



# Significant BITS

Newsletter of the  
DEPARTMENT OF COMPUTER SCIENCE

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## Pioneering valley transit

**D**ESPITE THE PROLIFERATION OF INEXPENSIVE MOBILE COMPUTING DEVICES that can be carried on our person or in our vehicles, ubiquitous computing environments are far from common. Although many wireless networking technologies are available, including cell towers, WiFi access points, and mobile ad hoc networks, all expect stable, contemporaneous paths across the Internet.

Wireless network paths can become unstable for several reasons, including high node mobility, low node density, and



Computers are placed in campus buses to provide wireless access to passengers and passersby.

short radio range; intermittent power from energy management schemes; environmental interference and obstruction; equipment failure; and malicious intent. These problems are common in practice, and especially so in undeveloped areas or when a stable infrastructure is destroyed by natural disaster or war.

Overcoming these problems

has been the focus of some of Associate Professor Brian Levine's research over the last several years. *Disruption tolerant networks* (DTNs) allow for routing in networks where contemporaneous end-to-end paths are unstable or unlikely. Nodes in a DTN might include moving vehicles, pedestrians, or kiosks.

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## CS faculty + = 3

### Three new faculty join Department

**T**HE DEPARTMENT OF COMPUTER SCIENCE WELCOMED three strong new faculty hires this fall. The tenure-track faculty joining the Department are Yanlei Diao, Kevin Fu, and Gerome Miklau. The new faculty members have research strengths in databases and XML, secure data management, and security. "I am delighted with our success in hiring three top-notch systems faculty this year. With the addition of Yanlei, Kevin, and Gerome to our faculty, our Department is well positioned to offer world-class research programs in databases and computer security," said Associate Professor Prashant Shenoy, faculty recruiting chair. "I also look forward to collaborating with our newest faculty members in the years to come." With a faculty growth rate of 20 percent in the last four years, the Department continues to evolve, ensuring its vitality and innovation in the many emerging fields of computer science.

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## FACULTY

CS faculty + = 3 ..... (from page 1)

## Yanlei Diao

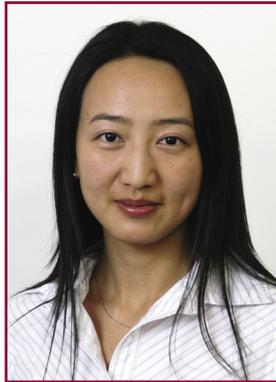
**Y**ANLEI DIAO JOINED THE DEPARTMENT THIS FALL AS AN Assistant Professor. Her research interests are in information architectures and data management systems, with a focus on data streams, data dissemination, XML query processing, and learning-based data processing. "I am very pleased to have the opportunity to join the Computer Science Department at UMass Amherst," said Diao. "For years, I have highly respected the quality of research from this Department. I have also been impressed with its culture of collaboration and support."

Diao's thesis topic was "Query Processing for Large-Scale XML Message Brokering." Her dissertation work has focused on leveraging XML (Extensible Markup Language) messaging to build large-scale distributed information systems for applications such as Web services, network and application monitoring, and personalized content delivery. "Emerging distributed information systems require increasingly flexible and adaptive infrastructures," said Diao. Traditional distributed systems tend to be tightly coupled either at the communication level or at the content level. Recently, messaging technology has gained wide acceptance as a solution for the loose coupling of systems in terms of communication. With respect to content, XML is becoming a *de facto* standard for data exchange on the Internet. Her research explores a combination of these two trends to build highly flexible infrastructures for distributed information systems. In addition, Diao's research exploits declarative XML queries to make such systems adaptive to the evolving needs of distributed applications.

"My thesis research is an important initial step towards the longer-term agenda of employing declarative queries to offer flexibility and adaptivity in emerging types of distributed information systems," said Diao. She plans to extend her approach to systems such as Internet-scale data dissemination, sensor-based networks, and mobile services. "Existing query processing techniques need to be broadened and enriched to rise to the challenges of these new environments," added Diao.

As part of her research, Diao has designed YFilter, a message brokering system that provides fast, on-the-fly filtering of incoming XML messages for a large number of users, and transforms the matching messages according to user-specific requirements. The YFilter software, produced while she was a student at Berkeley, was released as open source. The software has been used in research projects for grid monitoring and event processing, and has served as an exemplary implementation of such functionality for product-oriented development. Recently, it has also been integrated into Apache Hermes to provide an implementation of Web Services Notification. "In my future research, I will continue to follow my research philosophy of identifying important problems grounded in reality, finding right solutions, building real systems, and using such systems to evaluate software infrastructures and research concepts," said Diao.

Dr. Diao completed her Ph.D. in Electrical Engineering and



Computer Science at the University of California, Berkeley in 2005, her M.S. in Computer Science at the Hong Kong University of Science and Technology, and a B.S. in Computer Science from Fudan University in Shanghai, China. While at Berkeley, Professor Diao was a member of the database research group. She was also a research intern at BEA Systems and IBM Almaden Research Center and a Research Assistant at the Hong Kong University of Science and Technology. She is a member of the Association for Computing Machinery (ACM) and the Institute of Electrical and Electronics Engineers (IEEE).

## Kevin Fu

**K**EVIN FU JOINED THE DEPARTMENT in September as an Assistant Professor. His research interests in secure computer systems include secure storage, RFID security, Web security, applied cryptography, and cryptanalysis.

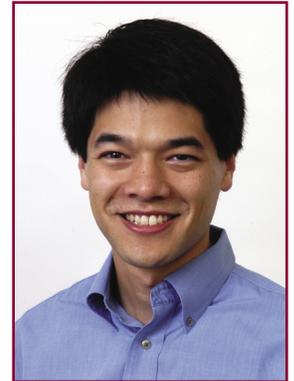
"The strong community of people at UMass Amherst fosters an ideal home for collaborative research in secure computer systems. In the Common Room, we can talk about cryptography and home-roasted espresso in the same breath. The security research group is already growing with projects in RFID security and secure storage, and I will begin offering a class in Applied Cryptography this Spring," said Fu.

Fu's thesis was entitled "Integrity and access control in untrusted content distribution networks." As part of his research, Fu designed and implemented cryptographic key regression protocols for use in secure storage. The protocols enable efficient group key management for access control of content served by untrusted hosts.

In other research, Fu implemented and benchmarked the read-only dialect of the Self-certifying File System (SFSRO). The SFS read-only file system makes the security of published content independent from that of the distribution infrastructure. In a secure area (possibly offline), a publisher creates a digitally-signed database out of a file system's contents, explained Fu. The publisher then replicates the database on untrusted content distribution servers, allowing for high availability. The read-only file system avoids performing any cryptographic operations on servers and keeps the overhead of cryptography low on clients, allowing servers to scale to a large number of clients. The implementation of this research appeared in the *ACM TOCS* journal.

In another project, Fu reverse engineered several Web user authentication systems. The work resulted in a USENIX Security paper on the importance of simple, correct protocols for authentication. The paper, "Dos and Don'ts of Client Authentication on the Web," won the Best Student Paper Award at the 10th USENIX Security Symposium, generated several invited talks, and provoked two articles in the *Wall Street Journal*.

"Computer system security is an interdisciplinary area," said Fu. "What initially captured my interest was the mix of theory, practice, and law in the great debate over export control of cryptography. The interdisciplinary nature also allows me to explore new areas of research." A likely direction for Fu's future research



FACULTY

is the improvement of RFID (radio frequency identification) security. RFID exhibits many of the ominous signs of a security crisis, given that RFID tags and readers communicate over semi-trusted, open channels, added Fu. He intends to build and measure systems that make RFID secure.

Prior to arriving at UMass Amherst, Dr. Fu was a Visiting Scholar at the Johns Hopkins Information Security Institute. While at MIT, he founded the Applied Security Research Group at the MIT Lab for Computer Science. Prior experience included positions at Sightpath/Cisco Systems, the MIT Network Security Team, and intern positions at the Bellcore (Telcordia) Security Research Group and Hewlett-Packard Labs.

Dr. Fu received his M.Eng. and Ph.D. in Electrical Engineering and Computer Science at the Massachusetts Institute of Technology in 1999 and 2005 respectively, and his S.B. in Computer Science and Engineering from MIT in 1998.

## Gerome Miklau

GEROME MIKLAU JOINED THE DEPARTMENT IN SEPTEMBER as an Assistant Professor. His research spans the areas of databases and security with a focus on classical security concerns such as confidentiality, privacy, and integrity of data. He has developed novel theoretical and practical tools for secure data management with the objective of enabling new forms of collaboration and data exchange. Other research interests include database theory and semi-structured data.

Miklau's Ph.D. thesis, "Confidentiality and Integrity in Distributed Data Exchange," addresses the problem of managing information disclosure – in both conventional database systems and distributed environments like the World Wide Web – in order to safely facilitate the sharing of data. "I believe security and trustworthiness can be enabling technologies, not merely application extensions that add expense or limit usability," commented Miklau. "When data management tasks are trusted, new forms of communication, interaction, and collaboration become possible since participants are comfortable releasing data or are certain of its authenticity."

Miklau's research has addressed the problem of ensuring con-

fidentiality of published data in both theoretical and practical terms. The owner of sensitive data is faced with the challenge of permitting its legitimate use while protecting it from unauthorized disclosure. When data is stored in a database, this is often accomplished by publishing a view of the database that is useful to the end user and hopefully omits confidential data items and associations.

Miklau's research provided a new theoretical standard for determining when it is safe to publish a view of a database without disclosing information about a sensitive query: when a view and a privileged query are secure, the view contains no information about the answer to the query, and the user will have no advantage in computing or guessing the answer. Intuitively, a query and view are deemed secure if the user's *a priori* knowledge about the query is the same as the user's knowledge about the query having seen the view and its answer. Miklau has also designed a practical framework for the controlled publication of views to multiple parties; he designed a controlled-publishing framework to permit the efficient, safe, and flexible exchange of data beyond trusted systems that conventionally govern access. A single partially-encrypted version of the database – to be used by all users – is automatically generated to enforce an access control policy.

Miklau received his M.S. and Ph.D. in Computer Science from the University of Washington in 2001 and 2005 respectively, and a B.S. in Mathematics and B.A. in Rhetoric with Honors from the University of California, Berkeley in 1995. Before joining the Department, Miklau had research internship positions at IBM Almaden Research Center and Lucent, Bell Laboratories. Previously, he was a derivatives trader for J.P. Morgan and Company.

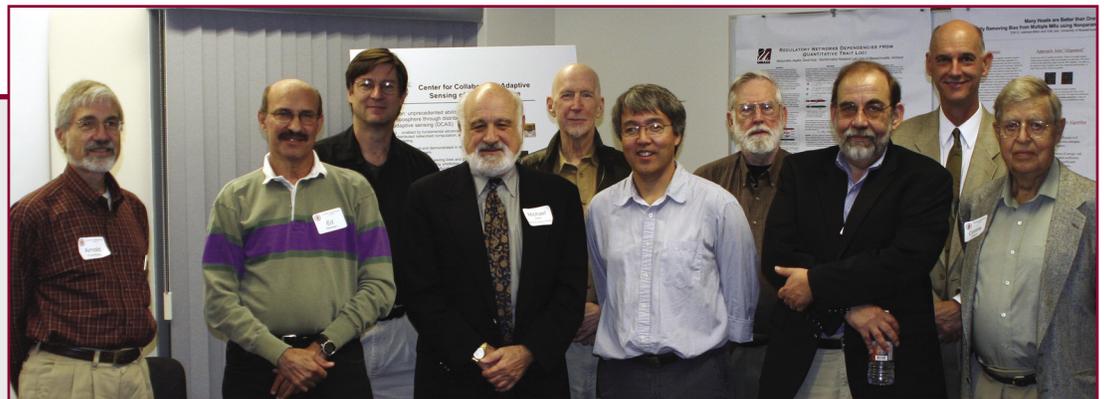
"I am thrilled to be a new member of the Computer Science faculty," said Miklau. "The students are enthusiastic and dedicated, and the faculty have been very supportive. I look forward to contributing to the Department as an educator and researcher."



## Department Chairs Reunite

ALL OF THE COMPUTER SCIENCE CURRENT AND FORMER Department

chairs (since the inception of the Ph.D. program) gathered together during the fall CS homecoming event. Left to right: Arnold Rosenberg ('92 –'93, acting chair), Edward Riseman ('81 –'85), Andrew Barto ('04, acting chair), Michael Arbib ('70



–'75), David Stemple ('94 –'98), Jim Kurose ('98 –'01), Robert Graham ('75 –'81), Rick Adrion ('86 –'94), Bruce Croft ('01 – present), and Connie Wogrin ('85 –'86, acting chair). Not shown: J.A.N. Lee ('64 –'69, pre-CS Ph.D. program).

## RESEARCH

## Pioneering valley transit ..... (from page 1)



**Figure 1: density of bus-to-bus connection opportunities**

Levine's DTN research has been focused on building a fully operational testbed called UMass DieselNet. "Simulations and analysis are important for predicting performance trends," Levine said, "but real systems expose problems that may not be obvious on paper." DieselNet currently consists of computers on 30 buses that roam the UMass Amherst campus and surrounding county. Each vehicle powers a small Linux-based computer with an attached WiFi access point to provide wireless access to passengers and passersby (The WiFi standard, based on IEEE 802.11b, is the most common form of wireless networking on laptops.). A second wireless card constantly scans the surrounding area for open WiFi networks and other buses. Each bus also has a GPS device attached to record its current location. The network has been operational since May 2004.

From the beginning, DieselNet has been the result of student efforts. John Burgess is a graduate student in Levine's lab and has been working on

DieselNet since he was an undergraduate at UMass Amherst. "While many students have spent time on the project, our progress on DieselNet is primarily due to John's hard work and the quality of his design," Levine said.

The custom software Levine's students have deployed allows the buses to transfer data between each other as they pass on the road and to connect to open wireless access points along the bus roads in the surrounding county. The buses use access points to "check in" whenever possible to a main site that contains software updates and doubles as a monitoring site. At that time a bus provides its current GPS location and MAC address, and it uploads logs of its performance during the day. All routes intersect in Amherst, Massachusetts; Figure 1 shows the density of bus-to-bus connection opportunities during a one-month period in that geographic area. The current status of the Diesel DTN and statistics like those shown in the figure are available on the web at [prisms.cs.umass.edu/diesel](http://prisms.cs.umass.edu/diesel).

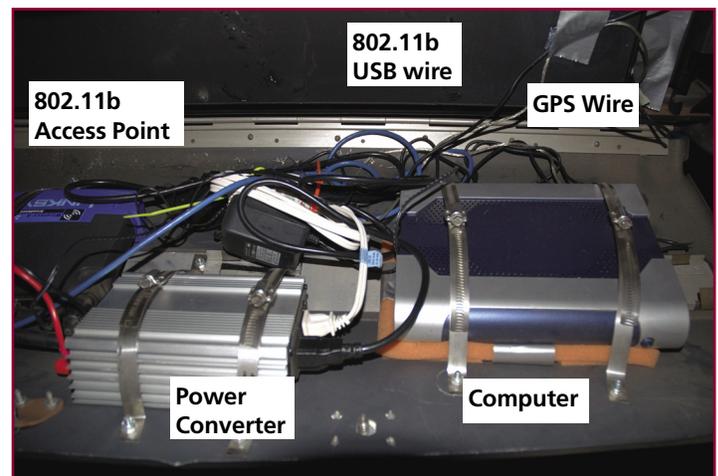
The project is part of a larger effort by Levine and Assistant Professor Mark Corner. Levine is working with Corner on the next stage of the research, and he credits the partnership for their success with funding agencies. The pair (together with partners Mostafa Ammar and Ellen Zegura from Georgia Tech) have received over 1.5 million dollars in funding from the National Science Foundation (NSF) and the Defense Advanced Research Projects Agency (DARPA) to research DTNs and related technologies. Corner's work focuses on building a novel mobile

platform for the DTN, incorporating energy management techniques that will allow stationary nodes to operate for months at a time on battery and solar power. These nodes will expand the DieselNet testbed by allowing buses that pass through the same area to exchange data even if they do not pass through at the same time.

Levine plans to offer a few novel services to bus passengers. "We are working with the great folks at the Pioneer Valley Transit Authority (PVTa), Adam Shearson and Tom Caron, who have been supportive of the project since the beginning, to do something different for bus riders," said Levine. Soon, each bus's web server will provide cached web pages, including news and sports information, podcasts of free radio shows, and a community bulletin board. "We are also trying to get a Risk-like board-game played across buses and across days. We want a trace of the communication load it generates between players," Levine said, "It will be very unique."

Professor Levine received a Ph.D. and a Masters degree in

Computer Engineering from the University of California, Santa Cruz in 1999 and 1996, respectively. His research interests in general include network privacy and security, peer-to-peer networking, and mobility. He joined the Department of Computer Science in 1999 as an assistant professor. This year, he was tenured and promoted to associate professor. He is Director of the Center for Academic Excellence in Information Assurance Education at UMass Amherst, as designated by the National Security Agency in 2003. He was awarded an NSF CAREER grant in 2001 for work in peer-to-peer networking. In 2004, he was awarded a Lilly teaching fellowship from UMass Amherst. Levine is an associate editor of the IEEE/ACM *Transactions on Networking*, and is co-chair of Intl. Workshop on Network and Operating Systems Support for Digital Audio and Video (NOSSDAV) in 2006 along with Prof. Mark Claypool at WPI. He lives in Northampton with his wife Amy, an English teacher at Amherst Regional High School.



**System installed inside a UMass Amherst PVTa bus.**

## RESEARCH

## Data points

**T**HE DEPARTMENT CONTINUES ITS SUCCESS in obtaining funding for exciting new research initiatives. Some of the recently funded projects are highlighted below.

### Corporate Support

IBM recognized Distinguished Professor Jim Kurose's achievements by selecting him as a recipient of a 2005 IBM Faculty Award. Associate Professor Andrew McCallum received a large donation of equipment from Sun Microsystems, Inc. for use on his research project "Infrastructure for Rexa, a Research Paper Search Engine." Assistant Professor Emery Berger received a gift from Microsoft Corporation in support of his research on randomization and replication to improve program reliability.

### Nightingale

The Center for Intelligent Information Retrieval (CIIR) is embarking on a five-year DARPA project under the Global Autonomous Language Exploitation (GALE) program. The goal of GALE is make foreign language (Arabic and Chinese) speech and text accessible to English speakers, particularly in military settings. The Nightingale research team includes UMass Amherst (as a subcontractor to SRI International) along with eleven universities and other institutions. The UMass Amherst team, led by Associate Professor James Allan (PI), Distinguished Professor Bruce Croft, and Associate Professor Andrew McCallum, will focus on highly accurate retrieval, dynamic topic models, social network discovery, and statistical machine translation.

### Autonomous Manipulation

Professors Rod Grupen (PI), Oliver Brock, and Erik Learned-Miller received a four-year grant from NASA (as a subcontractor to MIT) for their project "Autonomous Manipulation Capabilities for Space and Surface Operations." The proposed technology will enable autonomous robots to assemble units together in space, connecting cables and pipes, and to maintain and service vehicles in space by opening and closing access panels, swapping out boxes, and reconnecting cables. The technology will have application to at least two parts of the Exploration Program. It will be beneficial to assembly, maintenance, and servicing of vehicles in space even when they are remote from human presence. Additionally, it will have application to lunar and planetary surface operations. Robots will be used for site preparation and assembly of habitats made up of multiple components that need to be mated and connected by cables and pipes.

### Empowering the Elderly

The growing numbers of elderly individuals in need of support will severely stress the services infrastructure. Part of the answer is to develop technological innovations that allow an elderly population to successfully "age in place" with dignity and a sense of involvement with their community. The focus of this technology is to improve the lives of seniors by motivating

them through empathetic and empowering interaction in such matters as improving their self care, and providing new ways to connect them to their social care network, families, friends, and the community outside their own dwellings. It is essential to understand the needs of the target community through interdisciplinary perspectives of social science and computer science in partnership with potential elderly recipients of the technology themselves, said Professor Ed Riseman, principal investigator on this National Science Foundation-funded project. A unique aspect of this project is that the elderly will be essential members of the research team, thus permitting the elderly and key constituent groups to contribute to the shaping and design of assistive technology that will address their needs. This project's team of researchers brings together social scientists and geriatric social work practitioners from Smith College and computer scientists who have expertise in computer vision, robotics, augmented and virtual reality, and intelligent user interfaces from UMass Amherst (Professors Allen Hanson, Rod Grupen, and Erik Learned-Miller) and Mitsubishi Electrical Research Laboratory (MERL).

### Securities fraud detection

The world's largest private-sector securities regulator, the National Association of Securities Dealers (NASD), has teamed with Associate Professor David Jensen to bring cutting-edge computer science to the world of securities fraud. By developing statistical models that assess data that most models can't manage, the scientists in Jensen's Knowledge Discovery Laboratory (KDL) aim to help the NASD discover misconduct among brokers and concentrate regulatory attention on those who are most likely to misbehave. The work is highlighted in NASD's annual report this year, which states: "For NASD, our systems and technologies—and the data they house—are all critical assets. ... We are also working on advanced pattern detection technology designed to give us an early warning or alert us to problems in firms on a near real-time basis. For example, in one initiative, in conjunction with the University of Massachusetts, we are analyzing data already available to us to create a statistical model that predicts which brokers warrant additional supervisory or regulatory scrutiny."

### Router buffer size

The scalability of Internet routers is limited by the buffers they must use to hold packets: the problem is that the buffers must be both large and fast. It is safe to say that the speed and size of the buffers is the single biggest limitation to growth in router capacity today, and represents a significant challenge to router vendors, said Distinguished Professor Don Towsley. In a new DARPA-sponsored project, Towsley and Distinguished Professor Jim Kurose are collaborating with Electrical and Computer Engineering Professors Weibo Gong and Christopher Hollot on the study of buffer size in Internet routers, a topic in which little or no research has been done before. The team believes that buffers can be small enough to be held in on-chip SRAM (e.g. 32Mbits of buffers), which removes the bottleneck for electronic routers. The next step will be to build networks from all-optical routers using only a few dozen packet buffers.

## AWARDS

## Faculty and student accomplishments recognized

**H**ONOREES AT THE 2005 COLLEGE of Natural Sciences and Mathematics (NSM) First Annual Awards Ceremony, held this spring, included Distinguished Professor Bruce Croft, Daniel Bernstein (Ph.D. '05), and Charles (Skip) Jordan IV (B.S. '05).

**Bruce Croft**, Distinguished University Professor and Department Chair, received the 2005 NSM Outstanding Service Award for his sustained outstanding service contributions to the Department, to UMass Amherst, to his technical discipline, and to the federal government. His outstanding service starts with chairing a large, active, and successful Department with many high-quality faculty, graduate students, and employees. It continues with his role as director of the Center for Intelligent Information Retrieval, whose InQuery information retrieval/search software is used by the Library of Congress for accessing federal records, and his role as member of the Computer Science and Telecommunications Board, a unit of the National Research Council, where he advised the government on IT roles in responding to terrorism and on general IT roles in government, co-authoring five CSTB reports. However, by far the greatest aspect of Croft's distinguished service record is his professional service to his technical discipline and the broader scientific community. His research specialty is information retrieval (IR), a field that he has been involved in since the 1970s. He has served on the editorial boards of all the major IR journals, and as Editor-in-Chief of *ACM Transactions on Information Systems*, the top journal in the field. He has been extraordinarily active in the main professional society in computer science, the Association for Computing Machinery (ACM). He has chaired its Special Interest Group on Information Retrieval (SIGIR), chaired many SIGIR conferences, and served on the program committees of more than 50 other conferences.

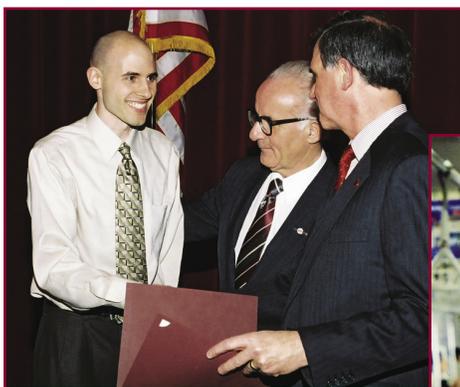
During the awards dinner, Croft presented **Daniel Bernstein** (Ph.D. '05) with the Department of Computer Science's 2005 Best Graduating Ph.D. Student Award in recognition for achieving overall success throughout his graduate career at UMass Amherst. Following a childhood interest in computers that grew as



**NSM Dean Lee Osterweil and Chancellor John Lombardi congratulate Distinguished Professor Bruce Croft (center) on his Outstanding Service Award recognition.**

an undergraduate at Cornell University, Bernstein came to UMass Amherst in 1998 to pursue a Ph.D. in the area of Artificial Intelligence (AI). "One of the reasons why I chose UMass Amherst is that it is very strong in AI," said Bernstein. "There are researchers working in many different areas of AI, and collaboration among research groups is encouraged." In addition to receiving the Departmental award, Bernstein also received a UMass Amherst Graduate Research Fellowship, a National Science Foundation Graduate Research Fellowship, and a NASA Graduate Student Researchers Program Fellowship. "My experience at UMass Amherst has been fantastic." He adds special thanks to his advisor, Professor Shlomo Zilberstein. "He was a wonderful source of support and wisdom. He is one of the most thoughtful people that I have met here, and I feel lucky to be associated with him." Bernstein is currently a Senior Postdoctoral Research Associate in the Department working with Zilberstein.

Also at the NSM dinner, Croft recognized **Charles "Skip" Jordan IV** with the distinction of Best Computer Science Undergraduate for 2005 for his academic success throughout his tenure at UMass Amherst. Jordan's mother accepted the award on his behalf. Jordan graduated from St. John's High School in Shrewsbury, Massachusetts as an AP National Scholar and National Merit Scholar and started his academic career as a Computer Science major at UMass Amherst in the Fall of 2000. Double majoring in Computer Science and Japanese Language and Literature with a minor in Mathematics, he was also a University Scholar and a John M. Simpson Memorial Scholarship winner. After receiving the Japanese Monbusho Government Nikken Scholarship, Jordan spent his senior year abroad studying at the Hokkaido University in Sapporo, Japan. He graduated in February of 2005 with honors. After graduation, he remained in Sapporo studying and working as a translator and English Teacher. When asked to look back on his education he simply states, "I think that the diversity offered at UMass Amherst is particularly valuable, and is the major reason why I chose UMass Amherst over highly-ranked tech schools. I liked the friendly atmosphere of the CS Department - even though it's a rather large Department, a number of faculty and graduate students knew me."



**(above) Dan Bernstein accepts the 2005 Best Graduating Ph.d. Student Award from NSM Dean Lee Osterweil and Chancellor John Lombardi during the NSM awards dinner.**

**(below) Charles "Skip" Jordan IV**



## NEWS

## NSF funds Five College testbed

A TEAM OF RESEARCHERS FROM UMASS AMHERST, Amherst College, and Mount Holyoke College received a grant from the National Science Foundation to acquire an experimental network of embedded and sensor systems. This network will be placed at locations within the participating institutions and used to drive research on these devices and their networking.

Networked embedded systems are widely used for sensor applications such as environmental monitoring, prediction, and detection of natural calamities such as earthquakes, hazardous weather detection, and urban monitoring. "Many of the research problems in networked embedded systems and sensor networks become interesting only when these systems scale to several hundreds of nodes," said Associate Professor Prashant Shenoy, project principal investigator. "Our testbed will enable a variety of cross-disciplinary activities such as the design of multi-tier multi-modal sensor networks, data management issues for sensor networks, memory management issues for embedded platforms, and hierarchical power management for embedded and sensor systems."

Professors Shenoy, Mark Corner, Deepak Ganesan, and Jim Kurose are involved in the Five Colleges, Inc. project along with Amherst College's Scott Kaplan and Mount Holyoke's Sami Rollins. The testbed will be made available to other Five College faculty for research on embedded systems and sensor networks.

## UMass Amherst named first Microsoft IT Showcase School

MICROSOFT CORPORATION DESIGNATED THE UNIVERSITY OF MASSACHUSETTS AMHERST as the first Microsoft IT Showcase School in the nation, recognizing the campus' innovative leadership in applying information technology to teaching and learning. To emphasize the importance of the distinction, Microsoft Chief Executive Officer Steve Ballmer personally made the announcement at the W.E.B. DuBois Library as UMass Amherst officially opened its new, technology-rich Learning Commons.

During his address, Ballmer noted that the designation is not a casual thing, given that there are so many institutions of higher education in the U.S. and the world. "Over the past seven years, we have worked closely with UMass Amherst's faculty and students, and we have been consistently impressed by their accomplishments," said Ballmer. "By recognizing UMass Amherst as a Microsoft IT Showcase School, we see the university as a true pacesetter in higher education, committed to providing an array of additional learning resources tailored to students' specific needs. It is a privilege to help the university share its knowledge more broadly."

Ballmer also noted that Microsoft and UMass Amherst share a vision of employing information technology to improve the delivery of educational materials, engage students in active learning, and encourage collaborative inquiry.



### Kurose receives award

DURING THE UMASS AMHERST FACULTY CONVOCATION, Chancellor John V. Lombardi presented Distinguished Professor Jim Kurose with the newly created Award for Outstanding Accomplishments in Research and Creative Activity. Kurose was one of 12 faculty members from across the entire campus who have, within the past three years, demonstrated outstanding achievement that has received national and/or international recognition appropriate to the discipline. Each of the honorees received a crystal award engraved with the Amherst campus seal.



(left to right): Microsoft Academic Developer Philip DesAutels, Microsoft CEO Steve Ballmer, CS undergraduate and UMass Amherst game developers club president Michael Beauchemin, CS undergraduate and Microsoft Student Ambassador Irene Ros, UMass President Jack Wilson, and UMass Amherst Chancellor John Lombardi.



# ALUM Matters

A newsletter for alumni of the Department of Computer Science



## Henning Schulzrinne leads VoIP revolution

**P**ROFESSOR HENNING SCHULZRINNE (Ph.D. '92) is currently serving as chair of the Department of Computer Science at Columbia University (New York) and director of the Internet Real-Time (IRT) Laboratory which focuses on supporting interactive applications in the Internet. Columbia's CS Department has about 34 faculty members, with particular strengths in areas from computer graphics and vision to networks, security, and machine learning. "We are fortunate to have two other UMass Amherst alumni on our faculty, Professor Dan Rubenstein (Ph.D. '00) and Professor Vishal Misra (Ph.D. '00)," noted Schulzrinne. Rubenstein, Misra, and Schulzrinne were all advised at UMass Amherst by Distinguished Professors Jim Kurose and Don Towsley.

Much of Schulzrinne's research has focused on the development of protocols and algorithms for voice-over-IP (VoIP) and other multimedia applications. VoIP, the transmission of voice and other multimedia over packet networks such as the Internet, started being developed seriously in the early 1990s, although first experiments date back to the early days of the Internet, in the 1970s. Only

in the 1990s did workstations achieve sufficient processing power and low-delay audio input and output. For example, Schulzrinne developed his first audio tool in the late 1980s on a Sun SPARCstation that had just been acquired by the Computer Network Research Group at UMass Amherst. The replacement of traditional analog and circuit-switched digital phone systems is now well underway; "it appears likely that traditional telephone systems will disappear, at least for long-distance transmission and larger enterprises, over the next decade," predicted Schulzrinne. The next challenge is to support VoIP over both cellular and IEEE 802.11 ("WiFi") wireless networks; Schulzrinne and his research group have been working recently on algorithm enhancements and new protocols to significantly enhance the capacity of 802.11 networks.

For several years, Schulzrinne has realized that the transition to a packet-based telephone infrastructure also requires upgrades to the public safety communications infrastructure. For example, the 911 calling system is still based on 1970s technology and has difficulty dealing with cell phones and, now, VoIP. "We

are working with Texas A&M University and public safety answering points to build a next-generation Internet protocol-based 911 system that is hopefully more robust and cheaper to maintain than the existing one," added Schulzrinne.

Another current project tries to extend data connectivity where traditional wired and wireless networks have not reached or that provide only spotty coverage. This includes dense urban environments and such places as the New York City subway, as well as rural areas in developing countries and disaster areas. The 7DS project ("seven degrees of separation") allows the distribution of data by copying it between mobile nodes that meet each other, e.g., by sharing the same subway car. Messages, containing web pages or encrypted email messages, are passed around until they reach the desired destination or an access point.

VoIP is for traditional phone calls, but can also be embedded in a variety of applications that do not look like telephones at all. For example, the IRT Laboratory has been working with the Federal Aviation Administration on a project to build a new training facility for their air traffic controllers. The project uses standard multimedia protocols, such as IP multicast, streaming control protocols and signaling, but simulates radio interactions between pilots and controllers. Other VoIP problems under study include the prevention of phone spam (called "spit") and the integration of rich presence information, geographic location, and telephony services, so that nuisances like phones ringing in movie theaters and telephone tag can be eliminated.

Unlike most other academic research labs, the IRT lab tries to not just publish papers and produce systems prototypes,

but also to contribute to standardization. “Almost all modern networks run on standardized protocols. Thousands of papers are published each year in networking; unfortunately, most are ignored by industry and one cannot simply rely on good work making it into practice based on its quality alone,” remarked Schulzrinne. He has been an active technical contributor to the Internet Engineering Task Force (IETF), the standardization body for Internet protocols. Among other efforts, he co-authored the Session Initiation Protocol (SIP) and Real-Time Transport Protocol (RTP) which form the foundation of most standards-based VoIP systems today. For example, Vonage, Yahoo, and Microsoft Messenger all use these protocols internally. The Real-Time Streaming Protocol (RTSP), another standard, is now used by Real and other streaming media software. The base protocols are largely patent-free, allowing their spread in both open source and proprietary software.

A few years ago, Schulzrinne served on the Internet Architecture Board (IAB), the Internet architecture advisory council for the IETF. “My first visit to the IETF came about when Jim Kurose organized a trip to the IETF meeting that took place in Cambridge in the summer of 1992,” said Schulzrinne.

After graduating from UMass Amherst, Schulzrinne spent 18 months at AT&T Bell Labs, as it was then called, working as a postdoc on Transputer-based network emulators, copyright protection, and the daunting task of trying to convince AT&T that their circuit switches were headed for the recycling bin of history. His visa regulations then required a return to Germany, where he put in a two-year stint at GMD Fokus, now part of the Fraunhofer Institute, in Berlin.

Schulzrinne’s research on real-time multimedia started with a DARPA DARTnet research project in Kurose’s and Towsley’s lab. DARTnet was an early dedicated research network con-

necting research institutions across the United States at the blazing speed (for the time) of 1.5 Mbs. It provided a test platform for developing one of the first network audio clients, NeVoT.

In 2004, Schulzrinne was named one of the 50 most powerful people in networking by *Network World*, the only academic on the top 50 list. He has also received the New York City Mayor’s Award for Excellence in Science and Technology and the VON (Voice on the Net) Pioneer Award. In 2005, at the IEEE Infocom Conference, both Schulzrinne and Kurose accepted the 2005 Award for Exemplary Service to the Community.

“Throughout my career, I have looked to Jim and Don for advice and try to model my graduate student interactions and their emphasis on high-quality, relevant work after their example,” concluded Schulzrinne.

More about Schulzrinne’s research can be found at [www.cs.columbia.edu/IRT](http://www.cs.columbia.edu/IRT).

## Alumni Connections

**Amos Wetherbee** (B.S. ’05) received a competitive three-year Department

of Homeland Security Graduate Research Fellowship. He is currently a graduate student at Johns Hopkins University.

**Eric Hansen** (Ph.D. ’98), former student of Professor Shlomo Zilberstein,

received the Best Paper Award at ICAPS 2005. ICAPS is the premier international conference on automated planning and scheduling. Hansen received the award with his student Rong Zhou for their paper “Beam-Stack Search: Integrating Backtracking with Beam Search.”



**Amos Wetherbee**

In the last few years **Jeff Bonar** (Ph.D. ’85) has been building JumpStart Wireless, a software company that he founded to create mass-market wireless software. JumpStart Wireless uses a unique expert system approach to automatically create all the major components of a wireless application: device user interface, over-the-air communication, server logic, and existing enterprise integration. JumpStart applications automatically include security, provisioning, device independence, replication of data to/from device/server, self-healing capabilities, and so on. Industrial strength applications that take months to build with conventional approaches are created and deployed in a matter of days. JumpStart has a rapidly expanding customer base, focused currently on construction, field service, and facility management. Several software companies use JumpStart technology to create products they sell directly to their customers.

“During my visit to UMass Amherst, I was struck by how much of what I learned there has made its way into the work I do now,” said Bonar. “The expert system approach and cognitive task analysis that went into the design of a wireless user interface came directly

from my graduate work. Perhaps most important, my dissertation work led to the high level specification language that allows our customers to say what they want rather than figure out how to program it directly.”

Anyone interested in learning more about Bonar’s company should go to his website at [www.jumpstartwireless.com](http://www.jumpstartwireless.com) or his blog at [wirelessbusiness.blogs.com](http://wirelessbusiness.blogs.com). “I am always looking for interns and new employees,” added Bonar. “I remade some connections with my UMass Amherst colleagues during the reunion day and look forward to doing some work together at some point.”

## In memoriam

**Patrick E. Bell** (B.S. ’04), 23, of Worcester, formerly of Greenfield, MA died on June 19th at the Metro West Medical Center in Framingham shortly after competing in a triathlon in Ashland. Patrick was a computer software engineer for the EMC Corp. of Southboro. He was a member of the Society of Engineers. Patrick was an accomplished triathlete and a member of the Vortex Racing Triathlon Development Team.

## OWL goes national

**H**OMEWORK MAY BE A CRITICAL COMPONENT of learning but it can be a source of frustration for faculty—especially when it becomes a time-sink. Now computer science professors can avoid that angst by taking advantage of OWL, the Online Web-based Learning tool. The computer science homework package is being offered nationwide this fall as an accompaniment to Thomson Higher Education's textbooks.

The new computer science package is one in a series of comprehensive Web-based homework systems developed by the Center for Educational Software Development (formerly CCBIT). "It's a labor-saving device for faculty and it's a more effective way to

learn," said David Hart, director of the center and one of OWL's creators. OWL was designed to encourage what educators call mastery learning, said Hart. Students work as long as they need to master each concept and must be able to demonstrate that they have a handle on it before moving onto the next unit. The exercises encourage critical thinking and analytical skills.

Shortly after OWL's inception, a physics package was added to the curricula and since then the online learning tool has been revised and expanded to be used by more than 20 departments and thousands of students at UMass Amherst. In 2001 Thomson Higher Education began offering the chemistry package na-

tionally with their textbooks. More than 200 colleges and universities across the country now use OWL in one form or another, said Hart.

Professors can customize OWL's content to their course or syllabus, mix and match questions, or create their own via an authoring interface. In the database behind OWL there are more than 600 questions correlated to specific computer science textbooks. The computer science package stands out in that it gives automatic feedback on student-submitted code. It also has several projects that students can return to, building on previous work. For an insurance project, for example, students start with next to nothing and end up creating an electronic prototype of an insurance form.

Students purchase the pack-

age along with their course textbooks and then log onto OWL through a Web browser. When students submit a response to an assignment question, OWL automatically grades their response and displays the correct answer along with helpful hints about where they went wrong. For computer science OWL assignments this includes fragments of Java code that are automatically checked for compilation and correctness. And if a student is stumbling with a particular concept or task, they can repeat an assignment; OWL will generate a new question set each time.

"OWL is evaluation with teeth," said Professor Robert Moll, a creator of the computer science OWL. "It tells the student why they are right or wrong and gives meaningful feedback, in real-time."

### Ph.D.s: Where are they now?

The following computer science students have graduated with Ph.D.s from UMass Amherst within the past year:

- Daniel Bernstein: "A Computational Approach to Decentralized Control of Markov Decision Processes" (Shlomo Zilberstein, Advisor); Senior Postdoctoral Research Associate, UMass Amherst Department of Computer Science.
- Michael K. Bradshaw: "Resource-Conserving Networked Multimedia Providers" (Jim Kurose and Don Towsley, Advisors); Visiting Assistant Professor, Department of Computer Science and Mathematics, Centre College.
- Aaron G. Cass: "Software Design Guidance by Process-Scoped Inconsistency Management" (Leon J. Osterweil, Advisor); Instructor / Assistant Professor, Computer Science, Union College.
- John Cavazos: "Automatically Constructing Compiler Optimization Heuristics Using Supervised Learning" (J. Eliot B. Moss, Advisor); Postdoctoral Fellow, University of Edinburgh, Scotland.
- Abhishek Chandra: "Resource Allocation for Self-managing Server Systems" (Prashant Shenoy, Advisor); Assistant Professor, Department of Computer Science and Engineering, University of Minnesota.
- Zhengzhu Feng: "The Role of Representation and Abstraction in Stochastic Planning" (Shlomo Zilberstein, Advisor); Software Engineer, Google.
- Daniel R. Figueiredo: "Providing Incentives for Cooperation in Anonymity Systems" (Don Towsley, Advisor); Postdoc Fellow, Computer Communications and Applications Laboratory, EPFL, Switzerland.
- Mohammad Ghavamzadeh: "Hierarchical Reinforcement Learning in Continuous State and Multi-Agent Environments" (Sridhar Mahadevan, Advisor); Postdoctoral Researcher, University of Alberta.
- Sharad Jaiswal: "'Measurements-in-the-middle': Inferring end-end path properties and characteristics of TCP connections through passive measurements" (Jim Kurose, Advisor); Member of technical staff, Bell Labs Research, Bangalore, India.
- Thomas F. Kalt: "Control Models of Natural Language Parsing" (Andrew G. Barto, Advisor).
- Toni M. Rath: "Retrieval of Handwritten Historical Document Images" (R. Manmatha, Advisor); Software Engineer, Google.
- Narendran Sachindran: "High-Performance Copying Garbage Collection with Low Space Overhead" (J. Eliot B. Moss, Advisor); Research Staff Member, IBM India Research Labs.
- Bhuvan Uргаonkar: "Dynamic Resource Management in Internet Data Centers" (Prashant Shenoy, Advisor); Assistant Professor, Department of Computer Science and Engineering, Pennsylvania State University.
- Bing Wang: "Priority and Realtime Data Transfer over the Best-effort Internet" (Jim Kurose and Don Towsley, Advisors); Assistant Professor, Department of Computer Science and Engineering, University of Connecticut.
- Matthew Wright: "Analysis of Attacks Against Anonymous Communications Systems" (Brian N. Levine, Advisor); Assistant Professor, Department of Computer Science and Engineering, University of Texas at Arlington.

## Me, a computer science grad student?

**T**HE DEPARTMENT OF COMPUTER SCIENCE has been working on many fronts to address the underrepresentation of women and minorities in computer science, a problem affecting computer science departments across the nation and impacting research and education at all levels.

To address one aspect of this problem, the Department held its first “CS-Saturday” event on Saturday, October 1, 2005 ([www.cs.umass.edu/cs-saturday](http://www.cs.umass.edu/cs-saturday)). The purpose of this event was not only to generate interest among college juniors and seniors in graduate study in computer science, but also to increase the degree of their success in the application process, the process of obtaining a graduate degree, and in subsequent computer science careers. “Although our hope is that our Department will benefit from this event through increased graduate applications from underrepresented groups, our goal was to generate interest in computer science graduate study in general, not just at UMass Amherst,” said Professor Andrew Barto, chair of the Department diversity committee. “We focused our advertising on underrepresented groups, but attendance was open to all.”

The Department invited interested juniors and seniors from a number of mostly local colleges to attend a day of information sessions on many aspects of graduate school. Thirty-six interested juniors and seniors attended, almost half of them women, from Williams College, Amherst College, Smith College, Mount Holyoke College, Rochester Institute of Technology, Wellesley College, Tufts University, Saint Anselm College in New Hampshire, Howard University, and UMass Amherst. In an effort to expand student participation from schools outside the New England area, the Department and the Northeast Alliance provided funding for four Howard University students to attend.

Department faculty, students, and staff welcomed the students to the event with morning refreshments. During the lead-off session, “Why consider graduate school?,” Professor Neil Immerman discussed the options and opportunities that a Ph.D. in computer science could provide. He also revealed important information about graduate school that many undergraduates don’t know, such as the fact that students usually get paid to attend. The next session was a “Career Options” panel discussion with faculty and guests from industry and government labs who talked about their experiences and careers. Following a catered lunch, a panel of four UMass Amherst graduate students explained what it is really like to be a computer science graduate student. Williams College Professor Andrea Danyluk then gave an inspiring talk about how it is possible to balance life with a career in computer science. After an afternoon break, which included an informal poster session during which visitors chatted with some of our graduate students about their work and watched a robot demonstration, Professor Lori Clarke provided detailed insights into the graduate school application process, including how to select schools, who to ask for letters of rec-



Graduate student panel session held during CS-Saturday.

ommendation, and even advice on which boxes to check on the typical application form.

Perhaps the most exciting part of the day was the graduate student panel, with Gary Holness, Brendan Burns, Özgür Şimşek, and Jen Neville sharing their experiences in graduate school at UMass

Amherst. “These students beautifully conveyed the challenge and personal fulfillment of pursuing a Ph.D. in a supportive environment,” said Barto. “I think it was Jen who said one of the day’s memorable comments about graduate school: ‘I am never bored’.” One of the students from Howard was glowing near the end of the event and thanked everyone for the day. She said that she learned so much about grad school that she never would have imagined, and that she planned to share it with her local ACM group when she returned home.

The event organizers plan to do a follow-up email to all the participants next May to see how many of them chose graduate school. “If we have influenced a few students positively in this direction, as we believe we have, then we were successful,” said Clarke. “It was both a job very well done and a very successful outcome.”

*The Department thanks all the faculty and student attendees and participants, and a special thanks to our outside visitors, Andrea Danyluk (from Williams College) and Warren Greiff (from MITRE; UMass Amherst CS Ph.D. ’99), and to those who helped fund this effort: CS Department Chair Bruce Croft, College of Natural Sciences and Mathematics (NSM) Dean George Langford, former NSM Dean Lee Osterweil, NSM Associate Dean Gordon Wyse, and Sandy Petersen from the Northeast Alliance.*

## Homecoming demonstration

Research Associate Professor Beverly Woolf (seated), Director of the Center for Knowledge Communication, gives a demonstration of CKC’s intelligent tutors to John Johnson (B.S. ’03) and his family during the CS homecoming reception and research poster session.



## Six degrees of separation explained

**K**NOWLEDGE DISCOVERY LABORATORY (KDL) RESEARCHERS have invented a new algorithm that explains a network-searching conundrum that puzzled computer scientists and sociologists for years.

Doctoral student Özgür Şimşek and Associate Professor David Jensen created an algorithm that helps explain the sociological findings that led to the theory of “six degrees of separation,” and could have broad implications for how networks are navigated, from improving emergency response systems to preventing the spread of computer viruses.

Dubbed “expected-value navigation,” the algorithm describes an efficient way of searching dynamic networks and was presented by Şimşek and David Jensen at the 19th International Joint Conference on Artificial Intelligence in Edinburgh, Scotland. The structure of these networks, for example ad-hoc wireless networks, change so quickly that any centralized hub becomes obsolete and search becomes difficult.

The work was inspired by research pioneered in the late 1960s on navigating social networks, explained Şimşek. In a now famous study by psychologists Milgram and Travers, individuals in Boston and Omaha, Nebraska, were asked to deliver a letter to a target person in Boston, but via an unconventional route: the message had to be passed through a chain of acquaintances. The people starting the chain had some basic information about the target individual—including name, age, and occupation—and were asked to forward the letter to someone they knew on a first-name basis in an effort to deliver it through as few intermediaries as possible. Of the letters that reached the target, the median number of people in the message-passing chain was a mere six.

“What came out of that study was that we are all connected,” said Şimşek. But the findings also raised a number of questions about how we are connected, she said. What are the properties of these networks and how do people efficiently

navigate them?

The social network exploited by the letter carriers of Travers and Milgram isn’t a straightforward, evenly patterned web. For one thing, network topology is only known locally—individuals starting with the letter did not know the target individual—and the network is decentralized—it didn’t use a formal hub such as the post office. So how did the letters efficiently arrive at their targets?

Participants in the Travers and Milgram study probably acted intuitively by leveraging two human traits: first, people tend to associate with people who are like themselves; and second, some individuals are more gregarious than others and so have many more acquaintances. The first characteristic, known as homophily, means that attributes of a node in the network tend to be correlated. Bostonians often know other Bostonians; teenagers often know other teenagers, etc. The second characteristic implies a “degree disparity” that leads to some individuals acting as hubs.

By using both of these factors, one can efficiently get to a target even when little is known about the network’s structure. The resulting searching algorithm gets messages to the target by passing it to gregarious individuals who are most like the target. In the language of network-searching, the algorithm favors nodes that maximize the probability of linking directly to the target, which is a function of both degree and homophily, said the scientists.

Previous research had explored these aspects separately, but Şimşek and Jensen are the first to incorporate both into one broadly applicable algorithm with a strong basis in probability theory. And the combination yields a powerful punch. It is remarkably efficient at finding the short paths between nodes without knowing the central network’s structure, said the researchers.

“In this case, one plus one is more than two,” said Şimşek.

### Undergraduate research in the field

Computer Science undergraduates in the wireless networking class (CMPSCI 496A) are getting hands-on experience setting up outdoor network nodes at various locations around the valley. The nodes use



802.11 directional antennae to communicate. They are shown at left testing one of the small parabolic antennae. The class is co-taught by Distinguished Professor Jim Kurose and Dr. Mike Zink, a postdoc in the Center for Collaborative Adaptive Sensing of the Atmosphere. The CS seniors in the class, all in the honors program, (left to right) are Oliver Chong, Irene Ros, Nick Maniskas, Byron Wallace, Tim Ireland, Adam Nyzio, Ivan Ordoñez, Brook Arnold, and Chris Moriarty.

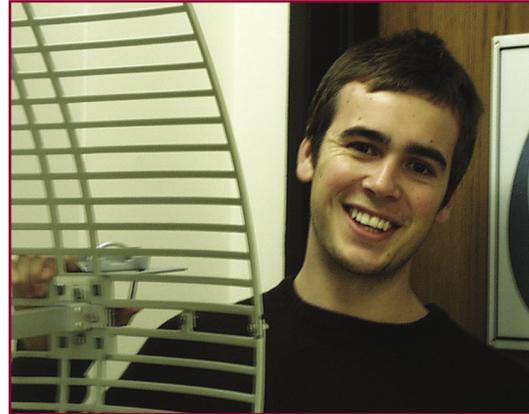
## Undergraduate presents at FIE 2005

Computer Science undergraduate Byron C. Wallace presented the paper “Using Multimedia to Support Research, Education and Outreach in an NSF Engineering Research Center” at the Frontiers in Education (FIE) 2005 Conference in Indianapolis, Indiana this fall. Currently in his senior year as a Computer Science major, Wallace was the lead author on the paper. “Presenting a scholarly paper in front of a room full of people you don’t know is a great experience,” said Wallace. “It also gave me the chance to see what other research groups are doing in this area.”

While it is the exception for undergraduates to write, let alone present papers at academic conferences, years of hard work as a student employee of the RIPPLES (Research in Presentation Production for Learning Electronically) lab led him to that point, said RIPPLES director Rick Adrion. Wallace started with the RIPPLES lab following his sophomore year in high school when he was introduced to the group by his father, Gary Wallace, a longtime technical staff person in Computer Science who now works for the Astronomy Department.

The younger Wallace started with the lab encoding multimedia content. While still in high school he took computer programming courses at Greenfield Community College. He believes these courses gave him a leg up when faced with the notorious freshman course CMPSCI 121. He feels that the introductory GCC courses along with being able to bounce questions off RIPPLES’ senior software engineer, Ken Watts, as well as his father, Gary, was extremely valuable and helped him succeed.

Over the years Wallace worked on a number of projects including multimedia encoding, graphics creation, flash animation, programming customized multimedia authoring tools, an application for web-based collaboration, and a java based version of the lab’s MANIC courseware. His current project is a Web-based archive using jMANIC of CMPSCI 496a, an independent study in wireless networks. Wallace participates in the class as a student, but he also operates a video camera to capture class presentations and projects. He uses the lab’s authoring tools to post the classes on the Web. His work can be viewed at [manic.cs.umass.edu/jMANIC/fall05/](http://manic.cs.umass.edu/jMANIC/fall05/)



Byron Wallace

[cs491/jMANIC.jnlp](http://cs491/jMANIC.jnlp).

“Working in a lab has given me first-hand experience with software development as well as an academic research environment which you just can’t get from classes,” said Wallace. “Understanding what

the research environment is like has spurred me to want to attend grad school. I think solely taking classes could be wearing.” Wallace plans to attend graduate school in fall 2006 to explore bioinformatics research.

### History flourishes in the CS building

As you walk through the main entrance of the Computer Science building, you will be greeted by a 10-foot Schefflera plant. It graciously spreads green life into an otherwise empty stairwell in the first floor atrium. Many people noticed the plant when it first arrived last spring, and they still remark on the welcome ambience it contributes as one ascends the stairs to the second floor. The plant was donated by Fenna Lee Bonsignore, the mother of CS alumnus John Bonsignore (BS ’85).

How, one asks, did this plant make its way to our atrium? One snowy January night last year, Department administrative assistant Kate Moruzzi spent a pleasant evening sitting underneath it at a holiday party in Leverett. When she complimented the hostess on such a fine “tree” in her house, Bonsignore explained that she had been stuck with it since her son graduated. The plant used to adorn his dorm room during his years at UMass Amherst. At first it was quite bedraggled (as many a dorm plant becomes) and hardly worth saving. However, Bonsignore took pity on the plant and nursed it back to health, dragging it outside during summers and bringing it in each fall. As the years passed, it began to outgrow each location in her home and now it was hitting the ceiling in her sunroom. She asked Moruzzi if she knew of anyone who might want an indoor tree.

The atrium of the new computer science building was the obvious solution. An instantaneous deal was struck - “Come and get it, it’s yours!” Once the threat of frost was gone, the plant was wrapped in a bedspread, tied into the back of Kate’s husband’s pickup truck and slowly transported down route 63 to its new home. Only one leaf was lost in the excursion.

The Schefflera plant is now over 20 years old and continues to sprout new growth and extend ever higher with the passing seasons. Our thanks go to the Bonsignore family for donating a little bit of living history to our building.





Professor Andrew Barto (left) and Collin Barringer this summer in Okinawa.

### Faculty News

Congratulations to **Shlomo Zilberstein** for his promotion to full Professor and to **Brian Levine** for his promotion to Associate Professor. Congratulations also to Brian on his August marriage to Amy Wallender. ■ Associate Professor **Andrew McCallum** presented a keynote address at the Association for Computational Linguistics Workshop on Feature Engineering for Machine Learning in NLP. He also gave an invited talk at the University of Edinburgh. ■ The UMass Amherst Center for Teaching chose Associate

Professor **Eliot Moss** for a 2005-2006 TEACHnology Fellowship. In addition, Moss is a newly elected Executive Committee member of the ACM SIGPLAN (Special Interest Group on Programming Languages) for a three-year term. He will also serve as Program Chair for the 2006 International Symposium on Memory Management. ■ Associate Professor **Prashant Shenoy** was invited to serve on the editorial board of the ACM/Springer *Multimedia Systems* journal. ■ Associate Professor **David Jensen** was selected for the 2006-2007 Defense Science Study Group, a panel of 15 distinguished young faculty in the sciences and engineering disciplines, sponsored by the Defense Advanced Research Projects Agency and administered by the Institute for Defense Analyses. Jensen was also appointed as a Director of the ACM SIGKDD (Special Interest Group on Knowledge Discovery and Data Mining). ■ In July, Professor **Andrew Barto** gave an invited three-hour talk as part of the Computational Neuroscience summer school in Okinawa, Japan. Graduate student **Collin Barringer** was a participant in the school, accepted through a competitive

international process. While an undergrad at UMass Amherst, Barringer had double majors in Computer Science and Japanese. ■ Associate Professor **Brian Levine** is the co-chair of NOSSDAV 2006, the 16th International Workshop on Network and Operating Systems Support for Digital Audio and Video. ■ Professor **Shlomo Zilberstein** is the Program Committee chair of the Ninth International Symposium on Artificial Intelligence and Mathematics to be held in January 2006 in Fort Lauderdale, Florida. He also gave an invited talk at the BISFAI 2005, the 8th Biennial Israeli Symposium on the Foundations of AI, held in June 2005 in Haifa, Israel. ■ Assistant Professor **Emery Berger** spent August at Microsoft Research working with them on programming language and operating system topics. ■ Research Assistant Professor **R. Manmatha**, who spent the summer at Google, attended the first Google faculty summit in August. He also received a Google research award this fall. ■ On April 26, Laura and Assistant Professor **David Kulp** and big sister Lily welcomed the birth of their new family member Naomi.

### Visitor News

**Daniel Obuobi**, a Fulbright Scholar from the University of Cape Coast in Ghana, is a Visiting Professor with the Center for Knowledge Communication (CKC) and the Research in Presentation Production for Learning Electronically (RIPPLES) group. ■ **Michael Kelm** is a Visiting Scholar from the University of Heidelberg, Germany; doing research on Conditional Random Fields for vision within the Information Extraction and Synthesis Laboratory (IESL). ■ Collaborating on research with Professor Shlomo Zilberstein, **Raghav Aras** is a Visiting Scholar from INRIA Lorraine in Nancy, France.

### Student News

Graduate student **Bhuvan Urgaonkar** received the Best Student Paper Award for “Dynamic Provisioning for Multi-tier Internet Applications” presented at the IEEE International Conference on Autonomic Computing in Seattle in June. ■ **Michael Sindelar** participated in the National Institute of Standards and Technology’s Summer Undergraduate Research Fellowship (SURF) program,

## We need your continued support

Gifts like yours help the Department in many ways, such as funding Departmental seminars by outstanding scientists, assisting undergraduate research and helping new faculty establish their research programs. In addition to contributions ear-marked for a specific purpose, general support helps make it possible for us to continue activities that enrich our educational and research programs.

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at the NIST Gaithersburg, Maryland facility in the Information Technology Laboratory, Software Diagnostics and Conformance Testing Division, Software Quality Group. His final SURF presentation was “Developing a Reference Dataset for Software Security Vulnerabilities.” ■ Graduate student **Matthew Rattigan** and Associate Professor **David Jensen** gave a tutorial on knowledge discovery and data mining at the Information Directorate of the Air Force Research Laboratory in Rome, NY. ■ Graduate student **David Stracuzzi** and his wife Krista are the proud parents of Willow Sophia, born on August 30. ■ KDL graduate student **Özgür Şimşek** received a UMass Amherst Graduate School Fellowship for the academic year 2005-06. ■ Graduate students **Jennifer Neville** and **Özgür Şimşek** presented their work at the Tenth AAAI/SIGART Doctoral Consortium during the Twentieth National Conference on Artificial Intelligence. The AAAI and ACM/SIGART Doctoral Consortium provides an opportunity for a group of Ph.D. students to discuss and explore their research interests and career objectives with a panel of established

## Best Student Paper Award



**Jamie Callan (Ph.D. '93), ACM Special Interest Group in Information Retrieval (SIGIR) Chair (left) and Nivio Ziviani, SIGIR 2005 Conference Chair (right) pose with Center for Intelligent Information Retrieval graduate student Don Metzler and Distinguished Professor Bruce Croft. Metzler received the Best Student Paper Award at the 2005 SIGIR Conference in Salvador Brazil in August for his paper “A Markov Random Field Model for Term Dependencies.”**

researchers in artificial intelligence. Neville is advised by Associate Professor David Jensen and Şimşek by Professor Andrew Barto. ■ **Shulin You** and graduate student **Li Huan** announced the birth of their daughter Shufan You on July 20.

### Staff News

**Andrew Tolopko (B.S. '05)** joined IESL as a Software Engineer this fall. ■ Computer Science Computing Facility staffer **David Korpiewski** received a promotion to Software Specialist 1. David

and his wife Lisa proudly announced the birth of their son David Korpiewski III, born on October 29. ■ **Alana Wiens** joined the Department as Project Manager of the Commonwealth Information Technology Initiative (CITI). ■ Working with the Knowledge Discovery Laboratory, **Agustin Schapira-Olcese** was promoted to Senior Research Software Engineer.

### Other News

The Knowledge Discovery Laboratory (KDL) recently released version 4.0 of their

Proximity software. Proximity is an open-source software environment for extracting non-trivial, previously unknown, and useful information from complex data sets. Proximity is particularly well-suited to analyzing highly relational data sets drawn from the web, computer networks, social networks, and relational databases. Proximity provides an open-source platform that can be used for both research and practical applications. Visit [kdl.cs.umass.edu/proximity](http://kdl.cs.umass.edu/proximity) for more details and to download the software.

## Arbib honored at CS homecoming

**D**URING THE ANNUAL COMPUTER SCIENCE HOMECOMING EVENT held on October 14, alumni and friends gathered at a luncheon to celebrate Professor Michael Arbib's 35th anniversary of his arrival at UMass Amherst. Earlier that same week, Arbib gave a presentation as part of the Department's Distinguished Lecture Series.

Arbib, a former UMass Amherst Computer Science Department chair, was a professor in the Department from 1970 to 1986. Upon his arrival in 1970, Arbib began the process of establishing the Department's Ph.D. program. He is currently a University Professor, Fletcher Jones Chair and Professor in Computer Science, and Professor of Biological Sciences, Psychology, Neuroscience, Biomedical Engineering, and Electrical Engineering at the University of Southern California.

In addition to the luncheon in Arbib's honor, other homecoming events included a research poster session, building tours, and reception. College of Natural Sciences and Mathematics Dean George Langford greeted the crowd at the start of the reception.

Even though there was torrential rain during CS homecoming day and for the rest of the weekend, a good showing of alumni and friends braved the storm to attend the event. Attendees got the chance to reunite with old friends and faculty and see the latest research initiatives in the Department. Stay tuned for plans for next year's event.



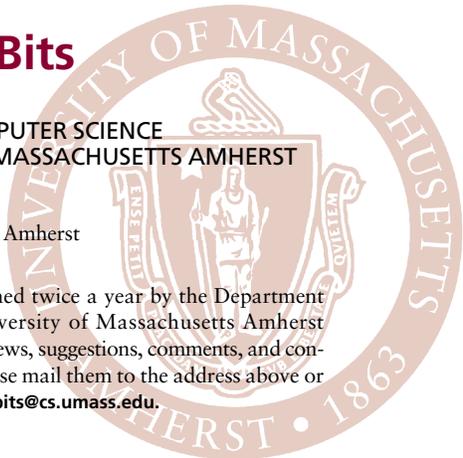
**Professor Michael Arbib speaks during the Homecoming luncheon held in his honor.**

# Significant Bits

NEWSLETTER of the  
DEPARTMENT OF COMPUTER SCIENCE  
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