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Note: Explanations of acronyms used in this report appear on the foldout inside the back cover.
Message from the Dean

For Computing and Information Science

Robert L. Constable

To many who reflect on the role of universities in modern society, it is clear that in the Information Age, society will come to rely even more on universities for leadership. These institutions must educate a citizenry that faces increasingly global issues—health, the food supply, the environment, globalization of business, jurisdiction of world government, the international sharing of intellectual property, and, increasingly, dependence of global institutions on a fragile software infrastructure.

Society will value those institutions that provide global leadership in coping with these issues. To lead in the Information Age, university administration, faculty, and staff will need to understand the capabilities and technologies of computing and information science, and bring that understanding to bear on the most pressing global problems—whether sequencing the SARS virus, building a protective digital skin for the planet, framing a coherent set of ideas and laws to manage digital intellectual property, or ensuring a reliable worldwide information resource.

Cornell has made it clear at the highest levels that it intends to remain a leader in computing and information science as the importance of this discipline increases. The university's academic units are presented on the university Web site under the heading "Academics." Among these units is the Faculty of Computing and Information Science (CIS). It is part of Cornell's response to leadership in the Information Age. Its mission is to create more capability in computing and information science by recruiting faculty, building academic programs, expanding research, and informing policy.

Academically, CIS shares attributes with the Graduate School, in that its budget and administration support academic programs that reside in several colleges, and thus it operates in close coordination with the schools and colleges. Administratively, it shares properties of the schools and colleges: it is led by a dean, is independently budgeted, and is engaged in faculty recruitment. In research, it has institutes and coordinates with research centers.

CIS—supported academic majors and the schools and colleges at Cornell with which they are affiliated are listed below:

- **Computer Science** (Arts and Sciences, Engineering) established 1972
- **Computational Biology** (Agriculture and Life Sciences; Arts and Sciences) established 2003
- **Information Science** (Agriculture and Life Sciences; Arts and Sciences) established 2003
- **Imperium Science** (Agriculture and Life Sciences; Arts and Sciences) established 2003
- **Computational Brain Science** (Agriculture and Life Sciences; Arts and Sciences) established 2003
- **Health Science** (Agriculture and Life Sciences; Arts and Sciences) established 2003

CIS currently supports forty-eight faculty members, who are listed in this report. All are affiliated with at least one academic program, several with more than one. Most CIS-funded faculty members are in CIS, all of whom are also appointed in Engineering; therefore CS is included in both CIS and the College of Engineering.

It is remarkable that these resources sustain broad programs outside the CS major and the CS graduate field. This is possible because of the strong coherence among the programs—a coherence that will be apparent in this report—and because of the participation of several other units—seventeen currently—that derive value from partnering actively with CIS and thus contribute courses and activities.

One of the images associated with CIS is that of a woven tapestry. The vertical threads—the warp—are Cornell's ten colleges and schools in Ithaca, plus the Weill Medical College in New York City. The horizontal threads—the weft—are CIS and the College of Engineering.

Our mission is to add strength by connecting units together by making clear and distinct the strength and "color" of the CIS programs. This report will focus your attention on our segments of the warp. You will see that this tapestry is a dynamic, living entity.

*with a minor available in Engineering, Human Ecology, Industrial and Labor Relations
At Cornell and other research universities, departments and research areas were once much more closely aligned. Physics was handled by faculty in the Department of Physics, anthropology was the purview of faculty in the Department of Anthropology, and so on. In those “Wild West” days, the department chair’s job was like herding researchers on the open range! With widely spaced academic homesteads, the primary responsibility was to guarantee “good grazing” up to and including the horizon. Chairs in fledgling subjects such as computer science had the additional problem of defining the horizon. My predecessors did an excellent job in that regard.

Now outward-looking they are in terms of curriculum: life on the prairie is defined by life on the homestead and the department is the homestead. In looking over our particular academic domicile, I am happy to report that we are stronger and more secure in our campus mission than ever before. Compared to last year, our research expenditures are up about 30 percent and the number of outside units that have representation in the field of computer science has doubled. (Psychology, Mechanical and Aerospace Engineering, and Science and Technology Studies join Electrical and Computer Engineering, Operations Research and Industrial Engineering, and Mathematics.) The number of departments that cross-list courses with CS has increased from a handful to about a dozen. This track record reflects our commitment to the university’s strategic plan for computing and information science and confirms that the CIS structure has been a success.

Thinking about faculty, we have two new professors. Paul Francis (networks) and Uri Keich (bioinformatics) bring new strength to our systems and computational biology groups. We have a Sloan Fellowship award winner (Johannes Gehrke). We have a record number of assistant professors (fourteen). It’s youth and creativity up and down the hallways of Upson!

Joe Halpern became a fellow of the ACM, Bart Selman and Don Greenberg became fellows of the AAAS, and Fred Schneider received an honorary doctorate from the University of Newcastle-upon-Tyne in England. Congratulations to these senior faculty members!

David Gries has returned to the faculty and will be serving as the associate dean for undergraduate education in the College of Engineering. We have joint appointments with the JGM (Den Huttenlocher) and the Weill Medical College (Ramin Zabih). There is outreach to other universities through the tri-institutional program for computational biology (Ramin Zabih) and an NIT grant concerned with high-performance code generation for scientific and engineering applications (Howard Ring). Steve Vavasis, Paul Chevalier. We have CS leadership in the CRC (Tom Gilmore), the RSC (Tom Gilmore), the IIT (Carla Gomes), the UH (Fred Schneider), the RSC (Don Greenberg), and the NIT (Bill Arms). These multidisciplinary adventures are supported by the department’s commitment to collegiality and core CS research.

Saddle up. It’s Big Sky Country!

Message from the CS Chair

Charles Van Loan
The Cornell Computer Systems Laboratory (CSL) brings together faculty members with common interests from the School of Electrical and Computer Engineering (ECE) 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, multiprocessor 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. 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 Cornell Computer Systems Laboratory.

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

Digital Libraries and the National Science Digital Library (NSDL)

For ten years, Cornell's digital libraries research group has carried out research into architectures, protocols, services, and policies that facilitate the creation, management, accessibility, and longevity of distributed information. In particular, the group has focused on interoperability—the challenge of building coherent services from many heterogeneous, independently managed digital libraries. Recent achievements include the Open Archive Initiative Protocol for Metadata Harvesting (OAI-PMH), which enables technically inexperienced groups to share information, and the FEDORA mechanisms for the storage, manipulation, access management, and dissemination of digital library content, when the parties are more sophisticated technically.

These problems go far beyond conventional computer science research and, through the new Information Science program, the group works closely with colleagues who have expertise in human-computer interaction, electronic publishing, information preservation, evaluation, and software engineering.

The NSDL is a long-term program of the National Science Foundation (NSF) to build a digital library of all digital resources that could benefit education in the sciences. The NSF has funded almost one hundred independent projects, with one central project to integrate them into a single library. Following a successful demonstration at Cornell, the central grant has been awarded to a collaboration between the University Center for Atmospheric Research, Columbia University, and Cornell, with Cornell taking the technical lead.

The NSDL is simultaneously a production library, a testbed for digital-libraries research, and a source of new research challenges. For example, Donna Bergmark received the Vannevar Bush award for a paper describing her research into methods for automatic selection of materials for the NSDL, combining selective Web crawling with methods from classical information retrieval.

For further information, see http://www.nsdl.org.
The 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—system and network security, reliability, and assurance. IAI is also intended to foster closer collaborations among Cornell and AFRL researchers. Fred Schneier is the director.

AFRL researchers participate in Cornell research projects, facilitating technology transfer and exposing Cornell research teams to problems facing the Air Force. Cornell researchers are 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 Battle-space Infosphere (JBI). Various other technical collaborations are also being explored—in the use of “gnosis protocol”, in language-based security—enhancement technology, and in data mining from networks of sensors.

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

The Intelligent Information Systems Institute

The mission of the IISI, founded in December of 2000, is to: (1) deliver and stimulate research in computing- 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 AFRL/U.S. Air Force Office of Scientific Research (AFOSR). Carla Gomer is the director of the Institute. The Scientific Advisory Board of the Institute consists of Robert Constable (Cornell), Nat Foster and Charles Messenger (Information Directorate of the AFRL/IF), and Neal Glassman and Juan Vasquez (AFRL/AFOSR).

The IISI supports basic research within CIS, 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 Raffaello D’Andrea (processing, machine learning, and information retrieval); Jon Kleinberg (algorithm design and networks); Lillian Lee (statistical methods for natural-language processing); Bart Selman (knowledge representation, complexity, and multi-agent systems); Perdita Sangster (neuroscientists from human and social content and human computer interaction); David Shmoys (algorithms for large-scale discrete optimization); Chris Steenkamper (large-scale optimization and modeling); B chân Spiegler (distributed computing and computer architecture); Steve Strogatz (complex networks in natural and social sciences); and Stephen Walker (intelligent wireless information networks).

Several research projects that involve direct collaborations between Cornell and AFRL/IISI researchers were initiated through the IISI. These cover topics such as probabilistic decision-making, architecture of active memory systems, multi-agent sensor networks, and visualization of reasoning and search methods. The IISI also hosted a hands-on workshop on foundations and complexity of multi-agent systems. As one of the outcomes of the workshop, a team of researchers from Cornell, Stanford, and the University of Washington is developing a tunable benchmark suite for the design and evaluation of new algorithms for combinatorial auctions. The IISI also sponsored the American Association for Artificial Intelligence (AAAI) Symposium on Uncertainty Within Computation, the 2003 Conference on Empirical Methods in Natural Language Processing (EMNLP 2003); and the 2003 Conference on Natural Language Processing (NLP 2003).

For further information, see http://www.cis.cornell.edu/iisi.
We believe that the information revolution is transforming universities, because it goes to the heart of what universities are about: the creation and dissemination of knowledge. A few universities will be leading the country and the world into this information-based future.

Computer Architecture and VLSI
Research in architecture and VLSI is part of the Computer Systems Laboratory. Computer-systems research at Cornell 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
Understanding intelligence and creating intelligent agents, the twin goals of artificial intelligence (AI), are two of the final frontiers of modern science. Early pioneers of computer science such as Turing, von Neumann, and Shannon were captivated by the idea of creating a machine intelligence. Though much progress has been made, computer science and AI are still young fields, and many of the questions and issues considered then are actively being pursued today.

Research in AI at Cornell covers a wide range of topics, including decision theory, information retrieval, knowledge representation, machine learning and data mining, natural-language processing, planning, reasoning under uncertainty, search, and vision. A particular strength of the department is that our research embraces both theory and experiment, with particular emphasis on learning approaches to AI problems. Given the complexity of many of the basic questions in AI, our research often transcends traditional scientific boundaries. We are actively pursuing connections to other disciplines such as bioinformatics, economics, genomics, information sciences, linguistics, operations research, physics, psychology, and statistics. The department is one of the main participants in the IISI and in two university-wide programs: COGNET and CIS.
Computational Biology

The recent completion of the Human Genome Project underlines the need for new computational and theoretical tools in modern biology. The tools are essential for analyzing, understanding, and manipulating the detailed information on life we now have at our disposal.

Problems in computational molecular biology range from understanding sequence data to the analysis of protein shape, prediction of biological function, study of gene networks, and cell-wide computations. Cornell has a university-wide plan in the science of genomics. CS is playing a critical role in this initiative. CS researchers are engaged in a broad range of computational biology projects, from genetic mapping to advanced sequence analysis, fold prediction, structure comparison algorithms, protein classification, comparative genomics, and long-time simulation of protein molecules.

Database Systems

The Cornell Database Group is exploring issues related to all aspects of data management. Our interests range from developing efficient algorithms for very large data sets to building large-scale systems for new and emerging applications. In the Cougar project, we are developing database technology for sensor networks. In the Hymalayas project, we are exploring new directions in data mining. In the Peppercorn project, we are developing a query layer for large-scale peer-to-peer systems. In the Quark project, we are building a unified data management system for both structured and unstructured data. We also collaborate with researchers in related areas such as systems, algorithms, and artificial intelligence.

Languages and Compilers

Cornell has particular strength in programming languages and compilation, with more than eight faculty members and twenty-five graduate students working in the area. Our research ranges from theory, including logics and semantics, to practical engineering issues in verification, optimizing compilers, security, and run-time systems. In addition, there are strong synergies within the languages and compiler groups, and linking them with other subdisciplines. For example, Greg Horman and Andrew Myers have developed secure programming languages, such as Typed Assembly Language (TAL) and Java Information Flow (JIF), that are used to ensure the safety and security of networked information systems. We also work closely with the computer industry. For instance, Keshav Pingali’s group has recently licensed program optimization tools to Intel for use in their IA-64 compiler product line.

Computer Graphics

Cornell is a leader in the fields of computer graphics. Computer graphics is a broad, interdisciplinary field that includes a wide and growing range of applications, from science to communication to entertainment. Research in computer graphics includes algorithms, physics, psychology, computation, computer vision, and architecture among other fields.

The Program in Computer Graphics (PCG) is an interdisciplinary research center with close ties to CS. It was one of the pioneering laboratories in computer graphics. Established in 1974, the PCG has made breakthrough contributions in several areas: research topics include reflection models; physics-based accurate rendering; visual perception for graphics, sketching, and modeling; medical visualization; and digital photography. The state-of-the-art facility includes many tools for advanced research, including a sophisticated light measurement laboratory, a 128-processor PC cluster, and a high-resolution tiled projection display.

Over the years, the PCG has brought together researchers and students from different disciplines: computer science; physics; mathematics; electrical, structural, and mechanical engineering; architecture; and perception psychology. The recent hires of CS faculty members Bala and Marschner, who are also members of the PCG, have further strengthened our presence in the field.

Operating Systems, Networks, and Distributed Computing

The Operating Systems group at Cornell examines the design and implementation of the fundamental software systems that comprise our computing infrastructure. Our interests span the very small, including the smart-card systems that fit on a postage-stamp-sized die, to the very large, including the wide-area distributed systems that span the globe.

Overall, we are concerned with fundamental questions in systems design. How should our computing infrastructure be structured to address the diverse challenges posed by ubiquitous computing, sensor networks, wide-area distributed computing, and large-scale Web services? What mechanisms and policies are required for a trustable computing infrastructure? What kind of techniques can we use to measure and characterize Web and Internet-based systems, and how can we apply the lessons learned to the construction of next-generation networked systems?

To answer essential questions like these, we have undertaken many projects on diverse topics, ranging from peer-to-peer systems, operating system services for ad hoc and sensor networks, fault-tolerant communication protocols, application of formal techniques to Web service construction, secure smart-card operating systems, extensible operating systems, intrusion detection, and secure networked service design, among others.

Scientific and Parallel Computing

Scientists and engineers rely more than ever on computer modeling and simulation to pursue their experiments and designs. From improved understanding of the body’s circulatory system to the smart design of new medicines, today’s scientific and technological advances would be impossible without the combination of powerful computers and the powerful algorithms running on those computers.

The scientific computing group at Cornell develops the algorithms that underpin simulation and optimization. Heterogeneous computers are a recurring theme in our research. The focus is on efficient and robust algorithms with an eye toward modern high-performance parallel and multithreaded architectures.

Security

Cornell is a leader on a broad range of research issues related to computer security. Under the aegis of the Information Assurance Institute, located within CS, we tackle the fundamental problem of ensuring the security and reliability of our global critical-computing infrastructure.

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. Three project areas 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.

Theory of Computing

The theory of computing is the study of efficient computation, models of computational processes, and their limits. It has emerged over the past few decades as a deep and fundamental scientific discipline. It is a young science, with many central questions still unanswered, and it is a science poised to have considerable impact on current issues in the development of systems and software, the nation’s networks and communications infrastructure, and the physical and biological sciences. At Cornell, we are proud of our position as a world leader in the ongoing development of theoretical computer science.

Research at Cornell spans all areas of the theory of computing and is responsible for the development of modern computational complexity theory, the foundations of efficient graph algorithms, and the use of applied logic and formal verification for building reliable systems. Our faculty and students are actively involved in areas such as the design of fundamental algorithms, combinatorial optimization, machine learning, computational complexity theory, computational algebra, logic in computer science, computational geometry, and applications to verification, reliable systems, data mining, information sciences, and the computational sciences.

In addition to its depth in the central areas of theory, Cornell is unique among top research departments in the fluency with which students can interact with faculty members in both theoretical and applied areas and work on problems at the critical juncture of theory and applications.
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CS faculty members, researchers, and graduate students are conducting leading-edge research in architecture, artificial intelligence, computational biology, databases and digital libraries, languages and computation, graphics, operating systems, networks and distributed computing, scientific and parallel computing, security, and theory of computing (see pages 22-55 for research summaries). CS, a university initiative that includes CS, encourages and sponsors interactions with university researchers in interdisciplinary programs including information science and computational biology. Our relationships with corporate partners provide many opportunities for collaboration.

We realize that a true partnership results in mutual satisfaction and gain. Toward this end, we invite our corporate partners to appoint a corporate contact who will work with CS to build a strategic corporate-CS partnership, build strong personal relationships on campus, or organize recruiting activities on campus for CS undergraduate and graduate students.

CS welcomes corporate partners to make unrestricted donations in support of department initiatives, make research grants to individual faculty and researchers, give matching funds to NSF or other granting agencies, create fellowships for graduate students, provide equipment grants, startup funds for new faculty support for BOOM (Bits on Our Minds, which showcases our student technology work), or course-development grants.

We welcome corporate partners to the department for long- and short-term visits to work with individual faculty members and research groups. The aforementioned research areas and two institutes, The Information Assurance Institute, and the Intelligent Information Systems Institute, as well as affiliated programs in computational biology, digital arts and graphics, information science, and computational science and engineering, are available to joint researchers on a case-by-case basis.

The Department of Computer Science at Cornell is ranked among the top computer science departments internationally and includes collaborations with the following corporate partners, whose financial contributions support our educational and research missions.

Credit Suisse First Boston
$7,500
Google, Inc.
$58,223
Green Hills Software, Inc.
$1,600
Hewlett Packard
$250,000
IBM
$460,000
Intel Foundation
$305,360
Microsoft Corporation
$386,950
PricewaterhouseCoopers, LLP
$1,000
Verizon
$310,000

We are also grateful for gifts from the following partners:

Microsoft Corporation
$250,000
McGraw-Hill
$4,000

CS is grateful for the support, including equipment and software, provided by our industrial partners.

Credit Suisse First Boston
$7,500
Google, Inc.
$58,223
Green Hills Software, Inc.
$1,600
Hewlett Packard
$250,000
IBM
$460,000
Intel Foundation
$305,360
Microsoft Corporation
$386,950
PricewaterhouseCoopers, LLP
$1,000
Verizon
$310,000

OS is also grateful for gifts from the following partners:

Microsoft Corporation
$250,000
McGraw-Hill
$4,000

CS faculty members, researchers, and graduate students continued collaborations with the following corporate partners, whose financial contributions support our educational and research missions.

Credit Suisse First Boston and Microsoft sponsored Bits On Our Minds (BOOM) this past March. The General Electric fund is providing support to identify new programs and approaches to increase the number of women and minorities in computer science. Green Hills Software provided support for the ACSU programming contest. Hewlett Packard donated equipment to Professor Gün Sirer to facilitate the integration of interactive wireless technology with teaching.

IBM provided the 2002 Faculty Partnership Award for Professor Jayavel Shanmugasundaram. Intel supported undergraduate teaching labs and provided a fellowship to Ph.D. student Dan Grossman. Intel also supported Professor Johannes Gehrke’s work on query caching and routing, and research on a light-weight DBMS and stream processor for sensor devices; and Professor Gün Sirer’s research “Assuring the Security of Components in the .NET Framework.”

Microsoft supported several faculty and senior researcher projects, including Werner Vogels’s distributed systems effort; Professor Johannes Gehrke’s work on query caching and routing, and research on a light-weight DBMS and stream processor for sensor devices; and Professor Gün Sirer’s research “Assuring the Security of Components in the .NET Framework.”

Microsoft also provided a fellowship for Ph.D. candidate Ranveer Chandra, and support for the Information Assurance Institute and the OIS curricula.

PricewaterhouseCoopers provided support to the CS Undergraduate Computing Association.

Verizon provided support for a CS graduate fellowship.

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Computational Biology

Genomic databases, protein databanks, MRIs of the human brain, and remote-sensing data on landscapes contain unprecedentedly detailed information about biological systems that are transforming the way that we do almost all of biology. Problems investigated by computational biologists span a wide spectrum, including topics as diverse as the genetics of disease susceptibility, comparing entire DNA genomes to uncover the secrets of evolution, predicting protein structures and understanding their motions and interactions, designing new therapeutic drugs, mathematically modeling the complex signaling mechanisms within cells, predicting how ecosystems will respond to climate change, and designing recovery plans for endangered species. The computational biologist must have skills in computer science, mathematics, statistics, and the physical sciences, as well as in biology. A key goal in training is to develop the ability to relate biological processes to mathematical models that can be solved computationally.

Cornell faculty members work primarily in four subareas of computational biology: biomolecular structure and function, bioinformatics and data mining, ecology and evolutionary biology, and statistical and computational methods for modeling biological systems. These include the computational study of topics such as DNA databases, protein structure and function, computational neuroscience, biomechanics, population genetics, and management of natural and agricultural systems. Beyond the core skills in mathematics, physical sciences, and biology, the computational biology program of study requires additional coursework in mathematics, computer programming, a "bridging" course aimed at connecting biology to computation, and an advanced course where the theoretical/computational component of one aspect of biology will be studied.

Undergraduates can major in computational biology through the new CIS–created undergraduate program of study, which encourages students to gain fundamental skills and understanding that will allow them to focus on specific subareas and problems later in their careers. Computational biology is an emerging area that has applications as broad as biology itself. The problems of interest, as well as the tools available to study them, will undoubtedly change during the four years of an undergraduate program. The program is an excellent preparation for students who wish to specialize in one of these computational areas in graduate school.

There is great, and increasing, demand for research scientists and technical personnel who can bring mathematical and computational skills to the study of biological problems.

Recently Cornell announced a combined graduate program in computational biology with Sloan-Kettering and Rockefeller University. This tri-institutional effort provides three fellowships for Cornell computer science graduate students.

Computational Molecular Biology (CMB) is an interdisciplinary field that brings together numerous diverse research areas. A separate and isolated program in CMB will have difficulties in maintaining excellence in all fields, in teaching the diverse tools, and in providing the breadth of research topics that form the core of CMB.

We therefore propose a different model of a multifield program in Computational Molecular Biology. For example, to meet the program conditions, a Ph.D. candidate in computer science can have supplementing studies in molecular biology. Alternatively, a Ph.D. student in the biophysics field can have supplementing studies in computer science and meet the CMB requirements. Hence, the students of this program may come from diverse fields such as molecular biology and genetics or computer science, creating the diverse community of researchers that we seek in CMB.

Through the Cornell Theory Center, two competitive IBM fellowships were granted to undergraduate students doing summer bioinformatic research. The research is a collaboration between the CBSU at the CTC and the Cornell faculty. It exposes the students to high-performance computing and its application to bioinformatics. The CBSU mission is to bridge the gap between molecular biology and mathematical sciences, by helping individual researchers or students, maintaining a computational-biology facility, and by conducting intensive training workshops.
Becky Chu, a master’s student in computer science, is holding forth on the topic of “spider porn”. The “spider porn” research topic in CIS involves reflection models, physics-based accurate rendering, visual perception for graphics, sketching and modeling, medical visualization, digital photography, and computer animation. The program offers many tools for advanced research, including a sophisticated light measurement laboratory, a 128-processor PC cluster, and a high-resolution tiled projection display.

Digital Arts and Graphics

The digital arts have become as important as computer graphics at Cornell. With these ties we are building a new academic program. As the director of Computer Graphics, I see a rich future for the arts and sciences engaging in research that is computationally driven. Critical to the overall environment is the Cornell Theory Center, whose Velocity Cluster supports lines of inquiry that require intensive, large-scale computation.

Becky Chu, a master’s student in computer science, explains her collaborative project during the BOOM event in Upson Hall, March 5.

Becky Chu, a master’s student in computer science, explains her collaborative project during the BOOM event in Upson Hall, March 5. The digital arts have strong ties to computer graphics at Cornell. With these ties we are building a new academic program. 

Information Science

Information Science at Cornell is an interdisciplinary program of CIS that allows graduate and undergraduate students to study new theories, models, concepts, and design principles that incorporate an understanding of both social and technical information systems.

The BOOM event returns with virtual spiders and velvet switches.

Becky Chu, a master’s student in computer science, explains her collaborative project during the BOOM event in Upson Hall, March 5.
Paul Francis
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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 fifteen 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, NIT Software Labs, and ARDIS (now CSR), and was chief scientist at two startups, BlueField Networks and Telitis Networks. Dr. Francis’ innovations include NAT (Network Address Translation), multicast shared trees (used in PIM-SM and CBT), shortcut routing, and landmark routing. He is also the originator of two key IPv6 concepts: the unique host identifier (HopID) and the use of multiple addresses for multihomed sites.

Dr. Francis’ research interests looking forward are in the areas of peer-to-peer applications, overlay networks, network host proximity, Internet scaling, and IP mobility.

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

SELECTED PUBLICATIONS

“IPNL: A NAT–Extended Internet Architecture”.

“Extending the IP Internet Through Address Reuse”, ACM SIGCOMM Computer Communications Review, 23(1): 16–33. (As Paul Tsuchiya, with T. Eng)


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Uri Keich received his Ph.D. in mathematics from the Courant Institute in New York City in 1996, and his M.Sc. in mathematics from Technion in Israel in 1993. Before coming to CS at Cornell, 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 Kármán 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, seed design for similarity search, sequence assembly, and mass spectrometry.

SELECTED PUBLICATIONS

“Designing Seeds for Similarity Search in Genomic DNA”.

“Genome-Wide Analysis of Bacterial Promoter Regions”.

Stuart Allen
Research Associate
sf@cs.cornell.edu
http://www.cs.cornell.edu/info/people/sfa/

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 in 1987. He has held several positions at Cornell since, and is currently a research associate in CS.

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
Professor
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William Arms received his B.A. degree 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 CS since 1999 and director of the Information Science Program since 2002.

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. The Cornell Digital Libraries Research Group received a major grant to build the core system for the NSF's new digital library for science, mathematics, engineering, and technology education. This is likely to be the largest and most heterogeneous digital library yet attempted. 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 term as chair of the Association for Computing Machinery (ACM) Publications Board. He is a member of the M.I.T. Press Management Board, and a member of a strategic-planning committee of the American Physical Society.

SELECTED PUBLICATIONS


Kenneth R. Birman  
Professor  
kb@cs.cornell.edu  
http://www.cs.cornell.edu/~kb/  
Ken Birman obtained a bachelor’s degree in computer science at Columbia University in 1970, and a Ph.D. in computer science at the University of California at Berkeley in 1982. He joined the CS faculty in 1982.

Birman’s research is concerned with reliability and security in modern networked environments. His 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 reliability and security). The French air-traffic control system (Isis is used to keep clusters of three to five controller workstations synchronized, and handles failures). The U.S. Navy’s Aegis warship’s radar system, and other mission-critical computer networks.

Birman’s current focus is on a new system called “Astrolabe”, which was developed as part of a DARPA-funded Spinglas effort. (http://www.cs.cornell.edu/InfoProjects/Spinglas). Astrolabe is like a network-wide database in which each computer or component contributes a live tuple. As data changes, Astrolabe propagates the updates. The system uses a form of dynamical materialization to continuously compute summaries of the picture of the network as a whole. This results in a powerful new tool for distributed monitoring, management, control, and live collaboration. A second part of Spinglas is concerned with reliable multicast. Birman’s group has developed a scalable multicast protocol that gives probabilistic consistency guarantees, and integrated it with Astrolabe. Underlying both systems is a class of reliable peer-to-peer communication protocols that are extremely scalable and provide probabilistic reliability techniques. The approach permits the development of systems that work as well with ten thousand computers as they do with just ten.

Birman was named an ACM Fellow in 1999 and won the Stephen ’57 and Marilyn Miles Excellence in Teaching Award in 2003. He was editor in chief of ACM Transactions on Computer Systems from 1993 to 1997, and has served on a number of university committees. Birman is chairman of the Responsible Conduct of Research Committee and is a member of the Founding Committee for the CIS faculty; the Engineering College Policy Committee; and the I-P Advisory Council for the Cornell Research Foundation.

SELECTED PUBLICATIONS
- “Radiance Interpolants for Accelerated Bounded-error Ray Tracing”.
- “Combining Edges and Points for Interactive High-Quality Rendering”.
- “Radiance Interpolants for Accelerated Bounded-error Ray Tracing”.
- “Combining Edges and Points for Interactive High-Quality Rendering”.
- “Radiance Interpolants for Accelerated Bounded-error Ray Tracing”.
- “Distributed Algorithms for Interference-Free Multiprocessor Scheduling”.
  JACM 50(3) (July, 2003): 253–256.
- “Combining Edges and Points for Interactive High-Quality Rendering”.
- “Radiance Interpolants for Accelerated Bounded-error Ray Tracing”.
- “Combining Edges and Points for Interactive High-Quality Rendering”.
- “Combining Edges and Points for Interactive High-Quality Rendering”.
- “Radiance Interpolants for Accelerated Bounded-error Ray Tracing”.
- “Combining Edges and Points for Interactive High-Quality Rendering”.
Claire Cardie
Associate Professor
cardie@cs.cornell.edu

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 CS faculty member at Cornell since 1994.

Cardie’s research is in the areas of natural language processing and machine learning. In particular, her group has focused both on building systems for large-scale natural language processing tasks like information extraction, question-answering, and document summarization, and on developing corpus-based machine learning techniques to address underlying theoretical problems in the semantic and syntactic analysis of natural language.

Cardie is a recipient of a NSF Faculty Early Career 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 (1994–2002), and is currently serving a four-year term as secretary of the North American Association for Computational Linguistics.

SELECTED PUBLICATIONS


L. Paul Chew
Senior Research Associate
chewy@cs.cornell.edu

L. Paul Chew received his Ph.D. in computer science from Purdue University in 1983. 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, vision, mesh generation, molecular matching, and protein shape-comparison. The work on protein shape-comparison has been used in part as the evaluation scheme for CASP (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 in 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 high-quality mesh. This work is being used in a large multidisciplinary project: developing adaptive software for field-driven simulations.

Chew is an associate editor for Pattern Recognition, the journal of the Pattern Recognition Society. He is also a member of the steering committee for the International Meeting Roundtables.

SELECTED PUBLICATIONS


Rich Girvan
Adjunct Professor
cirwine@cs.cornell.edu
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Rich Girvan obtained his Ph.D. in computer science from Carnegie-Mellon University in 1996. Currently he is an associate professor in CS, where he does research in machine learning and data mining. His current focus is on ensemble learning, inductive transfer, rank learning, adaptive clustering, and applications of these methods to problems in medical decision making and protein folding.

Inductive transfer is a subset of machine learning that aims to achieve better performance by learning related problems simultaneously—sometimes it is easier to learn 100 problems at the same time than to learn any one of them in isolation. Girvan helped create this subset by publishing the first paper on multitask learning ten years ago.

Learning rankings is an exciting new area in machine learning that has important applications in information retrieval and medicine. Girvan is developing algorithms that learn rankings for problems in medical decision making where it may be difficult to assess absolute risk for a patient, but easier to learn to order patients by relative risk. He developed the first machine learning algorithm specifically designed to learn rankings. This method outperformed a dozen other learning methods in a multi-institutional prostate-risk prediction project.

In 2000–01 Girvan 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 analgesics and cough syrup. Girvan’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 the protein-folding problem with colleagues in bioinformatics. The research in ensemble learning arose from a competition in a machine-learning course he teaches at Cornell where students use different learning methods to make accurate predictions for a mystery data set.

A theme that runs through all of Professor Girvan’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 are useful.

SELECTED PUBLICATIONS

Robert Constable
Professor
Deans for Computing and Information Science
Robert L. Constable is the Dean of Computing and Information Science, and a professor in CS. He obtained his Ph.D. in mathematics from the University of Wisconsin in 1965. He served as CS chair from 1994 to 1999. He was also acting chair from 1983 to 1994. Constable's research has focused on building a system called the logical programming environment (LPE). It provides substantial automation in the design, coding, verification, and evolution of large software systems. Generally, LPE will integrate programming languages and logic. In his groups cases, 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 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 the formal digital library component of the LPE that will allow interactive access to theorems and proofs from Nuprl, MetaPRL, PVS, and other major theorem provers. The library includes over two thousand theorems. Many of these are used in system verification, but a large number are from formal mathematics. These general theorems are a valuable resource. The group is funded by the Office of Naval Research (ONR) to further develop and explore the concept of a formal digital library of 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. Alan, the translation of formal proofs into natural language by Amanda Holland-Hinkle, the automatic analysis of the computational complexity of higher-order programs by Ralph Benzinger, and efficient reflection being designed and implemented by Eli Barstil.

Constable is the director of the PRL Project, and a member of the Cognitive Studies Executive Committee, the applied math policy committee and the LCS General Committee. He serves as editor for the Journal of Logic and Computation; Formal Methods in System Design; and the Journal of Symbolic Computation.

SELECTED PUBLICATIONS

rc@cs.cornell.edu
Dean for Computing and Information Science

K.C. Daly Fan
Assistant Professor
Fan is a recipient of a Graduate Teaching Assistant Award in CS (2000), a New York State Chancellor’s Award for Excellence in Teaching (2001). She teaches CS 100, and with Professor David Schwartz, develops the academic-excellence workshops that are associated with the programming courses. Fan is the director of the Summer College Explorations in Engineering Seminar for high school students. She actively participates in outreach initiatives, including Cornell’s CURIE Academy, which showcases engineering to high school girls.

Fan is a recipient of a Graduate Teaching Assistant Award in CS (2000), a New York State Chancellor’s Award for Excellence in Teaching (2001). She teaches CS 100, and with Professor David Schwartz, develops the academic-excellence workshops that are associated with the programming courses. Fan is the director of the Summer College Explorations in Engineering Seminar for high school students. She actively participates in outreach initiatives, including Cornell’s CURIE Academy, which showcases engineering to high school girls.

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Paul Ginsparg
Professor
OS Joint with Physics
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Paul Ginsparg received his A.B. in physics from Harvard University in 1977 and his Ph.D. in physics from Cornell in 1985 (Quantum Field Theory, thesis advisor: Kenneth G. Wilson). He was a fellow in the Howard Society of Fellows from 1983–84, and a junior faculty member in the Harvard physics department from 1984–86. From 1986–2001, 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 with the Department of Physics and the Faculty of CIS. He has been an A.P. Sloan Fellow and a DOE Outstanding Early Career Faculty (2002), an IBM Faculty Award (2000 and 2001), and the Cornell College of Engineering James and Mary Tien Excellence in Teaching Award (2001).

His theoretical purpose is to reject the deterministic tone of most claims about media and cultural expression, and to replace them with an understanding of technology as a complex material artifact, but one that may be articulated in ways that seem to support one ideological agenda or another. He finds this argument an important one to make, especially now—precisely because the decisions made today will set the standards by which the Internet is developed and regulated in the future.

SELECTED PUBLICATIONS


Johannes Gehrke
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Johannes Gehrke was a recipient of a 2003 Sloan Research Fellowship.

Gehrke obtained his Ph.D. in computer science at the University of Wisconsin at Madison in 1998, and he has been an assistant professor in CIS since then.

Gehrke’s research interests are in the areas of data mining, data stream processing, and novel applications of distributed database technology. In his current research, he is working on integrating complex querying capabilities into wireless sensor networks and peer-to-peer networks, and he is developing database techniques for high-speed data streams. His data mining research includes privacy-preserving data mining, theoretical foundations of data mining, and high-performance data mining algorithms, and his group has developed some of the fastest known algorithms for several important data mining tasks.

Gehrke is a recipient of an Alfred P. Sloan Fellowship (2003), a National Science Foundation CAREER Award (2002), an IBM Faculty Award (2000 and 2001), and the Cornell College of Engineering James and Mary Tien Excellence in Teaching Award (2001).

SELECTED PUBLICATIONS


"The Optimal Combination of Automated Text Classification, Data Mining, and Textual Mining for Use in Research Communications Infrastructure." In: Proceedings of the IEEE International Conference on Data Engineering (2003).


Geri Gay
Professor
OS, joint with Communication
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http://www.comm.cornell.edu/faculty/gay.html

Geri Gay is the director of the Human Computer Interaction Group (HCI Group) and a professor in 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, social network analysis (SNA), knowledge representations, collaborative work and learning (NASA and ATSD Foundation), and activity-centered design of mobile devices.

Professor Gay teaches courses in computer-mediated communication, human-computer interaction, and the social design of communication systems. She was awarded the New York State Chancellor’s Award for Excellence in Teaching in 2003.

SELECTED PUBLICATIONS


"In Press" (forthcoming, Fall 2003).


Donald Greenberg  

Professor  
Member of GSI, the John Snow School of Management, the Department of Architecture, and the Graduate Field of Computer Science  
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http://www.graphics.cornell.edu/people/dgreenberg.html  

Dr. Greenberg received his Ph.D. from Cornell in 1985. He joined the Cornell faculty in 1988, 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 and Columbia University. From 1960 to 1985, he served as a consulting engineer with several 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. Early in his career he taught courses in structural analysis and design, architectural design, shell structures, reinforced concrete, and computer applications in architecture. In 1970–71, he was a guest professor at the ETH in Zurich, Switzerland, and he has been a visiting professor at Yale University.

Professor Greenberg's current research is primarily concerned with physically based image synthesis and with applying realistic techniques to a variety of disciplines. His specialties include color science, parallel processing, and real-time interactive image generation. His application work includes medical imaging, architectural design, virtual perception, digital photography, and computer animation.

Greenberg is a member of Cornell's faculty in the John Snow Graduate School of Management, CS, and the Department of Architecture, and a founding member of the Faculty of GSI. In recent years he has taught courses in computer graphics, computer-aided architectural design, digital photography, and disruptive technologies. He is the director of the Program in Computer Graphics and was the founding director of the NSF Science and Technology Center for Computer Graphics and Scientific Visualization. In total, he has 300 articles on computer graphics have been published by the Program of Computer Graphics and many of Professor Greenberg's students have been highly recognized in the field, including several who have received the SIGGRAPH Award and others who have received Hollywood Oscars.

Greenberg received the ACM-Siggraph/Gorden Prize in 1987, the highest honor in the graphics field, the National Computer Graphics Association Academic Award in 1989, the ACM Creativity Research Award in Architecture in 1997, and an honorary doctoral degree from New York's Institute of Technology. He is an ACM Fellow and a member of the National Academy of Engineering.

SELECTED PUBLICATIONS


David Gries  

Associate Dean of Engineering for Undergraduate Programs  
Professor of Computer Science  
Cornell Wilos Presidential Fellow  
giese@cs.cornell.edu  
http://www.cs.cornell.edu/home/giese/giese.html  

Professor Giese research is aimed at gathering 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.

For more information please visit the following website:  
http://wnl.ece.cornell.edu

Zygmunt J. Haas  

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

David Gries  

Associate Professor  
GSI, joint with Applied Economics and Management  

Department Director, 118  
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Carla P. Gomes  

Joint with Applied Economics and Management  

Department Director, 118  
gomes@econ.cornell.edu  

http://www.econ.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 1995. She also holds an M.Sc. in applied mathematics from the University of Lisbon.

Gomes's research has covered many areas in artificial intelligence and computer science, including planning and scheduling, integration of CSP and CT techniques for solving combinatorial problems, software agents, and algorithm portfolios.

Her 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 in multi-agent optimal control, distributed wireless networks, and combinatorial auctions. She was the conference chair of the Eighth International Conference on Principles and Practice of Constraint Programming (CP-2002). Gomes is also the director of the Intelligent Information Systems Institute (I2IS) at Cornell.

SELECTED PUBLICATIONS

- "An Improved Approximation for the Mixed k-Snap Match Problem", in Theoretical Computer Science 1999, 220:15-70
- "Optimal Matching of Variables with Variables: An Algorithm", in Artificial Intelligence and Operations Research Challenges and Opportunities in Planning and Scheduling (with K. Salomon and G. S. Schwartz)

David Gries  

Associate Professor  

GSI, joint with Applied Economics and Management  

Department Director, 118  
giese@cs.cornell.edu  

http://www.cs.cornell.edu/home/giese/giese.html  

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Zygmunt J. Haas  

Associate Professor  

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

Professor of Computer Science  

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http://wnl.ece.cornell.edu

Zygmunt J. Haas received his Ph.D. degree 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 of 1995, he joined the EECS faculty at Cornell.

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 Institute of Electrical and Electronics Engineers (IEEE) and ACM conferences, and serves as editor of several journals and magazines, including the IEEE Transactions on Networking and IEEE Transactions on Wireless Communications. He has been a guest editor of three IEEE Journals of Selected Areas in Communications (JSAC) Issues (“Signal Networks”, “Mobile Computing Networks”, and “Ad-Hoc Networks”). Haas is the chair of the IEEE Technical Committee on Personal Communications.

Haas's current interests include mobile and wireless communications and network, personal communication service, and high-speed communication and protocols. He heads the Wireless Networks Laboratory (WNL) at Cornell, which performs research in the area of mobility management for wireless networks, ad hoc networking (routing, multicaressing, and disruptive access control, 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 protocols—the Zone Routing Protocol—which is currently an Internet Engineering Task Force (IETF) draft. The WNL (http://wnl.ece.cornell.edu) has also pioneered this research on ad hoc networks security.

Dr. Haas is a recipient of the Michael Tier College of Engineering Teaching award in the years 1997 and 2000.

SELECTED PUBLICATIONS

Joseph Halpern
Professor
Department of Computer Science and Engineering
Joseph Halpern received a B.Sc. 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 Beavuk Secondary School in Ghana. After a year as a visiting scientist at IIT, 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 CS at Cornell.

Halpern's major research interests are in reasoning about knowledge, 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 five patents, a book, Reasoning About Knowledge, and over 200 technical publications.

Halpern is a Fellow of the AAAI and the ACM. Among other awards, he received the Gold Prize in 1997, and was a Guggenheim Fellow and a Fulbright Fellow in 2005-03. Two of his papers have won best paper prizes at International Joint Conferences on Artificial Intelligence (IJCAI). Many of his other papers have been invited for special issues of journals. He serves as editor-in-chief of the Journal of the ACM and on several other editorial boards.

SELECTED PUBLICATIONS


SELECTED PUBLICATIONS


Joseph Helman

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

SELECTED PUBLICATIONS


Sheila S. Hemami
Associate Professor
Member of the School of Electrical and Computer Engineering

SELECTED PUBLICATIONS

Dexter Kozen
Professor of Engineering
kozen@cs.cornell.edu

Dexter Kozen received his undergraduate degree in mathematics from Dartmouth College 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 Cornell faculty in 1985.

Kozen’s research interests include the design and analysis of algorithms, computation-complexity theory, the 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 algebras and Kleene algebras 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 books.

SELECTED PUBLICATIONS


Dean Krafft
Senior Research Associate
Director of Computing Facilities
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Dean Krafft received his Ph.D. in computer science from Cornell in 1993. He spent a year at the University of California, Berkeley, as a postdoctoral researcher before returning to Cornell, where he is currently an associate professor in the Department of Computer Science.

Krafft’s research interests are centered around algorithms, particularly those concerned with the structure of networks and information. He focuses on combinatorial and randomised methods in the design of algorithms, with applications to information science; design optimisation, data mining; and computational biology. He has 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 Web.

Krafft 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, and the 2003 National Academy of Sciences Award for Initiatives in Research. He also received the Romeo Lui and Carol L. Lui Teaching Award from the Cornell College of Engineering, and the Cornell Association of Computer Science Undergraduates Faculty of the Year Award for 2003–2005.

SELECTED PUBLICATIONS


SELECTED PUBLICATIONS


Lee has received numerous awards and honors for her work in computational synthesis, including the 1999 ACM SIGART Outstanding Doctoral Dissertation Award and the 2001 ACM SIGART Outstanding New Researcher Award. She has also served on the editorial boards of several journals in the field of computational intelligence and has been an active member of various professional organizations, including the IEEE Computer Society and the Association for the Advancement of Artificial Intelligence. Her research has had a significant impact on the field of computational synthesis, and she has been recognized for her contributions to the field.  

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SELECTED PUBLICATIONS

Jeanna Matthews obtained her Ph.D. in computer science at the University of California at Berkeley in 2000. She is currently an assistant professor in CS. Matthews’ research lies in the areas of operating systems, storage systems, and networks. She is actively involved in several projects aimed at integrating hands-on exposure to research results into computer science courses.

SELECTED PUBLICATIONS


Steve Marschner obtained his B.S. 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 interests are in the field of computer graphics, focusing on realistic rendering, especially models for light reflection and scattering, and high-resolution geometric modeling. Recent projects include a new model to efficiently simulate translucent materials, which has been widely implemented by the film/fx effects industry. Angling work on processing very high-resolution geometric data for the Digital Michelangelo Project at Stanford, and an experimental and theoretical investigation into the scattering of light from human hair. The overall goal of his work is to use measurements to capture the complexity of real objects and understand the subtleties of real materials, thereby increasing the richness and realism of computer generated images.

SELECTED PUBLICATIONS

3. "From System F to Typed Assembly Language." ACM Transactions on Programming Languages and Systems 25(2) (May 2003). (With C. Kelly and V. Ekanayake)

Greg Morrisett
Associate Professor
jgm@cs.cornell.edu
http://www.cs.cornell.edu/home/jgm

Greg Morrisett obtained his Ph.D. in computer science from Carnegie Mellon University in 2000. He is currently an associate professor in CS at Cornell. 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 ML and Certifying Compilation. There 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 a type safety for C-code without sacrificing control over data structures, calling conventions, or memory management. Other projects include work on runtime code specialization, type-safe reflection, type-based alias analysis, region-based memory management, and in-lined reference monitors.

Greg Morrisett is an editor for the journal of Functional Programming, and an associate editor for 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.

SELECTED PUBLICATIONS

"Syntax-Based Type Inference." ACM Transactions on Programming Languages and Systems (1998). (With W. Wawrzynski)
"From System F to Typed Assembly Language." ACM Transactions on Programming Languages and Systems 21(3) (May 2000): 528–569. (With D. Walker, K. Crary, and N. Glew)
Anil Nerode
Goldwin Smith Professor of Mathematics
Member of the Graduate Field of Computer Science
andr@math.cornell.edu
http://www.math.cornell.edu/~andr/

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 Godel, at the Institute for Advanced Study, from 1957–58; visiting assistant professor with Alfred Tarski at the University of California at Berkeley from 1958–59; was brought to Cornell by J.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 1983–97, and was director of the Mathematics Sciences Institute from 1987-1996. He also served as director of the Center for Foundations of Intelligent Systems from 1996–2003.

Nerode's research areas include mathematical logic, computability theory, recursive mathematics, nonstandard logics, nonmonotonic logics, AI, applied mathematics, control theory, hybrid systems, and complex systems design.

SELECTED PUBLICATIONS


NON-MONOTONIC LOGIC: PROBLEMS OF COMPLEXITY (1995, 250 p.)

COMPUTABILITY AND CONSISTENCY (1993, 250 p.)


Andrew Myers
Assistant Professor
andru@cs.cornell.edu
http://www.cs.cornell.edu/andru

Andrew Myers received his Ph.D. in computer science from M.I.T. in 2000. He is currently an assistant professor in CS. Myers is particularly interested in using language-level information to improve security guarantees, performance, and transparencies 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 piracy violations in complex programs. These techniques have been employed in the jiffy compiler and run-time system for setting secure programs. jiffy has been applied to distributed systems containing untrusted components, and to systems in which security requirements change dynamically.

Myers received a NSF CAREER award in 2003, and the Alfred P. Sloan Research Fellowship and the Excellence in Teaching Award from the College of Engineering in 2002.

SELECTED PUBLICATIONS


Keshav Pingali
Professor
pingali@cs.cornell.edu
http://www.cs.cornell.edu/pingali/

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. in 1986. Since 1986, he has been on the CS faculty where he is currently a full professor. Pingali is also an ECE faculty member.

Pingali's research has focused on programming languages and compiler technology for program understanding, restructuring, and optimization. His group is known for its contributions to memory hierarchy, high-level analysis, and automatic code generation. Among other awards, Pingali has won the President's Gold Medal at I.I.T., Kanpur (1978), IBM Faculty Development award (1986–87), NSF Presidential Young Investigator award (1989–94), IBM P. Lynn teaching award of the College of Engineering at Cornell (1998). In 2000, he was a visiting professor at I.I.T., Kanpur where he held the Rama Rao Chaired Professorship.

SELECTED PUBLICATIONS

Robbert van Renesse
Senior Research Associate
merl.cs.cornell.edu

Robbert van Renesse received his M.Sc. in mathematics and computer science from the Vrije Universiteit in 1989, under the supervision of Andrei S. Tanenbaum, with the honorary addendum summa laude. He obtained his Ph.D. in computer science from the Vrije Universiteit in 1991, also under the supervision of Professor Tanenbaum.

His research focus is in large-scale, self-organizing network protocols and distributed applications. Currently, he is involved in four projects. First, the Astrolabe system is a peer-to-peer implementation of a DGS-like directory service that supports on-the-fly aggregation of resource information. It incorporates epidemic algorithms to ensure robustness and efficiency, and is used among others to build scalable multicast protocols. This is joint work with Ken Birman and Wouter Vogels. Second, with Liubing Zhu, he is developing an implementation of IPsec as an overlay network, using distributed hash tables and Astrolabe. Third, the Med-libre channel is a distributed multimedia facility that supports user-specific adaptation. This is joint work with Mike Holmes, Bob Combal, Mark Budsten, and Christoph Kretz. Fourth, with Fred Schneider and Visiting Professor Dag Skjøstad, he is investigating techniques for filtering high-volume event streams.

In addition to his current research, van Renesse is a technical advisor for Fast Search and Transfer, ASA, a company that develops search engines.

SELECTED PUBLICATIONS

“Coordination and Negotiation of Cooperative Distributed Applications” in Sixth ACM Transactions on Computer Systems (November, 2002). (With L. Zhu and F. Schneider)

Fred B. Schneider
Professor
CS, joint with Linguistics
roth@cs.cornell.edu

Roth's research is concerned with theories and applications in linguistics and computational linguistics, which combine theoretical linguistic formalism, knowledge, and problem statements with numerical modeling and parameter estimation techniques. Using current methodologies, it is possible to create approximately complete grammars of human languages, and using parsing algorithms and the grammars, to map sentences to representations that present their syntax and meaning. However, sentences of human languages are very ambiguous, to the extent that it would be possible 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.

Roth, whose appointment is joint with the Department of Linguistics and the faculty of CS, also works on the semantics of natural language, using logical methods and formalizations. He developed an approach to the meaning of information, which is known as alternative semantics. Currently, he is working on interactions between the grammar of ellipsis and the grammar of information.

Roth has a B.S. in mathematics from H.T., and a Ph.D. in linguistics from the University of Massachusetts at Amherst. Before joining the Cornell faculty, he was chair of theoretical and computational linguistics at the University of Stuttgart, and member of the technical staff at AT&T Bell Laboratories.

SELECTED PUBLICATIONS

“The current program is a third-generation ‘inlined reference monitor’ targeted to Microsoft’s CLR. Our collaborator is currently building a third-generation inlined reference monitor suite (targeted to Microsoft’s CLR) to support fault-tolerance and enforcing application-specific security policies; and for program transformations and optimisations. The program has developed program analysis techniques capable of analyzing memory accesses in recursive and multithreaded programs that heavily manipulate pointers. Concrete applications of these analyses include automatic parallelization of sophisticated divide-and-conquer programs, static detection of array bounds violations, and data race detection in multithreaded programs that use pointers and pointer arithmetic.

In his current research, he is investigating program analysis approaches to improve software reliability and security, by automating the process of checking the properties that guarantee program safety and functionality.

SELECTED PUBLICATIONS

“Static Analysis of Accessible Regions in Recursive Data Structures” in Proceedings of the sixth International Static Analysis Symposium (June, 2000). (With N. Chang)
“Symbolic Reach Analysis for Critical Path Programs” in ACM Transactions on Programming Languages and Systems 22(2) (January, 2000). (With W. Reid)

Mats Rooth
Professor
CS, joint with Linguistics
roth@cs.cornell.edu

Mats Rooth is a fellow of ACM and AAAS, and received an honorary doctorate in May 2003 from the University of Newcastle-upon-Tyne. He is associate editor-in-chief for IEEE Security and Privacy and serves on the editorial boards of several other journals.

Roth's research is concerned with theories and applications in linguistics and computational linguistics, which combine theoretical linguistic formalism, knowledge, and problem statements with numerical modeling and parameter estimation techniques. Using current methodologies, it is possible to create approximately complete grammars of human languages, and using parsing algorithms and the grammars, to map sentences to representations that present their syntax and meaning. However, sentences of human languages are very ambiguous, to the extent that it would be possible 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.

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“Symbolic Reach Analysis for Critical Path Programs” in ACM Transactions on Programming Languages and Systems 22(2) (January, 2000). (With W. Reid)
Bart Selman obtained a Ph.D. in computer science from the University of Toronto in 1991. Currently an associate professor in CS, he spent the previous six years 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.

Bart Selman has received an NSF CAREER Award (1998–2002) and an Alfred P. Sloan Research Fellowship (1999–2001). He has received four best paper awards at the American and Canadian national artificial-intelligence conferences, and at the International Conference on Knowledge Representation.

SELECTED PUBLICATIONS


Bart Selman was the recipient of an AMS Fellowship in 2003.

Phoebe Sengers received her Ph.D. in artificial intelligence and cultural theory in 1998 from Carnegie Mellon University. She was a Fulbright Scholar at the Center for Art and 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, 2003, 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, and new techniques for designing systems, including the use of self-experimentation in design and new forms of evaluation for open-ended systems. She works on the National Research Council’s Committee on Information Technology and Creativity, which develops policy suggestions for interdisciplinary research in information technology and the arts, humanities, and other creative areas.

SELECTED PUBLICATIONS


Phoebe Sengers was a recipient of a 2003 NSF CAREER Award.

Phoebe Sengers was an assistant professor in CIS, joint with Science and Technology Studies.

SELECTED PUBLICATIONS


David I. Schwartz obtained his Ph.D. in civil engineering at the State University of New York at Buffalo in 1999. He is currently an assistant professor in CS.

Schwartz’s research and interests involve educational technology, the support of undergraduate research, textbook writing, and graduate-student development. He continues to work on developing a multidisciplinary curriculum for computer game-design courses that incorporates technical and artistic aesthetics of computer-game design in a collaborative environment. Students from diverse backgrounds in engineering, computer science, fine art, and music formed teams that developed and implemented computer games and associated game-development tools. The project encourages women and underrepresented minorities to enter the field of computer sciences.

SELECTED PUBLICATIONS


Theodore Schwartz
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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 an assistant professor in CS.

Schwartz’s research and interests involve educational technology, the support of undergraduate research, textbook writing, and graduate-student development. He continues to work on developing a multidisciplinary curriculum for computer game-design courses that incorporates technical and artistic aesthetics of computer-game design in a collaborative environment. Students from diverse backgrounds in engineering, computer science, fine art, and music formed teams that developed and implemented computer games and associated game-development tools. The project encourages women and underrepresented minorities to enter the field of computer sciences.

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**Emre G"un Sirer**

Assistant Professor

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Assistant Professor

Evan Speight

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

espeight@ece.cornell.edu

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Evan Speight obtained his Ph.D. in electrical engineering at Rice University in 1998. Speight is an assistant professor in 2002, and is a field member of CS. His research interests include distributed and parallel computing, computer architecture, and affinity-directed mobility in mobile computing environments.

Speight's current projects include Active Memory Clusters (joint work with Professor Mark Tschuetter), which seeks to leverage the increased functionality of a programmable memory controller to provide hardware-distributed shared-memory performance from commodity clusters. The Delphi project (joint work with Professor Moti Benjartch) explores the benefits of utilizing value prediction techniques borrowed from the architectural community in improving the performance of cluster-based shared-memory multiprocessors. The Ten project represents work on examining the possible performance and fault-tolerant benefits of thread migration between hosts in an HY parallel-runtime environment. Finally, the BitBlock project (joint work with Professor John Bennett at the University of Colorado at Boulder and sponsored by Microsoft) provides a framework for mobile computing that relies on "affinity" to automatically direct application and data throughout a wide-geographic region for optimal user access.

**SELECTED PUBLICATIONS**


**SELECTED PUBLICATIONS**


**SELECTED PUBLICATIONS**


Paul Stodghill
Research Associate
stodghi@cs.cornell.edu
http://www.cs.cornell.edu/~stodghi/

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 in 1997. Since 1997, he has been a post-doctoral research associate and research associate in CS.

With the 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 computing, as Web services. He is also helping to develop model-based and empirical optimization techniques that allow codes to be migrated between platforms without loss of performance.

SELECTED PUBLICATIONS

"Computational Science Simulations Based on Web Services" in International Conference on Computational Science 2000. (With L. Ong et al.)
"Distributed Application-level Checkpointing of MPI Programs" in Principles and Practice of Parallel Programming (PPoPP) (July, 2000). (With C. Bischof, D. McMillan, and K. Egele)

Bruce Van Loan
Professor and Chair
http://www.cs.cornell.edu/cv/

Bruce Van Loan received his Ph.D. in mathematics from the Massachusetts Institute of Technology in 1964, and his Ph.D. in computer science from Carnegie Mellon University in 1975.

He is a cofounder and chairman of GrammaTech, Inc., and a panelist for the National Science Foundation 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 software and hardware systems. The objective is a new generation of tools that provide precise and complete information about the structure of complex systems. He is working to improve the performance and functionality of genetic dependence graph technology, and also exploring the use of the technology in various application domains, including software development, maintenance and reengineering of legacy code, test-data generation, security assurance and safety assurance inspection, and semantic interference checking in configuration-management systems.

Tetablaun received a B.S. in mathematics from the Massachusetts Institute of Technology 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 software and hardware systems. The objective is a new generation of tools that provide precise and complete information about the structure of complex systems. He is working to improve the performance and functionality of genetic dependence graph technology, and also exploring the use of the technology in various application domains, including software development, maintenance and reengineering of legacy code, test-data generation, security assurance and safety assurance inspection, and semantic interference checking in configuration-management systems.

SELECTED PUBLICATIONS

Ramin Zabih
Assistant Professor
rg@cs.cornell.edu
http://www.cs.cornell.edu/rg/

Ramin Zabih received undergraduate degrees in computer science and mathematics from the Massachusetts Institute of Technology, and a Ph.D. in computer science from Stanford University in 1994. He joined CS in 1994, and was promoted to associate professor in 2001. In 2003, he was also given a joint appointment in the Department of Radiology at Cornell's Joan and Sanford I. Weill Medical College.

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 has a major impact on Internet Explorer.

He received the Abraham Wong teaching award from the College of Engineering in 1995. In 2002 he received the best paper award at the European Conference on Computer Vision.

SELECTED PUBLICATIONS

"Saliency Maps 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 and PhanaMap".

Professor Yona is recipient of a National Science Foundation CAREER Award (2002).

SELECTED PUBLICATIONS


The Faculty of Computing and Information Science was pleased to welcome the involvement of business leader and educational visionary Narayana Murthy this year as an advisor for Cornell’s efforts in computing and information science. Murthy recently joined the Cornell University Board of Trustees, and is the CEO and founder of Infosys, a worldwide leader in software development. A campus talk by Murthy is planned for the CIS Distinguished Lecture Series in fall 2004.

John Belizaire '94

In December of 2002, Belizaire arranged for a generous academic site license for several top design and graphics software packages at Cornell. Autodesk, AutoShape, and DGS, which are used for projects in the Computer Science Department, have been actively reaching out to minority high school students on behalf of Cornell. Belizaire, a partner in NEXT STAGE, LLC, who resides in Manhattan, has also participated as an industry panelist at an annual Cornell Silicon Valley event focusing on entrepreneurship. Belizaire and fellow CS classmate Julian Pelenur '94 M.Eng. '95 made a huge splash when they sold their start-up company, The Theory Center Inc., to BEA Systems for $100 million in 1999.

The first Alumni artstudent Rhodes Holland '93 joined forces with Professors David Schwartz '68 and David Bordin (Music) to establish a ground-breaking educational project in computer game design. The project involved more than 45 students from a variety of fields working collaboratively to develop alternative game formats, in a multidisciplinary setting. The main purpose of the project, beyond teaching game design principles, was to encourage technical and liberal arts students to develop interesting, innovative games for the glu of videogame players in the market place.

In December of 2002, a panel of women leaders addressed a crowd of more than 75 students, faculty, and alumni at an event called “Perspectives on Women in Computer Science.” Ph.D. student and Cornell alumna Abby Weissblum '96 M.Eng. '99 served effectively as panel moderator. Association of Computer Science Undergraduates President Priyanka Nihaler '03 was one of five panelists discussing issues ranging from myths about women in computing-related fields to effective programs for mentorship and outreach. Other alumni attending this event were: Jordan Bevanon '92 M.Eng., Prof. Dennis Pavlis, Ph.D. '83, Ben Jenkins '03, Prof. Dexter Kozen, PhD. '77, and Prof. Lillian Lee '83.

Cornell had another successful year competing in the ACM Programming Championships thanks to the hard work of the student teams. The team once again secured generous sponsorships from Green Hills Software. A Cornell team won first place in the northeast regional competition and moved on to Beverly Hills, California, to compete in the national finals. Green Hills has sponsored Cornell teams for several years.

Cornell had several alumni, students, and friends on May 12, 2003 at the Plaza in New York City. More than eighty people came to hear professors Robert Constable, Dan Hatterlocher, and Ramin Zabih brief some of Cornell’s most active alumni on the progress of computing and information science. Topics included the new Information Science majors in the colleges of Engineering, Arts and Sciences, and Agriculture and Life Sciences; the expansion of the digital arts and graphics program; the growing success of the digital libraries initiative; collaborative efforts in biology and medicine; and the establishment of several key security institutes.

“An Evening with the Faculty” was the theme of a large gathering of alumni and friends on May 12, 2003 at the Plaza in New York City. More than eighty people came to hear professors Robert Constable, Dan Hatterlocher, and Ramin Zabih brief some of Cornell’s most active alumni on the progress of computing and information science. Topics included the new Information Science majors in the colleges of Engineering, Arts and Sciences, and Agriculture and Life Sciences; the expansion of the digital arts and graphics program; the growing success of the digital libraries initiative; collaborative efforts in biology and medicine; and the establishment of several key security institutes.
Below are the titles of the courses offered by the Department of Computer Science. For more details, see [http://www.cs.cornell.edu/CUCS/courses_degreeprogs/](http://www.cs.cornell.edu/CUCS/courses_degreeprogs/).

### Graduate Courses
- COM S 501: Software Engineering
- COM S 502: Web Information Systems
- COM S 505: Applied Systems Engineering 3
- COM S 513: Systems Security
- COM S 533: Intermediate Computer Systems
- COM S 543: Parallelism and Concurrency
- COM S 553: Advanced Reading
- COM S 558: Special Topics: Digital Animation
- COM S 599: Computer Networks
- COM S 520: Computational Tools and Methods for Finance
- COM S 572: Neural Methods for Optimization
- COM S 575: Language Technologies
- COM S 576: Decision Theory I
- COM S 578: Empirical Methods in Machine Learning and Data Mining
- COM S 595: Systems Geopolitics
- COM S 596: Theoretical Programming Languages
- COM S 597: Computer Design for High-performance Architectures
- COM S 598: Concurrent Programming
- COM S 599: Advanced Systems
- COM S 633: Adaptive Systems
- COM S 642: Metric Computations
- COM S 693: Numerical Optimization and Nonlinear Equations
- COM S 695: Numerical Solutions of Differential Equations
- COM S 696: Computational Molecular Biology
- COM S 698: Advanced Database Systems
- COM S 699: Natural Language Processing
- COM S 705: Reasoning About Knowledge
- COM S 717: Reasoning About Uncertainty
- COM S 720: Advanced Topics in Machine Learning
- COM S 725: Analysis of Algorithms
- COM S 728: Theory of Computing
- COM S 730: Advanced Design and Analysis of Algorithms
- COM S 738: Approximation and Network Algorithms
- COM S 739: The Structure of Information Networks
- COM S 740: Logical Programs
- COM S 758: Computer Vision and Inference
- COM S 772: Seminar in Advanced Programming Languages
- COM S 773: Seminar in Systems and Methodology
- COM S 775: Seminar in Programming Language Research
- COM S 777: Topics in Machine Architecture
- COM S 795: Seminar in Programming Languages
- COM S 897: Topics in Numerical Analysis
- COM S 936: Parallel Programming in Combinatorial and Geometric Algorithms
- COM S 975: Seminar in Database Systems
- COM S 977: Seminar in Artificial Intelligence
- COM S 978: Seminar in Natural Language Understanding
- COM S 979: Introduction to Linear Algebra
- COM S 981: Seminar in Theory of Machines and Computing
- COM S 983: Special Investigations in Computer Science
- COM S 986: Special Investigations in Computer Science

### Undergraduate Courses
- COM S 099: Fundamental Programming Concepts
- COM S 100: Introduction to Computer Programming
- COM S 101: Introduction to Cognitive Science
- COM S 113: Introduction to C
- COM S 132: Introduction to Numerical Methods
- COM S 142: Scientific Visualization with MATLAB
- COM S 144: Scientific Programming with MATLAB
- COM S 146: Development of Scientific Computer Programs
- COM S 148: Survey and Use of Software Libraries for Scientific Computing
- COM S 159: Data Structures and Algorithms for Computational Science
- COM S 311: Programming Languages and Logic
- COM S 312: Introduction to Graph Theory
- COM S 313: Graph Theory
- COM S 314: Graph Theory
- COM S 315: Graph Theory
- COM S 316: Graph Theory
- COM S 317: Graph Theory
- COM S 318: Graph Theory
- COM S 321: Numerical Analysis
- COM S 322: Information Discovery
- COM S 323: Introduction to Database Systems
- COM S 324: Introduction to Database Systems
- COM S 325: Introduction to Database Systems
- COM S 326: Introduction to Database Systems
- COM S 327: Introduction to Database Systems
- COM S 328: Machine Learning
- COM S 329: Introduction to Theory of Computing
- COM S 330: Introduction to Analysis Algorithms
- COM S 331: Quantum Computation
- COM S 332: Applied Logic
- COM S 333: Logic, Proofs, and Computation
- COM S 334: Software Engineering

### CS Student Wins Computing Research Association's 2003 Outstanding Undergraduate Research Award
Omar Khan received his Bachelor's degree in Computer Science in May 2003. Omar has done significant research in data analysis techniques. He has addressed a wide variety of problems at both the theoretical and implementation levels. Omar's work involves attempting to cluster all documents in the NCI Colorado Cancer Center collection and determining how the clustering changes with time. Omar posed fundamental questions about the nature of structures found by clustering algorithms. He contributed to the development and implementation of a sophisticated clustering technique that he then validated using several independent methods. His range of skills includes theoretical analysis, careful experimentation, and explanation of results. Additionally, he obtained research results in stochastic search and in convex fusion. Omar and his advisors are now writing papers that will disseminate his work.

Omar ranked first in his class of nearly 700 students at Cornell in his freshman and sophomore years. He has been a teaching assistant and a course consultant at Cornell. He has also been a research assistant at Cornell, a summer research intern at NREL, and a student researcher and project leader at the Cornell Theory Center. Omar has won national recognition in mock trial competitions. At Cornell University, he was awarded the 2002–03 Frank and Rose Powers Scholarship and has been named to the Dean's List in every semester of his undergraduate studies. He has participated in a variety of outreach activities with the Cornell Theory Center.
## Research Grants

### Funded Research Computing and Information Science/Computer Science

<table>
<thead>
<tr>
<th>Investigator</th>
<th>Sponsor</th>
<th>Award (dollars)</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arons</td>
<td>NSF</td>
<td>799,500</td>
<td>The National Science Digital Library (NSDL) Central System</td>
</tr>
<tr>
<td>A. Seidman</td>
<td>AFOSR</td>
<td>827,606</td>
<td>A Testbed for Highly-scalable Mission-critical Information Systems (CUNIP)</td>
</tr>
<tr>
<td>Berman</td>
<td>DARPA</td>
<td>280,000</td>
<td>Scalable Data Repositories for Near-term Tactical Military Applications</td>
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Submitted Grant Proposals

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Submitted Collaborative Research at Cornell

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