Loose Change

NEWSLETTER of the COMPUTER SCIENCE DEPARTMENT (formerly COINS) at the UNIVERSITY OF MASSACHUSETTS, AMHERST

Fall 1998

Countdown
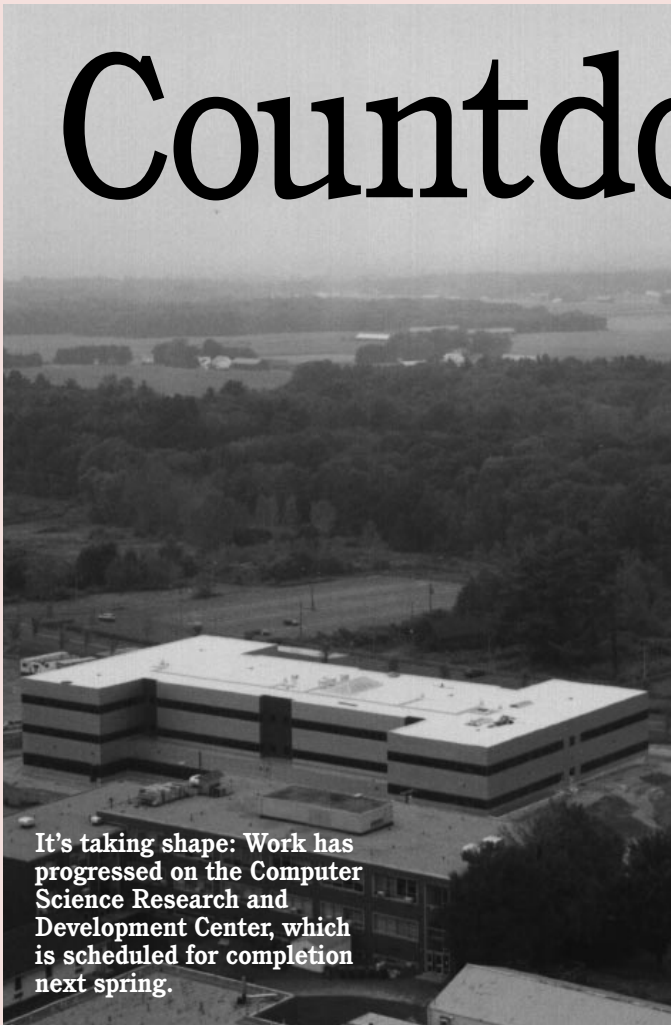
It's taking shape: Work has progressed on the Computer Science Research and Development Center, which is scheduled for completion next spring.

Department prepares for new quarters

With construction of the Computer Science Department's new Computer Science Research and Development Center nearing completion, the Department can look forward to taking occupancy in the late spring of 1999.

The three-floor, 78,000-square-foot building was developed collaboratively with architects and Computer Science Department staff to provide a superior educational and research environment with the optimal use of space.

Hugs and handshakes

Bryant York, '82, honored for service to the underrepresented

"It required a tremendous amount of assistance over several years to produce just one African American computer scientist. It worked because, at each stage, I was inspired by great people who took the time to speak with me, and I was welcomed into a community where I had a chance to participate and contribute."

So said Bryant York upon receiving the A. Nico Haberman Award from the Computing Research Association, an academic and industry group of computer scientists. The award is given for outstanding contribution to aiding members of underrepresented groups within the computing research community. York was presented the award on July 27, 1998.

York, a professor at Northeastern University's College of

Looking forward, with optimism

It's with great optimism that I've started my term as Department Chair. There are indeed many reasons to be optimistic.

This past year, we added four new faculty members to our ranks. Our faculty, students, and alumni were again honored in many ways for their accomplishments — several of the professional society fellowships, best paper awards, teaching accolades, and other major recognitions we received this past year are noted in this issue.

Our new building is nearing completion, with an anticipated move-in date of late spring of 1999. With the University's commitment to add faculty to our ranks, we see continued growth in the future; we're searching again this year to add one or two additional new faculty.

This optimism is tempered, however, by the realization that we face many challenges in moving forward. It is difficult to attract and retain top graduate students, staff, and faculty — there are simply too many opportunities in academia and industry and too few top people to fill those positions. We are seeing increased student demand for our existing courses (particularly at the undergraduate level) as well as increased demand from nonmajors needing a strong grounding in "information technology." We've been a leader on campus and beyond in educational technology, but we are still learning how to adapt our pedagogy to effectively use these new tools and materials.

Our Department also faces unique challenges. We're working to establish even closer interactions with private industry. We're also working toward interacting more effectively with our alumni. Finally, we're working to put the effects of the little-growth-in-resources period of the late '80s/early '90s fully behind us. New hires, continued investment by the University, continued successes in our research efforts, and hard work by many people are all helping to accomplish these goals.

So I am very much looking forward to the next three years as a time when the Department can grow and can continue to accomplish many good things. The job sometimes does seem rather daunting, but I'm fortunate to have both previous Chairs, Rick Adrion and Dave Stemple, in the environment as mentors. And, of course, our faculty have always been a very supportive lot. So I know there will be many resources to draw on as we move ahead. It would also be great to hear your thoughts, comments, and suggestions throughout the coming year.

—*Jim Kurose*
(kurose@cs.umass.edu)

Department names Chair

A faculty member in the Department since 1984, Jim Kurose assumes the post as Chair of the Department this autumn.

Kurose (**www.cs.umass.edu/ ~kurose**) leads the Computer Research Networks Group together with his longtime collaborator Professor Don Towsley. His research interests include real-time and multimedia communication, network and operating system support for servers, and modeling and performance evaluation.

Kurose, who holds a B.A. in physics from Wesleyan University and his M.S. and Ph.D. degrees in computer science from Columbia University, was named Chair in the spring of 1997, almost immediately before he and his family departed for a year in Sophia Antipolis, France. There, he was a visiting scientist at INRIA Sophia Antipolis — working with a group on distributed interactive Internet applications — and Eurécom, a new multidisciplinary facility with an international faculty and student body offering a "blend of academic, industrial, and international experiences," according to its Web site (**www.eurecom.fr**).

For his part, Kurose is approaching his new job as an administrative complement to his research and scholarship with characteristic enthusiasm and energy.

"The Department made a decision to move to a rotating Chair position, so we're moving away from career-track appointments," he explains. "For me, the reason I took this job now is that there are a lot of new resources coming into the Department — resources that will let me make a positive difference. There are changes going on that will make this job fun and challenging." (*See Kurose's "From the Chair" column at left.*)

Kurose takes over from outgoing Chair David Stemple, who officially became Professor Emeritus this October after 18 years in the Department. "The Department is indeed fortunate to have as pleasant and charming a person as Jim agree to serve as Chair; never mind that he is also brilliant," Stemple writes. "I am absolutely sure that Jim is bringing to this job the same dedication, intelligence, and creativity that he has demonstrated so notably in his research and teaching."

Manmatha, Fagg named research assistant professors

Raghavan Manmatha and Andrew H. Fagg have been appointed this fall as research assistant professors.

Manmatha (**www.cs.umass. edu/~manmatha**) works with the Multimedia Indexing and Retrieval group at the Center for Intelligent Information Retrieval on projects that evaluate images computationally.

Fagg (**www.cs.umass.edu/ ~fagg**) is affiliated with the Adaptive NetWorks Laboratory and the Laboratory for

Profiles of Manmatha and Fagg will appear in the next issue of **Loose Change.**

Perceptual Robotics; he also is the manager of the Interactive Intelligence Super-Lab.

Two named to tenure-track faculty

• *James Allan*

When it came time to find new faculty, the Department put the call out through major advertisements, its Web site, and other venues. Ironically, after all that effort, one of the two new professors was recruited from right down the hall.

James Allan (**www.cs.umass.edu/ ~allan**), who has been a research assistant professor for two years and was a postdoctoral researcher in the Department for two years before that, begins this fall as a tenure-track assistant professor.

An assistant director of the Center for Intelligent Information Retrieval (CIIR), Allan is enthusiastic about continuing his work with the Department. "We've been building up a good research program and organization," Allan says. "In my case, my connection with the Department has been strong, and I hope that [in awarding this position] they see the potential for future excellence."

Allan, who received his Ph.D. in 1995 from Cornell University's Department of Computer Science, has focused his research in four primary areas: automatic information organization, the underlying technology behind Web search engines; topic detection and tracking (TDT), emerging technology for categorizing and searching audio news stories; interactive information retrieval and organization, or how people interact with their systems to retrieve and interpret information; and multimodal retrieval, combining text and image queries and results in a meaningful fashion.

Allan now assumes some new challenges and responsibilities in the tenure-track position, including a shift from his research-only focus to more teaching responsibilities for undergraduate courses. Allan teaches CMPSCI 445 this fall, a course that presents the fundamental principles governing the operation and use of database management systems and the techniques involved in their implementation.

Allan also plays a critical role in the Department's participation in the National Science Foundation's Research Experience for Undergraduates (REU) program, grant funding that provides the resources to involve undergraduates from the Five

James Allan

Prashant Shenoy
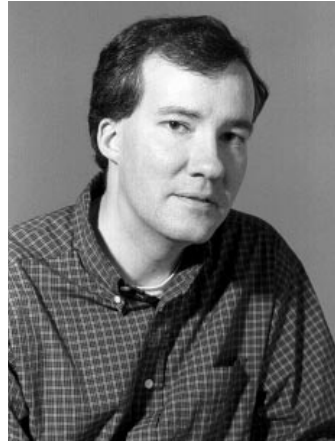
Colleges and beyond in aspects of research. Allan characterizes the program as "a difficult and time-consuming commitment," but one that yields hands-on research experience of value to its participants. "Two of the six [undergraduates working with us] this year told us point-blank that this experience got them their jobs," he points out.

"We're thrilled to have James continuing with us now as a tenure-track faculty member," Department Chair Jim Kurose says, noting the national reputation of CIIR's research and praising Allan's contributions toward that end. Allan's faculty colleagues at CIIR include Director W. Bruce Croft, Assistant Director Jamie Callan, and Raghavan Manmatha.

• *Prashant Shenoy*

Prashant Shenoy, who received his doctoral degree from the University of Texas at Austin, specializes in operating systems, with an emphasis on multimedia — the use of sounds and images in computers and on the Internet. Shenoy was drawn to multimedia, he said, "because it's a technology that's just emerging, and which poses very challenging issues."

"The demands that multimedia place on computer systems are a very difficult problem to solve," Shenoy continues. A major issue is speed: audio and visual clips tend to travel over the Internet slowly, creating information bottlenecks that result in awkward, stop-and-start sequences.

During his graduate studies, Shenoy (**www.cs.umass.edu/ ~shenoy**) was awarded the MCD Graduate Fellowship and con-

ducted research at AT&T Bell Laboratories (now Lucent Technologies) and Microsoft Research. He earned his undergraduate degree at the Indian Institute of Technology in Bombay, where he received the Institute Silver Medal for being the top-ranking graduating student in his class. Shenoy has numerous professional publications' and holds a patent on multimedia technology.

"My decision to come to UMass was based on the fact that there is not only a strong computer science department here, but also a very well-respected research group in networking," he said. "I'm looking forward to working collaboratively with my colleagues."

Shenoy's expertise is in identifying and evaluating multimedia-related problems in exist-

ing systems, as well as designing new systems that will be able to handle the enormous amounts of data needed to move and use multimedia files. His dissertation centered on finding ways of storing and retrieving multimedia files.

Shenoy is teaching a graduate seminar this semester on advanced topics in multimedia systems and hopes to teach undergraduates in semesters to come. He is developing a new hands-on, experimentally oriented multimedia systems laboratory as part of that course. One of Shenoy's major interests is in finding ways to apply his research to the hot new area of distance learning: "I'd like to use my research to enhance teaching, perhaps to digitize lectures and put them on the Web."
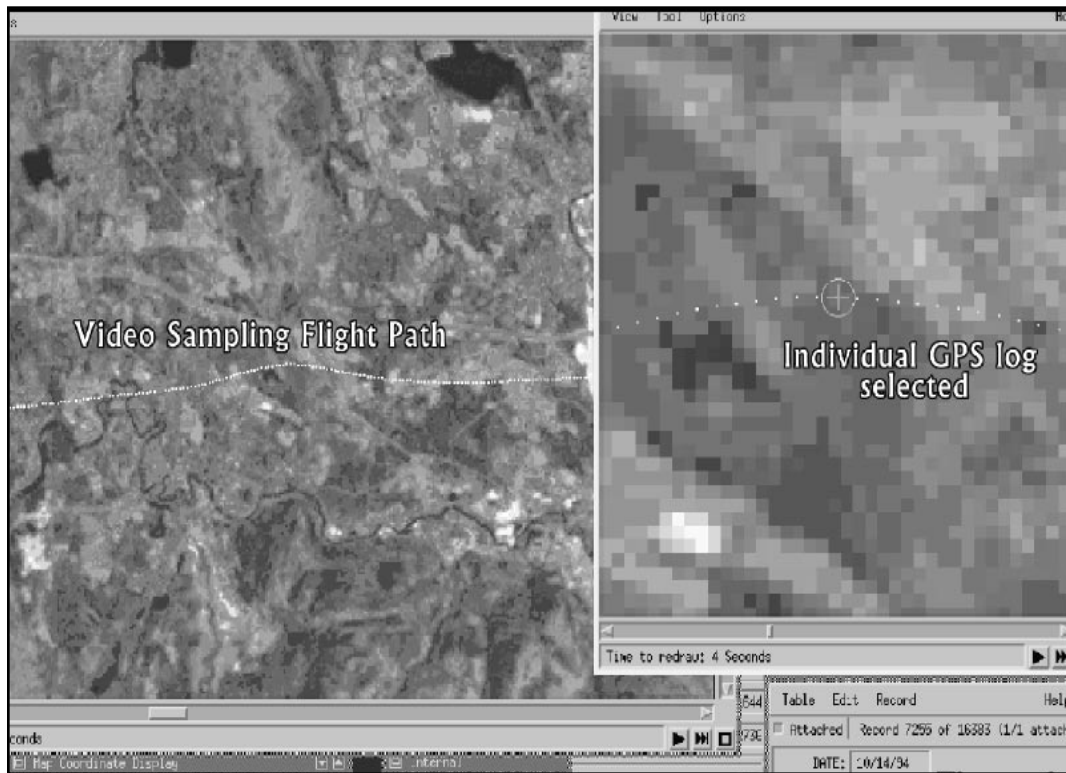
The Vision Lab is beginning a National Science Foundation–funded collaborative project with other Department groups and the UMass Forestry Department. The project works to map sizable tracts of the Northeast, storing vast quantities of visual data, and efficiently extract terrain features from large databases of high-resolution aerial image data.

Cooperative multitasking

CMPSCI researchers and groups, bucking academic trends, work together on interdisciplinary research

The UMass Computer Science Department has a long-standing tradition of collaboration with other departments, other colleges and universities, and private industry, in ways that are unusual in academia.

Ed Riseman, who joined the Department in 1969, says it has pretty much always been like that. A year after Riseman joined the department, he recalls, then-Chair Michael Arbib brought in faculty specializing in neuroscience and cognitive science, extending the reach of computer science and the vision of the Department. Subsequent recruitment has broadened the Department's scope by hiring faculty whose research interests include hardware and networking.

Over the 30 years that have followed, collaborative efforts within the Department have consistently mounted for two reasons.

• *Industry has increasingly been finding uses for computer software and hardware in its products.* In a time when General Motors puts as many CPU cycles in its cars in a year as Dell puts in its Pentiums, the applications of computer science are now being employed in practically all aspects of life and business. Invitations and overtures for computer scientists to work with industry and government have steadily increased over the years.

• *Computer Science research has progressively developed, matured, and branched out, touching more and more areas of other disciplines.* This research can be applied to a variety of topics, from storing and retrieving growing collections of data to interpreting image content to measuring and predicting network performance to understanding the nature of intelligence and the origins of human behavior.

The collaborative process

These two pathways converge on one conclusion: a department with diverse research interests that historically has collaborated openly on research and applications is doing so more than ever.

At its most basic level, a research group starts working on a problem and draws on the expertise of other groups to solve components of an ambitious project that can benefit from their respective specialties. Members of the Vision group, codirected by Riseman and Al Hanson, for example, draw on research and direction from faculty members like Kathryn McKinley, who possess the specialized knowledge of how a machine can best store and process vast amounts of visual data.

Research groups combine and jointly create interdisciplinary research projects. The Self-Adaptation For Extensibility and Reliability (SAFER) project, for example, which looks at software engineering aspects of robotic control systems, combines the forces of eight faculty members spanning multiple research groups. Spearheaded by Lee Osterweil and Lori Clarke, the group joins faculty who individually specialize in software engineering, vision, robotics, and operating systems.

Communication is obviously central to the success of this collaborative approach. Rod Grupen notes that the principal investigators (PIs) of the research groups pull together faculty and students periodically — in some cases, as often as once a week — to share research and

> **C**ollaboration is pretty much the only way to do the serious, serious work to be done in artificial intelligence.
> —Paul Cohen

contribute ideas and direction to each other's work. In the case of Grupen's research, which also includes researchers from the Psychology Department, the Computer Science faculty work with the psychologists twice a month.

"It's antithetical to traditions in academic laboratories," Grupen says. "But we make the synergies happen as often as possible. This uniform access to research also keeps us from redoing or undoing others' work."

To do so can be challenging. "You're forced to deal with issues and learn everyone else's language and underlying assumptions," Grupen says. "You get twenty people in a room, and they're so disparate in their traditions and technologies."

"Collaboration is pretty much the only way to do the serious, serious work to be done in artificial intelligence," Paul Cohen says. The professor describes a project that straddles departmental lines and the nature of the researchers in the Experimental Knowledge Systems Laboratory (EKSL). "This group is unique in the world and is absolutely world class on the psychology and computer science sides."

Cohen and his colleagues work in an inherently multidisciplinary field of computer science research that gets at the heart of how a system learns, whether it be a robot or a human being — and that calls for shared research.

"There's the potential for remarkable synergy, and there is some productive collaboration going on now. Collaboration is rare, and [the Department] is one of the only places to do it well," Cohen says.

Cohen's group also collaborates with Psychology Department researchers. He describes the project as almost a happy accident, with the right people converging at the right time.

> **W***e make the synergies happen as often as possible. This uniform access to research also keeps us from redoing or undoing others' work.*
> —ROD GRUPEN

Campus projects

As technology diffuses into society, it's not surprising that the rest of the UMass Amherst campus draws upon the support of the Department for projects. Several years ago, the Center for Computer-Based Instructional Technology (CCBIT) group produced Web-based support for the Chemistry Department and multimedia training for the W.E.B. Du Bois Library. Today, a similar collaboration is occurring with the Center for Intelligent Information Retrieval (CIIR). The Peabody Project, says CIIR codirector Jamie Callan, involves the group, the Du Bois Library, and a professor in the Education Department at Westfield State College in creating a Web-search interface designed to help K–12 students find information on the Internet, and eventually to help teach the students information literacy skills. The work is funded by the NSF's Electronic Information Literacy for Educational Environments program.

Complex finance

How does the unusual nature of the academic collaboration affect funding sources of that research?

Ed Riseman fires off the funding sources of the Vision group's latest forestry mapping project like so many bullets. His latest project received funding from the National Science Foundation's CISE Challenges Program — mostly. "They said that if the research was interdisciplinary and supported other departments, we'd have to go out and find separate funding for the forestry side," Riseman says — and they did. Five sources in all make the funding and administration a complex component of the project.

> **A***gencies in general, and the National Science Foundation in particular, want to see multidisciplinary activities.*
> —DON TOWSLEY

Don Towsley offers yet a different perspective. "Agencies in general, and the National Science Foundation in particular, want to see multidisciplinary activities," says the professor, who is codirector of the Networks research group. "The focus is increasingly on large-scale problems that don't fall into one discipline." His own concentration on network performance — research that is part of DARPA's Next Generation Internet program — involves rigorous statistical studies of lost or delayed packets, collaborative research with colleagues from the UMass Mathematics Department, AT&T Research, and Lawrence Berkeley National Laboratory in California. Towsley and his Networks colleague, Department Chair Jim Kurose, also join other participating scientists from three other universities, two industry research labs, and private industry on a National Science Foundation–related research project, Simulations of Integrated Computer Systems.

CIIR's heavy emphasis on collaboration with private industry is primarily a function of the group's funding mechanism. The CIIR, says codirector Jamie Callan, is one of NSF's State/Industry/University Collaborative Research Centers (S/I/UCRC). "The Center is funded jointly by NSF, the Commonwealth of Massachusetts, and industrial members. The Center is required, by its sponsors, and especially by NSF, to focus on both leading-edge research *and* technology transfer."

Although technology transfer began as a required activity, it has evolved into a very useful "reality check" for University research, as well as a rich source of new problems for study, Callan explains. "Access to 'real world' resources and requirements ensures that our researchers study the right problems, which increases the impact of our research results."

Effect on hiring

The Computer Science Department's research style has what might be called a snowball effect: when recruiting faculty, the Department seeks academics with like minds who are open to free exchange of ideas and research.

"We don't want to hire a faculty member who will go off and work by himself," Riseman says. "When our Department hires, we [judge applicants] not only on whether they're strong researchers and good teachers, but who they collaborate with and how."

To be a member of CMPSCI and not be a good collaborator, Riseman says, is "simply a lost opportunity." ◆

Susan Landau
A look at national cryptography policy

"I care a lot about making science accessible," says Research Associate Professor Susan Landau. Her new book, coauthored with Whitfield Diffie, *Privacy on the Line: The Politics of Wiretapping and Encryption,* published this past February by MIT Press, goes a long way toward making a complex area of computer science comprehensible to a nonspecialized audience.

Privacy on the Line explores the policy of cryptography — in the most basic of terms, the action of scrambling sensitive information into a form that keeps it unavailable to those who shouldn't have access to it.

Landau's coauthor, Whitfield Diffie, is a distinguished engineer at Sun Microsystems who coinvented public-key cryptography in 1975.

Government intervention in privacy and issues of encryption came to a head in the early 1990s when the government issued a plan that would adopt a new federal standard for encryption — the "clipper chip" — which would guarantee the government the ability to perform digital versions of wiretapping. The surrounding issues provide a backdrop for the scholars to examine cryptography in the contexts of public policy, national security, law enforcement, protection of privacy, wiretapping, and the implications of privacy in a society that increasingly relies on communicating through channels that at various intervals hop into the public airwaves.

The book is being used as text for some college courses on cybermedia and the law, and the authors have written and provided commentary in a number of media appearances. "The book was also cited on the floor of Congress even before it appeared," Landau says.

In writing from separate coasts, each author drew on unique geographic resources. Landau credits the government document librarians on campus with helping provide information that benefited the chapter on wiretapping, and as the nearer of the two to Washington, she also was responsible for interviewing a number of the figures involved in national cryptography policy.

Landau (**www.cs.umass.edu/ ~landau**) received her B.A. in mathematics from Princeton University, her M.S. from Cornell University, and her Ph.D. from MIT. She is teaching CMP-SCI 791M, "Cryptography and Network Security," with a focus that's similar to what's in *Privacy on the Line.* "I will talk about policy issues, for example, but I will also talk about social implications as I discuss such technical work as anonymous digital cash," Landau says.

Landau also wrote a report in 1994 for the Association for Computing Machinery (ACM) on crypto policy ("Codes, Keys, and Conflicts: Issues in US Cryptography Policy"). The ACM report was the effort of a committee that included Diffie. She is also scheduled to speak at the ACM Computer and Communication Security meeting in November, and she will be giving an invited talk at the USENIX Security Meeting next summer.

Susan Landau and Whitfield Diffie's conscientious analysis of the debate — they admit up front that they see "no simple solution to this conflict" — have been rewarded with brisk sales: more than 5,000 hardcover copies of the book have been sold, and the book is in its second printing.

Rich Sutton and Andy Barto
Writing the book on reinforcement learning

In their new textbook, *Reinforcement Learning: An Introduction* (MIT Press, 1998), Rich Sutton and Andy Barto describe a turning point in their research more than ten years ago. "This was simply the idea of a learning system that wants something, that adapts its behavior to maximize a special signal from its environment. This was the idea of a 'hedonistic' learning system, or, as we would say now, the idea of reinforcement learning."

In a nutshell, reinforcement learning, a branch of computer science based on the work of Harry Klopf, is "about learning from interaction how to behave to achieve a goal," the authors explain. Last year, Barto (**www.cs.umass.edu/~barto**), the director of the Adaptive NetWorks Laboratory, collaborated with Sutton, now a researcher at AT&T Shannon Laboratory in New Jersey (and soon to be an adjunct faculty member in the Department), to produce what is the first textbook of its kind. The result is *Reinforcement Learning,* which explores some of the terrain where psychology, neuroscience, engineering, and computer science intersect.

For Barto, their first book was more difficult than anticipated. "I have written long, detailed technical papers, and my first view of the book was an expanded version of one of these. It certainly didn't turn out that way, fortunately. We tried to make this technical subject accessible to a fairly wide range of researchers in various disciplines. It was an ordeal, but well worth it, in my opinion."

That accessibility has generated rave reviews from colleagues worldwide as the field itself has deepened. An early text of the book can be found at **www-anw.cs.umass.edu/~rich/book/ the-book.html**.

Krithi Ramamritham
A collection of knowledge on deadline scheduling

Professor Krithi Ramamritham (**www.cs.umass.edu/~krithi**) is one of four authors of *Deadline Scheduling for Real-Time Systems: EDF and Related Algorithms*, a book published in September by Kluwer Academic Publishers.

The book is a volume in the Kluwer International Series in Engineering and Computer Science.

The publisher says: "*Deadline Scheduling for Real-Time Systems: EDF and Related Algorithms* aims at collecting a significant body of knowledge on EDF scheduling for real-time systems, but it does not try to be all-inclusive (the literature is too extensive). The book primarily presents the algorithms and associated analysis, but guidelines, rules, and implementation considerations are also discussed, especially for the more complicated situations where mathematical analysis is difficult."

Krithi's three collaborators are Marco Spuri (Merloni Elettrodomestici Spa, Fabriano, Italy), Giorgio C. Buttazo (Scuola Superiore S. Anna, Pisa, Italy), and John A. Stankovic (University of Virginia, Charlottesville, Virginia). Stankovic was a CMPSCI faculty member prior to his appointment to Chair of the University of Virginia's Department of Computer Science.

Chip Weems
Introductory text is nationwide best-seller

An introductory programming text by Professor Chip Weems (**www.cs.umass.edu/~weems**), *Programming and Problem Solving with C++,* has been ranked first in the nation in sales of college computer science texts. Sales of the textbook, coauthored with professors Nell Dale, University of Texas-Austin, and Mark R. Headington, University of Wisconsin-Lacrosse, were tracked by publisher Jones and Bartlett.

The author of eight previous textbooks, Weems has taught in the Department since 1982. He received his B.S. and M.S. degrees from Oregon State University and his doctoral degree from the Department.

The publisher notes that the book "provides an accessible introduction to C++ and object-oriented programming for beginning students. [...] The straightforward, disciplined programming style is highly appropriate for introductory-level students."

A renewed interest

Weems notes that increased sales of the textbook reflect a renewed interest in computer science.

"When we first started, everybody wanted to be in computer science, and the textbook market was very large. Then people saw that they could operate computers with basic business applications, and enrollment in computer science and the textbook market fell quite dramatically," he said. "Now with the popularity of the Web, computer science enrollment is up, as is the textbook market."

Weems noted also that "there's been a shift in interest in programming languages. In the 1980s, it used to be everybody taught Pascal. Now, some teach C, C++, Java, or Ada.

Object-oriented programming languages are gaining popularity because they have caught on in industry in the last three or four years, although they have been around in academia for over twenty years."

And while object-oriented programming often results in the types of graphical user interfaces that can be simple to use, "In some ways, object-oriented

> **T**he challenge at the introductory level is to try to rein in complexity so the beginning student isn't overwhelmed.
>
> —CHIP WEEMS

languages are more difficult to teach because they require more engineering skills," says Weems. "You have to create a well-defined object for it to really work. Some languages have huge libraries that go with them, so you have to dig deep to find out what the objects do and how they fit in with the application you are developing.

"The challenge at the introductory level is to try to rein in that complexity so the beginning student isn't overwhelmed," Weems explains. "You have to pick a few objects that are essential and simplify the model so the student can learn the fundamentals of programming rather than memorize all the objects in the libraries. The challenge is to condense a huge mass of information to the essentials so the student doesn't get caught up in the complexity."

The textbook includes problem-solving case studies at the end of each chapter that offer examples drawing from science, engineering, and business. For more information about the book, visit **www.jbpub.com/catalog**.

Croft named to national advisory board

Professor **W. Bruce Croft** (**www.cs.umass.edu/~croft**) was recently named to the Computer Science and Telecommunications Board (CSTB) of the National Academy of Sciences. The CSTB was established in 1986 to provide independent advice to the federal government on technical and public policy issues relating to computing and communications.

CSTB generates and oversees a number of projects, the majority of which are requested by federal government agencies and Congress. Professor Croft noted recently that at any one time, there are about 20 CSTB projects in various stages of development. Some recent examples of reports are "Trust in Cyberspace," "Fostering Research on the Economic and Social Impacts of Information Technology," and "For the Record: Protecting Electronic Health Information."

"I have agreed to take part in the 'Digital Government' project in addition to being on the
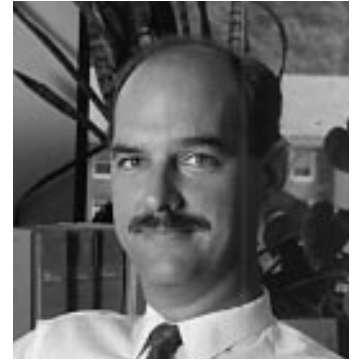
W. Bruce Croft

CSTB," Professor Croft notes.

Croft adds that at the last CSTB meeting, the board spent a "considerable amount of time" discussing the interim report of the President's Information Technology Advisory Committee (PITAC) with various government and funding agency people. "This report is likely to influence future research funding for computer science, so I recommend looking at it," he says.

The report can be found at **www.cra.org/Policy/pitac.html**.

Department sponsors Distinguished Lecture Series

The Department once again is sponsoring and hosting its Distinguished Lecture Series, which brings some of the nation's top researchers in computer science to speak on campus in Amherst.

• November 4, 1998: Scott Shenker, Xerox PARC: "Computer Networks, Congestion Control, and Game Theory." (Host: Don Towsley.)

• November 18, 1998: Hector Garcia Molina, Stanford: "The WHIPS Data Warehousing Project." (Host: W. Bruce Croft.)

• December 9, 1998: Guy Steele, distinguished engineer, Sun Microsystems: "Growing the Java Programming Lan-

guage." (Host: Kathryn McKinley.)

• February 17, 1999: Rod Brooks, MIT: "Child development and Social Interaction as a Model for Humanoid Robots." (Host: Rod Grupen.)

In a related event, Douglas Hofstadter of Indiana State University will speak on February 3, 1999. Cosponsored with the Music Department, his lecture, "Does Beautiful Music Spring from Life and Emotions, or Is It Basically a Collection of Syntactic Tricks?" will take place at 7:30 p.m. at the Bezanson Recital Hall.

Visit **www.cs.umass.edu** for confirmation and locations.

Moss receives major IBM grant

Funds automatic storage management research

Associate Professor Eliot Moss received an award of $120,000 from IBM during an August 25th visit to campus by approximately 25 representatives of the company.

Moss received one of 50 "University Partnership Awards" given annually by IBM to researchers who have demonstrated common professional interests with those of IBM researchers. About one third of project applicants receive the awards.

The award is worth $40,000 for one year and is renewable up to two more years, although it must be applied for and awarded each subsequent year. The majority of the funds will go toward graduate student support in Moss's research on automatic storage management.

"The award is significant in that it is competitive, and the selection criteria include both the quality of the work and its relevance to IBM's long- and short-term goals," Moss says.

Moss describes his research on automatic storage management as "memory recycling" within the running memory of a software program. As a program operates, its internal memory stores information that is necessary at a particular point along the way, but which might be immaterial later on.

Eliot Moss, right, receives an IBM grant from Vivtek Sarkar of IBM's T. J. Watson Research Laboratory. The company is funding research for its Java programming language effort.

The danger in the past, Moss says, is that computer programmers could erase or overwrite a piece of information from the program, leaving it unable to be retrieved. Equally troubling, he says, is saving every single piece of data used along the way, thereby overloading the work done by the program and decreasing storage capacity.

"You can make mistakes in both directions," he says.

The automatic storage management system would allocate space in the memory of the running computer program, reusing bits of storage space previously allocated but no longer needed by the program.

IBM, Moss says, has funded the grant to investigate space reclamation systems, sometimes known as "garbage collectors," for its Java software program. The award will help fund one or two graduate research assistants a year, Moss says.

Moss was presented his award by Vivtek Sarkar of IBM's T. J. Watson Research Laboratory of Hawthorne, New York, during a visit that was intended to explore the potential of a strategic partnership between the company and the University. The IBM representatives also visited other departments during their daylong visit.

—*Campus Chronicle*

Top undergrads named Bay State Fellows

This fall, three students from the Department — Alex Lowry, Kirk Macolini, and Tim Sliski — entered the Bay State Fellows Program, a scholarship for students who demonstrate superior talent.

In the spring of 1998, the Department offered a tuition-free program of study, accompanied by an assistantship, to any undergraduate computer science major at the University of Massachusetts, Amherst, who completes the program with an overall grade point average of at least 3.50.

In recognition of their academic achievements, participants are designated Bay State Fellows by the Department. Fellows may participate in the program for up to 18 months (three semesters).

RESEARCH CENTER (from page 1)

When completed, the facility will be home to about 40 faculty, 160 graduate students, and 50 or 60 staff members, according to Steve Cook, the director of the Computer Science Computing Facility, who drew preliminary plans for the building.

"We will have one new fifty-four-student multimedia classroom, and another supporting approximately twenty-five students," says Cook. "This facility will have state-of-the-art wiring and power to handle the significant computing demands of the department."

The department will also continue to use some of its existing space in the Lederle Graduate Research Center Lowrise for education labs and some research activities.

The concept for the Engineering and Computer Science Research Center received state approval in 1992, beginning a four-year ride through University and state government bureaucracies. Funding received final legislative approval in the spring of 1997. The contract for construction of the new facility was awarded to Suffolk Building Corporation of Boston.

A virtual tour and live view of the building are available on the department's Web site (**www.cs.umass.edu**). A live "Web cam," along with the software, computer, and connections to keep it running, was set up by a group of Computer Science and Math Department professors aided by staff from the Computer Science Computing Facility.

The new facility is expected to be of great benefit to the University as well as the region's software and computer industry by attracting new students, enabling expanded research, and turning out many new highly trained graduates into the workforce.

ALUMNI NEWS

BRYANT YORK..................(from page 1)

Computer Science, received his Ph.D. from the Department in 1982. Among the more than 100 people he thanked in a heartfelt speech were UMass professors Al Hanson, Robbie Moll, Rick Adrion, and "especially Ed Riseman for welcoming me into the UMass community."

York, who grew up in a housing project near Boston during the 1950s, acknowledged formative figures in his life. These included his early school teachers, one of whom "forced my homeroom teacher to address me with the same respect afforded the other students. I was no longer the N-word, but twelve-year-old Mr. York."

York's ten-minute speech charted his path through the Boston Latin school, studies at Massachusetts Institute of Technology, his graduate studies in the Department (then COINS), and then his research career at IBM, DEC, the National Science Foundation, and Northeastern.

York summarized his experiences in a heartfelt image. "I have shaken hands with and/or hugged every person mentioned above. [...] That collection of handshakes and hugs has been captured right here in the palm of my hand by a technology invented several millennia ago. That same technology has allowed me to pass along your accumulated gifts over the last forty-five years, and hopefully I can continue to do so into the next millennium."

York's speech can be found at **www.ccs.neu.edu/home/york/speech.html**.

Alumni association forms

A group of alumni and faculty have begun to organize the UMass Computer Science Department Alumni Association. Approximately 30 alumni, along with professors Andy Barto, Lori Clarke, Al Hanson, Barbara Lerner, Robbie Moll, Lee Osterweil, David Stemple, and Jack Wileden, attended the Association's inaugural meeting, held May 7.

Some of the ideas discussed at the initial meeting included:

• Developing more effective electronic links among alumni, including providing each alum a department e-mail address, at least for forwarding purposes;

• Creating an alumni directory of services and a consulting directory — an idea proposed by the sizable consulting contingent at the meeting;

• Creating a project class that would take on real-world problems encountered by alums in industry;

• Developing a mechanism for linking alums with the upcoming crop of department graduates.

Follow-up

Approximately 30 alumni, faculty, students, and staff attended a follow-up meeting on October 17. Following a tour of the Department's new Research and Development Center, Moll said, "Professors Jim Kurose and Kathryn McKinley and staffer Dave Hart talked about distance learning and computerized instruction efforts going on in the department."

A lively alumni panel on working in the software industry, with presentations by Chip Groder (Cadence Design), John Leonard (Lucent), and Elaine Haney (Switchboard, Inc.), followed.

"One conclusion: the Department's software engineering courses, and in particular CMPSCI 320, were by far the most useful courses taken by alumni," Moll noted.

Anyone interested in helping organize the association should contact Moll (**moll@cs.umass.edu**) or visit the CMPSCI alumni web site at: **www.cs.umass.edu/csinfo/alumni.**

Thanks for your support

The following alumni and friends have actively supported the Computer Science Department since August 1997. Such financial support is greatly appreciated and helps maintain a world-class instructional and research program. Contributions of alumni and friends help to fund important special activities that are not supported through the state budget.

Those interested in helping the Department should send a check made out to the University of Massachusetts to the Alumni Office, Memorial Hall, Box 35410, University of Massachusetts, Amherst, MA 01003-5410. Please state that your gift is *restricted to Computer Science.*

August 1, 1997
Mr. Roger I. Nasr — 1976
Mrs. Colleen Beaudin Kettle — 1984
Ms. Kathelle E. Di Bella — 1992
Mr. John K. Devadoss — 1994
Eugenio & Laura Acevedo
Joseph & Carol Calabresi
Jeffrey & Lisa Boone, 1986, 1987
MATCHING GIFT
Hewlett–Packard Co., matched to Miss Carole C. Russell — 1980
Johnson & Johnson, matched to Steven & Deborah Vaughan
Dictaphone Corporation, matched to Richard S. Colon — 1979

October 1, 1997
Dr. Edmund H. Durfee — 1987
Miss Elicia M. Harrell — 1982
MATCHING GIFT
Hewlett–Packard Co. Matched to Eric & Stephani Slutz

November 1, 1997
Ms. Christina M. Rothwell — 1994
Miss Martha A. Tripp — 1977
Maury Falkoff & Luanne Hendricks — 1982, 1984

December 1, 1997
Ms. Jane R. Soukup — 1976
Mr. Laurence M. Rubin — 1985
Mr. David L. Boudreau — 1976
MATCHING GIFT
Intel Corporation matched to Miss Elicia M. Harrell — 1982

January 1, 1998
Seth & Rebecca Rosenberg — 1977, 1979
Mr. Richard A. Bergeron
John & Cheryl Volpe
Donald & Cheryl Lagor
William and Ruth Mendonsa
William & Gay Craig
Denis & Diane Burt
MATCHING GIFT
Boston Foundation, Inc., matched to Mr. Sidney Topol — 1947
Raytheon Co., matched to Mrs. Nancy W. Wasiuk — 1979

February 1, 1998
Mr. Dana A. Owens — 1974
Steven & Deborah Vaughan
MATCHING GIFT
Cramer–Levin & Company, donor Charles & Elaine Cramer
Anonymous

March 1, 1998
Lewis & Lorane Whitcomb — 1948, 1949
Ronald & Juli-Ann Stachelek
Eric & Amy Ludlam — 1993, 1993
Mr. R. D. Marcus — 1971
Ms. Shirah Y. Zidel — 1991
MATCHING GIFT
Scientific Atlanta, Inc., matched to Boston Foundation, Inc.
Scientific Atlanta, Inc., matched to Mr. Sidney Topol — 1947

April 1, 1998
Ranjith & Pushpik Wijesinghe
Robert & Kathy Baldin
Mr. Saul R. Marcus — 1977
Ms. Barbara F. Bazemore — 1982
Mr. Samir K. Kar — 1977
Miss Lesley A. Cederlund — 1985
Mr. Richard L. Housel — 1980
Mr. John A. Gaitenby — 1979
Ms. Kathleen E. Di Bella — 1992
Robert & Miriam Winterbottom

May 1, 1998
F. Hardy & Carol Moore
Mr. Russell W. Potter — 1994
Mr. Richard A. Bergeron
Mrs. Mary C. Brown — 1985
Mr. Thomas P. Healy — 1984
David & Barbara Routhier — 1980, 1976
John & Cheryl Volpe
Mr. Joseph J. Cohen — 1980
Prof. Charles C. Weems, Jr. — 1984
Mr. Douglas R. Ely — 1989
Mr. Mark J. Cariddi — 1980

October 1, 1998
Joseph Kwong

DEPARTMENT NOTEBOOK

Faculty news

Professor Rick Adrion (adrion@cs.umass.edu) was elected chair of the American Association for the Advancement of Science (AAAS) Information, Computing, and Communication (T) Section. The nonprofit professional society is dedicated to the advancement of scientific and technological excellence across all disciplines, and to the public's understanding of science and technology. AAAS, founded in 1848, is among the oldest societies in America, having been started in Philadelphia. The 24 sections correspond to fields of interest among AAAS members, ranging from the physical, biological, and health sciences to the social, economic, and applied sciences.

Tom Murray (tmurray@cs.umass.edu) has been active this year in the international Intelligent Tutoring Systems research community. Murray was guest editor of a recent two-volume issue of the *International Journal of AI in Education* focusing on authoring tools for intelligent tutoring systems. Murray has been asked to give presentations on the state of the art in ITS authoring tools at the ASCILITE conference in Sydney in December and at the AI and Education conference in Le Mans in July. He also recently co-lead several workshops, including "ITS Authoring Tools" at the AAAI fall symposium, "Interoperability and Reusability" at the AI and Education conference in Kobe, Japan, and (with Mia Stern) "Web-based Intelligent Tutors" at the International ITS conference in San Antonio.

Murray is currently working half time in Hampshire College's Cognitive Science Department as Visiting Professor of Instructional Technology. Recent publications have appeared in *Journal of Instructional Science, Journal of the Learning Sciences, International Journal of AI in Education,* and the *Journal of Interactive Media in Education.*

This past summer, **Shlomo Zilberstein** received the Best Paper Prize for the 1998 European Conference on AI, held in Brighton, England. The paper, coauthored with his French colleague A. Mouaddib, was entitled "Optimal Scheduling of Dynamic Progressive Processing" (http://anytime.cs.umass.edu/~shlomo/papers/ecai98.html).

Welcome to **Jingan Yang,** visiting professor in the Vision group.

As of October 1, former Department Chair **David Stemple** officially became Professor Emeritus.

Student news

CMPSCI graduate student **Chi-Jen Lu** received one of two Best Student Paper awards at the twenty-fifth International Colloquium on Automata, Languages, and Programming in Aalborg, Denmark, in July. ICALP is the single leading European conference in theoretical computer science. Lu's paper on "Improved Pseudo-random Generators for Combinatorial Rectangles" (www.cs.umass.edu/~cjlu/paper.html) won the best student paper award for algorithmics. Lu's thesis advisor is Professor **Dave Barrington**. Lu also presented a solely authored paper this summer at the COCOON '98 conference in Taiwan.

Warren Greiff, a graduate

Clarke, Osterweil named ACM Fellows

Two Department faculty members have been elected as Fellows of the Association for Computing Machinery (ACM). The ACM Fellows Program recognizes and honors "outstanding ACM members for their achievements in computer science and information technology and for their significant contributions to the mission of the ACM."

Clarke

Professor **Lori A. Clarke** was honored for "outstanding research in software engineering, particularly in the areas of software testing and analysis, and for dedicated service to the software engineering community." Clarke joined the UMass faculty after receiving her Ph.D. from the University of Colorado at Boulder.

A codirector of the Laboratory for Advanced Software Engineering Research (LASER), and a recipient of a UMass Faculty Fellowship Award, Clarke's research interests include analysis of concurrent software, object management, and interoperability of software tools.

Osterweil

LASER codirector Professor **Leon Osterweil** was honored for "fundamental contributions in software engineering, particularly in testing and analysis, environments and process, and leadership in the computer science community." Osterweil's research interests include process modeling and process programs, analysis of software systems, and software architecture. "This a well-deserved recognition of these two outstanding scientists," Department Chair **Jim Kurose** noted. "They represent the best, and we are lucky to have them in our department. Software engineering, and software systems in general, are critical areas for computer science. Their recognition is one indication of our long-standing strength in, and commitment to, this important area within our discipline."

Clarke and Osterweil join UMass professors **W. Richards Adrion, W. Bruce Croft, Robert Graham, Arnold Rosenberg,** and **Don Towsley** as ACM Fellows. With more the 80,000 members, the ACM is the major international professional society for computer science.

Cohen named Conti Faculty Fellow

Professor **Paul Cohen** has been named a Samuel F. Conti Faculty Fellow for the 1998/99 academic year. The fellowship is provided in recognition of Cohen's "outstanding research and scholarship" and carries a year's release from regular academic activities to pursue scholarly endeavors. Cohen joined the UMass faculty in 1983, after receiving his Ph.D. from Stanford

Cohen

University in Computer Science and Psychology. His research interests are in the areas of empirical methods for artificial intelligence, plan evaluation and repair, and evaluation of AI methodologies. He is a coeditor of the *Handbook of Artificial Intelligence,* Volumes 3 and 4, and coeditor of a recent special issue of the journal *Artificial Intelligence.* His recent textbook, *Empirical Methods for AI,* is published by MIT Press. Cohen has also served as Councilor of the American Association for Artificial Intelligence.

student in the department's Center for Intelligent Information Retrieval, received the Best Paper award for "A Theory of Term Weighting Based on Exploratory Data Analysis" presented at the twenty-first Annual International ACM SIGIR Conference on Research and Development in Information Retrieval held in Melbourne, Australia, in August. Greiff's achievement was part of a very succesful conference for the CIIR, in that nine of the papers involved people from the Center. **Lisa Ballesteros,** also a graduate student with the CIIR, received the Best Student Paper award at the SIGIR conference last year.

Warm congratulations to grad students **Mance Harmon** and **Arish Ali,** who took home first prizes in the team and individual categories, respectively, of the ACM/IBM "Quest for Java" student competition. The goal of the program was to find "innovative Java applets and applications." (See **www.acm.org/jquest/98winners.htm.**)

Harmon's team project was WebSim, "a general simulator for neural networks, reinforcement learning, fractals, and other experiments." His teammates were Leemon Baird (Carnegie Mellon University) and Scott Weaver (University of Cincinnati/Wright Air Force Research Lab). Harmon is a member of Andy Barto's Adaptive Network Laboratory. His applet is posted at **www-anw.cs.umass.edu/~mharmon/websim/index.html.**

Ali's project was Chemistry AppLab — Applet Laboratory — an instructional applet for teaching concepts in chemistry. Ali is an ECE student who worked in Bev Woolf's Center for Knowledge Communication lab. His project consists of modules he had developed in the CKC for Chemistry Department Professor Bill Vining's Chemland project (see **www.cs.umass.edu/~ckc**). "Java makes it possible for the students to use the interactive modules for 'learning by doing' instead of using the 'net as a passive instructional

medium," Ali says.

Ali also was a first-prize winner of Sun's Java 3D programming contest (**www.sun.com/desktop/java3d**) for his work on interactive browsing of 3D anatomical models.

Staff news

Joining the Department in recent months were:
- Steven Battisti, staff programmer (CKC).
- Deborah Bergeron, secretary (EKSL).
- Peter Brown, senior staff programmer (CKC/CCBIT).
- Victor Danilchenko, associate software specialist (CSCF).
- Susan Dreyer, secretary/receptionist (Vision).
- Debbe Dugan-Birk, administrative coordinator (LASER).
- Marco Furini, visiting researcher (Networks).
- Pauline Hollister, receptionist (Main Office).
- Takeshi Ikenaga, visiting researcher.
- Michael Kositsky, senior postdoctoral research associate (ANW).
- Hyungwon Lee, senior postdoctoral research associate (LASER).
- David Marshall, staff programmer (CKC/CCBIT).
- Mary Anne Ramirez, senior research fellow (CKC).
- Jette Randlov, visiting researcher (ANW).
- Mark Sanderson, senior postdoctoral research associate (CIIR).
- Matthew Schlesinger, senior postdoctoral research associate (ANW).
- Stephen Siegel, senior software engineer (LASER).
- Young-Sung Soh, visiting researcher (Vision).
- Fei Song, visiting reseacher (CIIR).
- Cindy Stein, staff programmer (CKC/CCBIT).
- Jung-Bong Suk, visiting researcher (Networks).
- Elizabeth Terhune, senior research fellow (CCBIT).
- Zhigang Zhu, senior postdoctoral research associate (Vision).

Ramamritham named IEEE fellow

Professor **Krithivasan Ramamritham** (**www.cs.umass.edu/~krithi**) has been elected as a Fellow of the Institute of Electrical and Electronics Engineers (IEEE). Professor Ramamritham was honored by the IEEE for his "contributions to the theory and design of real-time systems."

Ramamritham

Ramamritham joined the UMass faculty after receiving his Ph.D. from the University of Utah. His interests span the areas of real-time systems, transaction processing in database systems, and real-time database systems.

Ramamritham served as Program Chair for the Real-Time Systems Symposium in 1994 and as General Chair in 1995. Also, he was a vice-chair for the Conference on Data Engineering in 1995 and has served on numerous program committees of conferences and workshops devoted to databases as well as real-time systems. He serves on the editorial board of many journals, including the *IEEE Transactions on Parallel and Distributed Systems* and the *Real-Time Systems Journal*. He is coauthor of *Deadline Scheduling for Real-Time Systems.* (*See article, page 6.*)

Ramamritham joins professors **Jim Kurose, Arnold Rosenberg,** and **Don Towsley** of the Computer Science Department as IEEE Fellows. The IEEE is the largest professional society in the world, with more than 300,000 members worldwide. Fewer than one tenth of one percent of these members are eligible to be nominated as Society Fellows in a given year.

Towsley named Distinguished Professor

At its June 1998 meeting, the Board of Trustees named Professor Don Towsley (**www.cs.umass.edu/~towsley**) as a Distinguished University Professor, an honorific chaired professorship at the University of Massachusetts that recognizes "outstanding academic distinction as a scholar or professional in his or her field."

Towsley

Towsley joined the UMass faculty in 1976 in the Department of Electrical and Computer Engineering and joined the faculty of the Department of Computer Science in 1986. He is a Fellow of both the Institute of Electrical and Electronics Engineers (IEEE) and the Association for Computing Machinery (ACM). His research interests include high-speed networks, multimedia systems, and stochastic scheduling.

Professor **Jim Kurose**, who codirects the Computer Networks Research Lab with Professor Towsley, remarked, "This is certainly a welcome and well-deserved honor for Don. It's been wonderful for me to be able to collaborate so closely with Don. He's not only a tremendous researcher, as indicated by this appointment, but he's a blast to work with."

Professor Towsley joins Professor **Arnold Rosenberg** as the second Distinguished University Professor in the Department.

LOGOUT

Equal-opportunity athletics

Results

Roderic Grupen
Manfred Huber
Glenn Stowell
? Stowell
Mary Andrianopoulos
Diesel (Border Collie)
Elizeth Araujo / Jefferson Coelho
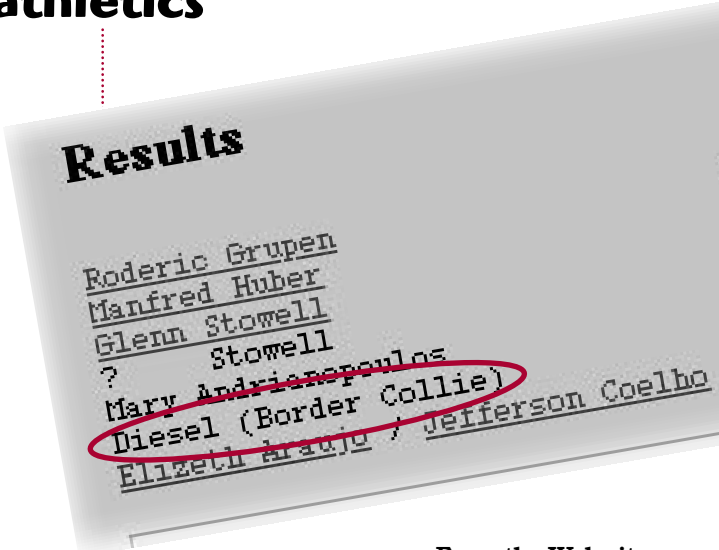
**From the Web site
announcing the results of
the Laboratory for Perceptual Robotics'
sixth annual Half Marathon.**

Improvisation 101

As one of four faculty acknowledged in the A. Nico Haberman Award acceptance speech of Bryant York, '82, Professor Al Hanson recalls a moment that reflects Massachusetts practicality.

"I believe that Bryant was one of the only students ever to defend his Ph.D. proposal (or maybe it was his thesis) at Cooley Dickinson Hospital. My recollection is that [fellow faculty member] Ed [Riseman] was in the hospital for something, and we all packed up the overhead projector and screen and went to Ed's room for the presentation. The hospital staff was outraged, of course."

Al wasn't fully certain he was remembering it right 16 years later, but it's a great story.