NC STATE UNIVERSITY

CONNECTED

A NEWSLETTER FROM THE
DEPARTMENT OF COMPUTER SCIENCE

FALL 2003

Artificial Intelligence and games

Researchers in the **Liquid Narrative Group**, a collection of graduate and undergraduate computer science students at NC State, headed by Dr. R. Michael Young, assistant professor, are investigating ways to enable computer games to reflect the interests of their players. They are creating software tools that will improve the artificial intelligence (AI) of games and educational software.

Tracking the red wolf

Computer scientists at NC State aren't afraid of the big bad wolf. Instead, they're revolutionizing the technology that tracks him. Dr. Robert Fornaro and students, including a Senior Design Center project team sponsored by Foundry Networks, are studying how tiny, sensor-based computers can improve wildlife tracking methods for red wolves in eastern North Carolina.

The security issue

It's fair to assume that personal information from online purchases will be used only for the specified purposes, right? Unfortunately, says Dr. Ana (Annie) Antón, associate professor of software engineering and an expert in Web security and privacy issues, in the rush to provide online services many companies have failed to consider privacy and security issues, and therefore have privacy policies, software systems and enforcement policies that are misaligned. With her four-year, $920,000 NSF grant, Antón aims to provide concepts, software tools and techniques to address Web-based privacy issues.

Friends, officials celebrate groundbreaking for new research, teaching facility

Leading the groundbreaking were, left to right: Thomas McPherson, former president and CEO of Hatteras Networks and NC State alumnus; Dr. Nino A. Masnari, dean, College of Engineering; Dr. Marye Anne Fox, chancellor, NC State University; Dr. Alan Tharp, department head, computer science; and Dr. Robert Trew, department head, electrical and computer engineering.

Progress on Engineering Building II, the new academic home for more than 2,800 computer science and computer and electrical engineering students moved forward Oct. 24 with the groundbreaking ceremony on NC State's Centennial Campus.

The $35 million facility, funded by the University of North Carolina Higher Education Bond Referendum, is the second phase in relocating the College of Engineering to Centennial Campus. Construction is scheduled for completion in 2005.

"To all of you, special thanks for the support that you gave us ... with this bond referendum," Chancellor Marye Anne Fox told the crowd. "It is the opportunity that provides facilities that will change the lives of our students, the lives of our faculty, and therefore the lives of all North Carolinians."

COE names Collins Distinguished Alumnus
First computer science recipient of college award

Keith Vann Collins (BS, '82, CSC), received one of three Distinguished Engineering Alumnus Awards for 2003.

Collins is vice president and chief technology officer of SAS Institute Inc., the largest privately held software company in the world.

Keith Collins

As chief technology officer for SAS Institute, Collins oversees operations within three divisions: global research and development, customer support functions and corporate information systems.

As a member of the executive management team, he plays an essential role in planning SAS Institute corporate strategy.

A frequent speaker at industrial and academic conferences and student association meetings, Collins is interested in encouraging students and future leaders. He has had a strong relationship with NC State in the years since his graduation and is a tremendous supporter of college and university endeavors.

A former NC State Engineering Foundation Board member, Collins is currently chair and a founding member of Computer Science's Strategic Advisory Board. He devotes time to cosponsoring recruiting events and has been a guest speaker at the Computer Science diploma ceremony.

Collins has coordinated contributions from SAS Institute to NC State over the years and was instrumental in establishing the Center for Knowledge Discovery at NC State.

Inside this issue

Providing vital skills for today's IT world

A message from the department head, Dr. Alan L. Tharp

Media coverage of the offshore movement of IT jobs continues to raise interesting points and more than a few questions. During our fall open house, in fact, one parent asked if there would be a job for his son, should he choose to major in computer science.

Dr. Alan L. Tharp

From my conversations with members of our Strategic Advisory Board and other industry contacts—including consultants and leaders at firms that have moved IT operations to other countries—I feel confident in saying that yes, tremendous potential remains for exciting careers in the computer science field. But my statement needs a qualifier. As industries mature, so do the skill sets needed in those industries.

The challenge is to nurture in our next generation of computer scientists the creativity that leads to innovation, and to help them develop not only the requisite technical ability but the teamwork, communications, and leadership skills that will enable them to bring real value to their employers—especially those working in a truly global marketplace.

As you read through this issue of *Connected*, I trust that you will see how the computer science department at NC State is meeting this challenge now, and preparing to do so into the future.

One reflection of our commitment to the future was the Oct. 24 groundbreaking for Engineering Building II, which will provide much needed modern classroom and research space for the departments of computer science and electrical and computer engineering. We appreciate the support of North Carolina's taxpayers in making this new facility possible, and know that our current and incoming students appreciate this commitment.

Another sign is that we continue to attract the brightest students—the average GPA for our incoming freshmen this year is 4.22, and the average SAT score is 1262—as well as top new faculty who are bringing expertise in areas vital to the continued development of computer science and information technology.

Our new and existing faculty have established a strong track record of securing research funding to support the continued development of knowledge in their respective fields of study—knowledge that translates into new academic coursework for our students as well as innovation with direct applications throughout the industry.

One example of 25 courses available to our seniors is the Senior Design Project course, in which student teams work on real-world projects with their company sponsors.

Former students have written to tell us how much they appreciated the opportunity to learn and practice the variety of skills that gave them a valuable edge when entering the job market.

Graduate and undergraduate students also have opportunities to work directly with our faculty on their research—theoretical and applied—through the department's research centers and labs. This valuable teamwork experience further prepares our students for positions in the evolving IT environment.

This tremendous academic and research environment is made possible through the ongoing support of national agencies, such as the National Science Foundation (NSF) and the Defense Advanced Research Projects Agency (DARPA), as well as corporate and individual funding, including support from the department's *e***Partners** members.

We appreciate the generous support of our donors, alumni and friends, and look forward to ongoing relationships that will help assure that our students have the preparation they need for success in the global information technology industry.

Sincerely,
Dr. Alan L. Tharp

In the News

Read news clippings online at http://www.engr.ncsu.edu/news/homepage/innews.htm

Antón at computer security conference
National Journal's Tech Daily and *The Chronicle of Higher Education* covered a Nov. 20-21 conference on computer security; Dr. Annie Antón was among the expert participants.

Making the unreal a reality
Media interest in the Nov. 8-9 Unreal University led to interviews and features by *CNN*, *G4*, *New York Times* and the Raleigh *News & Observer*.

AI, gaming research in *IEEE Computer*
Using AI in Games that Adapt to Users appeared in the July 2003 News Briefs section of *IEEE Computer*, describing Dr. R. Michael Young's artificial intelligence and gaming research.

Diet gadget monitors your eating
It's like carrying your mother around in your pocket. ... A Knight-Ridder Newspapers story about The Diet Download, which earned Senior Design Project team members Nathan Green, Jeremy Maness, Buck Webb and J.R. Wilson third place in the Fourth Annual IEEE Computer Society International Design Competition, was picked up by *Associated Press* and ran in over two dozen papers from Delaware to Hawaii, while other papers published local versions of the story.

Celebrating the start of construction

The new building will provide about 210,000 gross square feet of space for classrooms, research areas and offices for the two departments that are currently housed in at least nine different areas of the NC State campus.

"This new building will ... be a symbol of our collective commitments to the continued excellence in computer science and electrical and computer engineering. It will be a symbol that will be noticed by top faculty and students alike. The return on this investment will grow beyond measure," said keynote speaker Thomas McPherson, former president and CEO of Hatteras Networks.

"You all know how strong our students are," Fox said. "The average GPA in our freshman class is well over 4.0 and the SAT is well over 1,200. These are incredibly bright people who could go virtually anywhere they wanted ... they've come to North Carolina State because this is a university for the future ... a place where public-private partnerships have blossomed ... (partnerships that provide) internships and co-ops for our students, that in collaboration with our faculty are designing our future, providing new means (to) have the quality of live in North Carolina that we ... deserve."

Fox cited one of computer science's Senior Design Center project teams as an example of the quality students who choose NC State. The student team had earned third place at the IEEE Computer Society International Design Competition—the only U.S. team in the finals [See *In the News* on page 2 for details.]

Photos by Sheri Thomas, NC State University

Computer science faculty, staff, alumni and friends joined in the groundbreaking ceremony held atop the Red Hat parking deck at Centennial Campus. At a reception that followed, a display representing Don Bitzer's Emmy-award winning work in plasma screen technology and a display on artificial intelligence and gaming research by Dr. R. Michael Young and students were popular stopping points. Network Appliance sponsored the groundbreaking ceremony and reception.

*About a dozen computer science students shared their Wolfpack pride by helping with the Oct. 24 groundbreaking. Several of those serving as hosts stopped for a photograph with Ken Tate, director of the **ePartners** Program, and Alan Tharp, department head, center. The students are, from the left, Hilda Tong, Nikola Vouk, Brian Ferris; on the right: Mark Myzk, Andrea Castellow (CS '03, MBA candidate) and Francine Gatewood.*

Building 'naming rights' to strengthen endowments

NCSU's Board of Trustees has approved a "naming rights" plan for the new computer science and computer and electrical engineering building.

The primary goal of the "naming rights" campaign is to provide for growth in NCSU's endowment levels, which rank far behind many of our peer institutions. The "naming rights" program offers a unique multi-legacy gift opportunity for corporate and individual donors through the creation of a named endowment and the honor of being recognized with a permanent named space in the new building.

Additional information is available online at http://epartners.ncsu.edu/naming_rights.html.

Students appreciate Unreal University

Long hours didn't dampen student volunteers' enthusiasm for the Unreal University held at Withers Hall Nov. 8 and 9. About 20 members of the Game Developers Club at NC State, led by faculty advisory Dr. R. Michael Young, assistant professor, worked from noon Friday through 6 p.m. Sunday.

"Interest in this event was high in our organization, and everyone involved appreciated the opportunity to help out wherever possible," said Kevin Vaughan, vice president of the organization. "Many of our volunteers were present around-the-clock, doing everything from event registration to directing visitors, assisting faculty and helping oversee the Unreal Tournament 2004 labs."

Vaughan said he shared the excitement of the other student volunteers.

"I had the opportunity to talk with industry professionals and others about my ongoing research with the Mimesis research project and to receive advice about things we are trying to do, as well as personally about my career.

"I have been interested in game development since I was a child, and with graduation just a month around the corner, I am making an effort to do what most are unable to—make my childhood dream a reality. Unreal University definitely aided in this goal."

Vaughan and club president Michael Daly spearheaded the launch of the student organization this summer, following a suggestion from Young, whom they had for classes earlier in the year. They have been working with Young

Among those working at the Unreal University were, seated: Michael Lee, Kevin Vaughan, Chelsea Corbach, computer science students; standing: Mark Chandler, Epic; R. Michael Young; Anne Dube, Epic; Mark Rein, Epic; Chris Franklin.

on his Mimesis research project [See story: http://mimesis.csc.ncsu.edu/.]

While based in the computer science department, the club hopes to attract student members from various disciplines across campus, to mimic the diverse and social nature of the game industry, Vaughan explains.

"The main goal of our organization is to create a diverse tight-knit group of students interested in subjects related to game development such as music, art, programming and writing," Vaughan says.

"We currently have over 60 active members that participate in a variety of activities, including guest lectures from industry professionals, game analysis sessions and instructional workshops. Information about our upcoming activities is always available on our website, http://www.gamedevelopersclub.org/," Vaughan said.

"We have been exceeding our attendance expectations at every event and typically have 85 percent attendance at our guest lectures."

Kudos

Li attended a training session in Redmond, Wash., this fall. Next summer, he and Stallman will attend another session to share ideas about using new technology in the classroom. Li is the only computer science student in the program. NC State also has students in the program from applied math, forestry and poultry science.

Neha Jain received an NCSU Undergraduate Research Award which provides a $500 stipend for her and $500 for Dr. Ana (Annie) Antón, with whom she is conducting her research.

Their project is based on the increasing use of personal information in Web-based applications, which can result in unexpected disclosures. Antón and Jain will examine a taxonomy of privacy requirements for Web sites. They will use goal-mining—the extraction of pre-requirements goals from post-requirements text artifacts—to evaluate health care Internet privacy policies.

Four **undergraduate computer science teams**, accompanied by coach **Dr. Tom Honeycutt**, associate professor, competed at the Association for Computing Machinery's MidAtlantic International Collegiate Programming Contest.

Two of the teams placed in the top 20 of the 161 teams competing at nine sites in the region. More than the placement, though, team member Chris Rogus said that the students benefited from the opportunity to develop teamwork and problem solving skills and to form a stronger sense of community with their peers.

Team members and their rankings:

Placing 15th: Tsuwang Yang, Tracy Beck, Nigel Kirby, Katan Desai (reserve); Placing 13th: Ryan Smith, Brain Pike, Daniel Wong. Also competing on two teams were Melih Onvural, Wynn Lam, Nguyet Nguyen, Kevin Damm, Christopher Rogus, and Richard Killian.

Mital Patel was one of two NC State "Leaders of the Pack" honored during the Fall '03 homecoming game.

Grad student Markow sets high goals ... and aims to achieve

Tanya Markow's decision to pursue a master's degree in computer science is spurred by her desire to stand at the head of the class at West Point—as instructor.

Markow is a captain in the United States Army, an Apache helicopter driver and an instructor pilot. Her graduate degree in computer science will qualify her to teach at West Point, where she earned her bachelor's degree in aerospace engineering in 1995.

Aerospace engineering and computer science "aren't a very far cry from each other," she said. And besides, she's been playing with programming since she was six years old.

"We had an old Texas Instruments machine, and a *Teach Yourself Basic* book. My mother worked, so I opened the book and started copying the sample programs, and then started modifying and making my own programs over the years. It's [programming] always been a love of mine."

Flying is another love that she has nurtured over the years—she's been flying since she was 14. More recently, with national attention on the 100th anniversary of the birth of aviation, Markow has found herself involved in recreating aviation history. She is working with Nick Engler, founder of the Wright Brothers

Aeroplane Company of Dayton, Ohio. A master woodworker and pilot, he is creating historically accurate replicas of the Wright brothers' original aircraft, including several gliders.

Markow has served as volunteer pilot on several test flights of the replica gliders and has been included in documentaries and news specials about Engler's efforts. One of those is *The Wright Challenge*, airing 9 p.m. on Dec. 9, on the History Channel.

Additional details are available online at the Wright Brothers Aeroplane Company Website, http://www.wright-brothers.org/General/museum_guide.htm.

Senior Design Center team makes sponsor site visit

Students in the Progress Energy project, one of 20 sponsored projects in the fall '03 Senior Design Project course, visited the Shearon Harris nuclear power plant training facility in New Hill, NC.

Joining in the onsite visit were, from the left: Andrew Humphries, Andrew Williams, Mark Merrill, Matthew Ingle and sponsor, Lisa Council.

The Senior Design Center teams reported on their projects to sponsors and guests at Posters & Pies held Dec. 3 at the Talley Student Center. More about the Senior Design Center and student team projects is available online at http://sd.csc.ncsu.edu/.

Companies interested in sponsoring projects for spring or fall 2004 are invited to contact Dr. Robert Fornaro, professor and Senior Design Center director, at fornaro@csc.ncsu.edu.

Park Scholar helping with undergrad Web site

Jordan O'Mara, a sophomore Park Scholar, is working with the computer science communications staff to redevelop the undergraduate section of the department's Web site.

Their goal is to create a site that provides prospective undergraduates a sense of the energy and quality experience they can expect at NC State, while also presenting the facts that discerning students need when making college choices.

O'Mara comes to the task with considerable experience: he had his own Web development company before enrolling at NC State.

ACM/AITP members rebuilding computers

Members of NC State's ACM/AITP organization have been gathering used computers and other supplies for a computer refurbishing project.

The students have accumulated over 100 units thus far and plan to rebuild them in the spring semester. The computers will be donated to a school district that does not have computer equipment for its students.

Students also have been learning about industry trends from guest speaker presentations, including representatives from EMC and CISCO Systems, computer science department *e***Partner** companies.

Companies interested in speaking at a ACM/AITP meeting may contact Joe Bergmark at jebergma@unity.ncsu.edu.

WICS lunches becoming a popular stop

A weekly WICS lunch program has proven popular with members of the Women in Computer Science student organization, drawing a mix of graduate and undergraduate women students and faculty members for discussion on coursework, career planning and other topics.

Among the organization's recent activities was assisting 15 members of a local Girl Scouts troop in earning their computer science badges.

Alumni and business leaders interested in participating as a speaker at WICS events are invited to contact Julie Starr, WICS president, at jmstarr@ncsu.edu.

Joining a November lunch meeting were, seated: Margaret Heil, Senior Design Center assistant director; Rachana Doshi, WICS continuing president, Fall 2003; and members Andrea Castellow; standing: Francine Gatewood; Lauren Shupp; Julie Starr, WICS president; Laura Tateosia, member; and Hema Srikanth, WICS officer.

Sampling of new courses this year

Software Testing - *Melissa Lindaman* - provides an understanding of what software testing is and its key role in determining the quality of a software application for the customer.

Research Projects in Intelligent Interactive Entertainment - *Dr. R. Michael Young* - a projects-oriented course that gives upper division undergraduates in computer science and related disciplines exposure to a research projects environment. Students work in teams on the ongoing Mimesis research project. The focus of the course is the creation of an intelligent interactive 3D virtual environment for entertainment and/or education.

Graphics for Game Design - *Dr. Chris Healey* - an introduction to computer graphics, with an emphasis on the use of graphics techniques in computer gaming.

Information Systems Security - *Dr. Peng Ning* - a theoretical study of security policies, models and mechanisms for secrecy, integrity and availability. Topics include basic cryptography and its applications; operating system models and mechanisms for mandatory and discretionary access controls; data models, concepts, and mechanisms for database security; security in computer networks and distributed systems; and control and prevention of viruses and other rogue programs.

Sensor Systems - *Dr. Robert Fornaro* - explores the concept of pervasive computing—computing that is barely visible, inexpensive to the point of disposable and ubiquitous. Some pervasive architectures are built around ad hoc sensor networks that communicate via wireless, short-range radio, including motes developed by the University of California at Berkeley and now on the market. These motes are the subject of this course.

Database Security - *Dr. Ting Yu* - an overview of database security concepts and techniques and discussion of new directions of database security in the context of Internet information management.

Topics in Performance Study of Parallel Programs - *Dr. Xiaosong Ma* - a special topic course providing an in-depth study of parallel applications' performance, with an emphasis on cross-platform performance comparison and, especially, the inclusion of I/O operations in predicting the overall performance of large parallel applications.

Transform Theory and Other Concrete Math Applications in Computer Science - *Dr. Donald Bitzer* - explores the mathematics that can be particularly useful for computer scientists and engineers.

Database Systems - *Dr. Rada Chirkova* - an in-depth study of advanced research topics from classical and current literature in databases, with an emphasis on database performance and autonomic computing.

Wireless Networks - *Dr. Mihail Sichitiu* - a broad introduction to wireless networking principles and architectures, focusing on the differences between wireless networking and fixed networking

Key speakers share insight in leadership class

Students in the new Leadership in Technology Class, led by Ken Tate, *e***Partners** program director, gained an awareness of real-world leadership needs for today's corporate environment through presentations by industry leaders. Presenters were

- Suzanne Gordon, SAS Institute
- Bill Weiss, The Promar Group
- Steve Worth, EMC
- Ken Hibbard, Network Appliance
- Hayes Davis, Liquid Communication Systems
- Jennifer Shevach, Intel
- Jo Goodson, BNX Systems
- John Sutton, ABB
- Keith Collins, SAS Institute

Student project aims to simplify event planning

A class of 50 graduate students, taught in the fall semester by Dr. Tom Honeycutt, associate professor, are developing software intended to help revolutionize the event planning industry.

Working within the framework of a virtual company, the eight teams of students identified problems faced by trade show planners, including the difficulty of matching unique exhibitor needs to existing exhibit hall space.

Applying new algorithms, engineering practices and other skills, they were creating software to streamline and simplify processes used by exhibitors and show hosts in putting on major events. Honeycutt is looking to partner with companies interested in bringing real-world issues to this academic exercise.

"The economy, Internet and rapidly changing business practices are impacting the industry in new and sometimes unforeseen ways," he said. "Heightened competition on many fronts—from physical appearance of the exhibit space to all the logistical issues—make this a prime time to explore the problems in depth and develop workable solutions."

The student teams, half on campus and the others in the Engineering Online master's degree program, were pitching their software solutions to virtual venture capital representatives at the end of the course. Honeycutt has a greater goal in mind, however. He hopes viable solutions will get into the hands of real venture capital firms and then into the industry pipeline.

"That's the kind of real-world impact that we aim for when developing such learning experiences," Honeycutt said. Chuck Grad, former adjunct instructor of computer science, is collaborating with Honeycutt in this course.

RedPelican, a Raleigh-based company that is exploring a broader range of project management issues, commends the academic exercise.

"Marketers are seeking new solutions that will help them better manage programs, and, as such, the concepts and ideas that the students are applying are highly relevant and will prove beneficial to these marketers," said Donald Fluken, RedPelican CEO.

New members of the computer science faculty

The Computer Science Department welcomed five new assistant professors over the summer months.

Stephen Heber joined the department with a joint appointment in the Bioinformatics Research Center and the College of Physical and Mathematical Sciences.

He joins three other computer science faculty involved with this interdisciplinary research center: Donald Bitzer, Distinguished University Research Professor; Jon Doyle, SAS Institute Professor; and Mladen Vouk, professor and technical director for the Center for Advance Computing and Communication. For more information about this center, view online at http://statgen.ncsu.edu/sisg/people.php.

Heber has a doctorate in mathematics from the University of Heidelberg, Germany. His research focuses on gene order comparison, protein interaction, physical mapping and EST assembly and alternative splicing. He also completed postdoctoral studies at the University of California-San Diego.

Jaewoo Kang came to the department from the University of Wisconsin-Madison. His research focuses on understanding the fundamental aspects of building a large-scale Internet information system that can answer complex queries over billions of Internet data sources. He previously was founder and chief technology officer of a start-up in Santa Clara, CA, and has worked for Bell Labs.

Xiaosong Ma is one of three new faculty members joining the department from the University of Illinois at Urbana-Champaign.

Her areas of research include self-configurable performance optimization, storage systems, parallel I/O, high performance parallel computing, scientific data management and parallel data mining.

The second from the University of Illinois is **Jun Xu,** who brings to NC State a research focus in computer system security and reliability. In particular, he is interested in operating system and compiler support for defeating security attacks, fault injection based system security and reliability evaluation, distributed system for security and reliability, and measurement-based system security and reliability analysis.

The third is **Ting Yu,** whose research focuses on security, including trust management, privacy protection in open systems, and semi-structured databases.

Branting joins faculty

Dr. Karl Branting joined the computer science faculty as a visiting lecturer. His research interests include empirical methods for natural language processing, case-based reasoning, artificial intelligence (AI) and law, integrations of AI techniques, and ecological and environmental applications of AI. Branting is a principle research scientist with Livewire Logic in the Research Triangle Park.

NC State well represented at ACM conference

NC State's Department of Computer Science was well represented at the 10th annual Conference on Computer and Communications Security held by the Association for Computing Machinery Oct. 27-31.

Among the 35 accepted papers, four were presented by faculty from NC State's Department of Computer Science — the highest representation from one department at the conference. Dr. Peng Ning, assistant professor of computer science, and his students contributed three. Dr. Doug Reeves, professor of computer science, and his students contributed the fourth. Ning was the only author with three papers at the conference.

NSF Career Development Award recipients

The computer science department has 11 National Science Foundation Career Development Award recipients. These awards are the highest honor bestowed on new faculty members. Award recipients are:

- Dr. Annie Antón
- Dr. Christopher Healey
- Dr. James Lester
- Dr. Frank Mueller
- Dr. Injong Rhee
- Dr. George Rouskas
- Dr. Munindar Singh
- Dr. Peter Wurman
- Dr. R. Michael Young
- Dr. Vincent Freeh
- Dr. Karl Branting

FYI

Research expenditures for fiscal year 2002-2003 totaled $4,141,944.60. From the start of the fiscal year through early November, the department received ten new sponsored research awards, totaling $3,056,007 in committed funding from external sponsoring agencies, bringing the total current research funding to approximately $14 million.

Faculty research activities

Dr. Matt Stallmann, associate professor, has been named an associate editor of the ACM journal, *Journal of Experimental Algorithms*.

Dr. Peter R. Wurman, assistant professor, and his three doctoral students—Gangshu Cai, Jie Zhong and Ashish Sureka—received a Best Paper Award at this fall's International Conference on Electronic Commerce (ICEC-03). The title of their paper is "An Algorithm for Computing the Outcome of Combinatorial Auctions with Proxy Bidding."

Dr. Rada Y. Chirkova, assistant professor, and **Dr. Laurie Williams,** assistant professor, each received a Faculty Award for $40,000 through the IBM University Partnership Program.

The competitive, cash-only awards foster collaboration between researchers at leading universities worldwide and those in IBM research, development and services organizations, and promote courseware and curriculum development to stimulate growth in disciplines and geographies that are strategic to IBM.

Williams is conducting an empirical comparison of two strategies for managing the cost of and customer satisfaction related to serviceability, and will explore means for proactively improving serviceability.

Chirkowa is developing methods to improve the performance of sets of frequent and important queries on large relational databases, which could improve the efficiency of user interactions with data-management systems.

Dr. Douglas Reeves, professor, received the **Professional Engineer of the Year Award** as an "outstanding alumnus" of the Computer Engineering and Computer Science Department of the Speed Scientific School at the University of Louisville.

Dr. Peng Ning, assistant professor, published his book, *Intrusion Detection in Distributed Systems: An Abstraction-Based Approach*. The book was co-authored with Sushil Jajodia and X. Sean Wang and has been published by Kluwer Academic Publishers in the Advances in Information Security Series.

Dr. Annie Antón, associate professor of software engineering, received $920,000 from the National Science Foundation (NSF) for a proposal entitled "ITR: Encoding Rights, Permissions and Obligations: Privacy Policy Specification and Compliance."

Systematic encoding and enforcement of information privacy values, policy and requirements are needed because preliminary research for this project has found that the three are often misaligned, leading to IT applications that do not reflect the policies which are intended to govern them.

Project results, tools and findings will be fully documented on a Website currently supported by the NSF and created by Antón: ThePrivacyPlace.org.

Dr. Colin Potts, Georgia Institute of Technology, is co-principal investigator on this multiyear project. Among other NC State participants are business management faculty members Dr. Jule Earp, assistant professor; Dr. Lynda Aiman-Smith, associate professor; and Dr. David Baumer, associate professor.

Dr. Frank Mueller, assistant professor, received $130,000 for his proposal. "ITR: Collaborative Research: SPARTA: Static Parametric Timing Analysis to Support Dynamic Decisions in Embedded Systems." The project will run through August 2006.

Embedded systems with temporal constraints rely on timely scheduling and a prior knowledge of worst-case execution times (WCETs). Static timing analysis derives safe bounds of WCETs but its applicability has been limited to hard real-time systems and small code snippets.

The project addresses these limitations of timing analysis for embedded systems and contributes a novel approach to program analysis through parametric techniques of static timing analysis and provides innovative methods for exploiting them. The broader impact is to increasingly expose students to embedded systems and to provide essential temporal assurances, a prerequisite for applying the results to hard and soft real-time scheduling for embedded systems.

A proposal by **Drs. Doug Reeves**, professor, and **Peng Ning**, assistant professor,

"Tracing Attacks through Non-Cooperative Networks and Stepping Stones with Timing-Based Watermarking," has been funded for a five-month period for $119,310 by the **Advanced Research and Development Agency (ARDA)**, a funding arm of the intelligence community. If the ARDA exercises all of its options, the total funding could grow to over $1 million.

Attack attribution is the attempt to identify the source of an attack, so that appropriate defenses can be put in place and so the attacker can be prosecuted or quarantined. Many approaches are possible and have been tried. Most are not effective across proxies, gateways, and stepping stones (intermediate hosts used for staging attacks).

Drs. Reeves and Ning propose an approach based on packet timing characteristics. Their method embeds in packet timing a subtle watermark for this purpose. The watermark uses no bandwidth, can be made almost arbitrarily robust, and is difficult to detect without knowledge of the parameters of the watermark embedding scheme. The project will also investigate implementation and deployment issues.

Dr. Laurie Williams, assistant professor, and **Dr. Malden Vouk**, professor, received $24,515 from Nortel Networks for their proposal, "Agile Software Dependability."

Agile practices relate to the dependability of software systems in two ways: first, developers rapidly cycle from one software development practice to another, to get feedback early and often on decisions that have been made. This continual feedback provides "early and often" checks on factors that ultimately impact the dependability of the project.

This leads to the proper mapping of the right mix of dependability practices to the determination of "good enough dependability" for a particular project. What is "good enough" depends upon the project characteristics and requirements. The researchers will work with Nortel to study the corporation's current practices in software dependability in relation to industry best practices.

Sampling of current graduate student research topics

Xinyuan Wang, PhD candidate
Topic: Tracing attacker's traffic through the Internet

Most attacks are launched through the Internet these days by people who work hard to conceal their identity. Wang is investigating methods of tracing them through the network so their attacks can be stopped. Faculty advisor: Dr. Douglas Reeves

Prashant Murthy, MS candidate
Topic: Implementing reputation management in peer-to-peer (P2P) systems

P2P systems are used currently to share music (MP3) and video files, but in the future will be used as a very powerful, robust means of finding and sharing all kinds of information. The problem is in identifying who is providing the information and whether they can be trusted. Developing trust among strangers by user ratings of each other is the focus of this work. Faculty advisor: Dr. Douglas Reeves

Qinghua Zhang, MS candidate
Topic: Improving performance of peer-to-peer systems by caching

Existing P2P systems work well but are inefficient. Some measurements show that half the current Internet traffic is P2P traffic. Caching is a way to improve the performance of any system that makes repetitive requests. Implementing and evaluating the performance of caching for P2P is the focus of this project. Faculty advisor: Dr. Douglas Reeves

Xuejun Sun, MS
Topic: Extending the 'support-vector machine' data mining technique to handle data sets that contain both definite data and information about upper and lower bounds on specific missing data points

Sun applied this to analyzing astrophysical data from the new orbiting Chandra gamma-ray observatory, in order to separate stars from more interesting apparent galactic objects. He recently started a new job in the radiology department at the Duke Medical Center. Faculty advisor: Dr. Jon Doyle

Unreal weekend for gaming enthusiasts

The first Unreal University, held in Withers Hall Nov. 8 and 9, drew over 200 gaming enthusiasts from across the country, plus *CNN*, the *New York Times*, *G4* and the *News & Observer*. Some of the student participants traveled all night to be sure of arriving on time.

Cosponsored by the Center for Digital Entertainment at NC State; Epic Games, a Department of Computer Science *e***Partner** company; Atari; AMD and NVIDIA, the event featured workshops on Epic's Unreal game engine and provided a meeting ground for those interested in the gaming industry.

"The classes helped to better prepare individuals who are interested in game development for a career," said Dr. R. Michael Young, associate professor, director of the Center for Digital Entertainment at NC State, and coordinator of the event. It also taught gaming hobbyists how to use the technology to create 'mods' or modifications to computer games.

Participants also tested Epic's newest game in a LAN party using several dozen 64-bit computers provided by cosponsors ABS and AMD.

Maegan Walling and Brandy Swigart were among the attendees. Both are students at Full Sail in Orlando, Fla., and came for the intensive workshops.

"This is a very nice event to come to," Swigart said, adding that it enabled her to become more comfortable with her skills using the software, which will help her as she enters the job market.

Robert Navarro and Bruce Chipa, NC State computer science sophomores who

Photo above: Workshop participants had a chance to test Unreal Tournament 2004, scheduled for release early next year by Epic and Atari, at a nonstop LAN party set up in Withers Hall.

Mark Rein, vice president of Epic Games, talks with a participant from Minnesota, where he works for a gaming company.

were among the event's student volunteers, said they enjoyed the exposure to the industry. They also learned more about what the computer science department at NC State has to offer.

Chipa said he came to NC State because "everyone talked about and recommends the NC State computer science program. You have all these resources, labs, TAs, and a broad range of classes."

One of those classes is Young's course on gaming design that he teaches using the Epic engine.

Accepting challenges, opportunities puts Troy on global track

Donna Troy (BS '78) switched from physics to computer science in her junior year at NC State. She switched, she said, "when I couldn't identify with what I was being taught; thermodynamics did me in."

Donna Troy

That decision launched a career that now has her traveling around the globe as executive vice president of worldwide channels for Network Associates, Inc.

The partnerships, alliances and other business relationships that Troy manages comprise the distribution channels for Network Associates' two families of computer security solutions: McAfee System Protection Solutions for desktops and servers, and McAfee Network Protection Solutions for corporate networks.

Before joining Network Associates in 2003, Troy served as president and chief executive officer at Partnerware and held several leadership roles in the course of a 22-year career with IBM, including vice president of Tivoli Worldwide and vice president of solution developer alliances, managing overall IBM relationships with the largest independent software vendors around the world.

Troy started her career with IBM "right out of school, in custom application development for enterprise customers," she said. Her first project was building a mortgage system for First Federal Bank in Rochester, NY.

"After a year of working with customers on site and with the IBM sales team, I was recruited to work as a systems engineer." She then progressed rapidly through systems engineering positions.

IBM had clear career development tracks and identified people early for their executive resources program, moving people from line jobs to staff and back to line as part of the development process. "After a year I was promoted to my first management job and then every two years I progressed to different jobs and opportunities.

"Each had its own risk and rewards. It was not a given you would be successful. But taking the risk was part of the growth process. I moved from technical sales support to sales branch management and from there to my first HQ job in White Plains, New York."

Troy encourages today's graduates, particularly those who land positions with larger companies, to use the resources available to them.

"In larger companies with a focus on employee development, they should expect significant training and to be part of a

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It was not a given you would be successful. But taking the risk was part of the growth process.

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team, with management and mentors assigned," she said.

"They should also expect that they must reach out to use the resources that a larger company has to offer; it will not always come to them. Good interpersonal skills and good communications skills go far and set you apart."

A strong performance record at IBM resulted in new opportunities for Troy, including roles on task forces and special assignments that opened doors to further advancement. Her first international experience was representing the United States as part of a world-wide marketing team. "From there, I had additional assignments that were global in scope, and had to travel and establish relationships globally," she said.

Troy recently joined Network Associates, Inc. "I knew the management team, and the people you work with is a key issue to me. Also, the security industry is growing with lots of upside. Lastly, the opportunity was around the channel, which is what I love to do."

When asked if she faced unique challenges as a woman in the industry, Troy said, "Yes and no. I have had significant opportunity throughout my career, and have only had a few occasions when being a woman was an issue.

"But we have to live by a different standard, like it or not. My view is that you have to operate above reproach with the highest integrity. Men survive; women do not. Both should be held to the same standard of course, but that's not the real world."

Her advice to women embarking on their careers:

- Set your goals and go for them.
- Communicate and network with people who can help you move forward.
- Always do excellent work.

The same, of course, applies to men launching their careers. She also notes that while balancing a career with family and community responsibilities can be tough, it is possible.

"My husband and I share our responsibilities. We also have had great nannies, and we focused our free time on our kids. It's something you have to make a priority: God, family and work, in that order. Also…I don't think about it too much; I just do what I have to."

Troy recently added another commitment to her agenda: she joined the Department of Computer Science's Strategic Advisory Board at the invitation of Dr. Alan Tharp, department head.

She accepted because, "I thought I could bring my experience to the table, to help shape the program and the requirements from an industry point of view.

"I also want to connect my company to the university as a partner and resource."

Loher receives research award

Phillipe Loher (BS '02) received honorable mention from the Computing Research Association 2003 Outstanding Undergraduate Awards competition. At the awards banquet in San Diego, he meet such researchers as the inventors of RSA encryption and Java.

Currently a software developer for IBM's Lotus Software Group, Loher said the experience was extremely gratifying.

"When I arrived and met people my own age who were doing research, I noticed how much I really missed doing research. It's something I will never forget and something I want to come back to. Thank you again for your kind support," he said. Unrestricted funding provided by the department's *e*Partners and alumni made it possible for him to attend.

*e*Partners membership continues to grow

Since its start in 2000, the *e*Partners Program has grown to include over 50 companies. The *e*Partners program provides a framework for developing and nurturing strong collaborative relationships between the global business community and NC State's Department of Computer Science.

Its primary focus is to foster ongoing communication and interaction between students, faculty, and corporate partners to help shape the department's future direction. In addition, the unrestricted funding generated by the program allows the computer science department to continue to grow in emerging areas of computer science technology while providing the highest quality education for NC State's computer science students.

Additional information about *e*Partners is available online at http://epartners.ncsu.edu/ or by contacting Ken Tate, director, at 919-513-4292; email: tate@csc.ncsu.edu. Current members are:

Super *e*Partners

Cisco Systems	Network Appliance
EMC	Progress Energy
Foundry Networks	SAS
John Deere	

*e*Partners

Computer Service Partners	Intel
	Redhat
Duke Energy	Shark Technology
Epic Games	Tavve Software
Integrated Industrial Information, Inc.	Telehealth Services

Corporate Friends

ABB	Media Arts & Images
Apple	Microsoft
Bally Refrigerated Boxes	Mitsubishi Electric Research Labs (MERL)
Borland Software	
Carolina Turkeys	Nortel Networks
Council for Entrepreneurial Development	Northrop Grumman
	NovaGov
	OnWired
Dell Computer	OPNET
DynCorp	Parasoft
Fujitsu	Pearson Education
GlaxoSmithKline	PwC Consulting
GTE	QVS Software
Hatteras Networks	SlickEdit
Hewlett-Packard	Southpoint Partners
IBM	Tangram
KeywordRanking.com	TechEngage
Lockheed Martin	Verizon
Lucent Technologies	Viatec Research
MATRIX Resources	

Dr. K. C. Tai endowment established

Mrs. Ling Tai and Dr. Alan L. Tharp sign documents designating the establishment of the Dr. K. C. Tai Memorial Endowment Fund.

On Nov. 19, computer science faculty and staff joined in a brief ceremony marking the establishment of the Dr. K. C. Tai Memorial Endowment Fund.

The endowment was made possible through the generosity of friends, relatives, former students, and professional colleagues of the late Dr. K. C. Tai, who had been a professor of computer science at NC State for 27 years prior to his death in October 2002.

"I thank all of you for your generosity and support to make this become a permanent endowment," Mrs. Tai said. "This is a wonderful way to remember K. C. I'm sure that he would be very happy to know that this is helping the department, faculty and friends."

Joining Mrs. Tai in the ceremony was David Perkins (CS, '77) of California, whose sizeable donation earlier this year placed the contribution level at the $15,000 minimum required to establish a permanent endowment. To date, contributions have been provided by over 50 individuals, bringing the value of the endowment to over $20,000. Those interested in contributing to the endowment fund in remembrance of Dr. Tai may contact Ken Tate, *e*Partners program director, at 919-513-4292 or by email at tate@csc.ncsu.edu.

CSC alumnus David Perkins and Mrs. Ling Tai

Alumni make multi-year pledges

Two computer science alumni recently made multi-year pledges to the department. **Gerhard Pilcher** (BS '85) of Mount Airy, NC, made a $2,500 contribution toward a $10,000 four-year pledge. **Chris Crump** (BS '78) of Redwood City, Calif., made a $5,000 contribution toward a $25,000 five-year pledge. These are two of the largest individual alumni pledges ever made to the department. In addition, **Marshall Brain** (MS '89), Raleigh, NC, recently made a $4,000 one-time gift.

Both Pilcher and and Crump noted fond memories of their days at NC State and acknowledged the important role the university played in their successful careers. They also expressed great satisfaction in being able to give something back to help future generations of computer science students, and challenge fellow alumni to explore the many opportunities to make a difference in the lives of others.

CARE Act to encourage charitable giving

With the end of the 2003 tax year fast approaching and several important estate and income tax changes in place or on the way, now is a good time to revisit one's financial and estate plans.

One such change is the Charity Aid, Recovery and Empowerment Act (CARE), moving through Congress with a promising outlook for passage. It includes several provisions designed to encourage charitable giving, including a tax-free rollover from an IRA to a charity or through a life-income gift, such as a gift annuity, remainder trust or pooled income fund. Donors also may receive enhanced deductions for contributions of conservation property, artistic property, food, books, and computer and scientific equipment.

For updates on this and other changes that may affect charitable giving, contact Ken Tate, director of the department of computer science's *e*Partners program, at 919-513-4292, or Joan DeBruin, NC State's director of gift planning, at 919-515-2846.

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Staying *Connected*

A lot is happening at NC State's Department of Computer Science—exciting research, new courses, a new building, faculty and student accomplishments. We want to get the information out to our alumni and friends as effectively as possible, and are in the process of making improvements to our communication vehicles. A $5,000 grant from SAS Institute's Publication Marketing Group will enable the department to enhance the monthly enewsletter and expand its distribution to all computer science alumni as well as our *e***Partners**. We will continue to publish the biannual *Connected* that you are receiving today, but with a new focus. As always, we are interested in receiving your comments and suggestions by e-mail to the *Connected* editor, as well as your individual news. To stay connected, please take a minute to update your contact information online at **http://www.csc.ncsu.edu/alumni/alumni_update.ph**p.

Privacy experts tackle security issues

Dr. Annie Antón, associate professor of software engineering, was an invited participant at The Computing Research Association (CRA) and Association for Computing Machinery panel discussion on *Grand Research Challenges in Cyber Security*, held in Washington, D.C. in late November.

The panelists outlined the most challenging areas in long-term computer and network security research, as identified by the leading security researchers in academia, industry, and government labs worldwide who attended CRA's preceding invitation-only *Grand Research Challenges in Information Security and Assurance* conference. Antón also was among the conference participants.

While computing and information technologies have become pervasive in the national infrastructure—an infrastructure growing ever more complex as computational speed and capacity grow—there are growing threats of massive disruption and denial, loss of privacy, alteration of critical information and new forms of undesirable activities. Yet most of the money, attention, and energy in information security and information assurance has focused on incremental patches and updates to existing systems rather than on seeking fundamental advances. The conference was called to help fill that gap. More information is available online at http://www.cra.org/govaffairs/content.php?cid=20.