the *Atlantic*'s list of "33 Most Influential Living Americans."

An extraordinary life—one filled with energy and ideas. We're not sure how Len finds the time for it all—not only to be so actively involved in ongoing Internet research—but to warmheartedly mentor students, foster startups, hold positions on the boards of companies, and engage in public service. And we haven't yet even touched on that black belt in karate and those frequent trips to far-away exotic places...

NATIONAL MEDAL OF TECHNOLOGY AND INNOVATION

Paul Baran
Alumnus, (M.S. engineering, advisor Gerald Estrin, 1959)
Recipient of the National Medal of Technology and Innovation

UCLA engineering/computer science alumnus Paul Baran has been honored with the National Medal of Technology and Innovation awarded by President George Bush in a White House ceremony on September 29th, 2008. The medal is awarded to American inventors and innovators that have made significant contributions to the development of new and important technology. Paul's citation reads:

> *For the invention and development of the fundamental architecture for packet switched communication networks which provided a paradigm shift from the circuit switched communication networks of the past and later was used to build the ARPANET and the Internet.*

Paul Baran with President George W. Bush

The National Medal of Technology and Innovation is the country's highest honor for technological achievement. Established in 1980 by Congress, its purpose is to recognize lasting contributions to the United States through technological innovation. Other illustrious recipients of this award include Vint Cerf and Robert Kahn (creating and sustaining development of Internet protocols), Ken Thompson and Dennis Ritchie (UNIX operating system and C programming language), Bill Gates (vision of universal computing for home and office), and Steve Jobs and Steve Wozniak (development of personal computer).

Paul completed his undergraduate work at Drexel University and his M.S. at UCLA while working for Hughes Aircraft Company. He then embarked on a remarkable career with the RAND Corporation, where he became interested in the survivability of communication networks in the event of a nuclear attack; this led to his instrumental work in the formation of the ARPANET (later, the Internet). Still later, Paul founded Metricom—the first wireless Internet company to deploy a public wireless mesh networking system. Paul also extended his work in packet switching to a wireless spectrum theory, developing what he called "kindergarten rules" for the use of wireless spectrum.

In addition to this recent award from President Bush, Paul Baran has received many other honors for his work, including the Marconi Prize and the Bower Achievement in Science award and prize from the Franklin Institute. He is a Fellow of the IEEE, the AAAS, and a member of the National Academy of Engineering. We are honored to have him as an esteemed alumnus.

Leon Alkalai
2007 election to International Academy of Astronautics, which fosters the development of astronautics for peaceful purposes, and encourages cooperation in the advancement of aerospace science.

Paul Baran (alumnus)
2007 National Medal of Technology for "the invention and development of the fundamental architecture for packet switched communication networks which provided a paradigm shift from the circuit switched communication networks from the past and later was used to build the ARPANET and the Internet"

Vinton Cerf (alumnus)
2008 Japan Prize (with Robert Kahn), for "creation of network architecture and communication protocol for the Internet." Drs. Cerf and Kahn created the TCP/IP protocol that allows computers on different networks to communicate.

Tony Chan
2007 election to AAAS Fellow (American Association for the Advancement of Science) in recognition of his contributions to science and technology.

Jason Cong
2007 IBM Faculty Award in recognition of his achievements and the quality of his research programs.

Leonard Kleinrock
2007 National Medal of Science Award for "fundamental contributions to the mathematical theory of modern data networks, for the functional specification of packet switching which is the foundation of the Internet Technology, for mentoring generations of students, and for leading the commercialization of technologies that have transformed the world."

Eddie Kohler
2007 Presidential Early Career Award for Scientists and Engineers (PECASE) from the National Science Foundation, which recognizes the potential for leadership across the frontiers of scientific knowledge.

Todd Millstein
2008 IBM Faculty Award, which fosters collaboration between researchers and stimulates innovation and growth in strategic disciplines.

Judea Pearl
2008 Honorary Doctor of Humane Letters degree from Chapman University.
2008 Benjamin Franklin Medal in Computer & Cognitive Science, for creating the first general algorithms for computing and reasoning with uncertain evidence.
2007 Honorary Doctor of Science degree from the University of Toronto.

Amit Sahai
2007 Okawa Foundation Research Award for "Cryptographic Techniques for Encrypted Data."

Demetri Terzopoulos
2007 election to ACM Fellow for "contributions to computer graphics and vision."
2007 Inaugural recipient of the IEEE PAMI-TC Computer Vision Significant Researcher Award for his pioneering and sustained research on deformable models and their applications.

Frank Chang, **Jason Cong**, Adam Kaplan, Mishali Naik, **Glenn Reinman**, Eran Socher, and Sai-Wang Tam, "CMP Network-on-Chip Overlaid With Multi-Band RF-Interconnect," *Proceedings of 14th International Symposium on High-Performance_ Computer Architecture,* pp. 191–202, February 2008. **(Best Paper Award)**

Christopher Frost, Mike Mammarella, **Eddie Kohler**, Andrew de los Reyes, Shant Hovsepian, Andrew Matsuoka, and Lei Zhang, "Generalized File System Dependencies," *Proceedings 21st ACM Symposium on Operating Systems Principles (SOSP '07),* pp. 307–320, October 2007. **(One of three top papers)**

Nupur Kothari, **Todd Millstein**, and Ramesh Govindan, "Deriving State Machines from TinyOS Programs using Symbolic Execution," *Proceedings of International Conference on Information Processing in Sensor Networks (IPSN '08),* April 2008. **(Best Paper Award)**

Steve Lu, Daniel Manchala, and **Rafail Ostrovsky**, "Visual Cryptography on Graphs," *Proceedings 14th Annual International Computing and Combinatorics Conference (COCOON '08),* pp. 225–234, June 2008. **(Best Paper Award)** Invited to appear in the special issue of *Journal of Combinatorial Optimization for COCOON '08.*

Jonathan Katz, **Amit Sahai**, and Brent Waters, "Predicate Encryption Supporting Disjunctions, Polynomial Equations, and Inner Products," *Proceedings EUROCRYPT '08,* pp. 146–162, April 2008. **(One of four top papers)** To be included in a special issue of the *Journal of Cryptology.*

S. Lee, S. Mascolo, C. Casetti, **M. Sanadidi**, and **M. Gerla**, "Method and Apparatus for TCP with Faster Recovery," U.S. Patent Number 7,299,280 issued November 2007.

W.H. Wu, L.K. Au, B. Jordan, T. Stathopoulos, M.A. Batalin, W.J. Kaiser, A. Vahdatpour, **M. Sarrafzadeh**, M. Fang, and J. Chodosh, "The SmartCane System: An Assistive Device for Geriatrics," *Third International Conference on Body Area Networks (BodyNets '08),* March 2008. **(Best Paper Award)**

Foad Dabiri, Alireza Vahdatpour, Hyduke Noshadi, Hagop Hagopian, and **Majid Sarrafzadeh**, "Ubiquitous Personal Assistive System for Neuropathy," *2nd ACM International Workshop on Systems and Networking Support for Healthcare and Assisted Living Environments (HealthNet),* June 2008. **(Best Paper Award)**

Ying Nian Wu, Zhangzhang Si, Chuck Fleming, and **Song-Chun Zhu**, "Deformable Template as Active Basis," *Proceedings 11th IEEE International Conference on Computer Vision,* October 2007. **(Marr Prize honorable mention)**

Center for Autonomous Intelligent Networks and Systems (CAINS)

http://www.cains.cs.ucla.edu

LEAD SPONSORS
> Office of Naval Research (ONR)
> National Science Foundation (NSF)

UCLA DIRECTOR
> Mario Gerla

SCIENTIFIC BOARD
> (UCLA) Rajive Bagrodia, Babak Daneshrad, Leonard Kleinrock
> Izhak Rubin, Mani Srivstava, John Villasenor
> (ONR) Clifford Anderson

The Center for Autonomous Intelligent Networks and Systems (CAINS) was established in 2001, with six 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 such fields as engineering, medicine, biology and the social sciences. Information and technology will be exchanged through symposia, seminars, short courses, and through collaboration in joint research projects sponsored by the government and industry.

Many research projects are underway, including one that involves the development of technologies enabling unmanned autonomous vehicles (UAVs) to communicate and behave in an intelligent, coordinated fashion without direct human interaction. Current laboratory research includes work in the following areas:

> **Video network transport**
> **Vision-based localization**
> **Ad hoc multi-hop networking**
> **Vehicular networks**
> **Dynamic unmanned backbone**
> **Mobile sensor platforms**
> **Systolic OFDM radios**
> **Adaptive transceivers**

COLLABORATIONS
> Biology-inspired systems (USC, Caltech)
> UAV navigation systems (UCB, MIT, ACR)
> Learning systems (SRI)
> Mobile sensor platforms (Istituto Bollea, Torino, Italy)
> Autonomous agent-based systems (University of Trento, Italy)
> Large-scale disruption-tolerant wireless networks (Boeing, Inc.)
> Advanced MIMO systems (Raytheon)
> Vehicular communications research (Toyota)
> Mesh networks (Politecnico di Milano, Italy)
> Health networking (Microsoft Research)

Center for Embedded Networked Sensing (CENS)

http://research.cens.ucla.edu

LEAD SPONSOR
National Science Foundation (NSF)

DIRECTOR
Deborah Estrin
3531H Boelter Hall, UCLA
destrin@cs.ucla.edu

ADMINISTRATIVE DIRECTOR
David Avery
3563 Boelter Hall, UCLA
avery@ucla.edu

DEPUTY DIRECTOR
Greg Pottie
56-174G Engineering IV, UCLA
pottie@ee.ucla.edu

PROGRAM DEVELOPMENT DIRECTOR
Jeff Goldman
3563 Boelter Hall, UCLA
jgoldman@cens.ucla.edu

UCLA's Center for Embedded Networked Sensing (CENS) is a major research enterprise focused on developing wireless sensing systems and applying this revolutionary technology to critical scientific and societal pursuits. In the same way that the development of the Internet transformed our ability to communicate, the ever-decreasing size and cost of computing components is setting the stage for detection, processing, and communication technology to be embedded throughout the physical world, thereby fostering both a deeper understanding of the natural and built environment and, ultimately, enhancing our ability to design and control these complex systems.

By investigating fundamental properties of embedded networked sensing systems, developing new technologies, and exploring novel scientific and educational applications, CENS is a world leader in unleashing the tremendous potential these systems hold.

The Center is a multidisciplinary collaboration among faculty, staff, and students from a wide spectrum of fields including computer science, electrical engineering, civil and environmental engineering, biology, statistics, education and information sciences, urban planning, and theater, film, and television. CENS was established in 2002 as a National Science Foundation Science and Technology Center and is in partnership with UC Riverside, UC Merced, USC, and Caltech.

The Center's current research portfolio encompasses projects across nine technology and applications areas, examples of which include:

- Developing and deploying new measurement tools and techniques to identify the sources and fates of chemical and biological pollutants in natural, urban, and agricultural watersheds and coastal zones.

- Developing cameras and image analysis approaches that assist scientists in making biological observations. Together, the camera and analysis systems comprise a new type of biosensor that takes measurements otherwise unobservable to humans.

- Harnessing the technological power of mobile phones and the ubiquitous wireless infrastructure for applications in areas as diverse as public health, environmental protection, urban planning, and cultural expression, each of which is influenced by independent personal behaviors over periods of time and in a variety of locations.

Center for Information & Computation Security (CICS)

http://www.cs.ucla.edu/security

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 directorship of Professor Rafail Ostrovsky. In 2004 Professor Amit Sahai joined the leadership team to serve as associate director. Headquartered within the Computer Science Department, the Center's mission is to promote all aspects of research and education in cryptography and computer security.

The Center explores novel techniques for securing both national and private-sector information infrastructures across various network-based and wireless platforms, as well as wide-area networks. The inherent challenge in this work is to provide guarantees of privacy and survivability under malicious and coordinated attacks. Meeting this challenge is especially complex because solutions must achieve several conflicting goals. While making applications more accessible, ubiquitous, and widespread, any solution must also be resilient against a wide range of both internal and external coordinated attacks, simultaneously providing strong privacy and security guarantees to both individuals and organizations. The Center's research directions include the following:

- Developing state-of-the-art cryptographic algorithms, definitions, and proofs of security.

- Developing novel cryptographic applications, such as new electronic voting protocols, identification schemes, encryption schemes, data-rights management schemes, privacy-preserving data mining, searching on encrypted data, and searching with privacy.

- Developing the security mechanisms underlying a "clean-slate" design for a next-generation secure Internet.

- Developing novel biometric-based models and tools, such as encryption and identification schemes based on fingerprint scans.

- Exploring the interplay of cryptography and security with other fields, including algorithms, complexity theory, networks, communication complexity, machine learning, compiler and language design, operating systems, hardware design, and distributed computing.

The Center promotes both long-term foundational work and short-term applied research to support the development of cryptographic foundations and critical security tools and techniques. It has a cross-disciplinary nature and an active research program.

UCLA Wireless Health Institute (WHI)

THE CONVERGENCE OF WIRELESS TECHNOLOGY AND MEDICINE

Co-directors: Denise Aberle, M.D. (Medicine), Lillian Gelberg, M.D. (Public Health), William Kaiser Ph.D. (Electrical Engineering), **Majid Sarrafzadeh**, Ph.D. (Computer Science)

A new research field and industry is forming at the convergence of personal mobile wireless devices, networked sensing, and new embedded computing systems; this new field is directed toward advancing the quality and accessibility of healthcare. Multidisciplinary collaborations over the last ten years have established a leadership position for UCLA, with specific research objectives for advancing specific outcomes for individuals in health and wellness, disease management, rehabilitation, and geriatric care. Many important innovations have been successfully developed by the UCLA approach of an "end-to-end" view of the new field of wireless health.

In recognition of UCLA's leadership and the benefits of campus-wide coordination, we began efforts in recent years to create the new Wireless Heath Institute (WHI). A significant event in this development was the May 2007 UCLA Workshop on Wireless Health which assembled 60 researchers from organizations throughout the campus. This community of researchers has shared a common goal—that of establishing the WHI as a foundation for rapid growth in research progress and technology development for wireless health capabilities and services for patients.

WHI has been launched! WHI is centered in the Office of the Vice Chancellor of Research, with partners in many fields of medicine, nursing, molecular and medical pharmacology, and public health, in addition to the West Los Angeles Veterans Affairs Medical Center, the Anderson Graduate School of Management, the College of Letters and Science, and the Henry Samuel School of Engineering and Applied Science. Co-Directors of WHI include Denise Aberle, M.D. (medicine), Lillian Gelberg, M.D. (public health), William Kaiser Ph.D. (electrical engineering), and Majid Sarrafzadeh, Ph.D. (computer science).

One of the most urgent and daunting tasks of our time is to provide quality healthcare in the face of the increasing incidence of disease, an aging population, soaring costs, and declining public funding. A new community of researchers at UCLA has been formed to create a new low-cost healthcare model that applies technology to bring affordable care within the reach of every citizen. This model will revolutionize the way healthcare is provided in much the same way that low-cost cellular phone technology has enabled nearly all individuals to communicate from their locations. Wireless health combines this ubiquitous wireless access with personal sensing technology and a foundation in medical research to support a large population with a powerful, low-cost healthcare service.

Wireless health will be a ubiquitous, worldwide infrastructure benefiting all individuals. The prospects for business are nearly incalculable. Many of today's largest information technology industry leaders will turn their attention to this area with wireless services, new personal hardware products, search technologies that focus on health and wellness with data and guidance, and personal, optimized management of pharmaceuticals. The impact on individuals is also unprecedented—individualized, lifetime health promotion, and services that join consumer fitness and entertainment, disease management, and major advances in geriatric care with individualized guidance and monitoring for individuals in their homes and institutions. Today, new legislation requiring that insurers support health promotion has suddenly created a new business climate that further advances the opportunities for wireless health. Our Wireless Health Institute community is also dedicated to promoting and anchoring the expansion of the wireless health industry in the West Los Angeles area.

The SmartCane System

Injuries due to falls are a leading cause of death in the elderly. Conventional assistive cane devices are critical in reducing the risk of falls and are relied upon by over 4 million patients in the U.S. While canes provide physical support as well as supplementary sensing feedback to patients, these conventional aids also exhibit serious adverse effects that contribute to falls. Improper use of canes is particularly acute in the elderly and disabled where reduced cognitive capacity, accompanied by the burden of managing cane motion, lead to increased risk.

Majid Sarrafzadeh and his team of researchers are in the process of developing the *SmartCane System*, intended to:

- *Detect and classify* cane usage patterns

- *Predict* possible outcomes, such as a high risk of falling

- *Inform* the patient, caregiver, and clinician about the patient's current use of the cane

- *Correct* usage through education, training, or treatment

- *Provide* the research community with technology platforms and data to enable development of assistive technologies for the disabled that combine smart prosthetic devices with the Telehealth architecture

The SmartCane System is developed with low-cost, long-operating-lifetime embedded computing systems. The low-power wireless interface on the SmartCane System permits it to integrate with wearable sensors, standard handheld personal wireless devices, the Internet, and remote services that in the future may include a call center and medical facility. The diverse set of low-cost microsensors incorporated into the cane can be used to determine orientation, forces, and rotation, which aid in the classification of patient and environment characteristics when combined with other wearable sensor systems on the patient's body.

The SmartCane System architecture includes:

- *Low-cost sensors* integrated into the cane that measure motion, rotation, force, strain, and impact signals

- *Embedded computing platforms* supporting sensor data acquisition and low-power Bluetooth® radio interface

- *Standard personal device* supporting Bluetooth®, Wi-Fi, and GPRS interfaces

With the personal device as the master node over the Bluetooth® network, the SmartCane System can join other wearable sensors in the MEDIC system, and stream its data in real time to the personal device. The personal device can process the incoming sensor data from the SmartCane System in real-time, provide feedback to the user, and forward the data via network access to centralized servers for further development, verification and optimization.

Contact Pressure Sensor

Wireless Sensor Nodes
- one 3-axis accelerometer
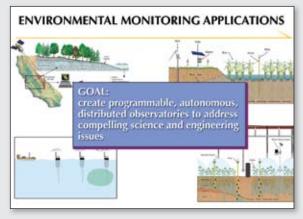- three single-axis gyros

gravity (*g*)

Bluetooth®
Personal device
Body sensors
Infrastructure networks

Contact pressure sensor

Automatically Deriving High-Level Models of Sensor Network Software

The role of embedded networked systems like sensor networks is rapidly increasing in many sectors of society. However, the challenges of building and maintaining reliable sensor network systems limits the ability of researchers and companies to experiment and innovate in this space. NSF-funded research at the University of California, Los Angeles and the University of Southern California is improving our ability to understand, debug, and evolve sensor network software.

Sensor networks, which are large-scale distributed systems composed of smart sensors embedded in the physical world, have a number of important scientific and social applications. For example, sensor networks have been used for monitoring the structural health of buildings, finding free parking spaces in a city, and testing groundwater for contaminants. The need to simultaneously address a variety of unique concerns, including severe resource constraints on sensor devices and an unpredictable environment, makes sensor network systems very difficult to build, maintain, and understand.

To address this problem, Ph.D. student Nupur Kothari (USC), Professor **Todd Millstein** (UCLA), and Professor Ramesh Govindan (USC) have developed a visualization tool for sensor network software called FSMGen. These researchers are members of UCLA's Center for Embedded Networked Sensing (CENS), an NSF Science and Technology Center that is developing sensor network technology and applying it to a variety of application areas.

FSMGen analyzes the software for sensor network applications that run on top of TinyOS, which is the standard sensor network platform. For each application, FSMGen produces a diagram called a Finite State Machine (FSM) that illustrates the application's behavior. The FSM describes how and under what conditions different components of the application interact. Developers can examine the FSM produced by FSMGen to better understand their applications, spot errors and inconsistencies, and plan modifications and extensions. Experiments on existing TinyOS applications indicate that FSMGen produces compact and accurate FSMs, and some of these FSMs illuminate previously unknown errors.

CMP Network-on-Chip Overlaid with Multi-Band RF-Interconnect

In order to scale future chip multiprocessors (CMPs) to hundreds or even thousands of cores, sophisticated interconnect topologies will be essential in enabling low-latency application communication and efficient cac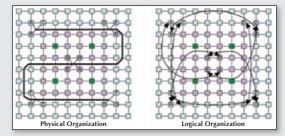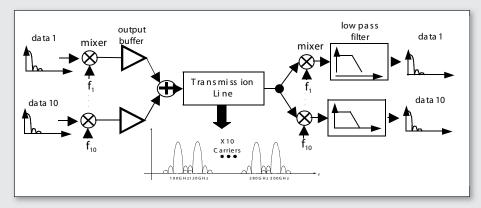he utilization. Professors **Glenn Reinman** and **Jason Cong** (CS) and **Frank Chang** (EE) and their students have demonstrated the tremendous potential of radio frequency interconnects (RF-Is) to provide higher bandwidth between such a large number of interacting components, and to reduce the number of cycles required for cross-chip communication, via signal propagation at the speed of light. This work was featured at the 14th International Symposium on High-Performance Computer Architecture (HPCA) 2008 and received the Best Paper Award.

**Glenn Reinman
Jason Cong
Frank Chang**

RF bandwidth comes at an area cost, and cannot completely replace conventional RC wired interconnect. Therefore, we propose a two-layer hybrid NoC scheme called MORFIC (Mesh Overlaid with RF InterConnect), where the RC wires (for example in a mesh topology) are analogous to city streets accommodating local traffic, and the RF is like a superhighway, connecting distant points on the chip.

Future work examines dynamic reconfiguration of RF-I to adapt to application-specific communication patterns. This can result in lower power on-chip interconnect since we can reduce the reliance (and therefore the bandwidth) of the underlying RC wires. Furthermore, RF-I has the dramatic potential to accelerate on-chip broadcast by tuning multiple receivers to the same transmission frequency.

Sample MORFIC Topology on a 10 x 10 Mesh NoC

Multiband RF-Interconnect (shown with 10 simultaneous data streams)

14

Virtual Humans

The behavior of computer-generated crowds in movies and video games could soon appear much more realistic, thanks to new software that gives characters complex personalities of their own.

This software has been demonstrated in a simulation of Pennsylvania Station, New York City, depicting more than 1000 commuters, law-enforcement officers, entertainers, and tourists going about their daily business, each demonstrating complex, rational behaviors that collectively create a much more lifelike representation of human activity.

These *autonomous pedestrians*, created by Professor **Demetri Terzopoulos** and graduate student Wei Shao, are governed by three different layers of behavior. A *motion layer* handles basic movement such as walking, running, standing and sitting. On top of this is a *reactive layer* that allows the virtual characters to respond to obstacles or other characters they encounter. It also enables them to perform simple behaviors that people normally take for granted, such as walking around a bench in order to sit on it. The most complex layer is the *cognitive layer* that enables the character to think ahead about what it's going to do in the future. For example, if the character is charged with catching a train, it knows that it must first carry out several subgoals—such as purchasing a ticket and finding the train platform. And there are even further subgoals—such as finding the ticket office and choosing the shortest ticket line.

Further, to make these virtual characters even more realistic, animators can give them desires, which might cause them to stop off to buy a soda from a vending machine, or pause to watch some street entertainers, make a cellphone call, or check emails on their laptops.
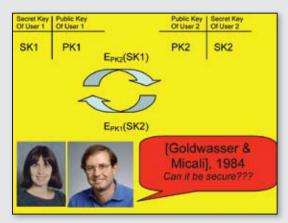

Autonomous pedestrians moving in a simulation of Pennsylvania Station, New York City

Solving A Two-Decade-Old Problem in Cryptography on Circular-Secure Encryption

A two-decade-old open problem in cryptography posed in 1984 by Goldswasser and Micali has been resolved. The cornerstone of modern cryptography is the ability to encrypt messages using public key cryptography. This means that any user can publish his public key (say, in the yellow pages), and keep his secret key private. Other users can encrypt messages to him, but only he can decrypt it using his secret key. In their seminal paper on this subject, Goldwasser and Micali noticed that the proof of security seems to completely break down if what is being encrypted is the secret key. Consider, for example, the following situation. Two friends (with independent public and corresponding secret keys) decide to give each other their secret keys. Thus, the first user takes his secret key and encrypts it using the second user's public key, and the second user does the same. What Goldwasser and Micali point out in their paper is that their proof of security no longer holds if secret keys are encrypted in such a manner, and their cryptosystem has to disallow such circular encryptions of secret keys. The question of how to construct cryptosystems that are provably circular-secure has been evading researchers for over two decades.

Rafail Ostrovsky (UCLA), Dan Boneh and Mike Hamburg (Stanford), and Shai Halevi (IBM) were finally able to show how to construct a public-key cryptosystem that is *circular-secure*. As mentioned above, all commonly accepted definitions for secure encryption assume that the plaintext message to be encrypted cannot depend on the secret decryption keys themselves. The danger of encrypting messages that the adversary cannot find on his own was already noted more than two decades ago by Goldwasser and Micali (1984). However, over the past few years, researchers observed that in some situations the plaintext messages do depend on the secret keys. Such situations may arise due to careless key management. For example, a backup system may store the backup encryption key on a disc and then encrypt the entire disc, including the key, and back up the result. Another example is the BitLocker disc encryption utility (used in Windows Vista), where the disc encryption can end up on the disc itself and be encrypted along with the disc contents. There are also situations where circular security is needed "by design," where multiple users are required to publish a cycle of their encrypted private keys so that if one of the users leaks anybody's key, all keys in the cycle become compromised, including the user who leaked any other key. Finally, in the formal methods community, the notion of key-dependent security was used to prove equivalence between *computational* security and *axiomatic* security. This year, the four researchers noted above were able to construct a cryptosystem that is "circular-secure," assuming a standard cryptographic assumption (hardness of Decisional Diffe-Hellman). This breakthrough work was presented at the 28th International Cryptography Conference (CRYPTO 2008) held in Santa Barbara, CA, July 2008.

AGENCY	TITLE	FACULTY
UC Discovery Grant	*Seamless Content Delivery: Modeling, Design and Implementation of P2P IPTV*	Mario Gerla
UC Micro	*Synthesis and Optimization for Application Specific Computing*	Jason Cong
UC Micro	*Peer to Peer Video and TV Streaming: Protocols and Models*	Mario Gerla
DHS/Colorado State University	*WIT: A Watchdog System for Internet Routing*	Lixia Zhang
National Science Foundation	*III COR: Collaborative Research: Graceful Evolution and Historical Queries in Information Systems*	Carlo Zaniolo
National Science Foundation	*SGER: Efficient Support for Mining Queries in Data Stream Management Systems*	Carlo Zaniolo
National Science Foundation	*NetS-Find Collaborative Research: Enabling Future Internet Innovations Through Transit Wire (eFIT)*	Lixia Zhang
National Science Foundation	*CISE-CNS-NET-WN: Wireless Mobility-How Can It be Harnessed?*	Mario Gerla
National Science Foundation	*NETS NOSS Collaborative Research: SEA SWARM: A Rapidly Deployable Under Water Sensor Network*	Mario Gerla
National Science Foundation	*Collaborative Research: CT-ISG. Enabling Routers to Detect and Filter Spoofed Traffic*	Peter L. Reiher
National Science Foundation	*NBD: Controlling Applications by Managing Network Characteristics*	Peter Reiher/Leonard Kleinrock
National Science Foundation	*CT-ISG: Foundations of Position Based Cryptography*	Rafail Ostrovsky
National Science Foundation	*RI: Large-Scale Dynamic Programming*	Richard E. Korf
National Science Foundation	*CSR-EHS Collaborative: Directed Real-Time Testing*	Rupak Majumdar
National Science Foundation	*Design & Analysis of Compressed Sensing DNA Microarrays*	Eleazer Eskin
National Science Foundation	*ITR: Intelligent Deformable Models*	Demetri Terzopoulos
National Science Foundation	*Cryptographic Techniques for Searching and Processing Encrypted Data*	Rafail Ostrovsky/Amit Sahai
NIH/University of Minnesota	*The Genes, Environment, and Development Initiative*	Eleazar Eskin
NIH/National Library of Medicine	*Hypothesis Web Development for Neuropsychiatric Phenomics*	D. S. Parker/Wesley Chu
U.S. DOD (DARPA)	*Programming Languages and Tools for Software Reliability*	Todd Millstein
U.S. Navy/Office of Naval Research	*Image Analysis Under Varying Light and Parallax*	Stefano Soatto
Alfred P. Sloan Foundation	*Alfred P. Sloan Foundation Research Fellowship*	Edward W. Kohler
Altera Corporation	*Synthesis and Optimization for Application Specific Computing*	Jason Cong
Broadata Communications, Inc	*Ultra High Speed Transport Protocol and Architecture*	Mario Gerla
Magma Designs Automation, Inc	*Synthesis and Optimization for Application Specific Computing*	Jason Cong
Semiconductor Research Corporation	*Network-On-Chip Design with RF Interconnects for Future Chip Multi-Processors*	Glenn D. Reinman
STMicroelectonics, Inc	*Peer to Peer Video and TV Streaming: Protocols and Models*	Mario Gerla
STMicroelectonics, Inc	*Seamless Content Delivery: Modeling, Design and Implementation of P2P IPTV*	Mario Gerla
IBM Corporation	*2007 IBM Faculty Award*	Jason Cong
Xerox Corporation	*Visual Cryptography*	Rafail Ostrovsky
Hewlett Packard Co	*Enhancing Isolation and Resiliency of Server Consolidation on Multicore Systems Using Virtualization*	Yuval Tamir
Intel Corporation	*Next Generation Verification Tools*	Rupak Majumdar
Intel Corporation	*Domain-Specific Computing*	Jason Cong
Okawa Foundation	*Research Support*	Amit Sahai
Sharp Labroatories	*Research Support*	Songwu Lu
Microsoft	*Research Support/Hardware Laboratory*	Majid Sarrafzadeh/Mario Gerla
Microsoft	*Telehealth; Fundamentals for Progressive Research and Education in Wireless and Ubiquitous Healthcare*	Majid Sarrafzadeh

Zhuowen Tu
Assistant Professor, Ph.D. (Ohio State University) 2002
Joint Appointment with Department of Neurology

Zhuowen Tu is a recent addition to the Computer Science Department faculty. He began his appointment as an assistant professor in July 2008, while also holding a joint appointment with the Department of Neurology. Current research interests include statistical modeling/computing, computational biology, machine learning, and brain imaging.

Zhuowen received his B.E. in electronic engineering from Beijing Information Technology Institute, his M.E. in digital mapping from Tsinghua University, and his Ph.D. in computer science from Ohio State University. His graduate work was in statistical modeling/computing for image analysis. Before joining the Laboratory of Neuro Imaging at UCLA, Zhuowen was a member of the technical staff at Siemens Corporate Research and a post-doctoral fellow in UCLA's Department of Statistics. His research has focused on the interface of computer vision, medical imaging, machine learning, and statistical modeling/computing. More specifically, his interest is in studying the relationship between discriminative and generative models. Details of his research can be found at http://loni.ucla.edu/~ztu.

Professor Tu has published a number of papers, some of which have been widely cited. He and his coauthors were awarded the 2003 Marr Prize for best paper and the 2003 Talbert Abrams Award from the American Society of Photogrammetry and Remote Sensing (honorable mention paper). Additionally, he and coauthors Mirza, Dinov and Toga were first-prize winners at the 2007 Medical Image Computing and Computer Assisted Intervention (MICCAI) Workshop on 3-D Segmentation in the Clinic.

Alan Yuille
Professor, Ph.D. (Cambridge) 1980
Joint Appointment with Departments of Statistics and Psychology

Alan Yuille is also a recent addition to the Computer Science Department faculty. He began his joint appointment as a full professor in July 2007, while also holding appointments with the Departments of Statistics and Psychology. His current interests lie in computer vision, Bayesian statistics and pattern recognition.

Alan received his B.A. in mathematics from the University of Cambridge in 1976, and completed his Ph.D. in theoretical physics at Cambridge in 1980. Following this, he held a postdoc position with the Physics department, University of Texas at Austin, and the Institute for Theoretical Physics, Santa Barbara. He then joined the Artificial Intelligence Laboratory at MIT (1982-1986), and followed this with a faculty position in the Division of Applied Sciences at Harvard (1986-1995), rising to the position of associate professor. From 1995-2002 Alan worked as a senior scientist at the Smith-Kettlewell Eye Research Institute in San Francisco. In 2002 he accepted a position as full professor in UCLA's Department of Statistics. He has over 150 peer-reviewed publications in vision, neural networks, and physics, and has coauthored two books: Data Fusion for Sensory Information Processing Systems (with J. J. Clark) and Two- and Three- Dimensional Patterns of the Face (with P. W. Hallinan, G. G. Gordon, P. J. Giblin and D. B. Mumford).

Amit Sahai
Associate Professor, Ph.D.
(MIT) 2000

Amit Sahai joined UCLA's Computer Science Department as an associate professor in the fall of 2004. Prior to that, Amit was an assistant professor of computer science at Princeton University (2000–2004) where he received an Alfred P. Sloan Foundation fellowship in recognition of his research efforts. In 2007 he was honored with an Okawa Grant for research in Cryptographic Techniques for Encrypted Data. These grants are awarded by the Okawa Foundation to acknowledge and support leading researchers in the fields of information and telecommunications.

Amit's research interests lie in theoretical computer science—with a primary focus on the foundations of cryptography and computer security, learning theory, computational complexity theory, and fault tolerant computing. He is the associate director for the department's Center For Information and Computation Security. There, he collaborates with other researchers to lead efforts in cryptographic proof systems, broadcast encryption, metric embeddings, and secure use of biometric information.

The National Science Foundation has honored Amit with several ITR and Cybertrust awards. He has published more than 60 original technical research papers at venues such as the ACM Symposium on Theory of Computing and CRYPTO, and in the Journal of the ACM. Additionally, he has given a number of invited talks at institutions such as MIT, Stanford, and Berkeley—including the 2004 Distinguished Cryptographer Lecture Series at NTT Labs.

Several news agencies have covered Amit's work. In 2007 the April issue of *Nature* featured his work on zero-knowledge proofs, which allows one to convince someone else that some statement is true, without revealing anything more. In particular, this means that, counter-intuitively, it is possible to convince someone (who doesn't trust you) that something is true without giving any plausible reasons why. Such proofs are very important in cryptography, where the "reasons" could involve confidential information. Amit's research has resolved many fundamental questions regarding zero-knowledge proofs and their applications in cryptography.

In 2008, BBC's Digital Planet interviewed Amit regarding his work on "functional encryption"—an innovative new paradigm in cryptography that one day could have an impact on how data is encrypted, stored and decrypted. As Amit succinctly puts it, the goal of functional encryption technology is to "change the rules of the game on hackers and even out the playing field" between defenders and attackers. This work was featured in several UCLA publications, as well.

Rupak Majumdar
Associate Professor, Ph.D.
(UC Berkeley) 2003

Associate professor **Rupak Majumdar** has been a valued member of the Computer Science Department's faculty since 2003. The focus of his research is in the algorithmic analysis of hardware and software systems.

Today, software systems manage much of the technology we depend on for our work, education, recreation, healthcare, finances, communication, etc., and the cost of system failures can be catastrophic. One of the main research challenges in software engineering today is the design and implementation of reliable and secure software systems.

Rupak developed *Blast*, a verification engine for C programs that automatically searches for a class of program errors, and *Splat*, an automatic test generation engine. He has developed algorithms for precise and scalable analysis for a range of software systems applications such as verification of web services, verification and control of real-time embedded systems, and robust logic synthesis for VLSI designs.

Algorithms to verify systems have their rooting in foundational problems in logic and language theory. Rupak's interests in theoretical problems in verification range from problems in automata theory to the interface between stochastic game theory and logic.

Rupak has published over 70 papers in diverse areas of computer science, including principles of programming languages, programming languages design and implementation, and logic in computer science. Venues for these papers included the International Conference in Software Engineering, Foundations of Software Engineering Conference, Design Automation Conference, and International Conference in Computer-Aided Design. His work is funded by the National Science Foundation through an ITR grant (2004), a CAREER award (2006), awards from the CPA and CNS programs, and awards from Intel and Microsoft.

Rupak received his B-Tech degree in computer science from the Indian Institute of Technology at Kanpur in 1998, and his Ph.D. in computer science from the University of California, Berkeley, in 2003. He is a recipient of the President's Gold Medal from IIT, Kanpur, and the Leon O. Chua award from UC Berkeley.

EXCELLENCE

THE COMPUTATIONAL STUDY OF INTELLIGENT BEHAVIOR—INCLUDING 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.

Richard Korf
Professor, Ph.D.
(CMU) 1983

Problem-solving, heuristic search, planning and parallel processing in artificial intelligence.

Michael Dyer
Professor, Ph.D.
(Yale) 1982

Processing and acquisition of natural language through symbolic, connectionist and genetic algorithm techniques.

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.

ARTIFICIAL INTELLIGENCE SELECTED PUBLICATIONS (2007 – 2008)

David Allen and **Adnan Darwiche**, RC-Link: "Genetic Linkage Analysis using Bayesian Networks," *International Journal of Approximate Reasoning*, Vol 48, No 2, pp. 499-525, 2008.

O. J. Mengshoel, **A. Darwiche**, K. Cascio, M. Chavira, S. Poll, and S. Uckun, "Diagnosing Faults in Electrical Power Systems of Spacecraft and Aircraft," *Proceedings of the Twentieth Innovative Applications of Artificial Intelligence Conference (IAAI)*, pp. 1699-1705, 2008.

Arthur Choi and **Adnan Darwiche**, "Many-Pairs Mutual Information for Adding Structure to Belief Propagation Approximations," *Proceedings of the 23rd AAAI Conference on Artificial Intelligence (AAAI)*, pp.1031-1036, 2008.

Knot Pipatsrisawat and **Adnan Darwiche**, "New Compilation Languages Based on Structured Decomposability," *Proceedings of the 23rd AAAI Conference on Artificial Intelligence (AAAI)*, pp. 517-522, 2008.

Arthur Choi and **Adnan Darwiche**, "Approximating the Partition Function by Deleting and then Correcting for Model Edges," *Proceedings of the 24th Conference on Uncertainty in Artificial Intelligence (UAI)*, pp. 79-87, 2008.

ARTIFICIAL INTELLIGENCE SELECTED PUBLICATIONS (2007 – 2008)

A. P. Dow and **R. E. Korf**, "Best-First Search for Tree Width," *Proceedings of the Association for the Advancement of Artificial Intelligence (AAAI'07),* pp. 1146-1151, July 2007.

R. E. Korf, "Analyzing the Performance of Pattern Database Heuristics," *Proceedings of the Association for the Advancement of Artificial Intelligence (AAAI'07),* pp. 1164-1170, July 2007.

A. Felner, **R. E. Korf**, R. Meshulam, and R. Holte, "Compressed Pattern Databases," *Journal of Artificial Intelligence Research, Vol. 30,* pp. 213-247, October 2007.

A. P. Dow and **R. E. Korf**, "Best-First Search with Maximum Edge Cost Functions," *Proceedings of the Tenth International Symposium on Artificial Intelligence and Mathematics (ISAIM'08),* January 2008.

S. Greenland, and **J. Pearl**, "Causal Diagrams," *Encyclopedia of Epidemiology,* pp. 149-156, Sage Publications, Thousand Oaks, CA, 2007.

I. Shpitser and **J. Pearl**, "What Counterfactuals Can Be Tested," *Proceedings of the Twenty-Third Conference on Uncertainty in Artificial Intelligence,* pp. 352-359, 2007.

J. Pearl, "The Mathematics of Causal Inference in Statistics," *2007 JSM Proceedings of the American Statistical Association, Biometrics Section,* pp. 19-26, American Statistical Association, Alexandra VA, 2007.

Z. Cai, M. Kuroki, **J. Pearl**, and J. Tian, "Bounds on Direct Effect in the Presence of Confounded Intermediate Variables," *Biometrics,* Vol. 64, No. 3, pp. 695-701, September 2008.

I. Shpitser and **J. Pearl**, "Dormant Independence," *Proceedings of the Twenty-Third Conference on Artificial Intelligence,* pp. 1081-1087, 2008.

EXCELLENCE

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; AND DEVELOPMENT OF TOOLS TO ENABLE SYSTEM DESIGNERS TO DESCRIBE, MODEL, FABRICATE, AND TEST HIGHLY COMPLEX COMPUTER SYSTEMS.

Jason (Jingsheng) Cong
Professor and Chair, Ph.D.
(UIUC) 1990

Computer-aided design of VLSI circuits, computer architecture and reconfigurable systems, fault-tolerant designs of VLSI systems, design and analysis of algorithms.

Glenn Reinman
Assistant Professor, Ph.D.
(UCSD) 2001

Processor architecture design and optimization, speculative execution, profile-guided optimizations, techniques to find and exploit instruction-level parallelism.

Milos Ercegovac
Professor, Ph.D.
(UIUC) 1975

Computer arithmetic and hardware-oriented algorithms, design of digital and reconfigurable systems.

Majid Sarrafzadeh
Professor, Ph.D.
(UIUC) 1987

Embedded and reconfigurable computing, VLSI CAD, and design and analysis of algorithms.

Miodrag Potkonjak
Professor, Ph.D.
(UC Berkeley) 1991

Complex distributed systems, including embedded systems, communication designs, computer-aided design, ad hoc sensor networks, comutational security, electronic commerce, and intellectual property protection.

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, reconfigurable systems.

CREATING, APPLYING, IMPARTING KNOWLEDGE

COMPUTER SYSTEM ARCHITECTURE & CAD SELECTED PUBLICATIONS (2007 – 2008)

J. Cong, G. Han, A. Jagannathan, G. Reinman, and K. Rutkowski, "Accelerating Sequential Applications on CMPs Using Core Spilling," *IEEE Transactions on Parallel and Distributed Systems*, Volume 18, Number 8, pp. 1094-1107, August 2007.

M. Chang, **J. Cong**, A. Kaplan, M. Naik, G. Reinman, E. Socher, and S.W. Tam, "CMP Network-on-Chip Overlaid With Multi-Band RF-Interconnect," *14th International Symposium on High-Performance Computer Architecture*, pp. 191-202, February 2008. (Best Paper Award)

J. Cong and W. Jiang, "Pattern-based Behavior Synthesis for FPGA Resource Reduction," *Proceedings 16th ACM/SIGDA International Symposium on Field Programmable Gate Arrays (FPGA'08),* pp. 107-116, February 2008.

J. Cong and Y. Zou, "Lithographic Aerial Image Simulation with FPGA-Based Hardware Acceleration," *Proceedings 16th ACM/SIGDA International Symposium on Field Programmable Gate Arrays (FPGA'08),* pp. 67-76, February 2008.

J. Cong and G. Luo, "Highly Efficient Gradient Computation for Density-Constrained Analytical Placement Methods", *Proceedings of the 2008 ACM International Symposium on Physical Design,* pp. 39-46, April 2008.

M. D. Ercegovac and J.-M. Muller, "Complex Square Root with Operand Prescaling," *Journal of VLSI Signal Processing,* No. 49, pp. 19-30, 2007.

T. Y. Yeh, P. Faloutsos, **M. D. Ercegovac**, S. J. Patel, and G. Reinman, "The Art of Deception: Adaptive Precision Reduction for Area-Efficient Physics Acceleration," *40th Annual IEEE/ACM International Symposium on Microarchitectures (MICRO'07),* pp. 394-406, December 2007.

J-G. Lee, J-A. Lee, B-S. Lee, and **M. D. Ercegovac**, "A Design Method for Heterogeneous Adders" *Proceedings ICESS'07, Lecture Notes in Computer Science,* No. 4532, pp. 121-132, Springer-Verlag, April 2007.

M. D. Ercegovac, "On Digit-by-Digit Methods for Computing of Certain Functions," *Proceedings 41st Asilomar Conference on Signals, Systems and Computers,* pp. 338-342, November 2007.

M. D. Ercegovac and J-M. Muller, "A Hardware-Oriented Method for Evaluating Complex Polynomials", *IEEE International Conference on Application-Specific Systems, Architectures and Processors,* pp. 122-127, July 2007.

Miodrag Potkonjak and Farinaz Koushanfar, "(Bio)-behavioral CAD," *Design Automation Conference (DAC),* pp. 351-352, June 2008.

Yousra Alkabani, Tammara Massey, Farinaz Koushanfar, and **Miodrag Potkonjak**, "Input Vector Control for Post-Silicon Leakage Current Minimization in the Presence of Manufacturing Variability," *Design Automation Conference (DAC),* pp. 606-609, June 2008.

Davood Shamsi, Farinaz Koushanfar, and **Miodrag Potkonjak**, "Challenging Benchmark for Location Discovery in Ad Hoc Networks: Foundations and Applications," *ACM International Symposium on Mobile Ad Hoc Networking and Computing (MOBIHOC),* pp. 361-370, May 2008.

Yousra Alkabani, Farinaz Koushanfar, and **Miodrag Potkonjak**, "Remote Activation of ICs for Piracy Prevention and Digital Right Management," *International Conference on Computer Aided Design (ICCAD),* pp. 674-677, November 2007.

Farinaz Koushanfar, Abhijit Davare, David T. Nguyen, Alberto L. Sangiovanni-Vincentelli, and **Miodrag Potkonjak**, "Techniques for Maintaining Connectivity in Wireless Ad Hoc Networks Under Energy Constraints," *ACM Transactions on Embedded Computer Systems,* 6(3) Article 16, July 2007.

COMPUTER SYSTEM ARCHITECTURE & CAD SELECTED PUBLICATONS (2007 – 2008)

Shawn Singh, Mubbasir Kapadia, Mishali Naik, Petros Faloutsos, and **Glenn Reinman**, "Watch Out! A Framework for Evaluating Steering Behaviors," *Proceedings of Motion In Games (MIG),* June 2008.

M. Frank Chang, Eran Socher, Rocco Tam, Jason Cong, and **Glenn Reinman**, "RF Interconnects for Communications On-Chip," *International Symposium on Physical Design (ISPD),* April 2008.

M. Frank Chang, Jason Cong, Adam Kaplan, Mishali Naik, **Glenn Reinman**, Eran Socher, and Rocco Tam, "CMP Network-on-Chip Overlaid With Multi-Band RF-Interconnect," *14th International Symposium on High-Performance Computer Architecture (HPCA)*, February 2008. (Best Paper Award)

Tom Yeh, Petros Faloutsos, Sanjay Patel, Milos Ercegovac, and **Glenn Reinman**, "The Art of Deception: Adaptive Precision Reduction for Area Efficient Physics Acceleration," *40th Annual International Symposium on Microarchitecture (MICRO),* December 2007.

Yongxiang Liu, Yuchun Ma, Eren Kursun, Jason Cong, and **Glenn Reinman**, "Fine Grain 3D Integration for Microarchitecture Design Through Cube Packing Exploration," *IEEE International Conference on Computer Design (ICCD),* October 2007.

Tia Gao, Tammara Massey, Leo Selavo, David Crawford, Bor-rong Chen, Konrad Lorincz, Victor Shnayder, Logan Hauenstein, Foad Dabiri, James Jeng, Arjun Chanmugam, David White, **Majid Sarrafzadeh**, and Matt Welsh, "The Advanced Health and Disaster Aid Network: A Lightweight Wireless Medical System for Triage," *IEEE Transactions on Biomedical Circuits and Systems (IEEE TBCAS),* Vol. 1, No. 3, pp. 203–216, 2007.

W.H. Wu, L.K. Au, B. Jordan, T. Stathopoulos, M.A. Batalin, W.J. Kaiser, A. Vahdatpour, **M. Sarrafzadeh**, M. Fang, and J. Chodosh, "The SmartCane System: An Assistive Device for Geriatrics," *Third International Conference on Body Area Networks (BodyNets '08),* March 2008. (Best Paper Award)

Hyduke Noshadi, Eugenio Giordano, Hagop Hagopian, Giovani Pau, Mario Gerla, and **Majid Sarrafzadeh**, "Remote Medical Monitoring Through Vehicular Ad Hoc Network," *2nd IEEE International Symposium on Wireless Vehicular Communicatons (WiVeC),* 2008.

Foad Dabiri, Alireza Vahdatpour, Hyduke Noshadi, Hagop Hagopian, and **Majid Sarrafzadeh**, "Ubiquitous Personal Assistive System for Neuropathy," *2nd ACM International Workshop on Systems and Networking Support for Healthcare and Assisted Living Environments (HealthNet),* 2008. (Best Paper Award)

Alireza Vahdatpour, Foad Dabiri, Maryam Moazeni, and **Majid Sarrafzadeh**, "Theoretical Bound and Practical Analysis of Minimum Connected Dominating Set in Ad Hoc and Sensor Networks," *International Symposium on DIStributed Computing (DISC),* September 2008.

AN INTEGRATIVE APPROACH TO UNDERSTANDING BIOLOGICAL SYSTEMS, WITH RESEARCH AREAS THAT SPAN SYSTEMS BIOLOGY, BIOINFORMATICS, GENOMICS, COMPUTATIONAL BIOLOGY, AND BIOMEDICAL ENGINEERING.

Leon Alkalai
Adjunct Associate Professor, Ph.D.
(UCLA) 1989

Robotic systems for space exploration, avionics systems, micro systems.

Boris Kogan
Adjunct Professor, Ph.D.
(Moscow Institute of Automation and Telemechanics) 1945

Simulation of dynamic phenomena in excitable biological tissues, massively parallel multiprocessor systems.

Joseph DiStefano III
Professor, Ph.D.
(UCLA) 1966
(also Prof. of Medicine and Biomedical Engineering)

Integrative, data-driven systems biology. 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.

D. Stott Parker
Professor, Ph.D.
(UIUC) 1978

Knowledge-based modeling and databases, stream processing, logic programming, rewriting, and systems for constraint processing.

Eleazar Eskin
Assistant Professor, Ph.D.
(Columbia) 2002

Computational biology and bioinformatics, and specifically, analysis of human variation and its relation to complex disease.

Zhuowen Tu
Assistant Professor, Ph.D.
(Ohio State University) 2002
(Joint appointment with Department of Neurology)

Statistical modeling/computing, computational biology, machine learning, and brain imaging.

EXCELLENCE

COMPUTATIONAL SYSTEMS BIOLOGY SELECTED PUBLICATIONS (2007 – 2008)

R. M. Javier and **J. J. Distefano III**, "Dynamical Biocontrol Systems: Insights Through Mechanistic Modeling," *Mathematical and Computer Modeling of Dynamical Systems* (in press).

M. Eisenberg, M. Samuels, and **J. J. DiStefano III**, "Extensions, Validation & Clinical Applications of a Feedback Control System Simulator of the Hypothalmo-Pituitary-Thyroid Axis," *Thyroid* (in press).

M. Eisenberg and *J. J. DiStefano III*, "TSH-Based Protocol, Tablet Instability & Absorption Effects on L-T4 Bioequivalence," *Thyroid* (in press).

S. Hori and **J. J. DiStefano III.** "Discriminating Mechanistic Hypotheses for GLUT4 Trafficking in 3T3-L1 Adipocytes," *Proceedings of the Annual Meeting of the Biomedical Engineering Society,* October 2007.
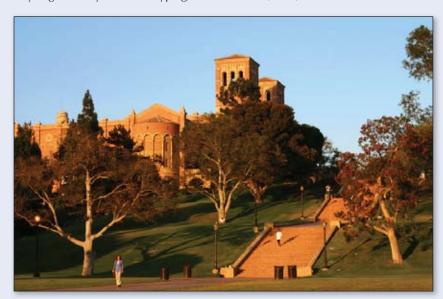
Kelly A. Frazer, **Eleazar Eskin**, Hyun Min Kang, Molly A. Bogue, David A. Hinds, (and 11 other authors), "A Sequence-Based Variation Map of 8.27 Million SNPs in Inbred Mouse Strains," *Nature,* 448(7157), pp. 1050–1053, 2007.

Eleazar Eskin, "Increasing Power in Association Studies by Using Linkage Disequilibrium Structure and Molecular Function as Prior Information," *Genome Research,* 18(4), pp. 653–660, *Special Issue Proceedings of the 12th Annual Conference on Research in Computational Biology (RECOMB '08),* 2008.

Arthur Choi, Noah Zaitlen, Buhm Han, Knot Pipatsrisawat, Adnan Darwiche, and **Eleazar Eskin**, "Efficient Genome Wide Tagging by Reduction to SAT," *Proceedings of the 8th Workshop on Algorithms in Bioinformatics (WABI '08),* September 2008.

Hyun Min Kang, Noah A. Zaitlen, Claire M. Wade, Andrew Kirby, David Heckerman, Mark J. Daly, and **Eleazar Eskin**, "Efficient Control of Population Structure in Model Organism Association Mapping," *Genetics,* 178(3) pp. 1709–1723, 2008.

Adam B Olshen, Bert Gold, Kirk E Lohmueller, Jeffrey P Struewing, Jaya Satagopan, Stefan A Stefanov, **Eleazar Eskin**, (and 12 other authors), "Analysis of Genetic Variation in Ashkenazi Jews by High Density SNP Genotyping," *BMC Genetics,* 9:14, 2008.
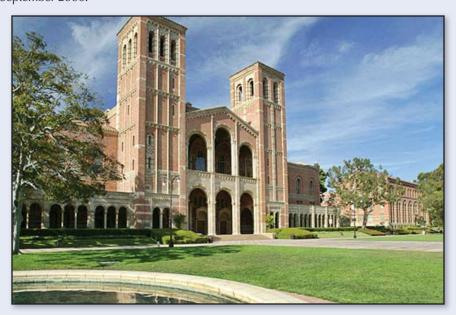
CREATING, APPLYING, IMPARTING KNOWLEDGE

COMPUTATIONAL SYSTEMS BIOLOGY SELECTED PUBLICATIONS (2007 – 2008)

P. K. C. Wang and **B. Y. Kogan**, "Parametric Study of the Noble's Action Potential Model for Cardiac Purkinje Fibers," *Chaos, Solitons and Fractals,* Vol. 33, pp. 1048–1063, 2007.

R. Samade and **B. Kogan**, "Calcium Alternans in Cardiac Cell Mathematical Modelsm," *Proceedings of 2007 International Conference on Bioinformatics & Computational Biology,* Vol. II, pp. 473–479, 2007.

R. B. Huffaker, J. N. Weiss, and **B. Kogan**, "Effects of Early Afterdepolazization on Reentry in Cardiac Tissue: A Simulation Study," *AJP—Heart and Circulatory Physiology,* Vol. 292, pp. H3089-H3102, 2007.

K.-H. Chang, Y.-K. Kwon, and **D. S. Parker**, "Finding Minimal Sets of Informative Genes in Microarray Data," *Proceedings International Symposium on Bioinformatics Research and Applications (ISBRA '07),* 2007.

D. S. Parker, R.-L. Hsiao, Y. Xing, A. Resch, and C. Lee, "Solving the Problem of Trans-Genomic Query with Alignment Tables," *IEEE Transactions on Computational Biology and Bioinformatics,* DOI 10.1109/TCBB.2007.1073, 2007.

H.-C. Yang, A. Dasdan, R.-L. Hsiao, and **D. S. Parker**, "Map-Reduce-Merge: Simplified Relational Data Processing on Large Clusters," *Proceedings ACM International Conference on Management of Data (SIGMOD '07),* June 2007.

R.-L. Hsiao and **D. S. Parker**, "The GOBASE: An Information Management System for Gene Ontology," *Symposium on Statistical and Scientific Database Management (SSDBM '06),* September 2006.

H.-C. Yang, **D. S. Parker**, and R.-L. Hsiao, "The Holodex: Integrating Summarization with the Index," *Symposium on Statistical and Scientific Database Management (SSDBM '06),* September 2006.

EXCELLENCE

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.

Tony F. Chan
Professor, Ph.D.
(Stanford) 1978

PDE methods in image processing, computer vision and computer graphics, VLSI CAD, multigrid/domain decomposition algorithms, iterative and Krylov subspace methods, parallel algorithms. (Joint appointment with Mathematics & Bioengineering)

Demetri Terzopoulos
Chancellor's Professor, Ph.D.
(MIT) 1984

Computer graphics, computer vision, medical image analysis, computer-aided design, artificial intelligence/life.

Petros Faloutsos
Assistant Professor, Ph.D.
(Toronto, Canada) 2002

Computer graphics, physics-based animation, robotics, and biomechanics.
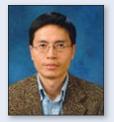
Alan Yuille
Professor, Ph.D.
(Cambridge) 1976

Computer vision, Bayesian statistics, and pattern recognition. (Joint appointment with Statistics and Psychology)

Stanley Osher
Professor, Ph.D.
(NYU) 1966

Image science, scientific computing, level set methods. (Joint appointment with the Mathematics Department)

Song-Chun Zhu
Professor, Ph.D.
(Harvard) 1996

Computer vision, statistical modeling and computing, machine learning. (Joint appointment with Department of Statistics)

Stefano Soatto
Professor, Ph.D.
(Caltech) 1996

Computer vision, non-linear estimation, control theory.

GRAPHICS & VISION SELECTED PUBLICATIONS (2007 – 2008)

T. Y. Yeh, **P. Faloutsos**, M. D. Ercegovac, S. J. Patel, and G. Reinman, "The Art of Deception: Adaptive Precision Reduction for Area-Efficient Physics Acceleration," *40th Annual IEEE/ACM International Symposium on Microarchitectures (MICRO '07),* pp. 394–406, December 2007.

P. Favaro, S. Soatto, M. Burger, and **S. Osher**, "Shape from Defocus via Diffusion," *IEEE Transactions on Pattern Analysis and Machine Intelligence,* 2007.

P. Favaro, **S. Soatto**, M. Burger, and S. Osher, "Shape from Defocus via Diffusion," *IEEE Transactions on Pattern Analysis and Machine Intelligence,* 2007.

A. Bissacco, A. Chiuso, and **S. Soatto**, "Classification and Recognition of Dynamical Models," *IEEE Transactions on Pattern Analysis and Machine Intelligence,* 2007.

H. Jin, D. Wang, D. Cremers, E. Prados, A. Yezzi, and **S. Soatto**, "3-D Reconstruction of Shaded Objects from Multiple Images Under Unknown Illumination," *International Journal of Computer Vision,* 2007.

J. Jackson, A. J. Yezzi, and **S. Soatto**, "Dynamic Shape and Appearance Modeling via Moving and Deforming Layers," *International Journal of Computer Vision,* 2008.

S. Soatto, "On the Distance Between Non-Stationary Time Series," *Modeling, Estimation and Control,* 2007.

F. Qureshi and **D. Terzopoulos**, "Intelligent Perception and Control for Space Robotics: Autonomous Satellite Rendezvous and Docking," *Machine Vision and Applications,* 19(3), pp. 141-161, May 2008.

W. Shao and **D. Terzopoulos**, "Autonomous Pedestrians," *Graphical Models,* 69(5-6), pp. 246–274, September/November 2007.

M.A.O. Vasilescu and **D. Terzopoulos**, "Multilinear Projection for Appearance-Based Recognition in the Tensor Framework," *Proceedings Eleventh IEEE International Conference on Computer Vision (ICCV'07),* pp. 1–8, October 2007.

F. Qureshi and **D. Terzopoulos**, "Virtual Vision and Smart Cameras," *Proceedings First ACM/ IEEE International Conference on Distributed Smart Cameras (ICDSC '07),* pp. 87–94, 2007.

Q. Yu and **D. Terzopoulos**, "A Decision Network Framework for the Behavioral Animation of Virtual Humans," *Proceedings ACM SIGGRAPH/Eurographics Symposium on Computer Animation (SCA '07),* pp. 119–128, August 2007.

Ying Nian Wu, Zhangzhang Si, Chuck Fleming, and **Song-Chun Zhu**, "Deformable Template as Active Basis," *Proceedings 11th IEEE International Conference on Computer Vision,* October 2007. (Marr Prize honorable mention)

L. Zhu, Y. Chen, Y. Lu, C. Lin, and **A. L. Yuille**, "Max Margin AND/OR Graph Learning for Parsing the Human Body," Proceedings Computer Vision and Pattern Recognition (CVPR 08), Anchorage, Alaska, 2008.

A. L. Yuille and H. Lu, "The Noisy-Logical Distribution and its Application to Causal Inference," Advances in Neural Information Processing Systems, Vol. 20, MIT Press 2007.

J. J. Corso, **A. Yuille**, and Z. Tu, "Graph-Shifts: Natural Image Labeling by Dynamic Hierarchical Computing, Proceedings of IEEE Conference on Computer Vision and Pattern Recognition, 2008.

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, DATA MINING, DISTRIBUTED DATABASES, DATA STREAM MANAGEMENT SYSTEMS, AND INFORMATION SYSTEMS FOR MEDICINE AND SCIENCE.

Alfonso Cárdenas
Professor, Ph.D.
(UCLA) 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.

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.

Wesley Chu
Professor, Ph.D.
(Stanford) 1966

Distributed processing and distributed database systems, and intelligent information systems.

Richard Muntz
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.

Carlo Zaniolo
Professor, Ph.D.
(UCLA) 1976

Knowledge-based systems, database systems, non-monotonic reasoning, spatio/temporal reasoning, and scientific databases.

INFORMATION & DATA MANAGEMENT SELECTED PUBLICATIONS (2007 – 2008)

Giuliano Casale, **Richard Muntz** and Giuseppe Serazzi, "Geometric Bounds: A Noniterative Analysis Technique for Closed Queueing Networks," *IEEE Transactions on Computers,* Vol. 57, No. 6, pp. 780-794, June 2008.
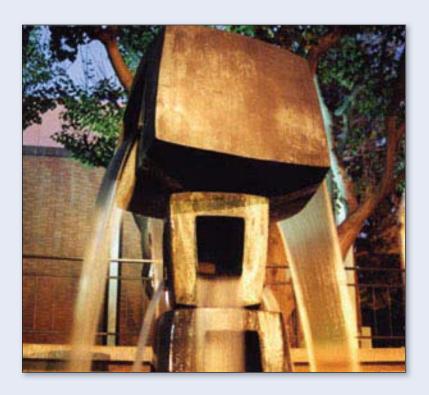
Carlo A. Curino, Hyun J. Moon, Letizia Tanca, and **Carlo Zaniolo**, "Schema Evolution in Wikipedia—Toward a Web Information System Benchmark," *10th International Conference on Enterprise Information Systems (ICEIS),* pp. 323-332, 2008.

Barzan Mozafari, Hetal Thakkar, and **Carlo Zaniolo**, "Verifying and Mining Frequent Patterns from Large Windows over Data Streams," *24th International Conference on Data Engineering (ICDE)* pp. 179-188, 2008.

Yan-Nei Law and **Carlo Zaniolo**, "Improving the Accuracy of Continuous Aggregates and Mining Queries on Data Streams under Load Shedding," *International Journal of Business Intelligence and Data Mining,* 3(1), pp. 99-117, 2008.

Fusheng Wang and **Carlo Zaniolo**, "Temporal Queries and Version Management in XML-Based Document Archives," *Data & Knowledge Engineering,* Volume 65, Issue 2, pp. 304-324, May 2008.

Deise Saccol, Nina Edelweiss, Renata Galante, and **Carlo Zaniolo**, "XML Version Detection," *Sixth ACM Symposium on Document Engineering,* pp. 78-88, August 2007.
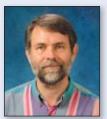
THE STUDY AND DESIGN OF DISTRIBUTED AND OFTEN MOBILE SYSTEMS—INCLUDING COMPUTERS, VEHICLES, PEOPLE, AND SENSORS INTERCONNECTED BY A COMMUNICATIONS NETWORK—AND ALSO THE APPLICATIONS THAT RUN ON THESE SYSTEMS AND PROTOCOLS THAT MAKE THE VARIOUS NETWORK COMPONENTS WORK TOGETHER AND PERFORM WELL; AND TO OPTIMIZE PERFORMANCE, A STUDY OF THE WIRED OR WIRELESS NETWORK ITSELF.

Deborah Estrin
Professor, Ph.D.
(MIT) 1985

Wireless sensing systems, Internet architecture and protocols, with particular applications to environmental sensing applications. (Joint appointment with the Electrical Engineering Department)

Peter Reiher
Adjunct Associate Professor, Ph.D.
(UCLA) 1987

Network security, operating system security, distributed systems, and file systems.

Mario Gerla
Professor, Ph.D.
(UCLA) 1973

Performance evaluation, design and control of distributed computer communication systems, and high-speed computer networks (B-ISDN and optical).

M. Y. "Medy" Sanadidi
Adjunct Professor, Ph.D.
(UCLA) 1982

Congestion control and adaptive multimedia streaming in heterogeneous networks; analytic modeling of computer and communications systems.

Leonard Kleinrock
Distinguished Professor, 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.

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)

Songwu Lu
Associate Professor, Ph.D.
(UIUC) 1999

Wireless networking, mobile computing, network security, sensor networks, network middleware.

Lixia Zhang
Professor, Ph.D.
(MIT) 1989

Internet architecture, principles in network protocol designs, security and resiliency in global scale systems.

EXCELLENCE

NETWORK SYSTEMS SELECTED PUBLICATIONS (2007 – 2008)

Lewis Girod, Nithya Ramanathan, Jeremy Elson, Thanos Stathopoulos, Martin Lukac, and **Deborah Estrin**, "Emstar: a Software Environment for Developing and Deploying Heterogeneous Sensor-Actuator Networks," *ACM Transactions on Sensor Networks,* Vol. 3, No. 3, pp. 1-35, August 2007.

Michael Allen, Lewis Girod, Ryan Newton, Samuel Madden, Daniel Blumstein, and **Deborah Estrin**, "VoxNet: An Interactive, Rapidly-Deployable Acoustic Monitoring Platform," *Proceedings of the Information Processing in Sensor Networks (IPSN'08),* April 2008.

E. Agapie, G. Chen, D. Houston, E. Howard, J. Kim, M. Y. Mun, A. Mondschein, S. Reddy, R. Rosario, J. Ryder, A. Steiner, J. Burke, **D. Estrin**, M. Hansen, and M. Rahimi, "Seeing Our Signals: Combining Location Traces and Web-Based Models for Personal Discovery," *Proceedings of the 9th IEEE Workshop on Mobile Computing Systems and Applications (HotMobile'08),* February 2008.

T. Ko, Z. Charbiwala, S. Ahmadian, M. Rahimi, M. Srivastava, S. Soatto, and **D. Estrin**, "Exploring Tradeoffs in Accuracy, Energy and Latency of Scale Invariant Feature Transform in Wireless Camera Networks," *1st ACM/IEEE International Conference on Distributed Smart Cameras (ICDSC'07),* September 2007.

J. Hyman, E. Graham, M. Hansen, and **D. Estrin**, "Imagers as Sensors: Correlating Plant CO_2 Uptake with Digital Visible-Light Imagery," *4th International Workshop on Data Management for Sensor Networks (DMSN),* 2007.

Soon Oh, Joon-Sang Park, and **Mario Gerla**, "E-ODMRP: Enhanced ODMRP with Motion Adaptive Refresh," *Journal of Parallel and Distributed Computing,* Vol.64, No.8, pp.1044-1053, August 2008.

Sewook Jung, Alexander Chang, Uichin Lee, Dae-Ki Cho, and **Mario Gerla**, "BlueTorrent: Cooperative Content Sharing for Bluetooth Users," *Elsevier Pervasive Mobile Computing,* Vol. 3, No. 6, pp, 609-634, December 2007.

Seung-Hoon Lee Uichin Lee, Kang-won Lee, and **Mario Gerla**, "Content Distribution in VANETs using Network Coding: The effect of Disk I/O and Processing O/H," *IEEE SECON '08,* June 2008.

Antonio Caruso, Francesco Paparella, Luiz Vieira, Melike Erol, and **Mario Gerla**, "The Meandering Current Mobility Model and its Impact on Underwater Mobile Sensor Networks," *Infocom '08,* April 2008.

Suk-Bok Lee, Gabriel Pan, Joon-Sang Park, and **Mario Gerla**, "Secure Incentives for Commercial Ad Dissemination in Vehicular Networks," *MobiHoc '07,* September 2007.

Leonard Kleinrock, "History of the Internet and its Flexible Future," *IEEE Wireless Communications,* pp. 8-18, February 2008.

NETWORK SYSTEMS SELECTED PUBLICATIONS (2007 – 2008)

K. Eustice, V. Ramakrishna, N. Nguyen, and **P. Reiher**, "The Smart Party: A Personalized Location-Aware Multimedia Experience," *Consumer Communications and Networking Conference,* January 2008.

J. Li, J. Mirkovic, T. Ehrenkranz, M.Wang, **P. Reiher**, and L. Zhang, "Learning the Valid Incoming Direction of IP Packets," *Computer Networks* (52), pp. 399–417, October 2007.

M. Beaumont-Gay, K. Eustice, V. Ramakrishna, and **P. Reiher**, "Information Protection Via Environmental Data Tethers," *New Security Paradigms Workshop,* September 2007.

A. Wang, G. Kuenning, and **P. Reiher**, "Using Permuted States and Validated Simulation to Analyze Conflict Rates in Optimistic Replication," *Simulation: Transactions of the Society for Modeling and Simulation International,* Vol. 83, No. 8, pp. 551–569, August 2007.

C. Marcondes, M. Martinello, M. Gerla, **M. Sanadidi**, R. Santos, and R. Schwartz, "PathCrawler: Automatic Harvesting of Web Infrastructure," *IFIP Network Operations & Management (NOMS),* April 2008

L. Chen, T. Chen, **M. Sanadidi**, and M. Gerla, "PBProbe: A Capacity Estimation Tool for High Speed Computer Communications," accepted for publication in *Computer Communications Journal,* May 2008

H. Shimonishi, C. Marcondes, **M. Sanadidi**, and Mario Gerla, "Combining TCP Westwood and Adaptive Reno: A Scalable and Safe Congestion Control Proposal," *ICC '08,* May 2008.

C. Paranello, A. Lombardo, G. Schembra, **M. Sanadidi**, and M. Gerla, "Active Window Management: Performance Assessment through an Extensive Comparison with XCP," *IFIP Networking '08,* May 2008.

D. Gao, Y. Shu, L. Yu, **M. Sanadidi**, and M. Gerla, "TCP SPC: Statistic Process Control for Enhanced Transport over Wireless Links" *Globecom '08,* December 2008.

Maneesh Varshney, Defeng Xu, **Mani Srivatava**, and Rajive Bagrodia, "SenQ: A Scalable Simulation and Emulation Environment for Sensor Networks," to appear in *IEEE/ACM Conference on Information Processing in Sensor Networks (IPSN),* track on *Sensor Platform, Tools and Design Methods for Network Embedded Systems (SPOTS),* 2007.

Ricardo Oliveira, Beichuan Zhang, and **Lixia Zhang**, "Observing the Evolution of Internet AS Topology," *ACM SIGCOMM,* August 2007.

Ricardo Oliveira, Mohit Lad, Beichuan Zhang, and **Lixia Zhang**, "Geographically Informed Inter-Domain Routing," *IEEE International Conference on Network Protocols (ICNP),* October 2007.

Mohit Lad, Ricardo Oliveira, Dan Massey, and **Lixia Zhang**, "Inferring the Origin of Routing Changes using Link Weights," *IEEE International Conference on Network Protocols (ICNP),* October 2007.

Nikitas Liogkas, Robert Nelson, Eddie Kohler, and **Lixia Zhang**, "Exploring the Robustness of BitTorrent Peer-to-Peer Content Distribution Systems," *Concurrency and Computation: Practice and Experience,* Vol. 20, Issue 2, February 2008.

Ricardo Oliveira, Dan Pei, Walter Willinger, Beichuan Zhang, and **Lixia Zhang**, "In Search of the Elusive Ground Truth: The Internet's AS-level Connectivity Structure," *ACM SIGMETRICS,* June 2008.

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
Professor, Ph.D.
(U. Texas, Austin) 1987

Wireless networks, mobile
computing and communications,
network simulation and analysis,
parallel and distributed computing.

Todd Millstein
Assistant Professor, Ph.D.
(U. Washington), 2003

Programming languages and
language design, compilation,
software model checking, formal
methods, and database systems.

Paul Eggert
SOE Lecturer, Ph.D.
(UCLA) 1980

Software design and engineering,
programming language design
and implementation, and software
internationalization.

Rupak Majumdar
Associate Professor, Ph.D.
(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.

Alan Kay
Adjunct Professor, Ph.D.
(University of Utah) 1969

Object-oriented programming,
personal computing, graphical user
interfaces.

Jens Palsberg
Professor, Ph.D.
(University of Aarhus, Denmark) 1992

Compilers, embedded systems,
programming languages, software
engineering, and information security.

Eddie Kohler
Assistant Professor, Ph.D.
(MIT) 2001

Operating systems, software
architecture, network measurement,
network protocol design, and
programming language techniques
for improving systems software.

David Smallberg
SOE Lecturer, M.S.
(UCLA) 1978

Computer science education,
programming languages, generic
programming, student software
analysis.

SOFTWARE SYSTEMS SELECTED PUBLICATIONS (2007 – 2008)

J. Lin, E.Shin, W. Chan, and **R. Bagrodia**, "Type-based Distributed Middleware for Mobile Ad Hoc Networks," *International Conference on Mobile and Ubiquitous Systems: Networks and Services (MOBIQUITOUS)*, 2008

Zhiguo Xu and **Rajive Bagrodia**, "GPU-Accelerated Evaluation Platform for High Fidelity Network Modeling," to appear in *Proceedings of 21st Workshop on Principles of Advanced and Distributed Simulation (PADS)*, 2007.

Yi Yang, Maneesh Varshney, Shrinivas Mohan, and **Rajive Bagrodia**, "High-Fidelity Application-Centric Evaluation Framework for Vehicular Networks," *4th ACM International Workshop on Vehicular Ad Hoc Networks (VANET)*, 2007.

Yi Yang, Mahesh Marina, and **Rajive Bagroda**, "Evaluation of Multihop Relaying for Robust Vehicular Internet Access," *Mobile Networking for Vehicular Environments (MOVE)*, 2007.

Maneesh Varshney, Defeng Xu, Mani Srivatava, and **Rajive Bagrodia**, "SenQ: A Scalable Simulation and Emulation Environment for Sensor Networks," to appear in *IEEE/ACM Conference on Information Processing in Sensor Networks (IPSN)*, track on *Sensor Platform, Tools and Design Methods for Network Embedded Systems (SPOTS)*, 2007.

Christopher Frost, Mike Mammarella, **Eddie Kohler**, Andrew de los Reyes, Shant Hovsepian, Andrew Matsuoka, and Lei Zhang, "Generalized File System Dependencies," *Proceedings 21st ACM Symposium on Operating Systems Principles (SOSP '07)*, pp. 307–320, October 2007.

Maxwell Krohn, Alex Yip, Micah Brodsky, Natan Cliffer, M. Frans Kaashoek, **Eddie Kohler**, and Robert Morris, "Information Flow Control for Standard OS Abstractions," *Proceedings 21st ACM Symposium on Operating Systems Principles (SOSP '07)*, pp. 321-334, October 2007.

Steve VanDeBogart, Petros Efstathopoulos, **Eddie Kohler**, Maxwell Krohn, Cliff Frey, David Ziegler, Frans Kaashoek, Robert Morris, and David Mazières, "Labels and Event Processes in the Asbestos Operating System," *ACM Transactions on Computer Systems,* 25(4), pp. 11:1–11:43, November 2007.

Russ Cox, Tom Bergan, Austin Clements, Frans Kaashoek, and **Eddie Kohler**, "Xoc, An Extension-Oriented Compiler for Systems Programming," *Proceedings 13th International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS XIII)*, pp. 244–254, March 2008.

Byung-Gon Chun, Sylvia Ratnasamy, and **Eddie Kohler**, "NetComplex: A Complexity Metric for Networked System Designs," *Proceedings 5th USENIX Symposium on Networked Systems Design and Implementation (NSDI '08)*, pp. 393–406, April 2008.

EXCELLENCE

SOFTWARE SYSTEMS SELECTED PUBLICATIONS (2007 – 2008)

Alessandro Warth, James R. Douglass, and **Todd Millstein**, "Packrat Parsers Can Support Left Recursion," *ACM SIGPLAN 2008 Workshop on Partial Evaluation and Program Manipulation (PEPM '08),* January 2008.

Nupur Kothari, **Todd Millstein**, and Ramesh Govindan, "Deriving State Machines from Tiny OS Programs using Symbolic Execution," *Proceedings of the International Conference on Information Processing in Sensor Networks (IPSN '08),* April 2008.

Ru-Gang Xu, Patrice Godefroid, and **Rupak Majumdar**, "Testing for Buffer Overflows Using Length Abstraction," *International Symposium on Software Testing and Analysis (ISSTA '08),* pp. 27–38, ACM Press, 2008.

Dirk Beyer, Damien Zufferey, and **Rupak Majumdar**, "CSIsat: Interpolation for LA+EUF," *Computer-Aided Verification (CAV '08),* Lecture Notes in Computer Science 5123, pp. 304-308. Springer-Verlag, 2008.

Yu Hu, Victor Shih, Lei He, and **Rupak Majumdar**, "FPGA Area Reduction by Multi-Output Function-Based Sequential Resynthesis," *Design Automation Conference (DAC '08),* pp. 24–29, ACM Press, 2008.

Ashutosh Gupta, Tom Henzinger, **Rupak Majumdar**, Andrey Rybalchenko, and Ru-Gang Xu, "Proving Non-Termination," *Principles of Programming Languages (POPL '08),* pp. 147–158. ACM Press, 2008.

Michael Emmi, **Rupak Majumdar**, and Koushik Sen, "Dynamic Test Input Generation for Database Applications," *International Symposium on Software Testing and Analysis (ISSTA '07),* pp. 151–162, ACM Press, 2007.

Christian Grothoff, **Jens Palsberg**, and Jan Vitek, "Encapsulating Objects with Confined Types," *ACM Transactions on Programming Languages and Systems,* 29(6), 2007.

V. Krishna Nandivada, Fernando Magno Quintao Pereira, and **Jens Palsberg**, "A Framework for End-to-End Verification and Evaluation of Register Allocators," *SAS '07,* pp. 153–169, 2007.

Jonathan K. Lee, **Jens Palsberg**, and Fernando Magno Quintao Pereira, "Aliased Register Allocation for Straight-Line Programs Is NP-Complete," *ICALP '07,* pp. 680–691, 2007.

Ben Titzer and **Jens Palsberg**, "Vertical Object Layout and Compression for Fixed Heaps," *CASES '07,* pp. 70–178, 2007.

Fernando Magno Quintao Pereira, and **Jens Palsberg**, "Register Allocation by Puzzle Solving," *PLDI '08,* pp. 216–226, 2008.

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
Associate Professor, Ph.D.
(MIT) 1982

Distributed algorithms, mathematical programming with application to distributed routing and control of data networks, and computer science theory.

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.

Sheila Greibach
Professor, Ph.D.
(Harvard) 1963

Algorithms and computational complexity, complex program schemes and semantics, formal languages and automata theory and computability.

Amit Sahai
Associate Professor, Ph.D.
(MIT) 2000

Theoretical computer science, primarily foundations of cryptography and computer security.

Adam Meyerson
Assistant Professor, Ph.D.
(Stanford) 2002

Approximation algorithms, randomized algorithms, online algorithms, theoretical problems in networks and databases.

EXCELLENCE

COMPUTER SCIENCE THEORY SELECTED PUBLICATIONS (2007 –2008)

Ashish Goel, **Adam Meyerson**, and Thomas Weber, "Fair Welfare Maximization," *Economic Theory,* 2008.

Gunes Ercal, Rafit Izhak-Ratzin, *Rupak Majumdar,* and Adam Meyerson, "Frugal Routing on Wireless Ad-Hoc Networks," *Symposium on Algorithmic Game Theory (SAGT),* 2008.

Aaron Cote, **Adam Meyerson**, and Laura Poplawski. "Randomized K-Server on Hierarchical Binary Trees," *ACM Symposium on Theory of Computing (STOC),* 2008.

David Kempe, **Adam Meyerson**, Nainesh Solanki, and Ramnesh Chellappa, "Pricing of Partially Compatible Products," *ACM E-Commerce (EC),* 2007.

Avrim Blum, Shuchi Chawla, David Karger, Terran Lane, **Adam Meyerson**, and Maria Minkoff, "Approximation Algorithms for Orienteering and Discounted-Reward TSP," *SIAM Journal of Computing,* 37(2), 2007.

Dan Boneh, Shai Halevi, Michael Hamburg, and **Rafail Ostrovsky**, "Circular-Secure Encryption from Decision Diffie-Hellman," *CRYPTO '08,* pp. 108–125, 2008.

Yuval Ishai, Eyal Kushilevitz, **Rafail Ostrovsky**, and Amit Sahai, "Cryptography with Constant Computational Overhead," *STOC '08,* pp. 433–442, 2008.

Steve Lu, Daniel Manchala, and **Rafail Ostrovsky**, "Visual Cryptography on Graphs," *COCOON '08,* pp. 225-234. (Best Paper Award)

Juan A. Garay and **Rafail Ostrovsky**, "Almost-Everywhere Secure Computation," *EUROCRYPT '08,* pp. 307-323, 2008.

Yevgeniy Dodis, **Rafail Ostrovsky**, Leonid Reyzin, and Adam Smith, "Fuzzy Extractors: How to Generate Strong Keys from Biometrics and Other Noisy Data," *SIAM Journal on Computing,* 38(1), pp. 97–139, 2008.

Jonathan Katz, **Amit Sahai**, and Brent Waters, "Predicate Encryption Supporting Disjunctions, Polynomial Equations, and Inner Products," *EUROCRYPT '08,* pp. 146–162, 2008.

Omkant Pandey, Rafael Pass, **Amit Sahai**, Wei-Lung Dustin Tseng, and Muthuramakrishnan Venkitasubramaniam, "Precise Concurrent Zero Knowledge," *EUROCRYPT '08,* pp. 397–414, 2008.

Jens Groth and **Amit Sahai**, "Efficient Non-interactive Proof Systems for Bilinear Groups," *EUROCRYPT '08,* pp. 415–432, 2008.

Nishanth Chandran, Vipul Goyal, and **Amit Sahai**, "New Constructions for UC Secure Computation Using Tamper-Proof Hardware," *EUROCRYPT '08,* pp. 545–562, 2008.

Yuval Ishai, Eyal Kushilevitz, Rafail Ostrovsky, and **Amit Sahai**, "Cryptography with Constant Computational Overhead," *STOC '08,* pp. 433–442, 2008.

The University of California, Los Angeles, encompasses over 419 acres in the foothills of the Santa Monica mountains, and boasts near-perfect weather all year around. Its architecture, theaters, concert halls, museums, libraries, and sculpture and botanical gardens supply the setting for everything from the ancient to the avant-garde. Since its inception, the University has been dedicated to preserving the past and creating the future.

UCLA at night

The Computer Science Department is helping to create that future with internationally recognized research in all areas within the many fields of computer science. Our current achievements and those of the past, such as our key role in the birth of the Internet 39 years ago, attract graduate applicants from every region in the United States, and indeed, from all over the world.

In addition to campus aesthetics and the challenging intellectual climate, there are other challenges for our students to face—such as the highly competitive basketball games between faculty and student teams, and the ever-popular softball games that take place during the Computer Science Department's annual picnic event.

UCLA is located just minutes from the beautiful Pacific Ocean.

Engineering V: the newest addition to the Henry Samueli School of Engineering and Applied Science

ACADEMIC YEAR 2007-2008

Ph.D. STUDENT'S NAME	ACADEMIA/INDUSTRY	TITLE	ADVISOR
Yijian Bai	Google Inc.	*Software Engineer*	Carlo Zaniolo
Alessandro Bissacco	Google Inc.	*Member Technical Staff*	Stefano Soatto
Douglas E. Carroll	Raytheon Inc.	*Member Technical Staff*	Adam Meyerson
Marcos David Chavira	Google Inc.	*Software Engineer*	Adnan Darwiche
Alvin Yun-Wen Chen	Microsoft Inc.	*Member Technical Staff*	Richard Muntz
Yu Chen	IBM Research	*Member Technical Staff*	Wesley Chu
Jerry Cheng	Yahoo!	*Software Developer*	Songwu Lu
Kevin Francis Eustice	Kiha Software	*Software Engineer*	Peter Reiher
Jessica Feng	Booz Allen Hamilton	*Senior Consultant*	Miodrag Potokonjak
Guoling Han	Auto ESL Design Tech.	*Member Technical Staff*	Jason Cong
Ray Bringhurst Huffaker	Automatic Infor. Network	*Member Technical Staff*	Boris Kogan
Sewook Jung	Broadcom Corporation	*Staff Scientist*	Mario Gerla
Mohit Vijay Lad	Packet Design Inc.	*Member Technical Staff*	Lixia Zhang
Anna Majkowska	Google Inc.	*Member Technical Staff*	Petros Faloutsos
Cesar Marcondes	Sao Paolo College, Brazil	*Assistant Professor*	Mario Gerla
Ani Nahapetian	CSU Dominguez Hills	*Assistant Professor*	Majid Sarrafzadeh
Gunes Ercal-Ozkaya	U of Kansas, Lawrence	*Assistant Professor*	Adam Meyerson
Claudio Enrico Palazzi	University of Bologna	*Professor*	Mario Gerla
Nithya Ramanathan	CENS System Lab, UCLA	*Postdoctoral Researcher*	Deborah Estrin
Ari Yochanan Shapiro	Rhythm & Hues	*R&D*	Petros Faloutsos
Ilya Shpitser	School of Public Health, Harvard	*Postdoc*	Judea Pearl
William Skeith	City College of New York	*Assistant Professor*	Rafael Ostrovsky
Azam Sadat Taghavi	IBM New York	*Software Developer*	Majid Sarrafzadeh
Benjamin L. Titzer	Sun Labs	*Member Technical Staff*	Jens Palsberg
Andrea Vedaldi	Oxford University	*Postdoc*	Stefano Soatto
Ho Yin Starsky Wong	IBM T.J. Watson	*Research Staff Member*	Songwu Lu
Thomas Y. Yeh	IEnteractive R & T	*CEO*	Glenn Reinman

The Computer Science 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. Both majors are approved by the Accreditation Board for Engineering and Technology (ABET).

The educational objectives for the computer science and the computer science and engineering majors are nearly identical:

- For CS—make valuable contributions to design, development, and production in the practice of computer science and related engineering or application areas, particularly in software systems and algorithmic methods. For CS&E—make valuable contributions to design, development and production in the practice of computer science and computer engineering in related engineering areas or application areas, and at the interface of computers and physical systems.

- Demonstrate strong communication skills and the ability to function effectively as part of a team.

- Demonstrate a sense of societal and ethical responsibility in all professional endeavors.

- Engage in professional development or post-graduate education to pursue flexible career paths amid future technological changes.

Members of the Undergraduate Program Advisory Board for Engineering and Technology are comprised of representatives from industry, academia, alumni and the student body. The board meets twice a year to review the computer science program and refine the department's goals.

BOARD MEMBERS

Shaun Ahmagian *UCLA CS Undergraduate*	**Michael Erlinger** *Harvy Mudd College*	**David Rennels** *UCLA CS Dept*
Leon Alkalai *JPL & UCLA CS Dept*	**Beayna Grigorian** *UCLA CS Undergraduate*	**John Rosati** *Cleo Consulting Partners*
Joseph Bannister *USC, ISI*	**Ryan Kastner** *UCSB*	**Thakkar Sachin** *UCLA CS Undergraduate*
Peter Blankenship *Northrop Grumman*	**Pekka Kostamma** *Teradata*	**Mike Sievers** *Time Logic, Inc.*
Doug Caldwell *Ecliptic Enterprises*	**Richard Muntz** *UCLA CS Dept*	**David Smallberg** *UCLA CS Dept*
Jon Canon *Windows Microsoft*	**Ross Stewart Niebergall** *Raytheon*	**Mike Todd** *Google*
Jason Cong *UCLA CS Dept*	**Nima Nikzad** *UCLA CS Undergraduate*	**Ben Zaman** *Yahoo!*
Paul Eggert *UCLA CS Dept*	**Joseph Ou-Yang** *IBM*	

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 a program sponsored by the AP Computer Science Institute, LAUSD teachers have participated in weeklong exchanges with UCLA professors and researchers to find ways to more actively engage young people, (especially woman and minorities) in pursuit of an education in computer science.

- Faculty members Alfonso Cardenas and David Smallberg are working with the School's Center for Early Education and Development (CEED) office to start an NSF-funded program named FOCUS (Frontier Opportunities in Computing for Underrepresented Students). FOCUS encourages potential and current community college transfer students to pursue computer science through summer courses, bridge programs, school-year seminars, and support programs.

- We have supported a number of women and underrepresented graduate students under the DOE-sponsored GAANN fellowship program and the National GEM Consortium. Additionally, we have set aside funding to support selected undergraduate and graduate students to attend the annual Grace Hopper Women in Computing conference.

- Several of the department's "Centers" have received funding for programs and partnerships that focus on increasing diversity in the field of computer science. One of those Centers, the Center for Embedded Networked Sensing (CENS), has a large women and minority educational component that includes undergraduate and graduate research programs and recruitment efforts, grants from NSF for "Gender Diversity in Science, Technology, Engineering, and Mathematics," and the "Women @ CENS," an educational grant.

Students & Mentors: Rise-Up Diversity Program

2008 Commencement

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 keeping 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 other activities that are posted on the department's alumni website (http://www.cs.ucla.edu/csd/people/alumni).

ALUMNI ADVISORY BOARD MEMBERS

Alfonso Cardenas (Faculty Chair)
Professor
UCLA Computer Science Department

Milos Ercegovac
Professor
UCLA Computer Science Department

Mike Erlinger
Professor and Chair Computer Science
Harvey Mudd College

Braulio Estrada (Alumni Vice Chair)
Analyst
Accenture

William Goodin
Manager, Short Course Program
UCLA Extension

Nader Karimi
Executive Vice President
Chief Information Officer
Screen Actors Guild/Producers Pension/
Health Plans

Anil Kripalani
WirefreeCom

Andrew Louie
Vice President of Information Technology
Iris International

Carey Nachenberg
Fellow, Vice President
Symantec Corporation

Frank Pearce
Executive Vice President
Product Development
Blizzard Entertainment, Inc.

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

Ric Pozo (Alumni Chair)
Director, Space & Airborne Systems Center
Raytheon Company

John Rosati
Founder and Managing Director
THR Associates

David Smallberg
Lecturer
UCLA Computer Science Department

James Winchester
Owner
Avionic Products, Inc.

Behzad Zamanzadeh
Director of Engineering
Domain Match, Yahoo!

JON POSTEL LECTURER SERIES

The Jon Postel Lecturer Series is dedicated to the memory of Dr. Jon Postel – an alumnus of UCLA's Computer Science Department, a quiet and gentle man, 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 lecturers 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.

2008-2009 LECTURERS

Jan M. Rabaey
UC Berkeley
A Brand New Wireless Day
November 18, 2008

Maurice Herlihy
Brown University
*Transactional Boosting:
A Methodology for Highly-Concurrent Transactional Objects*
January 15, 2009

David Haussler
UC Santa Cruz
100 Million Years of Evolutionary History of the Human Genome
January 27, 2009

Andrew A. Chien
Intel Corporation
*Universal Parallel Computing –
Challenges and Opportunities in Programming and Architecture*
February 5, 2009

Raghu Ramakrishnan
Yahoo!
Cloud Computing at Yahoo!
February 26, 2009

ANNUAL TECHNOLOGY FORUM

Each spring, the Computer Science Department participates in the Annual Technical Forum – an event sponsored by the Henry Samueli School of Engineering and Applied Science that showcases research results from all seven of the departments within the engineering school. This year's Forum was especially successful, with about 400 people attending or participating. In addition to the many technical presentations and panel discussions by faculty and distinguished guests, a significant portion of each year's review is devoted to a very large and successful poster session that attracts many enthusiastic visitors. Here, our emerging Ph.D. students have an opportunity to describe their research results to faculty and classmates, as well as to industrial guests who are often scouting for talented researchers who desire careers in industry. **(http://www.engineer.ucla.edu/techforum)**

The Computer Science Department is committed to maintaining strong ties to industry, collaborating on state-of-the-art research, and engaging in a mutually beneficial exchange of information regarding advances in technology. The department's Industrial Affiliate Program facilitates these goals, while also providing many benefits to its Affiliates through memberships.

BASIC MEMBERSHIP BENEFITS

- A faculty member assigned to serve as a liaison for the program (through mutual agreement between the Affiliate member and the department).
- Customized assistance to member recruiting needs, including graduate student listings and résumés, on-site job interviews, and one technical talk per year at our seminar series to highlight the member's research and technology.
- Interaction with faculty members in areas of interest to facilitate research collaboration, summer internships, and consulting.
- Invitation to the Annual Research Review (with up to five free admissions), a venue where students and faculty showcase current research and exchange ideas with Affiliate members.
- Invitation to the department's Jon Postel Distinguished Lectures series.
- Access to in-house research reports and technical publications, as available and on request.

GOLD MEMBERSHIP BENEFITS

- All of the benefits provided under the Basic membership.
- Close ties with a specified research laboratory or research center, including frequent visits to facilitate exchange of technology, research results, etc.
- Departmental visitor status for up to 12 months for one representative from the member company, to include office space and full access to our computer facilities, libraries, classes and lectures.
- Position on the department's Advisory Board, providing valuable input and receiving feedback.
- Participation in the undergraduate senior-year project program, in which member companies propose projects for teams of three to four students (under supervision of faculty advisor).

OUR THANKS TO AFFILIATE MEMBERS FOR THEIR SUPPORT

Amgen	Nokia
Blizzard Entertainment	Northrop Grumman MS-C2SD
Cisco Systems, Inc.	Northrop Grumman MS-ISRSD
Google	Panasonic
Juniper Networks	Raytheon
Magma Design Automation, Inc.	Sun Microsystems Labs, Inc.
Mauro Sentinelli	Symantec Research Labs
Mentor Graphics	Teradata Corporation
Mitsubishi Heavy Industries	Yahoo!

REMEMBERING JERRY POPEK

Our esteemed friend and colleague, Gerald (Jerry) Popek, passed away at age 61 on July 20th of this year after a courageous battle with stomach cancer. He is survived by his wife Paulene, and children Sarah and Darren. Jerry spent his undergraduate years studying nuclear engineering at New York University and graduate years at Harvard University, earning a Ph.D. in applied mathematics. A member of UCLA's faculty for 35 years, Jerry had a distinguished career in the Computer Science Department as an Internet pioneer and a leader in computer security, distributed Unix systems, file replication and mobile computing. His "outside" career was equally distinguished. As founder and chairman of the Locus Computing Corporation, Jerry directed the company's growth as a significant supplier of technology and services to the Unix systems community. In subsequent years, Jerry served as chief technology officer for Platinum Technology, CarsDirect.com, and most recently, United Online, where he developed and managed the company's technology infrastructure, including oversight of an ISP service with millions of users. Jerry's dedication to education and "making things work" will be missed by all of us, but the greater loss will be his warm, engaging and supportive presence for those who were fortunate enough to know him. We will miss him greatly.