University of Massachusetts Amherst

Spring 2008

Significant BITS

Newsletter of the
Department of Computer Science

Moll addresses online interactive education

Associate Professor Robert Moll and collaborators at the Center for Educational Software Development (formerly CCBIT), have come up with a revised model for online textbooks. The model promises to bring new vitality to computer science education. Called an Evaluator-Integrated Book, or EIB, a textbook in this mold has all of the traditional features of web-based learning, but with one special addition: the book includes exercises that use a real-time, web-based evaluator that scores and checks exercises for correctness. By deploying this new kind of textbook, Moll hopes to make computer science education more vital, more interactive, and more fun.

The most successful EIB so far is an elementary computer programming textbook in Java, called *iJava*. With this book, students read a few paragraphs, and then answer one or more easy questions, mostly programming, that help them to consolidate reading and thinking in a hands-on way. These learning-by-doing activities are "submitted"—passed to a server-based evaluator—and the server responds with a correctness judgment about the submission in real-time. For incorrect submissions, *iJava* provides a variety of diagnostics to the student. "The *iJava* volume, with its 140 embedded exercises, has dramatically reduced the failure rate in our classes over four trial semesters (from a 30-40% final exam failure rate to a 6-12% rate)," says Moll.

A second EIB has also been developed in physical chemistry, which was used for the first time in Fall 2007. Both of these web volumes rely heavily on the OWL (Online Web-based Learning) electronic homework system. This system, with automated grading, was originally developed as a joint collaboration between the UMass Amherst Computer Science and Chemistry Departments in the 1990s, with particular help from then Computer Science chair David Stemple.

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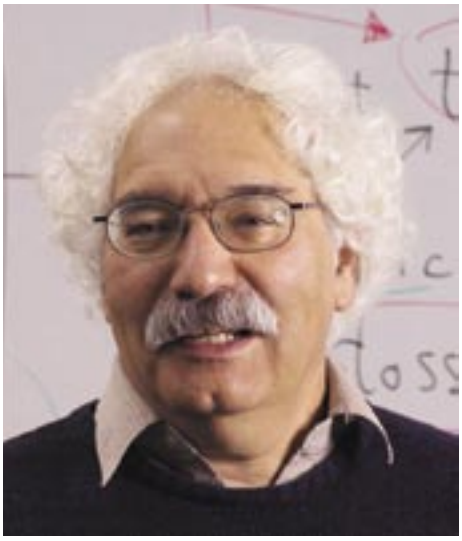

Robert Moll

Hanson and Rosenberg retire

Professor Emeritus Allen Hanson and Distinguished Professor Emeritus Arnold Rosenberg retired in January after a combined 52 years of service within the Department of Computer Science at UMass Amherst.

Even though he is officially retired, Hanson continues directing the department's Vision Lab. Details on his career can be found in the accompanying article on page five.

Since retiring, Rosenberg has been spending time traveling and is currently preparing a new textbook, *The Pillars of Computation Theory: State, Encoding, Nondeterminism*. Springer publishers accepted the text for its Universitext series. Universitext is a series of textbooks that presents material from a wide variety of mathematical disciplines at master's level and beyond. "ArnyFest," a celebration of Rosenberg's distinguished career was held in October, 2007. Details on Rosenberg's career can be found in the fall issue of *Significant Bits*, or at **www.cs.umass.edu/csinfo/announce/arnyfest.html**.

Allen Hanson

Arnold Rosenberg

From the Chair

Andrew Barto

Our faculty just completed a major overhaul of undergraduate degree requirements—with major changes to the Computer Science minor, the Bachelor of Science in Computer Science, and the introduction of a new Bachelor of Arts in Computer Science. In conjunction with the degree program revisions, we are also introducing a large number of new undergraduate courses, and a new core curriculum for all of our majors. We want to encourage a more diverse student population in our courses, and we hope to achieve this by offering our students more flexibility and a greater range of choices in their course selections.

What should be part of a core curriculum for anyone who claims to be educated in Computer Science? How much freedom should students have in selecting their electives? What is the best way to prepare students for an increasingly competitive and global marketplace? How should we prepare those students who want to continue on to graduate school? These are some of the questions that sparked passionate debates and some serious soul searching on the part of our faculty. It has been a long haul and a lot of work, but the results reflect a younger and more modern perspective on a field that is still subject to rapid and sometimes unexpected change.

Some agreements were easy, but most required a lot of talking, a lot of give and take, and a lot of careful planning by the department's curriculum committee. In the end, the faculty stood as one in a remarkable show of unity. We are very proud to announce new requirements for the BS, BA, and CS minor degree programs. All three are currently under review by the University and will not be official until the University formally approves them, but we expect the new degree requirements to take effect on January 1, 2009. All students graduating after 2008 will be able to transition into the new degree requirements, and everyone should find the new requirements far more flexible than our old ones.

Students are legitimately interested in computing and Computer Science for many different reasons, and we want to support students who wish to pursue a variety of different career paths. For some students, Computer Science is a secondary interest. These students will be able to complete a Minor in Computer Science with five CS courses (as opposed to nine for the old Minor).

For students who are committed to Computer Science, the new BS degree moves away from a "one size fits all" model. It requires six core CS courses plus eight CS electives. Students can complete their electives by selecting one of ten possible specialization tracks depending on their individual interests, or they can retain maximal flexibility by declaring no track. Under the old BS, students were required to complete nine core CS courses, and there were fewer elective options available at the undergraduate level. To support greater freedom of choice in our new BS degree, our faculty members have agreed to offer about 20 new 300- and 400-level CS courses, all reflecting active research activities within the department.

The greatest innovation is in our new BA program. For students who want to combine an interest in Computer Science with an interest in a second discipline, under our proposed new curriculum we will be able to offer a BA degree that recognizes the value of a broad educational experience in the spirit of a traditional liberal arts education. Our BA students will be given maximal flexibility in their choice of CS electives, and in exchange, they will be required to complete what amounts to a minor in one other department. We place no restrictions on the choice of a second department—we just want to see our BA students pursue a secondary interest alongside their primary CS interests. Our BA students will then enter the workplace with a foot in two worlds, and we believe these unique backgrounds will enable them to tackle problems in fundamentally new ways.

Our society is facing problems that were not even on the radar screen as recently as ten years ago. We must prepare the next generation to be maximally flexible in an increasingly unpredictable world, and we think our new BA program is one small step in the right direction.

We are looking forward to preparing a new generation of computer science majors with flexible educational options that are better suited for a world of increasingly challenging problems. The one-size-fits-all computer science major may have worked 20 years ago, but that was back when Super Mario Brothers was the hottest video game around. Computers will continue to play an increasingly critical role in modern society, and we are committed to supporting multiple pathways to expertise in Computer Science.

Moss named ACM Fellow

The Association for Computing Machinery (ACM) recently appointed Professor Eliot Moss as a Fellow. He was recognized with this prestigious fellowship for his contributions in transactions and memory management. Only 38 Fellows were named this year out of nearly 63,000 professional members of the ACM.

"Eliot's pioneering contributions to programming language implementation have played significant roles in making modern programming languages easy to use," says Department Chair Andrew Barto. "He certainly deserves this honor."

Moss's research interests include programming language design and implementation, database and information retrieval systems, persistent object stores and persistent programming languages, memory management, and garbage collection. He has studied and built systems in the areas of virtual machines (Smalltalk, Java), persistent object stores and languages, garbage collection, analysis and compiler optimization, application of machine learning to compilers, and transactional programming.

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Adrion chosen for CRA Distinguished Service Award

Professor Rick Adrion received the 2008 Computing Research Association (CRA) Distinguished Service Award, to be presented in July at the CRA Conference at the Snowbird Ski Resort in Utah.

The award recognizes more than two decades of contributions to the computing community, including leadership in the development and federation of national networks that led to today's Internet, strengthening the political voice of computer scientists in national politics, and strengthening the software engineering community.

Adrion has served several times as a senior manager at the National Science Foundation, where he was instrumental in setting strategic directions for computing research. He is also involved in strengthening, modernizing and invigorating computing and technology programs in Massachusetts public higher education, and currently serves as co-director of the Commonwealth Information Technology Initiative and director of the NSF Broadening Participation in Computing Commonwealth Alliance for Information Technology Education.

The use of multimedia technology for teaching and learning, both in the classroom and for distance education, is a major focus of Adrion's research. He is also active in the fields of testing, analysis and verification of complex software systems.

Adrion joined the Department of Computer Science in 1986, serving as chair of the department from 1986-94. During 1989-99, he served as president and chairman of the board of the Applied Computing Systems Institute of Massachusetts, a corporation he founded to transfer technology developed on campus.

Adrion received a doctorate from the University of Texas at Austin in 1971, and has held permanent and visiting positions at the University of Texas at Austin, Oregon State University, Georgetown University and the University of California at Berkeley. He is a fellow of the American Association for the Advancement of Science and of the Association for Computing Machinery.

UMass Amherst CS ranked in top 20

According to the 2009 *U.S. News & World Report* rankings of the best graduate schools, the UMass Amherst graduate program in computer science ranked 20th, while its artificial intelligence specialty ranked 10th and systems specialty ranked 18th.

The annual rankings are based on a combination of expert opinion about program quality and statistical indicators about the faculty, research, and students, the magazine says.

"We have grown dramatically, with the addition of eleven new tenure-track faculty since 2002. The department has tremendous vitality, with innovative courses and research in some of the most exciting emerging fields." says Professor and Department Chair Andrew Barto. "It is this expansion and our commitment to interdisciplinary research that helped to raise our ranking from 25th to 20th this year."

Kurose elected to CRA board

Distinguished Professor Jim Kurose was elected to a three-year term on the Computing Research Association (CRA) Board of Directors. The board is elected by CRA's member organizations. Kurose's term on the CRA board will begin on July 1.

"This election by peers is a strong acknowledgment of his leadership skills and the high regard that the field has for Jim and his many accomplishments," says Professor Andrew Barto, Department Chair.

Kurose's research interests include network protocols and architecture, network measurement, sensor networks, multimedia communication, and modeling and performance evaluation. He is a Fellow of the IEEE and the ACM. Other honors include the IEEE Computer Society's Taylor Booth Education Medal, and IEEE Communication Society Publications Exemplary Service Award.

Kurose was Founding Editor-in-Chief, *IEEE/ACM Transactions on Networking*, and twice served on the IEEE Communications Society Board of Governors. He has been program co-chair of a number of conferences and workshops, including IEEE Infocom, ACM Sigcomm, ACM Sigcomm Education Workshop, ACM Sigmetrics, and ACM IMC. Kurose also has chaired NSF workshops such as Network Research Testbeds and Integrated Computing and Education and Research, and co-chaired a CPATH New England Town Hall Meeting. He currently serves on the ACM Education Council. He was awarded a Ph.D. in Computer Science from Columbia University.

In addition to Kurose, UMass Amherst CS Professor Lori Clarke also holds leadership roles within the CRA. She has one year remaining as vice chair of the CRA, serving the position within both the Executive Office and Board of Directors, and co-chair of CRA's Committee on the Status of Women in Computing Research (CRA-W).

About the CRA

The CRA is a group of more than 200 North American organizations active in computing research: academic departments of computer science and computer engineering; laboratories and centers in industry, government, and academia; and affiliated professional societies (AAAI, ACM, CACS/AIC, IEEE Computer Society, SIAM, USENIX). CRA works with these organizations to represent the computing research community and to effect change that benefits both computing research and society at large.

MOLL – – – – – – – – – – *continued from page 1*

OWL now has a commercial presence in Chemistry and Computer Science, and OWL-Chemistry is one of the nation's premiere web-based homework systems, with nearly 100,000 student subscribers.

EIBs represent a tightly integrated marriage between OWL and an online instructional narrative. In addition to the evaluated exercises inside the *iJava* text, *iJava* also makes use of the elaborate CS-OWL homework system that was developed several years ago with significant support from the National Science Foundation. Thus, students in an *iJava*-based course do easy exercises that are embedded in the text narrative, and also do a harder suite of problems, which are separate from the text and which are drawn from the CS-OWL standard homework corpus.

Why is *iJava* successful? Moll believes that one traditional problem in the sciences is reading. "Students are often lousy readers of technical material," he says. "They do not know how or when to pay careful attention to a technical narrative. The *iJava* text is analogous to training wheels for a weak reader." By providing an easy question every few paragraphs, *iJava* helps students consolidate concepts while giving hands-on experience with the nuts and bolts of Java programming.

iJava has proved to be successful in other settings as well. It seems to be ideal for distance learning. "Learning Java in isolation is not easy, but the consistent drill of questions in the online book makes a remote class far less daunting," adds Moll. So far *iJava*-based distance learning classes have been offered five times, and student success rates are running at about 80%. Moll is also looking into ways of repackaging *iJava* so that it is appropriate for high school advanced placement (AP) classes.

Moll and graduate student Gordon Anderson have begun to exploit another aspect of EIBs. All interactions between students, the online book, and the associated homework system are logged in a database. With this database in hand, it is possible to analyze in some detail the study habits of students. Anderson has come up with one somewhat surprising early finding, says Moll. It turns out that while most students work through the book material first, and then proceed to the associated OWL homework, a surprising number work backwards—they try the homework first, and then return to the book and its material only later when they find that they have run into trouble. Which is a better method? Anderson's preliminary finding is that among students who enter an *iJava*-based course with no previous programming experience, students who work backwards do dramatically worse on exams than forward workers do.

Professor Moll believes that this online format is broadly adaptable, and is especially appealing as a vehicle for short courses that introduce a particular topic, for example Javascript or LINUX. Alternatively, EIBs could be deployed to provide short preparatory courses that are intended to shape and refresh student thinking before a class begins. With other faculty from the College of Natural Sciences and Mathematics, Moll is currently planning to create an electronic "bookshelf" of such courses in computing, chemistry, mathematics, statistics, and information technology. While

A typical *iJava* page, with an open embedded exercise. The blue rectangles in the text are unopened questions.

the current *iJava* work is supported by a U.S. Department of Education FIPSE (Fund for the Improvement of Postsecondary Education) grant, Moll is casting a wider net to try to build a Center for Electronic Education with a particular emphasis on short courses based around the EIB idea.

Moll first joined the Computer Science faculty at UMass Amherst in 1973. He holds a B.S. and M.S. in Mathematics from Carnegie Mellon University, and a Ph.D. in Mathematics from the Massachusetts Institute of Technology. Moll is also the department's Associate Chair for Academic Programs. In addition to the *iJava* volume, he has collaborated on five paper textbooks on programming and theoretical computer science, and he has co-authored two children's books. The first three chapters of *iJava* are online, at: **owl.cs.umass.edu/partners/iJava/v1-3.html.**

MOSS – – – – – – – – – – *continued from page 2*

He is currently researching automatic code generator generation and automatic simulator generation from machine descriptions, resilient grid programming with Java, schedulers and virtual memory managers that react better under high load, and the chaotic (non-linear) behavior of garbage collectors.

Moss received his B.S. ('75), M.S. ('78), and Ph.D. ('81) at the Massachusetts Institute of Technology. He joined the department faculty in 1985 and was promoted to full professor in Fall 2007. Since 2005 he has also been a priest of the Episcopal Church.

Moss joins previously-named CS ACM Fellows W. Richards Adrion, Lori Clarke, W. Bruce Croft, Robert Graham, Neil Immerman, James Kurose, Leon Osterweil, Krithi Ramamritham (now at IIT Bombay), Arnold Rosenberg, and Donald Towsley. The ACM Fellows Program was established in 1993 to recognize and honor outstanding ACM members for their achievements in computer science and information technology and for their significant contributions to the mission of the ACM.

The ACM is the oldest and largest society for computing and technology professionals worldwide. Moss will be inducted at an ACM awards banquet in June.

Allen Hanson retires

Professor Emeritus Allen Hanson retired in January 2008 after a thirty year career as faculty in the Department of Computer Science at UMass Amherst where he and the late Professor Emeritus Edward Riseman established and co-directed the Computer Vision Laboratory. In addition, Hanson and Riseman collaborated for more than a decade before Hanson joined the department.

"The department is immensely grateful to Al for his contributions on many fronts over his many years of service," says Andrew Barto, Department Chair. "His role as a leader of the VISIONS lab put the department on the map from the earliest days of computer vision while providing an exciting research atmosphere for a generation of students; his wisdom helped the department grow and prosper over the years; and his voice in department affairs always reflected deep concern for all of us."

Hanson received his B.A. in Electrical Engineering at at Clarkson College in 1964, and his M.S. and Ph.D. in Electrical Engineering from Cornell University in 1966 and 1969 respectively. Hanson and Riseman studied together at Clarkson and Cornell. After graduating with his Ph.D., Hanson was an Assistant Professor in the Computer and Information Sciences Department at the University of Minnesota until 1973 when he left for an Associate Professor position at Hampshire College. From 1974-1975, Hanson held the position of Dean of the School of Language Communication at Hampshire College. In 1978, Hanson joined the department as a Visiting Associate Professor and then became a tenure-track Associate Professor in 1981. All the while, he continued collaborating with Riseman. "Ed and I had complementary personalities, so we worked well together," says Hanson. "Ed took the lead as the salesman, and I was the engineer."

Hanson's research reflects a broad interest in computer vision and visual information processing, including knowledge-based image understanding, analysis of motion sequences, autonomous vehicle navigation, and parallel architectures for computer vision. Emphasis on practical systems is supported by research on databases for visual image processing, photo-interpretation of aerial images, biomedical image analysis, automated robotic manufacturing and assembly, real-time control of intelligent vehicles, and development environments for vision research. Current research also includes applications of technology for the elderly and vision technology for marine biology. He is the author of numerous technical papers and books in these areas. Hanson is a member of the IEEE, ACM, and AAAI and has served on the editorial boards of several technical journals.

Riseman and Hanson ("Ed and Al" as they are affectionately known) began their first research collaboration in 1969 working on character recognition and classification of hand printed characters. The project was funded by a grant from the U.S. Post Office (the U.S. Postal Service began operations in 1971) through 1973.

During 1972 and 1973, Hanson and Riseman began thinking about the bigger problems of computer vision. With their first National Science Foundation grant, they applied concepts from artificial intelligence and image processing to build an efficient computer vision system. Because it was difficult collaborating from Minnesota, Hanson decided to move East, initially to Hampshire College and then UMass Amherst.

Some of Hanson's and Riseman's groundbreaking research on image processing and image understanding led DARPA, through the Image Understanding program, to fund a broad range of projects related to computer vision in an attempt to understand various aspects of vision. "The whole set of projects that we worked on from 1974 through the middle 1990's were intellectually interesting and rewarding," says Hanson. "They contributed to the understanding of how vision works in the real world and how information from many sensory modalities is integrated into a coherent model."

In pioneering work, the Vision Lab participated in the DARPA Unmanned Ground Vehicle Program. During the five-year project, the Computer Vision Laboratory was one of only two academic labs to have a military HMMWV ("HumVee") on site for development of software for autonomous driving. In another project that showed their leadership in the field of vision, the lab produced a working system for reconstructing the three dimensional structure of the ground from aerial images, as part of the DARPA RADIUS and APGD programs.

As one of the largest research labs in the department, the Computer Vision Lab also had many of the latest computer systems available. During the early years, these included the first TI LISP machine and the first two VAX 11-780 machines. Along with other professors such as Victor Lesser and Bruce Croft, Hanson and Riseman made their machines generally accessible to the department so that the resources could be shared by all who needed them. "For us, it was a natural thing to do," says Hanson about their generosity. "Both Ed and I were very interested in promoting the growth of both the department and its reputation."

"In the late 1970's and early 1980's, it was an exciting time being here during the growth of the department," says Hanson. "There were many unselfish people in the department which made it a great place to be." During his career, Hanson collaborated with a large percentage of the department's faculty working on many cross-disciplinary projects.

In an effort to bring their research ideas to the market, Hanson and Riseman founded Dataviews Corporation (formerly VI Corporation) and Amerinex Artificial Intelligence Corporation (AAI), both of which were visual technology oriented companies originally located in the Amherst, Massachusetts area.

Some of the work at VI/Dataviews led to a ground-breaking product that could visualize large changing sets of data in real-time. The system could be customized to raise alerts if it detected something out of the ordinary.

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Jensen appointed to National Academies committee

Associate Professor David Jensen was recently appointed to serve on the National Academies' Committee to Assess the Research Program of the National Institute of Justice.

The Committee includes prominent scholars in law, criminology, and data analysis. It was commissioned by the U.S. Department of Justice's National Institute of Justice (NIJ) to conduct a 25-month study that will examine the full range of NIJ research activities, including its social science and technology research portfolios. The $1.25 million study will determine the impact of NIJ's programs and how its impact can be enhanced. The review will examine the ways in which NIJ develops and communicates its priorities as well as its research findings. The research will also assess the organization of NIJ, how well it executes its role for conducting research on crime, the criminal justice system and related aspects of the civil justice system, and its ability to respond to both long- and short-term research needs.

Jensen is the Director of the Knowledge Discovery Laboratory at UMass Amherst. His research focuses on the statistical aspects and architecture of systems for knowledge discovery in databases and the assessment of those systems for government and business applications. He has served on several program committees, including the International Conference on Knowledge Discovery and Data Mining, the National Conference on Artificial Intelligence, and the Conference on Intelligent Data Analysis. He is a member of the American Association for Artificial Intelligence, the ACM Special Interest Group on Knowledge Discovery in Databases, and Computer Professionals for Social Responsibility. In 2003, Jensen and researchers from his lab won first place in the KDD Cup data mining competition. He has M.S. and D.Sc. degrees from Washington University.

The National Academies brings together committees of experts in all areas of scientific and technological endeavor. These experts serve pro bono to address critical national issues and give advice to the federal government and the public. Four organizations comprise the Academies: the National Academy of Sciences, the National Academy of Engineering, the Institute of Medicine, and the National Research Council.

HANSON – *continued from page 5*

Walt Disney Company used the product to visualize the parade at Disneyland and AT&T used it on their communications system. VI/Dataviews was later purchased by General Electric.

Even though he is now retired, Hanson expects to remain active in the Vision Lab to continue his research efforts. A system developed for the project, ASSIST: Technology for the Elderly, is now at a test installation in an Amherst senior center. Hanson is also working on a proposal with Professor Rod Grupen to use robots in the ASSIST project. Hanson is working with Assistant Professor Erik Learned-Miller on a National Eye Institute grant to develop software for a device that can help blind and other visually impaired people to navigate through complex environments.

Another project that Hanson will continue to work on is the automatic recognition of plankton. Plankton are living micro-organisms in the Earth's oceans, and they are the foundation of the food chain for marine life. Plankton are also an integral component of the global carbon cycle which regulates the planet's temperature. In collaboration with the Machine Learning Lab at UMass Amherst, Bigelow Lab for Ocean Sciences, and the Coastal Fisheries Institute at Louisiana State University, Hanson's lab is automating the process by classifying plankton species from low-resolution images that are collected in-situ. Initially developed for the plankton community, the research is now reaching a broader community to identify other marine organisms under the sea.

Asked how he would like to be remembered, Hanson replies, "People are our legacy. It is not just awards that are important, but instead it is the students who have been in our group, and how much their education meant to them. We had so many great people in our Vision lab over the years who went on to do important things." Indeed, Hanson was the advisor to over 50 Ph.D. graduates (many co-advised by Riseman). He also led a steady stream of post-docs, programmers, research scientists, and M.S. and B.S. students.

A luncheon honoring Hanson and Riseman held during the CS Homecoming in October 2006 was well attended by their former students who spoke about the positive influences that Hanson and Riseman had on them.

One of Hanson's former students, Robert Collins (1986 Ph.D.), fondly recalls his days at UMass Amherst. "The VISIONS lab was an environment where pure exploration of ideas was possible for the students," says Collins, currently Associate Professor in the Department of Computer Science and Engineering at Pennsylvania State University. "Even when the thesis topic chosen by the student was not of previous interest to either Ed (Riseman) or Al, and did not appear to be immediately relevant, we were still given the chance to try that path to see what came of it. Fostering this sense of freedom to follow the ideas wherever they lead is the main thing that I have taken from my UMass Amherst years, and that I try to adopt in my own lab. It is only after trying to emulate it in my lab with my students that I fully appreciate how hard it was for Ed and Al to create such an ideal research environment."

Balasubramanian receives prestigious Microsoft Fellowship

Microsoft Research selected Aruna Balasubramanian, a graduate student advised by Professors Brian Levine and Arun Venkataramani, as a 2008 Microsoft Research Fellow.

Competition for the fellowship was extremely intense. Microsoft received applications from over 140 highly qualified students and conducted interviews with 56 applicants for 12 Microsoft Research Fellowships and four Microsoft Live Labs Fellowships. The fellowship covers 100 percent of tuition and fees, provides a stipend for living expenses, and includes an allowance for attending professional conferences and seminars. Each fellowship recipient also gets a TabletPC, and is invited to participate in a 12 week paid internship at Microsoft. In March, Balasubramanian was honored at an awards ceremony at Microsoft Research (MSR) in Redmond, Washington.

Balasubramanian will spend this summer as an MSR intern working on building infrastructure for Web access from shuttles on the Microsoft campus. Her current research involves mobile networking, including disruption-tolerant networking (DTNs), which are networks deployments in challenging environments. DTNs assist ecological and habitat monitoring, underwater sensing and actuation, vehicles in municipal networks, robust communication in disaster areas without requiring infrastructure, low-resource deployments in underdeveloped nations, and more. For more details on her current research, see the accompanying article below.

"It is clear why MSR chose Aruna for this award," says Levine. "She is extremely bright and knowledgeable about networking and security, has very good intuition, and is always ready with a new idea to extend her research. Aruna has all the qualities of a top graduate student researcher."

Prior UMass Amherst CS recipients of Microsoft Research Fellowships include Benjamin Carterette (2007), Aron Culotta (2006), and Donald Metzler (2006).

Profile: Aruna Balasubramanian

Aruna Balasubramanian is a Ph.D. student in the Privacy, Internetworking, Security and Mobile Systems (PRISMS) lab and works with Professors Brian Levine and Arun Venkataramani. Balasubramanian chose to pursue graduate studies in computer science because she liked the logic-based nature of the field. She also enjoys the balance of theory and practice in computer science. She has been a graduate student for three years and says she likes the constant challenges and the stimulating research environment. "The best part of being a graduate student in computer science is the consistent exposure to a wide array of learning opportunities," she says. "And UMass Amherst provides a collaborative and nurturing environment to learn and to do science." Her research interests are broadly in networking and system building.

Balasubramanian's current research focus is in building a robust network protocol to allow ubiquitous network connectivity. She hopes that her protocol can be used for connectivity by a wide range of users, including stationary users, pedestrians and passengers in a vehicle. In the last couple of years, she has worked on building a routing protocol that works efficiently in challenged networks where only intermittent connectivity is available. She spent the summer of 2007 at Microsoft Research in Redmond where she worked on enabling Voice over Internet Protocol (VoIP) to make Internet-based phone calls from moving vehicles. "Internships and conference travel are an integral part of grad school," says Balasubramanian. "To me these opportunities are very exciting because I can travel to new places and collaborate with researchers around the globe."

Balasubramanian participates in a wide variety of activities both within and outside the department. She was co-chair for the CS Women's group for a year. She planned several social events for the women in the department including a social she hosted at her house and a trip to the Northampton gardens. "These activities really bring people together and as a result I have made some great friends over the years," she says. She volunteers for the diversity committee and attends networking events and conferences for women such as the Grace Hopper conference. Her event-filled academic calendar includes poster sessions for departmental activities such as homecoming weekend, CS Saturday (a day-long event for undergraduate students to learn about CS grad programs), and panel discussions.

Outside the department, Balasubramanian nurtures a strong interest in Indian classical music and makes frequent trips to Boston to attend concerts. When she is not working in her lab, she likes being outdoors and spending time with friends. She can be found at the Amherst Brewing Company most Friday nights. Balasubramanian says she is able to easily balance school and social life especially since her husband, Niranjan, is also a graduate student in the department. She and her husband share an interest in science, music, cooking, traveling, and watching old classic movies. It really takes another grad student to understand the rigors and demands of grad school, she says. Her non-academic goal during her graduate life is to become a good skier.

University of Massachusetts Amherst
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Alum Matters

A newsletter for alums of the Department of Computer Science

Friedman to direct major networking project

Starting in September 2008, Timur Friedman (UMass Amherst CS Ph.D. '02) will be the Scientific Director of OneLab2, a European computer networking project that aims to facilitate the emergence of the future internet. The project brings together researchers from 26 academic and industrial laboratories to develop a common test bed on which radically new networking technologies can be tried out at a global scale. The project's total budget is 8.9 million euros (14 million dollars) for two years, of which 6.3 million euros is provided as a grant from the European Union.

Shortly after completing his dissertation under the supervision of Distinguished Professors Don Towsley and Jim Kurose, Friedman became a Maître de Conférences (assistant professor) at UPMC Paris Universitas (formerly known as the University of Paris VI) in France, and he joined the Networks and Performance Analysis research group of Professor Serge Fdida at the university's LIP6 computer science laboratory. Friedman worked with Fdida to assemble a coalition of ten research groups and obtained funding for the initial OneLab project, which started in September 2006.

As Director of OneLab, Friedman has put in place the PlanetLab Europe test bed. "We've taken the highly successful free open-source PlanetLab software and used it to create an infrastructure for European researchers," says Friedman. "Our test bed is federated with the original PlanetLab run by Princeton University." Researchers on each platform have access to the combined system. The INRIA research center in Sophia Antipolis in the south of France, a OneLab partner and technical lead on the project, has become a co-developer of the PlanetLab code base. "This gives us the ability to introduce functionalities that meet the demands of researchers in Europe," says Friedman, "such as our emulation capabilities for new wireless technologies."

As a result of this work, OneLab is at the center of the European Union's Future Internet Research and Experimentation (FIRE) Initiative

Photo by Cynthia Tolentino

for developing new internetworking paradigms and providing experimental facilities upon which to test them. OneLab2 will be one of FIRE's two flagship projects. Friedman and his colleagues are taking on a global leadership role in this area of research. "We are in regular dialog with similarly-motivated initiatives, such as GENI/FIND in the United States, and AKARI in Japan, which are also promising to devote considerable resources to this area," says Friedman. "It is an exciting time in computer networking."

Career planning panel session

Three UMass Amherst Computer Science alums and a career specialist spoke to CS undergrads during a March panel session titled "Whatcha Doin' This Summer … And Beyond?".

Panelists included (l. to r.): Vitaliy Lvin (BS '05; MS '07, Bay State Scholar), currently at Google; Irene Ros (BS '06), currently working for IBM; Jeff Silver from the UMass Amherst Career Services office; and Esha Ray (BS '02, MS '04; Bay State Scholar), currently at Sun Microsystems.

The panelists discussed planning for graduate school and also provided information on job hunting for summer jobs, internships, and careers in computer science. Fifty students listened to brief presentations from each of the panelists on how to find an internship or summer job, tips for interviewing, career options, and help with deciding on whether or not to go to graduate school.

The panel session was part of the "First Friday" series of events held on the first Friday of the month to provide undergraduates with critical information about their current studies in the department and career opportunities.

The University Council of the University of Macau appointed **Wei Zhao** (Ph.D. '86) as its 8th Rector. He will take office in the next academic year (2008/2009) for a term of 5 years. Zhao will leave his current post as Dean of the School of Science at Rensselaer Polytechnic Institute. Before he joined RPI in 2007, he was a Senior Associate Vice President for Research at Texas A&M University. Between 2005 and 2007, he also served as the Director for the Division of Computer and Network Systems at the National Science Foundation. During his career, he has also been a faculty member at Amherst College, the University of Adelaide, and Texas A&M University.

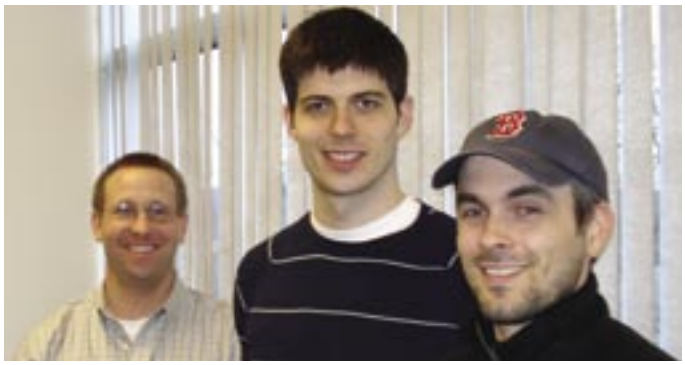
MIT's **Sai Ravela** (Ph.D. '03) is working with Kevin McGarigal, UMass Amherst Assistant Professor of Natural Resources Conservation, on an NSF-funded project to develop tools for employing digital photography to identify and monitor movements of individual animals in the environment. Ravela, whose advisor was Professor Allen Hanson, is currently a Research Scientist at MIT conducting research in earth systems and computational vision.

This past fall, CIIR graduate **Victor Lavrenko** (Ph.D. '04) accepted a position as a Lecturer at the University of Edinburgh School of Informatics. While at UMass Amherst, Lavrenko was advised by Distinguished Professor Bruce Croft and Associate Professor James Allan. Lavrenko's current research interests include formal models for searching text in multiple languages, annotating and retrieving images, and detecting and tracking novel events in the news.

Jayanta K. Dey (Ph.D. '98) holds the position of Director of Engineering at Network Appliance, working out of Sunnyvale, CA. He leads a team that develops storage solutions to retain data efficiently for long periods of time, an area that is seeing very high growth in industries worldwide. Previously, he was responsible for overall architecture and strategy of the digital media storage division of Avid Technology. He worked with Distinguished Professors Don Towsley and Jim Kurose while he was a UMass Amherst CS student.

Ramachandran Ramjee (Ph.D. '97), advised by Distinguished Professors Don Towsley and Jim Kurose, gave a research talk to the department in March titled "TrafficSense: Rich Monitoring of Road and Traffic Conditions using Mobile Smartphones." Ramjee is currently a Senior Researcher at Microsoft Research, India.

Other CS alums who spoke in the department this semester include **Don Metzler** (Ph.D. '07), currently a Research Scientist at Yahoo! Research, and **Sally Waisbrot** (MS '82), R&D Manager at McKesson Provider Technologies.



Alums at TripAdvisor

UMass Amherst Computer Science alums (r. to l.) Keith Fitgerald (B.S. '98) and Max Hansmire (B.S. '05) discuss their latest projects with Scott Mega (B.S. '89, UMass Amherst Computer Systems Engineering). The three alums work at TripAdvisor headquarters in Needham, MA.

"The UMass Amherst computer science program produces outstanding engineers and we're proud to have a number of them on the TripAdvisor team, where their skills and abilities have taken them to key leadership positions," says Steve Kaufer, TripAdvisor founder and CEO.

TripAdvisor-branded sites make up the largest travel community in the world, with more than 25 million monthly visitors, six million registered members and 15 million reviews and opinions. Featuring real advice from real travelers, TripAdvisor-branded sites cover 300,000+ hotels and attractions.

ACM taps Dwyer for achievements in computing

The Association for Computing Machinery (ACM) named Matthew Dwyer, UMass Amherst CS alum (Ph.D. '95), as an ACM Distinguished Scientist.

ACM has named 20 of its members as recipients of a recently created recognition program for their contributions to both the practical and theoretical aspects of computing and information technology. The program, initiated in 2006, recognizes those members with at least 15 years of professional experience and 5 years of continuous professional membership who have made significant accomplishments or achieved a significant impact on the computing field.

Dwyer, advised by Professor Lori Clarke while at UMass Amherst, is a Professor and Henson Chair of Software Engineering at the Department of Computer Science and Engineering, University of Nebraska Lincoln. His research interests are in software specification and analysis. Professor Dwyer is particularly interested in combining different forms of analysis, e.g., dynamic and static, lightweight and heavyweight, informed and randomized.

Spotlight on CS undergraduate Stevie Sellers

Stevie Sellers is not exactly sure why she enjoys computer science so much, but she does know that things just feel right when she is coding. "I remember when I was a little kid watching movies," says Sellers. "One kid would say 'I want to be a rock star' or 'I'm going to be an astronaut' or even 'I'm going to be a princess.' I looked at the person who was typing all these complex algorithms and thought 'that's what I want to do'."

As a child, Sellers used every opportunity she could to work with computers, such as the typing class her mother enrolled her in when she was about eight years old. Before taking any coding courses as a teen, Sellers taught herself basic HTML through online tutorials. She only took two major computer-related courses in high school, in Web design, and she excelled in both. These positive experiences helped her to decide to pursue an undergraduate degree in computer science, and she plans to minor in mathematics because of her love for math.

Sellers is currently a member of the Commonwealth College, the honors college at UMass Amherst, and expects to graduate in 2010, likely with honors. During her first year, she was a member of the Talent Advancement Program (TAP). TAP students live together with other students in the computer science program and attend several common courses. As a result of her great experience in TAP, she became a TAP ambassador in 2007 to speak with incoming students who were looking into joining the TAP. "When I first entered college, I was really scared," says Sellers. "But then I made many friends because of the TAP program so I am no longer scared and really enjoy college."

When she is not immersed in her studies, Sellers has a number of activities that she enjoys. She has played the flute since the sixth grade and has also started playing the piccolo. In the summer she plays for her hometown summer band. In addition to music, she also likes creative writing, hanging out with her friends, and going to sports events on campus. She is especially interested in going to hockey games because of the fast-paced and ever-changing environment of the game.

Sellers is hoping to get an internship this summer to give her some hands-on experience in her chosen career path. One option would be to work at EMC Corporation which is headquartered in her hometown of Hopkinton, MA.

As a woman in computer science, Sellers has often been asked if it is discouraging to be in a field where there are so few females. "Just the opposite," replies Sellers. "Just because very few females work in computer science, why should I not do what I love? It is fun going against the curve, and it is a challenge that I am willing to take head on."

Spotlight on CS and Psychology undergraduate John Tuttle

On his way to a career in psychology, undergraduate John Tuttle took a detour into the world of computer science. That detour led him to realize that computer science is where he wants to be. After graduating from UMass Amherst in May, Tuttle will join the department's Baystate Scholars program this fall to pursue a Master's degree in computer science.

"Given the fact that my interest in computers started when I was barely old enough to hold a Nintendo controller, I really should have known from the start that computer science was my true calling," says Tuttle. However, early in his undergraduate career, psychology was his first love. He had completed a Psychology major with departmental honors and was half-way through writing a thesis on examining the effect of facial distinctiveness on facial recognition when he started taking introductory computer science classes for fun. He quickly became hooked.

"In the first semester of my senior year, I made the difficult decision to delay my graduation for however long it would take to complete the computer science major," says Tuttle. "Two and a half years later, on the verge of graduating with a B.S. in computer science and a B.A. in psychology, I consider sticking around to be one of the best choices I have made in my academic career." Tuttle adds that his involvement with computer science has allowed him to get in touch with his true passions. Tuttle exclaims, "It has really put me on the path to getting what I want out of life, while allowing me to meet some great people along the way!"

Several semesters ago, Tuttle discovered the department's Information Assurance concentration and has since become extremely interested in the areas of security and digital forensics. Although he was unable to fit undergraduate research into his double major compacted curriculum, he looks forward to returning to UMass Amherst in the fall as a graduate student in order to pursue research in security. "Although my time in the CS major so far has been brief, I never could have imagined I would learn so much in such a short period of time."

Since last summer, Tuttle has worked for Golden Goose Games, a company in Northampton that produces software for larger companies such as Hasbro, doing contract work making web-based Flash games. He is using this same skill set this semester to combine his work interests with his education.

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CS women attend Grad cohort workshop

Professor Lori Clarke and graduate students Naomi Fox, Pallika Kanani, Divya Krishnan, and Bobby Simidchieva attended the CRA-W Grad Cohort Workshop in Seattle on March 13-14, 2008. Now in its fifth year, the workshop was created to arm female graduate students with the resources they need to be successful computer science researchers. The workshop also facilitates the development of a support network for women graduate students.

The attendees participated in sessions on topics pertinent to being successful in a computer science graduate program. Allotted free time between sessions gave participants the chance to network and share experiences in their programs. Over 300 graduate students, professors, and researchers from U.S. and Canadian universities and research labs attended the 2008 workshop, which was sponsored by Microsoft and Google.

In the workshop kick-off session, led by Penn State Professor Mary Jane Irwin, every attendee was instructed to prepare an elevator talk (see inset) to be used over and over during the workshop. For an unknown graduate student, having a good elevator talk is vital to getting others excited to discuss her research.

Two UMass Amherst members participated as speakers; Clarke led the session "Advising and Mentoring," and Fox spoke in the session "Finding Academic Year Funding." Other sessions included "Time Management," "Preparing Your PhD Proposal," and "Having a Career and a Life."

The conference also included a poster session during which second- and third-year graduate students presented their research. Fox presented her research on "Design of RigDyn: A Software Framework for Rigidity and Motion Analysis," and Simidchieva presented her work on "Representing Process Variation."

Prepare and practice your elevator talk!

An elevator talk is a three-sentence description of your research/interests, which addresses the following questions:

1. What is the problem you are solving?
2. Why is this problem important?
3. What is novel about your solution?

Mentoring program established

To get more participation from undergraduate women, the Computer Science Women's Group (CS Women) has established a Mentoring Program. The group paired each undergraduate woman who has declared computer science as a major with a female CS graduate student.

CS Women is a forum for women in the department to discuss academic and social issues. The group organizes visits from prominent women researchers from academia and industry to share their experiences and their thoughts on the role of women in research. They meet over lunches and other social events to stay connected. While CS Women's events are open to all women in the department, primarily graduate students attend. With the Mentoring program, the group hopes to change that. "We would really like to get to know the undergraduate women, and we think we might be able to help in case they have questions about the program or graduate school in general," says Huong Phan, one of the co-chairs.

"The graduate women reached a consensus that a mentoring program would have benefited them when they were undergraduates themselves," says Bobby Simidchieva, the other co-chair of the group. "We wanted a support system in place for the undergraduates who are not likely to see other female students in their computer science classes. We want to communicate to them that there are other women in computer science—our graduate program is almost 20 percent females."

Volunteer mentors began communications with their mentees during informal gatherings over coffee and email correspondence. The group is planning an end of semester event where all the mentors and mentees will gather to mingle.

"It is a good way to meet more people in the department," comments one undergraduate in the new program. "Having a mentor allows us to have another person to turn to when we have any questions about computer science."

Mentor Elif Aktolga adds that the Mentoring Program is a good idea for final year students who are about to get into the application process and who would have specific questions about grad school and careers, and also for new students who would benefit from help at the beginning of their college careers.

For more information about the Mentoring Program or CS Women, please visit **www.cs.umass.edu/~women/**.

TUTTLE - *continued from previous page*

He is currently working with Assistant Professor Mark Corner to design a set of user-interface tutorials for Corner's Usability class. In this project, he is writing step-by-step lessons that gradually introduce students with little programming experience to the features of Adobe Flex in order to show them how to create basic user interfaces. Tuttle is also embarking on a project with Associate Professor Brian Levine to create a piece of Flash software for the UMass Amherst Fine Arts Center.

As for other interests, Tuttle enjoys bicycling when the weather allows it, and he likes to break out his guitar every now and then. "I love martial arts, and I'm currently a green-belt, blue-stripe in Tae Kwon Do," adds Tuttle. He is also an avid video gamer who enjoys both playing and creating games.

Although he has abandoned psychology as a career path, he still possesses a strong interest in human behavior and enjoys reading about topics like body language and evolution. On the weekends, he will usually end up in the five-college area relaxing with friends or exploring a new restaurant with his girlfriend. "Amazingly enough, I have been here six years and there is still always something to do," adds Tuttle.

Improving security and privacy of implantable medical devices

Certain medical devices such as implantable cardiac defibrillators and pacemakers are now equipped with wireless technology, allowing for remote observation of patients. But this convenience may come with unanticipated risks. Assistant Professor Kevin Fu and colleagues from the University of Washington and Harvard Medical School demonstrated that patients' private medical information could be extracted from these medical devices. Also, these medical devices can be reprogrammed without the patients' authorization or knowledge. The research appeared at the 29th Annual IEEE Symposium on Security & Privacy.

The researchers' experiments used an implantable cardiac defibrillator, a sophisticated device that automatically regulates the heart beat by sending small electrical signals to the heart to stimulate the heart rate or by delivering a large shock to restore a potentially fatal heart rhythm back to normal. Implantable defibrillators have improved survival in selected patients at risk for sudden cardiac death, and millions of the devices have been implanted worldwide. The model used in the researchers' experiment contained computers and radios that allow health-care practitioners to diagnose patients, read and write private medical information, and adjust the device's therapy settings wirelessly.

In computer laboratory bench tests, the research team used an inexpensive software radio to intercept and capture signals sent from the implantable device. They were able to obtain detailed information about a hypothetical patient, including name, diagnosis, date of birth and medical ID number. Researchers could determine the make and model of the device and access real-time electrocardiogram results as well as data on the hypothetical patient's heart rate and cardiac activity. Researchers were able to turn off the therapy settings stored in the implantable device, rendering it incapable of responding to dangerous cardiac events. The researchers were also able to transmit a command to the defibrillator to cause it to deliver a shock. Such a shock could induce ventricular fibrillation, a potentially lethal arrhythmia.

Fu noted that the study developed several prototype defenses. "One of our primary contributions is the invention of three defense mechanisms that require no battery power, making them potentially easy to incorporate in the devices without extensive redesign of the device. While there has been much research that explores the biological safety of implantable medical devices, there is limited understanding about the related issues of wireless security and privacy."

The team expects that security and privacy will take on greater importance as implantable cardiac defibrillators begin to operate wirelessly at greater distances. These devices typically receive short-range wireless signals over several feet, but new technologies are expanding that reach even farther, creating the potential for information to be intercepted en route.

Fu's long-term research vision seeks to answer the question of how to balance security and privacy with safety and effectiveness for pervasive computing. With such balance patients will live more normal, healthy lives through better treatment of chronic diseases.

Robots assist with elder care

Baby boomers are set to retire, and robots are ready to help, providing elder care and improving the quality of life for those in need. Professor Rod Grupen and his colleagues have developed a robotic assistant that is being integrated into a system called ASSIST that can dial 911 in case of emergencies, detect and respond to falls, remind clients to take their medication, help with grocery shopping, and allow a client to talk to loved ones and health care providers.

Concerned family members can access the unit and visit their elderly parents from any Internet connection. The unit may also be remotely navigated around the home to look for Mom or Dad, who may not hear the ringing phone or may be in need of assistance. Doctors can perform virtual house calls, reducing the need for travel.

"For the first time, robots are safe enough and inexpensive enough to do meaningful work in a residential environment," says Professor Rod Grupen, director of the Laboratory for Perceptual Robotics, who developed project ASSIST with Professor Allen Hanson, the late Professor Emeritus Edward Riseman, and colleagues Dr. Phebe Sessions and Dr. David Burton in the Smith School for Social Work. Through focus groups, the researchers learned about the preferences of potential users and their expectations and fears of technology. This information was used to design ASSIST.

The robot, called the uBot-5, could allow elders to live independently, and provide relief for caregivers, the medical system and community services, which are expected to be severely stressed by the retirement of over 77 million Americans in the next 30 years.

The videophone is one of the services that ASSIST provides to its clients. Seniors love the uncluttered interface design and the ability to easily establish two-way video contact with family members.

The uBot-5 design was inspired by a human's anatomy. An array of sensors acts as the robot's eyes and ears, allowing it to recognize human activities, such as walking or sitting. It can also

continued on next page

Croft and Diao speak at WPI

In an effort to increase collaborations with other Massachusetts higher-education institutions, Distinguished Professor Bruce Croft and Assistant Professor Yanlei Diao gave talks as part of the Worcester Polytechnic Institute (WPI) Computer Science Department's Colloquium series.

On April 18, Croft spoke on Text Reuse on the Web. Many people are familiar with the issue of plagiarism using information available on the Web. Detecting duplicate documents has been studied because of its importance to Web search engines. Text reuse occurs whenever somebody "borrows" and modifies facts or statements from a source document and uses these facts or statements in another document. In his talk, Croft considered techniques for detecting a wide range of text reuse, and evaluation of such techniques. He also reported on an experiment to determine the amount of text reuse in news and blog databases.

"Expressing and Evaluating Complex Event Patterns over Streams" was the topic of Diao's talk on April 25. Complex event processing (CEP) is being applied in a growing number of stream environments such as financial services, RFID-based supply chain management, and electronic health systems. As the information needs of these applications evolve, there is an increasing demand for event processing involving filtering, correlation, and sophisticated pattern matching. Diao presented the design, implementation, and evaluation of SASE+, a complex event processing system that is being developed at UMass Amherst.

Influential paper award

Professor Victor Lesser and his former student Ed Durfee (Ph. D. '87) received the 2008 IFAAMAS Influential Paper Award for their 1991 paper "Partial Global Planning: A Coordination Framework for Distributed Hypothesis Formation" in IEEE *Transactions on Systems, Man, and Cybernetics*. The award, presented at the Seventh International Conference on Autonomous Agents and Multiagent Systems (AAMAS) in Portugal, is given by the International Foundation for Autonomous Agents and Multi-Agent Systems to recognize publications that have made seminal contributions to the field.

Lesser is the director of the department's Multi-Agent Systems Lab (MAS). Durfee is currently a Professor at the University of Michigan's Department of Electrical Engineering and Computer Science.

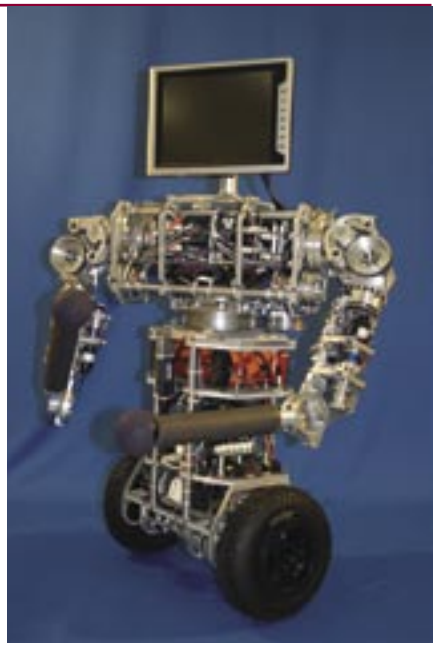
ROBOTS – – – *continued from page 12*

recognize an abnormal visual event, such as a fall, and notify a remote medical caregiver. Through an interface, the remote service provider may ask the client to speak, smile, or raise both arms, movements that the robot can demonstrate. If the person is unresponsive, the robot can call 911, alert family, and apply a digital stethoscope to a patient, conveying information to an emergency medical technician who is en route.

The system also tracks obstructions. If a delivery person leaves a package in a hallway, a sensor array on uBot-5 is trained to notice when a path is blocked, and the robot can move the obstruction out of the way. It can also raise its outstretched arms, carry a load of up to 10 pounds and has the potential to perform household tasks that require a fair amount of dexterity including cleaning, fetching objects, taking out the trash, or helping in the yard.

The uBot-5 carries a Web cam, a microphone, and an LCD display that acts as an interface that can be used to communicate with the outside world. "Grandma can take the robot's hand, lead it out into the garden and have a virtual visit with a grandchild who is living on the opposite coast," says Grupen, who notes that isolation can lead to depression in the elderly.

Graduate students Patrick Deegan, Emily Horrell, Shichao Ou, Sharaj Sen, Brian Thibodeau, Adam Williams, and Dan Xie are also collaborators on project ASSIST.



UBot-5

Searching for a new career?

Check out our job posting site to find listings from companies interested in hiring CS alums and current students: **www.cs.umass.edu/csinfo/jobinfo.**

Faculty News

Assistant Professor **Arun Venkataramani** and co-authors J.P. John, E. Katz-Bassett, A. Krishnamurthy, and T. Anderson received the Best Paper Award for "Consensus Routing: The Internet as a Distributed System" at the 5th USENIX Symposium on Networked Systems Design & Implementation (NSDI '08) held in San Francisco, CA in April.

Associate Professor **Brian Levine** received the "Excellence in Science & Technology Award" from the SUNY Albany alumni association. The award recognizes Levine for his many achievements since his days as an undergraduate at SUNY.

Professor **Lori Clarke** gave a Keynote address at the 2008 International Conference on Software Engineering describing the research that Professors Lee Osterweil, George Avrunin, and Clarke have been doing on medical safety with UMass Amherst Nursing Professor Beth Henneman and medical personnel at Baystate Medical Center.

Associate Professor **David Jensen** was appointed an associate editor of *ACM Transactions on Knowledge Discovery in Data*.

Assistant Professor **Kevin Fu** received a Commercial Ventures & Intellectual Property (CVIP) Technology Development Fund '08 award for commercial technology development of zero-power defenses for implantable medical devices. Using zero-power telemetry in implantation devices can extend the lifetime of batteries, enabling patients to have a better quality of life. Funding will be used to construct a prototype demonstrating the technology.

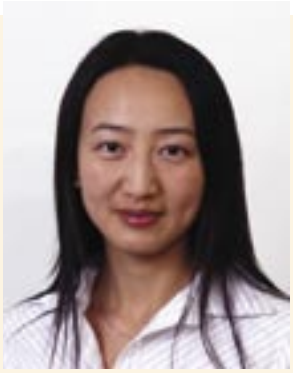
Distinguished Professor Emeritus **Arnold Rosenberg** was invited to give a talk at SPAA: ACM Symposium on Parallelism in Algorithms and Architectures in Munich, Germany in June.

Researcher News

Research Scientist **Michael Zink** and co-authors **Kyoungwon Suh** (UMass Amherst CS Ph.D. '07), **Yu Gu**, and **Jim Kurose** received the Best Paper Award for "Watch Global Cache Local: YouTube Network Traces at a Campus Network - Measurements and Implications" presented at the 2008 Multimedia Computing and Networking Conference (MMCN '08) held in San Jose, CA in January.

Susan Landau, former CS Research Professor and wife of Prof. Neil Immerman, received a 2008 Women of Vision Award from the Anita Borg Institute. Dr. Landau is currently a Distinguished Engineer at Sun Microsystems Laboratories. The Awards honor women making significant contributions to technology in three categories: innovation, leadership, and social impact.

Fellowship finalist



The Microsoft New Faculty Fellowship Program was established to recognize junior faculty who are advancing computing research in novel directions, have the potential for high impact on the state of the art, and demonstrate the likelihood of becoming innovative leaders in the field. The selection process was highly competitive. Among approximately 100 nominees, 11 candidates were invited for on-site interviews. Through this process, Assistant Professor Yanlei Diao was selected as a finalist for the Microsoft New Faculty Fellowship with an award trophy to recognize her research accomplishments and vision.

Diao's research is based on the vision that recent advances in sensing, network monitoring, and application monitoring will soon generate an unprecedented volume of real-time streaming data. Hence, there is an increasing demand of an information infrastructure that collects real-time data and delivers meaningful, actionable information of vital economic, social, and environmental importance. A large class of emerging applications in this new infrastructure presents daunting yet critical challenges that call for significant broadening and enriching of data management research. For example, in many applications such as object tracking and severe weather monitoring, data is incomplete, noisy, and even erroneous, and such data is produced at high rates. As such data is passed through various processing stages, the results are often of unknown quality. There is an increasing need for applications and infrastructures that can deal with such uncertainty. Similarly, there is a growing need for applications that can efficiently manipulate and handle low-quality data. An increasingly important form of data-information transformation is to define application information needs using complex logic that uses filtering, correlation, and sophisticated pattern matching. Such transformations must be performed in real-time and often using low-quality data.

To address these challenges, Diao proposes two new directions of research in data management: To handle uncertain data, her research advocates a fundamental extension of *real-time data management systems with learning capabilities*, including efficient inference over data streams, modeling computation error, and self-tuning for error reduction. For complex *data*-information transformation, her research explores *Complex Event Processing*, a new processing paradigm that is grounded in automata and complexity theory and amenable to efficient, robust implementation.

Dmytro Novytskiy joined the Biologically Inspired Neural and Dynamical Systems (BINDS) Lab as a Postdoctoral Research Associate.

Antonio Augusto de Aragao Rocha is a visiting scholar from the Federal University of Rio de Janeiro working with the Computer Networks Research Group.

Student News

Graduate students **Karl Schultz** and **Rachel Shorey** were awarded three-year National Science Foundation Graduate Research Fellowships. **Jacqueline Kenney** and **William Dabney** received honorable mention in the competition. The award includes a $30,000 stipend plus tuition and fees for three years for each awardee.

Undergraduate **Ali Shah**, who works with Assistant Professor Emery Berger, will spend the summer in the prestigious IBM Extreme Blue internship program for software developers.

Graduate student **Elisha Rosensweig** and his wife Anat welcomed the birth of their baby girl, Kinneret Channa, April 11.

Graduate student **Dubi Katz** and his wife Gili, announced the birth of their baby boy, Yahel Katz, born on leap day, February 29.

Staff News

Under the direction of Professor Rick Adrion, the Commonwealth Alliance for Information Technology Education (CAITE) and the Commonwealth Information Technology Initiative (CITI) welcomed **Renee Fall** as Project Manager and **Hillary Rathbun** as Communications Assistant.

Kevin Kohler joined the department as a Staff Programmer working with Professors Robbie Moll and Beverly Woolf.

Andre Gauthier was promoted to Systems Manager 1 within the Center for Intelligent Information Retrieval.

Cisco scholarship recipients

Computer Science undergraduates (l. to r.) Meagan Day, Marisa Pacifico, and Ashley Prudden accept congratulations from Cisco's Jim McCann. The trio received Cisco Systems Undergraduate Scholarships targeted towards underrepresented groups in CS. Department Chair Andrew Barto and Mary Ellen Yates, UMass President's Office Director of Corporate Relations, joined the group for a celebratory breakfast on February 8th.

Krainin receives Goldwater and CRA awards

Michael Krainin, an undergraduate Computer Science and Mathematics major, has won a prestigious Goldwater Scholarship, and he was selected for Honorable Mention in the Computing Research Association's (CRA) Outstanding Undergraduate Award competition for 2008.

The CRA program recognizes undergraduate students who show outstanding research potential in an area of computing research. Nominees whose work is considered to be exemplary are recognized with Honorable Mentions.

Krainin is one of just 321 students in the nation to win the Goldwater award for the 2008-09 academic year out of 1,035 students nominated. Goldwater Scholars are selected on the basis of academic merit, and are students who intend to pursue careers in science, mathematics, or engineering. It is the premier undergraduate award of its type in these fields. The scholarship covers the cost of tuition, fees, books, and room and board up to $7,500.

A Commonwealth College honors student, Krainin is currently on exchange at Uppsala University in Sweden, where he is taking courses in algorithmic problem-solving, machine learning, elementary particle physics, and basic Swedish.

For the past two years, Krainin has worked in the department's Multi-Agent Systems Laboratory under Professor Victor Lesser. He has also completed two summer Research Experience for Undergraduates programs with the Collaborative Adaptive Sensing of the Atmosphere (CASA), a National Science Foundation center. This led to his publication of a paper in the proceedings of the 2007 Intelligent Agent Technology Conference in California, where he presented his research.

"The scholarship is going towards helping to pay for my school fees and expenses for my final year at UMass Amherst," he said. "I've already completed the requirements for the computer science major, but I've elected to stay for a year longer than I would really have to. That way I have some extra time for opportunities I want to pursue. These include coming here to Sweden, taking a second major, continuing to do research, and taking courses like 'General Relativity,' about which I'm curious. Having this scholarship makes staying for a fourth year a bit easier."

The Barry M. Goldwater Scholarship and Excellence in Education Program, established by Congress in 1986, honors Senator Barry M. Goldwater. He served his country for 56 years as a soldier and statesman, including 30 years of service in the U.S. Senate.

Significant Bits

Newsletter of the
Department of Computer Science
College of Natural Sciences & Mathematics
at the University of Massachusetts Amherst

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Gifts like yours help the department in many ways, such as funding departmental seminars by outstanding scientists, assisting undergraduate research, and helping new faculty establish their research programs.

A current need within the department is to upgrade the equipment in our instructional education lab and PC lab with new computers. The department also needs to furnish the newly renovated study and classroom space in the Lederle Lowrise. In addition, donations to our CS Endowment fund will have continuing benefits to the department's graduate and undergraduate programs.