



# Significant BITS

Department of Computer Science

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The boxes are moved in, though not all are unpacked. The walls are quickly filling up—posters, conference announcements, job opening advertisements, study opportunities. The new Computer Science Building is getting that “moved-in” feel. Preparations for an all-out gala celebration are underway.

Building projects are overwhelming. There are endless decisions to be made, and differences in taste and opinion must be accommodated. Project budgets lead to headaches and schedules frustrate the most careful planners. But finally, with a combination of patience, skill, and good luck, the punchlist (outstanding items to be fixed) becomes the new reality. Furniture, equipment, boxes, and people move in. All those planning meetings fade into a distant memory.

The Engineering and Computer Science Research Development Center, the building’s official name, has been eight years in the making. Started in 1992, the project has preoccupied three department chairs (W. Richards Adrion, Dave Stemple, and Jim Kurose) and been covered in at least as many issues of the department’s newsletter. Fortunately, there has been a relatively consistent departmental building committee made up of faculty, staff, and graduate students (Lori Clarke, Paul Cohen, Steve Cook, Ed Riseman, Chip Weems,

## Home at Last!



Stephen Long photo

## Information Retrieval: It's not just English anymore

SOME MARKETING PEOPLE would like us to believe that the World Wide Web knows no boundaries. But for most people who speak and write only English and possibly one other language, that’s not the case. Language barriers create problems. For example, an exclusively English-speaking person cannot read a Japanese or Saudi Arabian newspaper over the Internet. This is a problem in both industry and defense-related applications. In industry, the inability to communicate

across languages can severely limit a company’s reach. In defense applications, the ability to get accurate information quickly in unfamiliar countries—regardless of language—is critical. The search for solutions to this problem motivates an interdisciplinary research effort.

When the Defense Advanced Research Projects Agency (DARPA) announced its Translingual Information Detection, Extraction, and Summarization (TIDES) program, the Department’s

## FROM THE CHAIR

By Jim Kurose

Information technology—we're finding more and more that our University's students (undergraduates, in particular) want to be fluent in it, and employers across the Commonwealth and the nation can't seem to get enough students who have it. But what is "it" that both students and employers are seeking? Is it a degree in computer science? Is it computer literacy? Is it something in between? Or something new?

A recent study from the National Research Council, "Being Fluent with Information Technology,"\* defines the fluent information technology (FIT) individual as someone who has three sets of skills: (i) a starter set of information technology skills (word processing, e-mail, databases, spreadsheets, WWW); (ii) an understanding of the basic concepts on which information technology is founded (computers, information systems, networking, abstraction, algorithmic thinking, technology limitations, societal impact); and (iii) logical reasoning skills. The FIT individual should be able to use infor-

mation technology in addressing personally relevant problems and have the foundation to adapt and thrive in the face of inevitable changes in information technology.

Certainly, our department has provided its own majors



**"Increasingly more students and employers are seeking fluency in information technology with the goal of applying it directly within their own field of study."**

with more than a plateful of (ii) and (iii), with (i) taken as a given. For years, we've also offered a few basic service courses in computer "literacy" to the larger university population. But "literacy" is not "fluency," and "fluency" is not "mastery."

Increasingly, more students and employers are seeking fluency in information technology with the goal of applying it directly within their own field of study. At a minimum, this seems to call for new courses to be offered and per-

haps even a new trans-disciplinary major to be developed—an approach several other schools have already adopted.

A workshop at UMass last Fall sponsored by the Department of Computer Science, Department of Electrical and

cent NRC report, and the opportunity to apply these skills within their major discipline. The courses in area (ii) on information technology concepts—those that we as a department will be most closely involved with—will likely delve deeper than our current service courses, yet not be as narrow or as specialized as our current undergraduate major courses.

Defining a new IT program has already proven to be a significant effort. Teaching, growing, and evolving the new curriculum will require significantly more effort (and expense!) still. Yet many of us feel that information technology will be so central to the lives and livelihoods of our University's students in the 21st century that we can't afford not to do so. It's a journey we're just beginning, and one that will likely be increasingly important to us, and to the larger University, for some time to come.

\*<http://www.nap.edu/books/030906399X/html/>

\*\*For a copy of the workshop report see:

[www.cs.umass.edu/IT/workshop.html](http://www.cs.umass.edu/IT/workshop.html)

### Corrections

In the last issue of *Significant Bits* the article noting *Martin Herbordt* as a CAREER Award recipient inadvertently listed his advisor as Robby Moll. His advisor was Chip Weems.

Also in the last *Significant Bits*, *Rahul Simha* was listed as a CAREER Award recipient when actually he received a Research Initiation Award, the precursor of CAREER.

Our apologies for any confusion this may have caused.

For information about  
Department research, visit  
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# Shenoy receives NSF CAREER Award

**H**E HASN'T BEEN on the faculty very long, but Prashant Shenoy already has a career to be proud of. In his case, it's a CAREER award funded by the National Science Foundation (NSF), one of the most prestigious awards that a junior faculty member in Computer Science can receive. The goal of the award is to help junior faculty members develop a career in research and teaching. It is very competitive; out of more than 2000 applications, 300-350 awards are made each year across all disciplines in Science and Engineering. A typical award consists of \$200,000 in funding over 4 years.

## A new type of glue

Shenoy's research group, the Laboratory for Advanced System Software (LASS), acts as a glue between operating systems, computer networks and the World Wide Web. His research focuses on the design of servers and networks for multimedia and web-based applications.

"The demands that such applications place on computer systems and networks make this a very challenging problem to solve," says Shenoy. Performance and scale are two key issues: servers must be able to efficiently retrieve large quantities of data and networks such as the Internet will need to deliver this data to users in a timely manner.

His grant proposal, "Scalable High-performance Information Servers for Internet-based Multimedia Applications," will investigate solutions to this problem. It focuses on three areas:

- (i) multimedia operating systems that run demanding applications,
- (ii) multimedia file systems that store huge amounts of data, and
- (iii) proxy servers that deliver this data over wide area networks such as the Internet.

The ability to deal with heterogeneity in application requirements and data characteristics is a driving force behind this research. An important outcome of this research will be a prototype system based on the Linux operating system that will demonstrate the efficacy of the approach.

Given the commercial potential of this research, Shenoy considered going into industry upon receiving his PhD in 1998, but felt that the academic environment provided him more freedom to do long-term research without the market pressures that exist in industry. He was also extremely excited about being able to col-

laborate with current faculty Jim Kurose, Krithi Ramamritham, and Don Towsley, who are each highly regarded in their fields.

"Prashant's broad range of interests—combining multimedia, operating systems and the World Wide Web—come together in this CAREER grant. This is an exciting time to be investigating issues that lie in the intersection of these areas, and Prashant is uniquely positioned to carry them out," remarks Ramamritham.

Shenoy received his doctorate from the University of Texas at Austin in 1998 where he was honored as having written the "Best Doctoral Dissertation of 1998-99" by the Computer Science department. He feels extremely appreciative of his graduate advisor Harick Vin. "I'm grateful to him for his advising and his help getting me started both while I was a graduate student and as a junior faculty member," says Shenoy.

Besides launching his new academic career and receiving a CAREER award, Shenoy was also recently married. He wanted to be sure to acknowledge the help and support of his wife, Anita.

For more information, visit [www.cs.umass.edu/~shenoy](http://www.cs.umass.edu/~shenoy).



Stephen Long photo

Prashant Shenoy

## Alumnus Hansen also receives CAREER Award

Eric Hansen '98 has received a four-year NSF CAREER Award for his proposal "A Decision-Theoretic Approach to Intelligent Planning and Control." This project contributes to artificial intelligence research in planning and decision making. "My contribution in this area has been to recognize some connections between different formal models for planning and control, including heuristic search, Markov decision processes, and automata theory, and to show how to exploit these connections to develop improved algorithms for these problems," says Hansen. "It includes a mix of theoretical and applied work, as well as teaching initiatives."

Hansen always wanted an academic career so "the recognition and funding that comes with an award like this are a big help" in getting started. He is currently an Assistant Professor of Computer Science at Mississippi State University.

He is grateful to his advisor, Shlomo Zilberstein. His dissertation "Finite-Memory Control of Partially Observable Systems" was nominated by our Department for the ACM Distinguished Dissertation Award in 1998, and is being published as a monograph by Kluwer Academic Publishers.

For more information, visit [www.CS.MsState.Edu/~hansen](http://www.CS.MsState.Edu/~hansen).

The NSF Faculty Early Career Development (CAREER) Program is a Foundation-wide activity that supports junior faculty within the context of their overall career development. It combines in a single program the support of research and education of the highest quality and in the

broadest sense. This premier program emphasizes the importance the Foundation places on the early development of academic careers dedicated to stimulating the discovery process in which the excitement of research is enhanced by inspired teaching and enthusiastic learning.

## IR

Center for Intelligent Information Retrieval (CIIR) was very interested. The CIIR, best known for its advances in the areas of search strategies and automatic query expansion for text, saw this program as an excellent vehicle for exploring its interest in multi-lingual and multi-modal information organization. The CIIR has begun two projects under TIDES: "Tools for Rapidly Adapt-able Translingual Information Retrieval and Orga-nization," and a project in collaboration with CIIR industrial member Dragon Systems, Inc.

The mission of the TIDES program "is to develop the technology to enable individuals working in English to locate, access, and utilize network-accessible text documents in multiple languages, without requiring any knowledge of the target languages," according to the DARPA web site. A critical goal of TIDES is to ramp up to a system that will accomplish the mission in a new language in as little as a week's time.

#### Translingual Retrieval

The research area associated with this problem is called translingual retrieval. Translingual implies different languages in the query and the source material. Consider the example of an Arabic newspaper given earlier. If computing resources and time were infinite, either the newspaper would be translated into English and the search prob-

formed, or the query would be translated first into Arabic and then the results translated back into English. Either way, the goal would be to make sure the results satisfy the intent of the query. Since, in reality, resources and time are limited, alternative approaches are needed to get reasonable results.

These kinds of problems have been of interest to the CIIR for some time. The main research issue is how information retrieval (IR) systems can achieve good results even if the translation is poor quality. "We use dictionary-based translations combined with techniques

to expand the query with related words and choose among a m b i g u o u s translations," says Bruce Croft, Distinguished University Professor and director of the CIIR.

For the TIDES program, the CIIR is extending research that was pioneered by Croft and two graduates of the

Department: Lisa Ballesteros and Jay Ponte. Ballesteros is now a faculty member with the Mount Holyoke College Computer Science Department in South Hadley, MA. While still a student, she worked with Croft on using query expansion both to improve the initial translation and to reduce the effect of phrases that can't be accurately translated automatically. Both techniques compensate for low quality machine translation. The application of language modeling to IR prob-

lems was initiated by Ponte, now a member of the Interactive Multimedia Department of GTE Labs in Waltham, MA.

Language modeling, previously used primarily for speech recognition and machine translation problems, provides a novel approach to IR. "We are using language models as the theoretical basis for much of our work now, including recasting some of our older approaches in the new model," explains

Professor James Allan, assistant director of the CIIR and co-principal investigator on the DARPA proposals. "They provide a way to think about IR that sidesteps some of the difficult problems that other theoretical approaches have been unable to explain." Allan has also begun applying similar approaches to his own work on Topic Detection and Tracking, an important initiative that is now part of TIDES.

#### More than just text

Language modeling is also appealing to CIIR researchers because it seems to offer a natural way to combine text, video, music, and images—other areas that the CIIR is currently pursuing. Prototypes using language modeling approaches have worked well and look quite promising. There is a lot of enthusiasm in the group for investigating how far this basic idea can be pushed.

Projects that are testing these limits include work being led by Professor R. Manmatha and

Don Byrd. "Indexing information that is in the form of video, pictures, audio, or paper documents, rather than machine

readable text form, is a non-trivial task," comments Manmatha on the problem he is trying to solve for multi-media IR. His group is developing techniques for content based retrieval of images and video. They are also working on finding text in images and indexing handwritten manuscripts like those

of George Washington. Byrd is working with Kings College London on a project called OM-RAS, a system for the efficient content-based searching and retrieval of musical information from online databases stored in a variety of formats ranging from encoded scores to digital audio.

Another important part of the effort is the NSF Research Experience for Under-graduates program run by the CIIR (see related article page 7), which is giving 8-10 undergraduate students per year the opportunity to explore the IR research environment.

The mission of the CIIR is clear: To develop technology that will support the emerging information infrastructure into the next century. Through its collaboration with federal and industrial partners, the CIIR is pursuing different research areas with the passion that makes it one of the world's leading IR labs.

Visit [ciir.cs.umass.edu](http://ciir.cs.umass.edu).

**The mission of the CIIR is clear: To develop technology that will support the emerging information infrastructure into the next century.**

**Language modeling, previously used primarily for speech recognition and machine translation problems, provides a novel approach to IR.**

## ON THE SIDE

## Wearable Computers as Personal Assistants

“At the grocery store, most people will wait until I’m past them, and then stop and stare,” says faculty member Andy Fagg, who is developing a wearable computer. He strolls through the frozen foods aisle wearing an apparatus that positions a tiny computer screen in front of his face.

“As general computing systems become smaller, it becomes conceivable to don these devices as easily as shoes or a baseball cap,” says Fagg. “This offers us access to information and communication resources

at any time. It isn’t about being able to write a paper or email while you’re on line at the grocery store. It’s about having digital assistance as you go about your life.”

Fagg’s aim is to teach the computer to “notice” a user’s routines and offer information accordingly. “I could tell the system I’m going to be cooking a certain recipe. The system will know what I have at home. Near the grocery store, it whispers, ‘Don’t forget to stop at the grocery store; you need three items for your recipe.’ The machine should

present information at the appropriate time, and in the appropriate way. It should know that I don’t care about groceries if I’m in my office.”

Fagg constructed the not-yet-elegant system from off-the-shelf components—assorted wires, serial ports, video ports, two batteries, a headset with earphones, a video monitor—and “a bit of my own soldering.” The hand-held keyboard is the size of a traditional computer mouse. A Global Positioning System (GPS) receiver, like the ones in upscale cars, now only works outside, but “one of my projects is finding a way to provide similar information indoors.”

Commercial systems, aimed at very specific industrial markets, are already available. Fagg



Stan Sherer photo

Andy Fagg

sees wearable computers becoming more stable, more comfortable, and less bulky as microprocessors continue to get smaller and smaller.

See [www-anw.cs.umass.edu/~fagg/projects/wearables](http://www-anw.cs.umass.edu/~fagg/projects/wearables).  
—Elizabeth Luciano

## OUTREACH

## Science Days inspire high school students

You’ve changed the wake-up setting of your alarm clock. The clock can pass on its new setting to the coffee maker in the kitchen and the heater in the bathroom. You wake up to find a warm bathroom and the aroma of freshly brewed coffee greeting you as you start your earlier-than-usual morning.

A futuristic scenario like this can intrigue anyone, but has special appeal to the 70 potential young scientists who traveled to campus for Science Days in October, 1999. After a buffet breakfast the high school juniors and seniors heard about various organizations and activities, opportunities such as Regional and State Science Fairs, and some of the academic options available at the University.

The real fun began as University faculty and grad students offered lectures and demonstrations in the areas of computer science and mathematics, life sciences, and chem-

High school seniors meet robotic dog



ical and physical sciences. The students had an opportunity to see laboratories in operation or to spend time with faculty. Host departments were from the College of Natural Sciences and Mathematics, the College of Food and Natural Resources, and the College of Engineering.

The students got a sampling from several CMPSCI labs:

**Multimedia classes:** The MANIC project is investigating how to use WWW multimedia technology so students can take classes being taught anywhere in the world at a time they prefer and at their own pace. [manic.cs.umass.edu/](http://manic.cs.umass.edu/)

**World’s smallest web server:** The iPic is a single chip computer the size of a match head. With the chip, a complete micro-computer connected directly to an Internet router and costing less than a dollar, you can connect practically any device or appliance to a network, and control it from the network. These devices then communicate with each other and co-ordinate each other’s activities. [www-ccs.cs.umass.edu/~shri/iPic.html](http://www-ccs.cs.umass.edu/~shri/iPic.html)

**Robots that grab and bark:** Taking cues from the ways that babies learn about their world, this lab is building robots that learn to see, reach, grasp, and navigate. Other major research areas include mobile robot navigation, geometric reasoning, assembly planning, and the application of learning theory to robotics. [www-robotics.cs.umass.edu/lpr.html](http://www-robotics.cs.umass.edu/lpr.html)

**Wearable Computers:** This lab is building personal assistants that can provide the right type and form of information in a proactive, just-in-time manner (see story above).

For more information, see [www.nsm.umass.edu/scievents.htm](http://www.nsm.umass.edu/scievents.htm).

## The date's set for a gala building opening

The building is now inhabited, but it won't truly be open until the official building opening celebration. Planning is well underway for a September 14-15, 2000 gala. "We want to publicly thank the Commonwealth, the University, and our industrial partners for helping to make this building possible," says Department chair Kurose on the upcoming fall event.

"The event is two days because we want to not only show our state legislators and the public-at-large what we are up to, but also to get into some technical depth with our industrial partners, alumni, and academic colleagues," remarks Marla Michel, external relations director for the Department and project manager for the event. "The first day we will grant honorary doctoral degrees to luminaries in our field and open our building, labs, and students' work up to everyone who wants to visit and learn about us. The second day will feature keynote presentations by our honorary degree recipients as well as technical talks throughout the day by our faculty." Invitations are expected to be mailed mid-summer.

## Workstations and coffeepots

### *Steve Cook managed the details of the new building*

As people move into a new office home they put books on the shelves, posters on the walls, plug in a coffeepot...and if the building project manager is Steve Cook, it will all work. In our new building all the details were considered, large and small, including two types of power wiring in case research labs want to put some of their equipment on a UPS (universal power supply), house power for appliances, and plenty of data outlets. Coffeepot? No problem, no circuit overloads here.

Steve came to manage the building project via a circuitous UMass route. Leaving here after three years in the late seventies, he spent most of the eighties starting up, working for, or running different companies in the west and New England. He was involved in R & D, telecommunications, and software development, both in technical areas and administration, for US Communications in California, Digital Equipment Corporation (DEC), and West Mooreland Technologies and sister company Durable Solutions, in New Hampshire. In 1989 he returned to UMass, finished his degree through University Without Walls, and started work as assistant director of the Department's RCF (research computing facility) where he

worked with then-chair Rick Adrion on space allocation within the Department. He wasn't planning on staying too long, but there was "too much to fix."

In 1994, when he became Director of the now renamed CSCF (Computer Science Computing Facility), a building project was already in the works. Steve's familiarity with the Department's space requirements, his previous industry and life experiences, and his understanding of current and future needs made him an ideal match for the task.

Detailed layouts were done for each room and type of office space: desk, chairs, carpeting, windows, telephone, power requirements, card keys, a/c loads, network connections, everything.

Steve notes that it has been "exciting to see the changes that allow the Department to fulfill its mission—that of a state-of-the-art computer science department. It was also neat to incorporate my experience with DEC into the building's design."

CSCF today continues to support research, education, and departmental labs with a dedicated full-time staff of 15 plus a number of undergraduates. Steve runs it like a busi-



ness—customer oriented, service oriented. He describes his position as exciting but tiring because it's difficult to keep up. "It used to be much simpler. Now, there are lots of different platforms and operating systems and many vendors supplying everything."

Now that the building is finished and the coffeepots and other more sophisticated pieces of equipment are performing flawlessly, Steve is planning to spend some serious time skiing. He has just been certified as an Examiner in the Professional Ski Instructors of America; he's also a member of the Examiner Training Squad, which teaches instructors. And he's looking forward to playing more golf this summer.

## HOME AT LAST! . . .

Beverly Woolf, Claire Christopherson, John Robinson (from Physical Plant), Anita Raja, Amy McGovern, and Matthew Schmill). This incredibly dedicated group has been responsible for all those decisions, always keeping in mind the interests of the more than 275 people who comprise the department (not counting undergraduate students).

The result is a sparkling, state-of-the-art, 3-story, 78,000-square-foot space devoted exclusively to the advancement of computer science teaching and research. It is unique on a campus where departmental buildings are a rarity and a testimonial to the pride that the campus and the state take in this outstanding department.

On the completion of the project, current chair Jim Kurose adds, "People are settling in and the sense of community within the department has been enhanced." Dave Stemple, former chair and now professor emeritus, commented, "It's gratifying that this building realizes many of the original goals set forth for this project: functional space for faculty, their research labs, and as much natural light as possible."

The physical move went extremely well. "If you think of the times your own office has been moved you'll understand that we wanted this experience to be as painless as possible for everyone," comments Steve Cook, building project manager (see related article, left). The well planned process of moving the department highlighted his approach to running a customer-focused group. "My staff was diligent in ensuring equipment and office contents were moved expertly and efficiently." The planning and service paid off. Despite a mid-semester move, overall satisfaction was extremely high.

## CENTERS

## FleetBoston first to join ICEE

Leading the pack of corporations working to stay on top, Massachusetts-based FleetBoston Financial Group has become the first major corporate sponsor of the recently formed Interdisciplinary Center for Electronic Enterprise (ICEE). As a sponsor, FleetBoston will be involved in research projects pertaining to the electronic enterprise including digital government, auctions, and enterprise business models. It will also have direct access to students taking relevant Internet-related courses. Blaise Heltai, FleetBoston's managing director for corporate internet strategy, has indicated that this type of research center is exactly what businesses in Massachusetts and beyond need. "ICEE is well positioned, both in UMass and the Commonwealth, to deliver great students and timely research. I am pleased that FleetBoston is able to be first of what will certainly become a lengthy roster of industrial partners."

Co-directors Lee Osterweil and Les Ball couldn't agree more. "We are thrilled to be working with a company of FleetBoston's stature," comments Ball. "We have been actively recruiting members, talking with the likes of IBM, Tanning Technologies, Whittman-Hart, and Scudder. Having FleetBoston on board gives us that extra edge that is so important in new organizations," adds Osterweil.

ICEE, created last year, is the northeast regional center for electronic enterprise and economic development. A joint project between the Department and the Isenberg School of Management, it is funded by industrial partnerships and research grants. Through research activities, educational opportunities, and outreach initiatives including conferences and seminars, ICEE adds value to the e-community by injecting new ideas via people, projects, and collaboration. ICEE home: [www.umass.edu/icee](http://www.umass.edu/icee).

## The Wise OWL at CCBIT helps both students and the University

The Center for Computer-Based Instructional Technology (CCBIT) has developed the Online Web-based Learning system (OWL) in collaboration with the Chemistry and Physics & Astronomy Departments. OWL now administers and grades online homework assignments for 4000 students each semester in fifteen departments on five campuses. Under a grant for the U.S. Department of Education's Fund for the Improvement of Post-Secondary Education, CCBIT has been studying the costs and benefits of OWL use. Results in the Physics & Astronomy Department show that students' scores on exams are increasing by a half to a whole letter grade on average and that the department is saving more than \$100,000 annually through OWL use.

CCBIT has also recently joined the School of Education as a collaborator on a Title II grant from the U.S. Department of Education for professional development. CCBIT will work with School of Education faculty and students to bring new instructional technologies to three technology-enriched schools in Springfield, MA that span the K-12 spectrum. This is part of a consortium grant involving different higher education institutions working with school systems in the Boston, Worcester, and Springfield areas.

CCBIT applies advances in educational technology to create practical instructional systems for undergraduate and K-12 curricula. CCBIT instructional systems are used by thousands of students each year at UMass as well as by students at a number of other campuses. For more information about CCBIT and OWL, contact Dave Hart, [dhart@cs.umass.edu](mailto:dhart@cs.umass.edu).

## CIIR runs NSF Research Experience for Undergraduates

Ten undergraduate computer science students will spend ten weeks living and working on the UMass Amherst campus this summer. The Center for Intelligent Information Retrieval (CIIR) is proud to be part of the National Science Foundation's interdisciplinary Research Experience for Undergraduates (REU) program. From June 6 through August 11, 2000 this select group of students from various colleges and universities will have the opportunity to participate in research in the

area of Information Retrieval and Organization Technologies.

Groups of two to four students will focus on a specific problem. Possible project areas for this summer include: multimedia indexing and retrieval; targeted web crawling; information retrieval system evaluations; user interfaces and visualizations; scaling to huge collections of text; acronym detection and expansion.

In the REU program students experience both individual and team research and have an opportunity to explore options for

graduate study. They will collaborate with faculty, researchers, graduate students, and other REU undergraduates.

Last year the work was so good that two REU undergraduate students, Paul Ogilvie of UMass Amherst and Brenden Tamilio of Hampshire College, co-authored a paper that was accepted at Digital Libraries '00 conference. The paper is titled "Acrophile: An Automated Acronym Extractor and Server."

The successful REU 2000 applicants will have a keen inter-

est in conducting research on human-technical systems and an open mind for multiple perspectives. They will be entering their junior or senior year and are not required to have significant research experience or technical sophistication. Each student will receive a \$3,000 stipend and on-campus housing.

Computer Science faculty involved with REU include Professors James Allan, W. Bruce Croft, and R. Manmatha. Researchers and staff include Stephen Harding, Jean Joyce, Dr. Leah Larkey, Daniella Malin, and Kate Moruzzi.

For more information, see [ciir.cs.umass.edu/REU](http://ciir.cs.umass.edu/REU).

## You can't judge a book by its URL?

### *On-line text studies networking*

Department Chair James Kurose and Keith Ross have published a book (Addison-Wesley) that's more than a book.

*Computer Networking: A Top-Down Approach Featuring the Internet* provides a fresh approach to the study of computer networking concepts. The authors provide a motivational treatment of important concepts for networking students. Based on the rationale that once a student understands the applications of networks they can understand the network services needed to support these applications, this book takes a "top-down" approach where students are first exposed to concrete applications and then drawn into some of the deeper issues of networking.

The book's focus on the Internet takes advantage of the fact that most computer networking students have had significant experience with it and

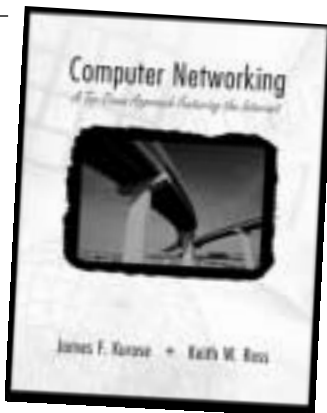
are enormously curious and excited about what is "under the hood."

And since in recent years computer networking has become virtually synonymous with the Internet, the book is also organized around the Internet-layered architecture rather than around the seven-layer OSI architecture.

Perhaps the most unique and innovative feature of this textbook is that it will be available both in hard copies and online. The website will feature:

- Fully searchable online text, with hot links and embedded animations
- Audio lectures
- Easy access to authors' updates and new editions as technology changes
- Links to the best sites relating to computer networks and Internet protocols

Addressing the problem that



"computer networking textbooks, if not done right, can be even more boring than accounting texts," the authors have not simply assembled a compendium of facts focused on what a

network does, rather than why. Instead they have identified the important, underlying issues that must be solved by a network architecture, and planned a methodical study of the various approaches taken towards addressing these issues. They have also used a sense of humor, analogies, and real-world examples to help make the textbook more interesting and accessible.

Since January 1998, Keith Ross has been a Professor and Department Head in the Multimedia Communications Department at Institute EURECOM, in Sophia Antipolis, France. Kurose and Ross began their collaboration in 1997 when Kurose was a Visiting Scientist at EURECOM. [www.awlonline.com/kurose](http://www.awlonline.com/kurose)

## Our grads lead the way at ICML-2000

The Department knows that it produces top Ph.D. students. But, when 20 percent of the area chairs for ICML-2000, the International Conference on Machine Learning, are UMass CS alumni, the rest of the world knows it, too.

The conference is for researchers interested in the computational field of learning. More than 350 papers have been submitted this year.

Our alumni and the areas they are chairing are:

- Tom Fawcett '93, LRN, applications, problem/representation engineering;
- Bruce Draper, '93, computer vision, multi-level learning, reinforcement learning;
- Claire Cardie, '94, natural language processing, case-based learning;
- David Lewis, '84, text learning, information retrieval.

The Department is also well represented. Professor Paul Utgoff, director of the Machine Learning Laboratory, is on the Program Committee as the area chair for decision-tree induction, rule induction, and learning in problem solving.

"It is marvelous that so many of our graduates have been chosen for these visible leadership roles," remarks department chair, Jim Kurose, on this achievement.

Information about the conference can be found at: [www-csli.stanford.edu/icml2k/](http://www-csli.stanford.edu/icml2k/).

### INDUSTRY

## Fidelity offers students an alternative to Florida

This year, twenty-seven UMass undergraduates passed up Florida suntans over spring break. Instead, they headed to one of three Fidelity Investments sites in the northeast to see what it's like at one of the world's most diversified and successful financial services companies.

Boston-based Fidelity Investments has teamed with the University to offer its Technology Exploration Program to students from all five UMass campuses. This "Shadowing Program," gives students the opportunity to spend three days with a Fidelity technology professional in one of three functional areas—Development, Telecommunications, or Operations—as they go about their daily work. In addition to learning about technology careers, participants gain insight into the skills and technologies that drive Fidelity's business. It also gives participants the chance to get a feel for what it would be like to work as a Fidelity intern or, potentially, to pursue a career at Fidelity.

Professor David Mix Barrington, undergraduate program coordinator, was the Amherst campus coordinator for this program. He brought together students from the College of Engineering, Isenberg School of Management, and Department of Computer Science for the orientation session. "We are pleased that 22% of the students selected for the program came from our campus. I'm doubly pleased because all but one of those students is either a declared or soon-to-be-declared computer science major," remarks Barrington. The students selected were: Luke Aiton, Jose Barbosa, Nancy Bronstein, Christopher Naugle, Grigory Presayzen, and Derek Robertson.

"This program is a win-win for all involved," says Barrington. "I'm glad to be a part of it."



## Project Aims to nurture disadvantaged students

Faculty member David Mix Barrington is serving as a co-principal investigator in a two-year, \$220,000 program aimed at supporting economically disadvantaged undergraduates in mathematics and statistics, computer science, and engineering. Funded with a grant from the National Science Foundation, the NSF Computer Science, Engineering and Mathematics Scholarship Program (CSEMS) is geared toward addressing the national shortage of engineers, mathematicians, and computer scientists, and the underrepresentation of women, minorities, and persons with disabilities in these fields.

“CSEMS will offer financial support, specialized courses and seminars, and academic and personal support,” said Kathleen M. Rubin, assistant dean for the College of Engineering and the program’s director.

Mix Barrington will co-teach a one-credit seminar for freshmen, which will familiarize them with the University and their particular discipline.

## Isenberg and Pluribus

### *Learning the Business Side of the Story*

Agustin Schapira-Olcese, a CIIR graduate student, received an Isenberg Award last year. These interdisciplinary awards are scholarships of up to \$10,000 to “aid graduate students who demonstrate academic merit and a commitment to the integration of science, engineering, and management.” Students from the sciences are thus encouraged to broaden their education by taking classes in the Isenberg School of Management (ISOM) or vice-versa. Agustin received a scholarship and took two classes in the ISOM, Les Ball’s e-commerce seminar, co-taught with CS faculty member Lee Osterweil, and George Milne’s “Internet Marketing.” He also participated in e-commerce projects with Management students.

Eugene M. Isenberg, SOM alumnus and CEO of Nabors Industries, Inc., established these awards in 1994. He wishes to support students as they develop the ability to make astute technical judge-

ments about the management of technology—as opposed to using technology to solve a problem. Selection is based on academic achievement, a demonstrated interest in the interrelatedness between management and science or engineering, and an essay describing a plan for integrating these fields in their education and future careers. Awards are determined each year by the deans of the College of Natural Sciences and Mathematics, the College of Engineering, and the ISOM, and are announced in the spring during an event held to honor the recipients.

For Agustin’s master’s thesis he built an Internet search engine called Pluribus that improves the quality of its results over time through the indirect collaboration of users. He expects to pursue a career in industry and says, “My interests include e-commerce and Internet development; I wanted to take courses at the Isenberg School to learn about the business side of the story.”

## Alum is McKnighted

### *Zhi-Li Zhang Awarded Prestigious Professorship at University of Minnesota*

“A university must nurture and sustain the careers of its most promising new assistant professors in order to build a strong faculty for the future.” Recent UMass alum Zhi-Li Zhang is going to benefit from this University of Minnesota commitment to junior faculty. Zhang M.S.’92, Ph.D.’97 has been awarded the prestigious McKnight Land-Grant Professorship, a two-year appointment that includes a generous research grant each year plus either a supplementary research grant or a year’s leave to pursue research during the second year of the award.

Established in 1987, the University of Minnesota Graduate School’s McKnight Land-Grant Professorship was named for a significant endowment gift from the McKnight Foundation which was combined with a share of the Permanent University Fund from the original Land Grant to the University. The name of the Professorship emphasizes this public-private partnership.

Zhang decided to go into university teaching because he enjoyed doing research and was attracted by the intellectual challenges offered by academia. His main research areas are in networking and multimedia systems, in particular, problems in Quality of Service provisioning for the Next Generation Internet. He says, “I also enjoy learning new things and sharing the excitement of that learning with other people. Hence teaching and advising students also appeal to me.”

Zhang speaks very positively about his experiences at UMass. “I was lucky to have the op-



Zhi-Li Zhang

portunity to work with my advisors Don Towsley and Jim Kurose, who are both outstanding teachers and professors. As advisors, both are extremely conscientious and responsible; they taught me how to conduct research, how to write research papers, and how to make presentations. Even today, they continue to be very supportive of me. I try my best to emulate them.”

By awarding this professorship UMN recognizes Zhang’s past and current research accomplishments and also conveys encouragement and the expectation that he will continue to excel. “With the research grant and one year ‘research leave’ provided, I will have more resources and time to work on my research projects and to visit other universities and industrial research labs. This will definitely help me further advance my research agenda and, hopefully, make more significant research contributions.”

Zhang can be reached at [www.cs.umn.edu/~zhzhang](http://www.cs.umn.edu/~zhzhang).

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### Faculty News

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Professor **Krithi Ramamritham** has been appointed program chair for the International Conference on Management of Data in Pune, India, December 2000. He is also a steering committee member for the International Workshop on Advanced Issues of E-Commerce and Web-based Information Systems (WECWIS 2000), June 2000, and a vice-chair of the International Conference on Data Engineering to be held in Heidelberg, Germany, 2001. ■ Professor **David A. Mix Barrington** has been invited to be on the program committee for a major theory conference, STACS 2001, in Germany. ■ Beginning July 2000, Distinguished University Professor **Amy Rosenberg** will begin serving a multi-year term as conference chair of the Annual ACM Symposium on Parallel Algorithms and Architectures. This is the flagship theoretical conference in this subject area. ■ Distinguished University Professor **Don Towsley** was recently awarded a 3-year NSF grant on video proxy services that involves researchers from Smith College (Professor Lixin Gao – UMass '96) and AT&T Labs (Drs. Jennifer Rexford and Gisli Hjalmtysson). Other participants at UMass include Professors **Jim Kurose** and **Praasant Shenoy**. ■ The “Thing” from the Laboratory for Perceptual Robotics, co-directed by Professors **Rod Grupen** and **Robin Popplestone**, was selected as the “Cool Robot Site of the Week” for February 14, 2000, by the NASA Space Telerobotics Program. The very cool web site can be seen at [ranier.hq.nasa.gov/telerobotics\\_page/coolrobots.html](http://ranier.hq.nasa.gov/telerobotics_page/coolrobots.html)

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### Visitor News

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**Berthold Voeking** is welcomed as a Visiting Assistant Professor

in the Theoretical Computer Science Group. ■ **Yang Xiang** has joined the Multi-Agent Systems Lab for the spring semester as a Visiting Associate Professor. ■ **John Zigman** joins the Architecture and Language Implementation Laboratory as a Visiting Researcher.

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### Research News

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The Multi-Media Laboratory welcomes **Fred Lenherr** as a Senior Research Fellow. ■ **Bryan Horling** has joined the Multi-Agent Systems Lab as a Senior Research Fellow. ■ **Stephen Blackburn** joins the Architecture and Language Implementation Laboratory as a Senior Postdoctoral Research Associate.

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### Graduate Student News

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A patent was awarded to CIIR graduate student **Srinivas Ravela** and faculty members **R. Manmatha** and **Ed Riseman** for “Image Retrieval by Syntactic Characterization of Appearance.” The US patent number is 5987456 and it is dated November 16, 1999. ■ **Dan Rubenstein**, a student in the Advanced Networking Laboratory, will receive a best student paper award at the forthcoming SIGMETRICS conference, June 2000, for “Detecting Shared Congestion of Flows Via End-to-End Measurement,” co-authored with **Jim Kurose** and **Don Towsley**.

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### Staff News

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**Sharon Mallory** has been promoted to Office Manager and Graduate Program Manager. ■ The Department welcomes **Johanne Menard** as a Bookkeeper I. ■ **Susan Harp** has joined the Experimental Knowledge Systems Laboratory as a Clerk III.

## Croft appointed Distinguished University Professor



W. Bruce Croft was appointed a Distinguished University Professor on February 2, 2000 by President William M. Bulger following approval by the Board of Trustees at its meeting in Boston. The honor recognizes Croft for outstanding academic distinction.

Chancellor David K. Scott, Senior Vice Chancellor for Academic Affairs and Provost Cora B. Marrett, and Dean of the College of Natural Sciences and Mathematics Linda Slakey recommended him for the honor.

“Professor Croft has clearly established himself as a world-renowned leader in a key field of computer science,” said Scott. “The University of Massachusetts benefits from the presence of such an eminent scholar. His record of more than 100 publications in benchmark journals and conference proceedings is exemplary.”

Croft is a highly regarded scholar in the field of information retrieval, and has laid the algorithmic foundations for systems that locate relevant text within large bodies of information, such as encyclopedias or sets of documents such as the World Wide Web.

In 1997, he was elected a fellow of the Association of Computer Machinery (ACM) and in 1998, he was appointed to the Computer Science and Telecommunications Board of the National Research Council. He has also been a distinguished lecturer at the University of California Irvine, Carnegie-Mellon University, Cornell University, and the ETH in Switzerland.

Croft has been particularly successful in linking research results to industrial needs. He is the founder and director of the Center for Intelligent Information Retrieval (CIIR). Funded by the National Science Foundation and industrial memberships, this facility has brought together faculty members, research scientists, and research staff from more than 70 companies and government agencies to develop applications based on research and to train the next generation of researchers.

Croft received his Ph.D. from the University of Cambridge, England, in 1979. He joined the Computer Science faculty that same year and has held the rank of full professor since 1991. He joins Amy Rosenberg and Don Towsley as our Department’s Distinguished University Professors.

—Elizabeth Luciano

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### New Ph.D. News

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**Tom Wagner** has been appointed as an Assistant Professor of Computer Science at the University of Maine, Orono, ME. He is a member of the MaineSAIL (Software agents and AI Lab). ■ **Supratik**

**Bhattacharyya** will begin work at Sprint Advanced Technology Laboratory as a Research Scientist. ■ **Eric McCall** will begin work at Hewlett-Packard Company ■ **Sue Bok Moon** will be joining Sprint Advanced Technology Laboratory as a Research Scientist.

## Faculty distinguishes itself

The frequency with which faculty members are asked to deliver a distinguished or invited lecture is one gauge of how well regarded a research department is by its technical community. Below is a sampling covering the period October 1999 – April 2000.

### ■ Rick Adrion

ASEE Engineering Research Council Summit on New Directions in Engineering Research, February 27-29, 2000; Forum (Session II) *New Directions in Information Science and Technology*

### ■ Andy Barto

Invited talk at the Center for Adaptive Systems, Boston University, April 2000; *Recent Advances in Reinforcement Learning* Smith College, Northampton, MA (upcoming); *Making Trial-and-Error Learning Work for Autonomous Systems*

Invited talk at First Annual Computational Neuroscience Symposium, University of Minnesota, October 1999; *Learning to Reach Via Corrective Movements: A Neural Model*

### ■ Lori Clarke

Distinguished lecture at Michigan State University, January 2000; *Formal Verification: Can we move beyond academic toys to practitioners tools?*

### ■ Paul Cohen

Invited speaker, AAAI Fall Symposium on Question Answering Systems, Falmouth, MA, November 1999; *8.4 Comments on Empirical Methods*

### ■ Rod Grupen

NSF/DARPA/MSA Workshop on Development and Learning, April 2000, Michigan State University; *Structure and Growth: A Model of Development for Robot Systems*

### ■ Jim Kurose

Keynote, IEEE International Workshop on Distributed Interactive Simulation and Real Time Applications, October 1999; *The convergence of multicast communication and active networking: Opportunities for restructuring networked applications*

Keynote, IEEE Real-Time Systems Symposium, December 1999; *Scalable Network Support for Multimedia, Real-Time Communication*

### ■ Victor Lesser

Invited talk, University of Illinois/Urbana-Champaign, November 1999; *BIG: A Resource-Bounded Information Gathering Agent*  
Invited Talk at Northeastern University, Boston, MA, to the Greater Boston Chapter of the ACM, February 2000; *A Next-Generation Resource-Bounded Information-Gathering Agent*

## Success at Sun for former faculty member Susan Landau

In a move that has worked out well for both career and family, Research Professor Susan Landau has joined Sun Microsystems, Inc. in Burlington, MA, as a Senior Staff Engineer. Focusing on cryptography and public policy, she divides her time between technical work for Sun, technical work of her choice, and policy work, and she is able to work mostly from her home.

During her ten years on the UMass faculty Landau especially enjoyed the “lively, interesting, and fun” graduate students, and she misses the sense of making a difference in peoples’ lives that one gets in teaching. In industry, “things move much faster; there is more emphasis on the current technology and what is feasible, patents are easily as important as papers. And everyone talks about stock prices.”

She and Whitfield Diffie have written “Privacy on the Line: The Politics of Wiretapping and Encryption,” which won the 1998 Donald McGannon Communication Policy Research Award, and the 1999 IEEE-USA Distinguished Literary Contributions Furthering Public Understanding of the Profession Award.

She has appeared on NPR several times, and has had articles published in the *Chicago Tribune*, the *Christian Science Monitor*, *Scientific American*, and in numerous scientific journals. She is currently a Distinguished Lecturer for Sigma Xi, and an Associate Editor of the Notices of the American Mathematical Society.

Landau received her Ph.D. from MIT, her MS from Cornell, and her BA from Princeton.

### ■ Lee Osterweil

Distinguished Lecture Series in Software Engineering at the University of Texas at Austin, November 1999; *Using Software Engineering to Engineer Processes*

### ■ Krithi Ramamritham

Malardalen University, Distinguished Lecture, Vasteras, Sweden, November 1999

Keynote: International Conference on Real-Time Computing Systems and Applications (RTCSA '99), December 1999  
2nd International Workshop on Mobility in Databases and Distributed Systems, Florence, Italy, September 1999

## IN MEMORIAM

Klaus Schultz, 64, died on Wednesday, February 9, 2000.

A professor of education and close friend and frequent collaborator of the Department, he developed and expanded a science and math teaching program in the mid-80's that was adopted by several states. Its objective was to halt the “brain drain” of science and math college graduates into high-paying, high-technology jobs which left few to teach in the public schools. Professor Ed Riseman notes that Schultz transcended

many academic departments and disciplines, having started in High Energy Physics at UMass, moved to the School of Education, and worked with CS researchers to deliver improved educational curriculum.

“Klaus was a dear friend to many of us in Computer Science, bringing an unforgettable spirit and warmth to every individual he interacted with. His smiling and always cheerful presence will be greatly missed.”



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