

Significant BITS

Newsletter of the
School of Computer Science



~~Department~~ School of Computer Science

This past December 11th, the UMass Amherst Faculty Senate officially ushered in a new era, voting to approve the transformation of the Department of Computer Science into the School of Computer Science. This change signals the recognition by the University of Massachusetts Amherst both of the excellence of the computer science faculty as well as the increasingly central role that computer science plays within the University of Massachusetts, the Commonwealth of Massachusetts, and the nation.

Schoolhood is an endorsement of our vision for the future of computing and computational thinking at the University of Massachusetts Amherst. In this vision, faculty with interests and expertise in computing in a very broad spectrum of disciplines across the campus come together to define and develop new and expanded research, educational programs, and collaborations. The School

will be the intellectual focal point for broad interdisciplinary activities in research, teaching, and outreach that engage UMass Amherst community members across the campus, building upon the CS faculty's nationally prominent research activities and its already-strong connections to other campus academic units in research, teaching, and service.

With this initiative, UMass Amherst joins other major universities across the nation that have capitalized on the growing understanding of the centrality of computing by undertaking different kinds of organizational innovations. Schoolhood supports a more effective engagement between computer science and other fields, allowing an expanded mission/footprint for computing, offering new educational programs, and forming broader and stronger interdisciplinary research connections.

continued on page 2

The promise and pitfalls of private data

As we each move through the physical world, and interact in the digital world, our activities leave digital traces. When these traces are combined with the traces of others, they form valuable data sources that can be used to advance scientific understanding and improve our lives. But these digital traces also contain sensitive personal information whose misuse could cause significant harm. Government regulations can sometimes limit the ability of institutions to collect and use information about us, but they often lag far behind current data usage practices. Technological approaches to privacy, developed by computer scientists and statisticians, are an increasingly important means for ensuring data is adequately protected.

Associate Professor Gerome Miklau's research into data privacy enables large-scale data analysis that is safe for individuals. One of his main goals is to develop methods for extracting useful aggregate facts about a group without disclosing sensitive information about the individuals in the group. For example, his research could enable doctors to use a collection of medical records to investigate the correlation between obesity and diabetes, without revealing the particular medical details of any single individual. It could allow urban planners to study a database of employees' commuting patterns without revealing the exact home or work location of any individual.



Gerome Miklau

continued on page 4

News

Shenoy: IEEE Fellow	4
Edwina Rissland Retires	5
Riseman and Hanson Scholarship	9

Awards

McCallum: Chancellor's Award	3
------------------------------	---

Alums

Alum Focus: Amy McGovern	10
Recent Ph.D. Grads	12
Alum Social	14



Lori A. Clarke

I am delighted to be able to announce that we are now the School of Computer Science. This is more than just a name change; it reflects the broad footprint that computing now has on campus (and worldwide) as well as newly increased flexibility and independence in shaping our future. Plans for becoming a school have been ongoing for the past four years. The Strategic Directions Committee, under the guidance of Rick Adrion, James Allan, Emery Berger, Bruce Croft, Jim Kurose, Lee Osterweil, and Prashant Shenoy, have been developing plans that reflect this increased role. Computer Science at UMass Amherst is extremely interdisciplinary. Faculty in Computer Science are engaged in research with every other college and school on campus and these interactions are continuing to grow. To complement our BS degree, several years ago we introduced a BA degree, which has fewer requirements so that students can combine the study of computing with studies in other disciplines. As I reported in my last letter, we now have a professional master's program. And, as part of the vision for the new school, we are exploring developing an Informatics Program that would offer degrees in more applied and specialized areas of computing, such as data analytics, health informatics, and multimedia. The new school is still part of the College of Natural Sciences, and we continue to report to Dean Goodwin, who has been very supportive of computer science and our increased independence. A celebration of our new status is currently being planned for Fall 2013—watch for an announcement.

At the end of this fall semester, we saw the departure of two faculty members. Kevin Fu resigned to join the faculty at the University of Michigan. Kevin is a very visible and respected researcher in computer security. With two small children, he and his wife wanted to be closer to their families. We wish them the best and expect to continue to hear great things about Kevin's research. As reported elsewhere in this newsletter, Edwina Rissland retired after thirty-three years as a faculty member at UMass Amherst. Edwina was one of the initial founders and a leading researcher in the area known

as case-based reasoning, which explored how artificial intelligence could be used to support lawyers in developing legal cases. In addition to her research, Edwina served two terms as a program director at the National Science Foundation, where she won praise for her dedication and hard work. Although now retired, Emerita Professor Rissland plans to continue to provide leadership in the case-based reasoning community. We thank her for her contributions and hope she enjoys her retirement.

Let me end this letter with news about a newly created graduate scholarship to recognize the contributions of Ed Riseman, who passed away in 2007, and Al Hanson, who retired in 2008. As many of you know, Ed and Al co-directed one of the major research laboratories in computer vision. Emeritus Professor Hanson continues to pursue research in computer vision and robotics, especially focusing on assistive living. Computer vision continues to be a major research area for our school, building upon work in machine learning, robotics, and computer graphics. Graduate scholarships, such as the Ed Riseman and Al Hanson Graduate Scholarship, help us attract strong graduate students to our Ph.D. program. In a recent review of university graduate programs, it was clear that UMass does not provide as many scholarships for graduate students as most comparable universities. With tightening state budgets, increased funding for scholarships is going to have to come from contributions. In the last several years, we (really you!) have successfully endowed four graduate student scholarships in honor of Robin Popplestone, Paul Utgoff, Victor Lesser, and Dave Stemple, as well as continued support for undergraduate scholarships. Please consider contributing to one of our scholarship programs.

We're on Facebook and LinkedIn

Keep up-to-date on the school's latest events and announcements. Join us on

Facebook (group name: UMass CS) and
LinkedIn (group name:
UMass Amherst Computer Science)

SCHOOL OF COMPUTER SCIENCE – – *cont. from page 1*

We have already embarked on new degree programs, including a Bachelor of Arts and a professional Master's Degree. Schoolhood will make it easier for us to offer programs that cross traditional departmental boundaries. Also in the planning stage is an Informatics program that will help meet the demands for computing across a variety of disciplines. Potential concentrations within the Informatics degree will include Data Analysis ("big data"), Multimedia, and Health Informatics.

Schoolhood also brings with it a number of immediate, practical benefits that will make it possible for us to realize our vision. It means that we will now have much

greater control of our destiny, through greater control over the hiring of new faculty members and teaching assistants. This newfound ability to guarantee continued growth for the CS faculty and student body will help us cope with the increasing demands for computer science courses as our undergraduate enrollment continues to grow by leaps and bounds. In addition to maintaining and building our strength in core areas of computer science, we will continue to hire faculty that cross disciplinary boundaries.

We view schoolhood as one more milestone on our path, and look forward to exciting developments in the years to come.



McCallum honored with Chancellor's Award

During the UMass Amherst Faculty Convocation held in September, Chancellor Kumble R. Subbaswamy presented Professor Andrew McCallum with the 2012 Chancellor's Award for Outstanding Accomplishments in Research and Creative Ac-

tivity. McCallum was one of five nationally and internationally acclaimed faculty members presented with the award.

McCallum's research focuses on information extraction and data mining. He has been active in research on statistical machine learning applied to text, especially information extraction, entity disambiguation, information integration, document classification, clustering, finite state models, semi-supervised learning, and social network analysis. McCallum is the director of the Information Extraction and Synthesis Laboratory and he also heads the campus's Computational Social Science Initiative, a cross-disciplinary, collaborative group that addresses the challenges and opportunities presented by collecting, storing, and analyzing large-scale data related to the social world. It offers the expertise needed to create practical solutions to challenges in everything from fighting crime and terrorism to tracking disease outbreaks and confronting climate change.

In 2009, McCallum was named an AAAI Fellow. He is the recipient of the UMass Amherst NSM (now CNS) Faculty Outstanding Research Award, the UMass Amherst Lilly Teaching Fellowship, and research awards from IBM and Google. He was the General Chair of the 2012 International Conference on Machine Learning (ICML).



Allan and Joyce receive CNS Awards

At the College of Natural Sciences (CNS) State of the College event held in September, Dean Steve Goodwin announced that Professor James Allan is a recipient of the CNS 2012 Outstanding Advisor Award.

Allan was recognized for his five-year term as the graduate program director (GPD) in which his efforts led to a revised and revitalized CS graduate program. During his tenure as GPD, the number of graduate student fellowships has increased, the time to degree has decreased, and the quality and satisfaction with the graduate program by both the faculty and students have increased.

"James did a superlative job as graduate program director. This is a well-deserved tribute for the great improvements he has made in the way our graduate program runs, and the individual help he has given to literally hundreds of students," notes Professor Neil Immerman, awards committee chair.

Also at the CNS State of the College ceremony, Jean Joyce was recognized as a recipient of the CNS Award for Outstanding Staff Support. Joyce serves as Administrative Director of the Center for Intelligent Information Retrieval, produces the *Significant Bits* newsletter, coordinates the CS industrial affiliates program, and manages events for alumni and friends of CS.



Berger receives most influential paper award

Associate Professor Emery Berger and co-authors Benjamin Zorn and former UMass Amherst CS professor Kathryn McKinley were chosen as the recipients of the ACM Special Interest Group for Programming Languages (SIGPLAN) Most Influential Paper Award for their OOPSLA (Object-Oriented Programming, Systems, Languages and Applications) Conference '02 paper, "Reconsidering Custom Memory Allocation." The papers are judged by their influence over the past decade. The award was presented during the Third Annual Systems, Programming, Languages and Applications: Software for Humanity (SPLASH) Conference in Tucson, Arizona in October, 2012.

The award citation reads: "Custom memory management is often used in systems software for the purpose of decreasing the cost of allocation and tightly controlling memory footprint of the software. Until 2002, it was taken for granted that application-specific memory allocators were superior to general purpose libraries. Berger, Zorn, and McKinley's paper demonstrated through a rigorous empirical study that

this assumption is not well-founded, and gave insights into the reasons why general purpose allocators can outperform handcrafted ones. The paper also stands out for the quality of its empirical methodology."

Berger leads the Programming Languages and Systems at Massachusetts (PLASMA) group. His research spans programming languages, runtime systems, and operating systems, with a particular focus on systems that transparently improve reliability, security, and performance.

Berger's and CS doctoral student Dan Barowy's recent research on AutoMan, the first fully automatic crowdprogramming system, was the focus of a *New Scientist* article, "Your next boss could be a computer" (released on Dec. 6, 2012). AutoMan is a platform for integrating human-based and digital computation. Barowy and Berger are working with Assistant Professor Andrew McGregor and doctoral student Charlie Curtsinger on a system that handles quality control, payment, and task scheduling automatically.

PRIVATE DATA - - - - - continued from page 1

And his techniques could be used by sociologists to study the structure of a social network, for example, to understand how rumors spread in a community, without revealing any particular friendship relation between individuals. “Ultimately, this area of privacy research reveals the extent to which personal privacy is compatible with hoped-for benefits of data analysis,” says Miklau.

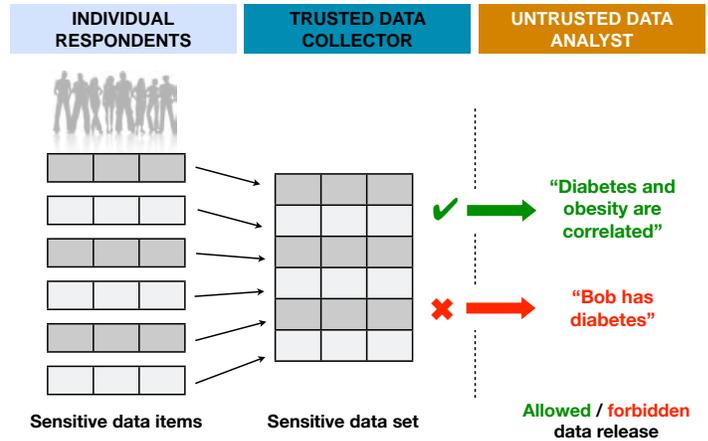
Much of Miklau’s recent privacy research has focused on the model of *differential privacy*, which provides a formal standard for protecting individuals’ personal information. When a differentially-private algorithm is used to study a dataset, individuals who contribute to the dataset receive the compelling assurance that the information released will be virtually indistinguishable whether or not their personal data is included. To achieve this standard of protection, the results of computations on the dataset cannot be released unmodified: they must be transformed by random perturbation. “This causes information loss, diminishing the utility of the results, compared to what would have been possible in the absence of privacy concerns,” adds Miklau. “A major goal of research in this area is to satisfy differential privacy while reducing information loss as much as possible.”

As his research has shown, sophisticated algorithms can often result in greater accuracy with no sacrifice of privacy. However, to achieve these improvements, it is typically necessary to consider each data analysis task carefully, customizing the algorithm to the task. Miklau’s research group has produced state-of-the-art algorithms for performing basic statistical analysis on tabular data (in which each record describes the properties of an individual). His group also developed some of the earliest differentially-private algorithms for networked data (which describes individuals along with their relationships or interactions with one another). An ongoing goal of his research is to generalize these techniques, making it easier to discover new privacy algorithms and apply them to new tasks.

Miklau recently began exploring a new and quite different approach to managing sensitive personal information. Personal data often has great value to the institutions that wish to analyze it, and it has a potential cost to the individuals who contribute data due to privacy risks. “Perhaps a *price* can be placed on personal data, allowing it to be bought and sold in a marketplace,” says Miklau. “While most privacy methods insist on imposing strict limits on the disclosure of information, a market-based approach instead allows personal information to be exposed, as long as individuals are properly compensated.”

This approach is motivated by the fact that data is increasingly treated as a commodity. Markets for (mostly business-related) data are growing quickly on the Web, driven by large corporations like Microsoft and Amazon, as well as start-ups that are collecting and selling data. Large data brokers also collect and sell data about individuals for marketing purposes. However individuals are rarely compensated, even when their personal information is widely disseminated.

Miklau, along with collaborators at the University of Washington, is investigating how an open market for personal information could be designed. In such a market, an ana-



The goal of private data analysis is to develop mechanisms that permit the release of aggregate properties of a dataset while protecting sensitive facts about identified individuals

lyst would submit questions about a population of individuals to a broker, but would be required to pay for answers. In fact, random perturbation can be added to the answers and the analyst could be asked to pay more for answers that are more accurate. Once payment is received, the data broker is responsible for fairly distributing the income received to contributing individuals. The major challenges include determining how the price should depend on the accuracy of released data and avoiding attacks by market participants who may attempt to avoid paying the given price by carrying out arbitrage in the market.

For the 2012-2013 academic year, Miklau is a Visiting Professor at INRIA and École Normale Supérieure de Cachan in France. He received his Ph.D. in Computer Science from the University of Washington in 2005. He was awarded the ACM PODS Alberto O. Mendelzon Test-of-Time Award in 2012, a UMass Amherst Lilly Teaching Fellowship in 2011, an NSF CAREER Award in 2007, and the ACM SIGMOD Dissertation Award in 2006.

Shenoy named IEEE Fellow

Professor Prashant Shenoy, who leads the Laboratory for Advanced Systems Software, was named to the 2013 class of Institute of Electrical and Electronics Engineers (IEEE) Fellows. He received the distinction “for contributions to the design and analysis of distributed systems and computer networking.”

The IEEE Grade of Fellow is conferred upon a person with an outstanding record of accomplishments in any of the IEEE fields of interest. IEEE Fellow is the highest grade of membership and is recognized by the technical community as a prestigious honor and an important career achievement. The IEEE is the world’s leading professional organization for advancing technology for humanity.



Edwina Rissland retires

Professor Edwina Rissland retired in December after a thirty-three year career as faculty at UMass Amherst Computer Science. Her research interests include case-based reasoning (CBR), artificial intelligence (AI), legal reasoning, CBR and information retrieval, mixed paradigm reasoning, and cyberlaw.

“Edwina is well known as one of the founders and leading researchers in the area of case-based reasoning,” says CS Chair Lori Clarke. “Her work on AI and the law has had and will continue to have a tremendous influence in how computing is used to support the judicial system.”

Rissland received an Sc.B. in Applied Mathematics with Honors magna cum laude from Brown University in 1969, an M.A. in Mathematics from Brandeis University in 1970, and a Ph.D. in Mathematics from the Massachusetts Institute of Technology in 1977.

She joined UMass Amherst Computer Science in 1979. For the 1982-83 academic year, she was a Fellow of Law and Computer Science at the Harvard Law School. From 1985 through 1996, she held an appointment as lecturer on law at the Harvard Law School, where she taught a seminar on artificial intelligence and legal reasoning.

From 2003 – 2007, Rissland served as a National Science Foundation (NSF) Program Director for the Artificial Intelligence and Cognitive Science (AICS) Program in the Division

of Information and Intelligence Systems (IIS) within the Directorate for Computer & Information Science & Engineering (CISE); and later became the Program Director, Robust Intelligence within IIS, CISE. She returned to the NSF for a two-year term (2010-2012) as a Program Director in the Robust Intelligence cluster in the IIS Division within CISE. She was also on the management team for the CISE Computing Research Infrastructure program.

“Edwina provided exceptional service to the computer science community during her tenure at the National Science Foundation,” adds Clarke.

Rissland was elected as a Fellow of the American Association for Artificial Intelligence (AAAI) in 1991. She has served as president of the International Association for Artificial Intelligence and Law and was on the board of councilors of the AAAI. She co-authored *Cognitive Science: An Integrated Approach* (MIT Press), one of the first textbooks in the field, and was a founding member of the editorial board of the journal *Artificial Intelligence and Law*.



CAITE receives NSF grant to improve CS education

Building on its success in drawing more women and under-represented minority students to study computer science at Massachusetts public colleges and universities over the past five years, the Commonwealth Alliance for Information Technology Education (CAITE) has won a major grant from the National Science Foundation (NSF) and will now take a national leadership role in computer science education.

CAITE will share the new five-year, \$6.24 million NSF grant with Georgia Computes!, a project at Georgia Tech, to create a national resource for other states that want to learn how to successfully broaden participation in computer science education. Together, these two teams will form an Expanding Computing Education Pathways (ECEP) alliance to offer new approaches and best practices in computing education to other states seeking the same goals.

As CAITE director Rick Adrion, professor emeritus of Computer Science, and project manager Renee Fall point out, students may decide as early as middle school not to pursue computer science as a career, but a quality experience with computing early on, or even in high school or community college, can change that, making computer science or information technology (IT) more attractive.

In Massachusetts, CAITE has reached more than 21,000 students and over 1,200 educators who attended more than 350 events since the program’s start in 2007. On the UMass Amherst campus, CAITE has held several day-long robot-

building activity days for middle school girls from across western Massachusetts, as well as FIRST LEGO League coach training workshops for club leaders and professional development for science teachers and college faculty.

Enrollment in information technology courses at community colleges in Massachusetts working with CAITE has risen 64 percent and 78

percent in transfer programs from community colleges to four-year universities. CAITE has helped nine campuses to implement supplemental peer instruction for more than 45 courses, which has helped keep more students in the state’s programs and raised average letter grades. CAITE has also contributed to an 88 percent increase in under-represented minorities at Bay State community college IT programs.

In the UMass system, enrollments in computer science are increasing at a greater rate than those at comparable institutions nationally, and community college enrollment in computer science and related courses is up dramatically, with the number of women and under-represented minorities significantly higher since CAITE began. CAITE staff have worked to align two- and four-year curricula and to recruit and support transfer students coming to the UMass campuses.



Rick Adrion

continued on page 6

New research initiatives

The School's faculty are embarking on many exciting new projects and collaborations. A few are highlighted below.

Professor Rod Grupen's proposal, "Representing and Exploiting Cumulative Experience with Objects for Autonomous Manipulation," was one of five proposals nationwide selected by NASA's (National Aeronautics and Space Administration) Game-Changing Technology Program. Grupen will work with Associate Professor Erik Learned-Miller on developing robots capable of solving new problems during deep space exploration. Their project is focused on autonomous sensing and control for multi-fingered grasping and manipulation applications, so that robots can learn how to improvise and trouble-shoot in space missions (*photo, right*).

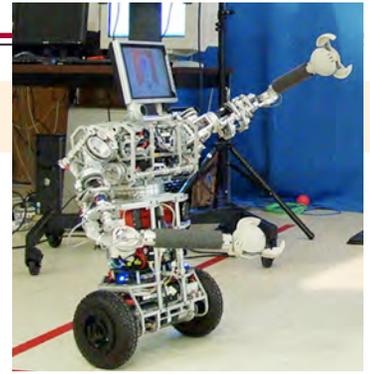
With a 4.5 year award from the Air Force Research Laboratory as part of their Deep Exploration and Filtering of Text

(DEFT) Program, Professor Andrew McCallum will work on large-scale probabilistic entity resolution with distributed computation and relation extraction with universal schema using tensor factorization. The DEFT program was created to "harness the power of natural language processing" to automate the discovery of relevant information contained within the large amount of data collected.

Research Associate Professor R. Manmatha received two Mellon Foundation awards this fall. He and collaborators Professor James Allan and Northeastern University Assistant Professor David Smith received a grant for their pilot project, "Proteus Infrastructure: Work Aggregation and Entity Extraction," to build and evaluate research infrastructure for scanned books. While there are several large scanned book collections, much of these are unstructured and not easily used by scholars in the humanities. The grant will support building a Proteus infrastructure that will help scholars navigate and use such collections more easily. Components of the infrastructure include automatically identifying a book's language, linking multiple editions of canonical works, finding quotations in canonical works, and entity detection.

In the other Mellon grant, Manmatha is collaborating with Texas A&M and other institutions on "OCRing Early Modern Texts." As part of this grant, the researchers will recognize the text from the 18th century English books using optical character recognition systems, and they will use their technology to automatically estimate OCR errors and correct the output of multiple OCR engines.

Associate Professor Ramesh Sitaraman, in collaboration with Professor Prashant Shenoy and graduate student Vimal Mathew, is working on an energy-efficient cloud system that doesn't sacrifice performance. Their recent research focuses on algorithms that turn off servers in a Content Delivery Network (CDN) to save energy. An evaluation of these new algorithms shows it can reduce total energy usage of a CDN by almost 50 percent while maintaining high performance to users and minimizing the wear-and-tear of the server hardware. Details at www.umass.edu/researchnext/internet-goes-green.



MGHPCC opens

Massachusetts Governor Deval Patrick joined university leaders and technology executives in November to cut the ribbon on the Massachusetts Green High Performance Computing Center (MGHPCC). The new Center will keep Massachusetts at the forefront of the innovation economy by enabling collaborative research on some of the biggest challenges facing engineering, science, and society.

"Our investments in education, innovation, and infrastructure have come together to support the creation of the Massachusetts Green High Performance Computing Center here in Holyoke," says Patrick. "This landmark project is a testament to what is possible when government, academia, and business work together, and it will serve as an economic development model for the state and the nation for generations to come." The Computing Center has the capacity for 10,000 high-end computers and expansion capabilities in the building for an additional 10,000 computers.

The facility, which was built on time and is expected to come in under budget, was developed and will be operated by Boston University, Harvard University, the Massachusetts Institute of Technology, Northeastern University,

and the University of Massachusetts. Additional funding was provided by the Federal New Markets Tax Credit Program, EMC Corporation and Cisco Systems.

Professor Prashant Shenoy, at MGHPCC. See related story on page 9.



CAITE GRANT - - - - - continued from page 5

The new ECEP, part of NSF's Computer and Information Science and Engineering (CISE) program, will be a resource for other state programs as they make systemic changes in educational pathways to increase the number and diversity of computing and computing-intensive degree graduates.

Adrian adds, "For computing to be taken seriously at all levels of education, we must define high school computing curricula, increase the number of well-trained and certified high school computing teachers, improve post-secondary degree programs, advising, retention and in general promote computing education reform."

Study explores use of robots to aid recovery from stroke

Professor Rod Grupen and UMass Amherst Communication Disorders researchers have teamed up to explore whether a personal humanoid robot may help people recovering from stroke by delivering therapy, such as word-retrieval games and arm movement tasks, in an enjoyable and engaging way.

Speech language pathologist Yu-kyong Choe received a grant from the American Heart Association to investigate the effect of stroke rehabilitation delivered by a humanoid robot, a child-sized unit with arms and a screen, where therapists, doctors, and others can interact with a client. Choe and Grupen, director of the Laboratory for Perceptual Robotics, are collaborating on ways to bring more and long-term, home-based therapy and social contact to people recovering from stroke.

It's estimated that 3 million Americans experience the debilitating effects of stroke daily. But even after years, they can recover significant function with intensive rehabilitation, says Choe. The bad news is that this is rarely available or accessible due to a shortage of therapists and lack of coverage for long-term treatments.

The researchers acknowledge that some may object to robots delivering therapy, but they say the need is great and definitely not being met now, especially in rural areas. The goal is to aid human-to-human interaction, so a robot can temporarily take the therapist's place and even help with routine tasks. Grupen says, "In addition to improving quality of life, if we can support a client in the home so they can delay institutionalization, we can improve outcomes and make a huge impact on the cost of elder care. There are 70 million baby boomers beginning to retire now."

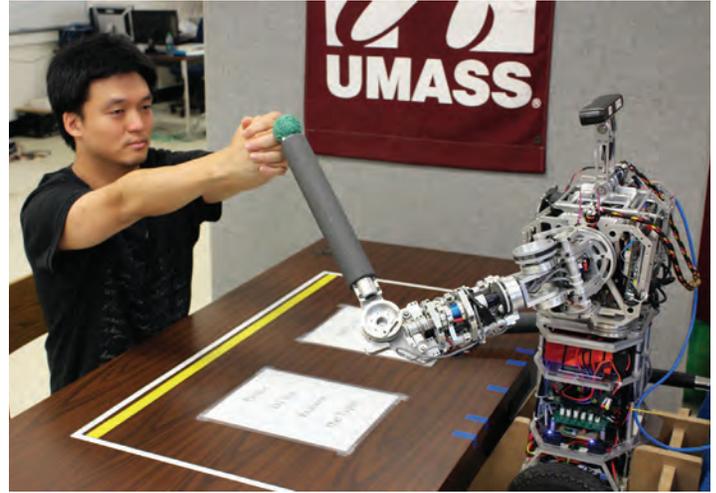
The research study will enroll five stroke patients per year to attend three sessions per week for five weeks at the UMass Amherst lab. Three treatments will be compared: computer-mediated, robot-mediated, and robot-assisted telepractice by a remote therapist.

In the robot-mediated condition, patients complete word-retrieval tasks and games, plus arm exercises, delivered by the robot alone based on therapy routines it has observed. In the computer-mediated condition, the same tasks and exercises will be presented on a laptop computer.

In the robot-assisted telepractice condition, the client performs word- and arm-movement tasks designed and directed by a therapist in a remote location being observed and mimicked by the robot via 3-D range camera. The robot exactly copies the therapist's movements.

CS doctoral students Takeshi Takahashi and Hee-tae Jung, along with therapists Jennifer Baird and Tammie Foster, are working with patients three days per week and developing software for uBot5, an adaptive humanoid robot, to act as the liaison between a remote therapist and the client at home.

Jung, who evaluates how well the robot is learning therapy routines and goals, says robots tended to be too task-specific previously, but now scientists are designing more flexible, adaptable robots. "I want the robot to pick up some specific skills and to facilitate interaction with flexible behavior. I also



Hee-tae Jung practicing therapeutic arm movement with a uBot5

want to know whether the therapist feels it's a valuable tool and whether patients like it," he says.

Grupen explains, "We hope to advance artificial intelligence by creating robots that learn from human beings while interacting with them. It will also allow doctors, therapists, and family to come into the home via telepractice. We want to explore embedding robots into human culture in a way that improves quality of life and increases human-to-human social interaction in a circumstance when age and disability can isolate people."

"Stroke rehabilitation is such a monumental financial problem everywhere in the world, that's where it can pay for itself," he adds. "A personal robot could save billions of dollars in elder care while letting people stay in their own homes and communities. We're hoping for a win-win where our elders live better, more independent and productive lives and our overtaxed healthcare resources are used more effectively."

Students attend GHC



CS students Shiri Dori-Hacohen, Tian Guo, Jacqueline Feild, Elizabeth Do, Elisabeth Baseman, and Borislava (Bobby) Simidchieva (*l. to r.*) attended a breakfast reception hosted by Yahoo! during the 2012 Grace Hopper Celebration of Women in Computing (GHC). Along with GHC travel grants to the GHC held in Baltimore, MD this October, some of the students also received funding assistances from Yahoo!, one of our industrial affiliate partners.

Sitaraman's research shows how poor online video quality impacts viewers



Associate Professor Ramesh Sitaraman and collaborators at Akamai conducted the first large-scale study of its kind to quantitatively demonstrate how video stream quality causes changes in viewer behavior. “Anyone who provides online video content, from the major news channels to sports and movie outlets, is worried about such things as a video failing, how fast a video starts up, whether it freezes, and how such loss of quality affects viewers,”

says Sitaraman.

“Content providers want viewers to not abandon their videos, want viewers to watch longer, and return often to watch more videos, resulting in more opportunities to show ads and to increase their subscriber base. The link between video streaming quality and viewer behavior has long been recognized as hugely important, but we couldn't study it with any scientific precision until now.”

“The ability to collect lots of relevant data, and new methods we developed for their analysis were the game changers,” says Sitaraman, who is an Akamai Fellow recognized for his past role in helping to create the Akamai network that now serves 15-30 percent of the global web traffic and helping pioneer content delivery networks now used to stream a large fraction of Internet videos.

In a recent paper presented at the ACM Internet Measurement Conference, Sitaraman and his co-author S.S. Krishnan report that viewers begin to abandon a site if the video does not start up within two seconds. Beyond two seconds, every additional one-second delay resulted in roughly a 5.8 percent increase in the abandonment rate. They also found that viewers are less tolerant of startup delay for short videos such as news clips compared to longer ones such as movies. And viewers with better connectivity abandoned a slow-starting video sooner. Further, a typical viewer whose video froze for 1 percent of its duration watched for 5 percent fewer minutes, and a viewer who left the site after failing to

play a video was 2.3 percent less likely to return to the same site within a week.

This study analyzes an unprecedented 6.7 million unique viewers from around the world who in aggregate watched 23 million videos for 216 million minutes. To conduct this research, Sitaraman and colleagues devised a novel technique based on Quasi-Experimental Designs (QEDs), an approach more familiar to medical and social science research than to computer systems research. They assigned viewers to one of two “treatment” groups. One had a good quality video viewing experience while the other group experienced poor quality such as video failure to launch, delayed start, or repeated freezing.

A viewer in a good quality group was then randomly matched with a viewer in the poor quality group so that the paired viewers had the same geography, connection type, content and other characteristics of interest. “By comparing the difference in behavior of the paired viewers for hundreds of thousands of pairs, we are able to better isolate the impact of quality alone and exclude other confounding factors,” says Sitaraman.

He adds, “A scientific understanding of the causal impact of streaming quality on viewers is a key piece of the puzzle for the success of online media. It helps computer scientists build better-distributed networks that deliver videos with higher user-perceived quality. Research in this area is particularly important now as even traditional media like television are migrating quickly to the Internet and more than 85 percent of consumer traffic on the Internet is predicted to be video-related by 2016.”

CS Women receive award

The CS Women's group was among the first recipients to receive awards from the Women for UMass Amherst Fund. The group received funding to send female students to the 2013 Grace Hopper Celebration of Women in Computing, the world's largest gathering of women in computing. The CS Women co-chairs involved in the proposal and presentation to the Fund include Anastasia McTaggart Meek, Elisabeth Baseman, and Ravalı Pochampally.

SAVE THE DATE

Outstanding Achievement and Advocacy Awards banquet planned

The fifth annual Outstanding Achievement and Advocacy (OAA) Awards banquet will be held on the evening of Friday, May 3, 2013 in the Massachusetts Room of the UMass Amherst Mullins Center. During the banquet, awards will be presented to recognize the remarkable accomplishments of graduates of the School's degree programs and to acknowledge the support of important friends of the school. Current student awards will also be presented. For details and to register for the event, go to: www.cs.umass.edu/oaa2013.

Edward Riseman and Allen Hanson Scholarship

Thanks to a generous initial contribution by Emeritus Professor Allen Hanson and his wife Joan, a new graduate student scholarship has been created to recognize the contributions of Emeritus Professors Edward Riseman and Hanson. Once endowed, the fund will provide an annual *Edward Riseman and Allen Hanson Scholarship in Computer Science* to a student pursuing a Ph.D. in computer science at UMass Amherst, with special consideration given to first-year students interested in computer vision research.

“The Riseman and Hanson Scholarship is a terrific tribute to two individuals who had a tremendous influence on the department,” says CS Chair Lori Clarke.

Riseman and Hanson were pioneers in the field of computer vision, and they were instrumental in building the collaborative culture and fostering the creative research that define the UMass Amherst School of Computer Science today. “Ed and I had complementary talents and personalities that allowed us to work well together for over forty years,” says Hanson.

Central to their impact on the research atmosphere of UMass Amherst CS was the successful Computer Vision Laboratory, which Riseman and Hanson established and co-directed. Their research broadened from an initial study of character recognition to a wide range of analysis and systems development in image understanding and visual information processing, including stereo and motion analysis; autonomous vehicle navigation; three-dimensional reconstruction; image databases, retrieval, and parallel processing; parallel architectures for computer vision; video mosaicking; and control issues in complex systems.

Addressing the need for practical applications in their work, Riseman and Hanson, along with student Tom Williams (Ph.D. ’81), designed one of the first knowledge-based image understanding systems that handled complex natural images. Their other applications included photo interpretation of aerial images with 3-D building and terrain recon-

struction, biomedical image analysis, automated robotic manufacturing and assembly, real-time control of intelligent vehicles, face recognition, environmental monitoring, and development environments for vision research.

Both Hanson and Riseman were dedicated faculty as well as leading research scientists. They advised more than ninety Ph.D. students and guided a steady stream of post-docs, programmers, researchers, and M.S. and B.S. students.

After Riseman’s retirement in 2003, the professors continued to collaborate, developing visual technology for marine biology and examining applications of technology for the elderly—two projects that Hanson has continued to work on since Riseman’s death in 2007 and his own retirement in 2008.

To contribute to the fund for the *Edward Riseman and Allen Hanson Scholarship in Computer Science* at UMass Amherst, gifts may be made by contacting Jennifer Cooper at 413-545-2771 or jcooper@cns.umass.edu, by making a gift online at www.umass.edu/give, or by check made out to UMass Amherst with designation to the Riseman and Hanson Scholarship and mailed to the College of Natural Sciences, 740 Lederle Graduate Tower, UMass Amherst, 710 North Pleasant Street, Amherst, MA 01003.



Edward Riseman



Allen Hanson

Shenoy receives grant to build academic cloud at MGHPCC

Professor Prashant Shenoy, along with researchers Chris Hill of MIT, Claudio Rebbi of Boston University, and Gene Cooperman of Northeastern University, recently received a grant from the National Science Foundation’s Major Research Instrumentation Program to support a shared computer cluster housed at the Massachusetts Green High-Performance Computing Center (MGHPCC) in Holyoke, MA. (See photo and related story on page 6.)

The new cluster, a collection of a few thousand servers, will serve a large number of scientists in a broad variety of disciplines at the four institutions who need high-performance machines that can carry out a high volume of extremely fast calculations and store large amounts of data, Shenoy says.

“Any scientist in the life sciences, genetics, weather modeling, geosciences, and engineering who needs high-performance computing capabilities will be able to request time on

the new cluster,” he adds. Our intent is to have a way for all of our campuses to benefit from and use this cluster, which we think of as an academic cloud.”

Computer science researchers from the participating institutions will work closely with scientist users to research new systems-level paradigms to help make high-performance computing more routinely used in day-to-day research workflows. The four principal researchers will also address issues such as effective sharing policies, privacy, security, and how to use energy most efficiently.

Shenoy notes, “This new system will provide support for the many exciting new big-data initiatives across the UMass system such as genomics research and personalized medical treatment studies which can take a huge amount of computational time. There is a pretty strong need among our researchers to invest in this. We are one of the first clusters to go in, so it’s an exciting time.”

Better weather prediction through data mining



Amy McGovern

Severe weather including tornadoes, thunderstorms, hail, and wind caused \$32 billion dollars of damage in 2011 and annually cause significant loss of life. Although forecasting the path and severity of hurricanes and tropical storms has improved significantly in recent years, tornadoes and other severe events on a smaller scale than hurricanes remain quite difficult to predict. While forecasters can identify conditions favorable for major tornado outbreaks several days in advance, short-term forecasting of individual storms, providing additional advanced notice, and predicting probable tornado paths remain a challenge.

The goal of much of Amy McGovern's (Ph.D. 2002, M.S. 1998) research as an associate professor in the School of Computer Science at the University of Oklahoma has been to revolutionize tornado prediction and other forms of severe weather. She does this using artificial intelligence, data mining, machine learning, and storm simulations. McGovern received a National Science Foundation (NSF) CAREER award in 2008 to jumpstart her research. She collaborates with the National Oceanic and Atmospheric Administration's (NOAA) National Severe Storm Laboratory (NSSL) and researchers in the School of Meteorology at the University of Oklahoma. She is also working on improving the prediction of aircraft turbulence in collaboration with the National Center for Atmospheric Research (NCAR).

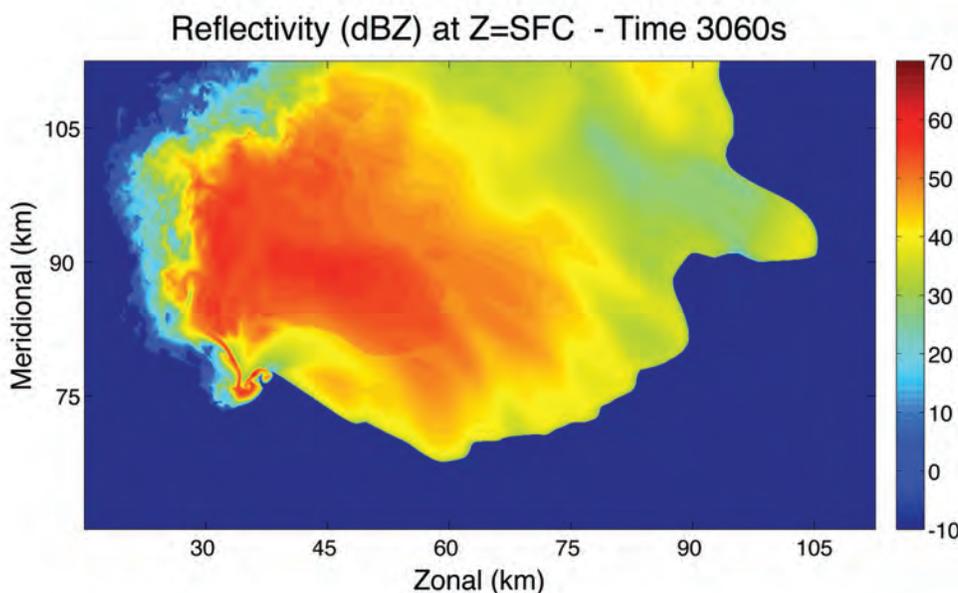
Severe weather poses a very challenging prediction and simulation problem. "Radars provide an incomplete picture of the atmosphere," says McGovern. "Although they can sense the intensity of the precipitation and a single dimension of the wind vector, there are many other important variables such as the full three-dimensional wind field, pressure, temperature, etc. that are important to prediction.

Although simulations are an answer to this, fully simulating the atmosphere is not computationally feasible." McGovern is developing a unique set of high-resolution simulations of supercell thunderstorms. These are the most severe type of thunderstorms and cause the most destructive tornadoes. These simulations also provide an unprecedented view of atmospheric turbulence.

Mining the simulations is also challenging. At the resolutions McGovern is simulating, each simulation generates over 1 terabyte (TB) of data. Statistical relational learning is used to identify high-level concepts and relationships in the data that can be used to predict tornadoes. Meteorologists already study existing storm data using conceptual models. They identify high-level concepts and regions in a storm such as updrafts, a region of air blowing upward, and downdrafts, a region of air blowing downward. McGovern's models provide the ability to identify spatiotemporal relationships between these regions that can be used to predict the severe weather events. She has developed novel data mining models that make use of the spatiotemporal nature of the data because neither space nor time can be ignored for weather prediction. In addition, weather is three-dimensional and her models can identify arbitrary shapes and relationships between the shapes.

McGovern's three-dimensional weather modeling of spatiotemporal hazards will be valuable to aviation weather forecasting in support of the future U.S. National Airspace System, known as NextGen. The current Federal Aviation Administration (FAA) system provides guidelines about how close an aircraft can fly to a thunderstorm. Working with researchers at NCAR and using observations collected from aircraft flying over the continental United States to study convectively-induced turbulence, McGovern is improving the prediction of how far turbulence can spread from a thunderstorm. "This can be used to save money by flying more efficient routes and to prevent injuries by flying safer routes," says McGovern.

Another goal of McGovern's work as a professor is to engage, retain, and graduate more underrepresented students. She focuses on developing authentic CS and ML applications, especially those involving severe



Simulated reflectivity (measure of the intensity of the precipitation) near the ground for one of McGovern's high resolution models.

continued on page 11

McGOVERN - - - - - *continued from page 10*

weather. Since her teaching environment is literally located in the proverbial “tornado alley” or “tornado capital of the world,” it provides many real world severe weather experiences in students’ actual lives. “They can more easily see the practicality of their CS and ML classes and related labs, homework, projects, and research throughout their college experience,” notes McGovern. She also engages students through a variety of active learning projects and has won several teaching awards while at the University of Oklahoma.

McGovern’s volunteer and community service activities are varied and many relate to the encouragement of undergraduate minorities and younger students to study CS. For the past five years, she chaired the Oklahoma EPSCoR (NSF’s Experimental Program to Stimulate Competitive Research) Women in Science conference held for middle and high school students and counselors across the state of Oklahoma. She also serves as faculty advisor to OU’s chapter of Alpha Sigma Kappa, a sorority for women in technical studies. As chair of the American Meteorological Society’s Committee on Artificial Intelligence Applications to the Environment, McGovern both brings together researchers in the environmental sciences and artificial intelligence and is also reaching out to students in grades kindergarten through sixth. Current development includes an iPad application to demonstrate the uses of artificial intelligence for weather applications.

McGovern joined the University of Oklahoma in 2005 and is currently the Director of the Interaction, Discovery, Exploration, Adaptation (IDEA) Laboratory. While at UMass Amherst, she was advised by Professor Andrew Barto.

ACM recognizes outstanding alums

The Association for Computing Machinery (ACM), recently announced that CS alum Lixin Gao (Ph.D. ’97) has been named an ACM Fellow for contributions to network protocols and internet routing. She is a professor of Electrical & Computer Engineering at UMass Amherst. The grade of Fellow recognizes the top 1 percent of ACM members for their outstanding accomplishments in computing and information technology and/or outstanding service to ACM and the larger computing community.

ACM also named three CS Ph.D. alums, Antony L. Hosking (Ph.D. ’95), Erich M. Nahum (Ph.D. ’97), and Peri Tarr (Ph.D. ’96), as 2013 Distinguished Members for their individual contributions and their singular impacts on the dynamic computing field. Nahum and Tarr are researchers at IBM Thomas J. Watson Research Center and Hosking is an associate professor at Purdue University. The ACM Distinguished Member program, initiated in 2006, recognizes those members with at least 15 years of professional experience who have achieved significant accomplishments or have made a significant impact on the computing field.

Bo An (Ph.D. ’11) was selected to China’s 1,000 Young Talents Program. In June 2012, he joined the Institute of Computing Technology of the Chinese Academy of Sciences as an associate professor. According to the Program’s website, this program is for young researchers under age 40 who have obtained a doctorate degree in a world-famous university, and have no less than three years of overseas working experience. “The applicants should be the top-notch talents in their research fields, and have the potential to become future leaders in relevant areas. Special admissions are granted to those who have made distinguished research achievements in their doctorate studies or in other areas.” As part of the program, recipients receive a living subsidy and a three year research grant.

Mark D. Smucker (Ph.D. ’08), assistant professor at the University of Waterloo, and co-author Charles L.A. Clarke, received the Best Paper Award at the 35th Annual International Conference on Research and Development in Information Retrieval (SIGIR ’12) for their paper “Time-Based Calibration of Effectiveness Measures.”

In November, **Steven Sinofsky** (M.S. ’89), former president of the Windows division of Microsoft Corporation, left the company after a 23 year career with the company. According to his tweet, he will teach this spring at Harvard Business School as an “Executive in Residence.”

The Technical University of Denmark has appointed **Joseph Kiniry** (M.S. ’95) professor. He is the head of the Software Engineering Section in the Department of Informatics and Mathematical Modeling. His inaugural lecture, “Saving Democracy from Technology,” was presented on February 1, 2013.

In Memoriam

We are sad to announce that two of our CS alums passed away recently. **Doug Niehaus** (Ph.D. ’93) died on August 21 at the age of 54. He was an associate professor of electrical engineering and computer science at the University of Kansas. **Gerald (Gerry) Hanam** of Framingham, MA died in October at the age of 46. He graduated cum laude with a B.S. in 1991. He leaves his wife, Catherine McCarthy (’88), and their daughter.

Dwyer named IEEE Fellow

CS Alum Matthew Dwyer (Ph.D. ’95) was named a 2013 IEEE Fellow. He received the distinction “for contributions to specification, testing, analysis, and verification of concurrent software.” IEEE Fellow is the highest grade of membership and is recognized by the technical community as a prestigious honor and an important career achievement. Dwyer is a Henson Professor of Software Engineering at the University of Nebraska. While at UMass Amherst, he was advised by Prof. Lori Clarke.



Michael Bendersky; *Information Retrieval with Query Hypergraphs*; (W. Bruce Croft, Advisor); Sept. 2012; Software Engineer, Google, Inc.

In this thesis we focus on verbose natural language search queries. To this end, we propose an expressive query representation based on query hypergraphs. Unlike the existing query representations, query hypergraphs model the dependencies between arbitrary concepts in the query, rather than dependencies between single query terms. Query hypergraphs are parameterized by importance weights, which are assigned based on their contribution to the retrieval effectiveness.

Query hypergraphs are not limited to modeling the explicit query, and we develop two methods for query expansion using query hypergraphs. In these methods, the expansion concepts may come either from the retrieval corpus or from a combination of external information sources. We empirically demonstrate that query hypergraphs are significantly more effective than many of the current state-of-the-art retrieval methods. Query hypergraphs improve the retrieval performance for all query types, and, in particular, they exhibit the highest effectiveness gains for verbose queries.



Filip Jagodzinski; *Towards Large Scale Validation of Protein Flexibility Using Rigidity Analysis*; (Ileana Streinu, Advisor); Sept. 2012; Assistant Professor, Dept. of Computer Science, Central Washington Univ.

Proteins flex and bend to perform their functions. At the atomic level, their motions cannot be observed. Rigidity analysis is a graph-based technique that infers the flexibility of molecules. Due to the lack of convenient tools for curating protein data, the usefulness of rigidity analysis in inferring biophysical properties has been demonstrated on only a handful of molecules. Conversely there is no agreed-upon choice of modeling of important stabilizing interactions.

We make progress towards large-scale validation of protein flexibility using rigidity analysis. We develop the KINARI software that permits automated curation of protein data. Rigidity analysis of protein biological assemblies generated by KINARI provides information that would be missed if only the unprocessed data were analyzed. We develop KINARI-Mutagen, which permits evaluation of the effects of mutations. Finally, we systematically vary the modeling of inter-atomic interactions and measure how rigidity parameters correlate with experimental data.

[Note: Special thanks to Filip for all of his efforts as a *Significant Bits* graduate student liaison for the past six years.]



Jin Young Kim; *Retrieval and Evaluation Techniques for Personal Information*; (W. Bruce Croft, Advisor); Sept. 2012; Applied Researcher, Microsoft Bing

Providing an effective mechanism for personal information retrieval is important for many applications, and requires different techniques than have been developed for general web search. This thesis focuses on developing retrieval models and representations for personal search, and on designing evaluation frameworks that can be used to demonstrate retrieval effectiveness in a personal environment.

From the retrieval model perspective, personal information

can be viewed as a collection of multiple document types each of which has unique metadata. Based on this perspective, we propose a retrieval model that exploits document metadata and multi-type structure. Proposed retrieval models were found to be effective in other structured document collections, such as movies and job descriptions.

Evaluating these methods is particularly challenging for personal information due to privacy issues. This thesis introduces a set of techniques that enables realistic and repeatable evaluation of techniques for personal information retrieval. In particular, we describe techniques for simulating test collections and show that game-based user studies can collect more realistic usage data with relatively small cost.



Scott Kuindersma; *Variable Risk Policy Search for Dynamic Robot Control*; (Roderic Grupen and Andrew Barto, Advisors); Sept. 2012; Postdoctoral Associate, MIT Computer Science and Artificial Intelligence Laboratory

In this thesis, I present efficient global and local risk-sensitive stochastic optimization algorithms suitable for performing policy search in variety of problems of interest to robotics researchers. These algorithms exploit new techniques in nonparameteric heteroscedastic regression to directly model the policy dependent distribution of cost. For local search, learned cost models can be used as critics for performing risk-sensitive gradient descent. Alternatively, decision-theoretic criteria can be applied to globally select policies to balance exploration and exploitation in a principled way, or to perform greedy minimization with respect to risk-sensitive criteria. This separation of learning and policy selection leads to variable risk control, where risk sensitivity can be flexibly adjusted and appropriate policies can be selected at runtime without requiring additional policy executions. I describe several experiments with the uBot-5 including learning dynamic arm motions to stabilize after large impacts, lifting heavy objects while balancing, and developing safe fall bracing behaviors.



Matthew Rattigan; *Leveraging Relational Representations for Causal Discovery*; (David Jensen, Advisor); Sept. 2012; Digital Analyst, Obama For America

This thesis represents a synthesis of relational learning and causal discovery, two subjects at the frontier of machine learning research. Relational learning investigates algorithms for constructing statistical models of data drawn from multiple types of interrelated entities, and causal discovery investigates algorithms for constructing causal models from observational data.

Traditionally, propositional (or “flat”) data representations have dominated the statistical sciences. These representations assume that data consist of independent and identically distributed (iid) entities which can be represented by a single data table. More recently, data scientists have increasingly focused on “relational” data sets that consist of interrelated, heterogeneous entities. However, relational learning and causal discovery are rarely combined.

This unexplored topical intersection represents an opportunity for advancement, in which we can provide insight into the challenges found in each subject area. By adopting a causal viewpoint, we can clarify the mechanisms that pro-

duce previously identified pathologies in relational learning. Analogously, we can utilize relational data to establish and strengthen causal claims in ways that are impossible using only propositional representations.

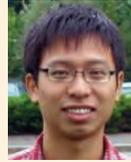


Xiaobing Xue; *Modeling Reformulation as Query Distributions*; (W. Bruce Croft, Advisor); Sept. 2012; Software Developer, Twitter

Query reformulation modifies the original query with aim of providing a better representation of a user's information need and consequently improving the retrieval performance.

Previous reformulation models typically generate words and phrases related to the original query, but do not consider how these words and phrases would fit together in realistic or actual queries.

A novel framework is proposed that models reformulation as a distribution of reformulated queries, where each reformulated query is associated with a probability indicating its importance. This framework considers a reformulated query as the basic unit and can capture the important query-level dependencies between words and phrases in a realistic or actual query. Since a reformulated query is the output of applying a single or multiple reformulation operations, this framework combines different operations such as query segmentation, query substitution and query deletion within the same framework. Moreover, a retrieval model is considered as an integrated part of this framework, which considers the reformulation model and the retrieval model jointly.



Tingxin Yan; *Designing Novel Mobile Systems By Exploiting Sensing, User Context, and Crowdsourcing*; (Deepak Ganesan, Advisor); Sept. 2012; Assistant Professor, Department of Computer Science & Engineering, Univ. of Arkansas

We focus first on the domain of context-aware mobile systems. We study the problem of how to incorporate user context into mobile operating system design by presenting a system named FALCON—an application-preloading engine, which infers user context from sensing data, learns associations between user context and application usage, and preloads applications to improve their responsiveness. Compared with existing caching schemes, Falcon improves the application responsiveness by two times.

The second focus is on the domain of participatory sensing. We explore the problem of improving image search accuracy by presenting a mobile service named CrowdSearch that achieves over 95 percent accuracy consistently across multiple categories of images with response time in a minute.

We then study the problem of image search under resource constraints, by presenting a mobile system named SenSearch that turns smartphones into micro image search engines, where images are collected, indexed, and transmitted using compact features that are two magnitudes smaller than their raw format. SenSearch improves the energy and bandwidth cost by five times compared with existing image search engines.

Rattigan on Obama For America analytics team

CS Alum Matthew Rattigan (Ph.D. '12) held an important behind-the-scenes role on the Obama For America (OFA) campaign as a member of the digital group within the analytics department. His group focused on the online aspects of the campaign (email, social media, etc.). They are highlighted in a November, 2012, *TIME* article, "Inside the Secret World of the Data Crunchers Who Helped Obama Win."

Rattigan's work was primarily centered on using Facebook to reach people through their network of supporters, culminating in a massive get-out-the-vote campaign on Election Day. He worked with Ph.D. grads from statistics, political science, physics, and computer science working together to try to change the way campaigns are run.

"We found that in many cases, the messenger is just as important as the message itself," says Rattigan. "People are much more likely to act (volunteer, attend an event, or even vote) when the request comes from a trusted friend rather than someone they have never met on a mailing list."

Rattigan, advised by Associate Professor David Jensen, was a member of the Knowledge Discovery Laboratory while at UMass Amherst. His research focuses on learning causal models with relational data.



Second place in ACM competition

In the Northeast Regional Preliminary Contest of the 2012 ACM International Collegiate Programming Competition, one of the UMass Amherst Computer Science teams placed second, qualifying them for the regional finals.

The "Garbage Collector" team, consisting of Khanh Nguyen, Aibek Sarbayev, and Tung Pham (*shown l. to r.*), competed against 17 other teams from nine schools at the event held in October at Western New England University. Associate Professor Erik Learned-Miller coached the UMass Amherst CS teams. During the Northeast North America Regional Finals held at Rochester Institute of Technology in November, the team placed sixth.

Bryan receives Aspirations in Computing Award and CS scholarship

Rebecca “Becky” Bryan, a freshman computer science undergraduate student at UMass Amherst, was a 2011-2012 winner of the Massachusetts Aspirations in Computing Affiliate Award (MACAA) and a runner-up of the National Center for Women & Information Technology (NCWIT) Award for Aspirations in Computing. As a recipient of the Massachusetts award, she also received a \$5,000 UMass Amherst Computer Science scholarship.

The NCWIT is partnering with local technology companies and universities to honor young high school women with the MACAA for their computing-related achievements and interests.

Never exposed to the subject before, Bryan, of Westborough, MA, took a computer science course during her junior year at Westborough High School. She expressed an interest in CS to her father, so he took her on a tour of MathWorks in Natick, MA, where he works. After that tour, Bryan decided to pursue a career in CS. She has already done some software engineering work and hopes to obtain a Research Experience for Undergraduates (REU) position this summer in a field other than software engineering so that she can explore as much of computer science as she can, stating,

“There are just so many options with computer science!”

Bryan was on the high school ski team for two years and

participated in cross-country running and indoor track. A member of the National Honor Society, she was also involved in the start-up of the Christian Student Alliance with two close friends at her high school. Through her junior and senior years, the alliance grew from the initial three students to fifteen. “It is so rewarding,” says Bryan, “to watch something grow for which you have worked so hard.” At UMass Amherst, Bryan is part of Navigators, a Christian group on campus, and is involved with MercyHouse, a local church in Amherst, MA.

UMass Amherst CS will again sponsor a scholarship for 2013 MACAA winners who meet the eligibility criteria.



Becky Bryan receives her award from CS Chair Lori Clarke (l.) and Assoc. Professor Yanlei Diao (r.).



CS alum social in Cambridge

On September 27, 2012, CS hosted a social gathering for UMass Amherst CS alums at Google’s Kendall Square, Cambridge, MA facility. CS Chair Lori Clarke and CS Alum Steve Vinter welcomed guests to the event. With over 125 people registered, the night was a great opportunity for our guests to talk with UMass Amherst Chancellor Kumble R. Subbaswamy, College of Natural Sciences Dean Steve Goodwin, fellow alums, CS faculty, and some of our CS students approaching graduation. CS Associate Professor David Jensen, Director of the Knowledge Discovery Laboratory, gave a presentation, “From Big Data to Effective Action.” The CS alum social organizing committee consisted of Carla Brodley (’94), Carol Broverman (’91), David Miller (’06), Marisa Pacifico (’10), Irene Ros (’06), Steve Vinter (’85), Steve Willis (’78), and John Woods (’80). More photos at www.cs.umass.edu/alumsocial2012.



Faculty News



Hava Siegelmann was promoted to full professor and Rui Wang was promoted to Associate Professor.

Kevin Fu, Yannis Smaragdakis, and David Smith were appointed as adjunct faculty members.



As part of his Samuel F. Conti Faculty Fellowship, Distinguished Professor **Jim Kurose** spent five months at the LINCIS (Laboratory for Information, Network, and Communication Sciences) and at Technicolor Research, both in Paris. He was a general co-chair of the ACM Internet Measurement Conference held in Boston this November. He is also a technical program co-chair of the 2013 ACM e-Energy Conference to be held in May in Berkeley, CA, and a co-chair of the National Science Foundation's CISE AC Subcommittee on MidScale Infrastructure. In January, Kurose gave a keynote talk at the 2013 IEEE COMSNETS conference in Bangalore, India.



In December, Professor **Lori Clarke** gave a University of Minnesota Cray Distinguished Speaker lecture titled "Using Process Modeling and Analysis Techniques to Reduce Errors in Health Care."



Distinguished Professor **Don Towsley** gave three distinguished lectures this fall. In October, he presented "A Walk in the Dark: Random Walks and Network Discovery" at the University of Minnesota as part of its Cray Distinguished Speaker series. In November, he spoke at the University of Oklahoma as part of the

School of Computer Science's Hitachi Distinguished Lecture Series. Also in November, he presented "Swarms: First Class Citizens in the Future Internet" at the Temple University Computer and Information Sciences Distinguished Lecture series.



Associate Professor **Erik Learned-Miller** and his wife Carol welcomed the birth of their son, Silas John, born on November 29.

As part of the UMass Amherst Distinguished Faculty Lecture Series, Adjunct Professor **Jane Fountain** presented "Technological Change as a Variable in State Development" this fall. At the conclusion of her lecture, she received the Chancellor's Medal, the highest honor bestowed to faculty by the campus. Fountain is a professor in the Department of Political Science and founder and director of the National Center for Digital Government.



Adjunct Professor **Ileana Streinu** was named to the 2013 prestigious inaugural class of American Mathematical Society (AMS) Fel-

lows. She is the Smith College Charles N. Clark Professor of Computer Science and Senechal, Louise Wolff Kahn Professor Emerita in Mathematics and History of Science and Technology. She was also the inaugural director of the Four College Biomathematics Consortium created in 2011 by a grant from the National Science Foundation to train the next generation of scientists in the rapidly emerging field of biomathematics.

In November, Associate Professor **Kevin Fu** (*photo left top, center*) testified before the U.S. Congressional Energy and Commerce Committee on technology for stopping Medicare fraud. According to Fu's prepared witness testimony, "a key lesson from modern cybersecurity research is that security technology alone will not solve a security problem unless there are effective policies implemented to control fraud."

Researcher News

Young Mee Yoon, professor in the Department of Engineering at Gachon University in Korea is a visiting professor in the BINDS lab.

Dong Chen from the School of Information Sciences and Engineering at Northeastern University is a visiting graduate student with LASS.

From the Institute of Software at the Chinese Academy of Sciences, **Jie Chen** is a visiting scholar in the LASER lab.

Joining the CIIR, Dr. **Yin Xucheng** is a visiting associate professor from the University of Science and Technology Beijing and **Ziqi Wang** is a visiting scholar from Peking University in Beijing.

Dr. **Xiangbin Zhu**, an associate professor in the College of Mathematics, Physics, and Information Engineering at Zhejiang Normal University in China, is working with the MAS lab.

This past semester, **Jinho Choi** (IESL), **Simon Heimlicher** (NETWORKS), **Mostafa Keikha** (CIIR), **Denis Foo Kune** (SPQR), **Mastooreh Salajegheh** (SQPR), and **Lynn Stephens** (KCC), joined CS as postdoctoral research associates.

Student News

Graduate student **Shiri Dori-Hacohen** was named the Google Student Ambassador to UMass Amherst for the 2012-2013 academic year.

Graduate student **Ben Ransford** and his wife Megan Sielken announced the birth of their daughter, Ilse Frances Ransford, born on December 11.

Staff News

CS welcomes **Samantha Howe** to the main office as the assistant to the undergraduate program manager.

Donna Falcetti and her husband, Seth Eichenlaub, announced that their son, Joseph Francis Eichenlaub, was born on August 5.

Renee Fall, project manager of the Commonwealth Alliance for Information Technology Education (CAITE), attended the two-day 2012 Google Roots in Science and Engineering (RISE) Global Summit at its offices in New York City. Fall and Engineering's Paula Rees won a RISE award for their proposal "Career Day and Middle School Outreach."

Significant Bits

Newsletter of the
School of Computer Science
College of Natural Sciences
at the University of Massachusetts Amherst

140 Governors Drive
University of Massachusetts Amherst
Amherst, MA 01003-9264

"Significant Bits" is published twice a year by the
School of Computer Science, University of Massachusetts Amherst
(www.cs.umass.edu).

Your news, suggestions, comments, and contributions are
welcome. Please mail them to the address above or send
them electronically to bits@cs.umass.edu.

Department Chair Lori A. Clarke
Editor Jean Joyce
Art Direction North Haven Design
Graduate Student Tian Guo,
Liaisons Borislava Simidchieva
Contributors Emery Berger, Annette Campbell, Gerome
Miklau, Ramesh Sitaraman, Martha Stearns,
UMass Amherst News Office staff

NONPROFIT ORG.
U.S. Postage
PAID
Permit No. 2
AMHERST, MA

Thanks for your support

The following alumni and friends have actively supported the School of Computer Science from July 2012 through December 2012. Such financial support is greatly appreciated and helps maintain a world-class instructional and research program. Contributions from alums and friends help to fund important special activities that are not supported through the state budget.

Those interested in helping the School should visit www.cs.umass.edu/about/donate for online donations or send a check made out to *UMass Amherst* to:
Attn: Jean Joyce, School of Computer Science
University of Massachusetts Amherst,
140 Governors Drive, Amherst, MA 01003-9264
Please state that your gift is restricted to Computer Science.

Anonymous	Mr. Thijs De Vries ('10)	Mr. Hanuma R. Kodavalla ('88)	Mr. William H. Stevens III ('95)	Paul Utgoff Memorial Scholarship
Mr. John F. Adler ('85)	Ms. Donna E. Deeley ('70)	Mr. Gordon M. Koizumi ('72)	Ms. Julia D. Stoyanovich ('98)	Prof. Sridhar Mahadevan
Mr. Edward G. Allen, Jr ('02)	Dr. Peter J. Desnoyers ('08)	Mr. Jiang Lan ('02)	Mr. Michael J. Sullivan ('71)	Mrs. Karen Utgoff
James and Christine Ahrens	Dr. Jayanta Dey ('98) – <i>In honor of Prof. Donald Towsley</i>	Mr. Kar H. Lau ('08)	Keith and Amy Swan	Ms. Naomi Utgoff
Mr. Daniel R. Amirault ('10)	Jean and Gregory Dorrell	Mr. Ha V. Le ('98)	Richard and Denise Vartanian	Dr. Victor A. Utgoff
Mr. Armen P. Babikyan ('02)	Hester and Daniel DuToit	Mr. Anthony J. Leonardi ('05)	Deborah Vatcher and James Donahue	
Dr. James J. Barber, Jr. ('08)	Mr. Venkata C. Duvvuri ('99)	Mr. Jones S. Leung ('04)	Vijay Turlapati and Vijayalakshmi Merla	Robin Popplesone Fellowship
Robert and Lynn Barnes	Julie and Kevin Flannery ('93)	Dr. Xiaoyan Li ('06)	Yunqing and Changting Wang ('02)	Prof. Kristin Morrison
Dr. Daniel J. Barrett ('98)	Mr. William M. Fisher ('75)	Ms. Louise M. Sironi ('65)	Dr. Zhenlin Wang ('99)	Edward Riseman and Allen Hanson Scholarship
Mr. John V. Bellissimo	Mrs. Teresa M. Foster ('81)	Dr. Austin P. Maher ('87)	Mr. Harteg S. Wariyar ('07)	Prof. Lori Clarke and Leon J. Osterweil
Mr. Howard Berman	Eric and Cynthia Fox	Mr. Victoria Manfredi ('05)	Mrs. Nancy W. Wasiuk ('79)	Prof. Robert Graham
Prashant and Hema Bhatt	Dr. Michael J. Franklin ('83)	Mr. Nicholas M. Maniskas ('06)	Mr. Peter F. Willey ('80)	Prof. Allen R. Hanson and Mrs. Joan Hanson
Jeffrey and Lisa Boone ('86)	Mr. Thomas A. Galanis ('99)	Mr. Saul R. Marcus ('77)	Steven Willis ('78)	Dr. Raghavan Manmatha ('97)
George and Kim Bowker ('83)	Lisa and Jon Glass ('85)	Andrew and Karin Merlino ('86)	Ms. Onyu A. Wong ('87)	Prof. Shlomo Zilberstein
Dr. Eric W. Brown ('96)	Gregory Goblirsch and Shirley Lasch	Paul Moore and Rosanne Devries	Timothy and Heidi Wright ('86)	
Mrs. Mary C. Brown ('85)	Mr. John Goshdigian ('73)	Mr. John J. Murphy ('76)	Mr. Shijun Wu ('12)	Corporate and Matching Gifts
George and Kim Bryant	Mr. Thomas A. Grandgent ('04)	Brian and Susan Moriarty ('75)	Mr. Yan Xiao ('00)	BBN Technologies Raytheon
Mrs. Carol Buote ('84)	Mr. Thomas E. Greene ('07)	Mr. Brian J. Morris ('91)	Mrs. Qin Yao and Mr. Yao Ren	EMC Corp.
Mr. Daniel F. Burke ('82)	Mr. Michael P. Greenzeiger ('01)	Ms. Terri A. Noyes ('83)	Dr. Zhongfei Zhang ('96)	Fiksu, Inc.
Dr. Brendan D. Burns ('02)	Mr. Kenneth E. Grode III ('80)	Victor ChunKong Ng and Angela Hing Wah Ng ('92)		Google
Jamie Callan and Adele Weitz ('93)	Johnna and Kevin Hardy	Mr. Adam P. Nyzio		Microsoft Corp.
Ms. Jennifer M. Cannan ('03)	Jonathan and Maureen Hartl ('90)	Dr. Jitendra D. Padhye ('00)	Victor Lesser Scholarship	Oracle Corp.
Dr. Aaron G. Cass ('05)	Mr. Michael J. Hartman ('82)	Mr. Charles N. Paliocha ('83)	Anonymous	Seimens Corp.
Dr. Shenze Chen ('92)	Heddi and Christopher Holmes ('91)	Dr. Ron Papka ('99)	Dr. Ping Xuan ('98)	State Street Corp.
Mr. Aaron Cho ('04)	Mr. Richard L. Housel ('80)	Mr. Robert M. Pilachowski ('88)		TripAdvisor
Mr. Jacky Cheuk Kei Chu ('01)	Mr. Christian J. Johnstone ('02)	Prof. Doina Precup ('00)	David W. Stemple Memorial Scholarship	Vistaprint
Mr. Stephen D. Clare ('01)	Mr. Jonathan J. Kaufman ('11)	Ms. Laura Anne Price ('87)	Prof. Lori Clarke and Leon J. Osterweil	
James and Donna Connell	Mr. Stephen A. Kelley ('78)	Mr. John Scarrici	Julie Stubbs and Petr Jirovsky	
Dr. Daniel D. Corkill ('83)	Mrs. Colleen B. Kettle ('84)	Ms. Anna L. Schnitzlein	Dr. Stephen T. Vinter ('85)	
Mr. David J. Couture ('83)		Mr. Kenneth D. Sherrill ('11)		
Dr. Jody J. Daniels ('97)		Mr. David R. Stevens ('07)		
Ms. Kristen M. Day				