# COMPUTING RESEARCH NEWS

A Publication of the Computing Research Association

September 2000 Vol. 12/No. 4

# Appropriations Far from Complete as 106th Congress Takes Summer Break

**By Lisa Thompson**

When Congress left Washington for its August break, it left behind a slew of unfinished legislation, including most of the 13 must-pass appropriations bills that will fund the government for Fiscal Year 2001 (October 1, 2000 to September 30, 2001). When legislators return in early September, they will have to scramble to finish these bills. As in recent years, it is all but certain that Congress and the White House will be engaged in negotiations on an "omnibus" spending package up to—and likely past—the deadline.

The last days of July were marked by partisan sniping over budget issues as Republicans and Democrats positioned themselves for the forthcoming end-game, putting them further behind schedule in the appropriations process. The Republicans have pursued a curious strategy of putting forth tightwad spending bills that they know will have to be expanded later in the process. At least five of the bills, as currently written, are under threat of veto for failing to provide funds for the White House's high-priority initiatives.

Funding for research and development programs will be one of the items at stake in these negotiations. In the appropriations bills that have been written so far, Congress has provided an overall increase in federal R&D, but most of the new money would be concentrated in the Department of Defense and the National Institutes of Health (NIH). Most of the other agencies would see their R&D funding grow very little or even decline.

Just before leaving, Congress cleared the Defense appropriations bill (H.R. 4576), which the President is expected to sign by the time Congress returns. It includes a 7 percent increase for defense R&D; defense basic research, especially, will see significant growth.

Although the House and Senate versions of the spending bill that covers the NIH have not yet been reconciled, it is likely the biomedical research agency will get close to a 15 percent increase, or nearly $3 billion in new funding.

The Administration, which proposed record increases for federal R&D this year, is clearly unhappy with the appropriations bills' treatment of R&D so far. The President's budget and science-technology officials have been concerned for some time about the lack of balance in the federal R&D portfolio: they have been emphasizing the need for growth in the computing, physical, and other sciences and stressing their importance to the success of biomedical research.

"Unfortunately, Congress has currently stalled our progress toward our shared national goals and toward balance in a healthy R&D portfolio precisely at the moment in history when we can best afford to invest in America's future," said Neal Lane, Assistant to the President for Science and Technology, in an August letter to the science and engineering community.

The President is likely to have the upper hand in the fall budget negotiations, as long as fiscal projections show the federal surplus continuing to grow. His negotiating team's stance on R&D will be crucial for those agencies hit hard by stingy appropriations bills.

## Mixed Results for Computing Research

The defense appropriations bill includes a 10 percent increase for DARPA computing programs. However, the budget request asked for a 27 percent increase. A similar result occurred last year, and apparently defense appropriators have not been persuaded that such increases for defense information technology R&D, which stand out among DARPA's spending accounts, are warranted.

With regard to the National Science Foundation, the House has passed a VA, HUD, and Independent Agencies appropriations bill that includes a 3.4 percent budget increase for the agency, just a fraction of the 17 percent increase requested by the agency. The Senate has not yet written its version of the bill, but the Chair and Ranking Member—Senators Christopher Bond (R-MO) and Barbara Mikulski (D-MD)—are trying to build support for a significant funding increase for NSF.

While the amount provided in the House bill for NSF's Computer and Information Science and Engineering (CISE) directorate is about 13 percent above current-year funding, it is about $90 million *below* what CISE has requested. The bill also fails to provide second-year funding for the Terascale Computing Systems program. ■

**Note to Department Chairs**

Taulbee Survey 1999-2000
is in the mail.

## Inside CRN



# NAE President Challenges Snowbird Attendees

William A. Wulf, President of the National Academy of Engineering, opened the CRA Conference at Snowbird 2000 with a keynote address outlining some of the important challenges facing computer science and engineering in the 21st century. Dr. Wulf, himself a computer scientist, spoke to more than 240 computer science and engineering heads, industry lab managers, and other leaders of the North American computing research community attending the conference.

This year the Snowbird program committee invited plenary and workshop participants who could provide a broad look at computer science and engineering in the new millennium. Three plenary sessions covered important new research areas and initiatives, the impact of the economic development imperative on universities, and educational challenges. Twenty workshops covering a range of topics provided opportunities for participation and discussion. A new feature this year was a session for deans, which resulted in plans for future gatherings of this group.

Those who were unable to attend may access brief summaries and presentation slides on CRA's website at: *http://www.cra.org/Activities/snowbird/00/Snowbird00.html*

The text of Dr. Wulf's keynote address is reprinted below.

## Some Challenges for Computer Science as It Enters the 21st Century

Let me begin by offering two caveats. First, you should be suspicious of a talk with a title like this. I will talk about some challenges, with the emphasis on *some*. I won't pretend to cover them all. Second, I'm going to focus on the *non-technical* challenges. There are fascinating technical challenges too, but today it's the non-technical ones I will address.

Dr. William A. Wulf
President, NAE

**Challenge 1: The challenge of being so *damned* relevant.**

I overheard at least three conversations today about the commitment of both faculty and students because of the dot-coms, stock options, and signing bonuses—all of those are because we're so damned relevant!

NAE President Continued on Page 8

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Expanding the Pipeline

# Distributed Mentor Project: Evaluation of Impact and Experiences of Participants

**By Mary Jean Harrold**

The Computing Research Association's Distributed Mentor Project (DMP) has completed a seventh year of support for outstanding undergraduate women in computer science and engineering. Each student spends approximately 10 weeks during the summer doing research under the guidance of a female professor and mentor. Most students perform their research at universities other than their undergraduate institutions.

The Distributed Mentor Project is sponsored by CRA and is managed by its Committee on the Status of Women in Computing Research (CRA-W). The project is supported by grants from the National Science Foundation (NSF) and from the National Computational Science Alliance (NPACI).

Three previous *CRN* articles (September 1993, September 1995, and January 1997) have described the background, the goals, and the first three years of the project. The January 1997 article also presented detailed information about the third year of the project (1996), and provided a summary of a third-party evaluation of the project. The purpose of this article is to report on the sixth and seventh years of the project, and to present highlights of a third-party evaluation of the DMP's impact on the 1999 participants and the experience of the participants. An upcoming article will present the results of a longitudinal study of the program.

## Project Goal

Women are severely underrepresented in Computer Science and Engineering (CS&E) in both academia and industry. The goal of the Distributed Mentor Project is to increase the number of women entering graduate school in computer science and engineering and, thus, increase the number of women holding high-level positions in academia and industry. To achieve this goal, during the summer following their sophomore or junior years, the project provides outstanding undergraduate women with: 1) a window on research and graduate life, and 2) a mentoring relationship with a successful female professor. Because of its distributed nature, the project reaches a large pool of students who can benefit from the experience.

## 1999 Project

In 1999, the selection committee chose 18 undergraduates from the applicants and matched them with mentors according to technical interests. Students came from a variety of home institutions: Brooklyn College, Brown University, Bucknell University, Dartmouth College, Duke University, Harvey Mudd College, Mississippi State University, Northwestern University, Purdue University, Rice University, Rose-Hulman Institute of Technology, Trinity College, University of Minnesota at Morris, University of Missouri, University of Oregon, University of Southern California, University of Tulsa, and Williams College.

Students conducted their research with professors at a number of institutions: Brooklyn College, Brown University, Duke University, Georgia Institute of Technology, Rice University, University of California San Diego, University of Central Florida, University of Massachusetts, Worcester Polytechnic Institute, University of Tulsa, and University of Utah.

Sara Smolensky is a computer science student from Mississippi State University who participated in the 1999 DMP with Professor Kathryn McKinley of the University of Massachusetts at Amherst. Sara maintained a detailed account of her DMP experience, which is available at our project website at *http://cra.org/Activities/craw/dmp/index.html*. Her journal provides such an interesting account of her experience, and was so useful to prospective DMP participants, that keeping such a journal is now a requirement for all DMP participants. The CRA-W website (*http://cra.org/Activities/craw/dmp/awards/2000.html*) contains the journals of this year's DMP participants.

## 1999 Project Evaluation

During fall 1999, the Learning Through Evaluation, Adaptation and Dissemination (LEAD) Center conducted a third-party evaluation of the project. The LEAD Center has evaluated the DMP since its inception, using both qualitative and quantitative methods, and has produced three previous reports.

The LEAD Center and the DMP coordinator developed a survey that was then sent to the 18 participants in the 1999 DMP. The survey consisted of two parts: 1) questions to gather information about the students as they entered the program: their demographics, undergraduate experience, and attitudes toward graduate school; and 2) issues related to the DMP: impact of the DMP and the DMP experience. Whereas the typical response rate for surveys conducted by the LEAD Center is 70 percent, the response rate for the 1999 DMP survey was 100 percent. Furthermore, the students provided complete responses, and often gave explanations for their ratings.

The study used the survey to assess the DMP's impact, and found that "most students reported a greater understanding of and preparation for graduate school and many reported being more committed to graduate studies." Of the 1999 student participants, 78 percent cited the DMP as a positive factor in their upcoming decisions about whether to pursue graduate studies in CS&E. Also, 78 percent of the students reported having an increased level of commitment to graduate school, with 72 percent feeling "committed" to "very committed" to graduate school following their participation in the program.

Most students reported a higher level of preparation, ability, and interest in CS&E following the program. The survey asked them to rate themselves relative to their peers in these three areas, and most left the program with "high" to "very high" ratings in preparation (77%), ability (94%), and interest (94%). One student described her gains as follows:

"I am extremely pleased with all that I have learned and accomplished. Being a co-author was really exciting for me. I have now given oral presentations to my elders, which has bolstered my confidence level in public speaking..."

The study also used the survey to assess the change in attitudes about graduate school resulting from the DMP experience. Most students rated their understanding of, preparation for, and commitment to graduate school higher after the program. This is most evident in the student comments explaining the change in these areas. These comments echo that of previous DMP students who also described the tremendous value of gaining experience with research and getting an inside view of graduate school when deciding whether to pursue graduate studies. One student wrote:

"That was my first exposure to research, and I not only learned a lot, but I end[ed] up with something well worth working [for] and useful for the project I worked on ... I have never before realized how much I would like to do research and work with people who are doing research, and I believe this experience came at the right moment in my life to give me the right direction for my future goals."

Distributed Continued on Page 9

***FINAL ANNOUNCEMENT***

**Grace Hopper Celebration of Women in Computing 2000 Conference**

**September 14-16, 2000**
**Sheraton Hotels, Cape Cod, Massachusetts**
**http://www.sdsc.edu/Hopper**

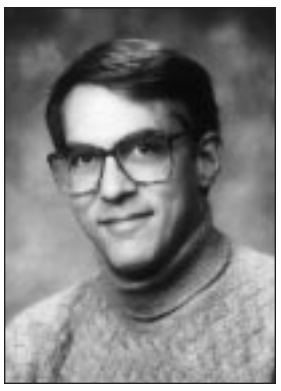
# A Snapshot of the Ricoh California Research Center

**By David Stork**

In 1989 the Ricoh Corporation (USA) founded the Ricoh California Research Center (CRC) to perform applied research that would "insure the continued success of Ricoh Company Limited (Japan)," a worldwide leader in office and electro-optical technologies. Ricoh located CRC in Menlo Park, California, in order to capture the energy and entrepreneurial spirit of Silicon Valley and to provide ready access to leading universities, specifically Stanford University and the University of California at Berkeley. The lab's focus on information technology, and software in particular, supports and complements the strengths of our Japanese colleagues, whose expertise in optical devices, miniaturization, manufacturing, toner chemistry, and so on have long held the parent company in good stead.

Every research project at CRC has been initiated by its roughly 20 scientists and engineers, rather than by directive from Ricoh Company. Of course, each project is evaluated on a number of risk/reward criteria before it is begun, and its ultimate value to Ricoh is of paramount consideration. One of CRC's earliest successes was the APT algorithm, a JPEG-compatible still-image compression algorithm that is particularly fast and energy efficient in VLSI implementations. APT can compress still images at video rates and, compared with traditional compression methods, uses much less power in digital hardware. Many products now use APT, including every Ricoh digital camera.

Because of CRC's impact and location, Ricoh Company asked us to expand our charter, and in 1997 we created the Strategic Business Center (SBC), the corporate venture capital arm of Ricoh. SBC invests in venture opportunities where both we and our partners can benefit from Ricoh's worldwide strengths as an office technology provider. While many major corporations have such investment groups, they are virtually always a part of a finance division. SBC is rare, in that it grew out of a technology *research* lab. The connection between CRC and SBC remains close: research scientists and engineers from CRC alert SBC to new technical developments and provide analyses of the technologies of potential corporate partners.



Dr. David Stork

CRC invents and develops technologies for Ricoh's current core needs as well as for emerging areas. As expressed by Ricoh's corporate slogan, "Image communication," superior image processing is central to a wide range of Ricoh products and services. CRC's greatest commercial impact so far has been in the core domains of color image processing and compression. After the APT algorithm (mentioned above), we developed a very fast binary compression method called ABS, which is now used in high-end copiers, third-party digital games, and elsewhere. Next, we developed CREW (Compression with Reversible Embedded Wavelets), a compression method that supports a wide range of features. For instance, the compression ratio in CREW can be set throughout a range (from lossless to highly lossy) at encode or decode stages or both. CREW serves as a key technology in the emerging JPEG 2000 international standard.

Another core technology for Ricoh is remote services. CRC developed FIXIT, a Bayesian belief net-based remote diagnostic system enabling "query-free" information retrieval. Thus, a customer telephones a Ricoh service representative and describes a product's problems and symptoms. The service representative types these symptoms into a PC running FIXIT, which then automatically displays the most probable faults and associated corrective measures. FIXIT dramatically reduces the time and cost of providing such product service information over the telephone.

CRC's greatest success in emerging technologies began as our Infinite Memory Multifunction Machine (IMMM) project. The IMMM device stores electronic copies of every document photocopied, faxed, or printed by any peripheral on an office intranet—*every* document. To build on our simple concept of "store everything," we invented many methods for human-machine interaction, as well as document search and retrieval. The IMMM led directly to the *eCabinet*™, the first in our continuing series of network office appliance products.

Ricoh Company recognized that major technology market trends start in the United States, and especially in Silicon Valley, and thus in early 1997 formed Network Office Appliance division (NOA) in Cupertino, California, close to CRC. NOA prototypes and develops new classes of office products noteworthy for their ease of use, such as the *eCabinet*™. We find that the greater the ease and reliability we seek in a Ricoh product, the harder and more risky the research program must be to invent it.

In June 1997, Ricoh Company founded Ricoh Silicon Valley, Inc. (RSV), a wholly owned American subsidiary that comprises CRC, SBC, and NOA division. The RSV corporate organization allows ready collaboration and consolidation of effort among its three groups. For instance, CRC's technology transfer in emerging technologies is to the NOA division, and is much simpler and faster than its transfer of core technology to Japan. It is unusual that the success of a research lab leads directly to the founding of a full operating company such as RSV.

Part of RSV's corporate culture is that each employee, and indeed each of CRC's small research groups, has an identified customer, generally internal to RSV or Ricoh Company. At CRC we encourage open publication and public presentation of technical results (usually after patents have been filed), and most researchers are either leaders or active in major international technical organizations. We have found that such openness is essential not only for generating the best research ideas, but also for recruiting and retaining the most talented scientists and engineers.

It is difficult to predict—let alone lead—technical developments in a world moving at Internet speed. Nevertheless, at CRC we have tried to foster a culture of creativity, openness, and integrity that contributes to both the continued financial success of Ricoh and the professional fulfillment of its employees.

*Dr. Stork is Chief Scientist at Ricoh Silicon Valley*
http://www.rsv.ricoh.com ■

## COMPUTING RESEARCH NEWS

Vol. 12/No. 4/September 2000

***Computing Research News*** **(ISSN 1069-384X)** is published five times per year, in January, March, May, September, and November. Copyright 2000 by the Computing Research Association (CRA), 1100 Seventeenth Street, NW, Suite 507, Washington, DC 20036-4632; tel. 202-234-2111. All rights reserved. Material in *CRN* is not endorsed by CRA nor intended to reflect any official positions of CRA or its board.

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## CRA UNDERGRAD AWARDS PRESENTED AT AAAI 2000

CRA's Outstanding Undergraduate Awards for 2000, sponsored by Mitsubishi Electric Research Laboratory, were presented by CRA board member, Tim Finin, at the AAAI Conference in Austin, Texas in August. Pictured above after the ceremony (l to r) are Luke Zettlemoyer, winner of the male award; Natalia Hernandez-Gardiol, winner of the female award; Tim Finin, presenter; Elaine Cheong, honorary mention; Jonathan Cohen, runner-up for the male award; Dina Demner-Fushman, honorary mention; and Kevin O'Neill, honorary mention.

## CRA Outstanding Undergraduate Awards

Deadline: October 23, 2000
Nomination Details available at:
http://www.cra.org/Activities/awards/undergrad/home.html

# Broadening the Scope of IT Research

**By Jerry R. Sheehan**

Information technology (IT) research has fueled incredible advances in the capabilities of computing and communications technologies. Work in device architectures, communications networks, databases, human-computer interaction, and other areas has made IT systems more functional and more usable. As a result, IT has moved out of the laboratory and the back rooms of large organizations to touch virtually all aspects of life. IT systems are transforming finance, commerce, education and learning, manufacturing, and a myriad of other important activities, raising new questions about the adequacy of the nation's IT research enterprise. Is sufficient research being conducted to ensure continued progress in IT and keep pace with the growing opportunities and challenges it presents? Is the work addressing the kinds of problems needed to make IT even more productive? Are the right organizational structures in place to fund and conduct the needed research?

A new report from the Computer Science and Telecommunications Board, *Making IT Better: Expanding Information Technology Research To Meet Society's Needs*, attempts to answer these questions. It examines trends in the evolution and application of IT, as well as in the nature of IT research and development (R&D) in industry and universities, and concludes that *the IT research agenda must be explicitly expanded to address a number of new and longstanding problems associated with the application of large scale IT systems to a growing number of social applications*. This work will require experimentation with new models of research that more actively involve end-users of IT systems and researchers with expertise in the social sciences, economics, business, and law.

## New Research for New Problems

By almost any measure, the nation's research base for IT is strong. The number of IT researchers and funding for IT research are at all-time highs. Federal expenditures for IT-related research climbed 40 percent in real terms between 1990 and 1998 to approximately $2 billion. The Clinton Administration proposed another $1 billion increase in combined funding for fiscal years 2000 and 2001. Industry investments in IT research and development (R&D) also climbed throughout the decade. Between 1990 and 1998, R&D investments by firms involved in computing and communications goods and services industries doubled from $26 billion to $52 billion—roughly one-quarter of which was classified as research. This growth occurred despite major reorganizations of research at large companies like AT&T, IBM, and Xerox. It also reflects significant increases in R&D funding by companies like Intel, Microsoft, and Cisco, as well as new entrants into the IT industry.

Despite burgeoning research expenditures, the rapid deployment of IT systems is making evident a number of deficiencies in the research base. Large companies and federal agencies continue to experience difficulties in developing, deploying, and operating new IT systems. Surveys suggest that only one-quarter of all large-scale system development efforts are completed on time and within budget, and that 30 percent are abandoned altogether. Even after deployment, large-scale systems continue to suffer problems of scalability, reliability, security, and fragility. Newspapers report regularly on high-profile Web sites that were unable to handle unanticipated surges in traffic, crashed for unknown reasons, or were broken into by hackers. Organizations and individuals continually struggle to modify their IT systems to incorporate new functionality or support new tasks. The difficulties they encounter both raise the cost of system modifications and stifle organizational change and innovation.

While inadequate management practices are surely responsible for some of the problems in developing IT systems efficiently, more fundamental processes are also at work. IT system design is still as much an art as a science, and the knowledge base for understanding systems is weak. Engineers lack suitable tools for predicting the performance of systems or encapsulating functionality in ways that limit unexpected interactions among components. These issues are not new to computing—they have plagued systems for decades. But as the complexity of IT systems grows and the scope of their deployment expands into even more critical applications, the need to solve them becomes ever greater. Issues of scalability, reliability, and security will become even more challenging as advances in networking technology and the Internet allow the deployment of more tightly inter-linked and interdependent IT systems.

The problems that need to be addressed are not exclusively technical in nature. Increasingly IT systems are being deployed in support of various "social applications"—applications that support groups of people in shared activities, such as in health care, education, manufacturing, or electronic commerce. Social applications can motivate technical research along a number of dimensions, such as improving overall efficiency and productivity, protecting privacy, and improving interoperability. In social applications, however, IT becomes part of a larger "sociotechnical system" that combines technology, people, and organizations in complex ways to perform a given set of functions. The technology cannot be considered apart from the context in which it operates, and research on social applications must therefore be inherently multidisciplinary. It requires the insight of technologists, as well as end-users of IT systems and researchers in the social sciences, business, and law who understand how people, organizations, and society interact with technology.

## New Mechanisms for New Research

The nation's research enterprise is not currently well equipped to address issues of large-scale systems and social applications. The bulk of IT R&D investments continues to come from companies that manufacture the components of IT systems: microprocessors, communications switches, software applications, for example. Firms engaged in developing systems (e.g., systems integrators) tend to invest little, if anything, in R&D, despite the burgeoning growth for their services. Nor do most organizations that are major end-users of IT systems and applications—despite the considerable sums they spend each year to develop more sophisticated applications. A recent survey of 500 leading end-user organizations—in industries ranging from financial services to health care to manufacturing—indicates that the median level of investment in IT R&D lies at just 0.14 percent of company sales.

Structural changes in the IT industry have further reinforced these tendencies. Over the past decade, the IT industry has become more stratified and firms more specialized. For example, the telecommunications sector has seen increased separation between those companies that manufacture communications devices and the providers of telecommunications services. Service providers—the companies most likely to encounter systems issues—have divested themselves of their internal research operations and even cut back on their external funding research.

Engaging end-users and researchers from other disciplines in IT-related research will require new mechanisms for organizing research. These can take any of several forms, from single-investigator research that examines issues at the nexus of IT and its applications, to multidisciplinary research teams that collectively bring a broad set of perspectives to bear on a problem, to larger multidisciplinary research centers that provide a long-term focus on groups of issues related to IT systems and applications. The greatest challenge in forming such enterprises will be overcoming the disciplinary nature of university departments and convincing end-users that expenditures on IT research will generate positive returns to them.

## Recommended Actions

The CSTB report provides a range of recommendations to government, university, and industry leaders to encourage research on large-scale systems and social applications, including:

- Government should continue to increase funding for IT research, commensurate with the growing number of research opportunities. Increases in line with those proposed by the Clinton Administration and the President's Information Technology Advisory Committee are of the right order of magnitude.
- DARPA and the National Science Foundation (NSF) should establish programs of fundamental research in the area of large-scale systems. These programs should engage IT experts from other federal agencies and private sector organizations that make use of large-scale IT systems.
- Federal agencies should increase funding for interdisciplinary work on social applications of IT. These programs could build on models such as the digital government initiative or the computing and social sciences program at NSF and include funding for a range of research models: single investigators, research teams, and larger research centers.

Broadening Continued on Page 9

# CDC Releases Minority Recruitment and Retention Report

A committee convened by the Coalition to Diversify Computing (CDC) has recently released a report entitled *Recruitment and Retention of Underrepresented Minority Graduate Students in Computer Science*. The report offers 25 practical suggestions for graduate departments to consider. These suggestions cover specific recruitment tactics, means to facilitate early success in graduate school, retention methods, and organizational issues such as best ways of providing financial support. The committee was co-chaired by Andrew Bernat (University of Texas at El Paso) and William Aspray (Computing Research Association). The study was sponsored by the National Science Foundation and PACI, with staff support from CRA. Single copies are available free of charge, but supplies are limited. Contact info@cra.org. The report is also available online at: *http://www.cra.org/main/cra.pubs.html*.

The Coalition to Diversify Computing is a program of the Computing Research Association, the Institute of Electrical and Electronic Engineering, the Association of Computing Machinery, and EOT-PACI, a national education, outreach, and training program funded by the National Science Foundation. CDC focuses on increasing the visibility of minorities and providing networking opportunities for minority researchers, faculty, and students in computer science and engineering (*http://www.npaci.edu/Outreach/CDC*). ▮

# H-1B Visa Legislation Still Up in the Air

**By Lisa Thompson**

Legislation to amend federal statutes governing the visa program (H-1B) for nonimmigrant professional workers could see Congressional action this month, but it still faces obstacles on the path to enactment. Having trouble meeting its high-tech employment needs, industry has been pushing Congress to raise the caps on these visas, but progress is threatened by the fact that the legislation is being weighted down with controversial unrelated provisions.

The principal vehicle being used by the Senate to lift the H-1B visa caps is the American Competitiveness in the 21st Century Act (S. 2045), sponsored by Judiciary Committee chairman Orrin Hatch (R-UT). The act would raise caps on H-1B visas to 195,000 per year for three years, and exempt from the cap those visas granted to foreign workers who are to be employed by research and other non-profit institutions or who recently received a master's or higher degree from a U.S. educational institution. The current ceiling is 115,000 visas per year, with no special exemptions.

Industry advocates strongly support the Hatch bill, which was approved by the Judiciary Committee in April. But squabbling between party leaders over the number and nature of amendments Democrats will be allowed to offer, and the rush to pass appropriations bills, have prevented the bill from proceeding to the floor.

The outlook is even more complicated in the House, where the committee of jurisdiction produced a bill that is distasteful to industry and to the leadership of both parties. In may, the Judiciary Committee approved the Technology Worker Temporary Relief Act (H.R. 4227), which was sponsored by Rep. Lamar Smith (R-TX), chairman of the panel's Immigration Subcommittee and a skeptic of industry's claims of a widespread high-tech labor shortage.

While Smith's bill would entirely eliminate the caps on H-1B visas for the next three years, it would limit their distribution to foreign workers with college degrees who are paid at least $40,000 a year, or who are employed by institutions of higher education. Current law allows applicants to substitute work experience for a college degree in determining eligibility, but critics see this as a "loophole" that invites fraud in the program. Moreover, the measure contains several provisions, which are designed to protect American workers and prevent abuses, that place new burdens on participating companies.

Industry groups and their allies in the House favor legislation introduced by Rep. David Dreier (R-CA), the Helping to Improve Technology Education and Achievement Act (H.R. 3983), which is similar to the Hatch bill. Ideally, the House leadership would like to find a way to bring the Smith bill to the floor and have it end up looking more like the Dreier bill.

Further complicating action is the fact that some lawmakers in both chambers, primarily Democrats, want to use the legislation as an opportunity for enacting other changes in U.S. immigration policy that are unrelated to H-1B visas. The Administration, for instance, is pushing to include controversial measures concerning immigrants from Central America and the rules under which illegal immigrants can apply for amnesty, an unpopular proposal among Republicans. Supporters fear that even one such addition could open the floodgates for other legislators' pet immigration proposals, leading to a situation in which the bill collapses under its own weight.

## Industry Succeeds in Making Case for IT Job Shortage

The Information Technology Association of America (ITAA) estimates that more than 840,000 information technology jobs in the United States will go unfilled this year. The H-1B visas available this year were all claimed by March. With statistics like these, and effective political pressure, industry groups like the Technology Network and ITAA have built a compelling case for raising the H-1B visa caps that has dominated debate in Washington.

"Skilled foreign professionals, many of whom are educated at American colleges and universities, represent a small percentage of the total U.S. workforce, but provide significant contributions to domestic growth and U.S. competitiveness in the global marketplace. Technically skilled foreign professionals enable U.S. employers to create products, implement new manufacturing processes, open foreign markets, train and educate American workers and create and support new jobs in America," reads a TechNet position paper.

While the opposition to raising the visa caps, led by anti-immigration groups like the Federation for American Immigration Reform and some engineers' organizations, has not been silent, Congress and the Administration are more than prepared to respond to the needs of industry. Both of the industry-backed bills include provisions to direct H-1B petitioner fees to education and training initiatives, which gives legislators who vote for lifting the H-1B caps some political cover.

Efforts to enact H-1B legislation are expected to move forward after the August recess. But the issue is a volatile one, as are nearly all proposed changes in U.S. immigration law, and compromises can unravel at a moment's notice. The sooner the bills move, the less likely it is that H-1B visas will become an issue in the November elections. ▮

# CRA and SDSC Inaugurate Digital Fellows Program

The Computing Research Association and the San Diego Supercomputer Center (SDSC) have announced a Digital Government Fellows program. The goal of the program is to build ties between the academic and industrial computing research communities on the one hand, and information technology workers in federal, state, and local governments on the other.

Digital Government Fellows are computing researchers—typically junior faculty or industrial researchers who have received the doctorate within the past few years—who show significant promise in their research. Three to four Fellows will be appointed each year. The program is supported by the National Science Foundation's Digital Government program.

Each Digital Fellow is expected to give a public lecture to an audience that includes a significant number of information technology workers in government. The lecture should feature the Fellow's own personal research, but it should also include enough background information that an audience of IT workers with varying backgrounds can follow it without difficulty. It is hoped that the topic will be one that could be applied, at least indirectly, to improve digital government.

Following the lecture, each Digital Fellow will spend an hour or more with some of the government IT workers to talk about how the Fellow's research fits with the computing needs of their government organizations. Not only will this benefit the audience, but Fellows will get feedback on the relevance of their research to government IT activities, make valuable contacts, and learn of funding opportunities that may be beneficial to their careers.

The first Digital Fellow is Geoffrey M. Voelker, an assistant professor at the University of California at San Diego. His research interests include operating systems, distributed systems, and Internet systems. Dr. Voelker received a BS degree in Electrical Engineering and Computer Science from the University of California at Berkeley in 1992, and the MS and Ph.D. degrees in Computer Science and Engineering from the University of Washington in 1995 and 2000, respectively.

Dr. Voelker will give a plenary talk at the Supercomputing 2000 Conference in Dallas, Texas, on Thursday, November 9 on the topic, "On the Scale and Performance of Cooperative Web Proxy Caching." Following the session, he will be available to meet with government IT workers in attendance for further discussion. The second Digital Fellow will be announced shortly, and is expected to give his or her lecture in the Washington, DC area early in 2001. Information will be available in *CRN* and on the CRA website at: *http://www.cra.org.* ▮

# CRA Welcomes New Staff Members

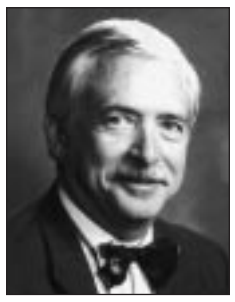
**Susan Garfinkel**, Webmaster and Diversity Programs Coordinator, holds a Ph.D. in American Civilization from the University of Pennsylvania. Since 1997, she has taught at George Washington and Georgetown Universities on topics including hypertext and the cultures of cyberspace. Susan brings to her position a photographer's strong interest in visual communication, along with considerable experience in university-level planning and governance.

**Simi Khetarpal**, a native of India, is CRA's new Administrator. Prior to joining CRA, she was a Government Sales Associate with a private firm. Simi lives in Maryland with her two young sons, Ishan (8) and Mihir (almost 4). Among other responsibilities, Simi will coordinate the professional opportunities section of *Computing Research News*.

Susan Garfinkel (l) and Simi Khetarpal (r).

# CRA New Board of Directors Members

## Incumbents:



**Peter Freeman**, Dean and Professor, College of Computing, Georgia Institute of Technology was reelected to a fifth term on the CRA board. During that time, he has served as vice chair of the board; chair of the Government Affairs Committee and a Snowbird Conference; Co-PI of CRA's Information Technology Worker Study released in 1999, and a member of the Elections Committee. Professor Freeman, who received his Ph.D. in computer science from Carnegie Mellon University, is a Fellow of the IEEE, AAAS, and ACM.

**Mary Jane Irwin**, who first joined the board in 1991, has served as vice chair of the board; co-chair and member of CRA's Committee on the Status of Women in CSE (CRA-W); and co-chair of CRA's 1998 Conference at Snowbird. Professor Irwin, who has a Ph.D. in computer science from the University of Illinois, Urbana, is currently Distinguished Professor of Computer Science & Engineering at Penn State University. She is a Fellow of the IEEE and ACM and winner of the ACM/SIGDA Leadership Award. In 1997, Professor Irwin was awarded an honorary doctorate from Chalmers University in Sweden. Professor Irwin works actively to increase recruitment, retention, and advancement of underrepresented groups (particularly women) in computer science and engineering. Fostering communications between CRA and its affiliate societies will continue to be one of her interests.

**Nancy G. Leveson**, Professor of Aerospace Software Engineering, Department of Aeronautics and Astronautics, Massachusetts Institute of Technology, is beginning her fourth term as a CRA board member. She is a member of NAE and an ACM Fellow, and the recipient of ACM's Allen Newell Award and the AIAA Information Systems Award. Professor Leveson was a co-founder and chair of CRA's Committee on the Status of Women in Computer Science and Engineering (CRA-W), and twice served as program chair of CRA's Conference at Snowbird. Professor Leveson received her Ph.D. in computer science from the University of California, Los Angeles.

**David Patterson**, Professor of Computer Science at UC Berkeley, has been a CRA board member since 1991, serving as chair from 1993-97. He is a member of the Computer Science and Telecommunications Board (1997-present). Professor Patterson is a member of the NAE, and was awarded the IEEE Mulligan Education Medal, the IEEE von Neumann Medal, the ACM SIGMOD Test of Time Award, and the ACM Karlstrom Outstanding Educator Award. As former chair of the CRA board, Dr. Patterson brings a long-term perspective to the issues facing CRA in the next decade. Dr. Patterson received his Ph.D. in computer science from the University of California, Los Angeles.

## Appointees:

**Andrew G. Hume** is a Technology Consultant at AT&T Labs-Research in the software systems research department. He has worked in the areas of software tools, pattern matching and string searching, and for the past few years has focussed on systems processing massive datasets. He has been on the USENIX Board of Directors since 1994, and served as President from 1996-2000. He is Vice President elect for 2000-2002.

**Guylaine M. Pollock**, the IEEE-Computer Society's 2000 president, has been appointed to her second term on the CRA board as one of the Computer Society's representatives. She is a senior member of the technical staff at Sandia National Laboratories, working with the Computational Plant parallel architecture project. Dr. Pollock received her Ph.D. in computer science from Texas A&M University. A society Golden Core member, Pollock has received numerous awards, including Notable Women of Texas, Upsilon Pi Epsilon membership, the society's Richard E. Merwin Scholarship, and a Gulf Oil Foundation Fellowship.

**David L. Waltz**, Vice President of Computer Science Research at NEC Research Institute, received his Ph.D. in electrical engineering from the Massachusetts Institute of Technology. He is a Fellow of ACM and AAAI, and a Senior Member of IEEE. Dr. Waltz has held 18 university distinguished lectureships, the most recent at Texas A&M University and the University of Illinois. Dr. Waltz participated in a number of CRA activities in his role as President of the American Association for Artificial Intelligence, a CRA member society. His experience spans academia, start-up R&D, corporate board membership, industrial research management, professional society leadership, and funding-agency service.

## Newly Elected:

**Randal E. Bryant**, who received his Ph.D. in computer science from the Massachusetts Institute of Technology, is currently President's Professor and Head of the Department of Computer Science at Carnegie Mellon University. He is a Fellow of the ACM and IEEE, and has received the ACM Kanellakis Award, the IEEE W.R.G. Baker Prize, and the Semiconductor Research Corp.'s Technical Excellence Award. He is a Member of the Executive Committee of the ACM/IEEE Design Automation Conference (1994-present, including technical program co-chair, 1998-99). He was also Associate Editor and Editor-In-Chief of *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems*.

**Janice Cuny** is an Associate Professor of computer and information science at the University of Oregon. She won an IBM Faculty Development Award and National Science Foundation Faculty Award for Women, and has been an IEEE Distinguished Visitor. Professor Cuny has a long involvement with CRA's Committee on the Status of Women in Computing Research (CRA-W). She has been a member since 1993 and was co-chair from 1996-99. Dr. Cuny has organized five faculty-mentoring workshops for CRA-W. For the past three years she has chaired the selection committee for CRA's Undergraduate Awards and has served as a mentor in CRA-W's Distributed Mentoring Program. Dr. Cuny has a Ph.D. in computer science from the University of Michigan.

**Jeffrey S. Vitter**, who holds a Ph.D. in computer science from Stanford University, is the Gilbert, Louis, & Edward Lehrman Professor and Chair of the Department of Computer Science at Duke University. He is the recipient of the NSF Presidential Young Investigator Award; and was named a John Simon Guggenheim Memorial Foundation Fellow in 1986. Dr. Vitter is an IEEE and ACM Fellow. He won the ACM Recognition of Service Award, and was a Fulbright Scholar in 1998. Dr. Vitter has an interest in the changing nature of Ph.D. education, and recently organized a Snowbird workshop addressing it. As Chair of ACM SIGACT, Fulbright Scholar, and EATCS Executive Committee member. Dr. Vitter has worked to forge links with foreign colleagues by organizing conferences abroad and planning joint initiatives.

**Ambuj Goyal** is Head of Computer Science and Vice President, Services and Software, IBM Research Division at the IBM T.J. Watson Research Center. He leads the worldwide research efforts of more than 1,000 computer scientists at IBM Research. Dr. Goyal, who holds a Ph.D. in electrical engineering from the University of Texas at Austin, is an IEEE Fellow, and has received the IBM Corporate Award, IBM Outstanding Technical Achievement Award, and the IBM Outstanding Innovation Award (in both 1987 and 1990). His research interests include fault-tolerant computing, distributed computing, and high performance databases. Dr. Goyal is a strong proponent of close interactions between the university and industrial computer science research communities, and has led the establishment of programs at IBM to foster these interactions.

**Elaine J. Weyuker** is a Technology Leader at AT&T Labs - Research. She is an ACM Fellow and a Senior Member of IEEE. Dr. Weyuker served on the original CRA-W committee. As the only member of CRA-W who was also a member of the ACM Committee on the Status of Women and Minorities, she also served as liaison between the two committees. Dr. Weyuker was Professor of Computer Science at the Courant Institute of Mathematical Sciences at NYU; and Director of Graduate Studies and Head of the Graduate Fellowship Selection Committee for the Computer Science Department, NYU. She currently serves on the Editorial Boards of the *Journal of Empirical Software Engineering* and the Advisory Editorial Board, *Journal of Software and Systems*. Dr. Weyuker publishes widely in software engineering, and has authored two books on the theory of computation. Dr. Weyuker holds a Ph.D. in computer science from Rutgers University. ▮

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There is a lot of money, attention, media, and power being focused on CS & CE departments because they are knowledge-creation engines. Despite that, sadly, I think the quality of the interaction between computer science/engineering departments and industry has changed. I did a lot of work with industry as a young faculty member, and it was a marvelous two-way street—they had problems and we had ideas. Nobody talked about intellectual property or IPOs. Our benefit was peer recognition of our intellectual contributions. There is still a lot of interaction between industry and academia in our field, but the quality is different, and I think lesser, because we are so damned relevant.

Being so damned relevant is not very comfortable for academics. We need to behave in ways that are different from, and hence not understood by, our academic colleagues. There are very practical consequences of that!

**Challenge 2: What is ethical behavior when you don't know what you are doing, *and can't*?**

If I get anywhere close to a technical issue in this talk, it is on this topic. I need to do so in order to explain what I mean by this challenge. I've had a very checkered research career. One of the things I've done is correctness of programs; another is security. So I will use these for my example, but I could have used any complex systems.

We all know what the correctness problem is—"given assumptions, A, and a post-condition, Q, does A imply the weakest precondition of Q?" If you can prove that theorem, the program will produce Q on termination.

You might not be able to automatically prove this theorem, but at least the problem is well formulated. The problem is *not* well formulated for computer security! The correctness statement for security is: "Prove that there does not exist a sequence of commands such that those commands applied to the program will not make something *bad* happen (where "something bad" is undefined and undefinable)." That's half of what I mean by "you don't know, and can't."

The second half of "you can't know" deals with emergent properties—properties of programs that may be perfectly correct in the sense of doing what the post-condition says to do, but they *also* do some unanticipated things.

There is a 1993 Naval Research Lab study of 50 security problems—22 were problems with the specifications. [Note: the selection criteria were such that one should not infer that 22/50ths of all security problems are due to specifications. It could easily be lower *or higher*!] I don't want to say "errors" in the specifications because they were things that someone thought were *essential* to the correct operation of the program! In fact, however, a clever person could exploit them to do "something bad." The popular myth that security problems are "bugs" just isn't true. Some are, but many of them result from correct implementations of specifications with unforeseen implications.

I don't know what it means to behave ethically when you can't know the full consequences of your engineered solution to a problem. I think it's a profound problem, and *this* field has to think it through because we're facing it before the rest of the engineering profession.

**Challenge 3: Growing responsibility!**

I feel strongly that CS/CE has a responsibility to society that it has not yet stepped up to, and in some ways it is deeper and more profound than other disciplines. Permit me to give you a few examples of these responsibilities.

First, our responsibility for broad liberal education. I don't see how someone can call himself or herself a liberally educated adult in the 21st century without having a deep understanding of the fundamentals of computation. Knowledge of the physical world is embedded in our culture—kids acquire it as a part of growing up. Newton's law of gravitation in its particular form may be a surprise in high school, but the notion that there is a force pulling you down, even the name Newton and the apple bouncing off his head, are part of the culture. Everyone is exposed to an amazing amount of fundamental knowledge of nature this way.

The fundamentals of computation are such relatively new concepts that they are not part of the culture. People don't absorb them in the same way as physical knowledge. We must compensate in our educational system. I don't mean word-processing or spreadsheets; I mean fundamental concepts! Computer scientists and computer engineers need to take an aggressive leadership position to make that happen.

Second, I am asked to do all kinds of funny things in this job. One of them was to speak to new Members of Congress on issues of IT that were likely to come up in the 106th Congress. I jotted down a list that surprised me. It surprised me in three ways. It was longer than I anticipated—five pages of cryptic notes. Second, the issues were *deep*! Third, what I thought of as the "far-off" stuff wasn't all that far off at all.

I want to give several quick examples of what I mean by deep issues. A law professor friend said to me: "You know, there are a handful of philosophies for legal systems around the world, and they really can be quite different from each other, but there are one or two things that are common to all of them. One is jurisdiction—the notion that laws apply in a place. Guess what, there is no "place" in cyberspace!" That is, a fundamental philosophical basis for our legal system doesn't apply to what everyone seems to agree is the basis of our new society.

What scares me is that, although I can talk to a group like you and you nod your heads, I know of no scholarship being done on the issue.

## CRA Service Awards Presented at Snowbird


Pictured above (l to r), CRA's vice chair, Mary Lou Soffa (University of Pittsburgh); Roscoe Giles (Boston University), winner of CRA's 2000 Habermann Award; Juris Hartmanis (Cornell University), winner of CRA's 2000 Distinguished Service Award; and Stephen Yau (Arizona State University), chair of the selection committee for the latter award. Professors Soffa and Yau presented the awards.

Let me consider another example. One of the special things about the United States is the civilian control of the military. One pillar of that control is an 1880s-era law called *Posse Comitatis*, which essentially says that the military operates outside the U.S. borders, and law enforcement inside; the military is (almost) never used to enforce civilian law. With IT, however, the borders are not obvious. It is often not clear who has authority or what the rules of engagement are. Thus, this pillar of civilian control is not so obviously applicable. Again, I know of no scholarship being done on this.

We have incredibly important social institutions, like universities, that I think are going to be profoundly transformed by IT. I can't think of a better example of an entity that is in the "information business" than a university. Universities create information, they store it, they wholesale it, they retail it. Whenever a technology changes its core competency, either a business will change dramatically in response or it is not going to exist. What are the implications for universities?

The point of these brief examples was to emphasize the potentially profound effect of our discipline on our society, its legal system, and its institutions. Only the CS/CE community has a hope of anticipating these effects, and I believe we have a *deep* responsibility to help society think them through.

**Challenge 4: The tripartite challenges of:**

- a CS/CE mid-life crisis,
- being both a discipline and an infrastructure, and
- identity.

These may look like separate challenges, but I think they are "of a piece."

I was recently at a conference in Zurich, where the speakers were "old guys" like myself. One of them said that all of the hard problems in computer science had been solved. I disagree—we old guys and gals may have picked the low-hanging fruit, but there are new *kinds* of problems. For example, if we were to try to aggressively support humanity scholars, we would find a class of problems that no one is thinking about yet.

However, I can't think of anything else on campus, except maybe mathematics, that is both a discipline and an infrastructure. That is a real challenge! It is a challenge at the NSF/CISE, which houses both computer science and engineering research, and the supercomputer centers, in the same directorate. Is that bad? No, it just *is*. That is a challenge in universities with academic departments and computer centers. Is that bad? No, it just *is*!

I seem to frequently get involved in discussions about whether this discipline is a science, engineering, or something else. In my view, one of the *wonderful* things is that it is *both*—it has managed to embrace everything from computability theory to crafty programming, and every point between. There's a great strength in that!

Pity the fields that have split science from engineering, and flavors of science/engineering from one another! There is only one nature. There isn't a physics nature and a chemistry nature and a biology nature. Those are human constructs. If our goal is to understand nature—but we carve up the search for that understanding in such a way that people can't talk to each other because their vocabularies are different, their technologies are different, their funding agencies are different, and their cultures are different—we have built barriers to achieving the goal we started with. This is not a way to improve the understanding of nature!

I think we *are* a science, we *are* engineering, we *are* an infrastructure, we are a whole bunch of things! We are different, and we don't have a choice about that. But that difference is *wonderful*. If we model ourselves on the traditional academic disciplines, we lose something very special, very important.

NAE President Continued on Page 9

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Another student wrote:

"I knew nothing about graduate school before, and now I know more about it, so I can make a more educated decision ... It was also really good to go to another institution. I was surprised to discover that they have a lot more female CS professors at [my mentor's institution] than they do at [my institution]. That definitely gave me a different perspective on women in CS."

A final student wrote:

"The experience was very valuable to me at least in part because it helped me decide that I did indeed want to go to graduate school. I wasn't sure if I would choose industry or academia following my undergraduate degree, but now I am certain."

The study also used the survey to assess the experience of the DMP participants, and found that all of them rated their DMP experience highly. Students were pleased with their participation in the program and thought that they had gained much from it. One student wrote:

"I had an excellent experience. Very helpful and knowledgeable mentor..."

Another student wrote:

"The DMP was a wonderful experience! I met lots of great people, and learned a ton!" A final student wrote: "I kind of had the time of my life during the DMP project. I was lucky to have a very attentive mentor, I learned a lot and gain(ed) back my confidence ... I realized that this is an atmosphere and circle of bright people I'd love to work with..."

## 2000 Project

In 2000, twenty undergraduates were selected from the applicants and were matched with mentors according to technical interests. Students' home institutions this year included: Ashland University, Columbia University, Dartmouth College, Franciscan University, Hope College, Marymount College, Mills College, Polytechnic University, Purdue University, Rutgers University, Santa Clara University, Transylvania University, University of California, University of Delaware, University of Oregon, University of Pittsburgh, and University of Southern California.

The research projects include: organizing health/anatomical information to facilitate extraction of such information from pictures; simulating the behavior of intelligent agents in continuous double actions (such as the stock market); building maps of an environment using readings from robot sensors; creating visualizations of parallel and distributed systems using Java; and simultaneously debugging two different versions of a program. Detailed information about the students' projects is available on their DMP website at: *http://cra.org/Activities/craw/dmp/awards/2000.html*.

The research was carried out at a number of institutions: Brown University, Duke University, George Mason University, Georgia Institute of Technology, North Carolina State University, Polytechnic University, Rutgers University, University of Delaware, University of Georgia, University of Wisconsin, University of Utah, University of Pittsburgh, and University of Washington.

## Acknowledgments

CRA thanks the professors who have given of their time to act as mentors over the past two years: Annie Anton, Isabel Cruz, Carla Ellis, Jeanne Ferrante, Nicola Ferrier, Phyllis Frankl, Rose Gamble, Jessica Hodgins, Jana Kosecka, Eileen Kramer, Amy Greenwald, Sally McKee, Kathryn McKinley, Rebecca Parsons, Nancy Pollard, Lori Pollock, Susan Rodger, Elke Rudensteiner, Barbara Ryder, Linda Shapiro, Mary Lou Soffa, Devika Subramanian, Pearl Wang, Liz White, Paula Whitlock, and Ellen Zegura. CRA also thanks those who served on the selection committees: Anne Condon, Elizabeth Simon, Mary Lou Soffa, and Ellen Zegura.

## Additional Information

For more detailed information on the 1999 DMP student experience and the impact of the DMP, please see the LEAD center report at: *http://cra.org/Activities/craw/dmp/index.html*.

An application for the 2001 Distributed Mentor Project is available on the Web at: *http://cra.org/Activities/craw/dmp/index.html*. Or send your request to: E-mail: mentor@cra.org; Fax: 202-667-1066; or Computing Research Association, Distributed Mentor Project, 1100 17th Street, NW, Suite 507, Washington, DC 20036-4632.

For more information about the mentor program, contact: Mary Jean Harrold, College of Computing, Georgia Institute of Technology, 801 Atlantic Drive, Atlanta, GA 30332-0280 (harrold@cc.gatech.edu). ■

Broadening from Page 4

- University administrators and researchers need to make changes in hiring, review, and tenure practices to encourage faculty—especially junior faculty—to venture into areas of large-scale systems and social applications, which have been under-represented in computer science and engineering departments to date.
- Industry needs to engage in work on large-scale systems and social applications. The report suggests that end-user organizations actively seek opportunities to engage in IT research, whether through funding relevant work in universities or sitting on advisory boards to IT research labs to ensure that their needs are expressed.

## Looking Forward

Future reports from CSTB will build on several of the themes identified in *Making IT Better*. A forthcoming report on digital government, for example, will identify ways in which government agencies can work more closely with the IT research community to ensure that their specific research needs are met. Another report on the evolution of the Internet will discuss issues of scalability and robustness. An ongoing effort will also discuss system- and application-level challenges associated with networked systems of embedded computers. The recurrence of these themes in the CSTB portfolio signals their growing importance to the IT research community and to the nation as a whole. Steps need to be taken now to ensure the continued development of advanced information technologies and society's ability to effectively harness those capabilities.

*Jerry Sheehan, a Senior Program Officer at CSTB, was the study director of Making IT Better. Copies of the final report may be purchased from National Academy Press at 1-888-624-8422 or www.nap.edu. Additional project information is available online at www.cstb.org.* ■

# Transitions

**Stephen R. Bourne**, Entrepreneur in Residence at El Dorado Ventures in Menlo Park, California, is the new President of ACM, effective July 1, 2000. Dr. Bourne, who is well known for his work on the UNIX operating system, received his Ph.D. in Mathematics from Trinity College, Cambridge, England.

**Giorgio M. McBeath**, Ph.D., PE, assistant dean in the College of Engineering and Computer Science and director of the Wright STEPP program, passed away on July 9, 2000. The Wright State University Organization for Black Faculty and Staff has announced the creation of the Giorgio McBeath Memorial Scholarship Endowment Fund in his honor.

**Sidney Karin** (UC San Diego) and **Eugene Spafford** (Purdue University), both CRA board members, have been made Fellows of the AAAS.

The National Institute of Standards and Technology (NIST) has selected CRA board member **Eugene "Spaf" Spafford** of Purdue University as the winner of its annual System Security Award. He will receive the award at the opening ceremony of the National Information Systems Security Conference (NISSC). ■

NAE President from Page 8

**Summary: The challenge of *being different*!**

Everything I have said, of course, leaves us with problems. How can we be a discipline and an infrastructure? How do we form a code of ethics when we can't know what we are doing? How do we cope with an academic superstructure that has expectations of a science or engineering discipline? But these problems are also opportunities. The whole reason that I formulated this talk the way I did was to proffer an opportunity to you—the leadership of the computer science and computer engineering intellectual community.

You have a choice. You can all do your research and ignore the kinds of issues I have tried to raise. I can understand that attitude, but there are some really deep social, philosophical problems that only *you* can think about. If your approach is to ignore them, there are profound human issues that won't be considered until they come up in court, in legislation, in regulation. At that point they *will* be resolved—but probably not in the optimal way, and certainly not with your understanding.

As Kermit the Frog said, "It's not easy being green." It's not easy straddling the usual science/engineering/infrastructure academic classification. It's not easy being different, but we are! I want to urge you, the CRA, the intellectual leadership of the computing community to seize the opportunity. When 23rd century historians write about this era they will identify it as much more important than the industrial revolution. You have the knowledge base to make it the most *positive* revolution in history! ■

# CDC Seeks Assistance for New Study

The Coalition to Diversify Computing (CDC) is seeking assistance from the community for its one-year study on the use of the Access Grid for distributed graduate minority Rap Sessions.

The goal is to study the effective use of the Access Grid to unite minority graduate students in the areas of computing at geographically different institutions to form a virtual community. For one year, students nationwide will participate in Rap Sessions to discuss relevant issues, focusing on the topic of what minority graduate students aspire to do after they complete the graduate degree and why.

Each Rap Session will consist of at most four sites, thereby limiting the audience size to allow ample discussion among the participants. Participants will be asked to complete a session evaluation form to aid in the assessment of the efficiency of using the Access Grid to build virtual communities of minority graduate students in computing. There will also be a web-based survey that includes questions related to why graduate students select a particular career path. The project is supported by the NSF EOT-PACI Program, CRA, and ACM.

Individuals are needed to serve as liaisons between institutions and the project. The primary responsibilities include advertising the Rap Sessions and encouraging minority students to attend. Please provide names of volunteers to Valerie Taylor (taylor@ece.nwu.edu), co-chair of the CDC Committee. Complete details about the Access Grid project are available at: http://www.npaci.edu/Outreach/CDC/news/CDC_study_on_access_grid.htm ■

# Professional Opportunities

## *CRN* Advertising Policy

**See http://www.cra.org/main/cra.jobshow.html**

### Arizona State University
**Computer Science and Engineering Department**

We anticipate that we will have several tenure-track faculty positions open at all ranks (Assistant, Associate, Full) for the years 2001 and 2001 - 2002, and invite outstanding candidates to apply. Applicants are required to have completed a Ph.D. in computer science, computer engineering, or a closely related field by the appointment date. Applicants at the assistant professor level must show exceptional promise in research and teaching, and applicants at the associate professor level and higher must demonstrate established excellence in research and teaching appropriate to the rank. Desired areas of interest include software engineering, embedded systems, hardware/software co-design, computer networks, distributed operating systems, database and knowledge-based systems, and visualization.

ASU is a major research university widely recognized as a rapidly emerging educational institution in the US. The main campus is located in the city of Tempe, in the metropolitan Phoenix area. The Department of Computer Science and Engineering provides a stimulating and fast-growing environment or research and teaching, with ample opportunities for partnerships with high-technology industry and emphasis on quality, leading-edge graduate and undergraduate education. For more information about the department, refer to the website:

http://cse.asu.edu

Applicants must include a detailed curriculum vitae, hard copies of their most important publications, and the names and addresses of four references. Complete applications and nominations must be received by post and directed to the Chair of Faculty Search Committee, Department of Computer Science and Engineering, Arizona State University, PO Box 875406, Tempe, AZ 85287-5406. Tel: 480-965-3190. The initial closing date is November 1, 2000. Applications received after that date will be reviewed weekly until the positions are filled. Salary is competitive. Positions pending budgetary approval.

ASU is an equal opportunity, affirmative action employer.

### Auburn University
**Department of Computer Science and Software Engineering**

*Faculty Positions and Director of Institute*

The Department of Computer Science and Software Engineering invites applications for multiple tenure-track faculty positions and Director of the Institute for Reconfigurable Smart Components (IRSC). IRSC, which is a joint effort with the Department of Electrical and Computer Engineering, will focus on (1) creation of enabling technology for reconfigurable smart components, and the transfer of the technology, as appropriate, to industry; and (2) enhancement of the graduate research programs in the College of Engineering. The University will invest over $1M (estimated) in five years in new positions with an objective of gaining national prominence in the area over this time period.

Successful applicants may start in January or August 2001. Responsibilities include research, graduate student supervision, and graduate and undergraduate teaching. Applicants must have a Ph.D. in computer science, software engineering, or a closely related field. We are particularly interested in candidates with research interests related to IRSC in the areas of computer and communication networks, security, real-time and embedded systems, wearable computing, operating systems and software engineering; however, all areas of computer science and software engineering will be considered. Appointments will be made at the Assistant, Associate, or full Professor level commensurate with the candidate's qualifications.

Director of IRSC (12 month) - The successful candidate will have demonstrated excellence in leading a research effort in the information technology area and developing partnerships with government and industry. The candidate must qualify for appointment at the rank of Professor with tenure in the CSSE Department. The Director will report to the Dean of Engineering on matters related to the Institute. The Director will coordinate and manage the research effort and will provide much of the vision and direction for the Institute.

The CSSE Department currently has 13 full-time faculty members and supports strong undergraduate (B.S., B.Sw.E.) and graduate programs (M.S., M.Sw.E., Ph.D.). Faculty research areas include software engineering, computer and communication networks, human-computer interaction, wearable computing, artificial intelligence, and database systems. More information about the Department and faculty research interests can be obtained from the Department's home page (http://www.eng.auburn.edu/csse).

Auburn University was chartered in 1856, and is the largest university in the state of Alabama, with a student enrollment of over 22,000 and 1,125 faculty. Auburn is located 100 miles southwest of Atlanta and 50 miles northeast of Montgomery, the State Capitol. Auburn is ranked 38th overall and 34th in Engineering among public universities by U. S. News and World Report. Auburn offers nearly 150 baccalaureate degree programs in 64 academic departments. The graduate school provides master's level programs in 130 areas and doctoral programs in 96 fields. The College of Engineering has an enrollment of 3,100 undergraduates and 500 graduate students in 8 departments. The picturesque main campus covers 1,875 acres, and includes the entire southwest quadrant of the city of Auburn. The Auburn-Opelika community has a population of about 70,000, an excellent public school system, and has been nationally ranked as one of the "best small towns in America".

Applicants should submit a current curriculum vita, research vision, teaching philosophy and 5 references to:

Dr. John M. Owens
Chair, CSSE Search Committee
College of Engineering
108 Ramsay Hall
Auburn University, AL 36849
www.eng.auburn.edu/irsc/

The interview process will begin November 1, 2000 and continue until candidates are selected and recommended for appointment.

AA/EEOE/Women and Minorities are encouraged to apply.

### Ben-Gurion University
**Department of Computer Science**

The Department of Computer Science at the Ben-Gurion University of the Negev in Israel invites applications for tenure track positions at all levels starting Summer or Fall 2000. Candidates must have a Ph.D. in computer science or a related field and demonstrate excellence in research and teaching. Candidates in all areas of computer science will be considered.

The CS Department offers B.Sc., M.Sc., and Ph.D. degrees in Computer Science, and has 17 full-time faculty members. It is currently undergoing significant expansion, with a large increase in the number of faculty members and resources.

Faculty members enjoy a research oriented atmosphere with moderate teaching loads and are encouraged to interact with the burgeoning high-tech industry in Israel.

Applications, including resume and the name and address of at least three references (please indicate E-mail addresses) should be sent to: Dr. Shlomi Dolev, Chair, Dept. of Computer Science, Ben-Gurion University, P.O.Box 653, Beer-Sheva, 84105, ISRAEL, Email: dolev@cs.bgu.ac.il.

### Clemson University
**Department of Computer Science**

Applications are invited for multiple positions at all ranks. Applicants for lecturer positions should hold the M.S. degree in computer science and provide evidence of a strong commitment to high quality undergraduate instruction. Applicants for the tenure-track positions (Assistant or Associate Professor) should hold the Ph.D. degree in computer science or a related field by the appointment date. Appointment at the Associate Professor level additionally requires evidence of significant accomplishment in teaching, research, and external funding. Areas of research preference include (but are not limited to) database, graphics, networking, operating systems, programming languages, software engineering, and visualization.

The Department has 21 faculty members, approximately 500 undergraduate majors, and 100 graduate students, and offers B.A., B.S., M.S., and Ph.D. degrees. The department also jointly administers a Masters in fine Arts and Computing degree with emphasis in computer animation and special effects. Clemson University is the land-grant university of South Carolina and has an enrollment of approximately 17,000. Clemson, S.C. is a small college town located on beautiful Lake Hartwell at the foothills of the Blue Ridge Mountains.

Applicants should send a curriculum vita and names of three references to the Faculty Search Committee, Department of Computer Science, Clemson University, Clemson, S.C., 29634-0974. Screening will begin August 15, 2000 and continue until the positions are filled.

Clemson University is an Equal Opportunity/Affirmative Action Employer.

## DIRECTORATE FOR COMPUTER AND INFORMATION SCIENCE AND ENGINEERING
### NATIONAL SCIENCE FOUNDATION
### ARLINGTON, VA 22230

NSF's Directorate for Computer and Information Science and Engineering seeks qualified candidates for 2 leadership positions:

***Director, Division of Computer-Communications Research (EP 00-18)***. This division supports research in a broad array of areas including design automation; computer systems architecture; software engineering and languages, operating systems and compilers; theory of computing; numeric, symbolic, and geometric computation; communications; and signal processing systems.

***Director, Division of Information and Intelligent Systems (EP 00-19).*** This division supports research to improve the ability to generate, organize, locate, communicate, and store knowledge using new technologies. Fundamental research foci include universal access, human language technology, knowledge modeling, scientific collaboratories, robotics, computer vision, data mining, database access technology, human-computer interaction, and embedded intelligent systems.

Appointment to these Senior Executive Service positions may be on a career or a 2- to 3-year limited term basis, with an ES-1 ($115,811) to ES-4 ($130,200) salary range. Alternatively, the incumbent may be assigned under Intergovernmental Personnel Act provisions. Applicants must have a Ph.D. or professional experience in computer and information sciences and engineering, substantial research administrative experience, and demonstrated leadership ability.

The announcements, including position requirements and application procedures, are located on NSF's Homepage at www.nsf.gov/home/chart/work.htm. Applicants may also obtain a copy of the announcements by contacting the Executive Personnel and Development Branch on (703) 292-8755 (hearing impaired individuals may call TDD (703) 292-8044). Applications must be received by September 29, 2000.

NSF is an Equal Opportunity Employer.

### CUNY Graduate Center
***Ph.D. Program in Computer Science***
***Professor***

CUNY Graduate Center seeks Professor with outstanding record or Associate Professor with great promise. Program is looking for individual who has had major impact in the field, is active in preferably more than one area, has a consistent grant record, and some of whose work is applied. A distinguished candidate of substantial merit with an international reputation may be nominated as Distinguished Professor.

Primary responsibilities include teaching doctoral-level students, research, departmental service, and supervision of dissertations. Requires: earned doctorate; record of significant (for Associate) or exceptional (for full) academic achievement; demonstrated ability to teach graduate students successfully.

Review of applications begins 10/31/00. Send letter of application, curriculum vitae, and names and addresses of three references to: Search Committee Chair, Ph.D. Program in Computer Science, CUNY Graduate Center, 365 Fifth Avenue, New York, NY 10016. EO/AA/IRCA/ADA Employer.

### Florida Atlantic University
**Department of Computer Science and Engineering**

The Department seeks applications for tenure-track faculty positions at the Assistant Professor level and for instructor positions. Applicants must hold a graduate degree in computer science, computer engineering, or a closely related field. Tenure-track assistant professor positions require a doctorate Applicants must show evidence of teaching ability and research potential. Instructors must hold a Master's degree and should have experience in high-tech industry and/or academe. Appointments will begin January or August 2001. Review of applications will begin October 2, 2000 and continue until the positions are filled. Salary, fringe benefits, and teaching load are competitive.

The Department has several well-equipped laboratories. It interacts closely with many high-tech companies in the area. We have an active research program, with both federal and industrial sponsors. For more information, browse to http://www.cse.fau.edu.

Applicants should send a cover letter specifying teaching and research interests, a resume, and the names, phone numbers, and email addresses of three professional references, to Faculty Search Committee, Department of Computer Science and Engineering, Florida Atlantic University, 777 West Glades Road, Boca Raton, Florida 33431. Address email to searchcomm@cse.fau.edu.

Florida Atlantic University is an equal opportunity/access/affirmative action institution.

### Georgia State University
**Department of Computer Science**

The Department of Computer Science of Georgia State University invites applications for anticipated tenure-track positions starting Spring and/or Fall, 2001, semester in the fields of computer architecture, software engineering, networks, graphics, and systems programming.

Specialties of particular interest include: Optical networks, high speed access devices, content processing, internet multimedia communications, modeling and simulation of opto-electronic devices and systems, modeling and simulation of mixed-signal ICs and boards, methodology for embedded software development of a middle layer for embedded software, development of an auto-coding environment for embedded software, and the design and fabrication of prototype products. The anticipated positions are part of a strategic initiative, Project Yamacraw, by the State of Georgia to make the state a global leader in the electronic design of high bandwidth communications.

Earned Ph.D. in Computer Science, or a closely related discipline, and a commitment to excellence in teaching and research in computer science are required with preference for extramural funding. Departmental computing facilities for research and instruction include a departmental network of PCs, UNIX workstations, and a 24-processor Origin 2000 high-performance computer and five laboratories, one with ATM switches for network research and another for hypermedia and visualization research. The departmental computing facilities are supported by two full-time systems programmers.

Applicants should send a letter of application, curriculum vitae without birthdate, but with citizenship status, and three letters of reference and transcripts of all graduate and undergraduate work to : Chair, Department of Computer Science, Georgia State University, University Plaza, Atlanta, GA 30303-3083 (or e-mail to: mfraser@ cs.gsu.edu). Applications will be accepted until positions are filled.

Georgia State University is an EEO/AA institution.

### Kansas State University
**Department of Computing and Information Sciences**

*Faculty Position*

The Department of Computing and Information Sciences at Kansas State University invites applications for multiple tenure-track positions beginning in Spring and Fall 2001. Applicants should have a PhD degree in computer science by the starting date of the appointment; salary will be commensurate with qualifications. Applicants must be committed to both teaching and research. Primary consideration will be given to computer scientists who work in data/knowledge base systems, programming languages, distributed and parallel systems and software engineering. Applications must include descriptions of teaching and research interests along with copies of representative publications. Non-U.S. citizens must include visa status.

The department has a faculty of seventeen and offers BS, MS, MSE, and PhD degrees. Computing facilities center around a network of UNIX-and Solaris-based single-and multiprocessor Sun workstations, X-terminals, and PCs. Details can be found at the URL http://www.cis.ksu.edu/

Please send applications to Dr. Virgil Wallentine, Head, Department of Computing and Information Sciences, 234 Nichols Hall, Kansas State University, Manhattan, KS 66506 (email: virg@cis.ksu.edu). Review of applications will commence September 15 and continue until the positions are filled.

Kansas State University is an Affirmative Action Equal Opportunity Employer.

### Old Dominion University
**Computer Science Department**

The Department of Computer Science invites applications for tenure track position(s) beginning Fall 2000 or Spring 2001. Rank is open. Areas of particular interest include high performance computing and communication, mobile computing, 3-D visualization, and networking. Exceptional candidates from other areas are also encouraged to apply.

Minimal qualifications include a Ph.D. in Computer Science or a related field augmented by research in computer science. Appointment at the Assistant Professor level requires potential for success in teaching, research and securing external funding. Appointment at the Associate Professor level requires several years of university teaching experience and a substantial record in research and external funding. Appointment at the Professor level requires international stature based on achievement in research and external funding.

The department awards the BS, MS and PhD. degree. We provide a collegial environment that encourages and supports collaboration between faculty members.

Collaborative opportunities exist across departments and colleges, as well as with other institutions in the area. The Eastern Virginia Medical School, NASA Langley Research Center, Thomas Jefferson National Laboratory, and Virginia Modeling, Analysis and Simulation Center are within easy driving distance from campus. The department has extensive computational facilities, including access to a 32-processor Sun Starfire HPC 10000 for on campus parallel computing. The department currently has funded initiatives to develop high performance solvers on Teraflop Parallel Computers (an ASCI level-2 grant from DOE) and for delivering our degree program using modern instructional technology.

To apply, send a curriculum vitae and the names, addresses and telephone numbers of three references to: Larry Wilson, Chair Recruiting Committee, Department of Computer Science, Old Dominion University, Norfolk, VA 23529-0162 Fax (757) 683-4900.

Review of applications will begin July 3rd, 2000 and continue until the opening(s) are closed. Old Dominion University is an Affirmative Action/Equal Opportunity Employer and requires compliance with the Immigration Reform and Control Act of 1986.

### Oregon State University
**Department of Computer Science**

Are you interested in joining a group of highly productive faculty who work well together? We are in a period of significant growth, and we invite applicants for one or more tenure-track faculty positions at any professorial rank. Appointments will begin September 2001. Candidates must hold or be completing a Ph.D. in computer science or a closely related field. Applicants for an assistant professor position should have records that demonstrate clear promise for innovative research and quality teaching. Applicants for associate and full professor positions must have sufficient experience to qualify for promotion at the indicated level according to university guidelines. Qualifications for associate professor or professor include a demonstrated record of accomplishment in teaching and research, significant refereed publications, and potential for contributions at the appointed level.

We desire candidates whose research complements our existing research strengths and are excited by a collaborative work environment. We particularly seek candidates in the areas of bio-informatics, geographical information systems, networking, and software engineering.

Oregon's reputation for livability is well deserved. Corvallis residents can enjoy all the benefits of small town life and still have easy access to everything from big-city culture to wilderness recreation.

To apply, send a complete resume, a statement of research interests, and at least three sealed letters of recommendation (email is acceptable) to Faculty Search Committee, Dept. of Computer Science, Oregon State U., 102 Dearborn Hall, Corvallis, OR 97331-3202. Phone: 541-737-3273. Email: jobs@cs.orst.edu Web: WWW.cs.orst.edu.

The application deadline is October 25, 2000. OSU has an institution-wide commitment to diversity and multiculturalism; it provides a welcoming atmosphere with unique professional opportunities for leaders who are women and/or people of color. Oregon State University is an Affirmative Action/Equal Opportunity Employer and has a policy of being responsive to the needs of dual-career couples.

### Rhodes College
**Department of Mathematics and Computer Science**

*Tenure-track position in Computer Science*

Rhodes College's Department of Mathematics and Computer Science seeks applications for a tenure-track position in computer science, the appointment starting August 2001. A Ph.D. in computer science or closely related area is required. Rank and salary will be commensurate with credentials and experience. Dedication to and excellence in undergraduate teaching is essential. The teaching load is 5 courses per year, ranging from introductory to advanced courses. Scholarship and student advising are also expected.

Rhodes College is building a solid Computer Science Program to provide majors with strong preparation for graduate study or careers in computer-related fields, and offer an appealing array of courses for non-majors. The College seeks applicants who have the interest and the ability to revise and expand existing computer science curriculum to create a vibrant and active program. The College is committed to supporting the development of the Computer Science Program and the expansion of student opportunities.

Founded in 1848, Rhodes College is a highly competitive, four-year, coeducational college of liberal arts and sciences located in Memphis, TN.

Rhodes has been related to the Presbyterian Church USA since 1855. The College has a student body of approximately 1500 and full-time faculty of 120; the average class size is 17 students. Computer facilities include Mac and PC labs, a Departmental Computer lab (seven Sun Ultra workstations), and numerous smart classrooms. For more information, see the Department's web page at http://www.mathcs.rhodes.edu.

Send application, vitae, and three letters of recommendation to Kennan Shelton, Chair, Mathematics and Computer Science Department, Rhodes College, 2000 N. Parkway, Memphis, TN 38112. Review of applications will begin October 15, 2000 and continue until the position is filled. Rhodes is an equal opportunity employer.

### Southeast Missouri State University
**Computer Science Department**

Applications are invited for one or more anticipated tenure track positions at all academic ranks starting August 2001. The department offers a B.S. in Computer Science and a B.S. in Applied Computer Science. There are well over 250 majors in the degree options. The department is working toward CSAB accreditation. A Ph.D. in Computer Science or closely related field is preferred. Postdoctoral experience is a plus. Candidates with a Ph.D. in another areas must have CS-related training, teaching, or research experience. ABD applicants are encouraged to apply. Retired individuals from both academia and industry are welcome. Instructor and adjunct positions for applicants with a master's degree or equivalent industrial experience are also available. There is no preference for the area of specialization in Computer Science, but the successful candidate must be able to teach the core subjects in the Computer Science curriculum. Excellent communication skills are required. The candidates with a Ph.D. must provide evidence of potential for continued scholarly activity.

Southeast Missouri State University is a regional comprehensive university located in Cape Girardeau, Missouri. The university has approximately 8,000 students and serves a region that extends from St. Louis to the Arkansas border and west to the foothills of the Ozarks. Cape Girardeau is the major commercial and services center between St. Louis and Memphis. The area has a warm climate, recreational opportunities, low taxes, and moderate housing costs. Further information about the university may be found at http://www.semo.edu .

Information about the region may be found at http://www.showme.net .

Submit a vita with the names of at least three references, unofficial transcripts, and a brief description of teaching and research experience and interests to: Dr. Anthony Duben, Chairman, Department of Computer Science, Mail Stop 5950, Southeast Missouri State University, One University Plaza, Cape Girardeau MO 63701-4799. Review of applicants will begin 2 October 2000 and continue until positions are filled. AA/M-F/EOE

Anthony J. Duben
Professor and Chairman
Computer Science Dept., MS 5950
Southeast Missouri State University
1 University Plaza
Cape Girardeau MO 63701-4799
phone: 573-651-2194
fax: 573-651-2791
e-mail: ajduben@semovm.semo.edu
or c867buc@semovm.semo.edu

### University of Illinois at Urbana-Champaign
**Department of Computer Science**

The Department of Computer Science, UIUC, anticipates one or more full-time tenured and/or tenure-track appointments. To be considered for a tenured position, applicant must have recognized national and international stature. Applicants are sought in all areas, with special emphasis on theory and software systems (security, networking and protocols, real-time and embedded systems, software engineering, HCI/graphics, and mobile and wearable systems), bioinformatics and e-commerce.

Computer Science at Illinois is a broad-based collaborative discipline with strong collaborative relations with the National Center for Supercomputing Applications (NCSA) and the Beckman Institute for Advanced Science and Technology. The department is embarked on an aggressive growth campaign that will site over 60 faculty in the new Thomas M. Siebel Center for Computer Science, the anchor of a new IT quadrangle on the University of Illinois campus. Further information about the department is available at http://www.cs.uiuc.edu.

Successful candidates will be expected to initiate and conduct independent research and to perform academic duties associated with our BS, MS, and Ph.D. programs. Qualifications: Ph.D. in Computer Science or a closely related field (or imminent completion of degree), outstanding academic credentials, an ability to teach effectively at both the graduate and undergraduate levels. The salary is open, based on qualifications. Starting date: August 21, 2001. To ensure full consideration, applications must be received by February 15, 200l. Interviews may take place during the application period, but a final decision will not be reached until ad closing.

Candidates should send a curriculum vita and statement of career objectives, and have at least three letters of reference sent to:

Barbara Armstrong
RE: Faculty Search
Department of Computer Science
1304 W. Springfield Avenue
Urbana, IL 61801
The UIUC is an AA-EOE.

### University at Stony Brook
**Department of Computer Science**

*Lecturer in Computer Science*

http://www.cs.sunysb.edu

Applications are invited for the position of Lecturer beginning August 2000 or January 2001. Lecturer candidates must hold a graduate degree in computer science or closely related field, should have a strong commitment to excellence in teaching, and must have experience teaching computer science at the university level.

Industrial Coordinator/Liaison for Computer Science Applications are invited for a position of Research Assistant Professor, beginning at or after August 2000, with primary responsibilities for increasing interaction between the Stony Brook computer science and local industry under the Strategic Partnership for Innovative Research (SPIR).

Candidates should hold a Ph.D in computer science or closely related field, and have a commitment to excellence in teaching and research at the university level.

Applicants for either position must send a curriculum vita and the names of three references electronically to skiena@cs.sunysb.edu or by mail to Prof. Steven Skiena, Instructor Search Committee, Department of Computer Science, State University of New York, Stony Brook, NY 11794-4400, (631)-632-9026. We will review applications as they arrive, and will continue to consider applicants until the positions are filled. Compensation is competitive and depends on experience and qualifications. The University at Stony Brook is an EEO/AA employer.

### University of Alabama at Huntsville
**Department of Electrical and Computer Engineering**

The Department of Electrical and Computer Engineering of the University of Alabama in Huntsville invites applications for three tenure-track positions at all levels. The starting date can be as early as the Spring of 2001. Specific areas of interests are computer engineering, photonics/optics, and wireless communications/signal processing. Applicants should have a Ph.D. in electrical, computer, or optical engineering and have demonstrated potential for excellence in both instruction and research. The Department offers programs leading to bachelors, masters and doctoral degrees. For a more detailed description of the University of Alabama in Huntsville and the Electrical and Computer Engineering Department, please visit us at http://www.ece.uah.edu. For information about Huntsville, visit http://www.ci.huntsville.al.us. Resumes with the names, addresses, and telephone numbers of three references should be mailed to Reza Adhami, Professor and Chair, Electrical and Computer Engineering Department, The University of Alabama in Huntsville, Huntsville, Alabama 35899. Review of applications will begin by September 2000 and will continue until all positions are filled.

UAH is an Equal Opportunity/Affirmative Action Employer

### The University of Arizona
**Department of Computer Science**

http://www.cs.arizona.edu

Applications are invited for tenure-track faculty positions at all ranks, beginning employment August, 2001. Candidates must hold a doctorate in computer science or related field, have a commitment to excellence in teaching, and a demonstrated strong potential for excellence in research.

Primary consideration will be given to computer scientists who work in systems software, networks, computational biology and graphics.

The Department of Computer Science at The University of Arizona has a long history of research accomplishment, influential software distribution and substantial external funding to individual faculty, exceeding 2.5 million dollars last year. Major funding has included three NSF infrastructure grants, providing a broad array of equipment for computing research. Research areas include programming languages, compilers, operating systems, networks, algorithm design, database systems, and computational biology.

Applicants must send a curriculum vitae and the names of at least three references to:

Faculty Recruiting Committee
Department of Computer Science
The University of Arizona
PO BOX 210077
Tucson, AZ 85721-0077.

We will start the review of applications on October 15, 2000, and will continue to consider applicants until the positions are filled, subject to availability of funds.

The University of Arizona is an EEO/AA employer - M/W/D/V.

### University of California, Irvine
**Department of Information and Computer Science**

www.ics.uci.edu

The Department of Information and Computer Science (ICS) has several tenured or tenure-track positions open in the following areas of research emphases:

A. Computer Graphics
B. Human-computer interaction, computer-supported cooperative work
C. Computer Security or Cryptography
D. Software Engineering
E. Bioinformatics or Medical Informatics
F. Information Infrastructure

Available positions are for an associate or assistant professor in computer graphics and assistant professor positions in other areas, but exceptional candidates from all ranks will be considered. In all cases, we are looking for applicants with a Ph. D. degree in Computer Science or a related field, and strong research credentials as evidenced by scholarly publications.

*(continued)*

# Professional Opportunities

Jobs from Page 11

Applicants for senior positions must also demonstrate a proven track record in funded research activities.

The ICS Department is organized as an independent campus unit reporting to the Executive Vice Chancellor. It runs the second most popular major at UCI and has designed an undergraduate honors program that attracts the campus' most qualified students. External funding from government and industrial sponsors exceeded $10 million last year. The Department currently has 38 full-time faculty and 250 Ph.D. students involved in various research areas including computer science theory, embedded computer systems, artificial intelligence, networks and distributed systems, databases, multimedia systems, computer systems design, software/software engineering, human-computer interaction and computer-supported cooperative work. ICS faculty are involved in the forefront of research in the emerging areas of the computer science discipline such as multimedia/embedded computing, knowledge-discovery in databases, bioinformatics and the role of information in computer science and society. The faculty has effective interdisciplinary ties to colleagues in digital arts, biology, cognitive science, engineering, management, medicine, and the social sciences.

Although UCI is a young university, it has attained remarkable stature in the past 3 decades. Two Nobel prizes were recently awarded to UCI faculty.

UCI is located three miles from the Pacific Ocean near Newport Beach, approximately forty miles south of Los Angeles. The climate is ideal year-round avoiding extreme temperatures in winters and summers. Irvine is consistently ranked among the safest cities in the U.S. and has an exceptional public school system. The campus is surrounded by high-technology companies that participate in an active affiliates program.

Both the campus and the area offer exciting professional and cultural opportunities. Mortgage and housing assistance are available including newly built, for-sale housing located on campus and within short walking distance from the department.

Applicants should send a cover letter indicating which of the areas above [A-F] best fits their research, a CV, three sample papers and contact information for three or four references to recruit@ics.uci.edu (PDF, postscript, Word, or ASCII). Applicants are requested to ask their references to send letters of evaluation to recruit@ics.uci.edu by January 12, 2001. Those that insist upon sending hard copy may send it to:

ICS Faculty Position [A-F]
c/o Peggy Munhall
Department of Information and Computer Science
University of California, Irvine
Irvine, CA 92697-3425

Application screening will begin immediately upon receipt of curriculum vitae. Maximum consideration will be given to applications received by January 5, 2001. The University of California is an Equal Opportunity Employer, committed to excellence through diversity.

## University of California at San Diego

### Department of Computer Science and Engineering

*Tenured or Tenure-track Positions*

The Department of Computer Science and Engineering has multiple tenured or tenure-track faculty positions open for Fall, 2001. We invite applications at all levels in all areas of computer science and computer engineering. Areas we are interested in include computational molecular biology and bioinformatics, Internet technologies, distributed systems and networks, databases, software engineering, artificial intelligence and machine learning, computer graphics and visualization, security, computer architecture, algorithms, data-intensive computing, programming languages and compilers, VLSI design & testing, and CAD. However, excellent candidates in all areas will be seriously considered.

The department is looking for applicants with outstanding research credentials. Successful applicants are expected to lead a vigorous research program and to have a strong commitment to teaching.

The department is in a period of exciting growth and has attracted extraordinary faculty in the past few years. It has strong research programs in computer science and computer engineering as well as a strong interdisciplinary research program in computational biology and bioinformatics. It has close research ties to the San Diego Supercomputer Center and the Center for Wireless Communications. For more information, please consult our web page http://www-cse.ucsd.edu.

*We encourage the candidates to send applications as soon as possible. Faculty applications received by January 15, 2001, will be given full consideration.*

A Ph.D. in computer science or a related area is preferred for all tenured or tenure-track positions. Salary and rank will be commensurate with qualifications in conformance with University of California policies.

We strongly encourage the electronic submission of the application material through our web site. Please follow the instructions on our web page at http://www-cse.ucsd.edu/recruitment for electronic submissions. If you do not have web access, please send a letter of interest (cover letter), curriculum vitae including research interests and plans, the names and email addresses of at least four references to the Recruiting Chair (recruit@cs.ucsd.edu), and cite the position reference number 3-757-C.

Recruiting Chair; Dept of Computer Science and Engineering-0114
University of California, San Diego; La Jolla, CA 92093-0114

UCSD is an Equal Opportunity/Affirmative Action Employer; women and minority applicants, veterans and persons with disabilities are encouraged to apply.

## University of Houston-Downtown

### Computer & Mathematical Sciences Department

*Description*: Two Tenure Track Positions at the rank of Assistant Professor

*Requirements:* Ph.D in Computer Science. Commitment to excellence in teaching and scholarship. Postmark deadline for applications November 1, 2000.

Search reopened at 30-day intervals until position filled. Starting date: August 2001. The University of Houston-Downtown is primarily an undergraduate, open admission institution. Please send a statement of interest, curriculum vita, transcripts, and three letters of recommendation to: Chairman, CS Search Committee, CMS Department, University of Houston-Downtown, One Main Street, Houston, TX 77002. Email: CMS@DT.UH.EDU

Salary is competitive and commensurate with experience.

The University of Houston-Downtown is an Equal Opportunity/Affirmative Action Employer.

## University of Maryland, College Park

### Center for Bioinformatics and Computational Biology

The University of Maryland invites faculty applications at all levels for the newly established Center for Bioinformatics and Computational Biology. The campus has substantial resources committed to the Center, including funds for the recruitment of six new faculty with research interests in focused areas of computational genomics such as functional genomics and proteomics. It is anticipated that the primary backgrounds of the new faculty will span computer science, mathematics and statistics, molecular biology, and biochemistry. The primary responsibility of the new faculty will be to lead a focused, nationally visible research program in computational genomics. All the new faculty will be housed in the University of Maryland Institute for Advanced Computer Studies (UMIACS) and will have access to significant high-end computing infrastructure. The new faculty will also be affiliated with at least one of the academic units on campus depending on their interests, with the potential of pursuing research collaborations with nearby outstanding research groups in organizations such as NIH, Celera, TIGR, UMBI, and the Smithsonian. To apply, send a letter of application, curriculum vitae and a list of suggested names and addresses for letters of recommendation to:

Dr. Joseph JaJa, Chair of Search Committee
Center for Bioinformatics and Computational Biology
Institute for Advanced Computer Studies
University of Maryland
College Park, MD 20742

For more information, please contact Dr. Joseph Jaja at 301-405-6722 or joseph@umiacs.umd.edu.

The University of Maryland is an affirmative action, equal opportunity employer. Women and minorities are encouraged to apply. Applications will be accepted until the positions are filled.

## The University of Montana

### Department of Computer Science

We invite applications for a tenure track position in computer science at the Assistant Professor level beginning January or September, 2001.

A Ph.D. in Computer Science or a closely related field is required. Candidates must have an interest in undergraduate and graduate computer science education as well as an interest in research. The successful candidate would be appointed to one of two possible career paths: a research track with expectations based on a traditional mix of teaching, research, and service; and a teaching track with heavier teaching and advising expectations, and reduced (but not eliminated) research expectations.

Please see our web page for further details and application procedures: www.cs.umt.edu

## University of Nebraska—Lincoln

### Computer Science and Engineering Department

The UNL CSE Department invites applications for several tenure-track faculty appointments at assistant, associate, or full professor rank to begin January or August 2001. Applicants should have promise for innovative research and teaching and have a PhD in computer science, computer engineering, or related field.

The CSE Department offers both computer science and computer engineering programs leading to BS, MS, and PhD degrees and has 20 tenured or tenure-track faculty, about 600 undergraduates and 100 graduate students. UNL is Nebraska's comprehensive research university with Carnegie I standing and membership in the American Association of Universities. UNL recently received the second largest gift in its history to establish the JD Edwards Honors Program in Computer Science and Management. In conjunction with this program, the Department has several new named professorships.

Review of applications begins October 1, 2000, and will continue until all positions are filled. A resume, statement of research and teaching interests, and a list of at least three references who will not be contacted prior to applicant consent should be sent to:

Rich Sincovec, CSE Chair
Computer Science and Engineering Department
University of Nebraska – Lincoln
Lincoln, Nebraska 68588-0115

See www.cse.unl.edu; email: search@cse.unl.edu; phone 402.472.2401; fax 402.472.7767. The University of Nebraska is committed to a pluralistic campus community through AA/EO, is responsive to dual career couples, and makes reasonable ADA accommodations.

## University Of North Texas

### Department of Computer Sciences

The Department of Computer Sciences at the University of North Texas invites applications and nominations for the Chair position starting Fall 2001. A Ph.D. in Computer Science or a related field, a strong commitment to excellence in undergraduate and graduate teaching, well-established research program, successful grant activities, as well as leadership skills are required.

Candidates for this position must be qualified for an appointment as a Full Professor. Prior administrative experience is preferred. Candidates are expected to develop a long term relationship with the area industries and bring visibility to the department both internally and externally.

With over 800 regular faculty and over 26,000 students,one-third graduate students, UNT is one of the largest state-supported universities in Texas.

Located 40 miles north of the Dallas-Fort Worth metroplex and surrounded by high-tech industries, Denton combines a small town atmosphere with the advantages of a major metropolitan area.

Opportunities for consulting and joint research with industry are excellent.

The department currently consists of 16 faculty, and offers BS/MS/PhD programs to approximately 800 undergraduate majors and 150 graduate students. Current faculty research interests include algorithms, architecture, artificial intelligence, data compression, databases, distributed computing, graph theory, neural networks, high-speed networking, scientific computing, simulation, and VLSI.

Persons interested should submit a curriculum vitae including the names addresses, telephone numbers and e-mail addresses of at least five references, to:

Chair Search Committee
Department of Computer Sciences
University of North Texas
P.O. Box 311366
Denton, TX 76203-1366
Tel: (940) 565-2767
FAX: (940) 565-2799

For E-mail inquiry, please contact search@cs.unt.edu

Screening of applications will start immediately and will continue until the search is complete.

UNT is an Affirmative Action/Equal Opportunity Employer and encourages applications/nominations from women and members of minority groups.

## The University of San Francisco

### Department of Computer Science

The Department of Computer Science at The University of San Francisco (USF) invites applications for a tenure-track position at the Assistant Professor level, to begin Fall 2001.

Further details on the position are available online at http://www.cs.usfca.edu/job.html. USF is an AAEOE.

## The University of Texas at Dallas

### Department of Computer Science

*Tenure – Track Positions*

The Computer Science Department of the University of Texas at Dallas invites applications for tenure-track faculty positions in software engineering at all levels, starting January 2001.

Candidates for tenure-track positions must have a Ph.D. degree in Computer Science or equivalent and expertise in the areas of Software Engineering, Embedded Systems. Candidates for junior positions should show strong potential for excellent teaching and research; candidates for senior positions should have a strong record of research, teaching and external funding.

The Computer Science Department offers the Ph.D. degree in Computer Science and has Master's degree in CS with major in Software Engineering as well as tracks in Telecommunications, and traditional computer science. We have experienced very rapid growth in enrollment in recent years. The University is located in the most attractive suburbs of the Dallas metropolitan area. There are over 250 high-tech companies within 10 miles of the campus, including Texas Instruments, Nortel Networks, Alcatel, Ericsson, Hewlett-Packard, Nokia, Fujitsu, MCI, EDS and Perot Systems. Almost all the country's leading telecommunication's companies have major research and development facilities in our neighborhood. Opportunities for joint university-industry research projects and consulting are excellent.

One of our major initiatives in software engineering is the Embedded Software Center (ESC), an innovative industrial/academic collaborative center investigating sophisticated tools and techniques to increase dramatically the productivity and quality of embedded systems. ESC is pioneering the IAPEX (Infrastructure for Advanced Programming for Embedded Computer Systems) environment to facilitate software reuse. Active research areas include COTS aware requirements engineering; design for independent composition and evaluation; automated code synthesis; transformation, and composition; automated testing; aspect-oriented quality analysis; and automated embedded framework technology.

In addition to individual faculty workstations, the department has six computer/research laboratories, equipped with around 200 high performance workstations and high-end PC's. The academic Computer Center supports both UNIX based workstations and PCs as well as high-speed-dial-in access to campus facilities.

Currently the Computer Science Department has thirty four tenured/tenure-track faculty and eight senior lecturers. The potential for growth is excellent. For more information contact Dr.Simeon Ntafos. Chair of the Search Committee, at 972-883-2809 or 972-883-2808; send e-mail to ntafos@utdallas.edu , or view the Internet Web Page at http://www.utdallas.edu/dept/cs .The search committee will begin evaluating applications on October 1, 2000 and will continue until the positions are filled.

Applicants should mail their *curriculum vitae* with a list of at least five academic or professional references as as soon as possible to: Academic Search #744, The University of Texas at Dallas, P.O. Box 830688, M/S AD 23, Richardson, TX 75083-0688. Indication of sex and ethnicity for Affirmative Action statistical purposes is requested but not required. Applications will be accepted until the position is filled; screening will begin immediately.

The University of Texas at Dallas is an Equal Opportunity/Affirmative Action Employer and strongly encourages applications from candidates who would enhance the diversity of the University's faculty and administration.

## Winona State University, Winona, MN

### Computer Science Department

The Computer Science Department at Winona State University has initiated a Masters of Science in Software Technology. This applied program is directed to the working IT professional. Applications are invited for an Associate/Full Professor of Computer Science based at the Rochester, MN Campus starting Spring (January) 2001 or Fall (August) 2001.

Responsibilities include a leading role in the development of this new program, liaison to local industry, and teaching upper division and graduate courses. Qualifications include a Ph.D. in Computer Science or closely related field, teaching experience, industrial employment or significant interaction with industry, and a specialization in computer networks, database management systems, or software engineering.

For a complete job description, see the Affirmative Action Office Home Page: http://www.winona.msus.edu/AffirmativeAction, e-mail our office: affaction@vax2.winona.msus.edu or call (507) 457-5639. Open until filled; review of applications begins October 15, 2000. Position available pending budgetary approval. AA/EOE.