GRADUATE STUDY *at*

RICE

MESSAGE FROM THE DEPARTMENT CHAIR

Computers and computing are an integral part of our lives today. Computing is revolutionizing the process of research, development, and discovery in all fields of engineering and science. The societal impact of computing continues to increase as computers become more broadly accessible. Meanwhile, the foundations of computing also continue to change at a dizzying pace. New technologies, such as manycore processors, mobile computing, and cloud computing are reshaping the landscape of computing, and new challenges are emerging as computer science becomes increasingly multidisciplinary. Leading-edge skills in Computer Science are in demand by employers across a wide range of industries. A strong Computer Science department is essential to Rice's mission to be a world-class research university that prepares students to contribute to the advancement of society.

Rice has a long history of leadership in computing, starting with development of the R1 computer in the late 1950s. The Department of Computer Science is continuing this legacy by advancing the frontiers of computing. We have a three-fold mission: to create knowledge, to disseminate knowledge, and to provide service to our communities—the local Rice community and the broader community beyond the campus. We serve as a center of expertise in computing technologies for our university, our research collaborators, and our industry partners.

On the research front, our faculty, staff, and students are exploring innovative ideas in areas that range from parallel computing through text and data analytics, from ways to program computers through ways to build them, and from fundamental principles of logic and discrete mathematics through the application of those principles to gaming, voting, and driving robots.

On the educational front, we place top-flight researchers in the classroom with our undergraduates and graduate students, while also leading Rice's online educational initiatives. Education at Rice is a contact sport, with myriad opportunities for students and faculty to interact. Many Rice undergraduates work in faculty research programs; those opportunities start with encounters in the classroom.

On the subject of service, our faculty members serve on a wide range of advisory and professional committees, advise local schools on technology issues, and take advocacy roles in public policy that range from advising the federal government on science policy through fighting to ensure secure voting systems.

Rice's Computer Science department is a lively and invigorating place. If you are a prospective undergraduate or graduate student in computer science, we encourage you to visit the Rice campus and interact with members of our CS community to learn more about who we are.

Sincerely,
Vivek Sarkar,
Chair, Department of Computer Science and
E.D. Butcher Chair in Engineering

GRADUATE STUDY IN COMPUTER SCIENCE

RICE UNIVERSITY

WWW.COMPSCI.RICE.EDU

THE PROGRAMS

The department offers two thesis graduate degrees: the Master of Science (M.S.) degree and the Doctor of Philosophy (PhD). Thesis-track students work directly with one or more faculty members who serve as research directors and mentors. Both the M.S. and the Ph.D. require a combination of course work and original research, as evidenced in a written thesis and a public oral defense of that thesis. Students normally complete an M.S. as part of the process of obtaining a Ph.D. The department also admits a limited number of students for terminal M.S. degrees.

The department also offers a professional master's degree, called the Master of Computer Science Degree (M.C.S.). The M.C.S. degree requires 30 hours of approved course work beyond the bachelor's degree. Students in the M.C.S. program are not required to participate in research. A specialized M.C.S. program, the Master of Computer Science in Bioinformatics exposes the student to additional course work in the areas of computational biology and bioinformatics.

FACULTY/CURRENT RESEARCH

Robert "Corky" Cartwright. Professor of Computer Science. Ph.D. (1977) Stanford University.

Professor Cartwright's principal research interests are programming language design and implementation, program specification, program testing and analysis, and software engineering. He currently is engaged in three major research projects: NextGen focuses on compatibly extending the Java programming language to support first class genericity; Soft Typing aims to develop program analysis tools for Java that use precise type inference to help programmers debug and optimize programs, and Dr. Java, the goal of which is to develop production quality pedagogic programming environments for Java using Extreme Programming. Professor Cartwright is a fellow of the Association for Computing Machinery.

Joseph R. Cavallaro. Joint Appointment. Professor of Electrical and Computer Engineering and Computer Science. Ph.D. (1988) Cornell University.

Professor Cavallaro's research interests include computer arithmetic, VLSI design and microlithography, and DSP and VLSI architectures wireless communication systems. He is particularly interested in parallel algorithms and architectures for real-time signal processing applications. Professor Cavallaro's current research includes design exploration of application specific architectures and area, time and power efficient realizations in FPGA and ASIC hardware. During the 1996–97 academic year, he served at the U.S. National Science Foundation as director of the Prototyping Tools and Methodology Program in the Computer Directorate. In 2005, he was a Nokia Foundation Fellow and a visiting professor with the Centre for Wireless Communications at the University of Oulu, Finland. He currently is associate director of the Center for Multimedia Communication at Rice University.

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Swarat Chauduri. Assistant professor of computer science at Rice University. His research lies in the interface of programming languages and automated resoning. Specifically, he is an expert on program verification, or automated reasoning about the correctness of programs, and program synthesis, or automated derivation of programs that are correct by construction. He is also interested in languages and systems for parallel programming. Professor Chaudhuri received a bachelor's degree in computer science from the Indian Institute of Technology, Kharagpur, in 2001, and a doctoral degree in computer science from the University of Pennsylvania in 2007. From 2008-2011, he was an assistant professor at Pennsylvania State University, University park. He is a recipient of the national Science Foundation CAREER award, the ACM SIGPLAN Outstanding Doctoral Dissertation Award, and the Morris and Dorothy Rubinoff Dissertation Award from the University of Pennsylvania.

Keith D. Cooper. John and Ann Doerr Professor of Computational Engineering, Professor of Computer Science and Electrical and Computer Engineering. Ph.D. (1983) Rice University.
Professor Cooper conducts research on a variety of problems that arise in the design and implementation of compilers—tools that translate programs into an executable form. His current research projects include: problems in the design of adaptive optimizing compilers; issues that arise in dynamic optimization of code and preparation of code for execution on the Grid, and uniprocessor compilation problems for targets ranging from low-cost embedded systems through high-performance commodity microprocessors. Professor Cooper is the leader of Rice's Scalar Compiler group. He is a fellow of the Association for Computing Machinery and co-author of *Engineering a Compiler*, an undergraduate textbook on compiler construction.

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Alan L. Cox. Associate Professor of Computer Science and Electrical and Computer Engineering. Ph.D. (1992) University of Rochester. Professor Cox's research interests include parallel processing, computer architecture, distributed systems, concurrent programming and performance evaluation. He currently is involved in the design and implementation of TreadMarks, a software distributed shared memory system running on a network of workstations. He also has worked on FASTLINK, a project to provide fast sequential and parallel genetic linkage analysis software.

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Scott Cutler. Professor in the Practice of Computer Technology. Ph.D. (1976) MIT. Scott Cutler came to Rice University in 2001 after a 25 year career in the personal computer industry. Prior to joining Rice, he was Vice President and Chief Technology for Compaq Computer's Personal Computer Group and before that, CTO of Digital Equipment's PC Group.Research interests concentrate on digital media and personal electronics devices such as smartphones and tablets. He teaches a graduate course on the future of Personal Computing Technology and a senior level project course on programming applications for the iPhone and other portable devices.Active in many aspects of Rice, he is on the Faculty Senate and is responsible for a number of systems used by students to plan their schedule such as Schedule Planner.

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Ronald N. Goldman. Professor of Computer Science. Ph.D. (1973) Johns Hopkins University. Professor Goldman's current research interests lie in the mathematical representation, manipulation and analysis of shape using computers. He is particularly interested in algorithms for polynomial and piecewise polynomial curves and surfaces, and he has investigated both parametrically and implicitly represented geometry. Professor Goldman's current work includes research in computer aided geometric design, solid modeling, computer graphics and splines. He is the author of the book *Pyramid Algorithms: A Dynamic Programming Approach to Curves and Surfaces for Geometric Modeling*, and he currently is writing an introductory text on computer graphics. In 2005, he was awarded the John Gregory Memorial Award at the Dagstuhl Meeting on Geometric Design for his outstanding contributions in geometric modeling. Before returning to academia, Dr. Goldman worked for 10 years in industry solving problems in computer graphics, geometric modeling and computer aided design. He joined the Rice faculty in 1990.

G. Anthony Gorry. Joint Appointment. Friedkin Professor of Management and Professor of Computer Science. Ph.D. (1967) Massachusetts Institute of Technology. Professor Gorry's current research concerns the impact of information technology on organizations and society. He previously conducted research on the application of artificial intelligence in medicine and on the development of decision support systems for management. Professor Gorry directs Rice's Center for Technology in Teaching and Learning. The center is developing computing and telecommunications for sharing knowledge in schools, universities, the workplace and the home. Professor Gorry also is a director of the W.M. Keck Center for Computational Biology, a joint endeavor of Rice, Baylor College of Medicine and the University of Houston. He directs a training grant on computational biology funded by the National Library of Medicine. He is a member of the Institute of Medicine of the National Academy of Sciences and a fellow of the American College of Medical Informatics.

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Christopher M. Jermaine. Associate Professor of Computer Science. Ph.D. (2002) Georgia Institute of Technology.
Professor Jermaine's research focuses on databases, specifically approximate query processing, physical database design and data mining. He received a 2008 Alfred P. Sloan Foundation Research Fellowship, a 2007 ACM SIGMOD Best Paper award and a National Science Foundation Faculty Early Career Development Program grant in 2004.

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David B. Johnson. Professor of Computer Science and Electrical and Computer Engineering. Ph.D. (1990) Rice University.
Professor Johnson's research interests center in the areas of network protocols, operating systems and distributed systems, particularly in the interaction between these areas. His primary research focus is in the area of protocols for wireless and mobile networking, and he leads the Monarch Project (Mobile Networking Architectures) at Rice University in this area. Major directions in his research include the problems of mobile internetwork routing, ad hoc networking, mesh networking and sensor networking; his work includes protocol design and performance evaluation through both simulation and real implementation and testbed systems. Related to this research, Professor Johnson also has been active in the Internet Engineering Task Force (IETF), the principal protocol standards development organization for the Internet, for more than a decade. He is one of the principal designers of the IETF standard Mobile IP protocol for IPv4 and is the primary designer of IETF Mobile IP for IPv6. Professor Johnson currently is the chair of SIGMOBILE, the ACM Special Interest Group on Mobility of Systems, Users, Data and Computing. He received the National Science Foundation (NSF) CAREER Award in 1995.

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Lydia E. Kavraki. Noah Harding Professor of Computer Science and Bioengineering. Ph.D. (1995) Stanford University.
Professor Kavraki designs algorithms and system architectures to solve complex problems arising in the physical world. One main area of application is robotics with emphasis on robot motion planning, assembly planning, micromanipulation and flexible object manipulation. Another main focus area is computational structural biology and bioinformatics. Kavraki's interests include computer-assisted drug design, the modeling of biomolecular interactions, the large-scale functional annotation of proteins and

relations of the above with systems biology. Kavraki holds a joint appointment at the Department of Structural and Computational Biology and Molecular Biophysics at Baylor College of Medicine in Houston. She is the recipient of the Grace Murray Hopper Award from the Association for Computing Machinery for her technical contributions. Kavraki also has received the NSF CAREER award, a Sloan Fellowship, the Early Academic Career Award from the IEEE Society on Robotics and Automation, recognition as a top young investigator from the MIT *Technology Review Magazine* and the Duncan Award for excellence in research and teaching from Rice University. Professor Kavraki is a fellow of the American Institute for Medical and Biological Engineering, a fellow of the World Technology Network and a fellow of the Association for the Advancement of Artificial Intelligence.

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Edward W. Knightly. Joint Appointment. Professor of Electrical and Computer Engineering and Computer Science. Ph.D. (1996) University of California at Berkeley. Professor Knightly's current research interests are in the areas of mobile and wireless networks and high-performance and denial-of-service resilient protocol design. His research group designs, models, implements and performs field trials of next-generation protocols. It currently is developing a first-of-its-kind hardware platform for clean-slate design of high-performance multihop wireless protocols. It has deployed and is now operating and performing protocol and measurement studies of a mesh network in a Houston low-income neighborhood. Professor Knightly received the NSF CAREER award in 1997 and the Sloan Fellowship in 2001. He is a senior member of the IEEE. He serves on the editorial board of multiple journals, including IEEE/ACM *Transactions on Networking*, and has chaired numerous conferences including IEEE INFOCOM.

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Yehia Massoud. Joint Appointment. Associate Professor of Electrical and Computer Engineering and Computer Science. Ph.D. (1999) Massachusetts Institute of Technology. Professor Massoud is interested in the modeling and design automation of high-performance and future Systems-on-Chip as well as applications of electromagnetics to nanotechnology and biotechnology. Before joining Rice University in 2003, he was a member of the technical staff at the Advanced Technology Group at Synopsys, Inc. in Mountain View, California. He received the NSF CAREER Award for 2004.

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James McLurkin. Assistant Professor of Computer Science. Ph.D. (2008) Massachusetts Institute of Technology. Professor McLurkin's research focuses on distributed algorithms for multirobot systems, with a focus on both algorithm and system design. His long-term goals are to understand computation on multirobot systems in theory and practice. He was the 2003 recipient of the Lemelson-MIT student prize for invention. He was named a Best and Brightest Under 40 by Black Enterprise magazine in 2003 and was featured on MSNBC's CosmicLog as a History-maker in Science in 2010.

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John Mellor-Crummey. Professor of Computer Science and Electrical and Computer Engineering. Ph.D. (1989) University of Rochester. Professor Mellor-Crummey's research focuses on software technology for high-performance computing with a particular emphasis on parallel computing. His current work includes data-parallel compiler technology, compiler and run-time technology for high performance scientific computing, tools for application performance analysis, "telescoping" compiler technology for domain-specific languages and black-box application performance modeling. Past work has included developing techniques for execution replay of parallel programs, efficient software synchronization algorithms for shared-memory multiprocessors and a system for efficiently detecting data races in executions of shared-memory programs using a combination of compile-time and run-time support.

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Luay K. Nakhleh. Assistant Professor of Computer Science. Ph.D. (2004) University of Texas at Austin. Professor Nakhleh's research interests fall into two categories. In the area of bioinformatics and computational biology, Professor Nakhleh works on reticulate evolution, multilocus genotype-phenotype inference and biological signaling networks. In the area of historical linguistics, Professor Nakhleh works on developing computational methods for reconstructing the evolution of natural languages and detecting borrowing among them. Professor Nakhleh is a recipient of a DOE Career Award.

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T. S. Eugene Ng. Assistant Professor of Computer Science. Ph.D. (2003) Carnegie Mellon University. Professor Ng's research interest lies in developing network models, network architectures and holistic networked systems that enable a robust and manageable global networked infrastructure for the future. The Internet is a critical global infrastructure and, unfortunately, also one of the most complex and fragile systems. To address the challenges imposed by the Internet's complexity, Professor Ng is developing models of the global network structure that can be leveraged to design more effective network control logic and large-scale distributed systems, network control architectures and network management systems that facilitate the coordination between network control logics and enforce network-wide management objectives, and end system mechanisms to improve end-to-end performance during network failure and recovery. Professor Ng is a recipient of an NSF CAREER award, and he received a 2009 Alfred P. Sloan Foundation Research Fellowship.

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Krishna Palem. Ken and Audrey Kennedy Professor in Computer Science and in Electical and Computer Engineering. Ph.D. (1986) University of Texas at Austin. Professor Palem's research career has ranged from work in algorithms through embedded systems, influenced by, and influencing compiler optimizations of programming languages driven by the need for technologies aimed at realizing scaleable systems. He led one of the three groups that co-developed TRIMARAN, an influential research complier and architecture simulation framework, for processors with a high degree of instruction level parallelism. In this framework, he has worked on compiler-driven design of application-specific hardware, laying the foundations for compiler-driven automation in the field now referred to as hardware–software co-design. His student Suren Talla's dissertation in this area won the Janet Fabri prize for an outstanding dissertation. In addition to this theme, his current research focuses on sustainable nanoelectronics: the design and implementation of hardware–software systems that

exploit uncertainty at the hardware level and base the design of a computing architecture on the value the end user places on the information being computed—the higher the value, the greater the cost. Based on evidence demonstrated collaboratively with his current Ph.D. students, this approach has led to "probabilistic silicon" (or PCMOS), which has the potential to yield dramatic improvements in the efficiency, cost and the power consumption of embedded computing systems in the future. Notable grants, contracts and awards from DARPA, Hewlett Packard and Intel have supported his work.

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Scott Rixner. Associate Professor of Computer Science and Electrical and Computer Engineering. Ph.D. (2000) Massachusetts Institute of Technology. Professor Rixner is interested in the interactions between operating systems and computer systems architectures, including research in the areas of network server architecture, memory systems architecture and embedded systems architecture. Professor Rixner's current research aims to develop new network subsystem hardware and software architectures by considering all levels of the system, including the operating system's network stack, network device drivers, the I/O system and network interface hardware. This will result in a fundamental restructuring of the hardware and software interfaces within the network subsystem of future computer systems. Such a restructuring is necessary to close the widening gap between the networking performance of traditional computer systems architectures and the ever increasing demand for network communication. Professor Rixner received a NSF CAREER award to pursue this project.

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Vivek Sarkar. E.D. Butcher Professor of Computer Science and Chair of the Department of Computer Science. Ph.D. (1987) Stanford University. Professor Sarkar conducts research in programming languages, program analysis, compiler optimizations and virtual machines for high performance computer systems. His past projects include the X10 programming language, the Jikes Research Virtual Machine for the Java language, the ASTI optimizer used in IBM's XL Fortran product compilers, the PTRAN automatic parallelization system and profile-directed partitioning and scheduling of Sisal programs. He is in the process of starting up three new research projects at Rice: implicit parallelism for mainstream multicore systems, optimization of high-productivity languages for high-end peta-scale systems and foundations of program analysis for parallel software. Professor Sarkar became a member of the IBM Academy of Technology in 1995. He was designated an ACM Distinguished Scientist in 2006 and named an ACM Fellow in 2008.

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Devika Subramanian. Professor of Computer Science and Electrical and Computer Engineering. Ph.D. (1989) Stanford University. Professor Subramanian's research is in the area of artificial intelligence and statistical machine learning. It is aimed at the design and analysis of resource-bounded systems that adapt and learn from experience. Her work centers on several applications designed to push the science of adaptive systems. Her current projects are in four main areas. In the area of computational biology, she is reverse-engineering metabolic networks from gene expression data in cancer cells, reconstructing signal transduction networks in granulocyte differentiation in AML and CML from flow cytometry data and identifying multilocus genetic markers from genotype–phenotype association data. In the area of conflict forecasting, Professor Subramanian is developing a system for predicting outbreaks of conflict in the Middle East based on temporal analysis of newswire stories from the region. In the area of adaptive compilers, she is designing learning algorithms that help compilers customize their optimization strategies to specific programs. In the area of understanding human learning on complex visual-motor tasks, she is building predictive computational models in real-time, based on eye-tracker and EEG data. Her work has been supported by the NSF, Gulf Coast Consortium, Office of Naval Research and National Institutes of Health. Professor Subramanian has won teaching awards at Stanford (the George Forsythe teaching prize), at Cornell (two Merrill Presidential Awards) and at Rice (the Julia Mile Chance Prize).

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James M. Tour. Joint Appointment. T.T. and W.F. Chao Professor of Chemistry, Professor of Mechanical Engineering and Materials Science and Computer Science. Ph.D. (1986) Purdue University. Professor Tour's scientific research areas include molecular electronics, chemical self-assembly, conjugated oligomers, electroactive polymers, combinatorial routes to precise oligomers, polymeric sensors, flame retarding polymer additives, carbon nanotube modification and composite formation, synthesis of molecular motors and nanocars, use of the NanoKids concept for K–12 education in nanoscale science and methods for retarding chemical terrorist attacks. Professor Tour is author of *Molecular Electronics*, which discusses paradigms for programming of disordered nanoscale arrays that are constructed in his laboratory. Professor Tour received the Alan Berman Research Publication Award from the Department of the Navy (2006), the Southern Chemist of the Year Award from the American Chemical Society (2005) and the Honda Innovation Award—NanoCars (2005). Dr. Tour is a co-founder of Molecular Electronics Corp. and NanoComposites, Inc. He has won several national awards including the NSF Presidential Young Investigator Award in Polymer Chemistry and the Office of Naval Research Young Investigator Award in Polymer Chemistry. Dr. Tour has more than 270 research publications and 20 patents, and he is the director of the Carbon Nanotechnology Laboratory at Rice.

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Moshe Y. Vardi. Karen Ostrum George Professor in Computational Engineering. Ph.D. (1981) the Hebrew University in Jerusalem. Professor Vardi's research interests focus on logical issues in computer science. In database theory, Professor Vardi's focus is on optimization of queries on semistructured data with an aim of delineating between decidable and undecidable optimization problems and developing techniques for automated optimization. Finite-model theory is the study of the logical properties of finite mathematical structures. He is exploring its connections to several areas of computer science, such as complexity theory and artificial intelligence. In knowledge theory, he is developing a theory of knowledge-based agents, i.e., agents that act on the basis of their knowledge. This theory has applications to the design and analysis of multiagent systems, such as distributed computer systems or teams of cooperating robots. In program specification and verification, he is studying techniques for automated verification of reactive programs, i.e., programs that continually interact with

their environment. His recent focus is on automated synthesis of such programs. Professor Vardi also is director of the Computer and Information Technology Institute at Rice. He is a fellow of the Association for Computing Machinery and a member of the U.S. National Academy of Engineering.

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Peter J. Varman. Joint Appointment. Professor of Electrical and Computer Engineering and Computer Science. Ph.D. (1983) University of Texas at Austin. Professor Varman's research interests are parallel algorithms and architectures, parallel I/O and the performance of database systems. His research in parallel computing is directed toward understanding the impact of the memory hierarchy (processor caches to I/O) on the performance of parallel programs. His research deals with the design, analysis and performance evaluation of parallel algorithms with special emphasis on non-numerical problems like sorting and searching, graph theory and computational geometry.

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Dan S. Wallach. Professor of Computer Science and Electrical and Computer Engineering. Ph.D. (1998) Princeton University. Professor Wallach's research involves computer security and the issues of building secure and robust software systems for the Internet, including security in peer-to-peer systems, as well as security in electronic voting systems. Wallach also is associate director of NSF's A Center for Correct, Usable, Reliable, Auditable and Transparent Elections (ACCURATE). A collaborative project involving six institutions, ACCURATE is investigating software architectures, tamper-resistant hardware, cryptographic protocols and verification systems as applied to electronic voting systems. Wallach has testified about security issues before government bodies in the United States, Mexico and the European Union. Professor Wallach is a recipient of an NSF CAREER Award.

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Joe Warren. Professor of Computer Science. Ph.D. (1986) Cornell University.

Professor Warren's research interests focus on the application of computers to geometric problems and are centered around the general problem of representing geometric shapes. His specific areas of interest include geometric modeling, or the construction and manipulation of data structures for representing geometric objects; and computational geometry, or using algorithms to solve geometric problems. He is particularly interested in algorithms for solving and manipulating systems of polynomial equations. Professor Warren's approach is to develop interesting mathematical methods for representing shape that can be used in practical applications. Topics he has worked on include modeling with piecewise algebraic surfaces, methods for finite-element mesh generation, properties of rational surfaces with base points and visualization of multivariate data. Warren's current research focuses on two related topics: subdivision, a method for concisely representing shape, and wavelets, a method for building an associated hierarchy of shapes. He is particularly interested in extending the theory associated with both to handle irregular geometry.

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Lin Zhong. Joint Appointment. Assistant Professor of Electrical and Computer Engineering and Computer Science. Ph.D. (2005) Princeton University. Professor Zhong is interested in design automation of digital systems and mobile and embedded computing as well as their applications in digital healthcare. His recent research focuses on energy efficiency, human factors and computing design using emerging nanometer devices.

FACILITIES

Anne and Charles Duncan Hall is home to several departments and institutes, including the Departments of Computer Science, Computational and Applied Mathematics and Statistics, part of the Department of Electrical and Computer Engineering, the Ken Kennedy Institute for Information Technology (K^2I), the Center for Value of Information-based Sustainable Embedded Nanocomputing (VISEN), the Center for Multimedia Communication (CMC) and the Center for Excellence and Equity in Education (CEEE). The building, designed to foster multidisciplinary research collaboration, contains state-of-the-art classrooms, offices, computer laboratories, conference rooms, a large auditorium and an atrium for social gatherings. These spaces are ideal for communication, education and collaboration. Graduate students have access to excellent tools, such as several multi-TeraFLOP, shared research computing clusters from Appro, Cray, HP and Sun. The Cray XD1™ cluster consists of 28 fully populated (336 Dual-Core AMD Opteron™ processors) XD1 chassis with infiniband interconnect, a large-scale Sun "Computer Condominium" cluster with quad-core Intel® Harpertwon processors interconnected using gigabit Ethernet. Also, researchers will soon have access to a large system from Appro with infiniband interconnect and Intel® Nehalem processors. In addition to the computational systems, researchers have access to multi-terabytes of high-performance storage.

RESEARCH CENTERS AND OTHER INSTITUTES

K^2I: Ken Kennedy Institute for Information Technology

The Ken Kennedy Institute for Information Technology (K^2I) at Rice University is a research institute composed of faculty, research scientists, staff and graduate students dedicated to the advancement of applied interdisciplinary research in the areas of computer and information technology. K^2I's goals are to support, foster and develop research and education across a wide area of computing technologies, computational science and engineering, and information processing and theory. Approximately 130 faculty members at Rice are affiliated with the institute. These faculty members represent close to 20 percent of Rice's total faculty and represent departments and academic disciplines from across campus; the majority of which are affiliated with the Schools of Engineering and Natural Sciences. Major research thrusts are organized as interdisciplinary research centers and groups affiliated with the institute. Today, K^2I is the home for several such centers and research groups engaged in research spanning a broad range in computational science and engineering.

VISEN: Value of Information-based Sustainable Embedded Nanocomputing

With the many hurdles facing Moore's law at the heart of the electronics and information technology industries — the maxim that states that the sizes of transistors will halve every two years — sustaining these industries past the next decade is viewed as a serious challenge. Increasingly, electronics and computing

devices are used in contexts where human perception is the primary interface to the (embedded) computing engine — cell phones, bioprosthetics, sensors, signal processing and search technologies, to name a few. The center's guiding philosophy is to take advantage of limitations in our ability to perceive quality of information from a computer, and when we do perceive it, our willingness to tolerate it if, in return, we are able to have access to devices with much lower cost, energy consumption, heat dissipation and an ability to cope with fluctuations in the "quality" of the transistors. Thus, value of information will be used to guide the design of computing devices, while treating many of the impediments as "features" modeled using probability and randomness, with the goal of sustaining the explosive growth of embedded computing in the nanoscale regime and increasing the energy footprint of computing systems to make them more friendly on a global scale.

HOW TO APPLY

Please see www.compsci.rice.edu/grads for detailed instructions on applying for graduate admission.

- Completed application forms, transcripts of grades, and three letters of recommendation are required.
- An application fee of $70 must be submitted with the application.
- The Graduate Record Examination (GRE) should be taken early to ensure transmittal of scores prior to the application deadline. Arrangements to take the GRE may be made directly with:

  Educational Testing Service
  20 Nassau Street
  Princeton, New Jersey 08540

- Foreign students whose language is not English must take the TOEFL examination and score at least 600 on the paper-based test, 250 on the computerized test and 90 on the Internet-based test.

SUBMITTING YOUR APPLICATION

You may apply online at http://gradapps.cs.rice.edu/ or log in to the Department of Computer Science at www. compsci.rice.edu/academics and go to the Application Information site. The application fee of $70 can be paid online either by credit card or electronic check. All applications are submitted electronically.

*Applicants who have graduated from Rice University should contact the Department of Computer Science for special application fee instructions.

TEACHING

Ph.D. students are expected to assist in the teaching and administration of courses. The typical workload is about 10 hours per week, averaged over the semester. Graduate students normally serve as a teaching assistant in five courses.

PAYING FOR GRADUATE SCHOOL

Graduate students enrolled in thesis degree programs can be supported from a number of sources, including departmental funds, research grants, and external fellowships. This support typically includes a monthly stipend and graduate tuition.

- Ph.D. program: First-year Ph.D. students are supported by the department. In subsequent years, students are supported from research funds—typically, their advisor's grants and contracts. Ph.D. students also are encouraged to apply for external fellowships.
- M.S. program: Students admitted to the Master of Science program can be supported by their research advisor. Such support is arranged directly with the advisor.
- The M.C.S. program is not a research degree program. The student's primary responsibility is taking classes. Thus, students in the M.C.S. program are not supported from research grants and contracts.

VISIT US

We encourage you to visit Rice University for a firsthand look at the Department of Computer Science, the beautiful tree-lined campus, and the vibrant city of Houston. Please visit www.compsci.rice.edu/visit for information on coming to campus. If you apply and are admitted, you will be invited to visit the campus at a later date at departmental expense. During your time here, you will visit with faculty and current graduate students, who will tell you all you need to know about the graduate experience at Rice. In the meantime, please feel free to contact the department with any questions you may have.

ABOUT RICE AND HOUSTON

Rice is a leading American research university—small, private and highly selective—distinguished by a collaborative, interdisciplinary culture and a global perspective. Only a few miles from downtown Houston, it occupies an architecturally distinctive, 285-acre campus shaded by nearly 4,000 trees. State-of-the-art facilities and laboratories, internationally renowned centers and institutes and one of the country's largest endowments support an ideal learning and living environment.

The university attracts a diverse group of highly talented students and faculty with outstanding graduate and professional programs in the humanities, social sciences, natural sciences, engineering, architecture, music and business. With just 2,374 graduate students and 3,708 undergraduates, it offers an unusual opportunity to forge close relationships with eminent faculty scholars and researchers and the option to tailor graduate programs to specific interests.

Houston offers all the expected educational, cultural and commercial advantages of a large urban center, and more. It's home of the Texas Medical Center, the largest concentration of medical schools, hospitals and research facilities in the world, as well as several other universities. Rice has cooperative programs with the University of Houston, Baylor College of Medicine, the University of Texas Health Science Center and Texas Southern University. Houston is one of the few U.S. cities with resident companies in all four major performing arts—drama, ballet, opera and symphony. It also boasts a museum district featuring exhibits of national and international prominence.

As urban as it is, Houston also is a surprisingly green city. Houstonians enjoy the outdoors in more than 300 municipal parks and 120 open spaces, and many frequent the beach at Galveston Island, only a 45-minute drive away. Other short trips include Austin, the state's capital, and historic San Antonio, both of which are a little more than three hours away.

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