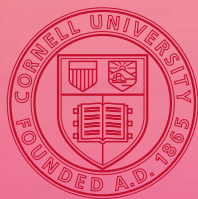


CIS



Cornell University

2005

Annual Report

COMPUTING
AND
INFORMATION
SCIENCE

Research and
Education

Knowledge + Liberal Education =

C o n t e n t s

Wisdom

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School of Industrial and Labor Relations

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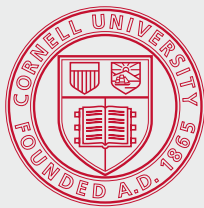
College of Architecture, Art and Planning

College of Engineering

College of Arts and Sciences

College of Agriculture and Life Sciences

Graduate School



Cornell University

Law School

Weill Medical College

School of Hotel Administration

CIS

Weaving together experts from
disciplines throughout Cornell University
with an atmosphere of collegiality.

Department of Computer Science

Computational Biology

Computational Science and Engineering

Cornell Theory Center

Department of Statistical Science

Information Science Program

Program of Computer Graphics

Message from the Dean of the Faculty of Computing and Information Science

This was a year of growth for the Faculty of Computing and Information Science. Last July, we welcomed the Cornell Theory Center (CTC) and the Program of Computer Graphics (PCG) into CIS. At the age of five, our mission to bring together experts in computing with researchers and scholars in a variety of disciplines is better defined. CIS will continue to grow, as plans for Cornell's Department of Statistical Science to join us on July 1, 2005 have been finalized.

Encouraged by Provost Biddy Martin and the Vice President for Research Bob Richardson to integrate these units and guided by the steady hand of Senior Associate Dean Juris Hartmanis during the process, the transition was exceptionally smooth. We owe CTC Director Thomas Coleman, now Dean of the Faculty of Mathematics at Waterloo, a great deal for building a tremendously strong CTC. Likewise, we owe Professor Don Greenberg, Director of the Program of Computer Graphics for his outstanding leadership over the years creating this distinguished unit and guiding CIS efforts in digital arts.

Each unit brings a unique strength to CIS, and the newest members illustrate this well. CIS and CTC share common, cross-cutting goals for empowering scientists and researchers with the technical expertise and computational resources they need to realize their objectives.

CTC's experience with high-performance computing, its unwavering commitment to bring HPC to new classes of users, and its ability to store and manage terabytes of data all support CIS's efforts to facilitate partnerships between researchers and computational experts.

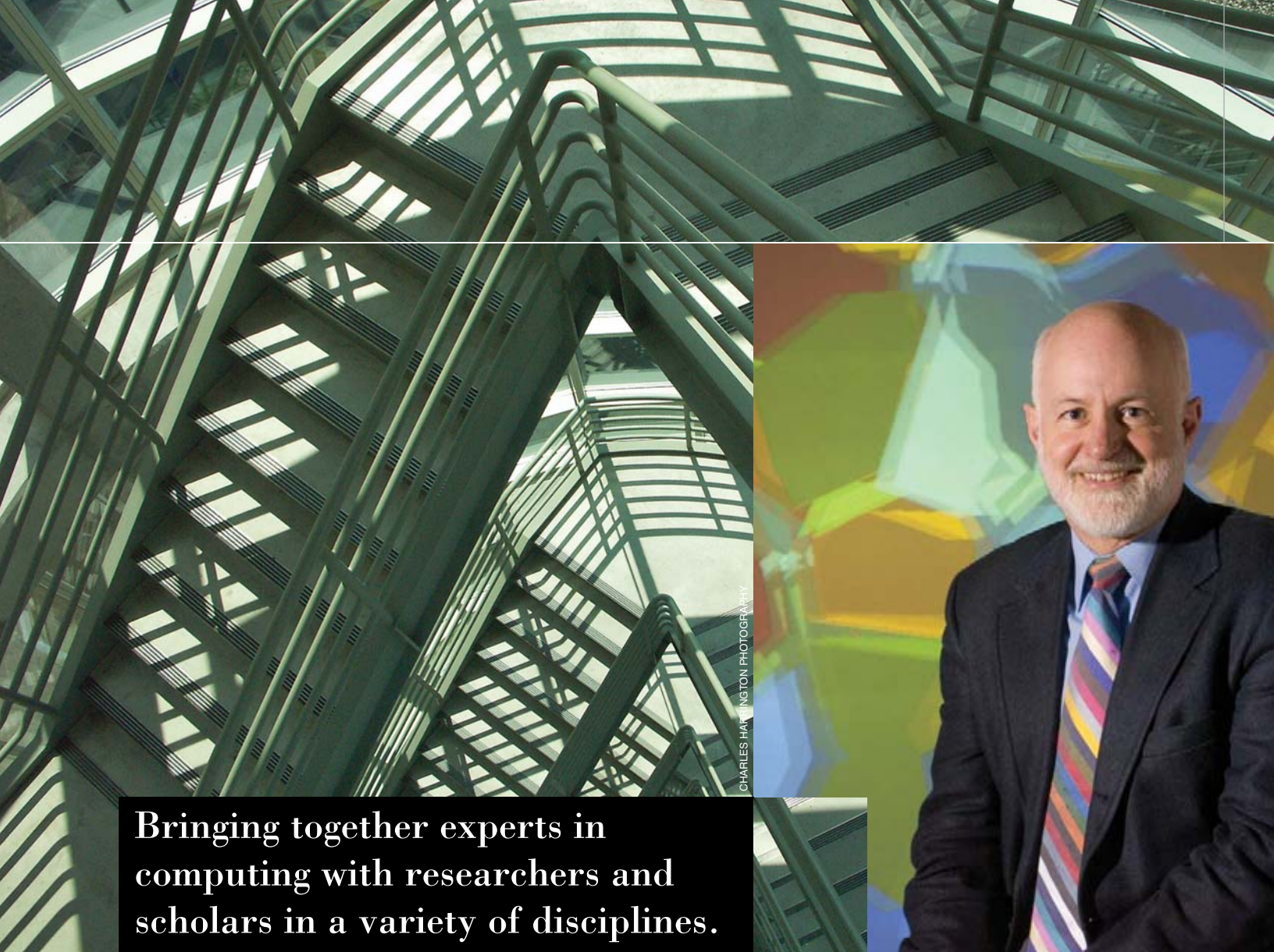
The range of CTC's research partnerships is illustrated by a \$1.8 million award to Computer Science from the National Science Foundation's CISE Directorate. The grant is to develop an information access and analysis system maintained by CTC that will meet the data-intensive needs of three projects—The Structure and Evolution of the World Wide Web, Large Scale Astronomical Surveys using the Arecibo Radiotelescope, and Physically Accurate Rendering in Computer Graphics. All will impact the way we mine and archive data, how we explore the universe, and how we digitally render objects.

Just as CIS and CTC share common goals, so do CIS and PCG. Founded in 1973, the program has distinguished itself as a leader in interdis-

plinary teaching and graphics research. CIS and PCG are committed to strengthening the foundations of computer graphics and providing a cutting edge educational experience for Cornell students. Five graduates of the program have been recognized with Oscars for their work in digital rendering. PCG's recent focus on animation and rendering will strengthen Cornell's presence in the digital arts and complement the new *Computing in the Arts* concentration in the College of Arts and Sciences. CIS's digital music program in the College of Arts and Sciences will strengthen digital arts further. Discussions are underway to hire a professor who serves both the music department and CIS. Donor support for this position was attracted by Pulitzer prize-winning composer Steven Stuckey of the Music Department.

As you can see from the chair's message, the Department of Computer Science has had an exceptional year. The Salton Lecture Series has brought several distinguished computer scientists to Cornell. The Department continued to be a major driver for CIS initiatives in Computational Biology through its role in attracting Adam Siepel to a position with CIS and the Department of Biological Statistics and Computational Biology. In addition, recruiting Bobby Kleinberg to the CS department increases Cornell's considerable strength in network theory which currently includes Jon Kleinberg, Eva Tardos and Steve Stogatz as well. This area gives Cornell an excellent base for future recruiting in systems biology, a goal for which we have support from the New Life Sciences Initiative.

The Information Science Program graduated its first class of five students in a special, intimate ceremony. With next year's class expected to number more than 20, we anticipate that the ceremony will be larger, but we guarantee that it will be special. The program recently was awarded a three-year grant from the Institute for Social Sciences to study social networks. This project is a telling example of the interdisciplinary character of Information Science. The Principal Investigator is Michael Macy, chair of the Sociology department and member of the graduate field of Information Science. The other investigators are all in this graduate field and include Geri Gay, chair of the Communication department, Daniel Huttenlocher of CS, and Jon Kleinberg of CS.



CHARLES HAWKINGTON PHOTOGRAPHY

Bringing together experts in computing with researchers and scholars in a variety of disciplines.

Robert L. Contstable

The Computational Biology program welcomed the state's approval of two new degrees, one at the Ph.D. level and the other at the master's level. Students will make use of CTC's Computational Biology Service Unit, one focal point of the program's graduate studies.

In 2004-2005, a minor graduate field in Computational Science and Engineering (CSE) was defined. Distinguished because of its connections to CTC's staff and computational resources, the minor graduate field in CSE will be presented to Cornell's trustees in October. CIS Associate Dean John Guckenheimer of the Mathematics department and Steve Vavasis of CS led this effort. Our actions this year were again guided by the CIS Council. The Council approved plans to promote members of CTC's leadership to new positions. In addition to serving as CTC's executive director, Linda Callahan has been named the

director of communications and outreach for CIS. David Lifka, CTC's chief technical officer, was promoted to the director of high-performance systems and innovative computing at CTC. The Council has approved our recruiting plans with music and statistical sciences. And, the Council helped Provost Martin create the Task Force on *Wisdom in the Age of Digital Information*, which is chaired by Professor Dan Huttenlocher.

In the spring the University leadership approved our plans to construct a CIS information campus with a signature building to house CIS units. Ken Birman heads the CIS Building Committee that will continue planning this \$150 million effort. Next year will be exciting on that basis alone.

Message from the Chair of the Department of Computer Science



CHARLES HARRINGTON PHOTOGRAPHY

Computer scientists have a penchant for one-liners.

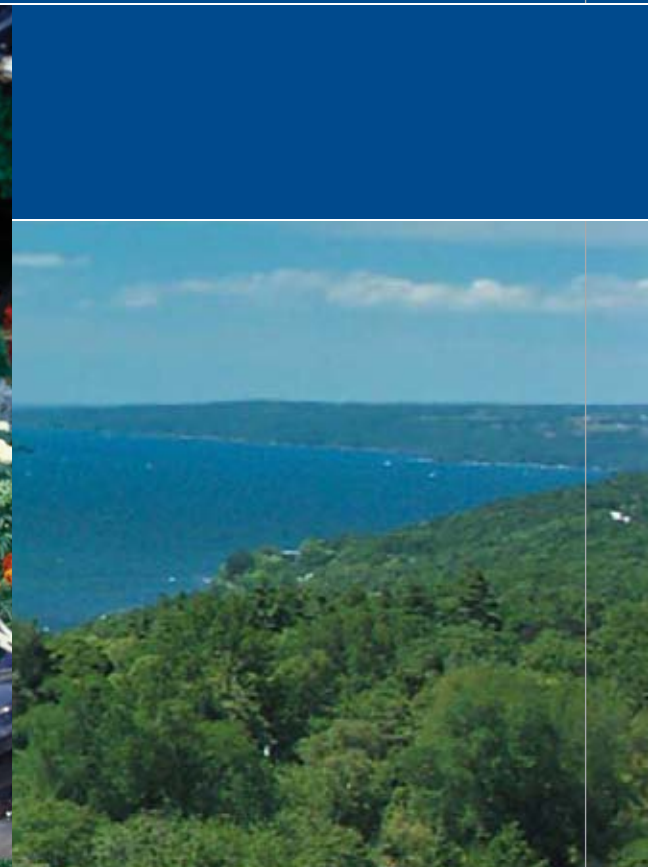
We love expressive programming languages that enable us to accomplish in a single instruction what might otherwise take hundreds of lines of code. Our cryptic, mathematical inclinations show up in book titles (Algorithms + Data Structures = Programs), and how we describe paradigm shifts (Biology = Chemistry + Information). “Equation-proverbs” like these clear a space for us to think about connections and deeper issues.

Simplify. Simplify. If an idea saves time, makes sense and fits on a post-it, then it’s OK by me! A while ago the faculty in Engineering was reconsidering college requirements and the discussion turned into a debate about discrete versus continuous mathematics. I pointed out that a computer scientist might use number theory and logic to tighten the security of a database in the same way that a materials engineer might use differential equations and deformation theory to harden a physical lock.

With ridiculous over-confidence I thought

that this analogy would nail the argument for increased flexibility in the core math requirements. But then a colleague from another department chimed in with a great one-liner, “*How can you be against calculus—it’s all about change?*” The double meaning of this good-humored observation pushed the debate to a higher plane and away from the drone of yet another low-level syllabus discussion. We quickly reached consensus; the requirements were relaxed in a way that preserved the great traditions of Cornell Engineering and accommodated fields like CS.

While on the topic of one-liners, here are a couple of no-brainers. *Nothing brightens the landscape as much as a well-deserved promotion.* Johannes Gehrke and Andrew Myers are now associate professors with tenure. Jon Kleinberg and Bart Selman have become full professors. *Nothing changes the landscape as much as a faculty departure or arrival.* Tom Coleman has moved to Waterloo but has left behind a legacy of great research and a blue print for continued

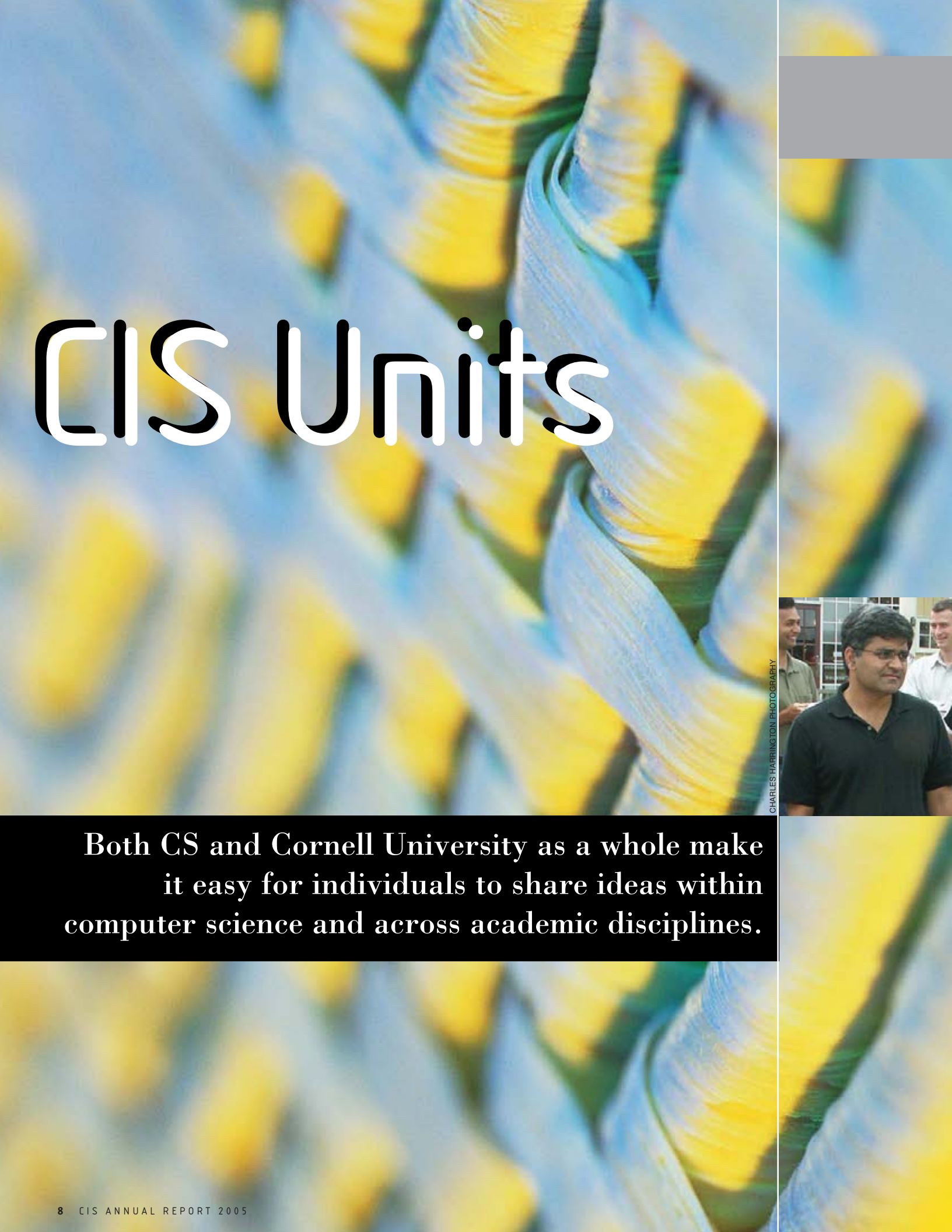


Charles Van Loan

innovation through the Theory Center. Bobby Kleinberg arrives (after his post-doc) with a research agenda that will multiply our strengths in a host of important areas. *Nothing depicts the landscape as well as a successful research proposal.* There were many, but the systems group kicked it up a notch with the landing of an NSF Science and Technology Center that will focus on ubiquitous secure technologies. This is a joint effort involving colleagues in ECE and several other universities. Fred B. Schneider will serve as Chief Scientist. *Nothing marks the landscape as well as a cogent textbook.* Released this year are *Reliable Systems* by Ken Birman and *Algorithm Design* by Jon Kleinberg and Eva Tardos. These volumes will be guiding students and researchers over the terrain well into the future.

So what's up for 2005-6? For sure we'll be thinking about ex-President Lehman and the challenging questions that he left behind on campus, especially, "What do we mean by wisdom in the age of digital information?" The

four-rung step ladder data-information-knowledge-wisdom is relevant to the query and provides a context for computer science. Researchers in data mining and artificial intelligence have a lot to say about stepping up from data to information and from information to knowledge. Logic, statistics, databases, and machine learning are involved. However, different supporting technologies are required to make "top rung" at our Miramar. Rapid access to a terabyte database does not equate to wisdom and computer simulations do not automatically resonate with the truth. Checks and balances are needed. For CS, the step to wisdom in the information age requires a pledge of allegiance to the scientific method and a commitment to a teaching agenda that connects us to colleagues and students who think differently. A one-liner sums up our responsibilities: **Knowledge + Liberal Education = Wisdom.** And by "wisdom" I mean "collective wisdom", my favorite kind.



CIS Units

Both CS and Cornell University as a whole make it easy for individuals to share ideas within computer science and across academic disciplines.



CHARLES HARRINGTON PHOTOGRAPHY

CIS Departments

The Department of Computer Science

In recent years the department has complemented its strength in the essential core areas (artificial intelligence, programming languages, scientific computing, systems, and theory) with new commitments to databases, graphics, machine learning, and natural language processing. Cornell CS is widely known for its collegiality and its ability to move rapidly into new interdisciplinary fields such as information science and computational biology. The department's challenge is to be simultaneously strong in the core areas of computer science while being a major force in emerging and interdisciplinary areas that are being developed within CIS. The high-level research goals are

- To help science, engineering, and business by making it possible for those communities to (a) interpret unprecedented volumes of data



and (b) build models and simulations to cope with exceedingly complex problems.

- To design and build the efficient, scalable, secure, and reliable systems that will form the foundation of our information-based economy and national infrastructure.
- To develop algorithms and languages that extend and automate the human capacity to visualize, reason, and compute.
- To advance the theoretical foundations of computer science with new mathematics that support the analysis of complex systems and computational processes.

This broad agenda is made possible by faculty whose research interests radiate in many directions and whose commitment to teaching is deep. The CS major in the College of Engineering and the CS major in the College of

Arts and Sciences emphasize breadth across the field and encourage students to develop a strong expertise in a second area. The one-year Master of Engineering Program gives students the opportunity to take a range of forefront courses and to develop skills that enhance their marketability. The Ph.D. program is highly ranked and over the past forty years has graduated many students who have gone on to influence the course of CS research in the world.

For more information, see
<http://www.cs.cornell.edu>

The Department of Statistical Science

Statisticians work at the interface of mathematics, computing, and data analysis. Statistics is, at its core, all about representing information. Notions like expectation and variance are meant to provide compact descriptions of large amounts of data. Large amounts of data are the stock in trade of many disciplines, so statisticians often are involved in analyzing data generated by research in other disciplines.

In biology, the role of statistics is so significant, in problems ranging from the design of clinical experiments to the analysis of genetic, genomic, and proteomic data, that a whole new field of biostatistics has emerged. Because computer science also has great interest in problems of information representation, there is a great deal of work at the interface of computer science and statistics, particularly on topics such as machine learning (automatic classification of data) and data mining (finding interesting patterns in large datasets)—indeed, we seem to be witnessing the beginning of a field of computational statistics.

The Department of Statistical Science (DSS) offers a Master of Professional Studies (MPS) in Applied Statistics degree and a Doctor of Philosophy (M.S./Ph.D.) degree in statistics. The academic and research programs at DSS take advantage of Cornell University's extensive resources, drawing from many colleges and research groups.

For more information, see
<http://www.stat.cornell.edu>



DEDE HATCH

CIS Programs



Program of Computer Graphics

Computer graphics is a rapidly evolving field that has had significant impact on most scientific, artistic, and engineering fields, and graphics is today the most common and efficient means of man-machine communication. At Cornell, research and teaching in computer graphics are centered in the CS department and the closely affiliated Program of Computer Graphics (PCG), one of the world's leading computer graphics laboratories and a dominant force in the international computer graphics community for more than thirty years.

The field of computer graphics relates to the broader area of Digital Arts and Graphics, a new CIS program area that involves computer graphics researchers, architects, artists, art historians, city planners, and information scientists. This program will explore the interaction of graphics and arts by considering the technical aspects of digital graphics, psychological aspects of vision and perception, and the creation of art in a time of digital reproduction.

Research in graphics requires a multidisciplinary team with knowledge in algorithms, systems, numerical simulation, machine vision, software and hardware engineering, physics, optics, and perception psychology. The PCG is particularly famous for its work on realistic rendering—simulating environments that are physically accurate and perceptually indistinguishable from real world scenes. Current graphics research at Cornell includes realistic interactive rendering, advanced material modeling, human visual perception in graphics, modeling complex scenes, image-based modeling and rendering, animation, and display technology.

Left to right: "Temple", from Lightcuts: A Scalable Approach to Illumination (Walter, et al.); Program of Computer Graphics Director Don Greenberg; Ascaris hemoglobin, courtesy of Ron Elber; Human-computer Interaction Group Director Geri Gay with students.

Information Science Program

Information Science is an interdisciplinary program within CIS. It brings together faculty, researchers and students who share an interest in studying digital information at the boundary between computer science and the social sciences.

Information Science examines information systems in their social, cultural, economic, historical, legal, and political contexts. Computer science is an important part of the program, but the emphasis is on systems and their use, rather than on the technologies that underlie them. The academic programs are divided into three streams: Information Systems draws from Computer Science and Operations Research; Human Computer Interaction from Communication, Psychology, and Cognitive Studies; Social Studies of Computing from Science & Technology Studies, Law, and Economics, and many others.

The program offers a Ph.D. and the first group of students entered in fall 2004. For undergraduates, majors in Information Science are offered in Arts & Sciences (A&S) and the College of Agriculture & Life Sciences (CALS). In Engineering, Information Science is one of the specializations in the major in Information Science,

Systems, and Technology (ISST). All undergraduate colleges offer minors or concentrations in Information Science.

The Information Science program is home to several large research groups, including the Human-Computer Interaction group, digital libraries research, and the ePrint arXiv.

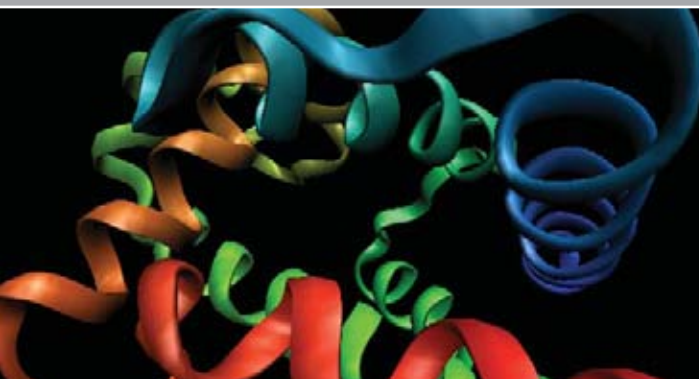
For further information see:
<http://www.infosci.cornell.edu/>

Computational Biology

Computation has become essential to biological research. Genomic databases, protein structure databanks, magnetic resonance images of the human brain, and remote sensing data on landscapes contain unprecedented amounts of detailed information that are transforming almost all of biology. Complex patterns, structure, and interactions raise fundamental and fascinating questions that can only be addressed using computational methods, and computational biologists are creating new tools to analyze these new sources of data.

More than fifty Cornell professors in six university colleges, including the Weill Medical College in New York City, are involved in computational biology. They tend to be quantitatively-oriented biologists,





biophysicists, doctors and medical researchers, mechanical engineers and others, and they are looking at everything from the genetic differences between humans and chimpanzees to how protein chains “fold” into three-dimensional structures to how hearts pump. A new Graduate Field of Computational Biology, established in 2005, provides an academic structure that facilitates interdisciplinary training in this broad area.

Problems investigated by computational biologists span a wide spectrum, including:

- the genetics of disease susceptibility
- comparing entire DNA genomes to uncover the secrets of evolution
- using protein structures to design new therapeutic drugs
- mathematical modeling of cellular signaling networks
- predicting how ecosystems will respond to climate change
- designing recovery plans for endangered species.
- animal behavior and ecology
- cognitive psychology and neurobiology
- modeling the spread of diseases

Research at Cornell in these areas usually involves interdepartmental collaborations to take advantage of Cornell’s great breadth in the biological sciences and strength in computer science, mathematics and the physical sciences. For example: researchers in the Departments of Computer Science, Molecular Biology and Genetics, and Chemistry and Chemical Biology focus on macromolecular biology. Predicting the structures and functions of proteins is a primary aim of research supported by the National Science Foundation too. This group of researchers is strong, well organized, and has ties to the Computational Biology Service Unit in Cornell’s Theory Center.

The group studying evolutionary genomics includes researchers from the Departments of Biological Statistics and Computational Biology, Molecular Biology and Genetics, and Ecology and Evolutionary Biology and is one of the strongest of its kind in the country. This group, like the macromolecular biology group, has strong ties to Cornell’s Genomics Initiative, which has Computational and Statistical Genomics as one of its major thrust areas.

Studies of non-linear systems bring together ecologists from the Departments of Ecology and Evolution and Natural Resources, neurobiologists from the Department of Neurobiology and Behavior and mathematicians from the Center for Applied Mathematics for increasingly sophisticated analyses of some of the highly complex coupled systems that arise in biology.

Intracellular signaling networks are studied by a collaboration involving biologists, physicists and engineers from the Departments of Chemistry and Chemical Biology, Physics, and Chemical and Biomolecular Engineering and the Cornell Theory Center. The NSF recently provided Cornell with funds for an Integrative Graduate Education and Research Traineeship (IGERT) program in non-linear systems to help support students in this area.

Computational Science and Engineering

Many of the faculty in engineering and the sciences engage in research that is computationally driven. Computational science and engineering (CS&E) at Cornell continues to be as strong as ever. Critical to the overall environment is the Cornell Theory Center, whose Velocity Cluster supports lines of inquiry that require intensive, large-scale computation.

Dean Constable appointed a committee to develop a graduate minor in Computational

Science and Engineering, which consisted of Professors John Guckenheimer, Steve Pope, Christine Shoemaker, Charles Van Loan and Steve Vavasis. This committee developed a proposed minor, which was then discussed in a town hall meeting with a larger group of faculty involved in research in Computational Science and Engineering. The committee then incorporated comments from the town hall meeting and submitted a proposal for a Graduate Minor Field in Computational Science and Engineering to the Graduate School, which has been approved. The proposal will pass through several more levels at Cornell.

The CS&E subgroup continues to offer a series of four mini-courses taught by Andrew J. Pershing:

CIS 401 Applied Scientific Computing with MATLAB

CIS 402 Scientific Visualization with MATLAB

In addition, Dave Lifka taught a new course as part of the emerging CSE curriculum initiative:

CIS 405 High-performance Computing: Platforms, Tools, and Effective Strategies for Computationally and Data Intensive Science

Designed primarily for first year graduate students, these four-week courses provide an efficient introduction to important topics in applied scientific computing. The first two courses focus on the MATLAB programming environment and demonstrate how systems like MATLAB can be used to aid scientific research. The last two courses consider the process of developing scientific software and explore a range of techniques and tools to make this process more efficient. These well-received courses attracted students from across the University.

CIS Centers and Institutes



Left: CTC Researcher Daniel Ripoll;
above: visitors to the CAVE

The Cornell Theory Center

The Cornell Theory Center (CTC) is Cornell's high-performance computing and interdisciplinary computational research center, serving more than 150 faculty research groups across campus and at the Weill Medical College. Professor Tony Ingraffea is serving as the acting director while the search for a permanent director continues.

CTC is widely recognized for pioneering the use of industry-standard hardware and software to create a productive, large-scale, computing environment. Strategic partnerships with Microsoft and Intel were critical in achieving this vision.

Currently, CTC's resources, which consist of a cluster complex of more than 2000 processors, keep Cornell at the forefront of computational science and engineering.

CTC also operates a CAVE, providing a three-dimensional, stereo immersive virtual reality environment for viewing scientific, engineering, architectural, and art applications. The CAVE enhances a variety of research projects and courses at both Cornell University and Syracuse University, including an architectural course and an engineering design course that is taught in conjunction with the NASA/NYS/AT&T-sponsored Advanced Interactive Discovery Environment for the Engineering Education Project.

CTC is the home for many of the large interdisciplinary research projects at Cornell.

CTC's Computational Biology Service Unit (CBSU) (<http://cbsu.tc.cornell.edu>) is headed by CS professor Ron Elber and applies computational resources and expertise to a variety of applications in life sciences, ranging from canine genetics and plant breeding to protein structure modeling. The CBSU is also active in training undergraduates through the CBSU Undergraduate Summer Internship program.

The Computational Materials Institute (CMI) at CTC focuses on fracture mechanics, which serves as one of the application areas for the Adaptive Software Project (ASP) led by CS professor Keshav Pingali and CEE professor Tony Ingraffea. Funded by the National Science Foundation under an ITR grant, ASP is developing software systems that can adapt to changes at the application, algorithmic, and system levels. Ongoing projects include the application of .NET and Web services to high-performance computing, investigations into semi-automatic application-level checkpointing and studies of automatic flight vehicle health monitoring and diagnosis.

CS professor Johannes Gehrke leads CTC's data-intensive computing initiative and is applying his data mining expertise to a breadth of applications, including project involving acquisition and analysis of data obtained by the Cornell-operated Arecibo radiotelescope. This work is funded in part by a Research Infrastructure (RI) grant from the National Science Foundation awarded to CIS, with Alan Demers as PI.

CTC has also done pioneering work in science communication, outreach, and informal education through its Virtual Worlds SciCentr educational outreach program, which consists of a series of multi-user virtual environments. This project has engaged several interdisciplinary teams of undergraduate programmers, designers, and content developers in the creation of interactive exhibits, as well as undergraduate mentors who support teams of high school student developers at remote locations. A number of team members come from CS. Through SciCentr, CTC shares research conducted by Cornell scientists and faculty in the fields of biotechnology, communication, fine arts, theatre arts, music, and architecture, by using current

technology that engages students. CTC is also involving undergraduates in the development of interactive online lab modules focused on bioinformatics through the BioQUEST Curriculum Library.

For more information, see <http://www.tc.cornell.edu>

Information Assurance Institute

The U.S. Air Force Research Laboratory (AFRL)/Cornell Information Assurance Institute (IAI) supports a broad spectrum of research and education efforts aimed at developing a science-and-technology base that can enhance information assurance and networked information-systems trustworthiness. IAI is also intended to foster closer collaborations among Cornell and AFRL researchers. Fred B. Schneider is the director.

AFRL researchers participate in Cornell research projects, facilitating technology transfer and exposing Cornell researchers to problems facing the Air Force; Cornell researchers become involved in AFRL projects and have access to unique AFRL facilities. The institute thus makes both Cornell and AFRL more attractive places to work, facilitating recruitment of higher-caliber personnel at each site.

Under the auspices of IAI, Cornell researchers are now involved in the development of the Air Force's Joint Battlespace Infosphere (JBI). Various other technical collaborations are also being explored—in the use of "gossip protocols", in language-based security policy-enforcement technology, and in data mining from networks of sensors.

For further information, see <http://www.cis.cornell.edu/iai>

NSF launches \$19 million research program for computer security, with Cornell's Fred Schneider as chief scientist

ITHACA, N.Y. -- Cornell University will be part of a nationwide initiative to develop long-term solutions to computer security problems, the National Science Foundation (NSF) has announced. The NSF expects to provide almost \$19 million in funding for the program over five years, with about \$3 million coming to Cornell.

The plan creates a new Science and Technology Center that will bring together researchers with a strong background in security research from eight academic institutions along with industrial and government partners. Fred Schneider, Cornell professor of computer science, will be chief scientist; S. Shankar Sastry, professor of electrical engineering and computer sciences at the University of California-Berkeley, will be principal investigator and director of the new center. Stephen Wicker, Cornell professor of electrical and computer engineering, leads the participating team of Cornell faculty and will be a member of the center's governing board.

The researchers have named the consortium TRUST, for Team for Research in Ubiquitous Secure Technology. The aim of TRUST's research is to create new technologies -- and perhaps even new social institutions -- that will make it possible to build computer software and networks that are inherently secure. "Security" here means not only protection against outside attacks, but also reliability of service and preservation of data.

"It's an extremely strong group, and it's going to be very exciting working with them. I expect to see some great work resulting from this collaboration. I expect to learn a lot, too," said Schneider, who is director of the Information Assurance Institute, a joint project of Cornell and U.S. Air Force researchers. He also is a founder and board member of the Griffiss Institute, a New York state security consortium. From 1998 to 2000, Schneider chaired the National Academy of Sciences' study committee on information systems trustworthiness. The committee's work led to the publication of the book *Trust in Cyberspace*, which Schneider edited.

Four other Cornell faculty members also will participate in the effort. They are: Kenneth Birman, professor of computer science; Rajit Manohar, associate professor of electrical and computer engineering; Emin Gun Sirer, assistant professor of computer science; and Lang Tong, professor of electrical and computer engineering.

The funding comes from NSF's Science and Technology Centers: Integrative Partnerships program, which creates collaborations among academic institutions, national laboratories, industrial organizations and others for research and education projects of national importance. Although funding for new centers under the program was scheduled to be cut, Congressman Sherwood Boehlert (R-N.Y.), chairman of the House Science Committee, worked to have it reinstated.

"This is wonderful news for Cornell University and for upstate New York, proving once again that our region is on the forefront of information security research," Boehlert said. "I congratulate Dr. Fred Schneider, Dr. Shankar Sastry and the all the members of the TRUST consortium for winning this award. They represent the dream team of information assurance and complex systems research, and their partnership is exactly the type of collaboration that was envisioned by the Cybersecurity Research and Development Act of 2002 that I authored. I am also pleased that the TRUST consortium will be working closely with the Air Force Research Laboratory -- Information Directorate at Rome, N.Y., to develop the next generation of secure, robust and reliable information systems."

As computing and communication become ever more important to the nation's financial, energy distribution, telecommunication and transportation infrastructures, attacks on computer systems have rapidly increased at all levels, the researchers point out. Since the essence of most attacks is to



JON REIS PHOTOGRAPHY

fool a computer into running a program surreptitiously loaded by an outsider, Schneider and others have proposed new software technology that would allow computers to determine whether a program is trustworthy and will do what it claims to do.

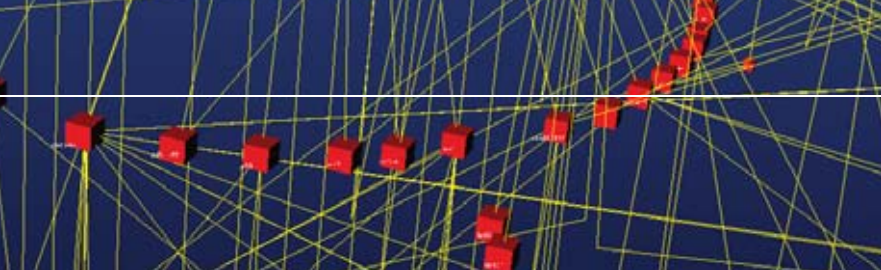
In addition to protecting computers against attacks, TRUST will consider ways to ensure that stored data remains intact and computer networks operate smoothly. Businesses increasingly rely on distributed sensors and controls to monitor and direct manufacturing and shipment of goods, but the networks used today remain vulnerable to breakdowns and intrusion. The electric power grid is a prime example and will be a key test bed for the research. "We need to learn how lightning storms in Ohio can lead to lights going out at JFK airport," Wicker explained.

Privacy, legal, societal and usability issues will be built into the technology as it is developed rather than added on as an afterthought, the researchers said in their proposal. "The best security in the world is useless unless you have a protocol for making sure people don't do something stupid," Wicker said. "We also plan to put more societal issues into our technical courses so students will understand how user behavior affects security."

The team's long-term approach includes creating programming languages and other tools with which secure systems can be built in the future and educating today's students in the use of those tools. The team will create courses in security and in building trustworthy systems, which will first be taught at the affiliated institutions and later made available to schools outside the team.

The other academic institutions involved are Carnegie Mellon University, Mills College, San Jose State University, Smith College, Stanford University and Vanderbilt University. Industrial and other partners are Bellsouth, Cisco Systems, ESCHER (a research consortium that includes Boeing, General Motors and Raytheon), Hewlett-Packard, IBM, Intel, Microsoft, Oak Ridge National Laboratory, Qualcomm, Sun Microsystems and Symantec.

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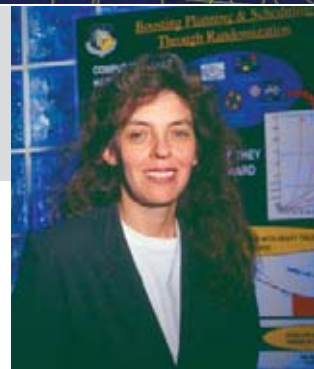
Left to right: IISI Director Carla Gomes;
CS Professor Joseph Halpern

Intelligent Information Systems Institute

The mission of the IISI, founded in December of 2000, is threefold: to perform and stimulate research in computational and data-intensive methods for intelligent decision-making systems; to foster collaborations within the scientific community; and to play a leadership role in the research and dissemination of the core areas of the institute. The institute is funded by the Air Force Research Laboratory. Carla Gomes is the director of the institute. The Scientific Advisory Board of the institute consists of Robert Constable (Cornell), Nort Fowler and Charles Messenger (Information Directorate of the AFRL), and Neal Glassman and Amy Magnus (AFRL/AFOSR).

The IISI supports basic research within Computing and Information Science, promoting a cross-fertilization of approaches from different disciplines, including computer science, engineering, operations research, economics, mathematics, statistics, and physics. Areas of research within the IISI are: search and complexity, planning and scheduling, large-scale distributed networks, data mining and information retrieval, reasoning under uncertainty, natural-language processing, machine learning, multi-agent systems, and combinatorial auctions.

Current IISI members at Cornell are Carlos Ansotegui (encodings and solvers for combinatorial problems using propositional logic (SAT), many-valued SAT, or constraints); Krishna Athreya (branching processes, Markov chains, mathematical statistics, and applications to computer science); Claire Cardie (natural-language understanding and machine learning); Rich Caruana (machine learning, data mining, and bioinformatics); Jon Conrad (resource economics, environmental economics); Raffaello D'Andrea (dynamics and control); Carmel Domshlak (modeling and reasoning about preferences and uncertainty, combinatorial search and optimization, and AI applications); Johannes



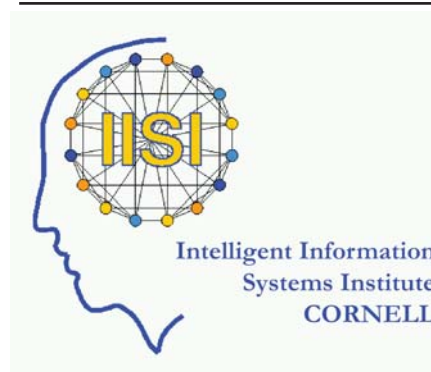
Gehrke (database systems and data mining); Carla Gomes (artificial intelligence and operations research); Joseph Halpern (knowledge representation and uncertainty); Juris Hartmanis (theory of computational complexity); John Hopcroft (information capture and access); Thorsten Joachims (machine learning and information retrieval); Jon Kleinberg (algorithm design— networks and information); Lillian Lee (statistical methods for natural-language processing); Bill Lesser (technology transfer, property rights issues); Roger Mailler (static and dynamic distributed problem solving including control in sensor networks, distributed constraint satisfaction, and distributed constraint optimization); José F. Martínez (multiprocessor architecture, micro-architecture, hardware-software interaction); David Schwartz (computer-game design); Meinolf Sellmann (OR and constraint programming for hard combinatorial problems); Bart Selman (knowledge representation, complexity, and multi-agent systems); Phoebe Sengers (intelligent systems in human and social content and human-computer interaction); David Shmoys (algorithms for large-scale discrete optimization); Chris Shoemaker (large-scale optimization and modeling); Steve Strogatz (complex networks in natural and social science); Willem-Jan van Hoeve (constraint programming and

operations research methods for combinatorial problems); and Stephen Wicker (intelligent wireless-information networks).

A number of research projects involving direct collaborations between Cornell and AFRL/IF researchers were initiated through the IISI. These projects cover topics such as probabilistic decision-making, game theory, architectures for active memory systems, multi-agent sensor networks, and visualization of reasoning and search methods. Over the past year, the IISI has also hosted or sponsored conferences and workshops such as the International Conference on Principles and Practice of Constraint Programming (CP); the National Conference on Artificial Intelligence (AAAI); the International Joint Conference on Artificial Intelligence (IJCAI); the International Conference on Theory and Applications of Satisfiability Testing (SAT); the International Conference on Integration of AI and OR Techniques in Constraint Programming for Combinatorial Optimization Problems (CP-AI-OR); the North American chapter of the Association for Computational Linguistics annual meeting (NAACL); meeting of the Association for Computational Linguistics (ACL); and Conference on Empirical Methods in Natural Language Processing (EMNLP).

To further its research mission, the IISI hosts many short-term visitors, and several scientists for medium- and long-term visits. Visitors have included researchers from AFRL/IF, Albert-Ludwigs-Universität Freiburg, AT&T Labs, Ben-Gurion University, Carnegie Mellon University, Hebrew University, ILOG Corporation, INESC Portugal, Max-Planck Institute, Microsoft Research, New York University, Rutgers University, Stanford University, Technion, University of Barcelona, University of British Columbia, University of Lleida, University of Lisbon, University of Massachusetts, University of Pennsylvania, and University of Washington.

For further information, see
<http://www.cis.cornell.edu/iisi>





On April 21, 2005, IISI members and colleagues gathered to celebrate the inauguration of the newly-renovated lab space of the Intelligent Information Systems Institute, housed in Upson Hall. Ribbon cutting, pictured L-R: Northrup Fowler (Chief Scientist of the Information Directorate, AFRL); Robert Constable (CIS Dean), and Carla Gomes (IISI Director, Associate Professor, CIS joint with Applied Economics and Management and Computer Science)

National Science Digital Library at Cornell

The National Science Digital Library (NSDL) is a long-term program of the National Science Foundation Division of Undergraduate Education to enhance all aspects of education in science, mathematics and engineering. It includes more than 150 projects that are supported by the NSF, together with numerous other digital library collections and services.

Cornell has received numerous grants under this program, including targeted research, collections projects, and a collaboration to integrate all the projects.

In 2000, the NSF funded six short-term projects to demonstrate ways to unite these components into a coherent digital library. One of these projects, Site for Science, was at Cornell. A year later, the NSF selected three of the demonstration projects to form a Core Integration team for the entire NSDL. The three are at Cornell University, the University Corporation for Atmospheric

Research (UCAR), and Columbia University.

The technical architecture for the NSDL is derived from the Site for Science prototype. The Cornell team has primary responsibility for developing and operating the central computing system for the NSDL. Extensive use is made of two other projects that Cornell has been closely involved with: the Open Archives Initiative and the Fedora repository service. The NSDL is one of the pioneers of large-scale metadata harvesting and techniques for accommodating varied metadata standards.

For further information see: <http://www.infosci.cornell.edu/dl/nsdl-cornell.html>

Computer Systems Lab with ECE

The Cornell Computer Systems Laboratory (CSL) brings together faculty with common interests from the School of Electrical and Computer Engineering and CS at Cornell.

The field of computer systems is both

experimental and theoretical, having grown out of computer architecture, parallel computer architecture, operating systems and compilers, computer protocols and networks, programming languages and environments, distributed systems, VLSI design and fabrication, and system specification and verification.

Graduate students are admitted to either ECE or CS. Usually students with primary interest in computer architecture, multi-processor design, VLSI, computer-aided design (CAD), and circuit design enroll in ECE, while students with interest in compilers, operating systems, and programming environments enroll in CS, although there are exceptions. There are no rigid student classifications; ECE students can have a thesis advisor in CS and vice-versa. Indeed, the interdisciplinary composition of the research teams is a strength of the Computer Systems Laboratory.

For further information, see <http://www.csl.cornell.edu>

Research in Computer Science

at Cornell



UNA MONEYPENNY

Experts in computer hardware work closely with members of the School of Electrical and Computer Engineering, forming interdisciplinary research teams. Graduate students are admitted to either graduate field. They usually enroll in ECE if their primary interest is in computer architecture, multiprocessor design, VLSI, computer-aided design (CAD) and circuit design; they enroll in CS if their interest is compilers, operating systems, and programming environments.

For more information, see
<http://www.cs.cornell.edu/Research/Architecture/>
and <http://www.csl.cornell.edu>

Students are not rigidly classified: ECE students can have a thesis advisor in CS and vice-versa. Research is conducted in the Computer Systems Laboratory and encompasses both experimental and theoretical work growing out of topics in computer architecture, parallel computer architecture, operating systems and compilers, computer protocols and networks, programming languages and environments, distributed systems, VLSI design, and system specification and verification.

Artificial intelligence research at Cornell is both theoretical and experimental and covers a range of topics, including decision theory, information retrieval, knowledge representation, machine learning and data mining, natural-language processing, planning, reasoning under uncertainty, search, and computer vision. Natural language processing, the ability to talk to machines in plain English, is an important research area in our Information Science

For more information, see
<http://www.cs.cornell.edu/Research/ai/> and
<http://www.cis.cornell.edu/iisi/>

Program, too. Research in AI often involves collaboration with other disciplines such as biology, economics, linguistics, medicine, operations research, physics, and psychology. A particular strength at Cornell is computer-intensive approaches to AI problems. Professors who work in AI also are key participants in the university-wide Cognitive Studies Program and in CIS's Intelligent Information Systems Institute.

Overall, the breadth and depth of the projects undertaken at Cornell are a direct result of the well-integrated, diverse and collegial environment that CS provides.



New computational tools are being developed to analyze, understand, and manipulate newly available, richly-detailed information on the basic structures of life. Without advanced computing, biological databases with gigabytes of information would defy attempts to recognize patterns in them. Cornell has a university-wide initiative in the science of genomics, in which CS and others are taking part. CIS oversees interdisciplinary teaching and research in many aspects of computational biology. CIS initiated a novel graduate program in Computational Biology and Medicine (CBM) in collaboration with Rockefeller University

and Sloan Kettering Research Institute. The Tri-institutional program in Computational Biology and Medicine, now in its second year, builds on the strengths in the medical sciences in the NYC campuses and on the strengths in the computer science at the Ithaca campus. For more information, see <http://www.triiprograms.org/cbm.html>

Within CS, the focus is on computational molecular biology. This includes pattern matching, protein classification, protein fold prediction, long-time simulation of protein dynamics and function, and structure comparison algorithms. CS is leading a new project, "The Library of Life",

in collaboration with the Bridging the Rift Foundation (BTR) that will integrate (and create) data from classical and molecular biology of all living systems. The BTR project also aims to promote peace in the Middle East and is located on the border between Israel and Jordan. The project will start with the creation of the Library of the Desert. For more details see <http://www.news.cornell.edu/features/BTR/>

Another multi-year project seeks to create a database of the world's approximately six million proteins. For more information, see <http://protomap.cornell.edu/> and <http://biospace.cornell.edu/>

For more information on computational biology at Cornell, see <http://www.cs.cornell.edu/Research/compbio/> and <http://www.cb.cornell.edu/> (or <http://www.cis.cornell.edu/cb/>)



Photos left to right: CIS Dean Robert L. Constable; CIS Professor Phoebe Sengers; CS Professors and Turing Award winners Juris Hartmanis and John Hopcroft; CS Professor Dexter Kozen.



CHARLES HARRINGTON PHOTOGRAPHY

The digitization of our daily lives has led to an explosion in the collection of data. Experts estimate that the amount of data doubles every three years. Researchers in Database Systems and Digital Libraries are collaborating with colleagues in theory, machine learning, and operating systems to build systems and tools to manage and analyze large datasets.

The database systems research is motivated by the increasing complexity of data and data-driven applications. The Cayuga project is developing a system for processing high-speed data streams. The Pepper Project is building a query layer for large-scale peer-to-peer systems. The Quark project is developing a next-generation database system for managing both structured and unstructured data. The Himalaya Data-Mining Project is exploring new directions in data mining, with a special focus on mining scientific data

sets and on data privacy. The Hilda project is developing a high-level language for developing data-driven web applications.

Digital libraries research is an interdisciplinary activity within Computing and Information Science at Cornell. The work is rooted in the practical problems of large-scale electronic publishing, Web information systems, scholarly communication and the long-term preservation of digital information. The National Science Digital Library (NSDL) is a program of the National Science Foundation to enhance all aspects of education in science. Fedora is a digital repository management system with mechanisms for the storage, manipulation, access management, and dissemination of digital library content. The Open Archives Initiative is a project that uses metadata harvesting for digital library interoperability.



Research in programming languages and compilation covers a diverse set of topics, ranging from theoretical and foundational aspects (such as logics and semantics of programming languages) to practical engineering issues (such as language design, optimizing compilers, program analysis, verification, security, and run-time systems). Ongoing research includes theorem-proving and logic-based tools to support programming; compiler technology for the development of adaptive software systems that automatically improve their efficiency and fault-tolerance; language-based security

For more information, see
<http://www.cs.cornell.edu/Research/lang>

mechanisms based on advanced type systems and program transformations; several extensions to the Java programming language; and program analysis and compilation techniques for memory management optimizations and for the detection of programming errors. Strong synergies exist with researchers in other areas. For instance, the theorem-proving technology has been used by the systems group to verify communication protocols; and the work on language-based security spans the areas of computer security, systems, and programming languages.

Cornell is a leader in the field of computer graphics, a broad, interdisciplinary field that includes a wide and growing range of applications from science to communication to entertainment.

Research in computer graphics involves algorithms, physics, psychology, computation, computer vision, and architecture, among other fields. At Cornell, research and teaching in computer graphics are centered in the CS department and the closely affiliated Program of Computer Graphics (PCG), one of the world's

leading computer graphics laboratories and a dominant force in the international computer graphics community for more than thirty years. The PCG is particularly famous for its work in realistic rendering, simulating environments that are physically accurate and perceptually indistinguishable from real world scenes.

The interests of the computer graphics group are broadly centered on the topic of high-quality rendering. Current research thrusts focus on the interrelated topics of improving the models

of light scattering that underlie realism, deepening our understanding of how human viewers perceive computer-generated images, and developing algorithms for high-quality rendering at interactive rates. Other areas of interest include image-based modeling and texturing, architectural modeling, animation, graphics hardware programming, and digital photography.

The PCG's state-of-the-art facility includes many tools for advanced research, including a sophisticated light measurement laboratory with unique capabilities for directional light measurement, a large PC cluster, and a high-resolution tiled projection display.



The systems group at Cornell is concerned with the design and implementation of the fundamental software systems that constitute a computing infrastructure. Our interests span from the very small, such as the smart card systems that fit on a postage stamp-sized die, to the very large, like the wide-area distributed systems that span the

globe. Past research by the group in fault-tolerance, distributed communication, extensible systems and Internet networking, is widely cited and used. Concrete software artifacts developed at Cornell are used by the New York Stock Exchange and the French air traffic control system, as well as deployed in commercial operating systems.

Scientists and engineers increasingly rely on computer models and simulation to buttress their experiments and designs. From the prevention of metal fatigue in engines to the design of new medicines, scientific and technological advances rely on powerful computers and the algorithms that run on them. The scientific

computing group develops the algorithms that underlie simulation and optimization. Matrix computations are a recurring theme in the research. The focus is on efficient and robust algorithms with an eye toward modern high-performance parallel and multi-threaded architectures.

For more information, see
<http://www.cs.cornell.edu/Research/scientif/>

OVER THE LAST YEAR:

The Spinglass group (led by Ken Birman), which focuses on scalable group communication, has developed a series of protocols and systems for scalable information sharing, distributed monitoring, data mining and control.

Paul Francis, who recently joined our department, has initiated the Firebreak project to add a ring of protection to the Internet Protocol to combat distributed denial of service attacks.

The Jif group (led by Andrew Myers) has shown that secure distributed systems can be constructed by automatically introducing encryption, partitioning and replication in order to satisfy explicit policies for data confidentiality and integrity.

Robbert van Renesse has worked on scalable peer-to-peer systems, and has developed self-organizing protocols for high-throughput consistent data replication, aggregation of distributed information, failure detection, overlay multicast, and publish/subscribe.

Fred B. Schneider has led a group attempting to understand how fault-tolerance can be combined with attack-tolerance and has investigated threshold cryptography with proactive secret sharing in the CorSSO and COCA authentication services.

The Beehive project (led by E. Gün Sirer) has introduced a novel replication technique that enables fast ($O(1)$) lookups in distributed, fault-tolerant, scalable hash-tables, and used this technique to build an alternative to the legacy Domain Name Service, a critical part of the cyber infrastructure used to translate Internet names to addresses.



UNA MONEYPENNY



Cornell is a leader on a broad range of research issues related to computer security and trustworthy computing. Under the aegis of the Information Assurance Institute located within CIS and as a partner in the newly funded National Science Foundation "TRUST" Science and Technology Center, we tackle the fundamental problem of ensuring the security and reliability of our global critical computing infrastructure.

For more information, see
<http://www.cs.cornell.edu/Research/Security/>

Many active research projects are aimed at developing a science-and-technology base that enhances information assurance and ensures the trustworthiness of networked information systems. These projects range from system and network security to reliability and assurance, spanning language-based security, secure online services, advanced type systems for mobile code, static information flow control, policy specification and enforcement,

and proof carrying code.

Overall, the breadth and depth of the projects undertaken at Cornell are a direct result of the well-integrated, diverse and collegial environment that CS provides. Our work draws its strength from the synergy between the groups working on security, programming languages, operating systems, logic, and formal methods.

Cornell is a world leader in the theory of computing with fundamental research that spans the breadth of the field. Our faculty and students have contributed to such diverse areas as the design and analysis of algorithms, combinatorial optimization, computational complexity, computational algebra, program logic and semantics, automated deduction, and computational geometry. Cornell is also at the forefront in applying theoretical ideas to practical problems in areas such as machine learning, data mining, software and hardware verification, reliable systems, computer vision and medical imaging,

computer graphics, programming languages and compilers, information science, and the computational sciences. Yet, while the theory of computing is by now recognized as a deep and foundational scientific discipline with broad impact, many of its central questions remain unanswered. As we enter the information age, continued progress on the fundamental theoretical questions will be essential for heightened understanding of complex systems and software, the nation's network and information infrastructure, and the physical and biological sciences.

For further information, see
<http://www.cs.cornell.edu/Research/theory/>

The GERARD SALTON Lecture Series

2004 - 2005



Karen Spärck Jones
University of Cambridge

Natural Language Information Processing: Words and Tasks, Statistics and Models

March 1, 2005



Raj Reddy
Carnegie Mellon University

The Million Book Digital Library Project

April 7, 2005



Rodney Brooks
Massachusetts Institute of Technology

Flesh and Machines: Robots and People

April 12, 2005

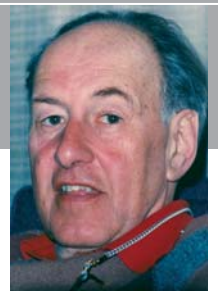
Presented by the Department of Computer Science
 Cornell University
 4130 Upson Hall, Ithaca, NY 14853
www.cs.cornell.edu

THE GERARD SALTON LECTURE SERIES

A towering figure in the field of information retrieval, Gerard Salton synthesized ideas from mathematics, statistics, and natural language processing to create a scientific basis for extracting semantics from word frequency. The impact of his contribution is profound—five textbooks, over 150 research papers, and dozens of Ph.D. students. The modern information science research scene, with its terabyte databases, Web, and related technologies, owes a great deal to Gerry's pioneering efforts.

This lecture series honors our former colleague with speakers who similarly are innovators in their fields.

For further information, see
<http://www.cs.cornell.edu/Events/saltonseries/>



Gerard Salton (1927-1995)



Corporate Interactions

From bioinformatics to artificial intelligence, network security to high-performance computing, human-computer interaction to computer vision, CIS offers a broad range of collaborative research possibilities for corporate partners. We tailor corporate relationships to be mutually beneficial: a wide variety of options includes unrestricted gifts, research grants, matching funds for proposals, and graduate student fellowships. Corporate residencies on campus provide opportunities for close collaboration.



Example corporate interactions include:

Microsoft funding to CS Professor Johannes Gehrke, for his research on data mining for scientific applications and for research on Petabyte Data Management and Analysis Services for Data-driven Science.

Microsoft funding to CS professor Fred B. Schneider in support of his successful NSF proposal: Pervasive Trustworthiness Education Initiative.

IBM support to CS Professor Keshav Pingali through an IBM Faculty Award.

Xerox support to Prof. Gehrke and the Cornell Data Mining Group and Professor Claire Cardie's machine learning research.

CIS is the broadest college-level computing and information unit at a comprehensive major research university and therefore provides excellent recruiting opportunities for students skilled in core computer science and information science and in the intersections of these and other disciplines, such as the physical sciences, life sciences, social sciences, digital arts, and engineering. There are more than 200 graduating majors each year, as well as 100 Masters of Engineering students and Bits On Our Minds (BOOM), highlighted on page 27, provides an annual showcase of student technology projects.

Corporate support for students this year included:

Bloomberg and **Credit Suisse First Boston** (CSFB) funding for this year's Bits On Our Mind (BOOM).

Intel Foundation awarded a fellowship to CS graduate student Kevin Hamlen.

Microsoft awarded Graduate Fellowships to CS students Kamen Yotov, and Ranveer Chandra.

Gifts and grants

CIS acknowledges corporate partners for their support, including equipment and software. Among this year's corporate partners:

4D Security	\$	1,000
ASPEED	\$	5,000
Bloomberg	\$	10,000
Campbell	\$	15,000
Credit Suisse First Boston	\$	7,000
Electronic Arts	\$	30,000
Ernst & Young	\$	15,000
IBM	\$	40,000
Intel	\$	100,473
Microsoft	\$	4,834,000
Stratus	\$	20,000
Unisys	\$	125,000
Xerox	\$	40,000

Photos left to right: Geri Gay, CIS Professor and Bill Gates; Microsoft Director of Research in Silicon Valley, Roy Levin; CIS Professor Dan Huttenlocher with Autodesk Chief Operating Officer Carl Bass; Bloomberg's Zach Cohen and Milo Chan at BOOM 2005

Address questions relating to corporate interactions with CIS to:

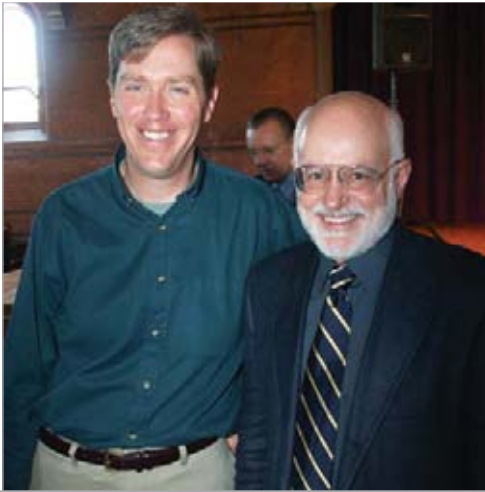
Linda Callahan
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<http://www.cis.cornell.edu/>

Alumni and External Relations

CHARLES HARRINGTON PHOTOGRAPHY



Photos left to right: Jeff Hawkins, co-founder of Palm Computing and Handspring, with Dean Constable during a visit in Fall 2004; CS alumni at an event in New York City in Spring 2005; CS Alum Amit Singhal, a principal scientist at Google; CS Alumni at the Jay Walker event in New York City this spring; Dean Constable stops outside of Rhodes Hall with Princess Soamsavali Kitiyakara of Thailand

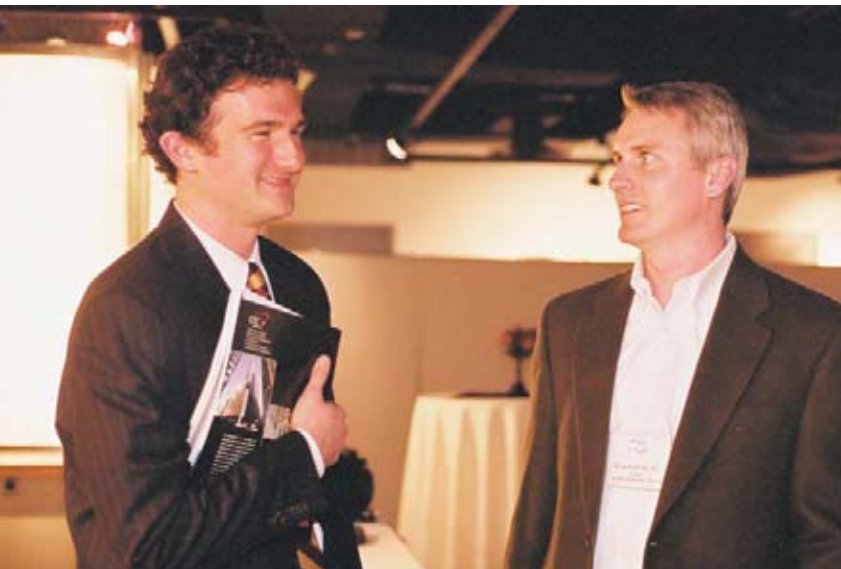
Jay Walker '77 sees a bit further ahead than most people. Walker is the founder of **priceline.com** and CEO of **Walker Digital**, an Edison-like idea factory for the new millennium. Walker sees the planet undergoing rapid transition; a place where personal privacy is evaporating, and communication via an increasingly seamless global network are growing by the day.

Walker gave a talk in Manhattan this past April to nearly 250 alumni and friends of Cornell on behalf of Computing and Information Science. He surprised those in attendance with predictions that we would soon be "wearing the web" and that not too long from now, we will be able to talk to the web directly. He believes that advances in network software and speech recognition will marginalize common interface devices such as the Qwerty keyboard. In Walker's view of things: ideas and information will constitute the foundation of a growing digital economy. Education will become more interactive, entertainment more accessible, and critical healthcare more personalized to individual needs. Lower-skill jobs will gradually be taken over by machines as human capabilities evolve upward. A storyteller in Africa, will spin an enchanting tale, live and on demand, for a young child settling down for the night in her home in Detroit. A net of cyber connections, will identify individual and group abilities, seamlessly selling resources to support those activities that most uplift aggregate human values.

Supporting the advance of science in many emerging areas, the Department of Computer Science at Cornell invited one of its most notable alums back to campus for a colloquium last November. **Cynthia Dwork, Ph.D. '83** gave a talk as part of the Distinguished Lecture Series in Computer Science. Her talk was titled "What Happened Next". The answer: A LOT! Machines got smaller and more powerful. New work emerged in the area of cryptography, complexity and systems. Dwork found herself at the center of many of these developments. Her doctoral studies at Cornell were done under the supervision of Turing Award winner, Professor John Hopcroft. After Cornell, Dwork engaged in advanced research at IBM's Almaden Research Center, followed by a brief gig as a fellow at the Compaq Systems Research Center, eventually joining Microsoft's Silicon Valley research lab in 2001. Dwork also serves as a consulting professor at Stanford, Berkeley, and the University of Siena.

Amit Singhal, Ph.D. '97, a Principal Scientist at **Google**, also gave a talk, "Challenges in Running a Commercial Web Search Engine". Singhal was a student of data-mining legend Gerard Salton, a pioneer in computer science at Cornell. He is one of the world's leading experts in search technology.

Another notable Googler, is **Sanjay Ghemawat '87**, who created the **Google** file system. This system handles hundreds of millions of users daily over a large number of server clusters. Sanjay did his graduate research work at M.I.T., and worked in the same group as Andrew Myers, who is now a CS professor at Cornell.



Jon Rubinstein '78, MEng '79, is staying busy in his role as the Senior Vice President of Apple's iPod Division. Jon reports directly to CEO Steve Jobs and is responsible for Apple's huge iPod success story. During the past year Rubinstein visited the Cornell campus to talk to computer scientists and electrical engineering faculty who are working at the cutting edge of systems and hardware research. His degree work at Cornell was in Electrical and Computer Engineering.

Mike Nash '85, has one of the most difficult jobs on the planet. As head of Microsoft's Windows Security Business Unit, Nash heads up a group that must address all security concerns and threats related to Windows products. Nash has been consulting with Cornell's top security guru, **Professor Fred B. Schneider '75**, among others, to exploit the latest developments in leading-edge security research. The topic of security is such a big issue that Cornell has decided to infuse more of the undergraduate and graduate curriculum with foundational security principles and practices.

Stephan Paternot '96 is making movies again. He is currently based in Manhattan and is focused on feature-length productions. He is raising \$35 million for a new project that will be produced by his company Palm-Star Entertainment.

Ashu Agrawal '91 has assumed leadership of Francisco Partners' efforts in India. Francisco is a leading technology investment firm managing more than \$2.5 billion in committed capital under management. Ashu recently returned to graduate school where he received a master's degree in business administration from Harvard.

Madhav Ranjan '99 has moved from UBS to assume the role of CIO for a startup called 406 Partners.

Kenneth Lee '97 has returned to Cornell for MBA studies. **Jean (Parker) Hill '83** has moved from Merrill Lynch where she was director of corporate technology to an executive director position at Morgan Stanley.

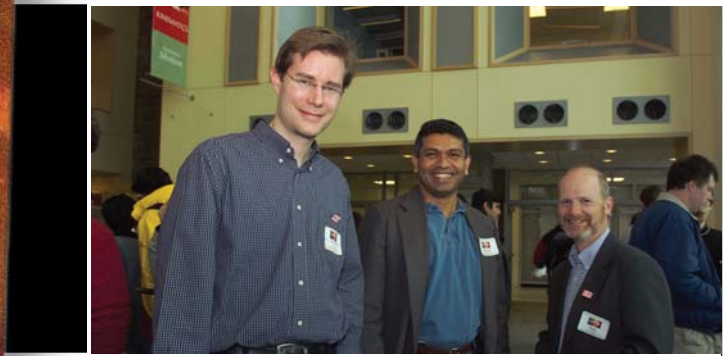
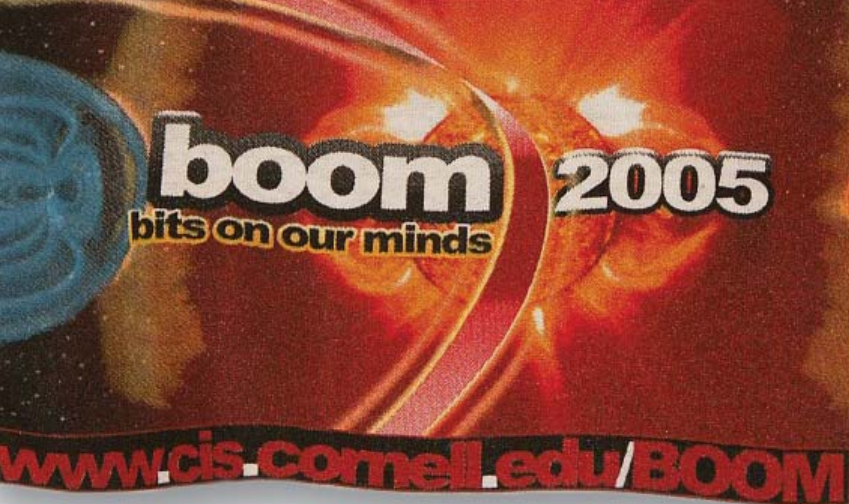
Regina Clewlow '01, who is currently the Director of Engineers for a Sustainable World at Cornell, has joined the Women's Mentorship Program in Computer Science. Other new mentors include: **Jackie Bodine '04**, **Daisy Fan, Ph.D. '01**, and **Alexa Sharp, Ph.D.** candidate in CS. For more information about the Women in CS program, visit www.cs.cornell.edu/women.

The **Jonathan E. Marx Senior Prizes** were presented to **Eric Tsu '05** and **Radha Nurayan '05** as part of the Computer Science Graduation Ceremony on Hoy Field on May 29th, 2005. **Jonathan E. Marx '85** was a CS major who died in a skiing accident shortly after his graduation 1985. The Marx family established the Marx Senior Prizes to recognize students who have most demonstrated a positive spirit among their classmates, held significant leadership roles, and have been of service in the community. The Marx family also established a teaching award in the name of Jonathan's father, the late **Alan S. Marx, JD '61**. The Alan Marx Memorial Prize for Excellence Supporting Undergraduate Education was awarded to **Radha Nurayan, '05** recognizing her efforts as a consultant and TA for CS 100. The Computer Science Prize for Academic Excellence, given by the CS Faculty, was awarded to **Paul Shafer '05**.

For more information about alumni or external relations in CIS or the Department of Computer Science, please contact Dan Jenkins at jenkins@cs.cornell.edu.

Bits On Our Minds





Above: CS Professor Johannes Gehrke with Xerox Lab Manager Rob Rolleston, and Xerox Fellow and Lab Manager Shriram Revankar at BOOM 2005.

Left: CS Professor Bart Selman and students observing a display during BOOM 2005.

BOOM '05 fills Duffield Atrium with Scintillating Sights and Sounds

Computing Projects Span Range of Fields

By Alex Kwan (Cornell Chronicle, March 17, 2005)

Hundreds of enthusiastic students filled the Duffield Hall atrium March 9 with glossy posters and computer presentations for BOOM (Bits On Our Minds) 2005, an annual fair that showcases Cornell's best student computing projects to the community.

BOOM 2005 boasted more than 50 projects with the common theme of computing. In between the expected projects on databases, programming and robotics, a few displays demonstrated how computing could be applied in fields as diverse as biology, psychology, economics and even the arts.

The Genetic MusicComposer was a Java-based creation of Yash Parghi '06, A&S, and Andrew Dailey '06, A&S, which brings together computer science and music by intelligently composing short tunes. Using a genetic algorithm, the program generates random tunes and scores them based on such criteria as harmony and rhythm. In the next stage, the most promising tunes are selected and recombined to make better tunes. This process is repeated until a worthy tune emerges. "Our program will not produce anything approaching a masterpiece anytime soon, but our approach is very open-ended and has great potential," said Parghi.

While its tunes might not be ready for the concert halls, Genetic MusicComposer was a perfect fit at BOOM. The program created new tunes within seconds and played them through speakers. To have an objective feedback for their work, the team set up a Web page with five MIDI samples and asked participants to rate them on humanness and pleasantness. "The survey response varies. Some would say they couldn't believe the tunes were generated by a computer. Others, especially the musically trained, were

disappointed at the music quality," said Parghi.

Daniel Cohen's project on solid freeform fabrication of tissue implants was an interdisciplinary effort combining computing and medicine. Cohen, a master's degree student in biomedical engineering, and his adviser, Hod Lipson, assistant professor of mechanical and aerospace engineering, made gantry robots that deposit cell-seeded gels layer by layer, following a pattern from computer-aided design drawings. When incubated under growth conditions, the cells consume the gel and form a structure made of living tissue.

"We can make these tissues in impressive geometries. Compared to the conventional fabrication methods using scaffolding, our technique is very efficient and quick," explained Cohen. He also noted that their technique enables them to create tissues consisting of multiple types of materials. "Our eventual goal is to provide inexpensive implants that are specific to the needs of a patient," he said.

This year was the ninth time that BOOM was held, but it was the first time the event was held in Duffield Hall. The spacious atrium provided the perfect venue for all the student projects to be displayed in one central location. In previous years, the event spanned several floors in Upson Hall.

The BOOM 2005 Web site at <http://www.cis.cornell.edu/boom> contains links for all the exhibits. The event was organized by the faculty of Computer and Information Science and sponsored by Bloomberg and Credit Suisse First Boston.

Alex Kwan is a science writer intern with the Cornell News Office.

CIS, CS, and Information Science Courses

CIS Courses

CIS 121	Introduction to MATLAB
CIS 122	Application of FORTRAN in the Earth and Environmental Sciences
CIS 165	Computing in the Arts
CIS 167	Visual Imaging in the Electronic Age
CIS 191	Media Arts Studio I
CIS 300	Introduction to Computer Game Design
CIS 401	Introduction to Applied Scientific Computing with MATLAB
CIS 402	Scientific Visualization with MATLAB
CIS 405	Effective Use of High performance Computing
CIS 490	Independent Reading and Research
CIS 566	Advanced Computer Animation
CIS 572	Heuristic Methods for Optimization
CIS 576	Decision Theory I
CIS 577	Decision Theory II
CIS 673	Integration of Artificial Intelligence and Operations Research
CIS 750	Evolutionary Computation and Design Automation
CIS 790	Independent Study
CIS 797	Topics in CIS/IGERT Seminars

CS Courses

COM S 099	Fundamental Programming Concepts
COM S 100	Introduction to Computer Programming
COM S 100J	Introduction to Computer Programming
COM S 100M	Introduction to Computer Programming
COM S 101	Introduction to Cognitive Science
COM S 113	Introduction to C
COM S 114	Unix Tools
COM S 130	Introductory Design and Programming for the Web
COM S 165	Computing in the Arts
COM S 167	Visual Imaging in the Electronic Age
COM S 201	Cognitive Science in Context Laboratory
COM S 211	Computers and Programming
COM S 212	Java Practicum
COM S 213	C++ Programming
COM S 214	Advanced UNIX Programming and Tools
COM S 215	Introduction to C#
COM S 230	Intermediate Design and Programming for the Web
COM S 280	Discrete Structures
COM S 312	Data Structures and Functional Programming
COM S 314	Computer Organization
COM S 322	Introduction to Scientific Computation
COM S 330	Applied Database Systems
COM S 381	Introduction to Theory of Computing
COM S 400	The Science of Programming
COM S 411	Programming Languages
COM S 412	Introduction to Compilers
COM S 413	Practicum in Compilers
COM S 414	Systems Programming and Operating Systems
COM S 415	Practicum in Operating Systems
COM S 419	Computer Networks (formerly COM S 519)
COM S 421	Numerical Analysis
COM S 426	Introduction to Computational Biology
COM S 427	Practicum in Computational Biology
COM S 428	Introduction to Computational Biophysics
COM S 430	Information Retrieval
COM S 431	Web Information Systems
COM S 432	Introduction to Database Systems
COM S 433	Practicum in Database Systems
COM S 465	Computer Graphics I
COM S 467	Computer Graphics II
COM S 468	Computer Graphics Practicum
COM S 472	Foundations of Artificial Intelligence
COM S 473	Practicum in Artificial Intelligence
COM S 474	Introduction to Natural Language Processing
COM S 478	Machine Learning
COM S 480	Introduction to Cryptology
COM S 481	Introduction to Theory of Computing
COM S 482	Introduction to Analysis of Algorithms



Smash! Kabam!

GAMES OF THE FUTURE

By Michael Morisy
(Reprinted from *The Cornell Daily Sun*)

The enemy fighter explodes in a burst of flames, unable to avoid a player's barrage of lasers. "Wait, try this," a student says, tapping in a few lines of code and restarting the game. This time, the enemy fighter dodges out of the player's way and shoots back. The student starts explaining his artificial intelligence changes when Prof. Mohan Rajagopalan, computer science, decides it's time to start the day's lecture.

After a quick introduction, the day's guest lecturer, Rama Hoetzlein '01, launches into a discourse on the history of computer games. Except for a few thoughtful questions, the audience is silent, absorbing the illustrated history of games from Pong to Pac-Man, through the video game crash of 1983. After class, a few students linger, asking questions or optimizing those last few lines of code.

"CS 490: The Computer Game Design Project" is obviously not your typical computer science course, but then again, as Rajagopalan explains, it isn't meant to be. "There really is a lot about computer game design that transcends what you learn in computer science classes. ... It is a creative craft," he said. This "craft" crosses traditional disciplinary boundaries as computer science majors team up with artists and musicians to create a common vision that comes to fruition as a fully-playable, stand-alone game.

Synthesizing ideas and teamwork is half the course's challenge. "I even had to change my stereotypes," co-instructor Prof. David Schwartz, computer science, admitted. "The [computer science students] thought they would tell the artists what to draw and the artists thought the engineers would program the game they envisioned." The right mix is somewhere in between.

Hoetzlein explained the importance of the day's lecture as part of appreciating this balance between artistic and technical skills. "We use the history of computer games to allow students from both the arts and computer science to work together. ... All through its history, making computer games has been a cross-disciplinary collaboration," he said.

The program started with seven students in fall 2001, growing to 10 students the next spring. The potential and the interest were both clearly there, so Schwartz sat down with Hoetzlein and they came up with a formalized syllabus. They decided to cover as much as possible, an overview of a field that Schwartz concedes truly needs its own curriculum and possibly major. The syllabus hit concrete topics such as artwork, physics, music and networking and even some esoteric ones such as gaming violence and social impact.

"In a technical class, it's 'How does this algorithm affect speed?' But how do you bring up 'How does this algorithm affect society?'" Schwartz said, emphasizing the nuances inherent in the class that separate it



from much of the computer science department.

Hoetzlein developed a lecture series for the topics and wrote the GameX engine. GameX is used to illustrate various concepts to the class and also serves as the base for many of the students' games. Hoetzlein, who graduated with a dual degree in computer science and fine arts, placed simplicity and ease-of-use as a priority with GameX, so that both programmers and artists could get involved in their project right away.

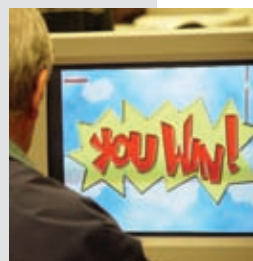
Each design team is typically made up of four or five students who decide everything from game type to difficulty level. From time to time, outside talent has been brought in, such as students from Prof. Todd McGrain's Drawing III class and Prof. David Borden's Digital Music class. Both of them added not only to the quality of the games but gave the teams real-life practice in communicating their ideas clearly to third parties.

Hopes are high for the future of the course. The class is officially an undergraduate research project, but with over 40 students participating, organizers hope to turn the research into an official course. But more pressing, Schwartz, Rajagopalan and Hoetzlein are working hard to secure funding -- their General Electric grant runs out at the end of this semester.

Despite their unofficial status and monetary uncertainty, the project team is upbeat. "[Computer game design] is a new frontier here and around the country," said Rajagopalan.

Schwartz agreed, adding that Cornell is "poised to be a forerunner in this industry. And this year, especially, we have an amazingly skilled group of students."

With this sort of enthusiasm and commitment, along with a booming \$7 billion-a-year computer game industry, there is little question that the project will continue to grow in scope and sophistication.



CS Courses, *continued*

COM S 483	Quantum Computation
COM S 486	Applied Logic
COM S 490	Independent Reading and Research
COM S 501	Software Engineering
COM S 504	Applied Systems
COM S 505	Systems Architecture, Behavior, and Optimization
COM S 622	Numerical Optimization & Nonlinear Algebraic Equations
COM S 624	Numerical Solution of Differential Equations
COM S 626	Computational Molecular Biology
COM S 627	Computational Biology: The Machine Learning Approach
COM S 628	Biological Sequence Analysis
COM S 630	Representing and Accessing Digital Information
COM S 632	Advanced Database Systems
COM S 633	Advanced Database Systems
COM S 664	Machine Vision
COM S 665	Advanced Rendering
COM S 667	Physically Based Rendering
COM S 671	Introduction to Automated Reasoning
COM S 672	Advanced Artificial Intelligence
COM S 673	Integration of Artificial Intelligence & Operations Research
COM S 674	Natural Language Processing
COM S 676	Reasoning About Knowledge
COM S 677	Reasoning About Uncertainty
COM S 678	Advanced Topics in Machine Learning
COM S 681	Analysis of Algorithms
COM S 682	Theory of Computing
COM S 683	Advanced Design & Analysis of Algorithms
COM S 684	Algorithmic Game Theory
COM S 685	The Structure of Information Networks
COM S 686	Logics of Programs
COM S 709	Department Colloquium
COM S 711	Seminar in Advanced Programming Languages
COM S 714	Topics in Systems
COM S 715	Seminar on PRL
COM S 717	Application-level Detection and Tolerance of Complex Faults
COM S 718	Seminar in Computer Graphics
COM S 719	Seminar in Programming Languages and Compilers
COM S 721	Topics in Numerical Analysis - Finite Element
COM S 726	Problems & Perspectives in Computational Molecular Biology
COM S 732	Seminar in Database Systems
COM S 733	Seminar in Database Systems
COM S 750	Evolutionary Computation and Design Automation
COM S 754	Systems Seminar
COM S 772	Seminar in Artificial Intelligence
COM S 775	Seminar on Natural Language Understanding
COM S 778	Topics in Machine Learning
COM S 786	Introduction to Kleene Algebra
COM S 789	Seminar in Theory of Algorithms and Computing

Information Science Courses

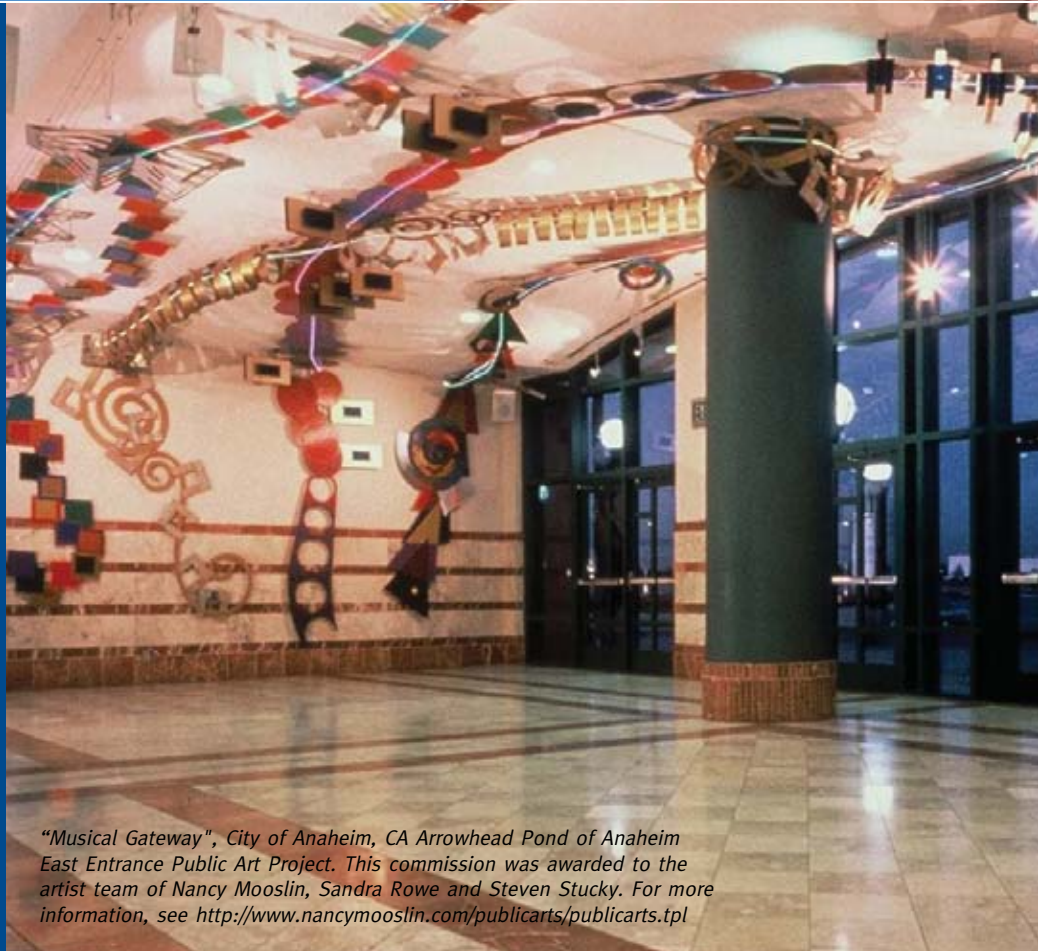
INFO 130	Introductory Design and Programming for the Web
INFO 214	Cognitive Psychology
INFO 230	Intermediate Design and Programming for the Web
INFO 245	Psychology and Social Computing
INFO 292	Inventing an Information Society
INFO 295	Mathematical Models for Information Science
INFO 330	Applied Database Systems
INFO 345	Human-Computer Interaction Design
INFO 355	Computers: From Babbage to Gates
INFO 430	Information Retrieval
INFO 431	Web Information Systems
INFO 435	Seminar on Applications of Information Science
INFO 440	Advanced Human-Computer Interaction
INFO 447	Social and Economic Data
INFO 450	Language and Technology
INFO 490	Independent Reading and Research
INFO 491	Teaching in Information Science, Systems, and Technology
INFO 515	Culture, Law, and Politics of the Internet
INFO 530	The Architecture of Large-Scale Information Systems
INFO 614	Cognitive Psychology
INFO 630	Representing and Accessing Digital Information
INFO 634	Information Technology in Sociocultural Context
INFO 635	Seminar on Applications of Information Science
INFO 640	Human-Computer Interaction Design
INFO 685	The Structure of Information Networks

COMPUTING

in the Arts

Cornell now has a formal administrative structure for Computing in the Arts . . . a Concentration in the College of Arts and Sciences with tracks in Music, Psychology and Computer Science, and a structure to greatly facilitate the adding of other tracks.

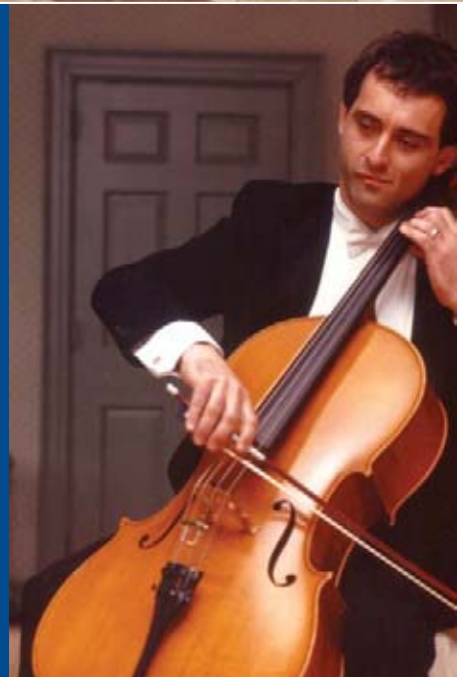
Thanks to the efforts of CS Professor Graeme Bailey, the Department of Computer Science, a coalition of arts college faculty including Carol Krumhansl (psychology), and 2005 Pulitzer Prize winner Steve Stucky (music), undergraduates in the College of Arts and Sciences will now be able to select an official academic concentration called Computing in the Arts. The computer plays a role in almost every aspect of human life, and its influence and potential now extend routinely not only to technical and commercial pursuits but also into the realms of the imaginative and the aesthetic. In announcing the news, CS Chair Charles Van Loan remarked: The Computing in the Arts concentration offers students opportunities to use computers to realize works of art, to study the perception of artistic phenomena, and to think about new, computer-influenced paradigms and metaphors for the experiences of making and appreciating art. Faculty from several departments in the college offer courses toward the concentration, drawing on disciplines in the arts, the social sciences, the humanities, and the physical sciences.



"Musical Gateway", City of Anaheim, CA Arrowhead Pond of Anaheim East Entrance Public Art Project. This commission was awarded to the artist team of Nancy Mooslin, Sandra Rowe and Steven Stucky. For more information, see <http://www.nancymooslin.com/publicarts/publicarts.tpl>

CIS 165

Over the centuries, artists in a wide variety of media have employed many approaches to the creative process, ranging from the philosophical to the mechanical to the virtual. CIS 165: Computing in the Arts, unravels some of the mysteries going on inside software used for art and music. We look at ways of breaking things apart and sampling and ways of putting things together and resynthesizing, and we explore ideas for creation.



Research Grants

Funded Research - Computing & Information Science / Computer Science

INVESTIGATOR	SPONSOR	AWARD	TITLE
Bala	PCCW	11,000	Constrained Texture Synthesis for Computer Graphics
Bala	NSF	75,000	Feature-based Rendering
Birman	AFOSR	427,608	A Testbed for Highly-scalable Mission-critical Information Systems (DURIP)
Birman	AFRL sub of Vanderbilt	209,000	Prometheus: Enhancing the Quality of Service of the Joint Battlespace Infosphere
Birman	Intel	180,000	Using QuickSilver to support Autonomic Services in Clusters
Birman / Gehrke / Demers	AFOSR	4,000,000	Scalable Technology for a New Generation of Collaboration Applications
Birman / Gehrke / Francis	DARPA	1,153,371	QuickSilver: Middleware for Scalable Self-regenerative Systems
Cardie	NSF	500,000	Reducing the Corpus Annotation Bottleneck for Natural Language Learning
Cardie	ARDA sub of U Pittsburgh	463,368	Opinions in Question Answering
Cardie	Xerox	20,000	Machine Learning in Natural Language Processing
Caruana	NSF	507,000	CAREER: Meta Clustering: Improving User Efficiency on Real-world Clustering Applications
Caruana / Joachims	NSF	270,000	Optimizing Classification Models to Application-Specific Performance Metrics
Caruana / Gehrke / Joachims	IBM	51,386	KDD Evaluation Proposal
Constable	AF sub of ATC-NY	29,000	SCorES, A Logical Programming Environment for Distributed Systems
Constable	NSF	460,000	Enabling Large Scale Coherency Among Mathematical Texts in the NSDL
Constable	NSF	300,000	Innovative Programming Technology for Embedded Systems
Constable	AFOSR	165,054	A Computation Infrastructure for Knowledge-based Development of Reliable Software Systems (DURIP)
Elber	ACS - PRF	80,000	Molecular Dynamic Simulations of EPR Spectra in Proteins
Elber	NIH	1,314,937	Long Time Dynamics of Biomolecules
Elber	NIH	500,000	A Computer Cluster for Computational Biology
Francis	NSF	496,421	SP: Very Fine-grained Proximity Addressing
Francis	Cisco	91,695	Next Generation NAT and Firewall Traversal
Gehrke	NSF	235,000	Interactive and Online Data Mining
Gehrke	NSF	210,000	Scalable Decision Tree Construction
Gehrke	NSF	340,000	CAREER: Towards Sensor Database Systems
Gehrke	NSF	500,000	SENSORS: Data-driven Sensor Networks
Gehrke	Sloan	40,000	Sloan Research Fellowship
Gehrke	Microsoft	35,000	Data Mining for Scientific Applications
Gehrke	Microsoft	50,000	PetaByte Data Management and Analysis Services for Data-driven Science
Gehrke	Xerox	20,000	Trend and Sequence Mining
Gehrke	IBM	100,000	Knowledge Dissemination and Discovery (KDD) Challenge Problem Experiment
Gehrke / Demers	KD-D thru NSF	1,626,200	Distributed Mining and Monitoring
Gehrke / Sirer / Shanmugasundaram	NSF	913,320	ITR: Massively Convergent Distributed Computing
Demers / Birman			
Ginsparg	NSF	958,798	E-print Archive
Ginsparg	NSF	796,395	Classification, Analysis and Navigation Tools for Physics Research Communication
Gomes	AFRL	5,000,000	Intelligent Information Systems Institute
Halpern	ONR	526,058	Software Quality and Infrastructure Protection for Diffuse Computing
Halpern	NSF	300,000	Towards Improved Logics For Reasoning About Security
Halpern	ONR sub of U Penn	189,000	Trustworthy Infrastructure, Mechanisms, and Experimentation for Diffuse Computing
Halpern	AFOSR	429,816	Reasoning About Authorization and Security
Halpern	AFOSR	322,788	Formulating and Reasoning About Security Policies
Halpern	ONR	354,763	A Logical Foundation for Reasoning About Security

INVESTIGATOR	SPONSOR	AWARD	TITLE
Hopcroft / Selman	NSF	300,000	ITR: Emerging Communities in Large Linked Networks: Theory Meets Practice
Joachims	NSF	400,000	CAREER: Improving Information Access by Learning from User Interactions
Joachims	NSF	14,000	Student Poster Program and Travel Scholarships for the Twenty-second International Conference on Machine Learning (ICML 2005)
Joachims / Caruana	NSF	270,000	Discriminative Methods for Learning with Dependent Outputs
Kleinberg	Packard	625,000	Algorithmic Methods for Networks
Kleinberg / Lee/ Cardie/ Selman	NSF ITR	450,000	The Construction and Analysis of Information Networks
Kozen	NSF	210,000	Kleene Algebra
Krafft	NSF sub of UCAR	320,000	National Science Digital Library Subcontract
Kreitz	NSF	285,000	Proof Automation in Constructive Type Theory
Lagoze	Mellon sub of U VA	510,325	The Open Source FEDORA Repository Development Project
Lagoze	Mellon sub of U VA	711,763	The Open Source FEDORA Repository Development Project: Phase II
Lagoze / Warner	NSF	865,550	II: Pathways
Lee / Kleinberg	NSF	449,897	Graph-based Approaches to Text Processing
Lee	Sloan	40,000	Sloan Research Fellowship
Marschner	NSF	412,000	CAREER: Modeling the Properties and Appearance of Materials
Morrisett	AFOSR / PECASE	820,000	Next Generation Systems Languages
Myers	NSF	349,999	CAREER: Practical Language-based End-to-end Security
Myers	Sloan	40,000	Sloan Research Fellowship
Myers	NSF	330,000	End-to-end Integrity and Confidentiality for Distributed Systems
Myers / Birman / Schneider	NSF	1,600,000	Integrating Security and Fault Tolerance in Distributed Systems
Pingali	DARPA sub of IBM	255,000	PERCS: Phase II
Pingali	NSF sub of U Delaware	236,826	A Framework for Developing Complex Applications on High-End Petaflop-class Machines
Pingali	NSF sub of U Illinois	590,000	ITR/SY: A New Framework for Program Optimization
Pingali	IBM	40,000	High-performance Computing
Pingali	NSF	400,000	CSR-AES: Collaborative Research: Library Generators for Advanced Execution Systems
Pingali / Rugina	NSF	850,000	NGS: A System for Semi-automatic Application-level Checkpointing of Parallel Programs
Pingali / Stodghill	NSF	100,000	CSR-AES: Mobile Applications in Computational Grids
Schneider	AFOSR	592,657	CIPIAF for Information Assurance Institute
Schneider	AFOSR	4,138,325	AFRL/Cornell Information Assurance Institute
Schneider	Intel	20,000	Research on Language-based Security
Schneider / Morrisett	AFOSR	471,107	Trust in Security-policy Enforcement Mechanisms
Schneider / Morrisett / Kozen / Myers	ONR	4,247,977	CIP Language-based Security for Malicious Mobile Code
Schneider	AFRL sub of Dolphin Technology	250,000	Secure Cross-domain Information Sharing Basic Research Process
Selman	DARPA sub of SRI	637,793	Analyzing Heuristic Approaches to Real-time, Distributed Coordination Problems
Selman / Gomes / Kreitz	DARPA / AFRL	3,580,000	Boosting Reasoning Technology Through Randomization, Structure Discovery, and Hybrid Strategies
Sengers	NSF	500,000	CAREER: Using Cultural Theory to Design Everyday Computing
Sengers	FIG	50,000	Faculty Innovation in Teaching Grant Program
Shanmugasundaram	NSF	406,750	CAREER: Towards Unifying Database Systems and Information Retrieval Systems
Tardos	NSF	150,000	Approximation Algorithms and Applications in Network Games
Tardos	ONR	1,176,548	Algorithmic Issues in Network Design and in Information Access
Tardos	ONR	375,000	Network Games and Approximation Algorithms
Tardos / Zabih	NSF	300,000	ITR/SY: Combinatorial Optimization Algorithms for Information Access
Yona	NSF	1,103,917	CAREER: Global Self-organization of all Known Proteins - Toward a Complete Map of the Protein Space

TOTAL EXPENDITURES FOR FISCAL YEAR 2004-2005: \$ 14,818,100

Research Grants, continued

Collaborative Research at Cornell

INVESTIGATOR	SPONSOR	AWARD	TITLE
Birman / Sirer / ECE	NSF	1,250,000	NETS-NOSS: Ultra Low-power Self-configuring Wireless
Birman / Schneider / Sirer / ECE	NSF	3,200,000	Team for Research in Ubiquitous Secure Technology (TRUST)
Caruana / Riedewald / Lab of Ornith	NSF	2,701,622	ITR-(ASE+EVS)- (dmc+sim): Tracking Environmental Change through the Data Resources of the Bird-monitoring Community
Caruana / CTC	NSF	379,999	Multi-algorithm Parallel Optimization of Costly Functions
Chew / Vavasis / MAE	NSF	1,393,410	ITR-(ASE)-(sim+dmc):Collaborative Research:Algorithms for Large-scale Simulations of Turbulent Combustion
Coleman / CTC	USDA	207,085	Computation Agriculture Initiative
Coleman / CTC	TG Information Network	225,000	Financial Engineering and Tools
Coleman / CTC	EPA	28,440	Design, Setup, and Testing of High Performance Computing Cluster to Support Water Modeling Needs at EPA
Coleman / CTC	Unisys	125,000	Collaboration and Equipment Loan Agreement: Collaboration Services Agreement
Demers / Huttenlocher / Kleinberg / Marschner / Astronomy / CTC	NSF	1,799,183	Petabyte Storage Services For Data-driven Science
Elber / Joachims / CTC	NIH	1,043,276	Optimization of Folding and Threading Potential
Elber / BSCB	anonymous	715,806	Two-track Program in Computational Biology and Medicine (CBM) as a Part of the Tri-Institutional Research Program
Guckenheimer / Math / Physics / CCB / MBG / Biomedical / Mole Med / Eng / Soc	NSF	3,371,200	IGERT: Program in Nonlinear Systems
Krafft / Arms / Lagoze / Eng Library / Comm	NSF	8,845,453	Collaborative Project: Core Integration - Leading NSDL Toward Long-Term Success
Pingali / CTC	NSF	1,500,000	CISE Research Infrastructure: A Two-tier Computation and Visualization Facility for Multiscale Problems
Pingali / Vavasis / Chew / CTC / Phy	NSF ITR	5,035,425	Adaptive Software for Field-driven Simulations
Selman / Gomes / MAE	AFOSR MURI sub of UCLA	255,763	Cooperative Control in Uncertain Adversarial Environments
Sirer / Gehrke / Demers / ECE	NSF	410,000	The Ad Hoc Classroom: Integrating Emerging Wireless Communications and Networking Technologies into Mainstream Computer Science and Electrical Engineering Curricula
Tardos / Kleinberg / Huttenlocher / Halpern / OR&IE / Econ	NSF	2,468,677	ITR: Networks of Strategic Agents: Theory and Algorithms
Vavasis / CEE	NSF	500,000	MSPA-MCS: Automatic Geometric Simplification
Yona / Bio Sci	NSF	1,000,000	CRCNS: Modeling Pathfinding and Target Recognition in the Olfactory System

Submitted Grant Proposals

Birman	DARPA sub of Telcorda	955,286	Adaptive Cognition-enhanced Radio Teams (ACERT)
Caruana	DHS sub of Media	33,000	A Commercially Available Software Product with Advanced Predictive Modeling Techniques
Caruana	NIH sub of UCLA	398,757	National Centers for Biomedical Computing
Constable	AF sub of ATC-NY	225,000	Scores, A Logical Programming Environment for Distributed Systems, Phase II
Constable	NSF	375,000	The Foundations of Proof Technology
Elber	NIH sub of U Pitt	58,305	Computational Prediction of Biomolecular Dynamics
Elber	NIH sub of MN	632,000	Exploring Reaction Pathways in Enzymes with Enhanced Sampling Methods

INVESTIGATOR	SPONSOR	AWARD	TITLE
Francis	ARDA sub of Telcordia	190,166	RapidTrace: Rapid Traceback of Cyber Attacks
Gehrke	NSF	450,000	Collaborative Research: Mining and Monitoring Situational Streams
Gehrke / Riedewald	NSF	449,531	Processing Data Streams: From Formal Semantics to Efficient Implementation
Halpern	ONR sub of ITT	150,000	Designing a Policy Language
Halpern	NSF	394,733	Taking Awareness, Language, and Novelty into Account in Decision-making and Game Theory
Hopcroft / Selman	NSF	474,991	The Analysis and Modeling of Large Linked Networks
Huttenlocher	NSF	599,486	Part-based Object Recognition Without Feature Detection
Joachims	BSF	22,500	Efficient Non-parametric Revelation of Ordinal Preferences
Keich	NIH	1,326,521	Motif Finding and Statistical Evaluations of Genomic Scale Datasets
Marschner	Unilever	81,000	Scattering and Computer Visualisation of Human Hair
Pingali / Stodghill	NSF	1,273,267	Mobile Applications in Computational Grids
Rugina	NSF	374,915	Compiler and Run-time Support for Memory Management Using Explicit Memory Reclamation
Schneider	AFOSR	773,378	From Fault-tolerance to Attack Tolerance
Sengers	NSF	439,342	Collaborative Research: Closing the Affective Gap
Shanmugasundaram / Demers	NSF	749,318	Hilda: A High-level Language for Data-driven Web Applications

Submitted Collaborative Research at Cornell

Arms / Huttenlocher / Kleinberg / Soc	NSF	1,999,990	Very Large Semi-structured Datasets for Social Science Research
Bala / PCG	NSF	522,429	Unifying Multi-Resolution Materials, Illumination, and Geometry for Scalable Image Synthesis
Cardie / Law / Hotel	NSF	750,000	Natural Language Processing Support for eRulemaking
Elber / Keich / Chew / CCB	NIH	2,250,000	Towards Optimal Detection, Alignment, and Structural Refinement
Gehrke / LEPP	NSF	1,500,000	DDDAS-TMRP: Developing Dynamic Data Driven Application Systems to Enhance the Performance of Particle Accelerators
Lagoze / Warner / Joachims / Comm	NSF	749,759	SCORE
Marschner / PCG	NSF	399,662	Unifying Geometric and Volumetric Light Scattering for Accurate Rendering of Dense Geometry
Pingali / Gomes / CTC	NSF	1,919,714	DDDAS-TMRP: An Aircraft Damage Adaptive Control System

New Faculty

Robert D. Kleinberg

Assistant Professor,
Department of Computer Science

rdk@cs.cornell.edu

<http://www.cs.cornell.edu/home/rdk>



Robert Kleinberg earned a bachelor's degree in mathematics from Cornell in 1997 and a Ph.D. in mathematics from M.I.T. in 2005. He joins the Cornell CS faculty as an assistant professor. During the 2005-2006 academic year, he will be on leave of absence to do research as an NSF postdoctoral fellow at Berkeley.

Kleinberg's research focuses on the design and analysis of algorithms, especially randomized and on-line algorithms for networked systems and electronic markets. His work has applied online learning theory to electronic commerce (pricing and reputation systems) as well as routing (adaptively estimating shortest paths). Before receiving his doctorate from M.I.T., Kleinberg worked for several years at Akamai Technologies, developing systems for Internet mapping and measurement and for scalable delivery of live streaming media. This led to an ongoing interest in network optimization problems such as oblivious routing, in which a network must make routing decisions without global knowledge of the traffic distribution, and network coding, which studies the possibility of using network bandwidth more efficiently by mixing data from multiple sources. His other research interests include algorithms for fast matrix multiplication and models for complex large-scale networks.

2004 – 2005 Publications

"Adaptive Routing with End-to-end Feedback: Distributed Learning and Geometric Approaches". *Journal of Computer and System Sciences*, special issue on computational learning theory. Extended abstract appeared in *Proceedings of the Thirty-sixth ACM Symposium on Theory of Computing* (STOC 2004):45-53. (With B. Awerbuch)

"(Almost) Tight Bounds and Existence Theorems for Confluent Flows". In the *Proceedings of the Thirty-sixth ACM Symposium on Theory of Computing* (STOC 2004 - invited for special issue of the *SIAM Journal of Computing*):529-538. (With J. Chen, L. Lovasz, R. Rajaraman, R. Sundaram, and A. Vetta)

"Degree Distribution of Competition-induced Preferential Attachment Graphs". To appear in *Combinatorics, Probability, and Computing*. Extended abstract appeared in *Proceedings of the Thirty-first International Colloquium on Automata, Languages, and Programming* (ICALP 2004):208-221. (With N. Berger, C. Borgs, J. Chayes, and R. D'Souza)

"Adaptive Limited-supply Online Auctions". In the *Proceedings of the Fifth ACM Conference on Electronic Commerce* (EC 2004):71-80. (With M. Hajiaghayi, and D. Parkes)

"A Transport Layer for Live Streaming in a Content Delivery Network". In the *Proceedings of the IEEE, Special Issue on Evolution of Internet Technologies* 92(9):1408-1419 (September, 2004). (With L. Kontothanassis, R. Sitaraman, J. Wein, D. Hong, B. Mancuso, D. Shaw, and D. Stodolsky)

"Nearly Tight Bounds for the Continuum-armed Bandit Problem". In *Advances in Neural Information Processing Systems* (NIPS 2004) 17:697-704.

"A Multiple-choice Secretary Problem with Applications to Online Auctions". In the *Proceedings of the Sixteenth ACM-SIAM Symposium on Discrete Algorithms* (SODA 2005):630-631.

"Isomorphism and Embedding Problems for Infinite Limits of Scale-free Graphs". In the *Proceedings of the Sixteenth ACM-SIAM Symposium on Discrete Algorithms* (SODA 2005):277-286. (With J. Kleinberg)

"Oblivious Routing in Node-capacitated and Directed Graphs". In the *Proceedings of the Sixteenth ACM-SIAM Symposium on Discrete Algorithms* (SODA 2005):782-790. (With M. Hajiaghayi, T. Leighton, and H. Racke)

"Online Client-server Load Balancing without Global Information". In the *Proceedings of the Sixteenth ACM-SIAM Symposium on Discrete Algorithms* (SODA 2005):197-206. (With B. Awerbuch, M. Hajiaghayi, and T. Leighton)

"Provably Competitive Adaptive Routing". In the *Proceedings of the Thirty-first IEEE INFOCOM* (INFOCOM 2005). (With B. Awerbuch, D. Holmer, and H. Rubens)

"Online Auctions with Re-usable Goods". In the *Proceedings of the Sixth ACM Conference on Electronic Commerce* (EC 2005). (With M. Hajiaghayi, M. Mahdian, and D. Parkes)

"Competitive Collaborative Learning". In the *Proceedings of the Eighteenth Annual Conference on Learning Theory* (COLT 2005). (With B. Awerbuch)

2004 - 2005 Lectures

"Distributed Trust and Multi-agent Learning in a Dynamic Environment." Microsoft Silicon Valley Research Center Seminar (July 2004), University of Washington CS Theory Seminar (August 2004).

"Online Client-server Load Balancing without Global Information". Sixteenth ACM-SIAM Symposium on Discrete Algorithms (January 2005).

"Isomorphism and Embedding Problems for Infinite Limits of Scale-free Graphs". Sixteenth ACM-SIAM Symposium on Discrete Algorithms (January 2005).

"A Multiple-choice Secretary Problem with Applications to Online Auctions". Sixteenth ACM-SIAM Symposium on Discrete Algorithms (January 2005).

"Adaptive Algorithms for Electronic Markets". Toyota Technological Institute Seminar (February 2005).

"Adaptive Algorithms for Price-Setting and Overlay Routing". Caltech Information Science and Technology Seminar (February 2005), Carnegie Mellon Tepper School of Business Seminar (April 2005), Cornell University Computer Science Colloquium (April 2005), Harvard University Computer Science Colloquium (March 2005), Microsoft Silicon Valley Research Center Seminar (January 2005), Stanford University Management Science and Engineering Seminar (February 2005), University of Massachusetts at Amherst Computer Science Colloquium (February 2005), University of California at San Diego Computer Science Colloquium (February 2005), University of Washington Computer Science Colloquium (March 2005).

"Online Auctions with Re-usable Goods". Sixth ACM Conference on Electronic Commerce (June 2005).

Awards and Honors

Fannie and John Hertz Foundation Fellowship
NSF Mathematical Sciences Postdoctoral Research Fellowship

Adam Siepel

Assistant Professor,
CIS, joint with the Department of Biological
Statistics and Computational Biology

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Adam Siepel obtained a bachelor's degree in agricultural and biological engineering from Cornell in 1994, his MS degree in computer science from the University of New Mexico in 2001, and his Ph.D. degree in computer Science from the University of California in 2005. He is currently with the Center for Biomolecular Science and Engineering and the Department of Computer Science at the University of Santa Cruz. He will join the Faculty of CIS in January, 2006.

Siepel's research interests lie in the area where computer science, statistics, evolutionary biology, and genomics meet. His most recent work has been in comparative genomics, particularly of mammals, and has included a mixture of statistical modeling, algorithms development, software implementation, and scientific discovery. Siepel likes to tackle problems of practical importance in genomics, such as gene finding and conserved element identification, using methods from machine learning and statistics. He also strives to maintain an evolutionary perspective on comparative genomics, and draws heavily from the field of molecular phylogeny. Siepel has written a popular program for conservation analysis called phastCons, and a phylogenetic gene (exon) prediction program called ExoniPhy. He did his Ph.D. work with David Haussler, a leader in machine learning, computational biology, and comparative genomics.

**2004 – 2005 Publications**

"Evolutionarily Conserved Elements in Vertebrate, Insect, Worm, and Yeast Genomes". *Genome Research* 15:1034-1050 (2005). (With G. Bejerano, J. S. Pedersen, W. Miller, D. Haussler, and others)

"Computational Screening of Conserved Genomic DNA in Search of Functional Noncoding Elements". *Nature Methods* 2:535-45 (2005). (With G. Bejerano, W. J. Kent, and D. Haussler)

"Phylogenetic Hidden Markov Models," in *Statistical Methods in Molecular Evolution*, R. Nielsen, editor :325-351, Springer, New York (2005). (With D. Haussler)

"Sequencing and Comparative Analysis of the Chicken Genome Provide Unique Perspectives on Vertebrate Evolution". International Chicken Genome Sequencing Consortium. *Nature* 432:695-716 (2004).

"The ENCODE (ENCyclopedia Of DNA Elements) Project". ENCODE Project Consortium. *Science* 306:636-640.

"Efficient Approximations for Learning Phylogenetic HMM Models from Data. In *Intelligent Systems for Molecular Biology 2004* and *Bioinformatics* 20:1161-168 (2004). (With V. Jojic, N. Jojic, C. Meek, D. Geiger, D. Haussler, and D. Heckerman)

"Computational Identification of Evolutionarily Conserved Exons". In *Proceedings of the Eighth Annual International Conference on Research in Computational Biology* :177-186 (2004). (With D. Haussler)

"Phylogenetic Estimation of Context-dependent Substitution Rates by Maximum Likelihood". *Molecular Biology and Evolution* 21:468-488 (2004). (With D. Haussler)

2004 - 2005 Professional Activities

Member, ENCODE Project Consortium

Member, International Chicken Genome Sequencing Consortium

Reviewer, Genome Research, PLoS Biology, PLoS Computational Biology, Molecular Biology and Evolution, Bioinformatics, BMC Bioinformatics

Conference reviewer: ISMB/ECCB (2004), ECCB (2005)

Awards and Honors

Graduate Research and Education in Adaptive bio-Technology (GREAT) Fellowship, University of California Biotechnology Research and Education Program (UCBREP) (2004-2005)

Achievement Rewards for College Scientists (ARCS) Scholarship (2003-2004)

Best Student Paper, Sixth International Conference on Research in Computational Molecular Biology (2002)

UC Santa Cruz Chancellor's Fellowship (2002)

Empire State Scholarship (1990)

CIS Faculty and Senior Researcher Profiles

Stuart Allen

Research Associate, Department
of Computer Science



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Stuart Allen received a bachelor's degree in computer science from the University of New Orleans in 1978, and a Ph.D. in computer science from Cornell University in 1987. He has held several positions at Cornell since, and is currently a research associate in the Department of Computer Science.

Allen's principal interest is in making computer-manipulable formal data an adjunct to, and ideally a medium for, precise human expression, especially argument. This involves the design, justification and employment of practical formal systems and notations.

The bulk of his work has been in relation to the PRL project (<http://www.nuprl.org>), which has traditionally focused on constructive theory of types and proof by means of tactics. In addition to theory, application and explanation of type-theory based practice, he has been interested in formalizing and exploiting conventional mathematical notations, as well as the development of interfaces for user immersion in bodies of formal data.

Most recently, Allen's efforts (as part of the PRL project) have been directed at designing methods for implementing digital collections grounded in formal material, especially proof, emphasizing theoretical neutrality and anticipating the coexistence of material with distinct, possibly conflicting, formal bases, entailing the need for strict yet extensible logical accounting.

William Y. Arms
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Computer Science

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William Arms received his B.A. in mathematics from Oxford University in 1966, and his M.Sc. (Econ) from the London School of Economics in 1967. He obtained his doctorate (D.Phil.) in operational research from the University of Sussex in 1973. He has been a professor in the Department of Computer Science since 1999.

Arms's interests concentrate on Web information systems, digital libraries, and electronic publishing. These fields integrate methods from many disciplines, so that the work ranges from technical topics, such as distributed computing and information representation, to the economic and social aspects of change. His book, *Digital Libraries*, was published by the M.I.T. Press in winter 2000. Since 1996, he has been engaged with the National Science Foundation's project to build a large scale digital library for science education (NSDL). The Cornell digital libraries research group has a major grant to build the core system for this library. He is also a member of the Petabyte Data Store project, which is building a very large-scale tesbed of snapshots of the Web going back to 1996. One of Arms's principal interests is the change in scientific publication as online materials replace printed journals as the primary means of creating, storing, and distributing research information.

Professor Arms has recently completed a period as chair of the ACM Publications Board. He is a member of the ERIC Steering Committee and an adviser to the American Law Institute's study, *Principles of the Law of Software Contracts*.



2004 – 2005 Publications

"Mixed Content and Mixed Metadata: Information Discovery in a Messy World". In *Metadata in Practice*, edited by D. Hillmann and E. Westbrook, ALA Editions in 2004. (With C. R. Arms)

2004 – 2005 Professional Activities

American Law Institute, Principles of the Law of Software Contracts
ERIC Steering Committee
Series Editor, M.I.T. Press series on Digital Libraries and Electronic Publishing
National Research Council, Public - Private Partnerships in the
Provision of Weather and Climate Service
Program committee, Joint Conference on Digital Libraries

2004 – 2005 University Activities

Director, eCornell
Member, Cornell University Library Board
Member, Faculty Senate

Selected Publications

"A Spectrum of Interoperability: The Site for Science Prototype for the NSDL." *D-Lib Magazine* 8(1) (January 2002).

<http://www.dlib.org/dlib/january02/arms/01arms.html> (With others)

Digital Libraries. M.I.T. Press (2000).

"Key Concepts in the Architecture of the Digital Library." *D-Lib Magazine* (July 1995).
<http://www.dlib.org/dlib/july95/07arms.html>



Graeme Bailey
Professor, Department of
Computer Science

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Originally working in low-dimensional topology and combinatorial group theory, through an odd mixture of circumstances Dr. Bailey has become actively involved in research in mathematics and medicine. One of two ongoing research projects in this area is the modeling of lung inflation, together with a research group at the Class One Trauma Center at the Upstate Medical University, Syracuse, NY. This is in the early stages of a program to extend to various pathologies affecting elasticity and aimed towards effective clinical treatments. The group, having made some significant advances in answering questions that had remained unsolved for over 30 years, is now in the process of trying to obtain reliable mathematical models. This involves building computer simulations of dynamic packing results under constrained perturbations and deformations.

The other project is in understanding deformations of trans-membrane proteins used in cell-signaling processes. This is a carefully constrained version of the protein-folding problems that have been exciting the mathematical biology community in recent years; the application of a topological viewpoint in collaborating with molecular pharmacologists and structural biologists has already yielded some intriguing insights.

More recently, his interests have migrated to mathematical modeling of various biological systems (the geometry of lung inflation, and protein deformations in cell signaling). He can also be found giving concerts (piano and cello- not simultaneously), on various ice rinks refereeing hockey games, with Cornell EMS, or even occasionally on the judo mat. Professor Bailey also spends many evenings at Risley Hall as a faculty fellow where he is given the opportunity to do what he does best- advise and challenge the students.

2004 – 2005 University Activities

Adjunct Professor; Mathematics
Director, Computer Science Masters of Engineering Program
Member, WCHI-Development and Transition Committee
Member, Master of Engineering Committee
Member, Cornell EMS

2004 – 2005 Professional Activities

Member, Fellowship Selection Committees: Rhodes, Marshall, Churchill, and Fullbright
Member, Board of Directors of Engineers without Frontiers USA
Member, Advisory Board for CURIE
Member, Faculty Committee for Residence Life
Member, Health Careers Advisory Board Committee
Faculty Advisor, Judo Club
Faculty Advisor, Cornell Lunatics Club
Risley Faculty Fellow

Awards and Honors

Kendall Carpenter Advising Award
ACSU Faculty of the Year, 2004

Kavita Bala

Assistant Professor, Department
of Computer Science

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Kavita Bala's research is in the area of computer graphics. Graphics data sets are becoming increasingly complex, driven by user demand and new acquisition technology. Bala's research focus is on two related areas: scalable representations of complex data sets, and scalable algorithms for high-fidelity, interactive rendering of complex synthetic and augmented-reality scenes. Her research interests include algorithms and systems for interactive rendering; image-based modeling and texturing; and feature-based rendering and texturing.

Bala received her Ph.D. in computer science at the Massachusetts Institute of Technology (M.I.T.). Before joining the CS department, she was a post-doctoral researcher in the Program of Computer Graphics at Cornell University.

2004 – 2005 Publications

"Implementing Lightcuts". *Siggraph 2005 Technical sketch* (2005). (With B. Walter, S. Fernandez, A. Arbree, M. Donikian, and D. P. Greenberg)

"Lightcuts: A Scalable Approach to Illumination". In *SIGGRAPH 2005 Conference Proceedings, Annual Conference Series*. ACM SIGGRAPH, ACM SIGGRAPH, M. Gross, editor, (July 2005).

(With B. Walter, S. Fernandez, A. Arbree, M. Donikian and D. P. Greenberg)

Rendering Techniques 2005. Springer-Verlag (2005). (K. Bala and P. Dutre, editors)

"Feature-based Textures". In the *Fifteenth Eurographics Symposium on Rendering* (2004). (With G. Ramanarayanan, and B. Walter)

**2004 – 2005 University Activities**

Curie Project Organizer, Summer 2005

2004 – 2005 Professional Activities

Co-chair, Eurographics Symposium on Rendering 2005

Program Committee, Eurographics Symposium on Point-based Computer Graphics 2005

Program Committee, Graphics Interface 2005

Papers Program Committee, SIGGRAPH 2004

Program Committee, Eurographics Symposium on Rendering (EGSR) 2004

Program Committee, Pacific Graphics 2004

Program Committee, Eurographics Symposium on Point-based Computer Graphics 2004

Posters Program Committee, SIGGRAPH 2004

Awards and Honors

Receipient, PCCW Affinito/Stewart Grant

Selected Publications

"Combining Edges and Points for Interactive High-quality Rendering". In *SIGGRAPH 2003 Conference Proceedings, Annual Conference Series*. ACM SIGGRAPH, ACM

SIGGRAPH, J. Hodgins, editor, (July 2003). (With B. Walter, and D. P. Greenberg)

Advanced Global Illumination. A K Peters Ltd. 2003. ISBN: 1-56881-177-2. (With P. Dutre and P. Bekaert. Foreword by P. Shirley)

"Adaptive Shadow Maps". In *SIGGRAPH 2001 Conference Proceedings, Annual Conference Series*. ACM SIGGRAPH, E. Fiume, editor, (July 2001). (With R. Fernando, S. Fernandez, and D. P. Greenberg)

Kenneth P. Birman
Professor, Department of
Computer Science



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Ken Birman obtained a bachelor's degree in computer science at Columbia University in 1978 and a Ph.D. in computer science at the University of California, Berkeley, in 1981. He joined the faculty of the Department of Computer Science in 1982.

Birman's research is concerned with scalability, reliability and security in modern networked environments. In past work on the Isis system, his software became a central part of the New York Stock Exchange and Swiss Stock Exchange (in both settings, Isis runs the core messaging component used to distribute new stock quotes and information about trades reliably and securely), the French air traffic control system (Isis is used to keep clusters of 3 to 5 controller workstations synchronized and handles failures), the US Naval Aegis warship's radar system, and other mission-critical computer networks.

Birman's current focus is on a new system called "QuickSilver", (<http://www.cs.cornell.edu/Info/Projects/QuickSilver>), a DARPA-funded effort to build a platform in support of a new generation of scalable, secure, reliable distributed computing applications able to "regenerate" themselves after failure. The basic idea is to develop a platform that integrates elegantly with modern software platforms, such as Web Services, but offers major advances with respect to the communication options normally included in those platforms. QuickSilver will support a group communication layer that exploits peer-to-peer gossip to gain tremendous scalability improvements over prior work, and offers a range of reliability and time-critical event notification options. The system will also be self-managed, using techniques we initially developed in our work on a system called Astrolabe. Target applications include very large data centers and military "GIG" systems that use publish-subscribe to integrate

applications across a diverse collection of underlying enterprises and systems.

Birman also heads the Software Tools research area for TRUST, a new NSF Science and Technology Center. He was named an ACM Fellow in 1999 and won the Stephen '57 and Marilyn Miles Excellence in Teaching Award in 2000. He was Editor-in-chief of *ACM Transactions on Computer Systems* from 1993 to 1997,; Founder and CEO of two companies (Isis Distributed Systems and Reliable Network Solutions), and has consulted extensively for the US government and other organizations. Software he developed is used today to run the New York and Swiss Stock Exchanges, the French Air Traffic Control System, the Navy's AEGIS warship, and in many other mission-critical applications, and technologies invented by his group are central to many commercial reliability products.

2004 - 2005 Publications

Reliable Distributed Systems: Technologies, Web Services and Applications. Springer-Verlag 675 pp. (April 2005). ISBN 0-387-21509-3.

"Building Network-centric Military Applications over Service-oriented Architectures". *SPIE Defense and Security Symposium 2005* Orlando, Florida (March 29-31, 2005). (With R. Hillman, and S. Pleisch)

"Overcoming Communications Challenges in Software for Monitoring and Controlling Power Systems". *Proceedings of the IEEE* 9(5) (May 2005). (With J. Chen, K. M. Hopkinson, R. J. Thomas, J. S. Thorp, R. van Renesse, and W. Vogels)

Scalable, Self-organizing Technology for Sensor Networks. Advances in Pervasive Computing and Networking, Bulent Yeler, editor. Springer Science and Business Media, Inc. New York, NY :1-15 (October 2004). (With S. Guha, and R. Murthy)

"Like it or not, Web Services are Distributed Objects!" *Communications of the ACM* 47:60-62 (December 2004).

2004 - 2005 University Activities

Member, University Committee on Conflicts
Member, Responsible Conduct of Research Committee
Member, Engineering College Policy Committee
Member, Leadership Council for the Faculty of Computing and Information Science
Chairman, CIS Building committee

2004 - 2005 Professional Activities

Chair, Program Committee for the 2005 ACM Symposium on Operating Systems Principles (SOSP-20)
Invited lectures at ICSE 2004 (Scotland), Microsoft, Intel, McGill University, Rome Air Force Research Laboratories, and NDIST-04

Awards/Honors

Stephen and Marilyn Miles Excellence in Teaching Award (2000)
ACM Fellow (1998)

Selected Publications

"Astrolabe: A Robust and Scalable Technology for Distributed System Monitoring Management, and Data Mining". *ACM Transactions on Computer Systems* 21(2):164-206 (May 2003). (With R. van Renesse, and W. Vogels)

"How to Securely Replicate Services. *ACM Transactions on Programming Languages and Systems* 16(3): 986-1009 (May 1994). (With M. Reiter)

"Exploiting Virtual Synchrony in Distributed Systems". *Eleventh ACM Symposium on Operating Systems Principles* (December 1987). (With T. Joseph)

Martin Burtscher

Assistant Professor, School of Electrical and Computer Engineering
Member of the Graduate Field of Computer Science



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<http://www.cs.cornell.edu/~burtscher/>

Martin Burtscher received his Ph.D. degree in computer science from the University of Colorado at Boulder in 2000 and his combined BS/MS degree in computer science from the Swiss Federal Institute of Technology (ETH) Zurich in 1996. He is an assistant professor in ECE at Cornell.

Dr. Burtscher leads the High-performance Microprocessor Systems Group in the Computer Systems Laboratory at Cornell University. His current work focuses on microprocessor cores, self-optimizing hardware, energy efficiency, processor simulators, trace compression, MPI libraries, and compiler optimizations.

To meet the continuing demand for ever-faster and more energy-efficient CPUs, high-end microprocessors depend on new architectural features and compiler optimizations. Designing, evaluating, and improving novel architectures and code optimizations as well as the corresponding research infrastructure is an important focus of professor Burtscher's research.

Ongoing projects include devising value-based compiler optimizations, making microprocessors more energy efficient without compromising their performance, designing adaptive and self-optimizing hardware, studying superspeculative execution cores, evaluating novel compression approaches for program traces, enhancing the performance and scalability of MPI libraries, and developing portable high-speed processor simulators.

2004 - 2005 Publications

"Reducing Communication Time through Message Prefetching". In the *Proceedings of the 2005 International Conference on Parallel and Distributed Processing Techniques and Applications* :557-563, Las Vegas, NV (2005). (With J. Ke, and E. Speight)

"On the Role of the Brain's Geometry in Closed Head Injuries". In the *Proceedings of the 2005 Summer Bioengineering Conference*, Vail, CO (2005). (With I. Szczyrba)

"Numerical Modeling of Brain Dynamics in Traumatic Situations - Impulsive Translations". In the *Proceedings of the 2005 International Conference on Mathematics and Engineering Techniques in Medicine and Biological Sciences* :205-211. Las Vegas, NV (2005). (With I. Szczyrba)

"On the Importance of Optimizing the Configuration of Stream Prefetchers". In the *Proceedings of the 3rd Annual ACM SIGPLAN Workshop on Memory Systems Performance* :54-61, Chicago, IL (2005). (With I. Ganusov)

"Complex Load-Value Predictors: Why We Need Not Bother". In the *Proceedings of the Fourth Annual Workshop on Duplicating, Deconstructing, and Debunking* :16-24, Madison, WI (2005). (With N. B. Sam)

"On the Energy-efficiency of Speculative Hardware." In the *Proceedings of the 2005 ACM International Conference on Computing Frontiers* :361-370, Ischia, Italy (2005). (With N. B. Sam)

"Automatic Generation of High-performance Trace Compressors." In the *Proceedings of the 2005 International Symposium on Code Generation and Optimization* :229-240. San Jose, CA (2005). (With N. B. Sam)

"Automatic Synthesis of High-speed Processor Simulators." In the *Proceedings of the Thirty-seventh Annual IEEE/ACM International Symposium on Microarchitecture* :55-66, Portland, OR (2004). (With I. Ganusov)

"Runtime Compression of MPI Messages to Improve the Performance and Scalability of Parallel Applications." In the *Proceedings of the SC 2004 High-performance Computing, Networking and Storage Conference*, Pittsburgh, PA (2004). (With J. Ke and E. Speight)

"Exploiting Type Information in Load-value Predictors." In the *Proceedings of the Second Value-prediction and Value-based Optimization Workshop* :32-39, Boston, MA (2004). (With N. B. Sam)

2004 - 2005 Lectures

"The Development of an Effective Trace-compression Algorithm". University of Wisconsin-Madison, Department of Electrical and Computer Engineering, Madison, WI.

"Automatic Generation of High-performance Trace Compressors". 2005 International Symposium on Code Generation and Optimization, San Jose, CA.

"Designing a High-performance Trace-compression Algorithm", IBM Corporation. Austin, TX.

"Automatically Synthesizing High-speed Processor Simulators". University of Colorado at Boulder, Department of Computer Science, Boulder, CO.

"Automatic Synthesis of High-speed Processor Simulators". Thirty-seventh Annual IEEE/ACM International Symposium on Microarchitecture, Portland, OR.

2004 - 2005 Professional Activities

Associate Editor, *Journal of Instruction-Level Parallelism*

Co-chair, Second Value-prediction and Value-based Optimization Workshop

Program Committee Member, Third International Symposium on Code Generation and Optimization
Reviewer: *International Conference on Parallel Architectures and Compilation Techniques*, *ACM Transactions on Architecture and Code Optimization*, *Journal of Instruction-level Parallelism*, *International Symposium on Code Generation and Optimization*, *ACM Transactions on Modeling and Computer Simulation*, *International Symposium on High-performance Computer Architecture*

2004 - 2005 University Activities

Member, Computer Advisory Committee, ECE

Awards and Honors

Recognition of Service Award, Association for Computing Machinery (ACM)

Claire Cardie

Associate Professor, Department
of Computer Science
Charles and Barbara Weiss
Director of Information Science

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Claire Cardie obtained a B.S. in computer science from Yale University in 1982 and an M.S. and Ph.D. in computer science at the University of Massachusetts at Amherst in 1994. She has been a faculty member of the computer science department at Cornell since 1994.

Cardie's research is in the area of natural language processing. In particular, her group has focused both on building systems for large-scale natural language processing tasks like information extraction, question answering, and multidocument summarization, and on developing machine learning techniques to address underlying theoretical problems in syntactic and semantic analysis of natural language. Her group is currently working on summarization and information extraction for opinion-oriented texts, cross-document coreference resolution, optimization of natural language learning algorithms for arbitrary performance metrics, and weakly supervised algorithms for natural language learning.

Cardie is a recipient of a NSF Faculty Early Career and Development (CAREER) Award (1996-2000) and was program chair for the Second Conference on Empirical Methods in Natural Language Processing in 1997. She has been secretary of the Association for Computational Linguistics Special Interest Group on Natural Language Learning (1999-2001), and recently completed successive elected two-year terms as secretary of the North American Association for Computational Linguistics (2000-2003). She will be program chair of the joint ACL/Coling conference in 2006 in Sidney, Australia.



2004 – 2005 Publications

"Playing the Telephone Game: Determining the Hierarchical Structure of Perspective and Speech Expressions". In the *Proceedings of the Twentieth International Conference on Computational Linguistics (COLING 2004)* :120-126 (2004). (With E. Breck)

"Low-level Annotations and Summary Representations of Opinions for Multi-perspective Question Answering". In *New Directions in Question Answering* :87-98, Mark Maybury, editor, AAAI Press/MIT Press (2004). (With J. Wiebe, T. Wilson, and D. Litman)

"Annotating Expressions of Opinions and Emotions in Language". *Language Resources and Evaluation* 1:2 (2005). (With J. Wiebe, and T. Wilson)

"Evaluating an Opinion Annotation Scheme using a New Multi-perspective Question and Answer Corpus". In *Computing Attitude and Affect in Text: Theory and Practice*, Shanahan, Qu, and Wiebe, editors (2005). (With Y. Stoyanov, J. Wiebe, D. Litman)

"Graduate Study in Information Science at Cornell University". *CHI-2005 Workshop on Graduate Education in Human-Computer Interaction, 2005*. (With L. Lorigo, G. Gay, and P. Sengers)

2004 – 2005 Lectures

"Noun Phrase Coreference Resolution for Information Extraction: Supervised and Weakly Supervised Methods". Invited Talk, Belgium and The Netherlands Workshop on Machine Learning for Information Extraction, University of Antwerp (March 2005).

"Machine Learning for Noun Phrase Coreference Resolution". University of Saarbruecken (February 2005).

2004 – 2005 Professional Activities

Action Editor, *Journal of Machine Learning Research*
Associate Editor, *Journal of Artificial Intelligence Research*

Editorial Board Member, *Machine Learning*

Executive Board Member, SIGDAT, Special Interest Group of the Association for Computational Linguistics for Linguistic Data and Corpus-based approaches to NLP

Member, North American Association for Computational Linguistics Nominating Committee
Program Committee Member, Ninth International Conference on Computational Natural Language Learning (CoNLL)

Panel Member, Student Session, Forty-second Annual Meeting of the Association for Computational Linguistics (ACL)

2004 – 2005 University Activities

Co-director, Information Science Program

Director of Undergraduate Studies, Information Science (A&S, CALS)

Co-director of Undergraduate Studies, Information Science, Systems and Technology

Member, CIS Council

Member, Cornell Presidential Research Scholars Board

Member, Provost's Advisory Group of Women in Science and Engineering (WISE)

Independent Major Advisor

Member, College Scholar Advisory Board

Member, Independent Major Advisory Board

College Scholar Advisor

Independent Major Advisor

Awards and Honors

National Science Foundation Faculty Early CAREER Development Award (1996-2000)

Ralph S. Watts College of Engineering Excellence in Teaching Award, Cornell University (1996)

Lilly Teaching Fellow, Cornell University (1996-1997)

Best Written Paper Award, Ninth National Conference on Artificial Intelligence, Honorable Mention (1991)

Graduate Fellow, University of Massachusetts (1993-1994)

Massachusetts Regents Fellowship, University of Massachusetts (1992-1993)

Rich Caruana

Assistant Professor, Department
of Computer Science



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<http://www.cs.cornell.edu/~caruana>

Rich Caruana obtained his Ph.D. in computer science from Carnegie Mellon University in 1998. Currently he is an assistant professor in CS, where he does research in machine learning and data mining. His current focus is on ensemble learning, inductive transfer, adaptive clustering, and applications of these to problems in bioinformatics, medical decision-making and weather forecasting.

Inductive transfer is a subfield of machine learning where better performance is achieved by learning many related problems together — it is easier to learn 100 related problems than to learn any one of those problems in isolation. Caruana helped create this subfield of machine learning by publishing the first paper on multitask learning ten years ago.

In 2000-2001 Caruana led a team of researchers that developed the first automated system for the early detection of bioterrorist releases of anthrax. The system applies data mining to consumer purchases in supermarkets to look for unexplained increases in the sales of products such as cough syrup that may signal the onset of symptoms from a recent attack. Because consumers tend to self-medicate using easily available products such as cough syrup and throat lozenges before consulting physicians, the system can detect the onset of flu-like symptoms 24-48 hours before these can be detected by visits to hospitals and doctors offices.

Caruana's work in ensemble learning and clustering are new focuses for him. His interest in clustering arose from limitations he discovered when applying traditional clustering methods to a protein-folding problem. Caruana recently received an NSF Career Award to pursue this research in clustering. The research in ensemble learning arose from an empirical comparison of machine learning methods he and students were performing where an ensemble of different learning methods outperformed ensembles of any individual learning methods. The ensemble selection method they are developing may be the first high-performance machine learning method that can be optimized to almost any performance metric.

A theme that runs through all of Professor Caruana's work is the importance of developing methods that are effective on real-world problems. He likes to mix algorithm development with applications work to insure that the methods he develops are useful in practice.

2004 – 2005 Publications

"Obtaining Calibrated Probabilities from Boosting". *International Conference on Uncertainty in Artificial Intelligence* :413-420 (2005).

"Predicting Good Probabilities". *2005 International Conference on Machine Learning (ICML)* (received a best student paper award). (With A. Niculescu-Mizil). Also an oral presentation at the 2005 Snowbird Workshop on Machine Learning.

"Predicting Dire Outcomes of Patients with Community Acquired Pneumonia." *The Journal of Biomedical Informatics* (2005). (With G. F. Cooper, V. Abraham, C.F. Aliferis, J. Aronis, B. G. Buchanan, M.J. Fine, J.E. Janosky, G. Livingston, T. Mitchell, S. Monti, and P. Spirtes)

"KDD Cup 2004: Results and Analysis". *SIGKDD Explorations* 6(2) :95-108 (2004).

2004 – 2005 Lectures

TTI-Chicago Machine Learning Summer School, invited lecturer, (May 2005).

Rensselaer Polytechnic Institute (RPI), Troy, NY (April 2005).

University of California at San Diego (UCSD) (January 2005).

Yahoo! Research Labs, Pasadena, CA (January 2005).

Fair Isaac Research, San Diego, CA, (January 2005).

American Meteorology Conference (AMS05), invited speaker (January 2005).

2004 – 2005 Professional Activities

Co-chair of the KDD-CUP for the 2004 ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD*2004).

Co-Chair of Workshop on Predicting Probabilities, Neural and Information Processing Systems (NIPS) (2004)

Awards and Honors

Merrill Presidential Scholars Associate Faculty Member, Cornell University (2005)

NSF Career Award (May 2004)

Sonny Yau Excellence in Teaching Award, Cornell University (2003-2004)

Nomination for Best Paper: "Evaluating the C-section Rate of Different Physician Practices: Using Machine Learning to Model Standard Practice". American Medical Informatics Conference (AMIA) (November 2003). (With S. Niculescu, B. Rao, and C. Simms)

Award for Outstanding Research Contribution, Philips Labs (1988)

Selected Publications

"Learning from Libraries of Models with Ensemble Selection". *2004 International Conference on Machine Learning (ICML)*. (With A. Niculescu-Mizil, G. Crew, and A. Ksikes)

"Data Mining in Metric Space". *2004 International Conference on Knowledge Discovery and Data Mining (KDD2004)*. (With A. Niculescu-Mizil)

L. Paul Chew

Senior Research Associate,
Department of Computer Science



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Paul Chew received his Ph.D. in computer science from Purdue University in 1981. He served as a faculty member at Dartmouth College until 1988 when he joined CS at Cornell as a senior research associate.

Chew's primary research interest is in geometric algorithms with an emphasis on practical applications. These practical applications have included placement, motion planning, shape comparison, vision, sensing, mesh generation, molecular matching, and protein shape-comparison. The work on protein shape-comparison has been used as part of the evaluation scheme for CAFASP (Critical Assessment of Fully Automated Structure Prediction), a "competition" held every two years to evaluate the performance of fully automatic servers for protein-structure prediction. Chew developed *backwards analysis* a method now widely-used for analyzing randomized algorithms. Chew's work on mesh generation has been motivated by the finite element method, a technique for finding approximate solutions to partial differential equations. The first step of this method is to create a mesh, i.e. to divide the given problem region into simple shapes called elements. For complex geometries mesh generation can be difficult. Chew has developed methods for automatically generating a high-quality mesh. This work is being used in a large, multi-disciplinary project: developing adaptive software for field-driven simulations.

Chew is the associate editor for the *Journal of the Pattern Recognition Society*. He is also a member of the steering committee for the International Meshing Roundtable.

2004 – 2005 Lectures

"The Consensus Structure for a Protein Family". Computer Science Colloquium, College of William and Mary (October 2004).

2004 – 2005 Professional Activities

Associate Editor, *Pattern Recognition: the Journal of the Pattern Recognition Society*

Steering Committee Member, International Meshing Roundtable

Member of the Program Committee, 2005 ACM Symposium on Computational Geometry

Selected Publications

"Finding the Consensus Shape for a Protein Family". *Algorithmica* 38(1): 115-129 (October 2003). (With K. Kedem)

"Guaranteed-quality Mesh Generation for Curved Surfaces". In the *Proceedings of the Ninth Symposium on Computational Geometry* :274-280, ACM Press (1993).

"There are Planar Graphs Almost as Good as the Complete Graph". *Journal of Computer and System Sciences* 39(2): 205-219 (1989).

Thomas F. Coleman

Professor, Department of Computer Science
Director, Cornell Theory Center
Director, CTC-Manhattan



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<http://www.tc.cornell.edu/~coleman/>

Thomas F. Coleman obtained his bachelor's in mathematics in 1975, and his master's in mathematics in 1976, both from the University of Waterloo. He received a Ph.D. in mathematics from Waterloo as well, in 1979. During 2004, he was a professor of computer science and applied mathematics at Cornell, and also the director of both the Cornell Theory Center (CTC)—a center for the support of large-scale computational science, and CTC-Manhattan, a computational finance consulting center in New York City.

With colleagues Yuying Li, Shirish Chinchalkar, Peter Mansfield, and Cristina Patron, Coleman worked on developing a variety of tools and methods for computational finance in the areas of portfolio management and options pricing (and hedging). Several Ph.D. students in the Center for Applied Mathematics were also involved in this work, including Jay Henniger, Siddharth Alexander, and Katharyn Boyle.

Coleman's specific interests include the computation of implied volatility surfaces from option prices, hedging techniques, index tracking, portfolio optimization, and the use of parallel computing techniques in computational finance.

Coleman is the author of two books on computational mathematics, the editor of four proceedings, and has published over sixty journal articles. He was chair of the SIAM Activity Group on Optimization (1998-2001) and is on the editorial board of numerous professional journals.

2004 – 2005 Publications

"Financial Computations on Clusters using Web Services". In *Lecture Notes in Computer Science* 3515: 76-83 (April 2005). (With S. Chinchalkar, P. Mansfield)

"Hedging Guarantees in Variable Annuities (under both Market and Interest Rate Risks). In the *Proceedings of the Fourteenth Annual Derivative Securities and Risk Management Conference*, New York (April 23-24, 2004).

2004 – 2005 Lectures

"Minimizing VaR, CvaR and Hedging Issues for a Portfolio of Derivatives". IMACS Iterative Methods Conference, Fields Institute, Toronto (May 5, 2005).

"Risk Management: Computational Issues and Directions". Aspeed, seminar, New York (April 12, 2005).

"Minimizing VaR, CvaR and Hedging Issues for a Portfolio of Derivatives". Credit Risk Asia (March 21, 2005). Singapore.

2004 – 2005 University Activities

Director, Cornell Theory Center

2004 – 2005 Professional Activities

Director, CTC-Manhattan (formerly, Financial Industry Solutions Center)

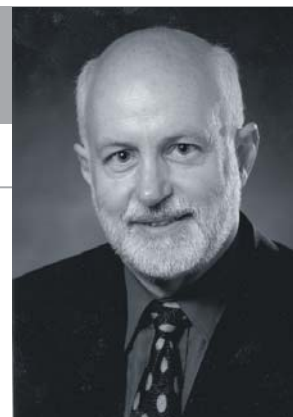
Member, International Visiting Committee: Computational Finance Engineering program, National University of Singapore (2004-)

Member, HPC Advisory Committee to the Council on Competitiveness (2004-2007)

Editorial Board: Computational Optimization and Applications (1992-)

Editorial Board: Applied Mathematics Letters (1989-)

Referee/Reviewer: Numerous professional journals



Robert Constable

Professor, Department of Computer Science
Dean of the Faculty of Computing and
Information Science

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<http://www.cs.cornell.edu/home/rc/>

Robert Constable is the Dean of the Faculty of Computing and Information Science and a professor in CS. He obtained his Ph.D. in mathematics from the University of Wisconsin in 1968. He served as CS chair from 1994 to 1999. He was also acting chair from 1993 to 1994.

Constable's research has focused on building a system called a logical programming environment (LPE). It provides substantial automation in the design, coding, verification, and evolution of large software systems. Generally an LPE will integrate programming languages and logics. In his group's case, they integrate the ML programming language and a programming logic based on type theory. Reasoning about ML programs is founded on type theoretic semantics for ML. The LPE also integrates a compiler, a theorem prover, and a formal digital library. Constable's group uses the latest version of Nuprl as the prover.

He is also working with others to build a Formal Digital Library that will allow interactive access to theorems and proofs from Nuprl, MetaPRL, PVS and other major theorem provers. The Library includes over ten thousand theorems. Many of these are used in system verification, but a large number are from general mathematics. These general theorems are a valuable resource. The group is funded by NSF to further develop and explore the concept of a formal digital library of formal constructive mathematics built around these theorems. Their theorem provers are used in a variety of other projects as well, including the creation of formal courseware by S. Allen, the translation of formal proofs into natural language by Amanda Holland-Minkley, the automatic analysis of the computational complexity of higher-order programs by Ralph Benzinger, and efficient reflection being designed and implemented by Eli Barzilay.

Constable is the director of the PRL Project, and a member of the Cognitive Studies executive committee; the applied math policy committee; and the LICS General committee. He serves as editor for the *Journal of Logic and Computation*; *Formal Methods in System Design*; and *The Computer Journal*.

2004 – 2005 Publications

"A Graph-based Approach towards Discerning Inherent Structures in a Digital Library of Formal Mathematics". In *International Conference on Mathematical Knowledge Management, Lecture Notes in Computer Science*, Springer-Verlag 2004. (With L. Lorigo, J. Kleinberg, and R. Eaton)

"Knowledge-based Synthesis of Distributed Systems using Event Structures". (With M. Bickford, and J. Halpern)

2004 – 2005 Lectures

"Foundations for the Management of Formal Mathematical Knowledge", Nijmegen (2004).

"Update on the Faculty of Computing and Information Science", Microsoft (2004).

Verifying Distributed Protocols using a Logic of Events", Intel (2004), Microsoft (2004), Rome Labs (2004).

2004 - University Activities

Dean: Computing and Information Science

Committee Member: Life Sciences Deans; ILR Dean Search

2004 - Professional Activities

Member, Advisory Council, Computer Science Department, Princeton University

Member, Advisory Board Review Committees: UC Irvine School of Information Science; University of Chicago Department of Computer Science

Editor: *Journal of Logic and Computation*; *Formal Methods in System Design*; *The Computer Journal*

Director, NATO Summer School, Marktoberdorf, Germany

Member, General Committee, LICS

Member, Computing Research Association Board

Awards and Honors

ACM Fellow (1995)

Guggenheim Fellow (1991)

Cornell Outstanding Educator Award (1989)

Alan J. Demers

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of Computer Science



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<http://www.cs.cornell.edu/~demers>

Alan J. Demers received his bachelor's degree in physics from Boston College in 1970. He obtained his Ph.D. degree in computer science from Princeton University in 1975. Demers was at Cornell between 1974 and 1985, a principal scientist at Xerox Parc from 1985 to 1995, and architect at Oracle from 1995 to 2000, and he returned to Cornell in 2000.

Demers' research concerns aspects of databases and distributed systems.

As part of the Cougar Project, he is studying "sensor database systems" using novel forms of in-network processing to do energy-efficient query processing over sensor networks.

With Johannes Gehrke, Mirek Riedewald, and others, he is studying stream-processing databases. The group is studying efficient query evaluation and multi-query optimization for extensions of publish-subscribe systems. It is also considering the formal underpinnings of such systems, developing an algebra of events that can describe parameterization and aggregation.

With Ken Birman, John Hopcroft, Robbert van Renesse, and others, he is studying randomized "gossip protocols". Such protocols are highly fault-tolerant and, when properly designed, extremely scalable as well. The group is studying convergence properties of variants of the basic protocol tailored to specific application requirements. It is also investigating algorithms that maintain approximate group membership views with provable probabilistic guarantees against partitioning under "churn".

2004 – 2005 Publications

"Correctness of a Gossip Based Membership Protocol". In *ACM Conference on Principles of Distributed Computing* (July 2005). (With A. Alavena and J. Hopcroft)

"Decentralized Schemes for Size Estimation in Large and Dynamic Groups". In the *Proceedings of the Fourth IEEE International Symposium on Network Computing and Applications*, Cambridge, MA, July 2005. (With K. Birman, I. Gupta, D. Kostoulas, and D. Psaltoulis)

"Research Issues in Mining and Monitoring of Intelligence Data". In *Data Mining: Next Generation Challenges and Future Directions*, H. Kargupta, A. Joshi, K. Sivakumar, and Y. Yesha, eds., MIT/AAAI Press (2005). (With J. Gehrke and M. Riedewald)

"A Vision for PetaByte Data Management and Analysis Services for the Arecibo Telescope". *Bulletin of the Technical Committee on Data Engineering, IEEE Computer Society* 27(4) (December 2004). (With M. Calimlim, J. Cordes, J. Deneva, J. Gehrke, D. Kifer, M. Riedewald and J. Shanmugasundaram)

Shimon Edelman

Professor

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Computer Science, and Information Science



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Shimon Edelman received his Ph.D. in computer science from the Department of Applied Mathematics and Computer Science at the Weizmann Institute, Rehovot, Israel, in 1988. He taught and conducted research at M.I.T., Weizmann Institute, and at the University of Sussex (UK), before assuming his current position at Cornell, where he is professor of psychology, and member of the graduate fields in psychology, computer science, and information science.

Professor Edelman has been the recipient of the Yigal Alon Fellowship, and of the Levinson Prize in Mathematics, the latter for his contributions to the computational study of human vision. Over the years, Edelman has taught courses and led seminars that matched his wide range of interests in cognitive sciences. His research in the past dealt with motor control, reading, perceptual learning, visual recognition and categorization, and computational linguistics. His present interests focus on vision (object recognition and scene perception) and language (acquisition and processing).

Edelman works on developing mathematical solutions to the problems at hand, on experimental assessment of these solutions as models of human cognition, and on bringing the theoretical understanding of cognition to bear on data from neurobiological studies of the brain.

Publications stemming from this research appeared in journals ranging from computational (such as the *IEEE Transactions on Pattern Analysis and Machine Intelligence*) to empirical (*Neuron*), spanning the fields of vision (*International Journal of Computer Vision*; *Vision Research*) and language (*Journal of Computational Linguistics*; *Journal of Linguistics*). Edelman's book, *Representation and Recognition in Vision*, was published by M.I.T. Press in 1999. He is currently writing a new book on computational cognitive psychology.

2004 – 2005

Publications

"A behavioral handle on the phenomenology of scene perception". In the *Proceedings of the Vision Sciences Society meeting* (2005). (With C. M. Hunter)

"The Interaction of Shape- and location-based Priming in Object Categorisation: Evidence for a Hybrid What+Where Representation Stage". *Vision Research* 45:2065-2080 (2005). (With F. N. Newell, D. Sheppard, and K. Shapiro)

"Bridging Computational, Formal and Psycholinguistic Approaches to Language". In the *Proceedings of the Twenty-sixth Cognitive Science Society Conference*, Chicago, IL (August 2004). (With Z. Solan, D. Horn, and E. Ruppin)

"Unsupervised Context Sensitive Language Acquisition from a Large Corpus". In the *Proceedings of the 2003 Conference on Neural Information Processing Systems (NIPS-15)*, L. Saul, editor, M.I.T. Press (2004). (With Z. Solan, D. Horn, and E. Ruppin)

2004 – 2005 Lectures

"Structured Cognition: from Vision to Language, with a Brief Detour via Motor Control", Machines and Locomotion series colloquium, Cornell University (March 2005).

"Unsupervised Learning of Natural Languages", Johns Hopkins University, CLSP colloquium (October 2004).

"Object Recognition and Categorization: Some Lessons from Psychophysics, Neurobiology and Computer Vision", CVPR-2004 Workshop on Generic Object Recognition, Washington, DC (June 2004).

2004 – 2005 University Activities

Committee Member, A&S admissions (spring 2005).

Member, steering committee (and past director), Cornell Cognitive Studies Program

2004 – 2005 Professional Activities

Associate Editor, *Cognitive Science*

Associate Editor, *Behavioral and Brain Sciences*

Awards and Honors

1988-1990: Chaim Weizmann Postdoctoral Fellowship

1990-1992: Koret Foundation Postdoctoral Fellowship

1992-1995: Yigal Alon Fellowship

1994-1998: Sir Charles Clore Career Development Chair

1996: Levinson Prize in Mathematics

Ron Elber

Professor, Department of
Computer Science
Director of bioinformatic project,
Bridging the Rift

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<http://www.cs.cornell.edu/ron/>

Ron Elber obtained a bachelor's degree in chemistry and physics in 1981, and a Ph.D. in theoretical chemistry in 1984 at the Hebrew University of Jerusalem. He was a postdoctoral fellow in theoretical biophysics from 1984-1987 at Harvard University. Ron was on the chemistry faculty of the University of Illinois (1987-1992) and on the chemistry and biology faculty at Hebrew University (1992-1999). Since 1999 he has been on the CS faculty at Cornell where he is currently a full professor. Ron is also a faculty member of the Department of Biological Statistics and Computational Biology.

Ron's research is in computational biology and bioinformatics. His group is developing novel tools (MOIL) to simulate dynamics of biological macromolecules. His current research focuses on algorithms to extend the time scales of simulations, and to study complex processes such as the kinetics of protein folding. Ron's techniques for path following and enhanced sampling are in wide use and motivated the development of related algorithms. His bioinformatic investigations focus on protein annotation, using sequence-to-structure matches (LOOPP). LOOPP linked a gene that influences the size of the tomato fruit with a human protein that controls cell growth and may cause cancer.

**2004 – 2005 Publications**

"Revisiting and Parallelizing SHAKE". *Journal of Computational Physics* (2005). (With Y. Weinbach)

"Atomically Detailed Potentials to Recognize Native and Approximate Protein Structures". *Proteins, Structure, Function, and Bioinformatics* (2005). (With J. Qiu)

"Long-timescale Simulation Methods". *Current Opinion in Structural Biology* 15:151-156 (2005).

"Probing Sequence-structure Relationships in Proteins: Application of Simple Energy Functions to the Inverse Folding Problem". In the *Proceedings of the NATO School on Soft Matter Physics*, Edinburgh (2004). (With J. Qiu, L. Meyerguz, and J. Kleinberg)

"Computing Time Scales from Reaction Coordinates by Milestoning". *Journal of Chemical Physics* 120:10880-10889 (2004). (With A. K. Faradjian)

"The Evolutionary Capacity of Protein Structures". *RECOMB 04* (With L. Meyerguz, D. Kempe, and J. Kleinberg)

"Computational Analysis of Sequence Selection Mechanisms". *Structure* 12:547-557 (2004). (With L. Meyerguz, C. Grasso, and J. Kleinberg)

2004 – 2005 Professional Activities

Member, Editorial Board: *Biophysical Journal*; *Theoretical Chemistry Accounts*; *Computer Physics Communication*

2004 – 2005 University Activities

Director, Ithaca campus of the Tri-Institutional Program in Computational Biology; The Computational Biology Service Unit; The Library of the Desert

Awards and Honors

The Stein Award for Ph.D. studies (1984)

The Camille and Henry Dreyfus New Faculty Award (1987-1990)

University of Illinois Scholar (1991-1992)

The Alon New Faculty Award (1992-1994)

The Bergman Award (1994)

Selected Publications

"Cloning, Transgenic Expression and Function of fw2.2: a Quantitative Trait Locus Key to the Evolution of Tomato Fruit". *Science* 289:85-88 (2000). (With A. Frary, C. Nesbitt, A. Frary, S. Grandillo, E. van der Knaap, B. Cong, J. Liu, J. Meller, K. B. Alpert, and S. D. Tanksley)

"Anharmonic Wave Functions of Proteins: Quantum Self-consistent Field Calculations of BPTI". *Science* 268:1319-1322 (1995). (With A. Roitberg, R.B. Gerber, and M.A. Ratner)

"Multiple Conformational States of Proteins: A Molecular Dynamics Analysis of Myoglobin" *Science* 235:318 (1987). (With M. Karplus)

K-Y. Daisy Fan

Assistant Professor, Department of
Computer Science

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<http://www.cs.cornell.edu/~dfan/>

Daisy Fan obtained her B.Sc. and M.Sc. degrees in civil engineering at the University of Manitoba, Canada, in 1994 and 1997 respectively, and her Ph.D. degree in civil and environmental engineering at Cornell University in 2002. She is currently an assistant professor in CS. Her research interests include the application of systems-analysis techniques for water resources and environmental problems. Problems she has investigated include optimal control of multiple-reservoir operation using stochastic dynamic programming and river basin water quality management. She researches and applies collaborative learning strategies and is developing a robotics control module to teach programming concepts in an introductory programming course. Along with Professor David Schwartz, Fan develops the CS100/211 Academic Excellence Workshops which use collaborative strategies to enhance student learning in programming.

Fan is a member of the Faculty Leadership Committee for CURIE, an engineering outreach program for high school girls who excel in sciences and mathematics. As a Faculty Fellow, she organizes activities to link the academic and residential lives of students who live on campus.

Fan is the recipient of the Cornell Society of Engineers Achievement Award (2004), and several graduate teaching assistant awards (1999-2001).



2004 – 2005 Publications

"Penalized Regression Dynamic Programming (PR-DP) for High-dimensional Continuous-state Stochastic Control Problems with Application to Reservoir Operation". (2005). (With C. Shoemaker and D. Ruppert)

"First Programming Course in Engineering: Balancing Tradition and Application". *Computers in Education Journal* 14(3): 55-60 (July-September 2004). (With D. Schwartz)

2004 – 2005 University Activities

Reviewer for Center for the Environment (Cornell) Graduate Research Grant Program

College of Arts & Science Admissions Committee (spring 2005)

Member, Faculty Leadership Committee for CURIE—plan the summer outreach program for high school girls

Faculty Advisor, FIRST Robotics Club, Cornell—assist and mentor high school and middle school students who compete in the annual FIRST Robotics and FIRST Lego League competitions

Faculty panels and hosting events for Engineering admission

Faculty Fellow—develop academic and social programs for students who live on campus

2004 – 2005 Professional Activities

American Society for Engineering Education Annual Conference and Exposition, Portland, OR (June 2005)

American Society for Engineering Education St. Lawrence Section Conference, Binghamton, NY (April 2005)

SIGCSE Technical Symposium, St. Louis, MO (February 2005)

Awards and Honors

Cornell Society of Engineers Achievement Award (2004)

Graduate Teaching Assistant Award (CS, Cornell, 2000, 2001)

New York State American Water Works Association Russell L. Sutphen Scholarship (2000)

John E. Perry Teaching Assistant Prize (Civil and Environmental Engineering, Cornell, 1999)

Natural Sciences and Engineering Research Council (NSERC Canada) Postgraduate Scholarship (1994-96)

Paul Francis

Associate Professor, Department
of Computer Science

francis@cs.cornell.edu

<http://www.cs.cornell.edu/people/francis>

Paul Francis received his Ph.D. from the University College London (UCL) in 1994. Dr. Francis is one of the industry's foremost scientists in large-scale routing and addressing and internetworking. He has nearly twenty years of research experience in network routing and addressing, large-scale self-configuring networks, and distributed peer-to-peer search.

Francis has done research at MITRE Corporation, Bellcore, NTT Software Labs, and ACIRI (now ICIR), and was chief scientist at two startups, FastForward Networks and Tahoe Networks. Dr. Francis' innovations include NAT (Network Address Translation), multicast shared trees (used in PIMSM and CBT), shortcut routing, and landmark routing. His work anticipated two key IPv6 concepts: the unique host identifier (from Pip) and the use of multiple addresses for multihomed sites.

Dr. Francis' research interests looking forward are in the areas of network management (configuring, provisioning, debugging), Internet scaling and addressing (IP anycast deployment, scalability of Internet routing, IP-level DDoS architectures), IP connectivity (NAT and secure firewall traversal), P2P networks (overlay multicast, organization of unstructured overlays, host proximity) and TCP performance.

Dr. Francis has chaired two IETF working groups, and has published numerous RFCs, U.S. and international patents, and research papers.

**2004 – 2005 Publications**

"Towards a Deployable IP Anycast Service" *First Workshop on Real, Large Distributed Systems (WORLDS '04)* December 2004). (With H. Ballani)

"MPAT: Aggregate TCP Congestion Management as a Building Block for Internet QoS". Twelfth IEEE International Conference on Network Protocols (ICNP 2004) (October 2004). (With M. Singh, and P. Pradhan)

"NUTSS: A SIP-based Approach to UDP and TCP Network Connectivity". *SIGCOMM Future Directions in Network Architecture (FDNA-04) Workshop* (August 2004). (With S. Guha, and T. Yutaka)

2004 – 2005 Lectures

"Firebreak: A DDoS Guard Deployment Architecture", presented at IBM Research, AT&T Research, Sprint Research, NTT Research (Tokyo), Google, and the IAI@Rome Summer Seminar Series.

"ChunkySpread Overlay Multicast," Poster Session, NSDI05. (With V. Venkatraman)

2004 – 2005 Professional Activities

Panelist, US Dept. of Commerce IPv6 Workshop

Member, NLR Network Research Board

P2P session organizer, IEEE Computer Communications Workshop (CCW) 2004

Program Committee, NSDI05 (Networked Systems Design and Implementation)

Program Committee, WCW05 (Web Caching Workshop)

Invited Participant, NSF Workshop on Overcoming Barriers to Disruptive Innovation in Networking

Invited Participant, Microsoft Summit, Self-Managing Networks

Awards and Honors

Co-PI, Darpa IPTO, SRS (Self-Regenerative Systems)

Eric Friedman

Associate Professor, School of Operations Research
and Industrial Engineering
Member of the Graduate Field of Computer Science

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<http://www.orie.cornell.edu/~friedman/>

Eric Friedman received an A.B. in physics from Princeton (1985) and a M.A. in physics (1987) and M.S. and Ph.D (1993) in operations research from Berkeley. He was on the faculty at Duke (decision sciences) and Rutgers (economics) before joining the faculty in ORIE at Cornell in 2001.

Eric's research is at the intersection of game theory, computer science and operations research. Current projects include: constructing reputation systems for peer-to-peer networks, designing fair and efficient web-serving algorithms, and allocating bandwidth in heterogeneous wireless systems. He is also interested in self-organized-critical systems, learning in games and the geometric structure of cost allocation methods.

2004 - 2005 Publications

"Algorithms for Power Allocation in Multiple Access Channels. In the *Proceedings of the Canadian Workshop on Information Theory 2005* (2005). (With Y. Shi)

"Fair and Robust Power Allocation Rules for Multiple Access Channels". In the *Proceedings of the Canadian Workshop on Information Theory 2005*.

"A Generic Analysis of Selfish Routing". In the *Proceedings of the Forty-third IEEE Conference on Decision and Control* (2004).

"Paths and Consistency in Additive Cost Sharing". *International Journal of Game Theory* 32(4):501-51(2004).

**2004 - 2005 Lectures**

"Algorithms for Power Allocation in Multiple Access Channels, 2004. Canadian Workshop on Information Theory 2005. (With Y. Shi)

"Fair and Robust Power Allocation Rules for Multiple Access Channels, 2004". Canadian Workshop on Information Theory 2005.

"Fair and Robust Power Allocation Rules for Multiple Access Channels", Beijing (August 2005).

"Manners and Etiquette in the Unlicensed Bands, The Economics, Technology and Policy of Unlicensed Spectrum", Michigan State University (2005).

"Scaling, Renormalization, and Universality in Combinatorial Games: the Geometry of Chomp". BIRS Combinatorial Game Theory Workshop (2005).

"A Generic Analysis of Selfish Routing", Forty-third IEEE Conference on Decision and Control, Nassau (December 2004).

2004 - 2005 Professional Activities

Co-chair: Third workshop on the Economics of Peer-2-Peer Networks.

Co-organizer: The Economics, Technology and Policy of Unlicensed Spectrum

Geri Gay

Professor

CIS, joint with Communication

**gkg1@cornell.edu****<http://www.comm.cornell.edu/faculty/gay.html>**

Geri Gay is the director of the Human Computer Interaction Group (HCI Group) and a professor and chair in the Department of Communication. She received her Ph.D. from Cornell in 1985.

The HCI Group is a research and development group whose members design and research the use of computer-mediated learning environments. Current research focuses on the use and design of PDAs for communication and collaboration (funded by Intel). Other research examines navigation issues, knowledge management, mental models and metaphors (NSF), knowledge representations, collaborative work and learning (NASA and AT&T Foundation), and system design of interactive computing systems.

Professor Gay teaches courses in computer-mediated communication, human-computer interaction, and the social design of communication systems.

Publications

Activity-centered Design: An Ecological Approach to Designing Smart Tools and Usable Systems. Cambridge, MA: M.I.T. Press (2004). (With H. Hembrooke)

"Culturally Embedded Computing". *IEEE Pervasive Computing, Special Issue on Art, Design and Entertainment in Pervasive Environments* (2004). (With P. Sengers, J. 'J.' Kaye, K. Boehner, J. Fairbank, E. Medynskiy, and S. Wyche)

"Eye-tracking Analysis of User Behavior in WWW Search". In the *Proceedings of the Twenty-eight Annual ACM Conference on Research and Development in Information Retrieval (SIGIR '04)*, Sheffield, UK (2004). (With L. Granka, and T. Joachims)

"The Determinants of Web Page Viewing Behavior: An Eye Tracking Study". In the *Proceedings of Eye Tracking Research and Applications*, S.N. Spencer, editor, New York: ACM SIGGRAPH (2004). (With B. Pan, H. Hembrooke, G. Granka, M. Feusner, and J. Newman)

"Usability, Learning and Subjective Experience: User Evaluation of K-MODDL in an Undergraduate Class". *Joint Conference on Digital Libraries* (2004). (With B. Pan, J. M. Saylor, H. Hembrooke, and D. Henderson)

2004 – 2005 University Activities

Member, Wisdom in the Digital Age Task Force

Member, CIS Council Committee (2004 – present)

Member, CIS Building Committee (2003 – present)

Advisor, CALS Technology Committee (2003 – present)

Member, Founder's Board, Faculty of Computing and Information Science (1999 – present)

2004 – 2005 Professional Activities

Chair, Department of Communication (2004 – present)

Director of Graduate Studies, Information Science Ph.D. Program (2003 – 2004)

Awards/Honors

2004 - Stephen H. Weiss Presidential Fellowship Teaching Award, Cornell University

2001 - Chancellor's Award for Excellence in Teaching, SUNY

2000 - Merrill Presidential Scholar Faculty

2000 - Innovative Teaching Award, College of Agriculture and Life Sciences

1996 - Distinguished Teaching Award of the Cornell Chapter of Sigma Delta, the Honor Society of Agriculture and Life Sciences, Human Ecology, and Veterinary Medicine

1989-1992 IBM Consulting Scholar

Johannes Gehrke

Associate Professor, Department
of Computer Science
Associate Director, Cornell
Theory Center

johannes@cs.cornell.edu

<http://www.cs.cornell.edu/johannes>

Johannes Gehrke received his Ph.D. in computer science from the University of Wisconsin-Madison in 1999, and he is now an associate professor in CS at Cornell. Gehrke is also an associate director of the Cornell Theory Center.

Gehrke's research interests are in the areas of data mining, data stream processing, and data privacy. In his current research, Gehrke's group is building a scalable system for stateful publish-subscribe of XML data streams for enterprise-wide information management. He is also working on data privacy with a focus on privacy-preserving data mining and on techniques for publishing data while controlling the amount of information that is released. His data mining research focuses on novel data mining algorithms, and his group has developed some of the fastest known algorithms for several important data mining tasks. He is also collaborating with several groups of scientists across campus to solve their data management and data mining problems.

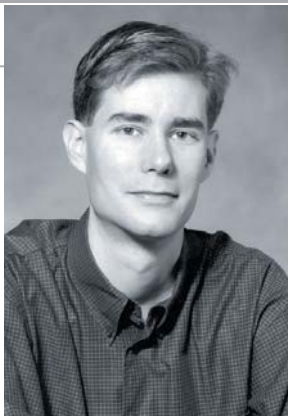
Gehrke has given courses and tutorials on data mining and data stream processing at international conferences and on Wall Street, and he has extensive industry experience as technical advisor and consultant.

2004 -2005 Publications

"Guaranteeing Correctness and Availability in P2P Range Indices." In *Proceedings of the 2005 ACM SIGMOD International Conference on Management of Data (SIGMOD 2005)*, Baltimore, Maryland (June 2005). (With P. Linga, A. Crainiceanu, and J. Shanmugasundaram)

"Processing High-speed Intelligence Feeds in Real-Time." *IEEE International Conference on Intelligence and Security Informatics, ISI 2005*, Atlanta GA (May 2005). Springer Verlag Lecture Notes in Computer Science (2005).

"Index Structures for Matching XML Twigs Using Relational Query Processors." *Second International Workshop on XML Schema and Data Management (XSDM '05)* in conjunction with ICDE 2005, Tokyo, Japan (April 2005).



"Directions in Multi-query Optimization for Sensor Network." In *Advanced in Pervasive Computing and Networking* (Springer Verlag, 2005). (With A. Demers, R. Rajaraman, N. Trigoni, and Y. Yao)

Guest Editorial to the Special Issue on Data Stream Processing. *VLDB Journal*, Special Issue on Data Stream Processing 13(4) (December 2004). (With J. Hellerstein)

"Detecting Changes in Data Streams." In *Proceedings of the Thirtieth International Conference on Very Large Data Bases (VLDB 2004)*, Toronto, Canada (August 2004). (With D. Kifer and S. Ben-David)

"Query Processing in Sensor Networks." In *Distributed Sensor Networks* (CRC Press, 2004). (With S. Madden)

"Research Issues in Mining and Monitoring of Intelligence Data." In *Data Mining: Next Generation Challenges and Future Directions* (MIT/AAAI Press, 2004). (With A. Demers and M. Riedewald)

Lectures

"Data Mining: Today and Tomorrow". Invited presentation at Xerox Corporation. Rochester, NY (June 2005).

Models and Methods for Privacy-preserving Data Publishing and Analysis". Invited Tutorial at the Twenty-fourth ACM SIGMOD-SIGACT- SIGART Symposium on Principles of Database Systems (PODS 2005). Baltimore, Maryland (June 2005).

"Data Mining: Today and Tomorrow". Cornell Theory Center's Lunch Lecture Series. Ithaca, NY (May 2005).

"Data-driven Science". Cyber Revolution: Cornell and the Massive Transformation of Business, Culture, Research, and Teaching, New York, NY (April 2005).

"Privacy-preserving Data Mining". Colloquium at the University of Darmstadt, Darmstadt, Germany (April 2005).

"Scalable Event Processing". Pantheon Workshop on Technologies and Testbeds for Actionable Intelligence. Argonne, IL (April 2005).

"Managing and Mining Sensor Data. Nokia Workshop on Large-scale Wireless Sensor Networks and Their Applications", Kuusamo, Finland (February 2005).

"PetaByte Storage Services For Data-driven Science. Cornell Wide-area and Distributed Computing Workshop, Ithaca, NY (January 2005).

"Privacy Breaches in Privacy-preserving Data Mining". Departmental colloquium at New York University, New York, NY (November 2004).

"Privacy Breaches in Privacy-preserving Data Mining". Database colloquium at the University of Wisconsin-Madison, Madison, WI (November 2004).

"Data Management and Data Mining for Sensor Data". Invited presentation at the NSF Information and Data Management 2004 Workshop, Boston, MA (October 2004).

"Statistical Privacy for Privacy Preserving Information Sharing". Invited presentation at the Workshop on Secure Knowledge Management (SKM 2004), Buffalo, NY (September 2004).

"Data Mining: Today and Tomorrow". Invited talk at "Informatics: Defining the Research Agenda." Bloomington, Indiana (September 2004).

"Two Challenges in Data Analysis". Invited talk at the Department of Homeland Security Data Sciences Workshop. Alexandria, VA (September 2004).

"Highly Distributed and Fault-tolerant Data Management". Invited talk as part of the IAI@Rome Lecture Series on Current Research Topics in Systems and Information Assurance. Air Force Research Lab, Rome, NY (July 2004).

"Thoughts on Open Problems in Data Mining". Dagstuhl Workshop on Data Mining: The Next Generation, Dagstuhl, Germany (July 2004).

2004 – 2005 Professional Activities

Member, Program Committee, IPSN Track on Sensor Platform, Tools and Design Methods for Networked Embedded Systems (SPOTS), Los Angeles, CA (April 2005)

Member, Program Committee, Third IEEE International Conference on Intelligence and Security Member, Program Committee, Fourteenth International World Wide Web Conference (WWW-2005). Chiba, Japan (May 2005)

Informatics (ISI-2005), Atlanta, Georgia (May 2005)

Member, Program Committee, Fifth SIAM Conference on Data Mining (SDM 2005) Newport Beach, CA (May 2005)

Member, Program Committee, Third International Workshop on Knowledge Discovery in Inductive Databases (KDID 2004). Pisa, Italy (September 2004)

Member, Program Committee, Thirtieth International Conference on Very Large Data Bases (VLDB 2004). Toronto, Canada (August 2004)

Program Co-chair, Tenth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (SIGKDD 2004), Seattle, WA (August 2004)
Guest Editor, *The VLDB Journal*, Special Issue on Data Stream Processing 13(4) (December 2004) (With J. Hellerstein)

Associate Editor, *IEEE Transactions on Data Engineering* (since 2004)



Tarleton Gillespie
Assistant Professor, CIS,
joint with Communication

Member, Editorial Board, *Journal of Privacy Technology* (since 2004)

Action Editor, *Data Mining and Knowledge Discovery* (since 2003)

Member, Editorial Board, *Machine Learning Journal* (since 2003)

Associate Editor, *Bulletin of the Technical Committee on Data Engineering, IEEE Computer Society* (2002-2004)

Associate Editor, *Knowledge and Information Systems. Associate* (since 2000)

Associate Editor, *Journal of Database Management* (since 1999)

Member, Workshop Steering Committee, Workshop on Data Management for Sensor Networks (DMSN 2004), co-located with the Thirtieth International Conference on Very Large Databases, Toronto Canada (September 2004)

Member, ACM SIGKDD Curriculum Committee

2004 -2005 University Activities

Faculty mentor, Japanese Graduate Student Association (since January 2003)

Member, Department Chair Search Committee, Cornell Department of Computer Science (2004)

Awards and Honors

Cornell University Provost's Award for Distinguished Scholarship (2004)

Alfred P. Sloan Foundation Fellowship (2003)
National Science Foundation CAREER Award, 2002

Cornell College of Engineering James and Mary Tien Excellence in Teaching Award, 2001.

IBM Faculty Development Award (2000 and 2001)

Selected Publications

"Limiting Privacy Breaches in Privacy Preserving Data Mining". In the *Proceedings of the Twenty-second ACM SIGACT-SIGMOD-SIGART Symposium on Principles of Database Systems (PODS 2003)*. San Diego, CA (June 2003). (With A. Evfimievski, and R. Srikant)

"Query Processing in Sensor Networks". In the *Proceedings of the First Biennial Conference on Innovative Data Systems Research (CIDR 2003)*, Asilomar, California (January 2003). (With Yong Yao)

Database Management Systems, Third Edition (2002). McGraw Hill. (With Raghu Ramakrishnan)

tlg28@cornell.edu

Tarleton Gillespie received his bachelor's degree in English from Amherst College in 1994, his master's (1997) and his Ph.D. in Communication (2002) from the University of California at San Diego.

His research uses recent disputes over copyright and the Internet to analyze the historical contest over the nature of authorship, law, and technology. He uses these cases to examine the cultural and institutional arrangements surrounding media and Internet technologies, considering how power and practice are woven into their use and cultural notions of their value. In particular, he is interested in the way that law and technology sometimes battle, but more often are often brought together to regulate knowledge production.

He is continuing work on his first book, *Technology Rules* (to be published by M.I.T. Press in 2006), which will address this "legal turn to technology". What are the implications when, rather than legislating individual behavior, or mandating design for some broad public benefit, lawmakers legislate technology so that it specifically regulates individual behavior? Cases include controversies around copy protection and Internet filtering, and the most recent example, the FCC's mandated "broadcast flag" for digital television — a controversy certain to impact the ongoing public discussion of this broader shift, and the co-production of law, digital media, and commercial institutions. Using these cases as examples, he is investigating not only this shift in American legal, political, and commercial strategy, and its consequences for legal doctrine, political subjectivity, and technological innovation; but also the shifting relationships between corporate and governing institutions it represents and depends on, and the impact of these institutional shifts for digital culture.

2004 – 2005 Publications

"Digital Rights Management, Trusted Computing, and the Institutions Who Love Them". In *Structures of Participation in Digital Culture*, J. Karaganis and N. Jeremijenko, editors (2005).

"Engineering a Principle: 'End-to-end' in the Design of the Internet". *Social Studies of Science* (2005).

"Copyright and Commerce: The DMCA, Trusted Systems, and the Stabilization of Distribution". *The Information Society* 20(4) : 239-54 (September 2004).

2004 – 2005 Lectures

"Why You Are in the Trenches of the Copyright Wars". Invited talk, Undergraduate Society for Intellectual Property, Cornell University (April 2004).

"Designing Against User Agency: A Consideration of the FCC 'Broadcast Flag'", presented to the Digital Cultural Institutions Project, Social Science Research Council, Santa Clara, CA (October 2004). Also presented at the Conference of the Society for the Social Studies of Science (4S), Paris, France (August 2004).

"Manufacturing a Principle: 'End-to-end' in the Design of the Internet". Presented at Internet Research 5.0, Association of Internet Researchers (AoIR), Sussex, England, (September 2004). Also presented to the Science & Technology Studies Department, Cornell University, Ithaca, NY. (January 2004).

2004 – 2005 Professional Activities

Editorial Advisor, *Social Studies of Science*

Honors/Awards

Summer research award, Digital Cultural Institutions Project, Social Science Research Council (2004)

Humanities Council Research Grant, Society for the Humanities, Cornell University (2003)

Paul Ginsparg

Professor

CIS, joint with Physics



<http://people.ccmr.cornell.edu/~ginsparg/>
ginsparg@cs.cornell.edu

Paul Ginsparg received his A.B. in physics from Harvard University in 1977 and his Ph.D. in physics from Cornell in 1981 (Quantum Field Theory, thesis advisor: Kenneth G. Wilson). He was in the Harvard Society of Fellows from 1981-84, and a junior faculty member in the Harvard physics department from 1984-90. From 1990-2001, he was a technical staff member in the theoretical division at the Los Alamos National Laboratory.

Ginsparg came to Cornell in 2001, where he holds a joint appointment in the Department of Physics and the Faculty of CIS. He has been an A.P. Sloane fellow and a DoE Outstanding Junior Investigator, and has held visiting positions at C.E.N. Saclay, France; Princeton University; Stanford Linear Accelerator Center; the Institute for Advanced Studies, Princeton; the Institute for Theoretical Physics at the University of California at Santa Barbara; the Mathematical Science Research Institute at University of California at Berkeley; and at Hebrew University of Jerusalem. In 1991 Ginsparg initiated the "e-print arXiv" as a new form of communications research infrastructure for physics.

Ginsparg's current research in information science investigates the optimal combination of automated text classification, data mining, machine learning, human-computer interaction, quantum field theory, and related techniques for use in research communications infrastructure.

2004 – 2005 Lectures

Keynote talk at National Academy of Science E. Journal Summit, Washington D.C. (July 2004).

Keynote talk at Council of Science Editors annual meeting (May 2005). Colloquium at University of Oregon (July 2005)

2004 – 2005 University Activities

Member, Cornell Faculty Advisory Board on Information Technology

Member, Cornell Library Board

Member, CIS Council

Member, Graduate Field Committee, Cornell Information Science

2004 – 2005 Professional Activities

Member, Advisory Board, Public Library of Science

Member, Advisory Board, NIH PubMedCentral National

Member, Oversight Committee, American Physical Society Publications

Member, Advisory Board, French CNRS "Centre Communication Scientifique Directe"

Member, Advisory Board, "Journal Club for Condensed Matter Physics"

Awards and Honors

A.D. White Fellow, Cornell University (1977-81)

Harvard Society of Fellows (1981-84)

A.P. Sloan Foundation Fellow (1986-90)

DOE Outstanding Junior Investigator (1986-91)

Distinguished Performance Award, Los Alamos National Laboratory (1992)

P.A.M. (Physics Astronomy Math) award from the Special Libraries Association (1998)

Lingua Franca "Tech 20" Award (1999)

Fellow of the American Physical Society (2000)

John D. and Catherine T. MacArthur Foundation Fellow (2002)

Council of Science Editors' (CSE) Award for Meritorious Achievement (2005)

Carla P. Gomes

Associate Professor

CIS, joint with Applied Economics and Management and Computer Science
 Director, Intelligent Information Systems Institute (IISI)

gomes@cs.cornell.edu

<http://www.cs.cornell.edu/gomes>

Carla P. Gomes obtained a Ph.D. in computer science in the area of artificial intelligence and operations research from the University of Edinburgh in 1993. She also holds a M.Sc. in applied mathematics from the University of Lisbon.

Gomes is the director of the Intelligent Information Systems Institute (IISI) at Cornell. Her research has covered many areas in artificial intelligence and computer science, including planning and scheduling, integration of constraint and mathematical programming techniques for solving combinatorial problems, complete randomized search methods, and algorithm portfolios. Gomes's research spans the full range of theory to applications. Gomes's central research themes program are (1) the integration of concepts from mathematical programming with constraint programming, (2) the study of the impact of structure on problem hardness, and (3) the use of randomization techniques to improve the performance of exact (complete) search methods.

Gomes's current projects focus on the interplay between problem structure and computational hardness, the use of approximation methods in large scale constraint-based reasoning systems, and applications of constraint-based reasoning and optimization to combinatorial problems such as those arising in combinatorial design, autonomous distributed agents, and most recently, combinatorial auctions. She is the program co-chair of the Ninth International Conference on Theory and Applications of Satisfiability Methods (SAT 2006) and she was the conference chair of the Eighth International Conference on Principles and Practice of Constraint Programming (CP 2002). She is also a member of the Executive Council of the American Association for Artificial Intelligence.



2004 – 2005 Publications

"Can Get Satisfaction". *Nature* 435 (June 9, 2005). (With B. Selman)

"The Achilles' Heel of QBF". In the *Proceedings of the Twentieth National Conference on Artificial Intelligence (AAAI-05)* (2005). (With C. Ansótegui, and B. Selman)

"Statistical Regimes across Constrainedness Regions". In the *Proceedings of the Tenth International Conference on the Principles and Practice of Constraint Programming (CP-2004)*. Distinguished paper award. (With C. Fernandez, B. Selman, and C. Bessiere)

"Approximations and Randomization to Boost CSP Techniques". *Annals of Operations Research* 130(1): 117-141 (August 2004). (With D. Shmoys)

"An Improved Approximation Algorithm for the Partial Latin Square Extension Problem". *Operations Research Letters* 32 (5):479-484 (2004). (With R. Regis, and D. Shmoys)

"Sensor Networks and Distributed CSP: Communication, Computation and Complexity". *Artificial Intelligence Journal* 161(1-2): 117-147 (2004). (With R. Bejar, C. Domshlak, C. Fernandez, B. Krishnamachari, B. Selman, and M. Valls)

"The Cardinality Matrix Constraint." In the *Proceedings of the Tenth International Conference on the Principles and Practice of Constraint Programming (CP-2004)*. (With J.C. Régin)

"Streamlined Constraint Reasoning". In the *Proceedings of the Tenth International Conference on the Principles and Practice of Constraint Programming (CP-2004)*. (With M. Sellmann)

"Quality of LP-based Approximations for Highly Combinatorial Problems". In the *Proceedings of the Tenth International Conference on the Principles and Practice of Constraint Programming (CP-2004)*. (With L. Leahu)

"The Challenge of Generating Spatially Balanced Scientific Experiment Designs", In the *Proceedings of the Sixth International Conference on Integration of AI and OR Techniques in Constraint Programming for Combinatorial Optimization Problems (CP-AI-OR '04)*, Nice, France (2004). (With M. Sellmann, C. van Es, and H. van Es)

2004 – 2005 University Activities

Director, Intelligent Information Systems Institute (IISI)

Member, Faculty Advisory Board on Information Technologies (FABIT)

Member, Committee on Support of Teaching & Learning (CSTL)

2004 – 2005 Professional Activities

Executive Council of the American Association for Artificial Intelligence (AAAI) (2002-2005)

Member, Editorial Board, *Journal of Artificial Intelligence Research*; *Journal of Knowledge Engineering Review*; *Journal of Satisfiability*; *International Journal on Artificial Intelligence Tools*

Program Co-chair, Ninth International Conference on Theory and Applications of Satisfiability Methods (SAT 2006)

Member, Program Committee, Twentieth National Conference on Artificial Intelligence (AAAI-05), 2005; Nineteenth International Joint Conference on Artificial Intelligence (IJCAI 05) 2005; Ninth International Conference on the Principles and Practice of Constraint Programming, CP 2005; Seventh International Conference on the Integration of AI and OR in CP for Combinatorial Optimization (CP-AI-OR) 2005; International Conference on Automated Planning and Scheduling, ICAPS 2005; Eighth International Conference on the Integration of AI and OR in CP for Combinatorial Optimization (CP-AI-OR) 2004; Seventh International Conference on the Theory and Applications of Satisfiability Methods, SAT 2004; International Conference on Automated Planning and Scheduling, ICAPS 2004

2004 – 2005 Lectures

"Heavy-tailed Phenomena in Computation". Symposium entitled "The Pervasiveness of Extreme Phenomena in Science, Economics, and Engineering". American Association for the Advancement of Science (AAAS) Annual Meeting, Washington, DC (2005).

"Backdoors in Combinatorial Problems". SRI International, Menlo Park, CA (March 2005).

"Backdoors in Combinatorial Problems". CS Colloquium, University of Lisbon (February 2005).

"Adventures in Randomized Computational Methods". International Research Forum, Coimbra, Portugal (2004).

"Backdoors in Combinatorial Problems". Canadian Operational Research Society (CORS), Banff, Alberta, Canada (2004).

"Exact Randomized Search Methods". Institute for Operations Research and the Management Sciences (INFORMS), Banff, Alberta, Canada (2004).

"Heavy-tailed Behavior in Computation". Inaugural Conference of the Northwestern Institute on Complex Systems (NICO), Northwestern University (2004).

"Heavy-tailed Behavior in Computation". Institute for Mathematics and its Applications (IMA) (2004).

Selected Publications

"Algorithm Portfolios". *Artificial Intelligence Journal* 126:43-62 (2001). (With B. Selman)

"Artificial Intelligence and Operations Research: Challenges and Opportunities in Planning and Scheduling". *Journal of Knowledge Engineering Review* 15(1): 1-10, Cambridge Press (2000).

"Heavy-tailed Phenomena in Satisfiability and Constraint Satisfaction Problems". *Journal of Automated Reasoning* 24(1-2):67-100 (2000). (With B. Selman, N. Crato, and H. Kautz)

Donald P. Greenberg

Jacob Gould Schurman Professor
Member of CIS, the Johnson School of Management,
the Department of Architecture, and the
Graduate Field of Computer Science

dpg@graphics.cornell.edu
<http://www.graphics.cornell.edu/people/director.html>

Dr. Greenberg joined the faculty of Cornell in 1968, with a joint appointment in the Departments of Architecture and Structural Engineering. His prior education consisted of both the architecture and engineering disciplines at Cornell University and Columbia University. From 1960 to 1965, he served as a consulting engineer with Severud Associates, and was involved with the design of numerous building projects including the St. Louis Arch, New York State Theater of the Dance at Lincoln Center, and Madison Square Garden. He has taught courses in structural analysis and design, architectural design, shell structures, reinforced concrete, and computer applications in architecture.

Of his two hundred plus graduate students, many have gone on to become leaders in the fields of computer graphics, computer animation, and computer-aided design for architecture. Five have now won Hollywood Oscars.

Since 1966, Dr. Greenberg has been researching and teaching in the field of computer graphics. During the last 15 years, he has been primarily concerned with research advancing the state-of-the-art in computer graphics and with utilizing these techniques as they may be applied to a variety of disciplines. His specialties include real time realistic image generation, geometric modeling, color science, and computer animation. He presently teaches the computer graphics courses in Computer Science, computer-aided design in Architecture, computer animation in Art, and technology strategy in the Business School.

Working with the General Electric Visual Simulation Laboratory, he produced a sophisticated computer graphics movie, "Cornell in Perspective" as early as 1971. He is the author of hundreds of articles on computer graphics (including two published in *Scientific American*, May 1974 and February, 1991, both of which have been highly publicized); and he has lectured extensively on the uses of computer graphics techniques in research applications.

He was the founding director of the National Science Foundation Science and Technology Center for Computer Graphics and Scientific Visualization. He has been the director of the Program of Computer Graphics for thirty-one years and was the originator and former director of the Computer Aided Design Instructional Facility at Cornell University.

2004 – 2005 Publications

"Perceptual Illumination Components: A New Approach to Efficient, High-quality Global Illumination Rendering". *Computer Graphics Proceedings, Annual Conference Series, ACM SIGGRAPH* (August 2004) :742-749. (With W.A. Stokes, J.A. Ferwerda, and B.J. Walter)

2004 – 2005 Lectures

"Design Environments of the Future: What's Right? What's Wrong?" Keynote Speaker, AIA/NYS Convention, Cornell University, Ithaca, NY (August 27, 2004).

"Where do we Come From? Where are we? Where are we Going?" Evans & Sutherland Distinguished Lecture Series, University of Utah, Salt Lake City, UT (February 9, 2005).

"Evolution of Computer Graphics". University of Utah Computer Science Dept. Lecture (February 10, 2005).

2004 – 2005 Professional Activities

Founding Director, National Science and Technology Center for Computer Graphics and Scientific Visualization



Technical Advisory Board, Intel Corporation
Member, Board of Directors, Interactive Data Corporation

Member, Board of Directors, Chyron
Member, Technical Advisory Board, Intel Corporation
Member, SIGGRAPH Awards Committee
Member, NSF Committee on the Future of Computer Graphics

2004 – 2005 University Activities

Professor, Architecture, Art, Computer Science, and Johnson Graduate School of Management

Member, Fields of Civil Engineering and History of Science and Technology

Member, Provost Committee, Digital Arts & Graphics

Member, Cornell University, Athletic Hall of Fame

Member, Computing and Information Science (CIS) Founders

Awards and Honors

Fellow, American Association for the Advancement of Science (2002)

Honorary Doctoral Degree, New Jersey Institute of Technology (1999)

Architectural Schools Computing Association Creative Research Award in Architecture (1997)

Fellow, ACM (1994)

Founding Fellow, American Institute of Medical and Biological Engineering (1992)

Member, National Academy of Engineering (1991)

NCGA Academic Award (highest educational award given by the National Computer Graphics Association) (1989)

ACM SIGGRAPH Steven A. Coons Award for Outstanding Creative Contributions to Computer Graphics (1987)

David Gries

Associate Dean of Engineering for
Undergraduate Programs
Professor, Computer Science Department
Cornell Weiss Presidential Fellow



gries@cs.cornell.edu

<http://www.cs.cornell.edu/gries/>

Professor Gries's research is aimed at gaining a better understanding of the programming process, with respect to both sequential and concurrent (or parallel) programs. The work requires investigation of theories of program correctness and their application, as well as investigation of other concepts in the semantics of programming languages.

Education is also a strong interest for Gries, particularly the first few courses in computer science. Under the thesis that logic is the glue that binds together reasoning in all domains, colleague F.B. Schneider developed a text "A Logical Approach to Discrete Math", which makes a usable "calculational logic" the foundation for almost all the discrete math topics.

Earlier, with his son, Gries developed a "livetext" – a text that comes on a CD and has over 250 2-3 minute recorded lectures with synched animation, as well as other innovative features. They are finishing up a paper text to accompany it.

2004 – 2005 Publications

Multimedia Introduction to Programming using Java. Springer Verlag, New York (2005), 536 pages (with CD-ROM ProgramLive). (With P. Gries)

"Supporting Workflow in a Course Management System. *SIGCSE 2005* (February 23-27, 2005) St. Louis, Missouri. (With 19 others)

2004 – 2005 Lectures

"Calculus and Calculational Logic. Invited talk, Festveranstaltung Friedrich L. Bauer 80 Jahre (June 2004). Technische Universität München, Garching bei München, Germany.

"Teaching the Development of Algorithms". Keynote lecture. ACM MidSoutheast Conference, Knoxville, Tennessee (November 11-12, 2004).

"Imparting Skill and Values, not Just Knowledge". Invited talk, Symposium on "Teaching Formal Methods" Ghent, Belgium (November 18-19, 2004).

"Teaching Program Development". Keynote lecture. ACM Mid-South College Computing Conference (MSCCC), University of Mississippi, Oxford, MS (April 1-2, 2005).

2004 – 2005 University Activities

Associate Dean for Undergraduate Programs

2004 – 2005 Professional Activities

Member, Editorial Board: *Acta Informatica*, *Information Processing Letters*

Co-editor, *Springer Verlag Texts and Monographs Series* (1972-)

Member, IEEE Piore Award Committee

Honors and Awards

Doctor of Science (Honorary Degree), Oxford University, Miami, Ohio (1999)

Doctor of Laws (Honorary Degree), Daniel Webster College, Nashua, New Hampshire, (1996)

ACM Karl V. Karlstrom Outstanding Educator Award (1996)

Cornell University Computer Science Department Faculty of the Year, 1995-96. (ACSU)

Weiss Presidential Fellow (for contributions to undergraduate education). Cornell University (1995)

Taylor L. Booth Award Education Award, IEEE Computer Society (1994)

ACM Fellow (Charter member: among the first group to be inducted) (1994)

ACM SIGCSE Award for Outstanding Contributions to Computer Science Education (1991)

Computing Research Association Award for Service to the Computing Community (1991)

Fellow of the AAAS (1990)

Chosen by a Cornell Merrill Presidential Scholar (Thomas Yan) as the faculty member who had the most positive influence on his education at Cornell (1990)

Clarke Award for Excellence in Undergraduate Teaching; College of Arts and Science, Cornell University (1986-87)

Education Award, American Federation of Information Processing Societies (1986)

Guggenheim Fellowship (1983-84)

ACM Programming Systems and Languages Paper Award, 1977 (With S. Owicki)

Zygmunt Haas

Professor of the School of Electrical and Computer Engineering, Member of the Graduate Fields of Computer Science and the Center for Applied Mathematics



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Zygmunt J. Haas received his Ph.D. from Stanford University in 1988 and subsequently joined AT&T Bell Laboratories where he pursued research on wireless communications, mobility management, fast protocols, optical networks, and optical switching. In August 1995, he joined the faculty of the School of Electrical and Computer Engineering at Cornell University.

Dr. Haas is an author of numerous technical papers and holds fifteen patents in the fields of high-speed networking, wireless networks, and optical switching. He has organized several workshops, delivered tutorials at major IEEE and ACM conferences, and serves as editor of several journals and magazines, including the *ACM/IEEE Transactions on Networking*, the *IEEE Transactions on Wireless Communications*, and the *Kluwer's Journal on Wireless Networks*. He has been a guest editor of three issues of the *IEEE's Journal of Selected Areas on Communication* ("Gigabit Networks", "Mobile Computing Networks", and "Ad-Hoc Networks"). Dr. Haas is a senior member of IEEE and the Chair of the IEEE Technical Committee on Personal Communications. He is an IEEE/COMSOC Distinguished Speaker.

Professor Haas's current interests include: mobile and wireless communication and networks, performance evaluation of communication systems, and biologically-inspired systems and networks. He heads the Wireless Networks Laboratory (WNL) (<http://wnl.ece.cornell.edu>) at Cornell, which performs research in the area of mobility management for wireless networks, ad hoc networking (routing, multicasting, medium-access control (MAC), and topology control), security of wireless communications, and cross-layer design of communication protocols. The ad hoc networking technology is the central research area of WNL. In particular, Haas's research group has developed the first hybrid ad hoc routing protocol—the Zone Routing Protocol—which is currently an IETF draft. The WNL has also pioneered in its research on ad hoc network security.

2004 – 2005 Professional Activities

Member, Editorial Boards: *IEEE Transactions on Wireless Communications*; *ACM/IEEE Transactions on Networking*; *IEEE Communications Magazine*; *Elsevier Ad Hoc Networks Journal*; *Wireless Communications and Mobile Computing Journal*, John Wiley and Sons; *Journal of High Speed Networks*; *ACM/Kluwer Wireless Networks*

General Chair, ACM Mobicom 2004, Philadelphia, Pennsylvania (September 26–October 1, 2004)

2004 2005 University Activities

Elected Member, ECE Policy Committee

Member, ECE Recruiting Committee

Member, ECE Ad Hoc Tenure Promotion Committee

Member, Ad Hoc Tenure Promotion Committee, College of Engineering

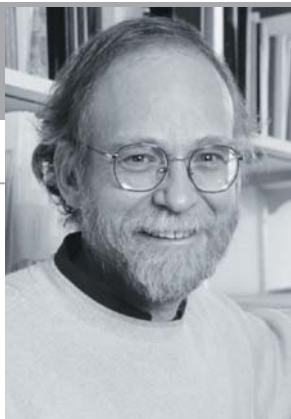
Awards and Honors

Distinguished Lecturer, IEEE Communications Society (2004–2005)

Michael Tien '72 Award, Cornell College of Engineering Excellence in Teaching Award for 2002–2003 (November 2003)

Joseph Halpern

Professor, Department of Computer Science
Director of Graduate Studies



halpern@cs.cornell.edu

<http://www.cs.cornell.edu/home/halpern/>

Joseph Halpern received a Bs.C. in mathematics from the University of Toronto in 1975 and a Ph.D. in mathematics from Harvard in 1981. In between, he spent two years as the head of the Mathematics department at Bawku Secondary School, in Ghana. After a year as a visiting scientist at M.I.T., he joined the IBM Almaden Research Center in 1982, where he remained until 1996, also serving as a consulting professor at Stanford. In 1996, he joined the Department of Computer Science at Cornell.

Halpern's major research interests are in reasoning about knowledge and uncertainty, security, distributed computation, and decision theory. Together with his former student, Yoram Moses, he pioneered the approach of applying reasoning about knowledge to analyzing distributed protocols and multi-agent systems. He has coauthored 5 patents, two books (*Reasoning about Knowledge* and *Reasoning about Uncertainty*), and over 200 technical publications. He was formerly editor-in-chief of the *Journal of the ACM*.

2004 – 2005 Publications

"A Cone-based Distributed Topology-control Algorithm for Wireless Multi-hop Networks". *IEEE/ACM Transactions on Networking* 13(1): 147-159 (2005). (With L. Li, P. Bahl, Y.-M. Wang, R. Wattenhofer)

"A Knowledge-theoretic Analysis of Uniform Distributed Coordination and Failure Detectors". *Distributed Computing* 17(3): 223-236 (2005). (With A. Ricciardi)

"A Minimum-energy Path-preserving Topology-control Algorithm". *IEEE Transactions on Wireless Communications* 3(3): 910-921 (2004). (With L. Li)

"Reasoning about Common Knowledge with Infinitely Many Agents". *Information and Computation* 191(1): 1-40 (2004). (With R. Shore)

"Complete Axiomatizations for Reasoning about Knowledge and Time". *SIAM Journal on Computing* 33(2): 674-703 (2004). (with R. van der Meyden and M. Y. Vardi).

"Using Counterfactuals in Knowledge-based Programming". *Distributed Computing* 17(2): 91-106 (2004). (With Y. Moses)

"Responsibility and Blame: A Structural-model Approach". *Journal of AI Research* 22: 93-115 (2004). (With H. Chockler)

"Great Expectations. Part II: Generalized Expected Utility as a Universal Decision Rule". *Artificial Intelligence* 159(1-2):207-230 (2004). (With F. Chu)

"A Formal Foundation for XrML". In the *Proceedings of the Seventeenth IEEE Computer Security Foundations Workshop* :251-263 (2004). (With V. Weissman)

"When Ignorance is Bliss". In the *Proceedings of the Twentieth Conference on Uncertainty in AI* :226-234 (2004). (With P. Grunwald)

"On Spectrum Sharing Games". In the *Proceedings of the Twenty-third Annual ACM Symposium on Principles of Distributed Computing* :107-114 (2004). (With M. M. Halldorsson, L. Li, and V. Mirrokni)

2004 – 2005 Professional Activities

Consulting Editor: *Chicago Journal of Computer Science*

Editorial board: *Artificial Intelligence Journal*; *Journal of Logic and Computation*

Coordinator: CoRR (Computing Research Repository)

Member: LICS (IEEE Conference on Logic in Computer Science) Advisory Board

Member: Logical Methods of Computer Science (journal) advisory board

Member: Army Research Laboratory Technical Assessment Board of the National Research Council

Councillor: Game Theory Society

President of Board of Directors: Corporation for Theoretical Aspects of Reasoning about Knowledge

Program Co-chair, Twentieth Conference on Uncertainty in AI

2004 – 2005 Lectures

"Great Expectations: On the Utility of Expected Utility". Workshop on Time Preference, Copenhagen, Denmark (May 2004).

"Reasoning about Uncertainty". MFCSIT 2004 (Third Irish Conference on the Mathematical Foundations of Computer Science and Information Technology), Dublin, Ireland (July 2004).

"Using Counterfactuals in Knowledge-based Programming". CombLog '04 (Workshop on Combination of Logics: Theory and Applications, Lisbon, Portugal (July 2004).

"Anonymity and Information Hiding" First IEEE Symposium on Multi-agent Security and Survivability, Philadelphia (August 2004).

"Rational Secret Sharing and Multiparty Computation". Games 2004 (Second World Congress of the Game Theory Society), Marseilles, France (July 2004).

- Hebrew University, Department of Computer Science, Jerusalem, Israel (December 2004)

- Cornell University: Computer Science Dept. Brown Bag lunch

"Redoing the Foundations of Decision Theory".

- Tel Aviv University, Economics Dept., Tel Aviv, Israel (December 2004)

- Hebrew University, Center for Rationality, Jerusalem, Israel

- Brown University, Providence, RI (February 2005)

"When Ignorance is Bliss". Twentieth Conference on Uncertainty in AI, Banff, Canada (August 2004).

"A Formal Foundation for XrML". Cornell Theory Center, New York (November 2004).

Awards and Honors

Fellow, American Association of Artificial Intelligence

Fellow, ACM

Fulbright Fellow

Guggenheim Fellow

Milner Lecturer at Edinburgh University

Awarded 1997 Godel Prize for outstanding paper in the area of theoretical computer science for "Knowledge and common knowledge in a distributed environment"

Jeff Hancock
Assistant Professor
CIS, joint with Communication



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<http://cucmc.comm.cornell.edu/jth34/index.html>

Dr. Jeff Hancock studies the ways that new technologies change the way we use language and form impressions about people. He evaluates people's propensity to use sarcasm, irony, deception, and other non-literal language in e-mail, instant messaging, and other channels, with their families, friends, and teachers.

Dr. Hancock was recently awarded a Cornell University Institute for the Social Sciences seed grant for his project "Lying Online: The Effects of Communication Technology on Deception."

2004 - 2005 Publications

Digital Deception: When, Where, and How People Lie Online". In *Oxford Handbook of Internet Psychology*, K. McKenna, T. Postmes, U. Reips, and A. Joinson, editors. Oxford: Oxford University Press.

"How do Communication and Technology Researchers study the Internet?" *Journal of Communication* (in press). (With J. Walther, G. Gay)

"On Lying and being Lied to: An Automated Linguistic Analysis of Deception. *Discourse Processes* (in press). (With L. Curry, S. Goorha, M. Woodworth)

"Realism, Imagination, and Videogames". In *Playing Computer Games: Motives, Responses, and Consequences*, P. Vorderer and J. Bryant, editors. New York: Lawrence Earlbaum Associates (in press). (With M. Shapiro, J. Pena-Herborn)

"LOL: Humor Online". *Interactions Magazine* 11:57-58 (2004).

Verbal Irony use in Computer-mediated and Face-to-face Conversations. *Journal of Language and Social Psychology* 23:447-463 (2004).

Proceedings

"An automated linguistic Analysis of Deceptive and Truthful Computer-mediated Communication". In the *Proceedings of the Hawaii International Conference on System Sciences*. (With L. Curry, S. Goorha, M. Woodworth)

"The Motivational Enhancement Effect: Implications for our Chosen Modes of Communication in the 21st Century". In the *Proceedings of the Hawaii International Conference on System Sciences* (in press). (With M. Woodworth, S. Goorha)

"Lies in Conversation: An Examination of Deception Using Automated Linguistic Analysis". In the *Proceedings of the Annual Conference of the Cognitive Science Society* 26:534-540. Mahwah, NJ: LEA (2004). (With L. Curry, S. Goorha, M. Woodworth)

"Emergent Networks, Locus of Control and the Pursuit of Social Capital". In the *Proceedings of Computer-Supported Cooperative Work* (2004). (With M. Stefanone, G. Gay)

"A Linguistic Model that Infers User States and Traits". In the *Proceedings of Intelligent Tutor Systems* (2004). Maceio, Brazil. (With N. Person, D. Burke, A. Graesser)

"Deception and Design: The Impact of Communication Technologies on Lying Behavior". In the *Proceedings of the Conference on Computer Human Interaction* (2004). New York: ACM. (With J. Thom-Santelli, T. Ritchie)

2004 - 2005 Lectures

Invited to the Santa Fe Institute to take part in the workshop on "Deception: Methods, Motives, Contexts, and Consequences" (April 1-3, 2005).

Invited to the National Science Foundation workshop on "Language and Deception" (June 1-2, 2005).

Deception Detection in Computer-mediated and Face-to-face Interactions: Effects of Medium and Motivation". Paper presented at the annual conference of the American Law and Psychology Society, Phoenix, AZ (2004). (With M.T. Woodworth)

The Equalization Phenomenon: Interpersonal sensitivity and the impact of medium.

Poster presented at the Fifth Annual Meeting of the Society of Personality and Social Psychology, Austin, TX (2004). (With E. Boucher, P.D. Dunham)

2004 - 2005 Professional Activities

Member: American Psychological Association; International Communication Association; Psychonomics Society; Society for Text and Discourse; Association for Computing Machinery

Editorial Board Member, *Journal of Online Behavior*

Member, International language and technology task force for the International Association for Language and Social Psychology

2004 - 2005 University Activities

Member, Information Science Undergraduate Working Group

President's Council of Cornell Women
Affinito-Stewart Grant Program reviewer

Juris Hartmanis

Senior Associate Dean for CIS
Emeritus Walter R. Read Professor of
Computer Science and Engineering
Turing Award Winner



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<http://www.cs.cornell.edu/people/hartmanis/>

Juris Hartmanis obtained his Ph.D. from the California Institute of Technology in 1955. In 1965, he founded CS and was its first chairman.

Hartmanis is also the founder of the field of computational complexity theory. He believes that computational complexity, the study of the quantitative laws that govern computation, is an essential part of the science base needed to guide, harness, and exploit the explosively growing computer technology.

Professor Hartmanis's current research interests are in computational complexity, structure and management of research organizations. His main focus has been on understanding the structure of computational complexity classes and exploring how to view computation as construction of complex objects and relate computational complexity to the complexity of constructed objects.

2004 – 2005 Lectures

"Understanding Complexity in its Various Incarnations". Santa Fe Institute Science Board, Santa Fe, NM (May 13, 2005).

2004 – 2005 Professional Activities

Editor, *Fundamenta Informatica*; *Journal of Computer and System Sciences*

Member, Science Steering Committee, Santa Fe Institute for Complex Systems

Member, Science Board, Santa Fe Institute for Complex Systems

Member, Advisory Board, Foundations of Computer Science

Member, Advisory Board, *European Association for Theoretical Computer Science (EATCS) Monographs on Theoretical Computer Science*

Member, DIMACS Advisory Board

Member, DAGSTUHL Advisory Board

2004 – 2005 University Activities

Senior Associate Dean, CIS

Member, CIS Council

Member, Presidential Search Committee

Awards and Honors

Grand Medal, Latvian Academy of Science (2001)

CRA Distinguished Service Award (2000)

Doctor of Science (*Honoris Causa*), University of Missouri, Kansas City (1999)

Doctor of Science (*Honoris Causa*), University of Dortmund, Germany (1995)

B. Bolzano Gold Medal of the Academy of Science, Czech Republic (1995)

Senior U.S. Scientist Humboldt Award, Max Planck Institute, Saarbruecken, Germany, (1993–94)

ACM Turing Award (shared with R. E. Stearns, 1993)

Fellow, American Academy of Arts and Sciences (1992)

Member, Latvian Academy of Science (1990)

Member, National Academy of Engineering (1989)

Fellow, American Association for the Advancement of Science (1981)

Sheila Hemami

Associate Professor of the School of Electrical and Computer Engineering and Member of the Graduate Field of Computer Science



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Sheila S. Hemami received her B.S.E.E (1990) from the University of Michigan, and her M.S.E.E. (1992) and Ph.D. (1994) degrees from Stanford University.

Her doctoral work comprised development of real-time, low-complexity lossy signal-processing techniques to provide reconstruction of image and video data lost in transmission over lossy packet networks. During her last year at Stanford, she was a member of the technical staff at Hewlett Packard Laboratories in Palo Alto, California. Upon completing her Ph.D., she joined the ECE faculty at Cornell where she currently directs the Visual Communications Laboratory.

The emerging information superhighway provides an example of the flexibility required of image and video compression and transmission techniques. Varying network capacities, differences in viewing devices, and a broad spectrum of user needs suggest the desirability of coding techniques that can efficiently span large quality and bandwidth ranges. Additionally, coded data must be robust to errors and loss of varying degrees across multiple network segments. For practicality, algorithms must be inexpensive to implement, in either hardware or software. Dr. Hemami's research interests broadly concern such communication of visual information. Particular topics of interest include multirate video coding and transmission, compression specific to packet networks and other lossy networks, and psychovisual considerations.

She is a senior member of the IEEE, Eta Kappa Nu, and Tau Beta Pi.

2004 – 2005 Publications

- "A New Class of Multiple Description Scalar Quantizer and its Application to Image Coding". *IEEE Signal Processing Letters* (April 2005). (With C. Tian)
- "Dynamic Contrast-based Quantization for Lossy Wavelet Image Compression". *IEEE Transactions on Image Processing* (April 2005). (With D.M. Chandler)
- "Bit Allocation in Video is Easy". *Data Compression Conference*, Snowbird, Utah (March 2005). (With Y. Sermadevi)
- "Mentoring for Academic Careers in Engineering: Proceedings of the PAESMEM/Stanford School of Engineering Workshop", E. Riskin, M. Ostendorf, P. Cosman, M. Effros, J. Li, S. Hemami, R. Gray, editors, Graphics Publishing (2005).
- "Multiple Descriptions with Central Refinement". *Thirty-ninth Annual Conference on Information, Sciences, and Systems (CISS)*, Baltimore, MD (March 2005). (With C. Tian, and J. Chen)
- "Robust Video Coding—A Review." *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, Philadelphia, PA (March 2005). (With M.D. Gaubatz, and D.M. Chandler)
- "Spatially-selective Quantization and Coding for Wavelet-based Image Compression". *Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing*, Philadelphia, PA (March 2005). (With M. Gaubatz, and D. M. Chandler)
- "Staggered Lattices in Multiple Description Quantization". *Data Compression Conference*, Snowbird, Utah (March 2005). (With C. Tian)
- "Visually Lossless Compression of Digital Radiographs based on Contrast Sensitivity and Visual Masking". *SPIE Medical Imaging: Image Perception, Observer, and Technology Assessment*, San Diego, CA (February 2005). (With D.M. Chandler, and N.L. Dykes)
- "A Scalable Video Quality Metric and Applications". *Video Processing and Quality Monitoring Workshop*, Scottsdale, AZ (January 2005). (With M.A. Masry)

"Spatial Quantization via Local Texture Masking". *SPIE Human Vision and Electronic Imaging 2005*, Santa Clara, CA (January 2005). (With M.D. Gaubatz, and D.M. Chandler)

"Convexity Results for a Predictive Video Coder". *Asilomar Conference on Signals, Systems, and Computers*, Pacific Grove, CA (November 2004). (With Y. Sermadevi)

"A Special Class of Multiple Description Scalar Quantizers". *IEEE Information Theory Workshop*, Austin, TX (October 2004)

"On the Analysis of Multiple Description Lattice Vector Quantization". *IEEE Transactions on Information Theory* (October 2004). (With C. Tian)

"Universal Multiple Description Scalar Quantization: Analysis and Design". *IEEE Transactions on Information Theory* (September 2004). (With C. Tian)

Awards and Honors

- Constance E. Cook and Alice H. Cook Recognition Award (from the Cornell University Advisory Council on the Status of Women, 2005)
- Cornell University College of Engineering faculty Diversity Award (2005)
- Joel and Ruth Spira Excellence in Teaching Award (2004)
- Elected senior member of the IEEE (2003)
- Eta Kappa Nu Outstanding Young Electrical Engineer Finalist (2002)
- Fulbright Distinguished Lecturer, Morocco (2001)
- HKN C. Holmes MacDonald Outstanding Teaching Award (2000)
- National Science Foundation CAREER Award (1997)
- Kodak term Professor of Electrical Engineering (1997, 1998, 1999)
- Lilly Teaching Fellowship (1996-19997)
- Cornell College of Engineering Michael Tien '72 Teaching Award (1996-9997, 1999-2000)

John E. Hopcroft

Professor, Computer Science Department
Turing Award Winner



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<http://www.cs.cornell.edu/jeh>

Professor Hopcroft's research centers on the study of information capture and access. This includes the study of large graphs, spectral analysis of structures, clustering and queries. He has also been involved in the theoretical aspects of computing, especially analysis of algorithms, formal languages, automata theory, and graph algorithms. He has coauthored four books on formal languages and algorithms with Jeffrey D. Ullman and Alfred V. Aho.

From January 1994 until June 2001, he was the Joseph Silbert Dean of the College of Engineering. He was formerly the associate dean for college affairs and the Joseph C. Ford Professor of Computer Science. After receiving an M.S. (1962) and Ph.D. (1964) in electrical engineering from Stanford University, Professor Hopcroft spent three years on the faculty of Princeton University. In 1967, he joined the Cornell faculty, was named professor in 1972 and served as CS chairman from 1987 to 1992. An undergraduate alumnus of Seattle University, Hopcroft was honored with a Doctor of Humanities Degree (*honoris causa*), in 1990.

2004 – 2005 Publications

"Spectral Analysis of Random Graphs with Skewed Degree Distribution". FOCS 2004 (With A. Dasgupta, and F. McSherry)

2004 – 2005 Lectures

"Future Direction in Theoretical Computer Science". Yale University (February 10, 2005).

"Computer Science Theory for the Information Age". City University of New York Graduate Center (September 23, 2004).

"A Theoretical Foundation for the Digital Age". Hanoi University of Technology (August 9, 2004).

2004 -2005 Professional Activities

Member, Board on Mathematical Science and Applications, National Academy of Sciences

Member, Science Advisory Board, Packard Foundation

Member, Financial Management Committee, Society of Applied Mathematics

Trustee, Boyce Thompson Institute

Editor and Member of Executive Committee, *Algorithmica*

Editor, *International Journal of Computational Geometry and Applications*

Editor, *Journal of Computer and System Sciences*

Associate Editor, *Information Sciences*

Council Delegate, American Association for the Advancement of Science

Chair, International Advisory Committee on Informatics and Engineering, National College of Ireland

2004 -2005 University Activities

Member, Nominations and Elections Committee

Member, Provost's Minority Postdoc Committee

Awards and Honors

Fellow, Association for Computing Machinery, 1994

Member, National Academy of Engineering, 1989

Fellow, American Academy of Arts and Sciences, 1987

Fellow, American Association for the Advancement of Science, 1987

Fellow, Institute of Electrical and Electronics Engineers, 1987

Recipient, ACM Turing Award, 1986

Daniel P. Huttenlocher

John P. and Rilla Neafsey Professor of Computing,
Information Science and Business
Cornell Weiss Presidential Fellow
CIS, joint with the Johnson Graduate School
of Management



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<http://www.cs.cornell.edu/~dph>

Dan Huttenlocher received a dual degree in computer science and experimental psychology from the University of Michigan in 1980, and master's and Ph.D. degrees in computer science from M.I.T. in 1984 and 1988, respectively. He has been on the CS faculty since 1988. He holds a joint appointment with the Johnson Graduate School of Management at Cornell.

Huttenlocher's research interests are in computer vision, computational geometry, electronic-collaboration tools, financial-trading systems, and the principles of software development.

In addition to teaching and research, Dan has considerable experience managing software-development efforts in corporate and academic settings. He has been chief technical officer of Intelligent Markets, a leading provider of advanced trading systems. He also spent more than ten years at the Xerox PARC, directing work that led to the ISO JBIG2 image-compression standard, and serving as part of the senior management team.

Huttenlocher has been recognized on several occasions for his teaching and research, including being named a Presidential Young Investigator by the NSF in 1990, the New York State CASE Professor of the Year in 1993, and a Stephen H. Weiss Fellow by Cornell in 1996. He holds twenty-four U.S. patents and has published more than fifty technical papers, primarily in the areas of computer vision and computational geometry.

2004 – 2005 Publications

"Spatial Priors for Part-based Recognition using Statistical Models". In the *Proceedings of the IEEE Computer Vision and Pattern Recognition Conference* (June 2005). (With D. Crandall, and P.F. Felzenszwalb)

"Pictorial Structures for Object Recognition". *International Journal of Computer Vision* 61(1):55-79 (January 2005). (With P.F. Felzenszwalb)

"Efficient Graph-based Image Segmentation". *International Journal of Computer Vision* 59(2):167-181 (September 2004). (With P.F. Felzenszwalb)

2004 – 2005 Lectures

"Efficient Object Recognition by Dynamic Programming". Middlebury College, Computer Science Seminar (April 2005).

"Graphical Models for Object Recognition".

- MIT CSAIL Seminar (April 2005).
- Snowbird Learning Workshop (April 2005).
- MSRI Workshop on Object Recognition (March 2005).

"Fast Belief Propagation for Low-Level Vision". MSRI Workshop on Low Level Vision (February 2005).

"Pictorial Structures for Finding People". Rank Workshop on Machine Understanding of People, Grasmere (January 2005).

"Distance Transforms of Sampled Functions". NIPS Workshop on Fast N-Body Learning, Whistler (December 2004).

"An Algorithmic View of Computer Vision".

- Computer Science Colloquium, Univ. of Chicago (November 2004).
- Computer Science Colloquium, Brown Univ., November 2004

"Relational Models for Object Recognition". International Object Recognition Workshop, Taormina (October 2004).

"Tutorial on Pictorial Structure Models". SRL 2004, ICML/UAI Workshop on Statistical Relational Learning, Banff (July 2004).

2004 – 2005 Professional Activities

Member, Program Committee, IEEE Conference on Computer Vision and Pattern Recognition

Member, Program Committee, ICCV

Member, National Academy of Sciences Study "Assessing the Feasibility, Accuracy, and Technical Capability of a National Ballistics Database"

2004 – 2005 University Activities

Director of Graduate Studies, Information Science

Member, CS Operations Review Committee

Member, CS Recruiting Committee

Member, Technology Management Planning Group, Johnson Graduate School of Management

Member, Steering Committee, Library and Related Information Systems

Member, CIS Council

Member, CIS Building Committee

Member, Information Science Undergraduate Major Committee

Member, CIS DA&G Committee

Member, Cornell-Queens M.B.A. Program Advisory Group

Thorsten Joachims
Assistant Professor,
Department of Computer Science

tj@cs.cornell.edu
<http://www.cs.cornell.edu/People/tj/>

Thorsten Joachims joined CS as an assistant professor in 2001. Earlier that year, he completed his dissertation with the title “The Maximum-margin Approach to Learning Text Classifiers: Methods, Theory, and Algorithms” at the Universität Dortmund, Germany, advised by Professor Katharina Morik.

Joachims’s research interests center on a synthesis of theory and system building in the field of machine learning, with a focus on support-vector machines, text mining, and machine learning in information access. In particular, he has worked on WebWatcher, an adaptive browsing assistant for the Web. He has developed and authored the SVM-Light algorithm and software for inductive and transductive support-vector learning. His most recent work is on learning from click-through data in search engines, and on discriminative training for predicting complex multivariate objects.

Joachims taught the course “Representing and Accessing Digital Information”, and the “Introduction to Machine Learning”.

2004 – 2005 Publications

“Support Vector Machine Learning for Interdependent and Structured Output Spaces”. *Proceedings of the ICML* (2004). (With I. Tsochantaridis, T. Hofmann, and Y. Altun)

“Eye-tracking Analysis of User Behavior in WWW-Search”. Poster abstract, *Proceedings of Twenty-eighth Annual ACM Conference on Research and Development in Information Retrieval (SIGIR 2004)*. (With L. Granka and G. Gay)

“Mapping Subsets of Scholarly Information”. *Proceedings of the National Academy of Sciences* 10: 1073.(2004). (With P. Ginsparg, P. Houle, and J. H. Sul)



2004 – 2005 Lectures

“A Support Vector Approach to Supervised Grammar Learning”. Invited plenary talk at the International Colloquium on Grammatical Inference (ICGI) (October 2004).

“Learning to Predict Complex Objects”. Invited plenary talk at the IEEE International Conference on Data Mining (ICDM) (November 2004).

“Support Vector Machines for Structured Outputs”. Invited plenary talk at the Conference of the German Classification Society (GFKL) (March 2005).

2004 – 2005 Professional Activities

Action Editor, *Journal of Machine Learning Research*

Action Editor, *Data Mining and Knowledge Discovery Journal*

Member, Editorial Board, *Journal of Artificial Intelligence Research*

Chair, Government Funding and Student Scholarship, International Conference on Machine Learning

Awards and Honors

CAREER award, Improving Information Access using Implicit Feedback, 2003

Dissertation Award, Universität Dortmund, 2002

Rotary Stipend to Study Abroad, 1994

Studienstiftung des Deutschen Volkes, 1991

Klara Kedem

Professor, Department of
Computer Science

kedem@cs.cornell.edu

<http://www.cs.cornell.edu/kedem/>

Klara Kedem obtained her Ph.D. in Computer Science at Tel-Aviv University in 1989. She is currently spending the summers as a professor in the Department of Computer Science at Cornell University and a professor in the Computer Science department at Ben-Gurion University in Israel.

Kedem's research is in computational geometry with applications to robotics, computer vision and bio-information. She is known for devising the minimum Hausdorff distance for shape matching, a robust method which has had a strong impact and is still being investigated by followers.

Kedem and collaborators from the department have looked into shape comparison problems in life-science disciplines and their applications. In computational molecular biology they have come up with a new metric, the URMS, to measure substructure resemblance between proteins. This measure has been further applied to the analysis of molecular dynamics. Her consensus shape for protein families is now being applied to finding protein interaction sites. She also works on applying string matching algorithms to protein shape comparison, and to RNA motif search.

2004 – 2005 Professional Activities

Member, Clore Foundation committee for fellowships

Member, Editorial Board, *Pattern Recognition Society Journal*

Member, Steering committee, Centers of Excellence in Computational Geometry, The Israeli Science Foundation

2004 – 2005 Publications

"Finding the Consensus Shape for a Protein Family". *Algorithmica* 38(1):115-129 (2004). (With L.P.Chew)

"Voronoi Diagrams of Moving Points in the Plane and of Lines in Space: Tight Bounds for Simple Configurations". *Information Processing Letters* 92: 245-251 (2004). (With A. Weisman, and L. P. Chew)

"STR2: A Structure to String Approach for Locating G-box Riboswitch Shapes in Pre-selected Genes. In *Silico Biology* 4(0049) (2004). <http://www.bioinfo.de/isb/2004/04/0049>. (With O. Bergig, D. Barash, and E. Nudler)

"The URMS-RMS Hybrid Algorithm for Fast and Sensitive Local Protein Structure Alignment". *Journal of Computational Biology* 12: 12-32 (2005). (With G. Yona)

"Searching for RNA Motifs using Computational Geometry: The Structure to String Method". In the *Proceedings of the IEEE Computational Systems Bioinformatics*: 660-661, Stanford, CA (2005). (With O. Bergig, and D. Barash)

2004 – 2005 Presentations

"Shape Matching for Biological Structures". The Technion, Computational Geometry Seminar 2004.

"Coding and Routing Optimizations in VOIP Networks". ORSIS, Operating Research Society, Technion (2004). (With N. Levin, E. Korach, and R. Ohaion)

"Searching for RNA Motifs using Computational Geometry: The Structure to String Method". Sixth Bioinformatics conference, Society for Bioinformatics in the Nordic Countries, Linkoping, Sweden (2004). (With O. Bergig, and D. Barash)

Awards and Honors

Mary Upson visiting professorship at Cornell University (1997-1998)





Uri Keich
Assistant Professor,
Department of Computer Science

keich@cs.cornell.edu
<http://www.cs.cornell.edu/~keich>

Uri Keich received his Ph.D. in mathematics from the Courant Institute in New York City in 1996, and his MSc in mathematics from Technion in Israel in 1991.

Before coming to CS, he was a project scientist at the Department of Computer Science and Engineering of the University of California, San Diego, and assistant professor at the Department of Mathematics of the University of California, Riverside until 2000. He was also a Von Karman Instructor at the Applied Mathematics Department of the California Institute of Technology.

Keich's research interests include statistical and algorithmic problems that arise in areas of bioinformatics such as motif finding, and sequence alignment.

2004 – 2005 Publications

"Computing the p-value of the Information Content from an Alignment of Multiple Sequences". *Proceedings of the Thirteenth Annual International Conference on Intelligent Systems for Molecular Biology, ISMB 2005*. (With N. Nagarajan and N. Jones)

"sFFT: A Faster Accurate Computation of the p-value of the Entropy Score". *Journal of Computational Biology* 12(4):416-430 (May 2005).

"Designing Seeds for Similarity Search in Genomic DNA". *Journal of Computer and System Sciences* 70(3): 342-363 (May 2005).Pages. (With J. Buhler and Y. Sun)

"A Faster Reliable Algorithm to Estimate the p-Value of the Multinomial IIR Statistic". *Lecture Notes in Computer Science* 3240: 111 - 122 (October 2004). (With N. Nagarajan)

2004 – 2005 Lectures

"Intelligent Systems for Molecular Biology".

- ISMB (June 2005)
- Second Barbados Workshop on Genomics and Gene Regulation, Bellairs Research Institute McGill University (Apr 2005).

"Algorithms in Bioinformatics: Fourth International Workshop (WABI) (September 2004), (presented by my student Niranjan Nagarajan).

- BIRS Workshop on Statistical Science for Genome Biology (Aug 2004).

2004 – 2005 University Activities

Member, Admission Committee, CS department

Member, Compbio Search Committee, CS department

Member, Search Committee, Department of BSCB

2004 – 2005 Professional Activities

Reviewer, *Journal of Discrete and Applied Mathematics*

Conference Reviewer, RECOMB (2005)

Jon Kleinberg

Associate Professor,
Department of Computer Science

kleinber@cs.cornell.edu

<http://www.cs.cornell.edu/home/kleinber/>

Jon Kleinberg received his Ph.D. in computer science from M.I.T. in 1996. He subsequently spent a year as a visiting scientist at the IBM Almaden Research Center, and is now professor in CS.

Kleinberg's research interests are centered on algorithms, particularly those concerned with the structure of networks and information. He focuses on combinatorial and randomized methods in the design of algorithms, with applications to information science, discrete optimization, data mining, and computational biology.

His work introduced the notion of network analysis based on hubs and authorities, a framework that has been incorporated into a number of prominent search tools on the World Wide Web.

Kleinberg is a recipient of an NSF Career Award, an ONR Young Investigator Award, an Alfred P. Sloan Foundation Fellowship, a David and Lucile Packard Foundation Fellowship, the Fiona Ip Li and Donald Li Teaching Award from the Cornell College of Engineering, and the 2001 National Academy of Sciences Award for Initiatives in Research.

2004 – 2005 Publications

Algorithm Design. Addison-Wesley (2005). (With E. Tardos)

"Isomorphism and Embedding Problems for Infinite Limits of Scale-free Graphs". In the *Proceedings of the Fifteenth ACM-SIAM Symposium on Discrete Algorithms* (2005).

"Triangulation and Embedding using Small Sets of Beacons". In the *Proceedings of the Forty-fifth IEEE Symposium on Foundations of Computer Science* (2004). (With A. Slavkins, and T. Wexler)

"The Price of Stability for Network Design with Fair Cost Allocation". In the *Proceedings of the Forty-fifth IEEE Symposium on Foundations of Computer Science* (2004). (With E. Anshelevich, A. Dasgupta, E. Tardos, T. Wexler, and T. Roughgarden)

"A Graph-based Approach towards Discerning Inherent Structures in a Digital Library of Formal Mathematics". In the *Proceedings of Mathematical Knowledge Management, Third International Conference* (2004). (With L. Lorigo, R. Eaton, and R. Constable).

"Computability and Complexity". An essay in *Computer Science: Reflections on the Field*,

Reflections from the Field. National Academics Press (2004). (With C. Papadimitriou)

"Structural Properties and Tractability Results for Linear Synteny". *Journal of Discrete Algorithms* 2(2): 207-228 (2004). (With D. Liben-Nowell)

2004 – 2005 Lectures

"Complex Networks, Search Algorithms, and the Evolution of the Web". Invited plenary talk at SIAM Conference on Discrete Mathematics (June 2004).

"Cascading Behavior and Bursty Dynamics in Computational Models of Social Networks". Invited plenary talk at Twentieth Conference on Uncertainty in Artificial Intelligence (UAI) (July 2004).

"The Temporal Dynamics of Information Networks". Packard Fellowship Annual Meeting (September 2004).

"Analyzing Complex Networks". Department of Homeland Security Data Sciences Workshop (September 2004).

"Contagion," Santa Fe Institute Business Network Topical Meeting (September 2004).

"Bursts, Cascades, and other Temporal Phenomena in Information Networks". M.I.T. Dertouzos Lecture, November 2004.

"Traffic Analysis". JASON Fall Meeting (November 2004).

"Search Processes in Complex Networks". CMU Symposium on Networks in Biology (April 2005).

2004 – 2005 Professional Activities

Editorial board: *Springer book series in Information Science and Statistics*

Editorial board: *Springer Lecture Notes in Computer Science (LNCS)*

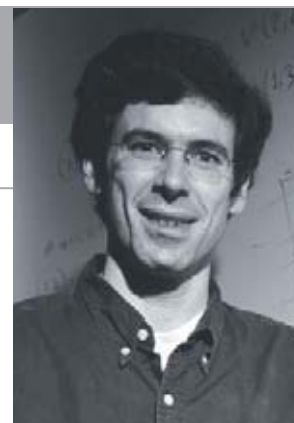
Editorial board: *Journal of Internet Mathematics*

Editorial board: *Foundations and Trends in Theoretical Computer Science*

Organizing committee: MSRI Program in Probability, Algorithms and Statistical Physics, spring 2005

Program committee: Second Conference on Email and Anti-Spam, 2005

Member, CIS Council



Awards and Honors

Best Research Paper Award, ACM SIGKDD International Conference, 2005

Best Research Paper Award, ACM SIGKDD International Conference, 2003

Cornell Association of Computer Science Undergraduates, Faculty of the Year Award, 2002

IBM Outstanding Innovation Award, 2002

National Academy of Sciences Award for Initiatives in Research, 2001

Fiona Ip Li '78 and Donald Li '75 Excellence in Teaching Award, College of Engineering, Cornell University, 2000

Best Paper Award, ACM Symposium on Principles of Database Systems, 2000

David and Lucile Packard Foundation Fellowship, 1999

Office of Naval Research Young Investigator Award, 1999

Alfred P. Sloan Research Fellowship, 1997

NSF Faculty Early Career Development Award, 1997

Machtey Award for Best Student Paper, IEEE Symposium on Foundations of Computer Science, 1996

George M. Sprowls Ph.D. Dissertation Prize, M.I.T. Department of Electrical Engineering and Computer Science, 1996

Selected Press Appearances

"Online popularity tracked". *Technology Research News* (July 28, 2004).

"The Google Guys' Attitude has been... Trust us... but has the Brashness Cost Them?" *San Jose Mercury News* (August 18, 2004).

"The Ongoing Search for Efficient Web Search Algorithms". *SIAM News* (November 2004).

"TRN's Top Picks: Technology Research Advances of 2004". *Technology Research News* (December 29, 2004).

"Search Engine Algorithms and Research". *Search Engine Watch* (April 15, 2005).

Selected Publications

"Authoritative Sources in a Hyperlinked Environment". *Journal of the ACM* 46(5):604-632(1999).

"Navigation in a Small World". *Nature* 406:845 (2000).

"Approximation Algorithms for Classification Problems with Pairwise Relationships: Metric Labeling and Markov Random Fields". *Journal of the ACM* 49(5):616-639 (2002). (With E. Tardos)

Dexter Kozen

Joseph Newton Pew, Jr.
Professor of Engineering



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Dexter Kozen received his undergraduate degree from Dartmouth College in mathematics in 1974 and his Ph.D. in computer science from Cornell in 1977. After working as a research staff member at the IBM Thomas J. Watson Research Center for several years, he returned to Ithaca to join the CS faculty in 1985.

Dexter's research interests include the design and analysis of algorithms, computational complexity theory, complexity of decision problems in logic and algebra, and logics and semantics of programming languages. He is currently involved in a research project involving efficient code certification and its application to malicious firmware. His most recent theoretical project is the development of the theory of Kleene algebra and Kleene algebra with tests, including results on complexity, deductive completeness, expressiveness, and applications to compiler correctness. He developed and taught a new course on this topic in spring 2002. Kozen is the author of three textbooks.

2004 – 2005 Publications

"Some Results in Dynamic Model Theory". *Science of Computer Programming* 51(1-2):3-22 (May 2004). *Special issue: Mathematics of Program Construction* (MPC 2002), E. Boiten and B. Möller, editors.

"Computational Inductive Definability". *Annals of Pure and Applied Logic* 126(1-3):139-148 (April 2004). *Special issue: Provinces of logic determined. Essays in the memory of Alfred Tarski. Parts I, II and III*, Z. Adamowicz, S. Artemov, D. Niwinski, E. Orłowska, A. Romanowska, J. Wolenski, editors.

"Natural Transformations as Rewrite Rules and Monad Composition". *Technical Report 2004-1942*, Computing and Information Science, Cornell University (July 2004).

"Proceedings of the Seventh International Conference on the Mathematics of Program Construction (MPC 2004)", D. Kozen, editor, Springer-Verlag *Lecture Notes in Computer Science* 3125 (July 2004).

"Toward the Automation of Category Theory". *Technical Report 2004-1964*, Computing and Information Science, Cornell University (September 2004).

"Supporting Workflow in a Course Management System" In the *Proceedings of the Thirty-sixth Technical Symposium on Computer Science Education (SIGCSE'05)* ACM SIGCSE:262-266, W. Dann et al., editors, St. Louis (February 2005). (With C. Botev, H. Chao, T. Chao, Y. Cheng, R. Doyle, S. Grankin, J. Guarino, S. Guha, P.-C. Lee, D. Perry, C. Re, I. Rifkin, T. Yuan, D. Abdullah, K. Carpenter, D. Gries, A. Myers, D. Schwartz, and J. Shanmugasundaram)

"Separability in Domain Semirings". *Technical Report 2004-16*, Institut fuer Informatik, University of Augsburg, Germany (December 2004). (With B. Möller)

"Second-order Abstract Interpretation via Kleene Algebra". *Technical Report 2004-1971*, Computing and Information Science, Cornell University (December 2004). (With L. Kot)

"Kleene Algebra and Bytecode Verification". In the *Proceedings of the First Workshop on Bytecode Semantics, Verification, Analysis, and Transformation (Bytecode'05)*, :201-215, Fausto Spoto, editor, Edinburgh (April 2005). (With L. Kot)

"Publication/Citation: A Proof-theoretic Approach to Mathematical Knowledge Management". *Technical Report 2004-1985*, Computing and Information Science, Cornell University (March 2005). (With G. Ramanarayanan)

"Coinductive Proof Principles for Stochastic Processes". *Technical Report 2004-1986*, Computing and Information Science, Cornell University (March 2005).

2004 -2005 Lectures

"Latin American Theoretical Informatics". (LATIN'04) (April 2004).

2004 – 2005 Professional Activities

Program committees 2003-2004:

Mathematical Foundations of Computer Science (MFCS) (2004)

Workshop on Logic, Language, Information and Computation (WoLLIC) (2003)

Chair, International Conference on the Mathematics of Program Construction (MPC) (2004)

Seventh International Seminar on the Relational Methods in Computer Science (May 2003)

Second International Workshop Applications of Kleene Algebra (May 2003)

Editorial Boards 2003-2004:

Journal of Relational Methods in Computer Science (2000-present)

Theory of Computing Systems (2001- present)

Journal of Logical Methods in Computer Science (2003-present)

Theoretical Computer Science, special issue for WOLLIC (2004)

External Committees and Advisory Boards (2003-2004):

Centre for Basic Research in Computer Science (BRICS), Aarhus University

IEEE Symposium on Logic in Computer Science (1999-present)

Chair (2003), Goedel Prize Committee, ACM (2000-2003)

2004 – 2005 University Activities

Freshman advisor, College of Arts and Sciences (2003-2004)

Chair, Academic Integrity Hearing Board, College of Engineering

Faculty Advisor, Cornell Men's Rugby Club

Faculty Advisor, Cornell Women's Rugby Club

Faculty Advisor, Johnson Graduate School of Management Rugby Club

Faculty Advisor, Absolute A Cappella Student Chorus

Awards and Honors

John G. Kemeny Prize in Computing, Dartmouth College (1974)

Outstanding Innovation Award, IBM Corporation (1980)

Fellow, John Simon Guggenheim Foundation (1991)

Research Prize, Polish Ministry of Education (1993)

Faculty of the Year, Association of Computer Science Undergraduates, Cornell (1994)

Class of 1960 Scholar, Williams College (2000)

Stephen and Margery Russell Distinguished Teaching Award, College of Arts and Sciences, Cornell (2001)

Research Prize, Polish Ministry of Education (2001)

Fellow, Association of Computing Machinery (2003)

Selected Publications

"Alternation". *Journal of the Association for Computing Machinery* 28(1):114-133 (1981). (With Ashok Chandra, and Larry Stockmeyer)

"Results on the Propositional Mu-calculus". *Theoretical Computer Science* 27:333-354 (1983).

"Kleene Algebra with Tests". *Transactions on Programming Languages and Systems* 19(3):427-443 (May 1997).

Dean Krafft

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Department of Computer Science
Director of Information Technology, CIS



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Dean Krafft received his Ph.D. in computer science from Cornell University in 1981. He serves as both a researcher and administrator at Cornell. On the research side, he is the Principal Investigator for the National Science Digital Library Project (<http://nsdl.org>) at Cornell. Krafft leads the effort to develop key components of the Core Integration Technology for the library and manages the team that maintains the production library services. He works with the other institutions involved in the Core Integration effort to specify, develop, and provide new digital library technologies to the over one hundred NSF-funded projects involved in the NSDL program.

As an administrator, he serves as Director of Information Technology for Computing and Information Science. He helps provide oversight for the Computer Facilities Support group, represents CIS to the campus-wide IT Managers Council, and focuses on a number of issues including IT policy, software acquisition, and computer security.

Krafft's own particular interests focus on ensuring the availability in the digital world of pre-digital published and manuscript materials, as well as related issues on copyright, the public domain, and public access to older and out-of-print materials.

2004 – 2005 University Activities

Member, IT Managers Council

Chair, ITMC Software Acquisition Committee

Member, IT Policy Advisory Group

Selected Publications

"Core Services in the Architecture of the National Digital Library for Science Education (NSDL)".

In the *Proceedings of the Second ACM/IEEE-CS Joint Conference on Digital Libraries* (July 2002). (With Carl Lagoze, et al.)

<http://arxiv.org/abs/cs.DL/0201025>

"Dienst: Building a Production Technical Report Server". In the *Proceedings of Advances in Digital Libraries* :211-223 (May 1995). (With J. Davis and C. Lagoze)

"The Challenge of Robotics for Computer Science". In *Advances in Robotics, Vol. 1: Algorithmic and Geometric Aspects of Robotics*, J. Schwartz and C. Yap, editors, Lawrence Erlbaum Associates, Inc. :7-42 (1986). (With J. Hopcroft)

Christoph Kreitz

Senior Research Associate,
Department of Computer Science

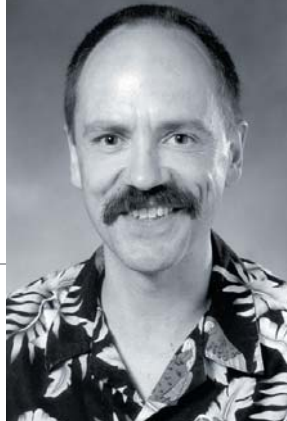
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Christoph Kreitz is a Senior Research Associate at Cornell University and a Professor of Computer Science at the University of Potsdam, Germany. He obtained his Ph.D. in computer science at the Fern Universitaet Hagen, Germany in 1984. His research has focused on computational models for infinite objects and on the application automated theorem proving to the design, verification, and optimization of software systems.

In collaboration with researchers of Robert Constable's Nuprl and Ken Birman's Ensemble groups he has built logic-based tools that automatically improve the code of fault-tolerant communication systems and guarantee that the improvements do not introduce errors. He has also developed techniques for the formal design and verification of adaptive distributed systems. He currently investigates the validation of end-to-end Quality-of-Service behavior of networked systems.

Christoph Kreitz also works on enhancing the automatic reasoning capabilities of theorem proving environments. Together with his former students and colleagues from Germany he has developed and implemented proof search procedures for classical intuitionistic, modal, and fragments of linear logic, and algorithms that transform the machine-found proofs into the proof calculus of other systems. His theorem prover JProver has been connected to the interactive proof assistants Nuprl, MetaPRL, and Coq and is being used to guide the development of proofs in these systems. Current investigations focus on boosting reasoning technology through hybrid theorem provers.

**2004 – 2005 Publications**

"A Matrix Characterization for Multiplicative Exponential Linear Logic". *Journal of Automated Reasoning* 32(2):121-166 (2004). (With H. Mantel)

"Building Reliable, High-performance Networks with the Nuprl Proof Development System". *Journal of Functional Programming* 14(1):21-68(2004).

"Innovations in Computational Type Theory using Nuprl". Submitted to *Journal of Applied Logic* (2005). (With S. F. Allen, M. Bickford, R. L. Constable, R. Eaton, L. Lorigo, and E. Moran)

2004 – 2005 Professional Activities

Program Committee, International Conference TABLEAUX'05 (2005)

Program Committee, Fourth International Workshop on Logical Frameworks And Meta-Languages (LFM'04)

2004 – 2005 University Activities

Head, Faculty Search Committee, Department of Computer Science, University of Potsdam

Chairman, Development and Planning Committee, University of Potsdam

Member, University Elections Committee, University of Potsdam.

Carl Lagoze

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Department of Computer Science

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<http://www.cs.cornell.edu/lagoze/>

Carl Lagoze obtained his master's degree in software engineering from Wang Institute for Graduate Studies in 1987. He is currently a senior research associate in the Faculty of Computing and Information Science at Cornell University.

Lagoze's research investigates web information systems - specifically digital libraries and new models of scholarly communication. His work focuses primarily on interoperability protocols and architectures, digital object models, and metadata frameworks.

Lagoze's research is recognized for a number of advances in distributed information systems. These include the Dienst architecture for distributed digital libraries, the FEDORA digital-object model for complex digital content, and the Open Archives Initiative Protocol for Metadata Harvesting that has been widely adopted as a foundation for information systems interoperability. His role as a scientist in the NSF-funded NSDL project provides the opportunity to realize these advances in a major national resource for science and mathematics education.

2004 – 2005 Publications

"Fedora: An Architecture for Complex Objects and their Relationships". *Journal of Digital Libraries* (to appear). (With S. Payette)

"Citation Classification and Its Applications". *International Conference on Knowledge Management* (October 2005). (With S. Aya)

"As We May Perceive: Inferring Logical Documents from Hypertext". *Sixteenth ACM Conference on Hypertext and Hypermedia* (September 2005). (With P. Dmitriev)

"An Information Network Overlay Architecture for the NSDL". *Joint Conference on Digital Libraries* (June 2005). (With D. Krafft)

"Rethinking Scholarly Communication: Building the System That Scholars Deserve". *D-Lib Magazine* (September, 2004).



2004 – 2005 Lectures

"Information Network Overlay Architecture: Adding Value to Digital Content". University of Pittsburgh Information Colloquium (2005).

"NSDL - A National Digital Library using RDF and Fedora Web Services". Building the Info Grid, Copenhagen. (2005).

"Adding Value to Digital Content Using Fedora". Fedora User's Group Meeting, Rutgers (2005).

"Building a New Fabric for Scholarly Communication". Symposium on Open Access to Knowledge and Scholarly Communication. Zurich (2004).

2004 -2005 Professional Activities

Member, Advisory Committee, NSF National Virtual Observatory

Member, Executive Team, NSF NSDL; Open Archives Initiative

Guest Editor, IEEE Internet Computing

Member, Program Committee, Ninth European Conference on Research and Advanced Technology for Digital Libraries; Joint Conference on Digital Libraries (2005)

Member, Program Committee, Joint Conference on Digital Libraries (2005)

Member, Advisory Board, Los Alamos National Laboratory Library

Member UTOPIA National Advisory Group, University of Texas at Austin

Awards and Honors

Library and Information Technology Association Frederick G. Kilgour Award (2004).

Lillian Lee

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Lillian Lee (A.B. Cornell University 1993; Ph.D. Harvard University 1997) is an associate professor in computer science. Her main research interests are natural language processing and machine learning, concentrating on the development of “knowledge-lean” statistical methods allowing computers to automatically learn linguistic and domain knowledge directly from text. Current joint projects with her students include using graph-based methods for sentiment analysis (for instance, automatically determining whether an unlabeled movie review is “thumbs up” or “thumbs down”) and applying statistical language models to information-retrieval applications. She and her colleagues have also considered applications ranging from finding word boundaries in streams of Japanese to creating English versions of computer-generated mathematical proofs. A major focus of previous work was the study of distributional similarity and distributional clustering.

Lee spent the 2004-2005 academic year on sabbatical leave as visiting faculty in the Language Technologies Institute and Computer Science Department of Carnegie Mellon University.

2004 – 2005 Publications

“PageRank without Hyperlinks: Structural Re-ranking using Links Induced by Language Models”. In the *Proceedings of SIGIR* (2005). (With O. Kurland)

“Better than the Real Thing? Iterative Pseudo-query Processing using Cluster-based Language Models”. In the *Proceedings of SIGIR* (2005). (With O. Kurland and C. Domshlak)

“Seeing Stars: Exploiting Class Relationships for Sentiment Categorization with Respect to Rating Scales”. In the *Proceedings of the ACL* (2005). (With B. Pang)

“‘I’m sorry Dave, I’m afraid I can’t do that’: Linguistics, Statistics, and Natural Language Processing circa 2001.” *Computer Science: Reflections on the Field, Reflections from the Field*. The National Academies Press (2004).

**2004 – 2005 Lectures**

“What is the Matter?” Explorations in Document Classification”, M.I.T. (2004).

“What is the Matter?” Explorations in Text Categorization, Carnegie Mellon (2005).

2004 – 2005 Professional Activities

Secretary of the NAACL, the North American chapter of the Association for Computational Linguistics (2004-2005)

Organizing-committee member, ACL Special Interest Group on Linguistic Data and Corpus-Based Approaches to NLP (SIGDAT) (2001-present)

Editorial-board member, *Machine Learning Journal* (2001-2004)

Editorial-board member, *Journal of Artificial Intelligence Research* (2005-2008)

2004 – 2005 Press Mentions

“Summarizer Gets the Idea”. *Technology Research News* (July 28/August 4, 2004).

“Summarizer Gets the Idea” (summary). *Technology Review* (July 30, 2004).

“Software Sorts Out Subjectivity”. *Technology Research News* (November 17/24, 2004).

“Software Sorts Out Subjectivity” (summary). *Technology Review* (November 16, 2004).

“Top Picks: Technology Research Advances of 2004”. *Technology Research News* (December 29, 2004/January 5, 2005).

“Will Machines ever Understand Us?” *New Scientist* (April 9, 2005).

“Summarizer Ranks Sentences”. *Technology Research News* (April 20/27, 2005).

Awards and Honors

Best paper award, HLT-NAACL 2004 (joint with Regina Barzilay)

Alfred P. Sloan Research Fellowship (2002-2004)

James and Mary Tien Excellence in Teaching Award (2002)

Stephen and Marilyn Miles Excellence in Teaching Award (1999)



Yuying Li
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Department of Computer Science

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<http://www.cs.cornell.edu/home/yuying/yuying.html>

Yuying Li obtained a bachelor's degree in applied mathematics at the Sichua University in China in 1982, and a Ph.D. in computer science at the University of Waterloo in 1988. She has been a research associate in CS since.

Li's research interests include numerical optimization and scientific computation. In addition, she is interested in the application of optimization methods to medical, engineering, and financial problems.

Her current interest has focused on solving problems in financial applications, e.g., volatility estimation, discrete hedging, portfolio compression, and portfolio optimization under different risk measures.

Awards and Honors

First Prize of the Sixth Fox Prize Competition in Numerical Analysis, Oxford, England, 1993



Hod Lipson

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Hod Lipson joined the Faculty of CIS and the faculty of the Sibley School of Mechanical and Aerospace Engineering in 2001 as an assistant professor. Prior to this appointment, he was a postdoctoral researcher at Brandeis University's Computer Science Department, working on evolutionary computation and evolutionary robotics, where he led the Golem Project- creating the first physical artificial life forms. He was also a lecturer at M.I.T.'s mechanical-engineering department, where he taught design and conducted research in design automation.

Professor Lipson's Ph.D. (Technion, 1998) research was on the reconstruction of a three-dimensional object from a single freehand sketch, as a means for human-computer interaction for CAD. Before joining academia, Lipson spent several years as a design engineer in the mechanical, electronic and software industries, and co-founded two currently-active companies.

Lipson's research interests are in the area of computational synthesis: How do we combine basic building blocks to achieve some high-level functionality? He is interested in understanding the synthesis process of design and emulating it computationally, and he focuses on the ideas of self-organization and self-replication as new paradigms of fully automated design, fabrication and learning. Primary questions concern automatic discovery of modules, regular and hierarchical composition, and automatic

abstraction of functionality. Cornell's computational synthesis group develops both new theoretical ideas and applies them to various engineering problems, from evolutionary robotics and structures to circuits and game players. Lipson believes that fully automated synthesis holds the key to future competitiveness, and presents a largely unaddressed challenge across engineering, biology, and AI.

2004 - 2005 Publications

"Nonlinear System Identification using Coevolution of Models and Tests". *IEEE Transactions on Evolutionary Computation* (2005) (With J. Bongard)

"Design and Control of Tensegrity Robots for Locomotion". *IEEE Transactions on Robotics and Automation* (2005) (With C. Paul and F. Valero Cuevas)

"Two-dimensional Photonic Crystals Designed by Evolutionary Algorithms". *Applied Physics Letters* (2005) (With S. Preble and M. Lipson)

"A Pen-based Freehand Sketching Interface for Progressive Construction of 3D Objects". *Journal of Computers and Graphics* (2005) (With M. Masry and D. Kang)

"Self-reproducing Machines". *Nature* 435(7038):163-164 (2005). (With V. Zykov, E. Mytilinaios, and B. Adams)

"Homemade: The Future of Rapid Prototyping". *IEEE Spectrum* feature article (May 2005).

"Networks, Dynamic and Modularity". *Physical Review Letters* 22(18) (2004). (With E. Variano and J. McCoy)

Selected Publications

"Generative Encodings for the Automated Design of Modular Physical Robots". *IEEE Transactions on Robotics and Automation* 19(4): 703-719. (2003). (With G. Hornby and J. Pollack)

"Uncontrolled Engineering: A Review of Evolutionary Robotics". *Artificial Life* 7(4): 419-424 (2001).

"Automatic Design and Manufacture of Artificial Lifeforms". *Nature* 406: 974-978. (2000). (With J. Pollack).

"Evolutionary Design and Evolutionary Robotics". *Biomimetics*, B. Cohen, editor, CRC Press.

Awards and Honors

Best Paper Award, ICAR 2005

GECCO (ACM SIGEVO) Gold Medal for Human Competitive Automated Invention (2005)

TIME Magazine's annual 2001 "most important events of the year" selection Shaping the Future Award, EXPO 2000.

Rajit Manohar

Associate Professor of the School of Electrical and Computer Engineering and Member of the Graduate Field of Computer Science

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<http://vlsi.cornell.edu/~rajit/>

Rajit Manohar received his B.S. (1994), M.S. (1995), and Ph.D. (1998) in computer science from the California Institute of Technology. He has been a member of the Cornell faculty since 1998 where he cofounded its Computer Systems Laboratory. His group conducts research on efficient asynchronous computation structures.

Research in Professor Manohar's group combines formal methods, algorithms for design automation, and the VLSI design of asynchronous circuits and systems. His group introduced a new class of high-performance asynchronous programmable logic structures, the first ultralow-power processor for sensor networks, and an asynchronous event-based architecture for discrete-event simulation. His work introduced the notion of slack elasticity and projection, which provides the theoretical foundation for fine-grained pipelining in asynchronous circuits.

2004 – 2005 Publications

"High-performance Asynchronous FPGA: Test Results". *2005 IEEE Symposium on Field-programmable Custom Computing Machines* (April 2005).

"BitSNAP: Dynamic Significance Compression for a Low Power Sensor Network Asynchronous Processor. *Proceedings of the Eleventh IEEE International Symposium on Asynchronous Circuits and Systems* (March 2005). (With V. Ekanayake, C. Kelly, IV)

"Automated Synthesis for Asynchronous FPGAs". *Thirteenth ACM International Symposium on Field Programmable Gate Arrays* (February 2005). (With S. Peng, D. Fang, and J. Teifel)

"Delta-dataflow Networks for Event Stream Processing. *Proceedings of the IASTED International Conference on Parallel and Distributed Computing and Systems* (November 2004). (With K.M. Chandy)

"An Ultra-low-power Processor for Sensor Networks". *Proceedings of the Eleventh International Conference on Architectural Support for Programming Languages and Operating Systems* (October 2004). (With V. Ekanayake, and C. Kelly, IV)



"A Rate Matching-based Approach to Dynamic Voltage Scaling". *Proceedings of the First Watson Conference on the Interaction between Architecture, Circuits, and Compilers* (October 2004). (With D. Biermann, and E.G. Sire)

2004 – 2005 Lectures

"Asynchronous FPGAs". Invited talk, Xilinx research labs, San Jose, CA (April 2005).

"Activity-driven Asynchronous Circuits and Systems". Invited seminar, IGERT Seminar on Machines and Organisms, Ithaca, NY (February 2005).

"Issues in the Design of Sensor Network processors". Invited talk, NSF meeting on Networks of Sensors Systems (October 2004).

2004 – 2005 Professional Activities

Program Chair, IEEE/ACM Symposium on Asynchronous Circuits and Systems (May 2005)

Member, Program Committee, Conference on Design Automation and Test in Europe (March 2005)

Awards and Honors

CAREER award

Cornell IEEE Teacher of the Year Award

College of Engineering Sonny Yau Excellence in Teaching Award

Tau Beta Pi and Cornell Society of Engineers Excellence in Teaching Award

Steve Marschner

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<http://www.cs.cornell.edu/~srm>

Steve Marschner obtained his Sc.B. degree in mathematics and computer science from Brown University in 1993 and his Ph.D. from Cornell in 1998. He held research positions at Hewlett-Packard Labs, Microsoft Research, and Stanford University before joining the CS faculty in 2002.

Marschner's research is in computer graphics, particularly realistic rendering, and focuses on modeling the optics of materials. His research aims to develop new material models, grounded in physics and supported by measurements of real materials that can represent the complex natural materials we encounter every day. These models will allow computer-graphics practitioners to achieve goals, such as creating realistic virtual human actors, that are currently hampered by the limitations of existing material models. Marschner is also exploring related areas of computer graphics, from image-based modeling and 3D scanning to visual perception and mechanics.

Recent projects include an investigation of light scattering from human hair and an efficient method for rendering translucent materials that has been widely implemented by the film-effects industry and resulted in an Academy Award for Technical Achievement.



José F. Martínez

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José Martínez graduated in computer science and engineering in 1996 from the Universidad Politécnica de Valencia, and earned M.S. (1999) and Ph.D. (2002) degrees in computer science from the University of Illinois at Urbana-Champaign. A two-time recipient of the Spanish government's prestigious National Award for Academic Excellence, he held a Bank of Spain Fellowship for Advanced Studies for four years.

Martínez's recent work on speculative synchronization was featured in IEEE Micro's 2003 Top Picks from Microarchitecture Conferences.

His research interests include, but are not limited to, parallel architectures, microarchitecture, reconfigurable hardware, and hardware-software interaction. He is a member of the ACM and the IEEE Computer Society.

His teaching responsibilities include the junior/senior computer architecture class, ECE 5D2/COMS 516.

2004 – 2005 Publications

"Power-performance Implications of Thread-level Parallelism in Chip Multiprocessors". In *International Symposium on Performance Analysis of Systems and Software* (March 2005). (With J. Li)

"Checkpointed Early Load Retirement. In *International Symposium on High-performance Computer Architecture* (HPCA) (February 2005). (With N. Kirman, M. Kirman, and M. Chaudhuri)

"Toward Kilo-instruction Processors". In *ACM Transactions on Architectures and Code Optimization* (December 2004). (With O. Santana, A. Cristal, and M. Valero)



Awards and Honors

College of Engineering, Kenneth A. Goldman '71 Excellence in Teaching Award (2005)

Best Paper Award, International Symposium on High-performance Computer Architecture (HPCA) (2005)

IEEE Micro's Top Picks from Microarchitecture Conferences, on "The Most Industry-relevant and Significant Papers of the Year in Computer Architecture" (2003)

Inducted by the Phi Kappa Phi Honor Society (1999)

Bank of Spain Fellowship for Advanced Studies (1995–1999)

National Award for Academic Excellence, Ministry of Education, Spain (1995 and 1997)

Selected Publication

"Speculative Synchronization: Programmability and Performance for Parallel Codes. In *IEEE Micro*, Special Issue "Top Picks from Microarchitecture Conferences (November - December 2003). (With J. Torrellas)

2004 – 2005 Publications

"Measuring and Modeling the Appearance of Wood". In the *Proceedings of SIGGRAPH 2005*, Los Angeles (July 2005). (With S.H. Westin, A. Arbree, and J. T. Moon)

"Dual Photography". In the *Proceedings of SIGGRAPH 2005*, Los Angeles (July 2005). (With P. Sen, B. Chen, G. Garg, M. Horowitz, M. Levoy, and H.P. A. Lensch)

Awards and Honors

CAREER Award

Academy Award for Technical Achievement (2003)

Selected Publication

"A Practical Model for Subsurface Light Transport". In the *Proceedings of SIGGRAPH 2001*, Los Angeles (August 2001). (With Henrik Wann Jensen, Marc Levoy, and Pat Hanrahan)

Sally McKee

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Sally McKee received her bachelor's degree in computer science from Yale University (1985), master's from Princeton University (1990), and doctorate from the University of Virginia (1995). Before graduate school, she worked for Digital Equipment Corporation's Personal Computer Division and Microsoft Corporation. She has also held internships at Digital Equipment Corporation's Systems Research Center and the former AT&T Bell Labs (now Lucent Technologies Bell Labs). McKee was a post-doctoral research associate in the University of Virginia computer science department from May of 1995 through May of 1996.

Her research is primarily in the area of computer architecture, particularly in memory-system design and analysis. She worked at Intel's Oregon Microcomputer Research Lab in 1996 through 1998, during which time she also taught at the Oregon Graduate Institute of Science and Technology and Reed College. In 1998, she moved to the University of Utah, where she performed research on the Impulse Adaptable Memory System Project and her own research (partly in collaboration with colleagues at Lawrence Livermore National Laboratories [LLNL]) for four years. She was a participating guest at LLNL during much of 2001–2002.

In 2002, she moved to the School of Electrical and Computer Engineering at Cornell University, where she works with four Ph.D. students and one research associate on infrastructure for introspective (ultimately autonomic) computer systems, intelligent memory systems, and other aspects of high-end computing.

2004 - 2005 Publications

"Drowsy Region-based Caches: Minimizing Both Dynamic and Static Power Dissipation". *ACM Computing Frontiers Conference*, Ischia, IT (May 2005). (With M.J. Geiger, and G.S. Tyson)

"Owl: Next-generation System Monitoring". In the *Proceedings of the ACM Computing Frontiers Conference (CF'04)*, Ischia, IT (May 2005). (With M. Schulz, B.S. White, H.S. Lee, and J. Jeitner)

"A Vision for Next-generation System Monitoring". In the *Proceedings of the Workshop on Hardware Performance Monitor Design and Functionality*, San Francisco, CA (February 2005) (abstract only). (With M. Schulz, B.S. White, and H.S. Lee)

"Evaluating System-wide Monitoring Capsule Design Using Xilinx Virtex-II Pro FPGA". In the *Proceedings of the Workshop on Architecture Research using FPGA Platforms*, San Francisco, CA (February 2005) (abstract only). (With T. Suh, H.S. Lee, and M. Schulz)

2004 – 2005 Professional Activities

PC Chair, Computing Frontiers 2006

Member, Program Committee, Nineteenth ACM International Conference on Supercomputing (2005)

Member, Organizing Committee, International Conference on High performance Embedded Architectures and Compilers (HiPEAC 2005)

Member, Steering Committee, International Conference on Parallel Architectures and Compilation Techniques (2002–present)

Member, Advisory Committee, IEEE Technical Committee on Computer Architecture (2001–present)

Officer, ACM Micro Special Interest Group on Computer Microarchitecture (2002–present)

Assistant Editor, *Elsevier International Journal of Parallel Programming*

Awards and Honors

Junior Faculty Fellow, Frontiers in Education Conference, Boulder, Colorado (November 2003)

Cornell University, President's Council of Cornell Women Affinito-Stewart Junior Faculty Award (June 2003)

AAAS/NSF Women's International Science Cooperation Travel Grant, with Universitat Politècnica de Catalunya (2003)

Cornell University, Cornell Information Technology Innovation in Teaching Grant (January 2000)

Greg Morrisett

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of Computer Science

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Greg Morrisett obtained his Ph.D. in computer science from Carnegie Mellon in 1995.

Morrisett's research focuses on programming language design, implementation, and semantics. He is particularly interested in the emerging area of language-based security. He is best known for the development of Typed Assembly Language and Certifying Compilation. These are important mechanisms that can be used to automatically verify an important class of safety properties for machine code. More recently, Morrisett has concentrated on type systems for legacy software. His Cyclone project provides type safety for C code without sacrificing control over data structures, calling conventions, or memory management. Other projects include work on run-time code specialization, type-safe reflection, type-based alias analysis, region-based memory management, and in-lined reference monitors.

Morrisett is an editor for the *Journal of Functional Programming*, *Information Processing Letters*, and *ACM Transactions on Programming Languages and Systems*. In 2000, he was given a Presidential Early Career Award for Scientists and Engineers. He is also a recipient of a Sloan Foundation Fellowship, an NSF Career Award, and the Allen Newell Medal of Research Excellence.

2004 – 2005 Publications

"L3 : A Linear Language with Locations". In *Seventh International Conference on Typed Lambda Calculi and Applications* :293-307 (April 2005). (With A. Ahmed and M. Fluet)

"Cyclone: A Type-safe Dialect of C". *C/C++ User's Journal* 23(1): 6-13 (January 2005). (With D. Grossman, M. Hicks and T. Jim)

"Experience with Safe Manual Memory-management in Cyclone". In *ACM International Symposium on Memory Management* : 73-84 (October 2004). (With M. Hicks, D. Grossman and T. Jim)

"Monadic Regions". In the *Proceedings of the Ninth ACM SIGPLAN International Conference on Functional Programming* :103-114 (September 2004). (With M. Fluet)

**2004 – 2005 Lectures**

"Simplifying Regions". Carnegie Mellon University, Pittsburgh, Pennsylvania (April 2005).

"A Type-safe Dialect of C". National Security Agency's Fifth Annual High Confidence Software and Systems Conference, Baltimore, Maryland (March 2005).

"Languages, Semantics, and Models". Symposium on the Verifying Compiler, Menlo Park, California (February 2005).

"Language-based Security". Tenth Estonian Winter School in Theoretical Computer Science, Tallin, Estonia (February 2005).

"L3: A Linear Language with Locations". University of Pennsylvania, Philadelphia, Pennsylvania (November 2004).

"What's Next for an Academic PL Researcher?". University of Pennsylvania, Philadelphia, Pennsylvania (November 2004).

2004 – 2005 Professional Activities

Chief Editor, *Journal of Functional Programming*

Editor, *Information Processing Letters*

Associate Editor, *ACM Transactions on Programming Languages and Systems*

Program Chair, *ACM Symposium on Principles of Programming Languages*

Member, Program Committees: Foundations of Aspect-Oriented Languages, European Symposium on Programming, Object-Oriented Programming Systems and Languages

Member, Academic Advisory Board, Microsoft Trustworthy Computing

Awards and Honors

Presidential Early Career Award for Scientists and Engineers (October 2000)

Alfred P. Sloan Fellow (1998)

Allen Newell Medal of Research Excellence (2001)

National Science Foundation Career Award (1999)

Ralph Watts Excellence in Teaching Award (Cornell University 2000)

Andrew Myers

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Andrew Myers received his Ph.D. in computer science from M.I.T. in 1999. He is currently an associate professor in CS. Myers is particularly interested in using language-level information to improve security guarantees, performance, and transparency for distributed systems and mobile code.

A current focus is on the protection of confidential data, a problem that is gaining importance in our connected world.

Methods are needed for building practical systems while guaranteeing that they enforce strong security properties.

Myers has developed novel and efficient static analysis techniques to identify and control privacy violations in complex programs. These techniques have been employed in the Jif compiler and run-time system for writing secure programs. Jif has been applied to distributed systems containing untrusted components, and to systems in which security requirements change dynamically.

2004 – 2005 Publications

“End-to-end Availability Policies and Noninterference”. *Proceedings of the Eighteenth IEEE Computer Security Foundations Workshop* (June 2005). (With L. Zheng)

“Belief in Information Flow”. *Proceedings of the Eighteenth IEEE Computer Security Foundations Workshop* (June 2005). (With M. Clarkson, F.B. Schneider)

“Language-based Information Erasure”. *Proceedings of the Eighteenth IEEE Computer Security Foundations Workshop* (June 2005). (With S. Chong)

“Trickles: A Stateless Network Stack for Improved Scalability, Resilience, and Flexibility”. *Proceedings of the Second USENIX Symposium on Networked Systems Design and Implementation* (May 2005). (With A. Shieh, E.G. Sirer)



“Supporting Workflow in a Course Management System”. *Proceedings of the ACM Technical Symposium on Computer Science Education* (February 2005). (With C. Botev et al.)

“Security Policies for Downgrading”. *Proceedings of the Eleventh ACM Conference on Computer and Communications Security* (October 2004). (With S. Chong)

“Scalable Extensibility via Nested Inheritance”. *Proceedings of the Nineteenth ACM Conference on Object-oriented Programming Languages, Systems, Languages, and Applications* (October 2004). (With N. Nystrom, S. Chong)

“Dynamic Security Labels and Noninterference”. *Proceedings of the Second International Workshop on Formal Aspects in Security and Trust* (August 2004). (With L. Zheng)

2003-2004 Professional Activities

Member, Program Committee, ACM Symposium on Principles of Programming Languages (2005)

Member, Program Committee, USENIX Symposium on Operating Systems Design and Implementation (2004)

Member, Program Committee, ACM Conference on Computer and Communications Security (2004)

Member, Program Committee, ACM SIGOPS European Workshop (2004)

2004 – 2005 Lectures

“Programming with Explicit Security Policies”. European Symposium on Programming (April 2005).

“Enforcing Robust Declassification”. AFRL/Cornell Information Assurance Institute Lecture Series (July 2004).

Awards and Honors

Alfred P. Sloan Research Fellowship (2002)

Abraham T. C. Wong '72 Excellence in Teaching Award (2002)

CAREER Award (2001)

Anil Nerode

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Mathematics
Member of the Graduate Field of
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Anil Nerode obtained his Ph.D. in mathematics under Saunders MacLane, from the University of Chicago in 1956. He was a NSF postdoctoral fellow with Kurt Gödel, at the Institute for Advanced Study from 1957 to 1958; visiting assistant professor with Alfred Tarski, Berkeley from 1958 to 1959; was brought to Cornell by J. Barkley Rosser in 1959; appointed professor in 1965; and named Goldwin Smith Professor in 1990. He served as chair of the Department of Mathematics from 1982 to 1987, and was director of the Mathematical Sciences Institute from 1987 to 1996. He also served as director of the Center for Foundations of Intelligent Systems from 1996 to 2001.

Nerode's research areas include mathematical logic, computability theory, computer science, mathematics of AI, and control engineering. His principal research at present is in theorems and algorithms for extracting controls for hybrid systems using differential geometry and logic based controllers. Tools include the relaxed calculus of variations and connections on Finsler manifolds. He is also continuing work on other problems in logic, including computable model theory of nonstandard logics, foundations of logic programming, and multiple agent systems.

2004 – 2005 Publications

"Tableaux for Constructive Concurrent Dynamic Logic". *Annals of Pure and Applied Logic* 135:1-72 (2005). (With D. Wijesekera)

Control in Hybrid Systems. (2004). (With W. Kohn, V. Brayman, and P. Cholewinski).

2004 – 2005 University Activities

Chair, University Benefits Committee

Member, CS Department Curriculum Committee

Member, Graduate Admissions Committee

2004 – 2005 Professional Activities

Editor, *Mathematics and AI*; *Pure and Applied Algebra*; *International Hybrid Systems Journal*; *Documenta Mathematica*

Board Member, several math institutes in New Zealand and in Russia

Chair, International Advisory Board, ClearSight Corporation, Bellevue, Washington

International Advisory Board Computer Science, NTT, Japan

International Advisory Board, Centre for Discrete Mathematics and Theoretical Computer Science, University of Auckland, New Zealand

Chair, Steering Committee, Logical Foundations of Computer Science Symposium (2007)

Program Committee, IEEE -MASS-2005 Security and Survivability Symposium

Selected Publications

Automata Theory and Its Applications. Birkhauser, 430pp. ISBN 3-7643-4207 (2001). (With B. Khoussainov)

"Control Synthesis in Hybrid Systems with Finsler Dynamics". *Houston Journal of Mathematics* 28(2):353-375 (2002). (With W. Kohn and V. Brayman)

"Control in Hybrid Systems". *International Journal of Hybrid Systems* 3 (2003). (With V. Brayman and P. Cholewinski)

"Effective Completeness Theorems for Modal Logic". *Annals of Pure and Applied Logic*, 128(1-3):141-195 (2004). (With S. Ganguli)

Andrew Pershing

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Andrew Pershing holds a joint appointment as an assistant professor in the Department of Earth and Atmospheric Science and Cornell's Faculty of Computing and Information Science. He received his Ph.D. in ecology from Cornell in 2001.

His research interest is biological oceanography. Specifically, he is interested in how the physical environment influences animal populations in the ocean. Pershing's research has focused on the Gulf of Maine and has dealt with animals ranging from rice-grained sized crustaceans called copepods to truck-sized right whales. Much of his work has concentrated on documenting the major modes of interannual and inter-decadal variability in the physical and biological conditions in the Gulf of Maine, and developing numerical models to understand the processes driving the observed changes.

Due to the large spatial and temporal scales, understanding year-to-year changes in marine ecosystems requires a creative use models and observations. Models, whether conceptual models or complex computer programs, provide a representation of how important processes (as determined by the modeler) interact to produce patterns. A major theme of Pershing's research is to use models to investigate the processes that produce year-to-year changes in marine ecosystems. An important part of this research is to develop new techniques to compare models with observations.

With funding from NOAA and NASA, Pershing is leading a project to use models of plankton abundance to forecast possible feeding areas of the endangered right whale. He is working with the Cornell Theory Center to develop the computational tools to synthesize multiple data sources and deliver information in a timely manner to right-whale researchers and managers.

2004 – 2005 Publications

"Interdecadal Variability in the Gulf of Maine Zooplankton Community with Potential Impacts on Fish Recruitment". *ICES Journal of Marine Science*. In press (2005). (With C. H. Greene, J. W. Jossi, L. O'Brien, J. K. T. Brodziak, B. A. Bailey)

"Supply-side Ecology and Zooplankton Population Dynamics in the North Atlantic". *Oceanography* (2004). 17:60-71. MERCINA Working Group (With C.H. Greene, B. C. Monger, M. C. Benfield, E. G. Durbin, M. C. Casas)

"The Influence of Climate Variability on North Atlantic Zooplankton Populations". In *Ecological Effects of Climatic Variations in the North Atlantic*, N.C. Stenseth, G. Ottersen, J. Hurrell, and A. Belgrano, editors. Oxford University Press. (With C.H. Greene, B. Planque, J.-M. Fromentin)

"Climate and the Conservation Biology of North Atlantic Right Whales: the Right Whale at the Wrong Time?" *Frontiers in Ecology and the Environment* 2: 29-34. (With C.H. Greene)

2004 - 2005 Lectures

"Climate, Copepods, and Calves: Enhancing Ecosystem-based Management through Observing System Data". Presented at the Gulf of Maine Ocean Observing System Board of Directors Meeting, Portland, ME (June 22, 2005).

"Right Whales, Wrong Time? Ecosystem Variability in the Gulf of Maine and the Fate of the Northern Right Whale". Presented at Brown University, Providence, RI (March 14, 2005).

"Right Whales, Wrong Time? Ecosystem Variability in the Gulf of Maine and the Fate of the Northern Right Whale". Presented at the University of Rhode Island Graduate School of Oceanography, Narragansett, RI (March 7, 2005).

"Response of the Gulf of Maine to North Atlantic Climate". Presented at the Maine Fishermen's Forum, Rockland, ME (March 5, 2005).

"The Fate of the Northern Right Whale in a Changing Environment". Presented at the University of Southern Maine, Portland ME (February 11, 2005).

"Zooplankton Informatics: using Operational Oceanography to Save the Whales". Presented at the Monterey Aquarium Research Institute, Moss Landing, CA (August 4, 2004).

"Ecosystem Variability and the Northern Right Whale: Saving the Whales, one Byte at a Time". Presented at the University of Maine, Orono, ME (March 22, 2004).



Conference Presentations

"Response of NW Atlantic Shelf Ecosystems to Basin-scale Climate Forcing". Poster presentation at the Gordon Research Conference on Coastal Ocean Circulation, New London, NH (June 5-10, 2005).

"Forecasting Right Whale Distributions using Satellite Data: Preliminary Results and Future Plans". Oral presentation at the Right Whale Consortium Meeting, New Bedford, MA (November 3-4, 2004). (With B. C. Monger, C. Mayo, M. Bessinger, J. Runge)

"BClimate-based Assessment and Forecasting for Ecosystems in the Gulf of Maine". Oral presentation at ICES Symposium on the Influence of Climate Change on North Atlantic Fish Stocks, Bergen, Norway (May 11-14, 2004). (With A. Bailey, L. O'Brien, J. K. T. Brodziak, C. H. Greene, J. Jossi)

"Climate-based Assessment and Forecasting for Ecosystems in the Gulf of Maine". Oral presentation at ASLO-TOS Ocean Research Conference, Honolulu, HI (February 15-20, 2004). (With B. A. Bailey, C. H. Greene)

Workshops

Regional Association for Research in the Gulf of Maine (RARGOM): Modeling Related to the Regional Observing System in the Gulf of Maine, Ogunquit, ME (July 6-7, 2005).

CORONA: Coordinating Research on the North Atlantic, Roscoff, France (July 20-23, 2005).

Coastal Circulation Modeling around New England, Rockport, ME (March 6, 2005).

CAFÉ: Climate-based Assessment and Forecasting for Ecosystems in the Gulf of Maine. Boston, MA (December 14-15, 2004). (Organizer)

SERDP Marine Mammal Modeling Experts' Workshop, Durham, NC (June 7-9, 2004).

Right Whale Foraging Ecology and Management Working Group, Woods Hole, MA (April 16, 2004).

2004 - 2005 University Activities

Member, Graduate Field of Atmospheric Science

Awards and Honors

National Defense Science and Engineering Graduate Fellowship (1996)

Keshav Pingali

India Professor of Computer Science
Director of Undergraduate Studies



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Keshav Pingali obtained a bachelor's degree in electrical engineering at the Indian Institute of Technology (I.I.T.), Kanpur in 1978, and an Sc.D. in computer science at M.I.T., Cambridge in 1986. Since 1986, he has been on the faculty of the Department of Computer Science where he is currently a full professor. In 2003, he became the first India Chair of Computer Science at Cornell University. Pingali is also a professor in the Department of Electrical and Computer Engineering (ECE).

Pingali's research focuses on programming languages and compiler technology for program understanding, restructuring, and optimization. His group is known for its contributions to memory-hierarchy optimization; some of these have been patented. Algorithms and tools developed by his projects are used in many commercial products such as Intel's IA-64 compiler, SGI's MIPSPro compiler, and HP's PA-RISC compiler.

His current research focuses on the design of self-optimizing programs, improving the memory behavior of programs that use complex data structures, and programming techniques to make software resilient to hardware faults.

Publications

"Automatic Measurement of Memory Hierarchy Parameters". *International Conference on Measurement and Modeling of Computer Systems (SIGMETRICS)* (June 2005). (With K. Yotov, and P. Stodghill)

"Think Globally, Search Locally". *Cornell CIS Technical Report TR2004-1969* (May 2005). (With K. Yotov, and P. Stodghill)

"Is Search Really Necessary to Generate High-performance BLAS?". *Proceedings of the IEEE, Special Issue on Program Generation, Optimization, and Adaptation* 93(2) (February 2005). (With K. Yotov, X. Li, G. Ren, M. Garzaran, D. Padua, and P. Stodghill)

"Look Left, Look Right, Look Left Again: an Application of Fractal Symbolic Analysis to Linear Algebra Code Restructuring". *International Journal of Parallel Programming (IJPP)* 32(6) (December 2004). (With V. Menon)

"Implementation and Evaluation of a Scalable Application-level Checkpoint-recovery Scheme for MPI Programs". *Supercomputing 2004* (November 2004). (With M. Schulz, G. Bronevetsky, R. Fernandes, D. Marques, and P. Stodghill)

"Checkpointing Shared-memory Programs at the Application Level". *European Workshop on OpenMP (EWOMP)* (October 2004). (With G. Bronevetsky, M. Schulz, P. Szwed, and D. Marques)

"Application-level Checkpointing for Shared-memory Programs". *Symposium on Architectural Support for Programming Languages and Operating Systems (ASPLOS)* (October 2004). (With G. Bronevetsky, M. Schulz, P. Szwed, and D. Marques)

2004 – 2005 Lectures

"Think Globally, Search Locally". Università di Padova, Italy (June 2004).

- Dagstuhl Workshop on Cache-oblivious and Cache-aware Algorithms (July 2004).

- ScalPerf 2004, Bertinoro, Italy (September 2004).

"Fractal symbolic analysis". University of Texas, Austin (December 2004).

"X-Ray: a Tool for Automatic Measurement of Hardware Parameters". Università di Padova, Italy (June 2004).

"A Semi-automatic System for Application-level Checkpointing".

- University of Delaware (August 2004).

- University of Texas, Austin (October 2004).

- University of Iowa, Iowa City (October 2004).

- Lawrence Livermore Laboratory, Livermore (December 2004).

- Los Alamos National Laboratory, Los Alamos (December 2004).

- Salishan High-speed Computing Conference (April 2005).

"The Adaptive Software Project (ASP)". Cornell University (September 2004).

"Computational Structure and Language Design". Royal Institute of Technology, Stockholm, Sweden (September 2004).

"Two Lectures on Grid Computing". University of Texas, Austin (September 2004).

2004 – 2005 University Activities

Member, Strategic Planning Committee, College of Engineering (2003-2005)

Director of Undergraduate Studies, Department of Computer Science (2003-)

Member, Advisory Committee, Cornell Theory Center

2004 – 2005 Professional Activities

Member, Editorial Board: *International Journal of Parallel Programming (IJPP)*, *Discrete Mathematics and Theoretical Computer Science (DMTCS)*

Program committee member: International Conference in Supercomputing (ICS 2005); ACM Symposium on Programming Language Design and Implementation (PLDI 2005), Parallel Architectures and Compilation Techniques (PACT 2005), First International Workshop on Data Management on New Hardware (DaMoN 2005), International Conference on High-performance Computing (HiPC) (2005)

General Chair: ACM Symposium on Principles and Practice of Parallel Programming (PPoPP 2005)

Awards and Honors

India Chair of Computer Science at Cornell University (2003-)

Distinguished lecturer, Texas A&M University (2003)

N. Rama Rao Professor, I.I.T. Kanpur (2000-2001)

Best paper award, International Conference on Supercomputing (1999,2000)

Russell Teaching Award, College of Arts and Sciences, Cornell (1998)

Ip-Lee Teaching Award of the College of Engineering, Cornell (1997)

Best paper award, ACM Symposium on Architectural Support for Programming Languages and Operating Systems (ASPLOS 1992)

N.S.F. Presidential Young Investigator Award (1989-94)

I.B.M. Faculty Development Award (1986-88)

President's Gold Medal, I.I.T. Kanpur (1978)

Lalit Narain Das Gold Medal, I.I.T. Kanpur (1978)

National Science Talent Scholar (1973)

Selected Publications

"Fractal Symbolic Analysis". *ACM Transactions on Programming Languages and Systems (TOPLAS)* 25(6):776-813 (November 2003). (With V. Menon and N. Mateev)

"Algorithms for Computing the Static Single Assignment Form". *Journal of the ACM (JACM)* 50(3):375-425 (May 2003). (With G. Bilardi)

"Optimal Control Dependence Computation and the Roman Chariots Problem". *ACM Transactions on Programming Languages and Systems (TOPLAS)* :462-491 (May 1997). (With G. Bilardi)

Rachel Prentice
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CIS, joint with Science and
Technology Studies



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Rachel Prentice is an assistant professor of the social, political, and ethical implications of information technology in the Department of Science and Technology Studies at Cornell. She obtained her A.B. in comparative literature from Columbia College, Columbia University, in 1987, and her Ph.D. in science, technology, and society from M.I.T. in 2004. Her dissertation, "Bodies of Information: Reinventing Bodies and Practice in Medical Education," is an ethnography about groups of physicians, engineers, and computer experts building computer applications and simulations for teaching anatomy and surgery.

She is interested in how interdisciplinary groups are creating new methods for representing and interacting with bodies. Before graduate school, she worked as a newspaper reporter in Washington state, New Mexico, and Rome, Italy, focusing on science, environment, and government issues.

Prentice taught "From Surgery to Simulation", and "Computers: From Babbage to Gates" in fall 2004. She also taught "Qualitative Research Methods for Studying Science", and "Exploring Cyberworlds: Thinking With and About Machines" in spring 2005.

Awards and Honors

Hugh Hampton Young Fellowship (2003–04)

Jacob K. Javits Fellowship, U.S. Department of Education (1998–2002)

Siegel Prize for Best Paper on Science and Technology Studies, for "Calculating Women, Calculating Machines: The Rise of Scientific and Technical Computation in England, 1920–1945" Science, Technology, and Society Program, M.I.T. (1998)

Ida M. Green Fellowship, M.I.T. (1997–98)

Robbert van Renesse
Senior Research Associate,
Department of Computer Science



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<http://www.cs.cornell.edu/home/rvr/>

Robbert van Renesse received his M.Sc. in mathematics and computer science from the Vrije Universiteit in 1985, under the supervision of Professor Andrew S. Tanenbaum, with the honorary addendum cum laude. He obtained his Ph.D. in computer science from the Vrije Universiteit in 1989, also under the supervision of Professor Tanenbaum.

His research focus is in large-scale, self-organizing network protocols and fault-tolerant and secure distributed applications. Jointly with Ken Birman he is running the Quicksilver project, which seeks to develop reliable technologies for large-scale enterprises.

Most recently, Van Renesse and his students developed the Fireflies protocol, a scalable intrusion-tolerant membership protocol to support secure overlay networking. Fireflies is used to support an intrusion-tolerant multicast protocol, and will be used for the management of event filtering servers in the WAIF project of the University of Trömsö, Norway. Jointly with Fred Schneider, van Renesse is investigating how to build replicated storage services for modern data centers. Finally, with Mark Bickford and Bob Constable, he is interested in the specification and construction of adaptive network protocols.

In addition to his current research, van Renesse is a technical advisor for Fast Search & Transfer, ASA, a company that develops data search and filtering technologies.

2004 – 2005 Publications

“Overcoming Communications Challenges in Software for Monitoring and Controlling Power Systems”. *Proceedings of the IEEE* 9(5) (May 2005). (With K.P. Birman, J. Chen, K.M. Hopkinson, R.J. Thomas, J.S. Thorp, and W. Vogels)

“JiST: An Efficient Approach to Simulation using Virtual Machines”. *Software—Practice and Experience* 35(6) (May 2005). Reprinted in *Handbook on Theoretical and Algorithmic Aspects of Sensor, Ad Hoc Wireless, and Peer-to-Peer Networks*, J. Wu, editor, CRC Press (2005). (With R. Barr, and Z. Haas)

“Chain Replication for Supporting High Throughput and Availability”. *Sixth Symposium on Operating Systems Design and Implementation (OSDI '04)*, San Francisco, CA (December 2004). (With F. B. Schneider)

“Environment Mobility - Moving the Desktop Around”. *Second International Workshop on Middleware for Pervasive and Ad-Hoc Computing (MPAC'04)*, Toronto, Canada (October 2004). (With D. Johansen and H. Johansen)

“Efficient Reliable Internet Storage”. *Workshop on Dependable Distributed Data Management.*, Florianopolis, Brazil (October 2004).

2004 – 2005 Professional Activities

Fourth International Workshop on Distributed Event-Based Systems (DEBS'05) (June 2005)

Program Co-chair, International Workshop on Peer-to-Peer Systems (IPTPS) (February 2004)

Eighteenth International Symposium on Distributed Computing (DISC 2004) (October 2004)

Workshop on Dependable Distributed Data Management (October 2004)

Mirek Riedewald

Research Associate, Department of Computer Science



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<http://www.cs.cornell.edu/~mirek>

Mirek Riedewald obtained his undergraduate degree in computer science from the University of the Saarland, Saarbrücken, Germany in 1998, and his Ph.D. in computer science from the University of California, Santa Barbara in 2002. Currently, Dr. Riedewald's research interests are centered around processing of massive data streams, in particular formal semantics of stream query languages and their scalable implementation.

He also leads major efforts by the database group to provide new data management and analysis techniques for the sciences. Together with Rich Caruana and scientists at Cornell's Lab of Ornithology, he investigates novel approaches to estimating the abundance of North American bird species based on citizen science data, and to correlating change in bird abundance with changes in the environment. He also heads a collaboration with Cornell's physics department to provide flexible and efficient techniques for managing metadata and provenance for high-energy physics experiments.

Dr. Riedewald joined CS in 2002; his main area of research is database and information systems, especially data stream processing and data management and analysis for the sciences.

2004 – 2005 Publications

"Semantic Approximation of Data Stream Joins". In *IEEE Transactions on Knowledge and Data Engineering (TKDE)* 17(1):44-59 (2005). (With A. Das and J. Gehrke)

"Dynamic Multidimensional Data Cubes for Interactive Analysis of Massive Datasets". In *Encyclopedia of Information Science and Technology*, M. Khosrow-Pour, editor, Idea Group Publishing (2005). (With D. Agrawal and A. El Abbadi)

"Processing High-speed Intelligence Feeds in Real-time". In *Proceedings of the IEEE International Conference on Intelligence and*

Security Informatics (2005). (With A. Demers, J. Gehrke, and M. Hong)

"A Vision for PetaByte Data Management and Analysis Services for the Arecibo Telescope". *IEEE Data Engineering Bulletin* 27(4):12-20 (2004). (With M. Calimlim, J. Cordes, A. Demers, J. Deneva, J. Gehrke, D. Kifer, and J. Shanmugasundaram)

"Approximation Techniques for Spatial Data". In the *Proceedings of the ACM SIGMOD International Conference on Management of Data* :695-706 (2004). (With A. Das and J. Gehrke)

2004 – 2005 Professional Activities

Member, ACM, ACM SIGMOD, and IEEE

Member, Program Committees: IEEE International Conference on Data Engineering (ICDE 2006); ACM Conference on Information and Knowledge Management (CIKM 2005); International Conference on Data Warehousing and Knowledge Discovery (DaWaK 2005); IEEE International Conference on Intelligence and Security Informatics (ISI 2005)

Reviewer: *ACM Transactions on Database Systems (TODS)*; *ACM Transactions on Information Systems (TOIS)*; *Journal of Very Large Data Bases (VLDB)*; *IEEE Transactions on Knowledge and Data Engineering (TKDE)*; *Data and Knowledge Engineering (DKE)*; *IEEE Computer*

2004 – 2005 Lectures

"Cayuga: Internet-scale Monitoring of Data Streams". CS colloquium at the University of Florida, Gainesville (2005).

"Data Warehouse Meets Data Stream". Dagstuhl Perspectives Workshop: Data Warehousing at the Crossroads (2004).

Honors and Awards

NSF ITR award, "Tracking Environmental Change through the Resources of the Bird-monitoring Community" (2004-2008) (With R. Caruana, J. Fitzpatrick, W. Hochachka, and S. Kelling)

Microsoft eScience award, "PetaByte Data Management and Analysis Services for Data-Driven Science" (2004) (With J. Cordes, A. Demers, J. Gehrke, L. Gibbons, D. Lifka, and J. Shanmugasundaram)

Scholarship, "Studienstiftung des deutschen Volkes" (German National Merit Foundation) (1992-1998)

Mats Rooth

Professor
CIS, joint with Linguistics



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<http://www.people.cornell.edu/pages/mr249/>

Mats Rooth's research is concerned with theories and applications in linguistics and computational linguistics that combine theoretical-linguistic formalisms, knowledge, and problem statements with numerical modeling and parameter estimation techniques. Using current methodology, it is possible to create approximately complete grammars of human languages, and using parsing algorithms and the grammars, to map sentences to representations that represent their syntax and meaning. However, sentences of human languages are very ambiguous, to the extent that it would be possible to know everything about the syntax of a language, without having any operative means of identifying the intended syntax and meaning of the sentences that people use. This problem is addressed by numerical models that put weights on possible representations. Numerical models and optimization algorithms also allow linguistic information (in particular, syntactic and semantic properties of individual words) to be learned from large data samples.

Rooth also works on the semantics of natural language, using logical methods and formalisms. He developed an approach to the meaning of intonation, that is known as alternative semantics. Currently, he is working on interactions between the grammar of ellipsis and the grammar of intonation.

Rooth has a B.S. in mathematics from M.I.T., and a Ph.D. in linguistics from the University of Massachusetts at Amherst. Before joining the Cornell faculty, he was chair of theoretical computational linguistics at the University of Stuttgart, and member of the technical staff at AT&T Bell Laboratories.

2004 – 2005 Publications

"Topic Marking on Quantifiers". in *The Partee Effect*, G. Carlson and J. Pelletier, editors, M.I.T. Press (2004).

"Comments on Krifka's Paper". In *Context Dependence in the Analysis of Linguistic Meaning*, H. Kamp and B. Partee, editors, Elsevier(2004).

"Empty Domain Effects for Presuppositional and Non-presuppositional Determiners". In *Context Dependence in the Analysis of Linguistic Meaning*, H. Kamp and B. Partee, editors, Elsevier. (With D. Abusch)

2004 – 2005 Professional Activities

Member, Editorial Board, *Natural Language Semantics*

2004 – 2005 University Activities

Director, Computational Linguistics Laboratory

Member, Founders Committee, CIS Council

Radu Rugina

Assistant Professor, Department of Computer Science

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<http://www.cs.cornell.edu/~rugina/>

Radu Rugina received a bachelor's degree in computer science from the University Politehnica of Bucharest in 1996, and a Ph.D. degree in computer science from the University of California at Santa Barbara in 2001. Between 1997 and 2001 he was a visiting scholar at the Laboratory for Computer Science at M.I.T.

His research interests are in programming languages and compilation techniques for program understanding, verification, transformation, and optimization. He is particularly interested in the area of program analysis, with emphasis on the analysis of complex, pointer-based data structures. His current projects include an analysis, transformation, and run-time system that provides compiler and language support for region-based memory management in Java programs; and practical program analyses for detecting memory errors in low-level programming languages such as C.

In his past work, Rugina has developed pointer and symbolic analyses for recursive and multithreaded programs that heavily manipulate pointers. These techniques have been used to enable the static detection of data races in pointer-based multithreaded programs, and the automatic parallelization of complex divide-and-conquer programs.

2004 – 2005 Publications

"A Verifier for Region-annotated Java Bytecodes". In *Proceedings of the First Workshop on Bytecode Semantics, Verification, Analysis and Transformation* (April 2005). (With S. Cherem)

"Symbolic Bounds Analysis of Pointers, Array Indices, and Accessed Memory Regions". In *ACM Transactions on Programming Languages and Systems* 27(2):185-235 (March 2005). (With M. Rinard)



"Region-based Shape Analysis with Tracked Locations". In *Proceedings of the Thirty-second ACM SIGPLAN-SIGACT Symposium on Principles of Programming Languages* :310-323 (January 2005). (With B. Hackett)

"Region-based Shape Analysis with Tracked Locations". *Cornell University Computing and Information Science Technical Report TR2004-1968* (October 2004). (With B. Hackett)

"Region Analysis and Transformation for Java Programs". In *Proceedings of the ACM SIGPLAN 2004 International Symposium on Memory Management* (October 2004). (With S. Cherem)

"Quantitative Shape Analysis". In *Proceedings of the International Static Analysis Symposium* (August 2004).

2004 – 2005 Lectures

"Error Detection using Shape Analysis with Local Reasoning". University of Illinois at Urbana-Champaign (May 2005).

"Program Analysis for Error Detection, Verification, and Optimization". Brown Bag Seminar, Computer Science Department, Cornell University (March 2005).

"Region-based Shape Analysis with Tracked Locations". Symposium on Principles of Programming Languages, Long Beach, CA (January 2005).

"Shape Analysis with Local Reasoning". New Jersey Programming Language Seminar, New York University (December 2004).

"Shape Analysis with Local Reasoning". IBM T.J. Watson (October 2004).

"Error Detection using Shape Analysis with Local Reasoning". Microsoft Research (October 2004).

"Quantitative Shape Analysis". Static Analysis Symposium, Verona, Italy (August 2004).

2004 – 2005 Professional Activities

Member, Program Committee, ACM SIGPLAN 2005 Conference on Programming Language Design and Implementation

Fred B. Schneider

Professor, Department of Computer Science
Director, Information Assurance Institute

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Fred B. Schneider has studied concurrent and distributed systems since joining Cornell's faculty in 1978. His early work concerned programming methodology and formal methods. He is known for formalizing "safety" and "liveness" properties as well as for developing methods to reason about concurrent and distributed programs. His work in fault-tolerant distributed systems led to now well-known protocols and structures (including the "failstop processor" abstraction, a seminal survey on the state machine approach, hypervisor-based fault-tolerance, and various protocols used in today's air-traffic control systems).

Most recently, Schneider's attention has turned to questions related to computer security:

- exploiting insights from formal methods and programming languages as a basis for relocating trust and enforcing application-specific security policies, and
- the design of systems and protocols to support both fault-tolerance and security in distributed systems.

His efforts this year were focused on developing a prototype firewall that is trustworthy by virtue of proactive obfuscation for creating independence among servers and (jointly with postdoc Riccardo Pucella) on characterizing the class of attacks proactive obfuscation blunts.

Schneider is also involved with Professor Gün Sirer and his research group in constructing a trusted computing platform that leverages new hardware primitives PC's will be supporting for attestation and sealed storage. Finally, Schneider has been investigating methods to derive quantitative measures of information flow in programs, working in collaboration with Professor Andrew Myers and graduate student Michael Clarkson.



2004 –2005 Publications

“CODEX: A Robust and Secure Secret Distribution System.” *IEEE Transactions on Dependable and Secure Computing* 1(1):34-47 (January-March 2004). (With M. Marsh)

“Time out for Station Identification”. Editorial. *IEEE Security and Privacy* 2(1):5 (September/October 2004).

“Chain Replication for Supporting High Throughput and Availability”. *Sixth Symposium on Operating Systems Design and Implementation (OSDI '04)*, :91–104, USENIX Association, San Francisco, California (December 2004). (With R. van Renesse)

“Peer-to-peer Authentication with a Distributed Single Sign-on Service”. *Peer-to-Peer Systems III, Third International Workshop IPTPS 2004*, La Jolla, CA, (February 2004), *Lecture Notes in Computer Science* 3279: 250–258, G. Voelker and S. Shenker, editors, Springer-Verlag, Heidelberg (2004). (With W. Josephson, and E.G. Sierer)

“It Depends on what You Pay”. Editorial. *IEEE Security and Privacy* 3(3):5 (May/June 2005).

“Automated Analysis of Fault-tolerance in Distributed Systems”. *Formal Methods in System Design* 28(2):183-196 (March 2005). (With D. Stroller)

2004 – 2005 Lectures

“Scientific Overview of TRUST”. Kickoff meeting, Team for Research in Ubiquitous Technologies, Chaminade, California (June 2005).

“Thinking after Communicating”. FAST R & D Engineering Retreat, Oslo, Norway (June 2005).

“Scalable Replication with Chains”. FAST Search and Transfer Technical Conference, Oslo, Norway (June 2005).

“Implementing Fault-tolerant and Scalable Storage Services”. Distinguished Alumnus Lecture, Stony Brook University Computer Science Thirty-fifth Anniversary Celebration, Stony Brook University, Stony Brook, New York (May 2005).

Two lectures as part of Cornell SYS 680, Topics in Systems Engineering, Cornell University, Ithaca, New York (April 2005).

- “Computer Security Principles”.

- “Quick Summary of Cryptography”.

“Divide and be Conquered: Separation of Concerns for Trustworthiness”. Distinguished Lecture Series on Computation and Society, Harvard University, Cambridge, Massachusetts (April 2005).

“Cyber-terrorism: Yesterday, Today, and Tomorrow”. Cornell ALS 481, Global Conflict and Terrorism, Cornell University, Ithaca, New York (February 2005).

“Paying for Security”. Security Think Tank, CTC New York City, NY (November 2004).

“Cyber Terrorism: Defense is Hard because Targets are Soft. Workshop on “Definitions, Myths, and Realities of Cyber Terrorism”. Peace Studies Program, Cornell University, Ithaca, New York (November 2004).

“Cornell’s Trustworthiness Education Initiative”. University of California at Berkeley, California (September 2004).

“Transitions”. Invited panelist. DoD University Research Initiative Workshop, Annapolis, Maryland (August 2004).

“Language-based Security for Mobile Code”. DoD University Research Initiative Workshop, Annapolis, Maryland (August 2004).

“Trust in Cyberspace”. National Academy of Sciences, Committee on Improving Cybersecurity Research, Washington, D.C. (July 2004).

“Research to Support Robust Cyber Defense”. DARPA SRS Program Kickoff Meeting, Washington, D.C. (July 2004).

“Scalable Replication with Chains”. IAI@Rome Lecture Series. AFRL/Rome (July 2004).

2004 – 2005 University Activities

Member, Faculty Advisory Board in Information Technology (FABIT)

Member, Founder’s Committee, Faculty of Computing and Information Science

Member, ERC Advisory Committee, College of Engineering

Member, University Conflicts Committee

2004 – 2005 Professional Activities

Director, AFRL/Cornell Information Assurance Institute

Chief Scientist, NSF TRUST Science and Technology Center

Member and Science Advisor, Board of Directors, Griffiss Institute

Editorial:

Editorial Board, *Distributed Computing*; *IEEE Security and Privacy*; *IEEE Transactions on Dependable and Secure Computing*

Associate Editor-in-chief, *IEEE Security and Privacy*

Co-managing Editor, *Springer-Verlag Texts and Monographs in Computer Science*

Industrial Advisory:

Member, Technical Advisory Board, CIGITAL; Fast Search and Transfer; Fortify Software; Packet General Networks

Co-chair, Trustworthy Computing Academic Advisory Board, Microsoft

Other Advisory Committees:

Member, Computer Science and Telecommunications Board, National Research Council

Member, Advisory Committee, NSF/CISE

Member, Committee on Improving Cybersecurity Research, National Research Council

Member, IFIP Working Group 2.3 (Programming Methodology).

Awards and Honors

Doctor of Science (*honoris causa*), University of Newcastle-upon-Tyne, U.K. (May 2003)

Daniel M. Lazar Excellence in Teaching Award (2000)

Professor-at-large, University of Trömsö, Trömsö, Norway (1996–2006)

Fellow, Association for Computing Machinery (1994)

Fellow, American Association for Advancement of Science (1992)

Selected Publications

Implementing Fault-tolerant Services using the State Machine Approach: A Tutorial. *ACM Computing Surveys* 22(4): 299–319 (December 1990).

“Enforceable Security Policies”. *ACM Transactions on Information and System Security* 3(1):30-50 (February 2000).

Trust in Cyberspace, F. B. Schneider, editor, National Academy Press, 331 pages (December 1998).

David I. Schwartz
Lecturer, Department of
Computer Science



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David I. Schwartz obtained his Ph.D. in civil engineering at the State University of New York at Buffalo in 1999. He is currently a lecturer in the Department of Computer Science and self-appointed Director of the Game Design Initiative at Cornell University (GDIAC).

Schwartz's research and interests involve educational technology, the support of undergraduate research, textbook writing, and graduate-student development. This year his work on developing multidisciplinary curricula for computer game design courses culminated with the first offering of CIS300: Introduction to Computer Game Design. Art, CS, Engineering, Music, and Writing students collaborated to create original computer games, all of which are posted on <http://gdiac.cis.cornell.edu>. His work on GDIAC attracted the attention of the videogame industry, which has hired the first "crop" of GDIAC students this year. He has also established game programming co-ops and internships.

Schwartz's work on the Cornell Library Collaborative Learning Computer Laboratory (CL³) (<http://cl3.library.cornell.edu>) came to fruition this year, just in time for CIS300. CL³ is a unique "shape-shifting" computer lab. Students and teachers can freely move tables to suit groups' needs. CL³ is also Cornell's first publicly accessible digital arts computing lab, hosting the game courses and other classes. The new lab has become extremely popular amongst all university students.

2004 – 2005 Publications

"GameX: A Platform for Incremental Instruction in Computer Graphics and Game Design". *SIG-GRAPH Proceedings* (2005). (With R. Hoetzlein)
"Developing a Virtual Engineering Curriculum Via Computer Game Design". In the *Proceedings of the St. Lawrence Section, ASEE, 2005*. (With R. Rajagopalan, and R. Hoetzlein)
Introduction to Unix, Second Edition. Prentice Hall (2005).

2004 – 2005 Lectures

"Game Design and Game Development Education", Phi Kappa Forum (2005). (With R. Rajagopalan)
"Collaborative Learning, Multimedia Development, Flexibility: Developing and Implementing the Cornell Library Collaborative Learning Computer Laboratory". LabMan 2005, the Sixth Annual Lab Management Conference, Cornell University (June 2005).

2004 – 2005 Professional Activities

Chair, St. Lawrence Section of the American Society of Engineering Educators
Member, Steering Committee, International Association of Game Educators and Researchers

2004 – 2005 University Activities

Engineering Admissions Committee
Director, The Game Design Initiative at Cornell University

Selected Publication

Introduction to Maple, Second Edition. Prentice Hall (2003).

Bart Selman
Professor, Department of
Computer Science



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<http://www.cs.cornell.edu/home/selman/>

Bart Selman obtained a Ph.D. in computer science from the University of Toronto in 1991. Currently a professor in CS, he previously worked at AT&T Bell Laboratories in the principles of artificial intelligence-research department. His research has covered many areas in artificial intelligence and computer science, including tractable inference, knowledge representation, stochastic search methods, theory approximation, knowledge compilation, planning, default reasoning, and the connections between computer science and statistical physics (phase-transition phenomena). His current projects focus on planning, multi-agent systems, and the integration of learning and reasoning techniques.

2004 – 2005 Publications

"Can get Satisfaction". *Nature* 435:751-752 (June 9, 2005). (With C.P. Gomes)

"The Achilles' Heel of QBF". In the *Proceedings of AAAI-05*. (With C. Ansotegui and C.P. Gomes)

"Regular Random k-SAT: Properties of Balanced Formulas". *Journal of Automated Reasoning* (2005). (With Y. Boufkhad, O. Dubois and Y. Interian)

"A New Approach to Model Counting". In the *Proceedings of SAT-05* (2005). (With W. Wei)

Statistical Regimes across Constrainedness Regions". In the *Proceedings of the Tenth International Conference on Principles and Practice of Constraint Programming* (CP-04), (2004). Distinguished Paper Award. (With C.P. Gomes, C. Fernandez and C. Bessiere)

"Towards Efficient Sampling: Exploiting Random Walk Strategies". In the *Proceedings of AAAI-04*, San Jose, CA (2004). (With W. Wei and J. Erenrich)

"Tracking Evolving Communities in Large Linked Networks". In the *Proceedings of the National Academy of Science* (PNAS). (2004). (With J. Hopcroft, B. Kulis and O. Khan)

Awards and Honors

Fellow, American Association for the Advancement of Science (2003)

Fellow, American Association for Artificial Intelligence (2001)

Alfred P. Sloan Research Fellow (1999–2000)

CAREER award (1998–2002)

Stephen '57 and Marilyn Miles Excellence in Teaching Award, College of Engineering, Cornell University (2002)

Cornell Outstanding Educator Award (selected most influential Cornell professor by a Merrill Presidential Scholar) (2001)

Executive Council, American Association for Artificial Intelligence (1999–2002)

Best Paper Award, Thirteenth National Conference on Artificial Intelligence (AAAI '96), (1996)

Best Paper Award, Tenth National Conference on Artificial Intelligence (AAAI '92) (1992)

Best Paper Award, First KR (1989)

Best Paper Award, Seventh Biennial Conference of the Canadian Society for the Computer Studies of Intelligence (CSCSI '88) (1988)

Phoebe Sengers
Assistant Professor
CIS, joint with Science &
Technology Studies



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Phoebe Sengers received her Ph.D. degree in artificial intelligence & cultural theory in 1998 from Carnegie Mellon University. She was a Fulbright Scholar at the Center for Art & Media Technology (ZKM) in Karlsruhe, Germany, and spent two years as a research scientist at the German National Research Center for Information Technology (GMD). She joined the Faculty of CIS in October 2001, and has a joint appointment with the Department of Science and Technology Studies.

Sengers works in human-computer interaction, especially problems that bridge cultural issues and technology design. She develops culturally embedded systems; i.e., new kinds of interactive technology that respond to and encourage critical reflection on the place of technology in culture. Her current research, funded by a five-year NSF CAREER Award, explores everyday computing, or interactive media devices for non-work contexts, and draws on techniques from computer science, cultural analysis, design, and the arts. She uses insights from analysis of consumer culture to rethink the work-based assumptions underlying technologies for the home, developing both new application areas for everyday computing, including systems to support personal reflection on emotional and social experiences, and new techniques for designing systems, including the use of self-experiment in design and new forms of evaluation for open-ended systems.

2004 – 2005 Publications

"Making by Making Strange: Defamiliarization and the Design of Domestic Technology". *Transactions on Computer-human Interaction (TOCHI)*, Special issue on Social Issues and HCI (June 2005). (With G. Bell, M. Blythe)

"Affective Presence in Museums: Ambient Systems for Creative Expression". *Digital Creativity* 16(2):79-89 (2005). (With K. Boehner, G. Gay)

2004 – 2005 Lectures

"Smart Home, Smart Idea?" Intel Seattle Workshop on the Digital Home (July 2004).

"Configuring User Identity". Pennsylvania State University Program in Science, Technology, and Medicine and Rock Ethics Institute (April 2005).

"Home Health Horoscopes". Intel Corporation (April 2005). (With B. Gaver, M. Golembewski, J. Kaye)

"Affect: Co-interpreting What Works". CHI 2005 Workshop on Evaluating Affective Systems (March 2005). (With K. Boehner, S. Warner, T. Jenkins)

"Critical Technical Practice as a Methodology for Values in Design". CHI 2005 Workshop on Quality, Values, Choices (March 2005). (With K. Boehner, S. David, J. Kaye)

"Affective Presence". University of Glasgow Department of Computer Science (March 2005). (With K. Boehner)

"Configuring Reflective Users (+ Designers)". University of York Department of Sociology (March 2005).

"Critical Technical Practice: Technology-building as Critique". University of York, Joint Seminar of Science and Technology Studies Unit and Human-computer Interaction (March 2005).

"Design for Interpretation". Stockholm University Department of Computer and Systems Sciences (January 2005).

"Interpreting Affect". Dutch Electronic Arts Festival (November 2004).

"Experience as Interpretation: Fear, Wilderness, Reflection, and IT". Society for Literature and Science (October 2004). (With A. Kravetz, E. Shin, L. Dunne)

"Configuring Reflective Users." Panel co-organization and presentation on "New Technologies in Monitoring and Reflection in Everyday Life: Examples from Environmental Performance and Monitoring". Conference of the Society for the Social Studies of Science (4S) (August 2004).

"Smart Home, Smart Idea?" Intel Seattle Workshop on the Digital Home (July 2004).

2004 – 2005 Professional Activities

Member, Editorial Board, *Interaction Studies*
Associate Chair, CHI 2005

2004 – 2005 University Activities

Member, Task Force on Wisdom in the Age of Digital Information

Faculty Senator for Science & Technology Studies

Member, Visual Studies Steering Committee
Information Science Undergraduate Working Group

Co-organizer, Cornell Symposium on Affect in Interaction, April 2004

Awards and Honors

NSF Career Award (2002-2007)

Lingua Franca, Tech Top 20 (named one of the "top 20 researchers changing the way we think about technology") (1997)

Fulbright Award (1998-1999)

Cornell Faculty Innovation in Teaching grant (for COM S/INFO 130, Web Design and programming)

Jayavel Shanmugasundaram
Assistant Professor, Department
of Computer Science

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<http://www.cs.cornell.edu/people/jai>

Jayavel Shanmugasundaram obtained his Ph.D. degree in computer science from the University of Wisconsin at Madison in 2001. He is currently an assistant professor in CS.

Shanmugasundaram's research interests include Internet data management, information retrieval, and query processing in emerging system architectures. His research group is currently working on three projects. The Quark project aims to unify the database and information retrieval worlds by developing a next-generation data-management system for handling both structured and unstructured data. The PEPPER project (joint with Professor Johannes Gehrke) develops highly robust indexing and query-processing strategies for evaluating complex queries over large-scale, distributed peer-to-peer systems. The Hilda project develops a platform for developing data-driven web applications.

Shanmugasundaram's research ideas have been incorporated in commercial data-management products, and have resulted in several patents.



2004 – 2005 Publications

"Guaranteeing Correctness and Availability in P2P Range Indices". *ACM SIGMOD Conference on Management of Data*, Washington, DC (June 2005). (With P. Linga, A. Crainiceanu, and J. Gehrke)

"Context-sensitive Keyword Search and Ranking for XML". *International Workshop on Web and Databases (WebDB)*, Washington, DC (June 2005). (With C. Botev)

"Efficient Inverted Lists and Query Algorithms for Structured Value Ranking in Update-intensive Relational Databases". *IEEE International Conference on Data Engineering (ICDE)*, Tokyo, Japan (April 2005). (With L. Guo, K. Beyer and E. Shekita)

"Triggers over XML Views of Relational Data". *IEEE International Conference on Data Engineering (ICDE)*, Tokyo, Japan (April 2005). (With F. Shao and A. Novak)

"Indexing XML Twigs Using Relational Query Processors". *International Workshop on XML Schema and Data Management (XSDM)*, Tokyo, Japan (April 2005). (With Z. Chen, J. Gehrke, F. Korn, N. Koudas, and D. Srivastava)

"Supporting Workflow in a Course Management System". *ACM Technical Symposium on Computer Science Education (SIGCSE)*, St. Louis, Missouri, (February 2005). (With C. Botev, H. Chao, T. Chao, Y. Cheng, R. Doyle, S. Grankin, J. Guarino, S. Guha, P. Lee, D. Perry, C. Re, I. Rifkin, T. Yuan, D. Abdullah, K. Carpenter, D. Gries, D. Kozen, A. Myers, and D. Schwartz)

"A Vision for PetaByte Data Management and Analysis Services for the Arecibo Telescope". *Bulletin of the Technical Committee on Data Engineering, IEEE Computer Society* 27(4) (December 2004). (With M. Calimlim, J. Cordes, A. Demers, J. Deneva, J. Gehrke, D. Kifer, and M. Riedewald)

2004 – 2005 Lectures

"DB and IR: Rethinking the Great Divide". SIGMOD Conference Panel (June 2005).

"Towards Unifying Database Systems and Information Retrieval Systems". Stanford University (February 2005).

"Structured Value Ranking in Update-intensive Relational Databases". IBM Almaden Research Center (February 2005), AT&T Research Labs (January 2005).

2004 – 2005 Professional Activities

Invited Expert, World Wide Web Consortium (W3C) XQuery Full-text Task Force

Conference Vice-chair: Semi-Structured Data and XML Track, International Conference on Data Engineering (ICDE), Tokyo, Japan (2005)

Member, Program Committee, International Conference on Very Large Data Bases (VLDB), Seoul, Korea (2006)

Member, Program Committee, Symposium on String Processing and Information Retrieval (SPIRE), Buenos Aires, Argentina (2005)

Member, Program Committee, Very Large Data Base (VLDB) Ph.D. Workshop, Trondheim, Norway (2005)

Member, Program Committee, International Workshop on XQuery Implementation, Experience and Perspectives (XIME-P), Baltimore, Maryland (2005)

Member, Program Committee, International Workshop on the Web and Databases (WebDB), Baltimore, Maryland (2005)

Member, Program Committee, ACM SIGMOD Conference on Management of Data, Baltimore, Maryland (2005)

Member, Program Committee, Workshop on the Integration of Information Retrieval and Databases (WIRD), Sheffield, United Kingdom (2004)

Awards and Honors

NSF CAREER Award

IBM Faculty Award

David B. Shmoys

Professor of Operations Research
& Industrial Engineering and
Computer Science
and Member of the Graduate
Field of Computer Science



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David Shmoys obtained his Ph.D. in computer science at the University of California-Berkeley in 1984. He has faculty appointments in both CS and the School of Operations Research and Industrial Engineering. Shmoys' research has focused on the design and analysis of efficient algorithms for discrete optimization problems.

His work has highlighted the central role that linear programming plays in the design of approximation algorithms for NP-hard problems. In particular, he is known for his results on scheduling and clustering problems, including the first constant performance guarantees for several problems central to the literature, including the k-center and k-median problems, the generalized assignment problem, as well as scheduling problems in which the aim is to minimize the average job completion time. Furthermore, his work on polynomial-time approximation schemes for scheduling problems introduced techniques that have subsequently been applied to a variety of other settings. His current work is focused on the design of approximation algorithms with provable performance guarantees for stochastic programming problems in such settings as inventory control and other logistics problems, as well as the application of these techniques to several issues in computational biology.

2004 – 2005 Publications

"Approximation Algorithms for Stochastic Inventory Control Models". In *Proceedings of the Eleventh MPS Conference on Integer Programming and Combinatorial Optimization* (2005). (With R. Levi, M. Pál, and R. Roundy)

"A Constant Approximation Algorithm for the One-warehouse-multi-retailer Problem". In *Proceedings of the Sixteenth Annual ACM-SIAM Symposium on Discrete Algorithms* :365-374 (2005). (With R. Levi and R. Roundy)

"Inventory and Facility-location Models with Market Selection". In *Proceedings of the Eleventh MPS Conference on Integer Programming and Combinatorial Optimization* (2005). (With R. Levi, J. Geunes and E. Romeijn)

"An Improved Approximation Algorithm for the Partial Latin Square Extension Problem". *Operations Research Letters* 32(5):479-484 (2004). (With C.P. Gomes, and R.G. Rommel)

"Approximations and Randomization to Boost CSP Techniques". *Annals of Operations Research* 130 (1-4): 117 – 141 (2004). (With C.P. Gomes)

"LP-based Approximation Algorithms for Capacitated Facility Location". In *Proceedings of the Tenth MPS Conference on Integer Programming and Combinatorial Optimization* :206-218 (2004). (With R. Levi and C. Swamy)

"Stochastic Optimization is (almost) as Easy as Deterministic Optimization". In *Proceedings of Forty-fifth Annual IEEE Symposium on Foundations of Computer Science* :228-237 (2004).

"The Design and Analysis of Approximation Algorithms: Facility Location as a Case Study". In *Trends in Optimization*, S. Hosten, J. Lee, and R. Thomas, editors, *AMS Proceedings of Symposia in Applied Mathematics* 61: 85-97 (2004).

2004 – 2005 Lectures

"Approximation Algorithms for Stochastic Programming Problems". New Horizons in Computing, Recent Trends in Theoretical Computer Science, Invited Plenary Speaker, Kyoto, Japan (February 2005).

"A Constant Approximation Algorithm for the One-warehouse-multi-retailer Problem". Sixteenth Annual ACM-SIAM Symposium on Discrete Algorithms, Vancouver, Canada (January 2005).

"Approximation Algorithms for Stochastic Inventory Control Models". Eleventh MPS Conference on Integer Programming and Combinatorial Optimization, Berlin, Germany (June 2005).

"Stochastic Optimization is (almost) as easy as Deterministic Optimization". Forty-fifth Annual IEEE Symposium on Foundations of Computer Science, Rome, Italy (October 2004).

2004 – 2005 University Activities

Member, Ad Hoc committee of the Dean of the Faculty on Course and Exam Scheduling

2004 – 2005 Professional Activities

Editorial board member, *SIAM Journal on Computing* (until December 31, 2004); *SIAM Journal on Discrete Mathematics*

Associate Editor, Committee Chair (until December 31, 2004) Mathematical Programming IPCO (Mathematical Programming Society conferences on Integer Programming and Combinatorial Optimization) Steering Executive Council Member, Prize Coordinator, ACM SIGACT Council Member for Publications, Mathematical Programming Society

Awards and Honors

ACM Fellow (2002)

Sonny Yau Award for Excellence in Teaching, Cornell College of Engineering (1995, 1998, 2003)

National Science Foundation Presidential Young Investigator Award (1987)

Selected Publications

"Using Dual Approximation Algorithms for Scheduling Problems: Theoretical and Practical Results". *Journal of the ACM* 34:144-162 (1987). (With D.S. Hochbaum)

"Scheduling to Minimize the Average Completion Time: On-line and Off-line Approximation Algorithms". *Mathematics of Operations Research* 22:513-544 (1997). (With L.A. Hall, A.S. Schulz, and J. Wein)

"Improved Approximation Algorithms for the Uncapacitated Facility Location Problem". *SIAM Journal on Computing* 33:1-25 (2003). (With F. Chudak)

E. Gün Sirer

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of Computer Science

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Emin Gün Sirer received his Ph.D. from the University of Washington in 2002. His research is focused on self-organization in peer-to-peer and mobile ad hoc networks, and spans operating systems, networking, and distributed systems.

The recently emerging peer-to-peer paradigm enables novel distributed services. Sirer's group investigates peer-to-peer systems that combine high-performance with scalability and fault-tolerance. In the Beehive project, the group developed a new distributed hash table with strong $O(1)$ performance guarantees for Zipflike query distributions. The Cooperative Domain Name Service (CoDoNs) project is developing an alternative to the Domain Name Service, the system used to translate Internet names to addresses, based on Beehive that provides low latency, resilience against denial of service attacks, and security against active attackers. The Herbivore project has applied the peer-to-peer paradigm to anonymous communication, and provides strong anonymity guarantees to its participants, even against attackers with unlimited wiretapping power. The Meridian project is developing a lightweight yet accurate peer-to-peer framework for solving location-based problems, such as finding the closest node, determining a geographically diverse set, and discovering a good overlay route, that can serve as a building block for large-scale distributed systems.

Another emerging domain where self-organization plays a large role is mobile ad hoc and sensor networks. The MagnetOS project investigates operating system support for this new domain. Specifically, Sirer's group is designing and building a new operating system that improves the longevity and reliability of applications on ad hoc networks through energy-aware, adaptive object migration. The group previously investigated hybrid routing protocols and proposed the SHARP protocol, which automatically finds the optimal mix of proactive route dissemination and reactive

route discovery for node-specific performance metrics. The Zoom project investigates cheap, software-based location-discovery mechanisms that can determine the physical location of wireless nodes without expensive and power-consuming GPS receivers.

Sirer's past work focused on operating-system architecture. The SPIN kernel proposed language-based techniques for safely extending operating systems with application-specific code. The Kimera system introduced a new virtual machine architecture that enables Java systems of drastically higher manageability, security, and performance, while reducing their resource requirements. The techniques developed in the Kimera project have been adopted throughout the industry, including Hewlett-Packard, Microsoft, Sun, and Schlumberger Inc.

2004 – 2005 Publications

"Design and Implementation of a Single System Image Operating System for Ad Hoc Networks". In *Proceedings of The International Conference on Mobile Systems, Applications, and Services (Mobisys)*, Seattle, Washington (June 2005). (With H.Liu, T. Roeder, K. Walsh, and R. Barr)

"Sextant: A Unified Node and Event Localization Framework Using Non-convex Constraints". In *Proceedings of The International Symposium on Mobile Ad Hoc Networking and Computing (MobiHoc)*, Urbana-Champaign, Illinois (May 2005). (With S. Guha, and R. Murty)

Trickles: A Stateless Network Stack for Improved Scalability, Resilience and Flexibility". In *Proceedings of Networked System Design and Implementation*, Boston, Massachusetts (May 2005). (With A. Shieh, and A. Myers)

2004 – 2005 Lectures

"CoDoNs: A High-performance, Fault-resilient Replacement for the Legacy Domain Name Service". Carnegie Mellon University, Computer Science Department (November 2004).

"Eluding Carnivores: File Sharing with Strong Anonymity". European SIGOPS Workshop, Leuven, Belgium (September 2004).

"The Design and Implementation of a Next Generation Name Service for the Internet". SIGCOMM, Portland, Oregon (August 2004).

"Operating Services 7/24: Domain Name Service for the Next Generation Internet". Planetlab Workshop, Palo Alto, California (April 2004).

2004 – 2005 Professional Activities

Co-chair, P2PECON 2005, Third Workshop on Economics of Peer-to-Peer Systems (2005)

File and Computational Sharing Session Chair, P2PECON 2004, Workshop on the Economics of Peer-to-Peer Systems (2004)

Participant: NSDI 2006, ACM Symposium on Networked System Design and Implementation (2006); SOSP 2005, ACM Symposium on Operating System Principles (2005); SECON 2005, IEEE Communications Society Conference on Sensor and Ad Hoc Communications and Networks (2005); IPTPS 2005, The Fourth International Workshop on Peer-to-Peer Systems (2005); ICDS 2005, International Conference on Distributed Computing Systems (2005); PADS 2005, ACM/IEEE/SCS Workshop on Principles of Advanced and Distributed Simulation (2005); SECON 2004, IEEE Communications Society Conference on Sensor and Ad Hoc Communications and Networks (2004)

Awards and Honors

Ralph S. Watts '72 Excellence in Teaching Award (2003)

Paul Stodghill
Senior Research Associate,
Department of Computer Science



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Paul Stodghill obtained his bachelor's degree in mathematics and computer science from Dickinson College in 1988. He obtained his Ph.D. in computer science from Cornell University in 1997. Since 1997, he has worked as a research associate in the department.

With deployment of high-bandwidth networks, computational science is entering a new era of distributed and collaborative computing. Stodghill's research interests focus on supporting this effort. For example, he has worked closely with a number of computational scientists to develop novel, high-performance distributed scientific applications.

Currently, he is developing fault-tolerant support for parallel applications and infrastructure for deploying scientific simulations as Web services. He is also helping to develop model-based and empirical optimization techniques that allows code to be migrated between platforms without loss of performance.

2004 – 2005 Publications

"Automatic Measurement of Memory Hierarchy Parameters." In SIGMETRICS (June 6, 2005). (With K. Yotov and K. Pingali)

"Is Search Really Necessary to Generate High-performance BLAS?". *Proceedings of the IEEE* 93(2): 358-386 (February 2005). (With K. Yotov, et al.)

"Implementation and Evaluation of a Scalable Application-level Checkpoint-Recovery Scheme for MPI Programs." *Proceedings of Supercomputing 2004* (November 6-12, 2004). (With M. Schulz, G. Bronevetsky, R. Fernandes, D. Marques, and K. Pingali)

2004 – 2005 Professional Activities

Co-chair, Working Group on Grid Checkpoint and Recovery, Global Grid Forum

Éva Tardos

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Computer Science



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Éva Tardos received her Ph.D. at the Eötvös University in Budapest, Hungary in 1984. After teaching at Eötvös and at M.I.T., she joined Cornell in 1989. She is a member of the American Academy of Arts and Sciences, an ACM Fellow, and she received the Fulkerson Prize in 1988 (awarded jointly by the American Mathematical Society and the Mathematical Programming Society for a paper in discrete mathematics). She has research fellowships from the Guggenheim, Packard, and Sloan Foundations, and teaching awards from the Cornell Engineering College and Computer Science Department. She is the editor of several journals, and Editor-in-chief of the *SIAM Journal of Computing*.

Tardos's research interest focuses on the design and analysis of algorithms for combinatorial-optimization problems on graphs or networks. Such problems arise in many applications, including the design and management of communication networks. She is most known for her work on network-flow algorithms and approximation algorithms for network problems. Her recent work focuses on algorithmic game theory, an emerging area concerned with designing systems and algorithms for selfish users.

2004 – 2005 Publications

Algorithm Design. Addison-Wesley (2005).
(With J. Kleinberg)

"Approximating the Smallest k-Edge Connected Spanning Subgraph by LP-Rounding". In the *Proceedings of Annual ACM-SIAM Symposium on Discrete Algorithms (SODA)* : 562-571 (2005).
(With H. Gabow, M. Goemans, and D. Williamson)

"Network Design for Information Networks". In the *Proceedings of the Annual ACM-SIAM Symposium on Discrete Algorithms (SODA)* 933-942 (2005).
(With A. Hayrapetyan and C. Swamy)

"Cost-sharing Mechanisms for Network Design". In the *Proceedings of the International Workshop on Approximation Algorithms for Combinatorial Optimization Problems (APPROX)* 139-150 (2004).
(With A. Gupta and A. Srinivasan)

"Min-max Multiway Cut". In the *Proceedings of the International Workshop on Approximation Algorithms for Combinatorial Optimization Problems (APPROX)* :207-218 (2004). (With Z. Svitkina)

"The Price of Stability for Network Design with Fair Cost Allocation". In the *Proceedings of the Annual IEEE Symposium on Foundations of Computer Science (FOCS)* : 295-304 (2004). (With E. Anshelevich, A. Dasgupta, J. Kleinberg, T. Wexler and T. Roughgarden)

2004 – 2005 Lectures

"The Price of Stability for Network Design with Fair Cost Allocation". Dagstuhl seminar on Computing and Markets (January 2005).

"Price of Anarchy and Stability in Network Games".
- Theoretical and Applied Mechanics Colloquium, Cornell (September 2004).

- University of Toronto, Distinguished Lecture Series (November, 2004).

- University of Rochester, Distinguished Lecture Series (December 2004).

- McGill University (January 2005).

- University of Pittsburgh, Distinguished Lecture Series February, 2005

"Price of Stability for Network Design with Fair Cost Allocation". Workshop on Algorithmic Game Theory, Bertinoro, Italy (July 2004).

"Price of Stability in Network Design" Workshop on Economic Aspects of Congested Networks and Queues, Bonn (July 2004).

"Price of Stability for Network Design with Fair Cost Allocation ". Annual IEEE Symposium on Foundations of Computer Science, Rome (November 2004).

2004 – 2005 Professional Activities

Editor-in-chief, *SIAM Journal on Computing* (since 2004)

Editor, *Journal of the ACM*; *Combinatorica*; *SIAM Journal on Discrete Mathematics*

Advisory Board Member, Center for Discrete Mathematics and Computer Science (DIMACS) at Rutgers

Program Chair, IEEE Symposium on the Foundation of Computer Science (2005)

Awards and Honors

Fellow of the American Academy of Arts and Sciences

ACM Fellow

ACSU Faculty of the Year (2005)

Guggenheim, Packard, and Sloan Foundation Fellow

F. I. Li'78 and D. Li'75 Excellence in Teaching Award

Fulkerson Prize (of AMS and MPS) (1988)

Selected Publications

"How Bad is Selfish Routing?" *Journal of the Association of Computing Machinery* 49(2): 236-259 (2002).

"Approximation Algorithms for Classification Problems with Pair-wise Relationships: Metric Partitioning and Markov Random Fields". *Journal of the ACM* 49(5): 616-639 (2002).

"A Strongly Polynomial Algorithm for the Minimum Cost Circulation Problem". *Combinatorica* 5:247-255 (1985).

Tim Teitelbaum

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Tim Teitelbaum received a B.S. in mathematics from the M.I.T. in 1964, and his Ph.D. in computer science from Carnegie Mellon University in 1975.

His research is concerned with the use of fine-grain dependence graphs for specification, development, and analysis of source and binary code. The objective is a new generation of tools that provide precise and complete information about the structure of complex software. He is working to improve the performance and functionality of generic dependence-graph technology, and also exploring the use of the technology in various application domains, including software development, maintenance and re-engineering of legacy code, security-assurance and safety-assurance inspection, and software anti-tamper protection.

Teitelbaum's earlier work on programming environments and incremental computation resulted in the Cornell Program Synthesizer and the Synthesizer Generator, two of the earliest systems to have demonstrated the viability of integrated language-based programming environments and syntax-directed editors. He is a co-founder and chairman of GrammaTech, Inc.

Selected Publications

"Model Checking x86 Executables with CodeSurfer/x86 and WPDS++", (tool-demonstration paper). In the *Proceedings of Computer-aided Verification* (July 2005). (With G. Balakrishnan, T. Reps, N. Kidd, A. Lal, J. Lim, D. Melski, R. Gruian, S. Yong, C.-H. Chen)

"CodeSurfer/x86—A Platform for Analyzing x86 Executables", (tool demonstration paper). In the *Proceedings of the International Conference on Compiler Construction* (April 2005). (With G. Balakrishnan, R. Gruian, T. Reps)

"Model Checking x86 Executables with CodeSurfer/x86 and WPDS++". In *Proceedings of the Workshop on the Evaluation of Software Defect Detection Tools* (June 2005). (With G. Balakrishnan, T. Reps, N. Kidd, A. Lal, J. Lim, D. Melski, R. Gruian, S. Yong, C.-H. Chen)

Awards and Honors

Listed by Thomson ISI as one of the 238 most cited computer-science authors of 1981 - 1989



William Thurston

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Professor Thurston is a topologist, though his work impinges on many other areas of mathematics. He has discovered unexpected links between topology, hyperbolic geometry, and complex analysis.

Highlights of his career include his classification of foliations of codimension greater than one, his classification of surface automorphisms, his hyperbolization theorem in three-dimensional topology, and the theories of automatic groups and confoliations. Thurston has also made fundamental contributions to the theory of symplectic and contact manifolds, dynamics of surface diffeomorphisms, and the combinatorics of rational maps.

His current research includes random 3-manifolds and relations of knot theory to computational complexity. His main interest remains his geometrization conjecture, a far-reaching proposed generalization of his hyperbolization theorem.

Selected Publications

Confoliations. AMS, Providence, RI (1998). (With Y. Eliashberg)

Three-dimensional Geometry and Topology, Princeton Mathematical Series 35. Princeton University Press, Princeton, NJ, (1997).

Word Processing in Groups. Jones and Bartlett Publishers, Boston, MA (1992). (With D. B. A. Epstein, J. W. Cannon, D. F. Holt, S. V. F. Levy, and M. S. Paterson)

Hyperbolic Structures on 3-manifolds, I. Deformation of Acylindrical Manifolds". *Annals of Mathematics*. 124: 203-246 (1986).

"Three-dimensional Manifolds, Kleinian Groups and Hyperbolic Geometry". *Bulletin of the American Mathematical Society* (N.S.) 6: 357-381 (1982).

Charles Van Loan

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Charles Van Loan received his Ph.D. in mathematics from the University of Michigan in 1973. After being a post-doctoral research fellow at the University of Manchester he joined CS as an assistant professor in 1975.

Professor Van Loan works in the matrix computation field specializing in least-squares and eigenvalue problems that arise in control engineering and signal processing. Block matrix computations are a current interest with a special emphasis on novel algorithms that exploit Kronecker product structure. Kronecker products are increasingly important because of the role that they play in fast transforms and various multilinear applications. He is currently focusing on low-rank approximations of high-dimensional tensors using the singular value decomposition.

Professor Van Loan is the author of five textbooks: *Matrix Computations* (with G.H. Golub), *Computational Frameworks for the Fast Fourier Transform*, *Introduction to Scientific Computation-A Matrix Vector Approach Using Matlab*, *Introduction to Computational Science and Mathematics*, and *Handbook for Matrix Computations* (with T. Coleman).

2004 – 2005 Lectures

"Tensor Rank and Matrix Factorizations".
Householder XVI Symposium, Seven Springs, PA
(May 2005).

2004 – 2005 University Activities

Member, Council on Mental Health

2004 – 2005 Professional Activities

Program Chair, 2005 Householder Conference
Member, Householder Thesis Prize Committee

Awards and Honors

Paul Advising Award, College of Arts and Sciences (1997)
McCormick Advising Award, College of Engineering (2003)

Selected Publications

Nineteen Dubious Ways to Compute the Exponential of a Matrix, Twenty-five Years Later". *SIAM Review* 45: 3-49 (2003). (With C. Moler)
"The Ubiquitous Kronecker Product". *Journal of Computational and Applied Mathematics* 123:85-100 (2000).
"The WY Representation for Products of Householder Transformations". *SIAM Journal of Scientific and Statistical Computing* 8: s2-s13 (1987). (With C. Bischof)

Stephen A. Vavasis

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Computer Science



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Stephen Vavasis received his Ph.D. in computer science from Stanford in 1989. Since then, he has taught at Cornell where he is currently a full professor. He has also held summer and sabbatical research positions at Sandia National Laboratories, RIACS, Xerox PARC, Bell Labs, and Argonne National Laboratory.

Vavasis's field is scientific computing. He is known for bridging the gap between theory and practice in numerical algorithms. His contributions include the first provably good mesh generator for three dimensional finite element analysis (with former student S. Mitchell, now at Sandia), the first interior point method for linear programming whose polynomial running time does not depend on the objective function or constraint right-hand side (with Y. Ye of Stanford), and guaranteed-quality geometric mesh partitioning (with Miller, Teng and Thurston).

More recently, in joint work with P. Ganguly and K. Papoulia of Cornell he has developed meshing algorithms in which all spatial directions are represented equally in the mesh (important for fracture mechanics applications). In joint work with E. Boman and B. Hendrickson of Sandia, he has discovered new techniques to solve linear equations arising in partial differential equations in nearly linear time.

2004 – 2005 Publications

"Solving Polynomials with Small Leading Coefficients". *SIAM Journal of Matrix Analysis Applications* 26:400-414 (2005). (With G. Jónsson)
"Accurate Solution of Polynomial Equations using Macaulay Resultant Matrices". *Mathematics of Computation* 74: 221-262 (2005). (With G. Jónsson)

"An Iterative Method for Solving Complex-symmetric Systems Arising in Electrical Power Modeling". *SIAM Journal of Matrix Analysis Applications* 26:

1150-1178 (2005). (With V. Howle)

"An Algorithm for Two-dimensional Mesh Generation Based on the Pinwheel Tiling".

Proceedings of the Thirteenth International Meshing Roundtable, available on the web at <http://www.imr.sandia.gov>. (With P. Ganguly, and K. Papoulia)

2004 – 2005 University Activities

Member, Faculty Senate

Member, Engineering Policy Committee

2004 – 2005 Professional Activities

Member, NRC Board for Assessment of NIST.

Member, Editorial Board, *Mathematical Programming*

Co-organizer, FOCM 2005 Workshop on Numerical Linear Algebra

2004 – 2005 Lectures

Solving Elliptic Finite Element Systems in Nearly Linear Time using Support Graph Preconditioners (plenary lecture), Householder Symposium XVI, Champion, Pennsylvania, May 23-27, 2005. (Joint work with E. Boman and B. Hendrickson.)

Honors and Awards

Presidential Young Investigator Award (1990-1995)

Guggenheim Fellowship (1996-1997)

Stephen Wicker

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Engineering
Member of the Graduate Field of
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Stephen Wicker received his BSEE from the University of Virginia in 1981 and his Ph.D. from the University of Southern California in 1987. He was a System Engineer for the Space and Communications Group of the Hughes Aircraft Company, in El Segundo, California from 1983 - 1987, designing and developing communication payloads for commercial, military, and NASA spacecraft.

From 1987 through 1996, he was a member of the faculty of the School of Electrical and Computer Engineering at Georgia Tech. He left for Cornell in 1996 to help build the wireless research area, and is now a Professor of Electrical and Computer Engineering.

Professor Wicker teaches and conducts research in wireless networks, with an emphasis on self-configuring sensor networks. He and his students use the tools of game theory, information theory, and mechanism design to develop local decision rules for networked agents that lead to desired global performance of the network.

Professor Wicker has written five books and a lot of papers on various aspects of wired and wireless links and networks.

He is a former associate director for research in the School of ECE, and has won several teaching awards. He has supervised over 30 Ph.D. theses.

2004 – 2005 Publications

“On the Behavior of Communication Links in a Multi-hop Mobile Environment”. *Frontiers in Distributed Sensor Networks*, S.S. Iyengar and R.R. Brooks, editors, CRC Press (2005). (With P. Samar)

“Base Station Location Optimization in Cellular Wireless Networks using Heuristic Search Algorithms”. In *Soft Computing in Communications*, E. L. Wang, editor, Springer-Verlag (2004). (With B. Krishnamachari)

“Link Dynamics and Protocol Design in a Multi-hop Mobile Environment”. *IEEE Transactions on Mobile Computing* (2005). (With P. Samar)

“The Sum-rate Distortion Function and Optimal Rate Allocation for the Quadratic Gaussian CEO Problem”. *IEEE Journal on Selected Areas in Communications: Special Issue on Sensor Networks* 22(6) (August 2004). (With J. Chen, X. Zhang, and T. Berger)

“Robustness vs. Efficiency in Sensor Networks”. *IPSN 2005*, Berkeley, CA. (2005). (With X. Zhang)

“Robustness vs. Efficiency for the Quadratic Gaussian CEO Problem”. *Allerton Conference* (2004). (With X. Zhang)

“Characterizing the Communication Links of a Node in a Mobile Ad Hoc Network”. *Proceedings of ICC 2004*, Paris, France. (With P. Samar)

“How to Distribute Sensors in a Random Field”. *Proceedings of IPSN, 2004*, Berkeley, CA. (With X. Zhang)

“Route Filtering in Swarm Intelligent MANETs”. *Tenth Annual International Conference on Mobile Computing and Networking (MobiCom)*, Philadelphia, USA (2004). (With M. Roth)

“On the Behavior of Communication Links of a Node in a Multi-hop Mobile Environment”. *Fifth ACM International Symposium on Mobile Ad Hoc Networking and Computing (MobiHoc)*, Tokyo, Japan (2004). (With P. Samar)

2004 – 2005 Professional Activities

Editor, Special Issue on Ad Hoc Networks, *Volume 2, IEEE Journal on Special Areas in Communications* (2005)

Editor, Special Issue on Sensor Networking, *IEEE Journal on Special Areas in Communications* (2004)

Editor, *Special Issue on Ad Hoc Networks, IEEE Journal on Special Areas in Communications* (2004)

Chair, Technical Program Committee, Fifth International Symposium on Information Processing in Sensor Networks (IPSN 2006), Nashville, Tennessee

Member, Technical Program Committee, Fourth International Symposium on Information Processing in Sensor Networks (IPSN 2005), Berkeley, California

Member, Technical Program Committee, Second IEEE International Conference on Sensor and Ad Hoc Communications and Networks (SECON 2005)

Member, Organizing Committee, First IEEE Conference on Sensor Networks: Applications, Protocols and Technology (SNAPT 2004)

Technical Program Committee, First Annual IEEE Communications Society Conference on Sensor and Ad Hoc Communications and Networks, Santa Clara CA, October 2004

David Williamson

Professor, CIS, joint with the
School of Operations Research
and Industrial Engineering



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dpw@cs.cornell.edu

David Williamson received his Ph.D. in computer science from M.I.T. in 1993. He spent several years as a research staff member at the IBM T.J. Watson Research Center, and then as a senior manager at the IBM Almaden Research Center. He joined Cornell University in January 2004 with a joint appointment in CIS and the School of Operations Research and Industrial Engineering.

His primary research interest has been in the design and analysis of polynomial-time algorithms for the approximate solution of hard problems in discrete optimization, especially problems arising in network design, scheduling, facility location, and routing. He focuses on the use of techniques from the area of mathematical programming for designing such algorithms, including such techniques as the primal-dual method and semi-definite programming.

2004-2005 Publications

"Approximating the Smallest k-Edge-Connected Spanning Subgraph by LP-Rounding". In the *Proceedings of the Sixteenth ACM-SIAM Symposium on Discrete Algorithms*, Vancouver, Canada (January 2005). (With H. Gabow, M. Goemans and E. Tardos)

"Improved Approximation Algorithms for Capacitated Facility Location Problems". *Mathematical Programming* 102:207-222 (2005). (With F. Chudak)

"Approximate k-MSTs and k-Steiner Trees Via the Primal-dual Method and Lagrangean Relaxation". *Mathematical Programming* 100:411-421 (2004). (With F. Chudak and T. Roughgarden)

2004-2005 Lectures

"Finding Provably Near-optimal Solutions to Discrete Optimization Problems". University of Illinois at Urbana-Champaign (April 2005).

"Searching the Workplace Web". University of Connecticut (November 2004).

2004-2005 Professional Activities

Area Editor, *Mathematics of Operations Research*

Associate Editor, *ACM Transactions on Algorithms*

Associate Editor, *SIAM Journal on Discrete Mathematics*

Associate Editor, *SIAM Journal on Computing*

Awards and Honors

IBM Faculty Partnership Award (2005)

Fulkerson Prize from the Mathematical Programming Society (2000)

SIAM Optimization Group Prize (1999)

SIAM DiPrima Prize (1996)

Mathematical Programming Society A.W. Tucker Prize (1994)

Golan Yona

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of Computer Science

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Golan Yona obtained a bachelor's degree (honor program) in physics and mathematics, and Ph.D. in computer science at the Hebrew University of Jerusalem in 1999. He was a Burroughs-Welcome postdoctoral fellow in computational molecular biology at Stanford University from 1998 until 2000.

Yona's research focuses on computational molecular biology, with an emphasis on developing tools and methodologies for large-scale analysis of the protein universe. The goal of his research is to explore high-order organization and obtain a global view of the protein space. The global view is expected to yield valuable insights about the nature and function of new genes and can lead to the discovery of global principles in the protein space.

Yona's research is rooted in two different disciplines, computer science and molecular biology, and is related to fields of intensive research in both. It incorporates study and development of methods for metric embedding, unsupervised learning techniques, efficient graph algorithms, parallel applications and efficient database management. On the computational biology side, it is involved with development of new algorithms and approaches for protein comparison, statistical models of protein families and study of the mapping from sequences to structures. A great emphasis is on developing novel machine-learning-based techniques, both in the context of the study of the protein space, and as general-purpose tools. His study so far resulted in two large databases that are being used by biologists to study new genes, ProtoMap (<http://protomap.cornell.edu>) and Biozon (<http://biozon.cornell.edu>) which is a unified biological knowledge resource.

**2004 – 2005 Publications**

"Protein Family Comparison using Statistical Models and Predicted Structural Information". *BMC Bioinformatics* (2004). (With R. Chung)

"On Prediction using Variable Order Markov Models". *Journal of Artificial Intelligence Research* (2004). (With R. Begleiter and R. El-Yaniv)

"The URMS-RMS Hybrid Algorithm for Fast and Sensitive Local Protein Structure Alignment". *Journal of Computational Biology* (2005). (With K. Kedem)

"Correcting BLAST and PSI-BLAST e-Values for Low-complexity Sequences". *Journal of Computational Biology* (2005). (With I. Sharon, K. Chang, A. Birkland and R. El-Yaniv)

2004 – 2005 Lectures

"The Biozon System for Complex Analysis of Heterogeneous Interrelated Biological Data and Discovery of Emergent Structures".

- Cornell Medical School April 2005,
- Columbia Apr 2005,
- UCSF May 2005,
- UCSC 2005.

2004 – 2005 University Activities

Member, Search Committee, Physical/Life Sciences Interface, Computational and Statistical Genomics

2004 – 2005 Professional Activities

Member, Program Committee, Ninth Annual International Conference on Research in Computational Molecular Biology (RECOMB), Boston (May 2005)

Member, Planning Committee, Thirteenth International Conference on Intelligent Systems for Molecular Biology (ISMB), Detroit (July 2005)

Member, 'Faculty of 1000' (<http://www.facultyof1000.com>)

Reviewer for: *Bioinformatics*; *Journal of Computational Biology*; *Journal of Molecular Biology*; *Proteins*; *Protein Science*; NSF; The Bi-National Science Foundation; Israel Science Foundation; NIPS.

Member, Editorial Board, *Bioinformatics*

Honors and Awards

National Science Foundation Career Award (2002)

Simeon Warner
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Simeon Warner works in the Information Science Program. He received his Ph.D. degree from the University of Manchester, UK in 1994.

Warner's current research interests are in Web information systems, interoperability and open-access scholarly publishing. He works on the arXiv eprint archive and the Open Archives Initiative.

2004 – 2005 Publications

"The OAI Data-provider Registration and Validation Service". Abbreviated version to be published in the *Proceedings of ECDL2005* (2005).

"The Transformation of Scholarly Communication". *Learned Publishing* 18:177-185 (2005).

"Evaluating Affect: Co-interpreting What 'Works'". *Workshop on Affective Evaluation Interfaces* at CHI2005. (With P. Sengers, K. Boehner, T. Jenkins)

"Resource Harvesting within the OAI-PMH Framework". *D-Lib Magazine* 10(12) (December 2004). (With C. Lagoze, H. Van de Sompel, M. L. Nelson)

"Rethinking Scholarly Communication: Building the System that Scholars Deserve". *D-Lib Magazine* 10(9) (September 2004). (With H. Van de Sompel, S. Payette, J. Erickson, C. Lagoze)

2004 – 2005 Lectures

"An Update from the OAI", CNI Fall Forum 2004, Portland, Oregon, (December 2004). (Presented jointly with H. van de Sompel, M. Nelson)

"arXiv: Eprint Repository and OAI Data-provider", Open Archives seminar "Facilitating Free and Efficient Scientific Communication", DEF/DTV/DTU, Copenhagen, Denmark, (February 18, 2004)

"The Open Archives Initiative", Open Archives seminar "Facilitating Free and Efficient Scientific Communication", DEF/DTV/DTU, Copenhagen, Denmark (February 18, 2004).

Ramin Zabih

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of Computer Science



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Ramin Zabih received undergraduate degrees in computer science and in mathematics from M.I.T., and a Ph.D. in computer science from Stanford in 1994. He joined CS in 1994, and was promoted to associate professor in 2001. In 2001, he was also given a joint appointment in the Department of Radiology at Cornell's Weill Medical College in New York City.

Zabih's research interests are in computer vision and its applications, especially in medical imaging. He is best known for the work his group has done in applying combinatorial-optimization methods, such as graph cuts, to computer-vision problems. He is currently supervising several Ph.D. students who are working on applying such methods to the automated analysis of magnetic resonance imagery. He has also done extensive consulting for Microsoft, where his work had a major impact on Internet Explorer.

2004 – 2005 Publications

"A Multiprocessor Scheduling Implementation of the Simultaneous Multiple Volume (SMV) Navigator Method". *Magnetic Resonance in Medicine* (2004). (With V. Kolmogorov, T. Nguyen, A. Nuval, P. Spincemaille, M. Prince, and Y. Wang)

"Spatially Coherent Clustering using Graph Cuts". *Proceedings of the IEEE Computer Vision and Pattern Recognition Conference* (2004). (With V. Kolmogorov)

"What Energy Functions Can Be Minimized via Graph Cuts?". *IEEE Transactions on Pattern Analysis and Machine Intelligence* 26(2): 147–159 (2004). (With V. Kolmogorov)

2004 – 2005 Professional Activities

Member, Program Committee, Asian Conference on Computer Vision (2004)

Reviewer for: *Journal of Lisp and Symbolic Computation*; AAAI/IJCAI Conferences; International Joint Conference on Artificial Intelligence; *Journal of Logic Programming*; *Journal of the ACM*; IEEE

International Conference on Robotics and Automation; Image and Vision Computing; *Artificial Intelligence*; ACM Conference on Multimedia; *Springer-Verlag Lecture Notes in Computer Science*; *IEEE Transactions on Pattern Analysis and Machine Intelligence*; *IEEE Transactions on Medical Imaging*; *International Journal of Computer Vision*; National Science Foundation (CAREER award and regular proposals); ACM SIGGRAPH Proceedings

2004 – 2005 University Activities

Member, Computer Security Committee, Department of Radiology

Field Memberships: Computer Science, Cognitive Studies, Electrical and Computer Engineering

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