Loose Change

Associate Professor Roderic Grupen

A running dialogue with the world

Rod Grupen explores the intelligence of machines and living beings

BY STEVEN SOLOMON

FACULTY PROFILE

Point your web browser toward http://interaction.cs. umass.edu to find the brief description of an exciting endeavor's underlying assumption: "The Interactionism Project is based on the idea that machines should acquire their own conceptual systems or ontologies through interaction."

The Interactionism Project consists of UMass-Amherst computer scientists working in several labs and alongside colleagues in other disciplines. They and their colleagues were recently made beneficiaries of a major National Science Foundation (NSF) infrastructure grant enabling the creation

Getting an education — in the corporate world

Bruce Wells '87 finds that a Computer Science undergraduate degree leads to success at IBM

BY STEVEN SOLOMON

As Bruce Wells was handed his sheepskin in 1987, he had only recently decided what his next step should be. This pattern of career development, one of happily being found by his own life's direction, was already familiar. Four years earlier, having taken but one programming class while attending high school in Hatfield, Mass., he already understood that he enjoyed the problem-solving nature of programming. Thus, upon receiving the University of Massachusetts Chancellor's Talent Award, and a four year scholarship, the decision to come to UMass-Amherst and study Computer Science was obvious.

Four years later, Bruce was faced with a choice between pursuing an advanced degree in a field that he loved to study, or seeking employment as an entry-level programmer. Having been interviewed by IBM, and

Bruce Wells - last year from the Knife Edge on Mt. Katahdin, Maine.

ALUMNI PROFILE

having worked hard at his studies the past years, Bruce opted for the world of the large corporation. He saw the opportunities for advancement that it held for a disciplined and talented individual. Someday,

Partial Devolution

A funny thing happened to me on the way to my retirement. When I took the Chair position three years ago, it was with the understanding that I would serve for three years and then retire, not just from the Chair position, but from the faculty as well. In fact, I will do exactly that at the end of September.

But I will be serving as "Continuing Chair" through May, 1998 in a post-retirement appointment. I will fill in for the next Chair, Jim Kurose, while he is on sabbatical.

I agreed to this partly because the Department Chair job is being transformed into a more manageable job, one that is compatible with a continuing, though less productive, research life for the Chair. The faculty heard from the Chair candidates this past year that such a change in job definition was necessary. In the past few months this transformation has started taking place. Faculty committees and individuals have taken up responsibilities previously shouldered by the Chair; a process of partial devolution has started.

While some may think that this is the reverse of evolution (and they would be partly right, according to the dictionary), devolution in the sense of transfer of powers from central to local entities has become quite popular in a number of circles recently.

The most salient of these transfers is being studied in Great Britain, where parliaments for Scotland and Wales are planks in the new Labor government's platform. In Scotland, the parliament was disbanded in 1706 in return for England's taking up some of the debt incurred by Scotland in a disastrous attempt to establish a trading colony in the Darien of Panama, in effect an overland Panama Canal. Of course, the government in Washington is actively devolving the welfare system by giving it back to the states to run. Ideas such as devolution wax and wane in their acceptance, not always due to fad and fashion. Some ideas are right for their times, such as a Panama passage for trade, but badly wrong in other times.

I am convinced from seeing the energy being devoted to the delegated activities, such as managing the building issues, that this is a good time for a more distributed management style in the Department. I believe the coming year will be a mostly smooth transition to a new way of doing business in the Department and that Jim will return to an environment in which he and the Department will prosper and grow.

—David Stemple

WELLS

though, he thought he'd go back for that advanced degree.

Ten years later, having risen from being an Associate Programmer to an Advisory Software Engineer at IBM, that advanced degree is still on hold. Bruce is enjoying his work, specializing in security issues but involved in the entire process of delivering software products for the OS/390 mainframe operating system.

According to Bruce, "I work with a team of fifty, developing products that allow system administrators to solve multiple problems, both hardware and software, as the line between the mainframe and client/server environments blurs. The mainframes are actually cheaper to manage, and our work is extending the life of the product line." Two examples of products traditionally found in the client/server environment, now under development or presently in the field, are web and Lotus Notes servers.

In addition to his work with IBM, Bruce is enjoying life in New York's Hudson River Valley. It was there that he discovered his passion for hiking. This interest, in turn, has led him to adventures in such places as the Rockies, Alaska, and most memorably, Nepal. There, in 1994, he ascended to the Annapurna base-camp in the Himalayas. Said Bruce, "You're already at 13,500 feet when you're at the bottom of the valley, and you're looking up at the peaks of the world's biggest mountains." He added, "The people there are very special, also; honest, sincere, friendly. They make you feel safe even while you're in this place that's so distant and strange to an American."

When asked about his memories of UMass, Bruce fondly recalled his relationship with his Talent Award Mentor and Academic Advisor, Professor Jack Wileden. "It was a very personal student/advisor relationship. He really went out of his way to spend time with me and to introduce me to the wider world of computer science," he explained. "I enjoyed the fact that he would sometimes invite me over for lunch with the faculty. It was great to be able to sit in and listen to the shop-talk."

As we concluded our telephone chat, Bruce was about to embark on his latest hiking trip, this time to rural New Hampshire. I asked him if there was anything he'd like to add before signing off.

His answer: "Only that UMass-Amherst is a great place to study Computer Science!"

Distance learning program offers degree in Computer Science

People seeking a master's degree in Computer Science can now do so without setting a foot on campus, through the Video Instructional Program (VIP). VIP has offered engineering degrees at the master's and doctoral levels for the past 23 years and has now expanded those offerings to include a master's in Computer Science. The recent boom in computer technology and the Internet is behind the new offering, said Mary McCulloch, VIP's marketing coordinator.

"There is a real demand for advanced degrees in computer science among mid-career people who are looking to move forward," McCulloch said.

Prospective students can register for the program over VIP's secure World Wide Web site (http://www.ecs.umass.edu/vip/). The new degree program will premiere in the spring of 1998.

—Adapted from an article originally in the Campus Chronicle by Elizabeth Luciano

GRUPEN

of a facility for cross-disciplinary investigation of sensorimotor development in both machines and humans. We check in with the infrastructure proposal's lead Principal Investigator (PI), Associate Professor Rod Grupen.

Today, Professor Grupen is the Co-Director of the Laboratory for Perceptual Robotics, which along with the Computer Science (CS) department's laboratories for Adaptive Networks, Experimental Knowledge Systems, Machine Learning and Natural Language Processing, comprise the CS side of the Interactionism Project.

Rod earned his Ph.D. in Computer Science from the University of Utah in 1988, having previously earned an M.S. in Mechanical Engineering, and undergraduate degrees in both Physics and Mechanical Engineering. In addition to his teaching, research, and direction of the department's graduate program, he sits on numerous editorial boards, and executive and program committees related to robotics and computational intelligence.

What do you hope to learn in the new cross-disciplinary facility for sensorimotor development?
We're interested in how systems, whether infants or robots, interact with the world and learn what is relevant. How is it that humans gain intelligence through our running dialogue with the world?

We have a unique opportunity to finally get at the computational issues of intelligence in a manner that allows us to describe both biological systems and machines. It may be a real opportunity to "de-jargonize" the field, and to come to grips scientifically with exactly what it means to think, and how intelligence develops over time. We don't have any concise definition of what it means to be intelligent; we don't know where common sense comes from, or

how language might develop between individuals in the same species.

What potential practical outcomes that you can see down the line?
We're after a common framework for explaining how "meaning" is attached to behavior. Our conjecture focuses on whether organisms and machines can

for maintenance and operations in orbiting space stations.

Also, this grant supports two "Whole Arm Manipulators," or WAMS. This is the first robot designed specifically to interact with the world over its own entire surface, and it integrates Barrett BH8 three-fingered hands. These systems should be more flexible mechanically and provide more sensory feedback than traditional robot sys-

share "meaning" if they are both embodied and share experiences grounded in the same world.

Consider the implications of a web browser that understands a query, or a high-performance knowledge base that knows what data is relevant to a user.

Beyond these issues, we feel that the mechanism employed by biological organisms for coordinating multiple sensory and motor activities is relevant to technologies for scheduling flexible manufacturing facilities, or may lead to machines that "grow" by acquiring skillful strategies for particular task domains. We have an opportunity to change the way we think about computing at the same time we learn something about our own minds.

We're terribly excited at the possibility that our work, and that the tools of computing and computer science, will help us to understand the development of children. Perhaps we will be able to better understand the cognitive implications of a physical disability, and perhaps this understanding can lead to successful interventions. This really speaks to the interdisciplinary nature of our efforts.

What about the facility itself?
With this grant, our Department

will become one of the preeminent experimental robotics laboratories in the world, and the psychology department will further strengthen its experimental facilities for studying infant development. We have the distinction of being a leader in experimental work on both humans and machines regarding reaching and grasping. In fact, we have more kinds of robot hands than any other institution, except, perhaps, for NASA. We also hope to work with NASA on semi-autonomous extra vehicular activity robots

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> We have an opportunity to change the way we think about computing at the same time we learn something about our own minds.
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> — R O D   G R U P E N

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tems. Additionally, we are acquiring stereo vision hardware and acoustic information-processing architectures.

Are there plans to open the facility to others beyond the PIs immediately involved with the proposal?
The NSF shared our concern that this unique facility should be available to researchers everywhere. So we intend to attract people from other disciplines, from other universities and from industry to participate in the work.

Who are your colleagues who are participating in this project?
I want to recognize Peggy Weston in CS, who helped make this research infrastructure happen, and all of the other Principal Investigators: Paul Cohen and Andrew Barto of CS, Carole Beal, Rachel Clifton and Neil Berthier of Psychology, and the university's administration, including Deans Linda Slakey and Glen Gordon, Vice Chancellor Fred Byron, and Department Chairs Dave Stemple and Melinda Novak. They worked tirelessly to make this truly interdisciplinary endeavor happen.

Let me invite those interested in knowing more about the project to contact me at `grupen@cs.umass.edu`.

Investigating Fundamental Mysteries

A linchpin in the effort for the NSF grant funding has been Professor Paul Cohen, who, according to Rod Grupen, "is responsible for much of the scope of our investigations into sensorimotor interaction and learning." The following is excerpted from a January, 1997 paper by Professor Cohen.

The conceptual tasks at which we all excel — classification, judgment of similarity, language and particularly metaphor — all develop from sensorimotor beginnings. Lately, the implications of this premise are shaking foundations in philosophy, linguistics, artificial intelligence and robotics. The rationalist view, that reason is objective and doesn't depend in any way on the reasoner, is being challenged. New theories of "embodied" intelligence claim that conceptual distinctions are grounded in the physical interactions we have with our environments.

This interactionist view solves several problems in the philosophy of mind and explains observations of human classification systems and language that do not square with objectivism. Interactionism is also a promising philosophical basis for artificial intelligence and robotics. My research focuses on the transition from sensorimotor activity to knowledge, the point at which learned activities become the objects of thought.

Recent technical reports

97-01 *Markov Decision Processes with Observation Costs.* E.A. Hansen. January, 1997.

97-02 *TINTIN: A System for Retrieval in Text Tables.* P. Pyreddy and W. B. Croft. January, 1997.

97-03 *Relative Value Function Approximation.* Paul E. Utgoff, Doina Precup. January, 1997.

97-04 *Constructive Function Approximation.* Paul E. Utgoff, Doina Precup. January, 1997.

97-05 *Classification Using Phi-Machines And Constructive Function Approximation.* Doina Precup, Paul E. Utgoff. January, 1997.

97-06 *CBR Transmission of VBR Stack Video.* January, 1997.

97-07 *Finding Symmetry in Intensity Images.* R. Manmatha and H. Sawhney. January, 1997.

97-08 *Applying Static Analysis to Software Architectures.* G. Naumovich, G.S. Avrunin, L.A. Clarke and L.J. Osterweil. January, 1997.

97-09 *Finding Text In Images.* V. Wu, R. Manmatha, E.M. Riseman. January, 1997.

97-10 *Complex Goal Criteria and Its Application in Design-to-Criteria Scheduling.* T. Wagner, A. Garvey and V. Lesser. January, 1997.

97-11 *Leveraging Uncertainty in Design-to-Criteria Scheduling.* T. Wagner, A. Garvey and V. Lesser. January, 1997.

97-12 *Learning Situation-Specific Coordination in Cooperative Multi-agent Systems.* M.V. Nagendra Prasad and V.R. Lesser. February, 1997.

97-13 *A Parallel Implementation of a Correspondence-Finder for Uncalibrated Stereo Image Pairs.* B. Cahoon, S. Singhai, G. Weaver, E. Wright. February, 1997.

97-14 *Automatically Acquiring Rules for Event Correlation from Event Logs.* February, 1997.

97-15 *Efficient Multicast Flow Control using Multiple Multicast Groups.* S. Bhattacharyya. February, 1997.

97-16 *Criteria-Directed Task Scheduling.* T. Wagner, A. Garvey and V. Lesser. March, 1997.

97-17 *Parity-Based Loss Recovery for Reliable Multicast Transmission.* J. Nonnermacher, E. Biersack and D. Towsley. March, 1997.

97-18 *Text Segmentation by Topic.* J. Ponte and W.B. Croft. March, 1997.

97-19 *Comparing Coordination and Repair Strategies in a Distributed Scheduling System.* D.E. Neiman & V.R. Lesser. March, 1997.

97-20 *Software Processes are Software Too, Revisited.* L.J. Osterweil. March, 1997.

97-21 *A New Approach to Terrain Classification Using Three-Dimensional Features.* X. Wang, F. Stolle and H. Schultz. March, 1997.

97-22 *A System for Surface Texture and Microstructure Extraction from Multiple Aerial Images.* X. Wang & A. Hanson. March, 1997.

97-23 *Efficient Admission Control of Piece-Wise Linear Envelopes at EDF Schedulers.* V. Firoiu, J. Kurose and D. Towsley. March, 1997.

97-24 *Playback Restart in Interactive Streaming Video Applications.* J.K. Dey, S. Sen, J.F. Kurose, D. Towsley and J.D. Salehi. March, 1997.

97-25 *On the Efficient Retrieval of VBR Video in a Multimedia Server.* S. Shau, Z-L. Zhang, J. Kurose and D. Towsley. March 1997.

97-26 *On Integrating Apprentice Learning and Reinforcement Learning.* J. Clouse. April, 1997.

97-27 *Consistency Management for Complex Applications.* P. Tarr and L. Clarke. April, 1997.

97-28 *Online Smoothing of Live Video.* S. Sen, J. Dey, J. Kurose, J. Stankovic and D. Towsley. April, 1997.

97-29 *Color Recognition in Outdoor Scenes by Non-parametric Learning.* S. Buluswar. May, 1997.

97-30 *Color Recognition in Outdoor Images through Context-Based Models.* S. Buluswar. May, 1997.

97-31 *Action Representation, Prediction and Concepts.* M. T. Rosenstein, P.R. Cohen, M.D. Schmill and M.S. Atkin. May, 1997.

97-32 *Planning Information Gathering Under Uncertainty.* J. Grass and S. Zilberstein. May, 1997.

97-33 *Smoothing Variable-Bit-Rate Video in an Internetwork.* J. Rexford and D. Towsley, May 1997.

97-34 *Information Gathering as a Resource Bounded Interpretation Task.* V. Lesser, B. Horling, F. Klassner, A. Raja, T. Wager and S. Zhang. June, 1997.

96-35 *Failure Handling and Coordinated Execution of Workflow in Parallel and Distributed Workflow Control Environments.* M. Kamath & K.

Ramamritham. June, 1997.

97-36 *Augmented Ring Networks.* W. Aiello, S.N. Bhatt, F.R.K. Chung, A.L. Rosenberg & R.K. Sitaraman. June, 1997.

97-37 *Optimal Architecture/Independent Scheduling of Fine-Grain Tree-Sweep Computations.* L. Gao, A.L. Rosenberg, and R.K. Sitaraman. June, 1997.

97-38 *Performance Evaluation of Connection Rerouting Schemes for ATM-based Wireless Networks.* R. Ramjee, T. LaPorta, J. Kurose, D. Towsley. July, 1997.

97-39 *Automatic Model Acquisition through Intelligent Control.* C. Jaynes, M. Marengoni, A. Hanson and E. Riseman. July, 1997.

97-40 *Performance Evaluation of ATM Shortcut Connections in Overlayed IP/ATM Networks.* V. Firoiu, J. Kurose and D. Towsley. July, 1997.

97-41 *A Randomized ANDOVA Procedure for Comparing Performance Curves.* J.H. Piater and P.R. Cohen, July 1997.

97-42 *Gaining Confidence in Distributed Systems.* G. Naumovich, L.A. Clarke, L.J. Osterweil and M.B. Dwyer. August, 1997.

97-43 *Comparing Implementation Strategies for Composite Data Flow Analysis Problems.* G. Naumovich, L.A. Clarke & L. J. Osterweil. August, 1997.

Dates predicted for milestones in new CS Research Center building

Work continues apace on the excavation for the new Computer Science Facility, to be located just north of the Polymer Science Building. The following preliminary building milestones have been announced:

◆ Start construction of building — 9-1-97

◆ Building structure — 2-1-98

◆ Design data network — 2-1-98

◆ Roof and exterior skin — 5-1-98

◆ Interior finishes — 9-1-98

◆ Construction complete and UMass accepts building — 10-1-98

◆ Install furniture and equipment — 10-1-98 through 1-1-99

◆ Install data network — 10-1-98 through 1-1-99

It is also anticipated that a number of building-related events, such as alumni gatherings and the ribbon cutting will occur over the next eighteen months. The construction and move to the new facility is truly a cause for celebration, not only for the Department of Computer Science, but for the entire region's software and computing community.

The department's web page will soon feature a live picture of the building project (updated every 5 minutes) as well as a time-lapse movie of the construction progress.

LASER research group hosting software quality roundtable

For the second year in a row, the Laboratory for Advanced Software Engineering Research (LASER) research group is organizing a series of roundtable discussions on issues of software quality.

The LASER Outreach Program aims to build and strengthen the community of software engineering researchers and practitioners in New England and adjacent areas.

The first activity in this outreach program is a series of Symposia centered on the topic of Software Quality. The Symposia will ordinarily take place on the morning of the first Friday of each month in the Boston area and feature presentations by distinguished software engineering community leaders. Additional symposia will be offered intermittently in western Massachusetts as well. Each presentation is followed by a discussion and a panel session during which time the presentation is explored and placed in the context of problems and issues specific to local practitioners.

LASER has been established to support the vigorous pursuit of basic and applied research in software engineering as an academic pursuit. Lori A. Clarke and Leon J. Osterweil, LASER co-directors, recognize that academic research is most successful when it is engaged in synergistic interactions with practitioners committed to using, evaluating, and improving research products.

Conversely, innovative software engineering research can also be instrumental in improving software product quality and reducing production costs. Thus, fostering effective university-industry synergy seems to offer substantial benefits to all parties and should be pursued as a community initiative activity.

Programs taking place this fall:

Friday, Oct. 3: Dr. Barry Boehm, USC, will present "Developing Multimedia Applications with the WinWin Spiral Model." It will take place at the Boston Marriot Hotel in Newton -8:30a.m.
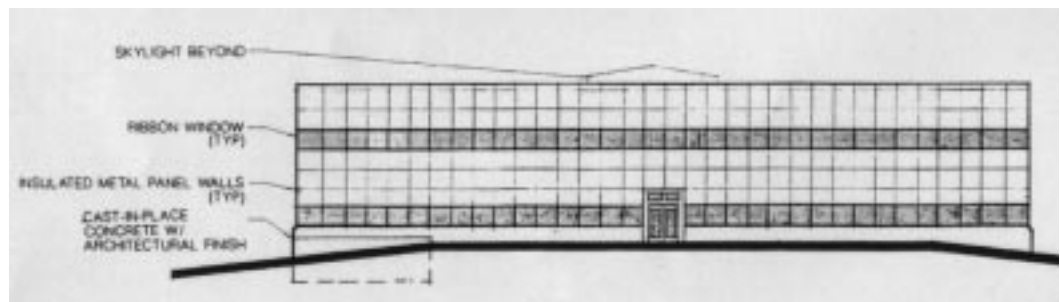
Friday Nov. 7: Robert Ladagga of DARPA will speak.

Friday Dec. 5: Dr. Gary McGraw, Reliable Software Techologies, will present "Towards Secure Executable Content: Java Security."

Please see our web page http://laser.cs.umass.edu/outreach/ Email **RSVP** to cooper@cs.umass.edu

Local influence on national CS policy

Adrion influences organization of National Science Foundation's CISE directorate — again

A major reorganization of the Computer and Information Science and Engineering (CISE) Directorate of the National Science Foundation (NSF) is slated to take place within the next twelve months. CISE and the Defense Advanced Research Projects Agency (DARPA) are the leading supporters of basic research in computer science and engineering, and the Department has enjoyed considerable success in obtaining funding from these agencies. Hence, the reorganization of CISE has the potential for significant impact on the members of our department, as well as computer scientists nationwide. It is therefore fortunate that Professor Rick Adrion is once again playing an influential role in the process of determining how CISE will be organized.

CISE was created in 1986 by combining programs from the Division of Computing Research (then in Mathematics and Physical Sciences), the Division of Information Science and Technology (then in Biological and Behavioral Sciences), programs from the Engineering directorate (computer engineering, information theory and communications research, VLSI and circuits), and the Office of Advanced Scientific Computing (then in the NSF Director's office). As chief scientist for CISE under its first director, Gordon Bell, Adrion played a key role in defining the initial CISE organization along the lines of five thrusts defined by Dr. Bell: core computer science; robotics and intelligent information systems; microelectronics; high-performance computing and networking. In describing the formation and subsequent evolution of CISE, Adrion says "We defined an organization that would support these initiatives while encouraging collaboration among the CISE subdisciplines and between research and general infrastructure (NSFNET and the supercomputer centers). Over the years, the CISE programs substantially grew and evolved and, with the rest of the NSF, CISE increased its emphasis on education and human resource development."

Shortly after helping to define the initial organization of CISE, Adrion left NSF to join the UMass Computer Science Department. He served as department chair for eight years and is currently a full professor, director of the Centers for Real-Time and Intelligent Complex Computing Systems and President of ACSIOM, the University's technology transfer agent. In the meantime, CISE has been an important source of support for department research activities. As Adrion notes, "In addition to important grants for individual faculty research projects, we have been fortunate to receive four NSF/CISE infrastructure grants. The first established the Computer Science Research Facility. The second and third established major research groups, laboratories and centers within our department. The fourth and most recent, which has just been awarded, will fund a unique collaboration between computer science and psychology for research on human and robotic learning. [See related stories in this issue. Ed.] These grants have enabled us to remain at the leading edge of computer science research and have shaped the style of research in the department. Thus, the organization and focus of NSF/CISE are critical to us."

The upcoming CISE reorganization will be guided by a series of studies from several perspectives carried out by the CISE Advisory Committee over the last two years: three subcommittees looked at cross-cutting issues in computing research; other subcommittees

examined the networking and advanced scientific computing infrastructure programs; and Professor Adrion chaired a subcommittee that looked at the CISE organization. The reports from these committees, along with the mandated NSF committee-of-visitors reports on each program element provided the data to support the proposed changes. A preliminary reorganization plan was presented to the CISE Advisory Committee at its June meeting by the current CISE director, Juris Hartmanis.

While details are still to be finalized, it appears likely that reorganization will reduce the number of divisions in CISE by one: the Microelectronics Information Processing Systems (MIPS) Division will disappear. MIPS programs and staff will be moved into the Computing and Computation Research (CCR) and Cross Disciplinary Activities (CDA) divisions. These will be renamed the Communications and Computation Research and Experimental and Integrative Activities (EIA) divisions, respectively, and both will be restructured. Smaller changes will be made in the other divisions, although each will be renamed and somewhat restructured.

"From the perspective of the University and the department," Adrion says, "I believe two features of the proposed organization are important to note: the

> These grants have enabled us to remain at the leading edge of computer science research … the organization and focus of NSF/CISE are critical to us.
>
> — RICK ADRION

expansion of CCR; and the alignment of group/individual/infrastructure and experimental/theoretical project support within the divisions. CCR, created from the existing core programs in the original computer science division, has grown as CISE has grown, but less than the MIPS and IRIS divisions that were aligned with the original CISE initiatives or the expanded NSF role (via CDA) in facilities, equipment, education and human resources. The new CCR incorporates the MIPS hardware systems research and the communications and information theory research programs. Does the new organization return emphasis to core programs and encourage closer ties among

these programs?"

Professor Adrion notes additional unknowns regarding the reorganization. "How will these programs interact with EIA and IIS, particularly in light of the NSF-wide initiative in Knowledge and Distributed Intelligence?", he wonders. "The new structure seems to place all of the group research, 'experimental' research, science and technology centers and infrastructure programs in EIA. Does this alignment indicate a distinction between these programs and the traditional individual project grant programs? How will the Advisory Committee's recommendation for more group and experimental project support be implemented? The breadth of EIA, which also includes the education, human resources and other "cross-disciplinary" programs, will place considerable pressure on the program managers and the division director to evaluate and manage this diverse portfolio. Coordination across all of the research programs will be key", says Adrion.

Asked for any concluding comments, Professor Adrion says, "The goal of the CISE reorganization and the changing programmatic emphasis is to build a more flexible and responsive organization to support computing science and engineering research and a national science and engineering information and computational infrastructure. It has always been my belief that organizations are not the solution, people are. For CISE, this means that more of our colleagues need to volunteer their time at NSF. The weakest part of the proposed CISE reorganization is the shortage of key administrators coupled with the usual turnover in program staff. We, in the CS community, need to help NSF by volunteering our time to serve as program and division directors if CISE is to continue its excellent work."

Students respond positively to CCBIT Online Chemistry System

The Center for Computer Based Instructional Technology (CCBIT), managed by Computer Science Research Professor Beverly Woolf and Executive Director David Hart, has announced preliminary results in the deployment of the OWL Online Chemistry Homework System, a project jointly developed with the Department of Chemistry and sponsored by the College of Natural Science and Mathematics.

CCBIT works in collaboration with faculty, students and staff from other UMass-Amherst departments, as well as educators from area K-12 schools in developing computer-based instructional systems.

During the Spring 1997 semester, the interactive system saw use by more than 1,300 students in two UMass-Amherst general chemistry courses. At the end of the semester, a 13-question survey that was developed in consultation with Eric Heller, Donahue Institute Director of Research and Evaluation, was appended to the standard UMass Course Evaluation form.

With 5 percent (65 responses) of the class total in, some results are compelling enough that the investigators believe that they will stand when the whole survey is tabulated.
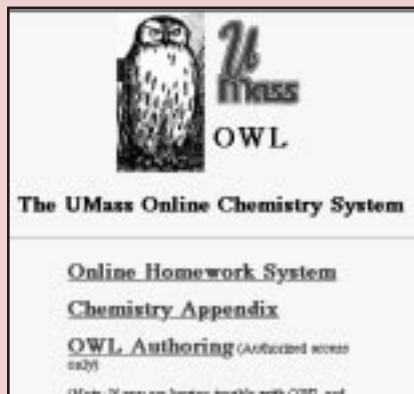
The major trends:

• 65 percent of students say that OWL helped them learn more Chemistry than they would have otherwise.

• 85 percent say they think OWL will help raise their grade "somewhat." 12 percent reported that that improvement could be as much as a whole letter grade.

• 71 percent used OWL to study for midterms and exams.

The students were also asked to compare OWL to

OWL
The UMass Online Chemistry System

Online Homework System
Chemistry Appendix
OWL Authoring (Authorized access only)

PLATO, the text-based predecessor to OWL, as fully 92% had used PLATO in the past.

• 72% preferred OWL over PLATO. 44% answered "Strongly prefer OWL." Only 6% expressed any preference for PLATO over OWL.

• 58% said OWL was more reliable than PLATO. Only 18% said PLATO was more reliable, while the rest saw no difference.

• 74% said OWL was more responsive than PLATO, meaning the system response time to user actions was faster. 48% said "OWL was much faster" than PLATO. 17% said PLATO was more responsive.

Finally, some statistics from the OWL usage database:

• Average usage time during the semester was about 1 hour per student per week from early March, the start of tracking, through late April. Usage then jumped up to two hours per student per week from the last week in April right through exam week.

• Likewise, the average number of quizzes started at between 2000-3000 per week. By the end of the semester the average quizzes/week had jumped to around 6000, and in the last week of the semester OWL gave fully 9000 quizzes. As students may take a quiz numerous times before mastering it, the average of

quizzes/student can be as high as 5-8 in a given week.

• Roughly half of all quizzes were taken outside the Chemistry Resource Center (CRC), and during the last two weeks of the semester, when the CRC was crowded, 60% were taken from outside the CRC.

The basic message appears to be that OWL is a hit. The Physics and Astronomy Department will begin using the system in the fall with an initial course, and others are to follow in the spring. Additionally, the OWL team has won two grant awards from federal agencies, totaling roughly $700,000, to convert OWL into easily accessible web-based multimedia tutorials.

In addition to Hart and Woolf, Principal Investigators on the chemistry project include Professor Roberta Day, Lecturer Beatrice Botch and Associate Professor William Vining, all of the Chemistry Department. OWL developers are Erik Haugsjaa, Michelle Lamar and Julian Marinus. Design consultants from Computer Science included David Stemple, Richard Hudson and Frank Stolle.

The Department's CCBIT group designed and implemented the Chemistry Department's online homework system. The system was unveiled this past spring and has received overwhelmingly positive feedback.

DEPARTMENT NOTEBOOK

Chancellor salutes Sharon Mallory

Sharon Mallory, the Computer Science department's graduate program manager, was one of ten UMass staff members honored for "exemplary and outstanding service" this past spring when she was presented with the Chancellor's Citation Award.

Mallory was nominated for the award "on the basis of her outstanding performance in contributing her time and/or skills in helping the University achieve its goals and objectives," according to the award criteria.

In his remarks, the Chancellor noted the "massive number of letters received in support of her nomination - more than for any nominee" We are not surprised. Congratulations Sharon!

Sharon Mallory receives the Chancellor's Citation Award from UMass Chancellor David Scott.

Faculty News

Professors **Paul Cohen** and **Rod Grupen** have been awarded a three-year grant from DARPA/AFOSR, High Performance Knowledge Bases initiative, to be funded through the Air Force's New World Vistas Program. The new project is entitled "Building and Learning Interactionist Ontologies."

Professor Cohen is also the recipient of a new 3-year DARPA/Rome Laboratory grant entitled "Mixed Inititiative Plan Evaluation and Repair," with a subcontract to Robert St. Amant, a former graduate student and currently Assistant Professor at No. Carolina St. University.

Professor **Arnold Rosenberg** delivered an invited speech to SIROCCO 97: The 4th International Colloquium on Structural Information & Communication Complexity, July 24-26, 1997 in Ascona, Switzerland.

Professor **Chip Weems** is the author of a new book, co-edited with Argy Krikelis of Aspex Microsystems Ltd., entitled "Associative Processing and Processors". It is available from the IEEE Computer Society Press.

Professor **Susan Landau** spoke in Montreal on a panel on "The Pros and Cons of Cryptography" as part of the "International Conference on Privacy."

Her book on cryptography policy, co-authored with Whitfield Diffie of Sun Microsystems, *Privacy on the Line: The Politics of Wiretapping and Encryption,* will be published in January by MIT Press. Landau also will speak on the "Washington Update" panel at the RSA Data Security meeting in January.

Post-doc news

Steven Soderland (PhD '97) has taken a post doctoral position at U. Washington.

Tom Murray was awarded two grants recently. An NSF CCD proposal titled "Tectonica Interactive: A Guided Interactive Hypermedia Tutoring System for Plate Tectonics" in which WWW-based methods for guided exploratory learning will be investigated, was written with Chris Condit of the Geology Department. An NSF ASSERT proposal titled "Adding Sophisticated Reasoning and Visualization to an Authoring System for Knowledge Based Computer Tutors" will fund two students to continue ongoing work on a TRP grant funding work on authoring tools for intelligent tutoring systems.

Staff news

Welcome to **Lisa Nagy,** who has joined us as Main Office Receptionist

Welcome also to **Judith Walker** who has joined our Main Office staff

Ethan Haslett has joined the CSCF (Computer Science Computing Facility) staff as a Software Specialist. Ethan had previously worked a year for the CSCF group as a Graduate Student from the Engineering Department.

Paul Sihvonen-Binder has also joined the CSCF as a Staff Assistant

Junior faculty win NSF Career Awards

When Ramesh Sitaraman was awarded a National Science Foundation Career Award in the 1996-97 competition, he made it a clean sweep for the department's junior faculty. Kathryn McKinley and Shlomo Zilberstein had each received one of these prestigious multi-year research grants from the NSF during 1995-96. Now each of the department's three assistant professors will have a stable base of funding for their research activities for the next several years.

"It is very significant that all of our junior faculty now hold NSF Career Awards," said department chair David Stemple. "This accomplishment reflects very well on each of them, and on the department, since the competition for Career Awards is intense. Only a small fraction of the applicants receive these awards, and they are generally given to those deemed most likely to become leaders in the field over the course of their careers. We are pleased and proud that Kathryn, Ramesh and Shlomo have been recognized in this way."

DEPARTMENT NOTEBOOK

Student news

Michael Rosenstein, a graduate student in the Experimental Knowledge Systems Laboratory, has been awarded a National Defense Science and Engineering Graduate Fellowship from the Department of Defense. Michael's research interests include activity representation, machine learning, and nonlinear dynamics.

A team of three UMass undergrads placed high in the international finals of the annual undergraduate progamming contest sponsored by the Association for Computing Machinery (ACM), the leading computer science technical society.

In a showdown of regional winners in the ACM International Collegiate Programming Contest, the team of UMass undergrads **Brian Hanechak, Ben Horowitz,** and **John Sullivan** placed 16th overall. More than one thousand teams from around the world participated in ACM's Programming Contest. UMass, MIT, and Harvard represented the Northeast United States in the international finals. Harvey Mudd College won that round. The UMass team finished tied with teams from Harvard, Stanford, Columbia, Swarthmore, CMU, Bucharest Univ, and the Univ. of Twente .

Professor **Robbie Moll,** the team's coach, remarked, "The invitation to the international finals and our fine showing both regionally and in the international finals is a tribute to these students and the strength of our undergraduate program."

Two faculty named fellows of IEEE

Two faculty members from the UMass Department of Computer Science, Professors **Jim Kurose** and **Arny Rosenberg,** have been elected as Fellows of the Institute of Electrical and Electronics Engineers (IEEE).
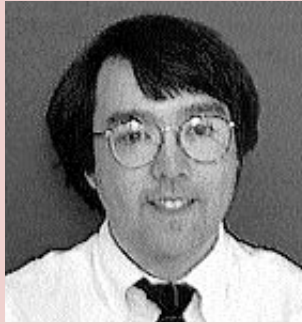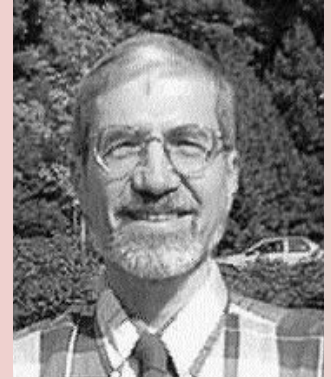
Jim Kurose

Kurose was honored for his "contributions to the design of real-time communication protocols." He joined the UMass faculty in 1984, after receiving his Ph.D. from Columbia University. His research interests include real-time and multimedia communication, multicast communication, network and operating system support for servers, and modeling and performance evaluation. Kurose is the past Editor-in-Chief of the *IEEE Transactions on Communications* and was the founding Editor-in-Chief of the *IEEE/ACM Transactions on Networking.* He has been active in the program committees for both the IEEE Infocom conference and the ACM SIGCOMM conference for a number of years.

Rosenberg was honored for "fundamental contributions to theoretical aspects of computer science and engineering." His research focuses on theoretical aspects of parallel architectures and communication networks, with emphasis on developing algorithmic techniques for designing better networks and architectures and using them more efficiently. His current research focuses on efficient parallel computing in high communication-latency environments, such as networks of workstations. He is the author of more than 120 technical papers on these and other topics in theoretical computer science and discrete

Arny Rosenberg

mathematics. Rosenberg is the editor-in-chief of *Theory of Computing Systems* and a Fellow of the Association for Computing Machinery (ACM).

Kurose and Rosenberg join Professor Don Towsley of the Computer Science Department as IEEE Fellows. The IEEE is the largest professional society in the world, with more than 300,000 members worldwide. Fewer than one tenth of one percent of these members are eligible to be nominated as Society Fellows in a given year.

(Re)name this newsletter — win a prize!

Once upon a time, the UMass Computer Science Department was called the Computer and Information Science Department, or COINS for short. So, when the department started publishing a newsletter, it was not unreasonable to dub it *Loose Change.* Today, however, that name no longer seems to fit.

Hence, we are seeking a new name for the newsletter! Any and all suggestions will be entertained, and the best name (in the judgment of the editorial staff) will grace the nameplate of the next issue. More importantly, the person proposing that name will receive a suitable, tasteful (but mystery) prize!

(In case of a tie, the decision of the judges will be complicated.)   So don't delay. Send your suggestion(s) for a new newsletter name to cooper@cs.umass.edu.

EKSL'S Robots — Learning all the time!

The Experimental Knowledge Systems Laboratory's work with the Pioneer robots, led by Senior Systems Manager David Westbrook, explores the relationship between intelligence and interaction with one's environment. The robots — shown here exploring the Computer Science department — use a simple learning mechanism, driven by activity and experience, to acquire concepts about the world, such as how to avoid harmful circumstances and how to take advantage of new opportunities.

New graduates

This past academic year saw approximately ten-percent of the University's Doctoral graduates receiving degrees from the department of Computer Science. Many of these graduates actually received both their Masters' and their Doctorate while attending the University of Massachusetts at Amherst.

Albert T. Chamillard: PhD
Jeffrey Clouse: MS/PhD
Robert Crites: PhD
Amer S. Diwan: MS/PhD
Lixin Gao: PhD
David L. Haines: MS/PhD
Marty A. Humphrey: PhD
Frank I.Klassner: MS/PhD
Joseph F. McCarthy: PhD
Lory D. Molesky: PhD
Maram V. Nagendraprasad: PhD
Erich M. Nahum: MS/PhD
Ramachandran Ramjee: MS/PhD
James D. Salehi: MS/PhD
Tuomas W. Sandholm: MS/PhD
Stephen G. Soderland: PhD
Robert A. St. Amant: MS/PhD
Peri L. Tarr: MS/PhD
Jinxi Xu: PhD
Zhili Zhang: MS/PhD

Computer Science Department
Distinguished Lecturer Series
1997-1998

4:00 p.m. - Goessman Laboratory, Room # 20

Refreshments will be served prior to each lecture at 3:30 p.m. in the atrium of the Lederle Graduate Research Center Lowrise

Date	Speaker
October 1st	**Jim Foley** "Information Visualization and the WWW" (MERL) Mitsubishi Research
October 29th	**Dave Clark** "Elephants and Tea Leaves: the Future of the Internet" MIT LSC
November 12th	**Anita Jones** "Innovation -- the American Way; Unspoken Compacts and Unsealed Covenants" University of Virginia
December 3rd	**Alex Pentland** "Smart Rooms, Smart Clothes" MIT Media Lab
May 6th	**Christos Papadimitrou** "Computational Aspects of Organization Theory" University of California, Berkeley

ALUMNI PAGE

Professor Chip Weems writes that one of his former students, now on the faculty at the University of Houston, has recently received an NSF Career Award.

Martin Herbordt (MS '90, Phd '94) is involved in NSF funded research integrating architecture-level simulation with industrial CAD, creating tools for prototyping high-performance coprocessors.

Joe McCarthy (PhD '96) is now working at Arthur Andersen near Chicago.

Eric Wright has received his MS('97) and is working at IBM TJ Watson Research Center.

Ellen Riloff (MS '89, PhD '94), recently won an NSF Young Scientist Award. She is anAssistant Prof at U. Utah.

Amer Diwan completed his PhD last fall and started as a Research Associate at Stanford, working on the SUIF (the Stanford University IntermediateFormat)compiler project, bringing special expertise on optimizing object-oriented code.

Object Systems Laboratory MS graduates this year include Cindy Stein, who is pursuing local programming opportunites (including some within the department), and Jim Doyle, who will be moving to New Jersey in the fall.

Professor Victor Lesser reports on several of his recent students:

Alan Garvey(PhD '96) is now an Assistant Professor at Truman State University, Missouri;

Frank Klassner(MS '90, PhD '96) has taken a position as an assistant professor at Villanova;

M V Nagendra Prasad completed his PhD this semester and has taken a job at the Center for Strategic Technology Research, at Andersen Consulting;

Tuomas Sandholm(MS '94, PhD '96), who is an Assistant Professor at Washington University, St. Louis has just received an NSF Career Award.

Lixin Gao finished her PhD this past year co-supervised by Arny Rosenberg and Ramesh Sitaraman. She is now an assistant professor at Smith College.

James Ahrens (BS '89) received his Ph.D. from the University of Washington in 1996 and is currently employed as a visualization research scientist at the Los Alamos National Laboratory in New Mexico. He and his wife (Christine) have two sons, Peter and Daniel. He may be reached at ahrens9@ibm.net.

After spending a year on the faculty of the Computer Science Department at Flinders University in Adelaide, Australia, **Alan Kaplan** (PhD '96) is now an assistant professor in the Computer Science Department at Clemson University in Clemson, South Carolina.

CS Department Alumni

WE'D LOVE TO KNOW WHAT'S GOING ON WITH YOU.

Please visit the *Loose Change* web site (follow the links from http://www.cs.umass.edu/) to submit your news to the editor. Send to Loose Change, Department of Computer Science, University of Massachusetts, LGRC, Box 34610, Amherst, MA 01003.

Thank you for your support

The following alumni and friends have actively supported the Computer Science Department in 1997. Such financial support is greatly appreciated and helps maintain a world-class instructional and research program. Contributions of alumni and friends help to fund important special activities that are not supported through the state budget.

Those interested in helping the department should send a check made to the order of the University of Massachusetts to the Alumni Office, Memorial Hall, Box 35410, University of Massachusetts, Amherst, MA 01003-5410. Please state that your gift is *restricted to Computer Science*.

Richard A. Bergeron
Jay S. Bolgatz '85
Denis and Diane Burt
Michael and Linda Campo
Maureen A. Casey '96
Joseph J. Cohen '80
Richard S. Colon '79
William and Gay Craig
Charles and Elaine Cramer
Brian V. Deluca '94
Wayne W. Duso '85
Douglas R. Ely '89
David A. Franklin '87
Theordore and Jeannine Garneau '94,'95

Cheryl A. Gilman '66
David Guarnaccia '59
Kenneth W. Harvey '96
Thomas S. Hsu '75
Michael P. Johnson '97
Samir K. Kar '77
Ha W. Kung '94
Christopher C. LeBlanc '94
Barbara Lewis
Valerie I. Magoon '77
William and Ruth Mendonsa
Ram Mukunda '81
Victor ChunKong Ng '92
James J. Nichols '80
Graham V. Poor '88

Kumaresan Ramanathan '95
Laurence M. Rubin '85
Carole C. Russell '80
King Shaw '90
Eric and Stephani Slutz
Martha E. Steenstrup '85
Eduardo M. Valcarce '84
Steven and Deborah Vaughan
Nancy W. Wasiuk '79
David and Betsy Weatherhead
Gregory S. Weill '90
Ranjith and Pushpika Wijesinghe
Paul and Penelope Wilson

LOGOUT

First Tokyo, then New York, now...?

It's almost destroyed before work has even started! The scale model of the new Computer Science wing in the front office is threatened by a prehistoric lizard. In an example of the pervasiveness of University regulations, the sign warns, "You must be at least this tall to attack the building."

Groundbreaking
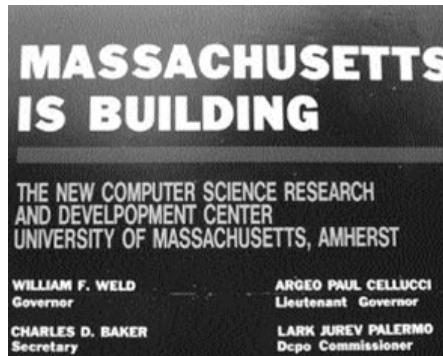
WHAT'S WRONG WITH THIS PICTURE: perhaps it's time for spell checkers on computerized tools for the creation of signs. The error seen here was quickly corrected, however.

By the Numbers: 1996–97 Undergraduate Factoids

- ◆ Forty-one students graduated.
- ◆ Twenty-five percent began their higher education as Computer Science majors.
- ◆ Slightly more than twenty-five percent began their higher education in the Department of Computer Engineering.
- ◆ Slightly less than twenty-five percent were transfer students.
- ◆ Approximately eighty-percent of May graduates had attended Massachusetts High Schools.
- ◆ More than ten-percent of our students have gone on to pursue graduate degrees.
- ◆ More than three in four of our graduates had jobs at the time of graduation. Employers included such copanies as: Apogee, Forgen, Lucent, FTP Software, Mitre, Lockheed-Martin, BBN, Cabletron, Sovereign Hill, and the UMass LASER group.