

Significant BITS

Newsletter of the College of Information and Computer Sciences

Faster or Better: The Dilemmas of Algorithm Design in the Big Data Era

In an interview with Barna Saha, CICS assistant professor, she described some of the research challenges and latest advances in the area of algorithm design and analysis.

The amount of data in our world has been exploding at an unforeseeable rate. The increasing volume and detail of information captured by enterprises, and the rise of multimedia, social media, and the Internet of Things are contributing to this exponential growth. Healthcare industries are promising to transform the world through “big” data. The ongoing data deluge is bringing in new opportunities in businesses, finances, and education. But with big promises, come big challenges.

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Introducing the UMass Amherst College of Information and Computer Sciences

Letter from the Dean & Chair

Greetings from the executive team of the new College of Information and Computer Sciences (CICS) – Bruce Croft, interim dean, and James Allan, chair of the faculty. Becoming a college is a major step for our program and the most common reactions from people when they hear this news are two questions: “Why a college?” and “Why now?” The simple answer to the first question is that computing and computational thinking have become so important both across academic disciplines and society in general that we needed to have a stronger role in the strategic discussions in the university. We have moved from being one of sixteen departments and other academic units in the College of Natural Sciences (CNS) to being one of nine colleges that talk directly to the Provost, Chancellor, and other senior administrators. The answer to the second question is that the faculty have been discussing this move for more than three years and “all” it took was the strong and decisive leadership of Chancellor Kumble Subbaswamy and Provost Katherine Newman to make it happen.

Starting a new college provides both opportunities and challenges. One of the first challenges we have had to deal with is building up a college-level organization for functions that were previously provided by CNS, such as advising, development, and career services. This has involved hiring a number of new staff, appointing associate deans, and creating new faculty committees. Professor Jack Wileden has taken on the job of associate dean for student affairs (also known as the academic dean) and deals with the ever-increasing numbers of prospective and current computer science undergraduate majors.

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Bruce Croft



James Allan

Four New Faculty Join CICS

The College of Information and Computer Sciences welcomes four outstanding new faculty members. Joydeep Biswas, René Just, Akshay Krishnamurthy, and Arya Mazumdar joined the college as assistant professors in 2015-2016.

“We are thrilled to have these four rising stars join our college. With research strengths in areas such as robotics, machine learning, information and coding theory, and software engineering and security, these new faculty members will strengthen the college’s core research programs, bring expertise and new perspectives to our new college, and build connections to other disciplines on- and off-campus,” said James Allan, professor and chair of the faculty.

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Professor Shlomo Zilberstein is the associate dean for research and engagement, tasked with building up our funding portfolio and industry outreach. Kerry Shaw is the director of external relations and communications and has taken on many roles, including managing our branding, web presence, and industrial affiliates program. New staff include Barbara Stahelski and Robbie Calliham in the dean's office, Joyce Mazeski and Tara LaFlamme in the main office, and Victoria Rupp in the chair's office. Other important staff hires are underway, including a director of development to manage the crucial college development program. Probably the most important search underway is for a permanent dean. We are hoping to find a talented and visionary person to start in September 2016.

As examples of the opportunities enabled by being a college, and building on our faculty's research reputation and the success of previous ventures, the Center for Data Science, headed by Professor Andrew McCallum, launched this year and the Cybersecurity Institute, headed by Professor Brian Levine, will be formally announced soon. These new research collaborations, along with future efforts in areas such as biomedical informatics, will provide a focus for grants, industry outreach, and development. We expect that faculty growth in these areas, together with the need to hire lecturers for new degree programs, will increase the faculty size from the current number of 45 to about 60 in the next few years. This raises another common question in discussions about the college: How many departments are there, and what are they? The current structure of the college is, in effect, a single department although there is no longer a Department of Computer Science. We have discussed the possibility of forming multiple departments in the future. Although what these departments are and when they will be formed will depend on the growth and success of the different aspects of our organization.

The prospect of future growth and the expected changes in the organization are reflected in the name of our college, "Information and Computer Sciences" – note the plural, in particular. Data Science, for example, can be considered as one of the information sciences. We have recently started an Informatics degree, and are discussing whether this program should develop into a full-blown information science program that would include master's and doctoral programs and could also integrate the Information Technology Minor program that is a new part of the college.

Speaking of master's programs, growing our currently very small Professional Master's program is a major goal for the new college, to support the increasing demand for professional education, to serve as an important component of industry outreach, and to contribute to our financial growth. Our faculty is designing new programs in data science and cybersecurity that will soon be available. We are looking at a range of options for offering courses to make it easier for people currently working to complete these degrees.

Along with all these changes, we plan to maintain and strengthen our commitment to developing connections with our alumni. We are continuing our East Coast and West Coast events and will be participating in a new mentoring program designed to connect alumni and current students. We look forward to being able to develop even more useful and productive venues for interaction, guided by the recently formed College Advisory Board (described below).

So, it is an exciting and interesting time for computer science at UMass Amherst! There is plenty of work ahead for everyone in this venture, but the benefits in terms of influence, reputation, and growth potential are undeniable. We will keep you posted about the important developments as we proceed.

Bruce Croft

Distinguished Professor and Interim Dean

James Allan

Professor and Chair of the Faculty

CICS Advisory Board Established

The College of Information and Computer Sciences Advisory Board, established this fall, consists of leaders from industry and academia and our alumni. The board provides advice to the dean on important aspects of the college operations, such as industry relations, outreach, development, research directions, and the content of our academic programs.

Current members include:

- Eric Brown (M.S. '92, Ph.D. '96), Director of Watson Algorithms, IBM Watson Group
- Renu Chipalkatti (M.S. '87), Head of Customer Experience, Consumer Products, Verizon
- Wayne Duso (M.S. '85), General Manager, Amazon Web Services
- Tripp Peake, General Partner, Long River Ventures
- Debra J. Richardson (M.S. '78, Ph.D. '81), Professor of Informatics and Founding Dean, Donald Bren School of Information and Computer Sciences, University of California – Irvine
- Gareth Ross, Senior Vice President, Advanced Business Analytics and Data Science, MassMutual
- Robert Sproull, Vice President and Director, Oracle Labs (ret.)
- Steve Vinter (M.S. '83, Ph.D. '85), Engineering Director and Site Lead, Google Cambridge
- Steven Willis (B.S. '78), Co-founder of networking companies including Wellfleet and Argon

FOUR NEW FACULTY - - - - - cont. from page 1



Joydeep Biswas' research interests are in robotics, including robot perception, motion planning, and control systems. Examples of his research, the CoBots, are indoor service mobile robots that perform tasks like delivering packages, collecting and delivering mail, escorting visitors, and delivering spoken messages on multiple floors of the different buildings occupied by the School of Computer Science at Carnegie Mellon University. He was

previously a post-doctoral fellow in the Computer Science Department at Carnegie Mellon University where he also received his Ph.D. in Robotics in 2014 and his M.S. in 2010. He was the recipient of a 2015 Siebel Scholarship, served on the Program Committee for the RoboCup Symposium, and continues to serve on the Executive Committee of the RoboCup Small Size League.



René Just's research interests span software engineering and software security, in particular static and dynamic program analysis, mobile security, mutation analysis, type systems, and mining software repositories. Just's research focuses on advancing software development and software quality, especially correctness, robustness, and security. Previously, Just was a post-doctoral research associate in the College of Computer Science & Engineering

at the University of Washington. He received a Ph.D. from the University of Ulm, Germany in 2013. Just's research was awarded two ACM SIGSOFT Distinguished Paper Awards at the International Symposium on the Foundations of Software Engineering (FSE '14) and the International Symposium of Software Testing and Analysis (ISSTA '14) respectively.

Akshay Krishnamurthy's research interests are in machine learning and statistics. He is specifically interested in interactive learning and learning settings involving feedback-driven data collection. His Ph.D. thesis, "Interactive Algorithms for Unsupervised Machine Learning," focused on interactive approaches for discovering and exploiting low-dimensional structure in datasets. Krishnamurthy, who will be on campus in fall 2016, is currently a post-doctoral research fellow at Microsoft Research. He received his Ph.D. from Carnegie Mellon University in 2015 and his B.S. in Electrical Engineering and Computer Sciences from the University of California Berkeley in 2010. In 2015, he co-organized the ICML 2015 workshop on Advances in Active Learning.



Arya Mazumdar's research interests include error-correcting codes and information theory (fundamental limits of reliable data-processing) and their applications. He was previously an assistant professor at the University of Minnesota-Twin Cities. Mazumdar received his Ph.D. from the University of Maryland, College Park in 2011. Following this he was a post-doctoral scholar at the Massachusetts Institute of Technology (2011-2012). He spent the summers of 2008 and 2010 at the Hewlett-Packard Laboratories and IBM Almaden Research Center, respectively. He is a recipient of a 2014-15 NSF CAREER award and the 2010 IEEE ISIT Jack K. Wolf Student Paper Award and received a Distinguished Dissertation Fellowship Award from the University of Maryland in 2011.



New England Security Day

On September 17, 2015, CICS hosted the first annual New England Security Day in the Computer Science Building. The event drew 115 faculty, researchers, and students to the university from as far south as New Jersey for talks and poster sessions that highlighted the importance and timeliness of cybersecurity research.

Speakers included Katherine Newman, UMass Amherst provost and senior vice chancellor for academic affairs, and Jeremy Levine, program director for the National Science Foundation's Secure and Trustworthy Cyberspace (SaTC) program.



New England Security Day attendees gather in front of the Computer Science Building

Professor Brian Levine led a cross-campus, multidisciplinary organizing committee for this first-of-its-kind conference. The event was sponsored by the UMass President's Office.

DILEMMAS OF ALGORITHM DESIGN – – cont. from page 1



Barna Saha

“If we have to bear the fruit of big data, we need to analyze this large amount of data in a timely manner and extract relevant information from it,” said Saha. “We need algorithms that run fast, are robust to changes in data, and understand the trade-off between efficiency and accuracy.”

From its inception, complexity theory through concepts such as NP-Hardness has classified computational problems into those that have relatively efficient solutions versus those that are intractable. Any problem that

can be solved in time polynomial in the input size falls in the first category. “Let us consider the Facebook graph where each user represents a vertex in the graph and there is an edge between two vertices if the corresponding users are friends,” said Saha. In 2014, Facebook had more than 1.32 billion users, approximately $1/7$ th of the world population. A simple query of finding all-pairs shortest distance requires cubic time-complexity in the number of vertices, i.e., more than the total time since the inception of the earth. Clearly this is not efficient. “We need a finer-grained classification of problems categorized as ‘efficient’ under the traditional complexity theory,” noted Saha. “We need to design faster algorithms, or to understand why such algorithms do not exist.”

“Can we improve the cubic running time for finding all-pairs shortest paths in general graphs?” questioned Saha. There is no concrete answer to this question. But a recent result shows that if the edges have arbitrary real weights, then finding a truly subcubic algorithm, one that runs in $n^{(3-\delta)}$ (n is the number of vertices, $\delta > 0$) time will be a breakthrough. This will lead to better running times for a large number of computational problems from disparate domains for which no progress has been made for decades. On the other hand, faster algorithms are known when the graph is sparse, or if we allow a small “approximation.” Exploiting the structural properties of the underlying instance, and allowing approximations, are two key ingredients for designing fast algorithms. Approximation introduces inaccuracies. If the true distance between some pair of nodes is “ x ,” an approximation algorithm may return results within $x(1 \pm \epsilon)$ where the goal is to make ϵ as small as possible. The smaller the ϵ , the better the quality of solution and the slower the algorithm. “When time is of essence, a fast approximation algorithm can be of greater value than a slow exact algorithm,” added Saha.

While all-pairs shortest paths compute distances among vertices in a graph, edit distance is a fundamental distance measure between sequences. It computes the number of edits (e.g. insertion, deletion, substitution) to convert one string to another, and has wide applications in computational biology, natural language processing, and so forth. A recent article in *MIT Review* (news.mit.edu/2015/algorithm-genome-best-possible-0610) reports on a new result on the complexity of finding edit distance between two sequences. For decades

researchers have tried to design subquadratic algorithms for edit distance computation; this result shows such algorithms will refute “the strongly exponential time hypothesis” (SETH), a conjecture that is becoming a main device for proving conditional hardness of problems. A broader problem with an overwhelming number of applications arises when we allow matching a sequence to a class of sequences, instead of just a single sequence. Consider a class of documents, and we want to know whether a specific document matches the semantics of this class, and if not what minimal changes are required to match it with any one of them. Often the valid class of documents can be represented by a formal grammar. In that case, the problem of computing edit distance to any valid member of the grammar is known as the “language edit distance problem.” Using dynamic programming, it is possible to compute exact language edit distance in cubic time. In a recent result, we show this is nearly the best possible – connecting this problem to many fundamental graph problems such as all-pairs shortest paths and beyond. This provides a bridge between the complexity of distance computation over sequences to basic graph problems.

“Can we design faster approximation algorithms for the language edit distance problem beating the cubic hardness? In one of our works, we show indeed that is possible,” said Saha. “Our algorithm also gives fast alternatives to many graph problems exploiting the connection. The main crucial ingredient in this algorithm is a method of ‘dependent randomized rounding.’ First, we show the language edit distance computation can be computed fast if for all substrings the true distance belongs to a small possible set of distances. If that is not the case, we ‘round’ the actual distances to belong to that set. We select the rounded value by following a carefully crafted probability distribution depending on the value of the actual solution, and we slowly build the solution to successively larger sequences like in dynamic programming. Indeed, our method can be useful to accelerate dynamic programming, one of the most fundamental methods for developing polynomial time algorithms. Exact dynamic programmings are often slow.” In a recent project funded by NSF, Saha is striving to build new generic tools for scalable dynamic programmings, where approximation and randomization promise to play very important roles.

“In prior works, we have developed new paradigms of dependent randomized rounding which were useful to obtain polynomial time algorithms for many NP-Hard problems,” said Saha. “Here, a similar concept helps us to design fast algorithm for a polynomial time problem.” The area of understanding the fine-grained complexity of problems, and designing fast algorithms through that lens is still in its early-stage, and there are many open problems. In the big data era, when a quadratic running time is as bad as a NP-Hard problem in efficiency, the importance of fine-grained complexity is growing.

As a fellow in the Simons Institute at the University of California Berkeley, Saha is participating in a semester long program devoted to understanding the main challenges in this area, and making progress on a variety of fundamental questions in the theory of computation utilizing close connections between complexity theory and algorithm design.

New Center for Data Science Expands Academic Programs and Industry Engagement

On April 9, 2015, more than 200 people came to campus to celebrate data science research and highlight its role in industry, government, and education during the Center for Data Science's launch. Faculty, staff, CICS alumni, and executives and representatives from the Commonwealth and corporations such as Amazon, Google, Booz-Allen, MassMutual, Pratt & Whitney, Thomson Reuters, and Yahoo! attended the daylong symposium.

The symposium opened with remarks from UMass Amherst Chancellor Kumble Subbaswamy, Provost Katherine Newman, as well as James Kurose, CICS distinguished professor and assistant director of the NSF's Computer & Information Science & Engineering (CISE) directorate. The University projects an investment that leverages faculty, many of them new, from across campus working in data science related areas and enhanced industry partnerships.

"This growth in faculty is enabling the growth in the campus's data science course offerings within CICS and beyond," said Andrew McCallum, professor and director of the new center. "New courses, B.S. and M.S. concentrations, and professional certificates are being developed to address the high demand for the data science workforce. The Center hopes to triple the number of M.S. students currently enrolled in data science."

Building on CICS's research strengths in data science sub-areas, such as machine learning, computer vision, human language technology, algorithms, networking, and scalable data management, the Center will expand in fields such as deep learning, parallel-distributed data analytics, theoretical machine learning, mechanism design, data visualization, as well as application in areas such as digital healthcare, urban analytics, climate science, and other areas of eScience.

Saha Receives Two Early Career Awards

In April, Assistant Professor Barna Saha received an NSF Computer and Information Science and Engineering (CISE) Research Initiation Initiative (CRII) grant for her proposed research on developing a new theory for scalable dynamic programming algorithms. Saha is the first UMass Amherst recipient of this new grant, which is given to teaching and research faculty in the first two years of their appointments.

Saha also received the Simons-Berkeley Research Fellowship for 2015-16 given to exceptional young scientists within at most six years of the award of their Ph.D. from The Simons Institute at the University of California Berkeley.

Industry has expressed its enthusiasm for the Center's expansion of research and education in data science. "Several companies, such as Amazon, Microsoft, Thomson Reuters, and Yahoo! have made significant contributions of services, hardware, data, and funding to deepen our collaborations. Companies are joining our new Industry Affiliates Program too in order to have expanded access to our research, students, and topical workshops," noted McCallum.

The symposium punctuated those connections with a one hour "blitz session" of 16 faculty and industry partners speaking alternately about industry challenges and relevant data science research. The session started with Google Cambridge's site director and engineering director, Steve Vinter (Ph.D. '85). Another alumnus, Andrew Merlino (B.S. '85), founder and CEO of Pixel Forensics, spoke in the segment on computer vision. The range of material presented, from sensor design, to theoretical algorithms, to machine learning, to parallel-distributed systems, mirror the Center's mission of addressing a broad set of problems across cutting edge data science.

McCallum commented after the event, "Our interests and those of the key players in data science are well-aligned. We all want to make better decisions, whether they're about how to improve efficiency, to maintain our health or expand a business or accelerate the progress of science. In coming up with these solutions, we're addressing some of the biggest, most complex problems faced by today's society." For more information, visit ds.cs.umass.edu.



Chancellor Kumble Subbaswamy gives opening remarks

McCallum Awarded NSF Grants

Andrew McCallum, professor and director of the new Center for Data Science, has received two National Science Foundation (NSF) grants in support of machine learning research.

McCallum was awarded a four-year grant for the project "Constructing Knowledge Bases by Extracting Entity-Relations and Meanings from Natural Language via 'Universal Schema.'" This project aims to greatly increase the accuracy with which entity-relations, the connections between objects, can be extracted from text, as well as increase the fidelity with which the entity relations can be represented.

McCallum will also work on with researchers from the Massachusetts Institute of Technology on a project to the speed up the development of new materials by using machine learning to help predict which combinations of inorganic compounds would be likely to produce, or synthesize, the desired materials. The project, titled "The Synthesis Genome: Data Mining for Synthesis of New Materials," is funded by a collaborative grant.

CICS Hosts 3rd Annual Eureka! Program

For the third consecutive year, CICS hosted Girls Inc. of Holyoke's Eureka! program, a national initiative that brings girls ages 12-18



onto college and university campuses to explore science, technology, engineering, and mathematics (STEM) fields. The program launched on the UMass Amherst campus in 2013 in collaboration with the College of Natural Sciences, the prior home of the School of Computer Science.

Throughout July, the Computer Science Building served as headquarters for approximately 100 Eureka! Scholars who explored campus, ate in dining halls, and participated in educational workshops conducted by campus faculty. CICS professors, assisted by several graduate students, led three of these workshops.

Assistant Professor Benjamin Marlin and Associate Professor Deepak Ganesan led a five-day workshop, "An Introduction to Creative Computing with Scratch," that provided an introduction to computer science through hands-on programming activities using MIT's programming language, Scratch. Assistant Professor Amir Houmansadr led "Protecting Your Privacy on the Internet," discussing the risks of losing private information on the internet and best practices for safeguarding your identity. Research Professor Beverly Woolf ran, "MathSpring: Personalizing Math," which explored mathematics through interactive games on the computer that are designed to improve math understanding.

Kick-Starting CS in Western Massachusetts High Schools

Over the 2015-2016 academic year, participating teachers from twelve western Massachusetts high schools will come to UMass Amherst and other technology industry or educational sites to attend workshops to prepare them to offer new introductory computer science classes to their students.

The workshops are part of a statewide program, the Massachusetts Exploring Computer Science Partnership (MECSP), supported by a grant from the National Science Foundation. UMass Amherst leads the western hub of the MECSP, a partnership with the Educational Development Center, UMass Boston, Framingham State University, Massachusetts Technology Leadership Council Education Foundation, and the Massachusetts Computing Attainment Network to train more than 100 Massachusetts teachers and reach more than 1,000 students. The western Massachusetts ECS hub is part of the Commonwealth Alliance for Information Technology Education, led by Professor Emeritus Rick Adrion.

Renee Fall, director for the MECSP western regional hub, said that the teachers are preparing to offer students up to six units over the coming year covering such topics as human-computer interaction, data analysis, problem-solving, web design, robotics, and introduction to Scratch programming.

The program includes teacher professional development and a year-long curriculum structured in such a way that all students, especially those in schools with many low-income background and students of color, are introduced to the problem solving, computational practices, and modes of inquiry associated with doing computer science, said Fall.

"The ECS teaching practices focus on equity, culture, and students' curiosity," said Fall. "We hope to build community among the teachers that will benefit them as educational professionals, no matter the level of computing content they teach."

Visit our new website for the latest news
www.cics.umass.edu

We're on Facebook and LinkedIn

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and
LinkedIn:

UMass Amherst Computer Science

Lifetime Alumni Email

Email forwarding addresses are now available for any of our UMass Amherst computer science alumni. Although you might change employers or Internet providers, your alumni email address will always stay the same and will forward your email to whatever address you choose. The email address will generally be `firstname.lastname@alum.cs.umass.edu`. To sign up for your email forwarding address, go to cics.umass.edu/lifetime-email-forwarding.



Lori Clarke Retires

Lori Clarke, professor and former chair of the School of Computer Science, retired in June after forty years at the University of Massachusetts Amherst.

Dr. Clarke is co-director of the University's Laboratory for Advanced Software Engineering Research (LASER) where her research focuses on testing, verification, and

requirements engineering for distributed systems. She recently has been concerned with improving the safety of life-critical, human-intensive systems, such as medical procedures.

Clarke's work as a researcher and member of the faculty has been recognized with numerous awards, including the 2012 ACM Special Interest Group on Software Engineering (SIGSOFT) Outstanding Research Award, a lifetime career award, and the 2011 University of Massachusetts Outstanding Accomplishments in Research and Creative Activity Award.

During her four years as chair, Clarke oversaw rapid growth in undergraduate enrollment and led strategic planning efforts that resulted in the school receiving college designation this spring.

"Lori joined the department a relatively short time after it was founded, when computer science was still a small field," said Bruce Croft, interim dean of the new College of Information and Computer Sciences. "Her work and leadership over the past forty years have been a key part of establishing computer science within the University and have played a big role in the advancement of the field as a whole."

Clarke will continue to be involved in research and efforts to increase participation of underrepresented groups in computer science. She serves as a board member of the Computing Research Association's Committee on the Status of Women in Computing Research (CRA-W). She will also continue to advise UMass CS Women, a group she founded twenty-five years ago to support and serve women computer science faculty and students.

A campus celebration honoring her contributions to the University was held on May 29. In 2014, CICS alum Rajesh Jha ('90) and his wife Sudha Mishra, created a scholarship in Clarke's honor. The *Lori A. Clarke Scholarship in Computer Science* will be awarded to first year graduate students from underrepresented groups. Learn more about the scholarship and how you can contribute at cics.umass.edu/CSendowments.

Krithi 60 Symposium Celebrates Professor Krithi Ramamritham

On May 2, 2015, the Krithi 60 Symposium on Computer Science and Engineering was held on campus in the Computer Science Building to celebrate the 60th birthday of Krithi Ramamritham, former UMass Amherst computer science professor now at IIT Bombay.

Panos K. Chrysanthis (Ph.D. '91), Steve Vinter (Ph.D. '85), and Wei Zhao (Ph.D. '86) are three of Krithi's UMass Amherst doctoral students who took the lead in organizing the daylong event attended by 50 of Krithi's colleagues, former students, academic descendants, and family and friends.

"Krithi is a dedicated mentor, an engaging teacher, an inspiring leader, and, above all, a groundbreaking innovator," said Chrysanthis. "As one of the pioneers of data consistency and real-time systems, his seminal contributions have shaped the evolution of real-time operating and database systems. His outstanding contributions in the area of real-time scheduling, operating systems, data management, and transaction processing have earned him international renown. The impact of his work is significant and far-reaching."

During the Symposium, a number of researchers gave presentations ranging from "Network Function Virtualization Orchestration" by K. Arvind (Ph.D. '91) of Overture Networks to "Exploration and Mining of the Deep Web" by Nan Zhang, associate professor of computer science at George Washington University. Chrysanthis noted that Zhang is one of Krithi's student descendant "grandchildren" (Zhang's advisor was Wei Zhao), and that 10 of Krithi's "great-grandchildren" were also in attendance.

Krithi 60 also included two keynote speeches, "An



expanding and expansive view of computing and Krithi Ramamritham's many contributions to this vision" given by Jim Kurose, UMass Amherst CICS distinguished professor and assistant director of the Computer and Information Science and Engineering (CISE) division at the National Science Foundation (NSF), and "Towards a Theory of Transitions" given by Alejandro Buchmann, professor of computer science at Technische Universität Darmstadt. The full program can be viewed at db.cs.pitt.edu/krithi-60.

A dinner at the Lord Jeffery Inn with reminiscent short talks concluded the day. The symposium participants presented Krithi with a gift of a customized UMass Amherst chair. In recognition and appreciation of Krithi's work and influence, his students have also established the endowed *Krithi Ramamritham Computer Science Scholarship*. The scholarship will provide support each year to a graduate student pursuing research in the area of data management, computer systems, or related fields. To find out more about the Krithi scholarship fund or to donate, go to cics.umass.edu/CSendowments.

A New Scholarship for a New College

The establishment of the College of Information and Computer Sciences (CICS) brings new opportunities and key challenges. Recruiting the best undergraduate and graduate students in an increasingly competitive environment is a pressing issue. In comparison with most other colleges within UMass Amherst, CICS has very few scholarships, and the ones we do have are underfunded. This is particularly true for undergraduate scholarships, but providing financial assistance to our prospective undergraduates from Massachusetts is where we could have the most impact. Nearly 60 percent of the college's considerable in-state undergraduate student population qualify for need-based aid.

To address this issue and to emphasize the importance of providing top-quality education to undergraduates at UMass Amherst, we have established our first new college undergraduate scholarship, the Conrad Wogrin Scholarship in Computer Science. The scholarship has the goal of providing full scholarships to undergraduate UMass Amherst students in the College of Information and Computer Sciences who show particular promise and demonstrate financial need. Preference will be given to students who are underrepresented in computer science.

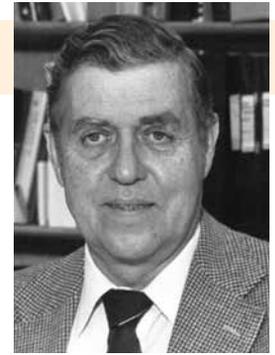
The scholarship has been named after Emeritus Professor Conrad Wogrin, one of the major figures involved in establishing, nurturing, and growing computer science at UMass Amherst. Bruce Croft, distinguished professor and CICS interim dean, commented, "In my first years here, Connie was running the rapidly developing University Computing Center but was also involved in all the main discussions

and decisions in our department as we developed into a nationally recognized program. He encouraged and mentored the junior faculty, including me, and was a big supporter of my research in information retrieval."

Wogrin came to UMass Amherst in 1967 as a professor of Computer Science and director of the Research Computer Center from 1970-1988. Along with the general responsibility of the Center at UMass Amherst, his research interests were in image processing, computer-based education, and computer-aided design. Wogrin was one of the first seven faculty hired for the program and was instrumental in the growth of computer science at UMass Amherst.

Dr. Wogrin was the acting chair of the Computer Science Program at UMass Amherst from 1969 to 1970 and took on the responsibility for the search for a new chair. With Dr. Wogrin's help, the program was upgraded in 1972 to the Department of Computer and Information Science (COINS), which expanded its offerings to include both M.S. and Ph.D. degrees.

The Wogrin Scholarship was established by Professor Emeritus Wogrin's family, but significant additional funding is needed to bring it to a level where full scholarships can be awarded each year. If you are interested in contributing, contact Rika Clement at rika@umass.edu or 413-545-1151. For online donations, go to: cics.umass.edu/wogrin.



Conrad Wogrin

Woolf Awarded Grant to Commercialize Math Tutoring Software



Beverly Woolf

Research Professor Beverly Woolf recently received a grant from the NSF to commercialize the intelligent tutor known as MathSpring for e-learning in mathematics.

Woolf, along with assistant professor Ivon Aroyo at Worcester Polytechnic Institute and staff at UMass Amherst, created intelligent and emotionally perceptive teaching software for students in grades 5 through 10 that features friendly animated characters who interact one-on-one

with users like a personal trainer. The tutor uses artificial intelligence techniques to evaluate student skills and knowledge in real time, then adjusts its responses to offer personalized strategies that address knowledge gaps and provide advice for tackling difficult problems. The characters also speak to students about the importance of perseverance and effort.

"No online tutor today responds by analyzing both student knowledge and behavior," said Woolf. "Our MathSpring project addresses the high failure rate of K-12 students to learn mathematics. It applies theoretical understanding of the

individual student's knowledge and mood, which helps to guide each tutor response. These interactions are designed to move students away from boredom or disengagement and will have the capability to select from as many as 700 problems in the system."

An earlier version of Woolf's software improved student performance on standardized test scores by an average of 10 percent, a critical difference for low-achieving and other students who often struggle with math. It has been used worldwide to improve students' early relationships with mathematics, keeping later career options open.

"Since the annual U.S. education expenditure for K-12 is approximately \$625 billion, a large potential exists for making both a commercial and social impact in this space," Woolf noted. The research plan is to design the tutoring software for both Android and Apple's iOS platforms and hope to identify groups of schools as long-term partners.

The MathSpring project will partner with CarneyLabs, a performance acceleration company, to guide commercial aspects of the translation from research to commercial reality and Virginia Advanced Studies Strategies, a non-profit company that works with the Virginia Department of Education, to provide a test environment, Woolf said.

Industrial Affiliates Program News

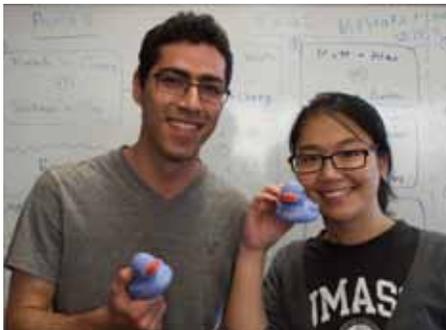


CICS Industrial Affiliates Program (IAP) member companies sponsored a number of student events and awards recently.

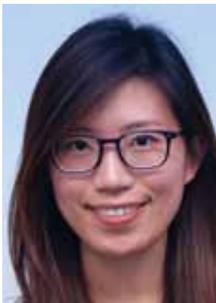
EMC Corporation sponsored the EMC Student Participation Awards. The 2015 recipients (*above*) include:

Apoorva Balevalachilu, Myung-ha Jang, Tiffany Liu, Sneha Shankar Narayan, Emma Strubell, Ameer Trivedi, and Dan Zhang. The 2015 award funding helped defray costs to attend the 2015 CRA-W Grad Cohort Workshop held in San Francisco, CA. Four other students, Yunmeng Ban, Ishita Dasgupta, Liudmila Elagina, and Sofya Vorotnikova, were also able to attend through CRA-W funding.

Yahoo! supported the eighth annual computer science foosball tournament that was held on April 28. The event is hosted by the UMass Amherst ACM Student Chapter and is sponsored by Yahoo!, which provides food and prizes. The foosball table was a gift from Yahoo! eight years ago. This year's winning team consisted of Mostafa Dehghan (*left*) and Chang Liu (*right*). Tian Guo and Stephen Lee were on the runner-up team.



Yahoo! is also a longtime sponsor of the Accomplishments in Search & Mining Awards. The 2014-2015 awards were granted to doctoral students Chia-Jung Lee (*left*) and Arvind Neelakantan (*right*).



Lee is a Ph.D. student in the Center for Intelligent Information Retrieval and is advised by Distinguished Professor Bruce Croft. Her research focuses on the relationships between archival and social media and how those relationships can be used to improve the effectiveness of search. "She has proposed new approaches to linking media, incorporating social media in retrieval models, and evaluating the outcome of integrated archival/social search," said Croft.

Neelakantan is a Ph.D. student in the Information Extraction and Synthesis Laboratory and is advised by Professor Andrew McCallum. Neelakantan has done fundamental new research at the intersection of vector embeddings of semantics and logical reasoning in knowledge bases. "This is an important intersection in which I predict Arvind's strong skills in both machine learning and managing large data will carry him far," noted McCallum.

Cisco Systems sponsored the 6th Annual Programming Competition held on April 14, 2015 in the CS building. Hosted by the UMass Amherst ACM Student Chapter, the event was open to all Five Colleges students and was attended by 35 students who competed in the ACM ICPC-style programming competition. Food and prizes were provided by Cisco Systems. The first through third place winners are (*left to right*) Thai Nguyen, Khanh Nguyen, and Batkhuyag Batsaikhan.

For more information about our industrial affiliates program, visit: cics.umass.edu/outreach/industrial-affiliates.



The UMass Amherst Computer Science ACM Student Chapter visited **Google** in Cambridge, MA in April 2015.

Giri Kumaran (Ph.D. '08) Tackles Data Science Issues

How does one estimate the price of a “Stride Rite Naiya Sandal Toddler Girls Size 7W” or a “Pivot Mach 429 Carbon Mountain Bike Frameset, Size Medium”? As a data science manager at eBay Inc., Giridhar (“Giri”) Kumaran (Ph.D. '08, advised by Prof. James Allan) led a team that worked on the difficult problem of estimating the final selling price of the millions of diverse items listed for sale on eBay. “Sellers on eBay typically have a hard time determining how much their items are worth,” said Kumaran. “They also struggle with how best to set their prices to optimize for sales, profit, sales velocity, seasonal trends, and so on.” The real-time price guidance service that Kumaran’s team built proved to be a hit with sellers. It led to more successful sales at better prices than before, thus impacting seller happiness and eBay’s bottom line.

The real-time price guidance service is powered by a sophisticated machine learning model that utilizes hundreds of features. “Surprisingly, its roots are in very basic information retrieval,” noted Kumaran. “The most impactful feature is what similar items sold for recently. These items are found by searching through past sales with the item’s title as a query using BM25 as a ranking function!” Working on this problem, first as an individual contributor and later as a team lead, Kumaran found further validation that the key to a successful supervised model lay with the careful design and choice of features rather than the particular algorithm itself. Also playing a critical role in shaping the price guidance service was Kumaran’s product management counterpart and fellow UMass Amherst CICS alum, Vikas Khandelwal (M.S. '01, also from the Center for Intelligent Information Retrieval (CIIR) and advised by Allan).

Prior to working on the pricing problem, Kumaran developed bidding algorithms for eBay paid search marketing campaigns. The development of a few features that captured the actual return on investment on bids placed on keywords dramatically changed the campaigns from loss to profit-making for eBay.

Today, Kumaran works as a senior director of data science and business intelligence at Expedia Inc., where he leads efforts to combat fraud and manage risk in online transactions. He believes that to be successful in a career in data science, it is important to get exposure to a wide variety of problems in various contexts. In just seven years since receiving his Ph.D. in Computer Science from UMass Amherst, his work has spanned web search, computational advertising, ecommerce, and now online travel. Kumaran began his career as a scientist at Microsoft Live Labs, where he conducted research in web search. The goal was to fold that research into Microsoft’s products. He soon realized that he could have greater impact by joining a product group, in this case Bing, rather than working as a research partner. It was at Bing that Kumaran cut his teeth as a data scientist, teaching himself to use Microsoft’s Map Reduce tools and experimenting with petabytes of data. While he believes that his foundation was built at UMass Amherst’s CIIR research lab, where he spent months (and years!) analyzing search

queries and wading through thousands of documents to identify patterns he could leverage to improve retrieval, it was at Microsoft where he got an opportunity to work at scale. While at Microsoft, Kumaran learned to build predictive models and scalable services, and evangelize new ideas; he also developed a knack to marry his work to business impact. “These are all the skills a person known as a data scientist today is expected to have,” noted Kumaran.

Today data science is considered a hot field. More and more businesses are realizing the importance of unlocking the value in the mountains of data they possess, noted Kumaran. He believes that the training of data scientists is not complete if they have not made business cases for their project, gotten their hands dirty cleaning up data, trained a machine learning model with a business objective in mind, gone through the intricacies of deploying their models in a production environment, designed an A/B test, analyzed the online performance of their solutions, and incorporated feedback from performance to inform the next version of the product.

At a high level, a data scientist should have expertise in machine learning, empirical methods, etc., and, an ability to glean insights from data, and leverage those insights to make impact. According to Kumaran, these three skills are critical for a successful career in data science and are progressively difficult to acquire. Even amongst experienced data scientists, the ones who can consistently demonstrate the third skill are the most sought after.

“These are exciting times in the data science field, and it’s a thrilling experience being in the frontlines,” said Kumaran. “Barriers to entry are being broken, with several startups and big companies offering data science platforms as a service. New applications of data science in fields like healthcare, government, and geographical exploration are emerging. Continual breakthroughs are being made in data engineering and machine learning. All this is great news for the still-maturing field.”



Save the Date: April 29, 2016

Recipients of the 8th Annual Outstanding Achievement and Advocacy Awards (OAA) will be honored on Friday, April 29, 2016. The awards recognize the remarkable accomplishments of graduates of the college’s degree programs and acknowledge the support of important friends of the college. For details, go to: cics.umass.edu/outreach/oa2016.

Seventh Annual Outstanding Achievement and Advocacy Awards

The accomplishments of the 2015 Outstanding Achievement and Advocacy (OAA) Award winners and CS undergraduate and graduate student award recipients were celebrated during a banquet at the Marriott Center in the Campus Center on Friday, May 1, 2015. Prior to the banquet, OAA events included building tours, a reception, and a panel discussion to highlight the varying technical career paths of our award recipients who shared their knowledge and experiences as students and faculty at UMass Amherst.

Lori Clarke, then chair of CS, and Bruce Croft, interim dean of the College of Information and Computer Sciences, welcomed the attendees and Professor Leon J. Osterweil presented the OAA awards.



The 2015 OAA Award Recipients are:

- Outstanding Achievement in Education: **Kevin D. Ashley** (Ph.D. '88), professor, University of Pittsburgh School of Law, professor, graduate program in intelligent systems, and senior scientist, Learning Research and Development Center



- Outstanding Achievement in Technology Development: **Eric W. Brown** (M.S. '92, Ph.D. '96), director of Watson Algorithms for IBM Watson Group Innovations



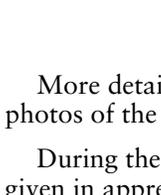
- Outstanding Contributions to Society: **Jan Cuny** (Former UMass Amherst faculty member), National Science Foundation CISE program director for computing education; program director for NSF's Broadening Participation in Computing Alliance Program



- Outstanding Achievement in Management: **Peter F. DiGiammarino** (BDIC '75), chairman of Compusearch and CEO of IntelliVen, LLC



- Outstanding Achievement in Research: **Lixin Gao** (Ph.D. '97), professor in the Department of Electrical and Computer Engineering at the University of Massachusetts Amherst.



- Outstanding Achievement in Entrepreneurship: **Ziv Gillat** (B.S. '95), co-founder and evangelist at Eye-Fi, Inc.



- Outstanding Achievement by a Young Alum: **Meck Khalfan** (B.S. '05), CEO and co-founder of Puku LLC

More details on the OAA award recipients, along with photos of the event, are posted at cics.umass.edu/oa2015.

During the banquet, Clarke was presented with a plaque given in appreciation for her leadership as chair from 2011-2015.

Current students and recent alumni were also recognized. The graduate student awards are sponsored by Yahoo!, a member of the College's Industrial Affiliates Program (IAP). Professor J. Eliot Moss, graduate program director, presented these Outstanding Graduate Student Awards:

- Outstanding Doctoral Dissertation Award: John G. Altidor (Ph.D. '14) and Marc Maier (Ph.D. '14)
- Outstanding Synthesis Project Award: Thomas Boucher and Emma Tosch
- Outstanding Teaching Assistant Award: Chaniel Chadowitz and Ryan Connell

The undergraduate student awards were sponsored by IAP member Fiksu. Professor Rod Grupen, undergraduate program director, presented these Outstanding Undergraduate Awards for achievement in:

- Computer Science (Overall): Bruce Arthur Spang
- Software Engineering: Aleksandr Valeriy Burkatovskiy
- Undergraduate Research: Rachel Clare Gordon
- Software Systems: Lauren Elizabeth Higgins
- Interdisciplinary Studies: Cara Magliozzi
- Artificial Intelligence: Tung T. Pham
- Artificial Intelligence: Ryan B. Szeto
- Theory: Brendan Paul Teich



Outstanding Graduate Student Awards: (l. to r.): Marc Maier, John G. Altidor, Emma Tosch, Thomas Boucher, Yahoo!'s Ken Schmidt, Prof. Eliot Moss, Chaniel Chadowitz, and Ryan Connell



Outstanding Undergraduate Awards: (l. to r.): Aleksandr Burkatovskiy, Bruce Spang, Tung Pham, Cara Magliozzi, Rachel Gordon, Ryan Szeto, Brendan Teich, Prof. Rod Grupen, and Fiksu's John Tuttle

Graduation Celebrations

To celebrate the accomplishments of the newest class of computer science alumni, nearly 400 computer science student graduates, families, friends, faculty, and staff gathered at the Worcester Dining Commons on Friday, May 8, 2015 for the graduate student graduation celebration luncheon and on Saturday, May 9, 2015 for the undergraduate student graduation celebration luncheon.

Lori Clarke, then the chair of the School of Computer Science, Eliot Moss, graduate program director, and James Allan, master's degree program director, welcomed each M.S. and Ph.D. graduate to the stage during Friday's festivities. On Saturday, Clarke, Rod Grupen, undergraduate program director, and Tim Richards, chief undergraduate advisor, welcomed each undergraduate to the stage to receive their diploma holder. Benjamin Marlin, honors program director, joined the group on stage to recognize the computer science honors students. After the formal ceremony, undergraduates had the chance to take the microphone to talk about their experiences.



Congratulations to the following Ph.D. graduates who have received tenure-track assistant professor appointments: **Thomas Helmuth** (Ph.D. '15), Department of Computer Science, Washington and Lee University; **George Konidaris** (Ph.D. '11), Departments of Computer Science and Electrical and Computer Engineering at Duke University; **Scott Kuindersma** (Ph.D. '12), School of Engineering and Applied Science, Harvard University; and **Scott Niekum** (Ph.D. '13), Department of Computer Science, University of Texas, Austin.

Ben Carterette (Ph.D. '08), associate professor of computer and information sciences at the University of Delaware, received the Best Paper Award at the 2015 ACM SIGIR International Conference on the Theory of Information Retrieval (ICTIR 2015) held in Northampton, MA in September.

Henning Schulzrinne, (Ph.D. '92), the Julian Clarence Levi Professor of Mathematical Methods and Computer Science at the Fu Foundation School of Engineering at Columbia University, has been named the recipient of the 2016 IEEE Internet Award for exceptional contributions to the advancement of Internet technology.

Recent graduate **Ranysha Ware** (M.S. '15), of the Architecture and Language Implementation (ALI) Lab, has taken a position at the MIT Lincoln Laboratory, working on an IARPA program in cybersecurity.

Tuomas Sandholm (M.S. '94, Ph.D. '96), computer science professor and director of the Electronic Marketplaces Laboratory at Carnegie Mellon University (CMU), was quoted in a *Pittsburgh Post-Gazette* article, describing his work on Claudico, a CMU-developed program that plays (and beats) human professional poker players.

Recent Computer Science Ph.D. Graduates (February 2015 and May 2015)



Md. Ashraf Alami; *Reconstructing Geometric Structures from Combinatorial and*

Metric Information; Ileana Streinu, Advisor; Feb. 2015; Software Engineer, Intel Corporation



Gordon Anderson; *An Analysis of Two Student Learning Strategies in High En-*

rollment Computer-based College Courses; Robert Moll, Advisor; May 2015; Lecturer, College of Information and Computer Sciences, UMass Amherst



Boulat Bash; *Fundamental Limits of Covert Communication;* Donald Towsley, Advisor;

Feb. 2015; Postdoctoral Fellow, BBN Technologies



Bruno Castro da Silva; *Learning Parameterized Skills;* Andrew G. Barto, Advisor; Feb.

2015; Associate Professor, Computer Science, Federal University of Rio Grande do Sul, Brazil



Yung-Chih Chen; *Robust Mobile Data Transport: Modeling, Measurements, and*

Implementation; Donald Towsley, Advisor; May 2015; Senior Performance Engineer, Akamai Technologies



Stefan Christov; *Model-Based Guidance for Human-Intensive Processes;* Lori

A. Clarke, George Avrunin, Advisors; Feb. 2015; Assistant Professor of Software Engineering, Quinnipiac University



Boduo Li; *A Platform for Scalable Low-Latency Analytics using MapReduce;* Yanlei

Diao, Advisor; May 2015; Researcher, NEC Laboratories America



Jason Naradowsky; *Learning with Joint Inference and Latent Linguistic*

Structure in Graphical Models; David A. Smith, Advisor; Feb. 2015; Research Associate, Machine Reading Lab, University College London



Laura Sevilla Lara; *Long Range Motion Estimation and Applications;* Erik

Learned-Miller, Advisor; Feb. 2015; Postdoctoral Researcher, Max-Planck Institute, Germany



Borislava Simidchieva; *Variation in Human-Intensive Systems: a Conceptual*

Framework for Characterizing, Modeling, and Analyzing Families of Systems; Leon Osterweil, Advisor; May 2015; Scientist, Distributed Systems Group, BBN Technologies



Michael Wick; *Epistemological Databases for Probabilistic Knowledge Base Construction;* An-

drew McCallum, Advisor; Feb. 2015; Senior Member of Technical Staff, Oracle Labs East



Dan Xie; *An Opportunistic Service Oriented Approach for Robot Search;* Allen Hanson,

Roderic Grupen, Advisors; Feb. 2015; Senior Software Engineer, Autodesk Inc.



Limin Yao; *Universal Schema for Knowledge Representation from Text and Structured*

Data; Andrew McCallum, Advisor; Feb. 2015; Software Engineer, Twitter Inc.

See details on the graduates' research at: cics.umass.edu/phdgrads_febmay15

CICS Undergraduate Dean's List – Spring 2015

See the full Spring 2015 Dean's List and the list of student citations (students recognized for their outstanding performance in the classroom) at cics.umass.edu/people/spring-2015-deans-list-and-citations.



In July, CICS faculty, graduate students, an alum, and even a future faculty member got together for a photo op at the International Conference on Machine Learning 2015 in Lille, France. Back (l. to r.): Philip Thomas, Akshay Krishnamurthy, Benjamin Marlin, Kevin Winner; Front (l. to r.): Yariv Levy (Ph.D. '12), David Belanger, Andrew McCallum, Tao Sun

Faculty News



Effective in September, **David Jensen** and **Ramesh Sitaraman** were each promoted to full professor.



Sitaraman's paper, "Optimizing Grouped Aggregation in Geo-Distributed Streaming Analytics," co-authored by Benjamin Heintz and Associate Professor Abhishek Chandra (Ph.D. '04) from the University of Minnesota, Twin Cities, was a best paper finalist at the ACM Symposium on High-Performance Parallel and Distributed Computing (HPDC) held in June.



Assistant Professor **Yuriy Brun** received a collaborative grant from the NSF's Secure and Trustworthy Cyberspace (SaTC) program for work helping to understand why developers make security errors and how to help prevent the introduction of such errors. Brun also received an Outstanding Reviewer Award at

the International Conference on Software Engineering 2015 held in May in Florence, Italy.



AutoMan, an automatic crowdprogramming system, has been selected as a *Communications of the ACM* (CACM) Research Highlight to appear in January 2016. AutoMan is a joint project of CICS graduate students Daniel Barowy and Charlie Curtsinger, and faculty members **Andrew McGregor** (left) and **Emery Berger**.



Professor **Emery Berger** was selected as Program Chair for PLDI 2016, to be held in Santa Barbara, California, and was elected as a Member-at-Large to the ACM SIGPLAN Executive Committee, the governing body for SIGPLAN. In June, Berger was an invited speaker at the 5th Annual Henry Taub International TCE Conference in Technion, Israel.



Shlomo Zilberstein, professor and associate dean for research and engagement, received an NSF grant for artificial intelligence research on probabilistic planning. Zilberstein is serving as Conference Committee Chair for the Thirtieth AAAI Conference on Artificial Intelligence (AAAI-16) that will be held in February 2016 in Phoenix, Arizona.



Assistant Professor **Amir Houmsadr** received an NSF grant for his research on networking fingerprinting. The work could help security experts identify the origins of network-based attacks or help law enforcement track the source of criminal activity.



Associate Professor **Gerome Miklau** has been invited to be a 2015-2016 UMass Interdisciplinary Studies Institute Fellow for the seminar "Secrecy, Publicity, Privacy, and Security."



Distinguished Professor **Bruce Croft** (left), CICS dean and director of the Center for Intelligent Information Retrieval (CIIR), and **James Allan** (right), chair of the faculty and co-director of the

CIIR, were co-chairs of the 5th Annual ACM SIGIR International Conference on the Theory of Information Retrieval (ICTIR 2015) held in Northampton, MA in September.

Associate Professor **Charles Weems** is the co-editor of a new book, *Topics in Parallel and Distributed Computing: Introducing Concurrency in Undergraduate Courses* (Morgan Kaufmann Publishers, 2015).



Distinguished Professor **Donald Towsley** was co-program chair for the Computer Vision and Pattern Recognition 2015 conference, which took place in June in Boston, MA.

In June, Professor Emeritus **Rick Adrion** gave the keynote address at the 20th Anniversary Verizon Next Step Program Faculty Institute.



CICS adjunct faculty **Lee Spector** (Hampshire College) and **Heather Pon-Barry** (Mt. Holyoke College) each received an award from the Google CS Engagement Small Awards Program for their work on supporting student engagement and retention.

Ryan MacDonald and **Anna Rita Napoleone** are new lecturers in CICS.

UMass Science and Technology Grants Awarded to CICS Faculty

On June 3, 2015, UMass President Robert L. Caret awarded two Science and Technology Initiative Fund grants to CICS faculty.

Professors Andrew McCallum and David Jensen received a grant to support the Center for Data Science's efforts to engage industrial partners and to develop as a leading source of research and talent in this field.

Professors Brian Levine and Emery Berger were awarded a grant to support the development of a Cybersecurity Institute on campus. Once formally established, the institute will build on strong collaborations among the five Amherst-area colleges. The team envisions partnerships with other UMass campuses, enabling the institute to pursue research and development projects in several strategic areas including the Internet of Things, data security, cryptography, and networks.

Researcher News

Michael Hay is a visiting assistant professor from Colgate University.

Two postdoctoral researchers joined CICS recently: **Bo Jiang** is working with the Networks Laboratory and **Ajay Nagesh** has joined IESL.

Dr. **David Novak**, of Masaryk University, is a Visiting Scholar with the Center for Intelligent Information Retrieval (CIIR). Novak has received a Fulbright Scholar award for his research here. Dr. **Jiafeng Guo**, of the Institute of Computing Technology, Chinese Academy of Sciences, also joined the CIIR as a Visiting Scholar.

Yue Gao, from Zznod Technology Co. in Beijing, China, is a visiting researcher with LASER.

Carina Gonzalez joined CKC as a visiting researcher this spring.

The BINDS laboratory welcomes two visiting faculty: **Andrzej Pietrzykowski** from Rutgers University and **Edward Rietman** from Tufts University.

Student News

Graduate student **Sofya Vorotnikova** received an honorable mention for the National Science Foundation Graduate Fellowship.

Graduate student **Terri Yu** is the recipient of a Google Anita Borg Memorial Scholarship. This prestigious award, named for one of the trailblazers in computer science and technology, recognizes female undergraduate and graduate students for their academic achievements and demonstrated leadership.

PLASMA doctoral student **Dan Barowy** won the Distinguished Artifact Award at PLDI 2015 for his work on FlashRelate, a synthesis engine that lets ordinary users extract structured data from spreadsheets without programming.

CIIR doctoral student **Shiri Dori-Hacohen** received a scholarship from ACM-W to attend SIGIR 2015 held in Santiago, Chile.

Doctoral student **Hee-Tae Jung** was elected a program committee co-chair of the ACM/IEEE Conference on Human-Robot Interaction Pioneers Workshop 2016. The workshop seeks to foster creativity and collaboration amongst students early in their academic careers.

For their paper "Learning Dynamic Feature Selection for Fast Sequential Prediction," IESL graduate students **Emma Strubell**, **Luke Vilnis**, and **Kate Silverstein**, and Professor **Andrew McCallum** received the Best Paper Award at the 53rd Annual Meeting of the Association for Computational Linguistics (ACL 2015) held in Beijing, China in July.

Graduate student **Amee Trivedi** has been asked to sit on the Anita Borg Institute Student Advisory Council where she will be reviewing curriculum and content designed by the institute.

CIIR Retirees



Two long-time Center for Intelligent Information Retrieval (CIIR) staffers recently retired. **David Fisher**, a senior software engineer with the CIIR and computer science lecturer, retired after spending 20 years in CS. Fisher continues to work part-time for the CIIR on the Lemur project. **Kate Moruzzi**, CIIR Administrative Assistant, retired in June after 21 years. During her retirement, she plans to enjoy more outside activities (such as the hiking adventure pictured), but will continue to work on some of the tasks she enjoys within the CIIR on a post-retirement basis.

Doctoral student **Chang Liu** and co-authors, including Distinguished Professor **Donald Towsley**, won the Kenneth C. Sevcik Outstanding Student Paper Award at ACM SIGMETRICS 2015 for the paper, "Fisher Information-based Experiment Design for Network Tomography."

Staff News

Tara LaFlamme joined the main office staff in August as undergraduate program assistant.

A number of new staff were hired to support the additional functions that come with being a college. **Kerry Shaw** is the director of external relations and communications. **Joyce Mazeski** is the assistant for research, development, and communications. **Victoria Rupp** joined CICS as the chair's assistant. **Barbara Stahelski** is the new assistant to the CICS dean. **Robbie Calliham** is the assistant to the academic dean, and **Greg Boisseau** is an academic advisor.

After 20 years with UMass Amherst computer science, **Laura Macsuga**, former office manager and assistant business manager, left CICS in June for a position on campus in the Human Resources office.

The following CICS staff members were honored with Longevity Awards at the university's annual Founder's Day celebration: **Kate Moruzzi** (20 yrs.), **Thomas Murray** (20 yrs.), **Stephen Cook** (25 yrs.), **Glenn Stowell** (25 yrs.), **Valerie Caro** (30 yrs.), **Barbara Sutherland** (30 yrs.), and **Laurie Downey** (35 yrs.).

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Your news, suggestions, comments, and contributions are
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them electronically to bits@cs.umass.edu.

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Chair of the Faculty	James Allan
Editors	Jean Joyce, Kerry Shaw
Art Direction	North Haven Design
Graduate Student Liaison	Tiffany Liu
Contributors	Giri Kumaran, Pam Mandler, Marla Michel, Andrew McCallum, Barna Saha, John Sippel, UMass Amherst News Office staff

Thanks for your support

The following alumni and friends have actively supported the College of Information and Computer Sciences from January 2015 – June 2015. Such financial support is greatly appreciated and helps maintain a world-class instructional and research program. Contributions from alumni and friends help to fund scholarships and important special activities that are not supported through the state budget.

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Dr. Krishnamoorthy Arvind ('91)
Mr. Alejandro Buchmann
Dr. Panayiotis K. Chrysanthis
('91) on behalf of Krithi's
Ph.D. students
Prof. Lori Clarke
Xinwen Fu
Dr. Oscar J. Gonzalez ('01)
Mr. Shrikuma
Hariharasubrahmanian ('03)
Dr. Mohan U. Kamath ('98)
Dr. Huan Li and Shulin You ('02)

Dr. Beverly Park Woolf and
Stephen Woolf ('84)
Dr. Cristobal
Pedregal-Martin ('02)
Ms. Zhimin Shi and
Dr. Fuxing Wang ('90)
Prof. Ramesh K. Sitaraman
Dr. Stephen T. Vinter ('85)
Dong Xuan and Zhaohui Shen
Prof. Jianping Wang
Mr. Wei Yu
Mr. Nan Zhang
Dr. Wei Zhao ('86)

Paul Utgoff Memorial Scholarship

Mrs. Alexandra
Utgoff Taylor ('74)

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