

News & Notes

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CompSci @ Carolina



Dear Friends,

The weather is turning crisp and it's a beautiful time of year in Chapel Hill. It is also a very busy time of year, with a new semester underway, a new department chair, the welcoming back of students, continuing and new research, and the preparation of numerous grant proposals.

I am very honored to have been selected by my peers to be the new chair of computer science. It's an exciting time in the department, with many new research collaborations and the newest areas of research, robotics and computer security, really taking off. I would like to thank Jan Prins for his excellent leadership over the past five years.

This summer, we were proud to learn that Assistant Professor Lana Lazebnik was the recipient of a Microsoft Research New Faculty Fellowship. Lana is the second in our department to receive this prestigious award, with Associate Professor Wei Wang having received the fellowship in its inaugural year. Congratulations, Lana!

Congratulations also to our three alumni fellowship award winners - Gennette Gill, Xiaoxiao Liu and Jason Sewall. You can read about their dissertation research on page 3. Thanks to those of you who support this fellowship, and for those of you who haven't yet donated, please consider doing so. The alumni fellowships are of great benefit to the students who receive them.

I welcome any thoughts you'd like to share about the future of computer science at UNC. Feel free to send me a note, or stop by and see us sometime!

Armando Lanza

HIGH DEMAND FOR COMPUTER SECURITY

As long as bad guys want to steal data or interrupt computer networks, good guys trained in computer security will be in demand. The challenge of computer security is ever evolving and never ending: Where will the next breach be?

Security is a slice of computer science research that's hard to categorize because it uses many different approaches to solving its problems. "I work in security," says Dr. Michael Reiter (B.S.M.Sci. 1989), "but I'm a student of machine learning, distributed algorithms, systems, formal methods, statistics, and applied mathematics." Reiter points out that the security field attracts people with very diverse interests and skills to work on network security, software security, and applied cryptography for math-based encryption—all focused on an ever-

changing adversary. "We're interested in the technical means that hackers use to accomplish an attack. What makes it fascinating is that we're dealing with human adversaries that can change and adapt," he says. "They read our papers."

Reiter came to the department in 2007 to launch a security research group, and he was joined in 2008 by Dr. Fabian Monrose. They had previously worked together at Bell Labs in the Secure Systems Research Department, which Reiter headed. They went back into security research in academia—Reiter at Carnegie Mellon University and Monrose at Johns Hopkins University—but were successfully lured to UNC. Their research group includes a dozen grad students (some shared with other specialties).

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Computer Security, continued from page 1

The need for computer security is growing at an exponential pace because we're so dependent on communication, transportation and financial networks, just to name a few. Its profile is rising, even to the highest level of government.

You're not likely to read about big system compromises because few companies are willing to disclose them when they occur. Who wants to have CNN announcing that they've been hacked? If Reiter and Monroe work as consultants to a company, they're obligated to secrecy. "I've signed non-disclosure agreements where I can't talk about the work even with my wife," says Reiter.

It's a compelling and always-changing field, with plentiful jobs because the need is so great. At UNC, classes in security are offered for both undergraduate and graduate students. Dr. Kevin Jeffay teaches Introduction to Computer and Network Security for undergraduates; Reiter teaches the graduate-level courses Introduction to Computer Security and Applied Cryptography and Network Security; and Monroe is teaching Network Security for graduate students this fall, and will teach a new undergraduate course in spring 2010. Further connections

between students are developed in a weekly lunch meeting that focuses on research in progress.

On the research side, Reiter is PI on a NSF-funded center studying situational awareness for networking, to understand threats to a network. "It involves collection of techniques for detecting intrusion," he explains, "and the command-and-control precursors to an attack. We're data mining on a network to find malfasant activity." Monroe's current DHS-funded research is focused on techniques for minimizing information leakage in anonymized data.

Reiter is also involved in equipping the third floor of the Brooks Building with a network of ceiling-mounted security devices that can be accessed through a cell phone. "It allows you to delegate authority through the cell network—say, if I'm on a trip and I need to allow someone access to my office or files on my computer." It's a system that he invented, in collaboration with colleagues at CMU, and it will serve as a test bed for further research. "With this, I deal with mobile devices and formal methods for provable security. It's a case in point that computer security is a multi-approach field."

Dr. Reiter goes to Washington

Earlier this year, Michael Reiter was one of a select group of academics chosen to provide input into the new initiative on cybersecurity announced by President Barack Obama on May 29. He took part in a teleconference led by Melissa Hathaway of the National Security Council, who was tapped by President Obama to review the nation's cyberspace policy. Reiter then organized the response from academic experts to questions posed by Hathaway during the teleconference. Questions covered a broad range of topics, from ensuring privacy to the status of research on self-repairing networks.

"Cybersecurity is a pressing matter that requires near-term stop-gap measures, longer-term thinking about how to shift the balance in the 'arms race' between attackers and defenders, and a focus on education to produce a security-minded computing workforce," Reiter said.

INTERDISCIPLINARY HUMAN MOVEMENT RESEARCH LABORATORY

Promising physical rehabilitation research is under way on a dual-belt treadmill in the new Interdisciplinary Human Movement Research Laboratory. On the specialized treadmill—purchased with a grant from the North Carolina Biotechnology Center—each belt can be set to move at a speed independent of the other. The belts sit on force plates, which measures the force interactions between the user's feet and the treadmill belts. It's used to help stroke patients regain near-normal walking. The exciting new development is adding the ability to give the patients visual feedback through a virtual environment created by computer scientists.

Dr. Rick Segal, director of the Division of Physical Therapy, is PI on the Biotech grant, which received matching funds from the Office of Research and Economic Development, School of Medicine, Dept. of Allied Health Sciences, Dept. of Exercise and Sport Science, and the College of Arts and Sciences. The research hypothesis is that the dual-belt treadmill will allow the patient to adjust his gait slowly until the affected leg functions at the same pace as the unaffected leg, and the immersive virtual environment will reinforce the changes with visual cues.

Segal brought in Dr. Michael Lewek, who completed a post-doctoral fellowship in neuromechanics at the Rehabilitation Institute of Chicago/Northwestern University. He's been researching how peripheral sensory input is integrated to influence motor commands during gait. "This is potentially a new rehab intervention," Lewek says. "The treadmill gets feedback from the way a person is walking—updating information in real time. The patient gets proprioceptive feedback from the leg movements required to walk on the treadmill and visual feedback from the virtual environment."

LAZEBNIK RECEIVES MICROSOFT RESEARCH NEW FACULTY FELLOWSHIP



Svetlana Lazebnik, assistant professor, was named a recipient of a Microsoft Research New Faculty Fellowship Award earlier this year.

The awards, announced July 14 by Microsoft Research, recognize and support early-career professors engaged in innovative computing research. Five recipients are selected each year from a pool of about 100 nominees. Each fellow receives an unrestricted cash gift of \$200,000.

Lazebnik, who joined the department in July 2007, conducts research in the area of computer vision, which deals with how machines interpret images.

“This fellowship will enable me to explore a lot more and do things that are maybe more speculative or long-term in my area of research,” Lazebnik said. “This is a very generous gift and extremely helpful for young faculty, especially at a time when funding is tight.”

Lazebnik’s research focuses on designing effective representations of content in large digital image collections, such as images on the Internet. One of the goals of her work is to allow users to search a large collection of digital images based on what can be seen in the picture, as opposed to only searching textual tags that describe the picture.

“We are very proud of Lana’s cutting-edge research in computer vi-

sion and applaud this recognition of the impact she has had so early in her career,” said Anselmo Lastra, chairman of the department of computer science.

Lazebnik is the second UNC faculty member to receive the award. Associate Professor Wei Wang, who does research in the area of bioinformatics, received the fellowship in 2005, its inaugural year.

Lazebnik holds a Ph.D. in computer science from the University of Illinois at Urbana-Champaign. She is a 2009 recipient of a Faculty Early Career Development (CAREER) award from the National Science Foundation and was honored for excellence in teaching by the department’s Computer Science Student Association in 2008.

ALUMNI FELLOWSHIP RECIPIENTS

Gennette Gill, Xiaoxiao Liu and **Jason Sewall** are the recipients of the 2009-2010 Computer Science Alumni Fellowships. These fellowships are awarded annually to Ph.D. candidates in their final year of study, allowing the students to work full time on dissertation research. Generous contributions by alumni and friends help to make these fellowships possible.

Gennette Gill is doing her dissertation work under her advisor Montek Singh. Her research is on new algorithms and automated methods for analyzing and optimizing asynchronous hardware. Asynchronous design has the potential to alleviate the next generation of hardware design challenges. By eliminating global clocking in favor of local synchronization using handshaking, asynchronous design can offer greater modularity, faster speeds, and lower energy consumption. Lack of design

tools and testing methods, however, stand as a barrier to widespread use of asynchronous design techniques. Gennette’s work is a step towards making asynchronous hardware easier to design, which will enable more designers to create high-performance asynchronous chips.

Xiaoxiao Liu is pursuing a dissertation under her advisor Stephen M. Pizer. Her research involves shape-correlated statistical models for respiratory motion characterization in 4D CT radiotherapy for cancer treatments. 4D image-guided radiation therapy in lung and liver using cone beam CT (CBCT) is challenging due to the complicated breathing motion. Serious CBCT streak artifacts due to the motion make it more difficult to locate the tumor during the treatment. She is working on statistical respiration models with prior knowledge from a planning 4D CT image se-

quence to predict/infer the motion at treatment time. The statistical motion prediction framework can be useful to other medical applications with different imaging modalities as well.

Jason Sewall is investigating computational models for physical phenomena that are inherently suited to utilize parallel hardware. While many models for computational simulation of natural phenomena exist, they are often challenging to adapt to parallel models of computation -- Jason is developing techniques for simulation that use formulations that are straightforward to run on parallel architectures. He has developed techniques for the efficient simulation and visualization of shockwaves and high-energy gas flows as well as models for the simulation of large networks of automobile traffic. Jason is working on his dissertation under his advisor Ming C. Lin.

AN EPIC STORY - MICHAEL V. CAPPS, PH.D.

Four years at Carolina gave Michael Capps two degrees and the longest stint he'd ever lived in one place. Son of a military hospital designer, Raleigh-born Capps moved dozens of times as a child, and staying in Chapel Hill was bliss to him. He earned a B.S. in mathematical sciences with a computer science option in 1994, and a master's in computer science in 1996. "I had a lot of fun there," he says. "I decided I loved the place so much, I wanted to end up teaching there someday, and so I'd better go somewhere else to get a third degree."

Funded by an NSF fellowship, he went to MIT but completed his doctorate working on large-scale simulation at the Naval Postgraduate School (NPS) in Monterey, Calif. While he was there, an officer from the Army recruiting command came along with an idea that a military computer game could be useful for recruiting. "They asked us who might be able to do it," Capps recalls. Speaking for his cohort of young professors, he replied, "We'll do it!"

The project turned out to be "the most awesome thing ever." As a newly minted Ph.D., Capps was working with a \$15 million grant from the Department of Defense. He frequently wielded his contract letter from the Assistant Secretary of the Army: "I used it to ride in tanks and fire every man-portable weapon. I was trained by a sniper team." Their game would create basic training and combat, and as producer, designer and lead programmer for a 3D multiplayer action game, Capps needed to know what soldiers' work felt like. "Our job was to make it realistic, but fun—to show what infantry training is like and to teach Army values, such as loyalty and honor."

The game is called "America's Army" (www.americasarmy.com) and it presents army combat in Mideast desert areas, as well as training for it. "In most military games," explains one college-age gamer, "if you're a medic, your character touches a wounded man and he's healed. In AA, your character starts by sitting in a classroom while an avatar lectures for 20 minutes, and you have to take a written exam to become a medic." Because Capps had a short, two-year timeline, he licensed the Unreal Engine, core gaming technology developed by Cary, N.C.-based Epic Games. AA launched on July 4, 2002, and has been phenomenally successful, logging more than 30 million downloads through three versions and increasing Army recruiting.



photo by Ginny Turner

Where does a gaming programmer go after such a peak? How about back to his favorite part of the country to work with the Unreal Engine technology? In 2002, Epic Games isolated its "Unreal" game franchise in a new startup in Cary called Scion Studios and invited Capps to head it.

Scion and Epic merged in 2004, and Capps became president of Epic Games (www.epicgames.com). He oversaw the evolution of the engine into a third version whose 1.5 million lines of code drive a wide array of tools that can be used to construct multiplayer games with greater visual fidelity and more realistic gameplay. It's licensed by many game developers and also used for serious games and advanced learning technologies. "Our technology is ever expanding. We've got virtual explorations of actual places, space games, fire fighting trainers." It's also the muscle under the hood of a series of "Unreal" multiplayer games for Epic that have sold 7 million copies worldwide.

In 2006, Epic released a mega-super hit, "Gears of War," which has won 30 game-of-the-year awards, followed by "Gears of War 2" in 2008, which was "50% bigger and much, much better." Epic has tremendous sales from games, licensing and a new revenue trickle from related toys and comic books—all generated by a staff of about 100 employees. New employees are being added slowly, but a new Epic building going up next door reveals Capps' view of Epic's future—it's Unreal and very, very big.

NETWORKING RESEARCHERS WORK TOGETHER SEAMLESSLY

“Networking research is all about providing better or more efficient communication services.” Dr. Kevin Jeffay’s definition greatly simplifies a growing research area in computer science. He adds, “All of computing today is realized by a confederation of distributed computers and networks. At a high level, making sure these components all work together seamlessly is at the core of our work.”

Jeffay outlines the scale of the task by describing UNC’s network. “There may be 50,000 devices on perhaps 10 square miles, and everyone depends on it working perfectly 24/7/52. And yet there are maybe only 20 people to maintain it. The main thing that makes it a challenge is that everyone makes changes to their computers. It fosters innovation, but it’s fantastically complex to manage. We’re developing new tools to help manage networks like that.”

Key figures in the Networking group are Jeffay, who with Dr. Don Smith (Ph.D. 1978) works on network management software, software for routers, and experimental methods for networking research. Dr. Jasleen Kaur focuses on the communications software found in PCs as well as large systems, and Dr. Ketan Mayer-Patel’s research aims at different ways to make the media used in applications richer. In a partial overlap from the Security group, Drs. Mike Reiter and Fabian Monroe are digging into how to make networks more secure (for more information on Reiter and Monroe’s work, see the article on Computer Security research on page 1). The group is aided by a dozen graduate students.

Networking classes for undergrads are Internet Protocols and Services, which emphasizes the software aspects of networking, and Introduction to the World Wide Web, which is an applied networking course for CS majors about service, content and delivery. For graduate students, Kaur teaches Computer Networks (hardware and software); Smith teaches Internet Architectures and Protocols; and Mayer-Patel teaches Multimedia Networking.

Networking research in the department is supported by both federal and industry grants. “We try to do basic science and get NSF funding for that,” explains Jeffay. “We’ve also done applied work and we get industry funding for solving their problems. We just got deals with CA (formerly Computer Associates) and VMWare.”

Both class work and research occur in the Networking Lab, a room with 28 racks that hold about 250 computers, dozens of switches and routers, and miles of Ethernet patch cables. The lab provides the ability to create experimental internetworks running at speeds from 100 Mbps to 10 Gbps. Smith describes one such project: “These 70 or so computers are dedicated to graduate student Jay Aikat’s research. Her traffic generators are attempting to reproduce the traffic that enters and leaves the UNC campus, which might be about 50,000 computers on campus and another 100,000 computers sending data in. She can do experiments to see how a high-speed network link would perform when something changes, like the load or capacity of the link or the kinds of applications using it.” He emphasizes that good research on networks depends on working with an accurate representation of traffic on that network. “And it’s not just volume, but also the pattern in which data arrives. More important is the variation over sub-second intervals.”

Aikat says that networking is an area where there isn’t as much to see occurring as there is in computer graphics, but it affects every person who has sent an e-mail or surfed the web. “A network is organic,” says Smith. “We’re trying to recreate one path through the worldwide Internet in this lab under controlled conditions. At a much smaller scale, it’s similar to physicists trying to recreate the conditions of the Big Bang in a particle collider.”

Jeffay finds networking fascinating because the problems and solutions are a combination of technology, politics and business. It’s also connects readily with other computer science research areas. The group’s weekly meeting for anyone interested in computer systems, dubbed the Systems Tea, is a tech-based, quasi-social event that attracts students in networking, collaborative computing, security and machine architecture.

UNC’s networking students are now working at Google, NEC Research, Cisco, Microsoft, and in academia. The networking field is huge and growing, according to Jeffay, and career opportunities abound. “Highly trained and highly skilled people in this field will always have a job.”

ALUMNI NEWS

M.S. and Ph.D. Alumni

After a six month hiatus from the semiconductor industry, **James Stanfield** (M.S. 1975) has received employment as a Systems Engineer for L-3 Communications in Salt Lake City, Utah. (*james.stanfield@comcast.net*)

Chris Schleiter (M.S. 1981) is still the On-Site Project Manager (Timing, Scoring and Results) for Swiss Timing in Vancouver. He reports that they're into the last six months before the 2010 Olympic Winter Games in February and things are getting busy. After the Games, which will be his last as a full time employee, he says he's looking forward to some time off and will see what develops. (*sprtstat@ix.netcom.com*)

Lee Nackman (Ph.D. 1982) joined Microsoft at its Redmond, Wa., location in April 2009. He is a Corporate Vice President leading the Identity and Security Division. Moving from a 26-year career at IBM to Microsoft (via a consulting stint with UNC spin-off Morphormics) was a big change, with new technology and a new company to learn and a move across the country. Their youngest child, Joel (17), is a senior at Durham Academy, so Lee's wife Ava and Joel are still in Chapel Hill while Joel finishes high school. Once Joel graduates, Ava will join Lee at their new house in Kirkland, Wa., where they'll be able to start their empty-nester phase exploring the Pacific Northwest! Rachel (24) has started a graduate program in Art History at NYU in Manhattan and Sam (21) is a senior studying Mechanical Engineering at Vanderbilt. They'd love to hear from their UNC contemporaries at *{ava, lee}@nackman.com* or 919-960-0026 (Ava in Chapel Hill) or 425-968-8802 (Lee in Kirkland).

Ray Van Dyke (M.S. 1989, J.D. 1990) is now an Adjunct Professor at Southern Methodist University in Dallas,

where he has taught since 2000, and at Texas Tech University in Lubbock, where he has taught since 2008. His short course on Intellectual Property for engineers, business people, students and faculty covers the basics of patents, trademarks, copyrights, trade secrets and antitrust. He continues to practice intellectual property law in Washington, DC. (*vandyke@acm.org*)

Bill Oliver (M.S. 1990) took a new job in 2008 as Professor of Pathology and Director of Autopsy and Forensic Services at Brody School of Medicine, Greenville, N.C. Cindy, his wife, has retired, but he reports that he is still chugging along, maintaining a small federal network in DC, still associated with the Applied Imagery Pattern Recognition Workshop in DC (*www.aipr-workshop.org*), and still interested in forensic imaging. He just submitted a paper on imaging tattoos in mummified remains. Currently, Bill is on the Executive Committee for the Scientific Working Group on Imaging Technologies for the Department of Justice and on the major medical panel for evaluation of less lethal technologies. He is also doing forensic pathology as the regional medical examiner for north-east NC. If you're ever in eastern NC, look them up! (*unc@billoblog.com*)

Yen-Ping Shan (Ph.D. 1990) says he's been on a personal quest to find the simplest and easiest way to play golf. After 3 years of research and visiting many teachers around the country and the world, he published his notes on *www.simplifiedgolf.net*. He would love to hear from any alumni who have any comments or questions. (*ypsan@bizwob.rr.com*)

Gopal Gupta (Ph.D. 1992) assumed the position of department head of computer science, at the University of Texas at Dallas, in August 2009. The Computer Science Department at UT Dallas is one of the larger departments in the nation with 53 faculty members and more than 1,350

students. Gopal continues to do research in logic programming and programming languages. He is also working on an NSF-funded project to increase appreciation of computer science among middle school students. Recently he founded a company, his second, to commercialize his research. His company, interoperate.biz, Inc., uses semantics-based techniques to migrate legacy code. Gopal lives in Plano, Texas, with wife Deepa and two children, Ritika and Rohan. (*gupta@utdallas.edu*)

Ulrich Neumann (Ph.D. 1993) was recently promoted to full professor in the University of Southern California Computer Science Department. Ulrich's research group (*graphics.usc.edu*) has three papers accepted at CVPR'09 related to automatic city modeling and texturing from aerial Lidar and imagery. In family news, Ulrich's wife, Patricia, is teaching Geography at El Camino Community College. Their oldest son, Peter, graduated from USC in May 2008 (Psychology) and is starting a Ph.D. in neuroscience at WSU, Pullman, in the fall. Their son David is graduating from USC (Business), and their daughter, Beckie, will be a freshman at Berkeley in the fall (Political Science). (*uneumann@usc.edu*)

The blue, sparkled 2002 SIGGRAPH mug finally reached its rightful owner when **Carl Mueller** (Ph.D. 2000) turned it over to **Ellen Scher-Zagier** (M.S. 1998) on April 7, 2009 in Manhattan. Carl, his wife, Masha Boitchouk, and their daughter, Maya (5) moved in the spring to Manhattan from Seattle, Carl continuing his employment with Nintendo. Ellen was visiting family in New York. She currently lives in Columbia, Mo., with husband Alan, children Jonah (14), Hera (12), and Eli (10), and dog Prairie (2).

Ben Lok (Ph.D. 2002) has been promoted to Associate Professor with tenure in the Computer and Information Science and Engineering De-

partment at the University of Florida. (lok@cise.ufl.edu)

Chris Dwyer (Ph.D. 2003) is the recipient of a Presidential Early Career Award for Scientists and Engineers. He is currently an assistant professor in the departments of electrical and computer engineering and computer science at Duke University. (dwyer@ece.duke.edu)

Bill Baxter (Ph.D. 2004) and his family moved to Seattle, Wa., in April 2008. He's now in the Microsoft Research group that includes other UNC alums Naga Govindaraju (Ph.D. 2004) and Avneesh Sud (Ph.D. 2006). (wbaxter@gmail.com)

After one year as a visiting assistant professor at Claremont McKenna College in Calif., **Joshua Stough** (Ph.D. 2008) recently started as tenure-track assistant professor at Washington and Lee University in Lexington, Va., near the beautiful Blue Ridge Mountains. (stoughj@wlu.edu)

Undergraduate Alumni

Phil Fittante (B.S.M.Sci. 1987) accepted a position as Senior Navigation Flight Test Engineer for the Navy's P-8 program in Patuxent River, MD. He recently retired as a Lieutenant Colonel from the US Air Force, having served as a test pilot in numerous aircraft. He also had his second novel, *God's Eye*, published by Salvo Press in April 2009 (www.salvo-press.com). (pfitt@bellsouth.net)

Sunil Nagaraj (B.S. 2004) earned his MBA in June 2009 from Harvard Business School, having served as President of the Technology & Media Club as well as Co-Chair of the Cyberposium technology conference. He is now launching a technology company, Triangulate, focused on behavioral data analytics. (snagaraj@mba2009.hbs.edu)

Michael Stewart (B.S. 2007) is starting his PhD in Computer Sci-

ence at Virginia Tech. (tgm@thegreat-michael.com)

Daniel Parker (B.S. 2008) is working for SENTEL Corporation as a software engineer doing military contracting work. (dkparker@email.unc.edu)

ALUMNI PUBLICATIONS

Lenwood Heath (Ph.D. 1985, heath@vt.edu):

Heath, L.S., and A. A. Sioson. "Multimodal Networks: Structure and Operations," *IEEE/ACM Transactions on Computational Biology and Bioinformatics* 6, 2009, pp. 321-332.

Heath, L.S., and A.A. Sioson. "Semantics of Multimodal Network Models," *IEEE/ACM Transactions on Computational Biology and Bioinformatics* 6, 2009, pp. 271-280.

Mane, S.P., C.V. Robinet, A. Ulanov, R. Schafleitner, L. Tincopa, A. Gaudin, G. Nomberto, C. Alvarado, C. Solis, L.A. Bolivar, R. Blas, O. Ortega, J. Solis, A. Panta, C. Rivera, I. Samolski, D.H. Carbajulca, M. Bonierbale, A. Pati, L.S. Heath, H.J. Bohnert, and R. Grene. "Molecular and Physiological Adaptation to Prolonged Drought Stress in the Leaves of two Andean Potato Genotypes," *Functional Plant Biology* 35, 2008, pp. 669-688.

Watkinson, J.I., L. Hendricks, A.A. Sioson, L.S. Heath, H.J. Bohnert, and R. Grene. "Tuber Development Phenotypes in Adapted and Acclimated, Drought-stressed *Solanum tuberosum* ssp. *andigena* Have Distinct Expression Profiles of Genes Associated with Carbon Metabolism," *Plant Physiology and Biochemistry* 46, 2008, pp. 34-45.

Pati, A., Y. Jin, K. Klage, R. Helm, L.S. Heath, and N. Ramakrishnan. "CMGSDB: Integrating Heterogeneous *Caenorhabditis elegans* Data Sources Using Compositional Data Mining," *Nucleic Acids Research* 36 (Database Issue), 2008, pp. D69-76.

Gopal Gupta (Ph.D. 1992, gupta@utdallas.edu):

Min, R., and G. Gupta. "Co-SLDNF Resolution," *Proc. Logic Programming Synthesis and Transformation (LOPSTR'09)*. To appear.

Kona, S., A. Bansal, G. Gupta, B. Blake. "Generalized Service Composition," *Proc. International Conference on Web Services*, IEEE Press, 2008.

Simon, L., A. Bansal, A. Mallya, G. Gupta. "Co-Logic Programming," *Proc. Int'l Conference on Automata Languages and Programming (ICALP)*, 2007, Springer Verlag, LNCS 4596, pp. 472-483.

Mark Harris (Ph.D. 2003, harrism@gmail.com):

Satish, N., M. Harris, and M. Garland. "Designing efficient sorting algorithms for manycore GPUs," *Proc. 23rd IEEE Int'l Parallel & Distributed Processing Symposium*, May 2009.

Bill Baxter (Ph.D. 2004, wbaxter@gmail.com):

Baxter, W., P. Barla, and K. Anjyo. "N-way Morphing for 2D Animation," *Computer Animation and Virtual Worlds (CASA 2009 special issue)*, 20(2-3), June 2009, pp. 79-87.

Baxter, W., P. Barla, and K. Anjyo. "Compatible Embedding for 2D Shape Animation," *IEEE Transactions on Visualization and Computer Graphics*, 15(5), Sept.-Oct. 2009, pp. 867 - 879.

IN MEMORIAM

Dr. Derek S. Henderson, Distinguished Visiting Lecturer in the Spring Semester 1968-69, died on 7 August 2009 in his native South Africa. Henderson, who had been Peter Calingaert's first doctoral student (at Harvard), became the first professor of computer science in South Africa. He later served as Dean of Science at the University of the Witwatersrand in Johannesburg and as Vice-Chancellor and Principal of Rhodes University in Grahamstown, South Africa.

DEPARTMENT NEWS

WELCOME New Faculty

Stan Ahalt is a professor and director of the Renaissance Computing Institute (RENCI). He holds a Ph.D. in electrical and computer engineering from Clemson University and joins the department from Columbus, Ohio, where he led the Ohio Supercomputer Center (OSC) for six years and held a faculty position in the department of electrical and computer engineering at the Ohio State University for 22 years.

Visiting Researchers

Jan Bartelsen is a visiting scholar working with Jan-Michael Frahm in the area of computer vision. He is employed as a Research Associate at Bundeswehr University Munich.

Andrea Bastoni is a visiting scholar working with Jim Anderson in the area of real-time systems. He is a Ph.D. Student in Computer Engineering at the University of Rome.

Scott Coull is a postdoctoral research associate working with Fabian Monrose in the area of computer security. He is a 2009 Computing Innovation Fellow and received his Ph.D. in computer science in May 2009 from Johns Hopkins University.

Li Guan is a postdoctoral research associate working with Jan-Michael Frahm in the computer vision group. He defended his dissertation in August 2009.

Edgar Lobaton is a postdoctoral research associate working with Ron Alterovitz in the robotics group. He is a 2009 Computing Innovation Fellow and received his Ph.D. in electrical engineering and computer sciences from UC-Berkeley in May 2009.

THANKS AND FAREWELL

John Halton, professor, retired in June. He joined the department in 1984.

Tammy Pike, receptionist, left the department in May.

Seon Joo Kim (Ph.D. 2008), postdoctoral research associate working with Jan-Michael Frahm and Marc Pollefeys in computer vision, left in September.

Christopher Zach, postdoctoral research associate working with Jan-Michael Frahm in the computer vision group, left in September to take a position at ETH Zurich.

CONGRATULATIONS Faculty and Staff

Ron Alterovitz was co-author of a paper titled "Guiding Medical Needles Using Single-Point Tissue Manipulation," which was selected as a finalist for the Best Medical Robotics Paper at the IEEE International Conference on Robotics and Automation in Kobe, Japan.

Ming Lin was appointed a Wows Scholar for a two-year term beginning summer 2009. Wows Scholars are Working on Women in Science: they are dedicated to the recruitment, retention, and professional advancement of women in the sciences.

Diane Pozefsky was named Favorite Faculty Member for the 2008-2009 academic year by the undergraduate computer science club.

Tim Quigg and **Michael Reiter** were recognized for excellence in teaching for the 2008-2009 academic year by the Computer Science Student Association.

Jasleen Kaur Sahni was promoted to Associate Professor with tenure.

Mary Whitton was elected a Senior Member of IEEE.

Graduate Students

Eric LaForce was named TA of the Year for the 2008-2009 academic year.

Keith Lee was named president of UNC's Graduate and Professional Student Federation for the 2009-2010 academic year. As president, Lee repre-

sents the thousands of graduate and professional students at UNC.

William Moss and **Micah Taylor** tied for first place among the student presentations at the Acoustical Society of America North Carolina Regional Chapter meeting. Moss's presentation was titled "Physics-based Liquid Sound Synthesis" and was based on work with graduate student Hengchin Yeh, Assistant Professor Jeong-Mo Hong (Dongguk University), Professor Ming Lin and Professor Dinesh Manocha. Taylor's presentation was titled "Fast edge Diffraction for Sound Propagation in Complex Virtual Environments," and was based on work developed with graduate students Anish Chandak, Zhimin Ren and Christian Lauterbach, and Professor Dinesh Manocha.

Rahul Narain is the recipient of one of this year's Intel PhD Fellowships. The Intel PhD Fellowship program selects students who do research in one of Intel's technical areas: Hardware Systems Technology and Design, Software Technology and Design, or Semiconductor Technology and Manufacturing. Recipients receive a generous fellowship award that covers stipend, tuition, travel and related expenses for nine months. Narain's dissertation topic is Multi-Level Simulation of Complex Phenomena, which he is working on under his advisor, Ming Lin. This year, 26 fellowships were awarded and Narain was the only recipient from the state of North Carolina.



Katrina Coble with American Idol's Anoop Desai at the 21st Annual Carolina Blood Drive. Coble is the drive's chair.

Liangjun Zhang, a Ph.D. student of Professor Dinesh Manocha, won the Chinese Government Award for Outstanding Self-Financed Students Abroad. This award recognizes top Chinese Ph.D. students studying abroad around the world in all research areas. This year, he is the only recipient from UNC. Awardees are selected on academic merit and research achievements after three rounds of judging by invited experts from their field in China as well as their host country.

December 2008 M.S. recipients: Xiaowei Li, Peter Lincoln, Jason Sewall, Serhat Tekin, Tim Thirion.

December 2008 Ph.D. recipients:
Nicolas Galoppo von Borries. *Animation, Simulation, and Control of Soft Characters using Layered Representations and Simplified Physics-based Methods.* Advisor: Ming Lin.

Qiong Han. *Proper Shape Representation of Single- and Multi-Figure Anatomical Objects.* Advisor: Stephen Pizer.

Seon Joo Kim. *Radiometric Calibration Methods from Image Sequences.* Advisor: Marc Pollefeys.

Sang-Uok Kum. *Encoding of Multiple Depth Streams.* Advisor: Ketan Mayer-Patel.

Eldon Scott Larsen. *Temporal Multi-view Reconstruction using Enhanced Belief Propagation.* Advisor: Henry Fuchs.

Joshua Howard Levy. *Refinement of Object-Based Segmentation.* Advisor: Stephen Pizer.

Sushant Pramod Rewaskar. *Real-world Evaluation of Techniques to Mitigate Impact of Losses on TCP Performance.* Advisor: Jasleen Kaur.

Joshua V. Stough. *Clustering and Shifting of Regional Appearance for Deformable Model Segmentation.* Advisor: Stephen Pizer.

Hua Yang. *Differential Tracking through Sampling and Linearizing the Local Appearance Manifold.* Advisor: Gregory Welch.

May 2009 M.S. recipients: Jayashree Aikat, Catilin Constantin, Stefan Estrada, Stephen Guy, Steven Hopper, Tyler Johnson, Eric LaForce, Sang Woo Lee, Marc Macenko, Joshua Markwordt, William Moss, Rahul Narain, Mark Neyer, Jeffrey Pool, Mert Sedef, Jamie Snape, Georgi Tsankov, Lei Wei.

May 2009 Ph.D. recipients:
Ja-Yeon Jeong. *Estimation of Probability Distribution on Multiple Anatomical Objects and Evaluation of Statistical Shape Models.* Advisor: Stephen Pizer.

Dorian Boris Miller. *Can we work together?* Advisor: David Stotts.

Alok Shriram. *Design of a Scalable Available Bandwidth Information Infrastructure.* Advisor: Jasleen Kaur.

Jingdan Zhang. *Object Detection and Segmentation using Discriminative Learning.* Advisor: Leonard McMillan.

Undergraduate Students

August 2008 B.S. recipients: John Giles Foushee, Nana Baffour Okyere.

December 2008 B.S. recipients: Garrett Lee Davis, James Rudy Griffith, Jonathan Kyungwook Park, Daniel Keith Parker, Mitchell Mannige Rao, Zachary James Swartz, David Bradley Talton, Colby Lee Walburn, Eric Arild Widgren.

May 2009 B.S. recipients: Andrew Lateef Abumoussa*, Christopher Boyd Barefoot, Jacob William Bartel, Samuel D. Brice, Thomas M. Brumley, Yu Cheng, Hayeong Choi, Kevin S. Coletta, Bryan Lee Denny, Namatullah Kamal Eljabaly, Hong Fan, Richard Eric Gavaletz Jr., Arthur Greis Greenside, John Andrew Hulbert, Jon Binford Latane, Michael William McArthur, Malcolm S. Mollison*, Zachary James Mullen, Andrew Joseph Ryan, Zachary A. Sheffield, Michael Lee Zachary.

August 2009 B.S. recipient: Robert Christopher Rogers.

**With Honors*

RECENT GRANTS

3D Display and Capture of Humans for Live Virtual Training. PIs: Gregory Welch and Henry Fuchs. Office of Naval Research.

Advanced Kalman Filter for Real-Time Responsiveness in Complex Systems. PI: Gregory Welch. US Department of Energy.

Computational Morphometry in Schizophrenia and Related Disorders. PI: Marc Niethammer. Brigham and Women's Hospital/National Institutes of Health.

Computing Innovation Fellow – Edgar Lobaton. PI: Ron Alterovitz. Computing Research Association/National Science Foundation.

Computing Innovation Fellow – Scott Coull. PI: Michael Reiter. Computing Research Association/National Science Foundation.

Density Estimation and Anomaly Detection in Large Social Networks. PI: Svetlana Lazebnik. Duke University/Army Research Office.

Fast 3D Reconstruction and Visualization for Explosive Ordnance Disposal for Unmanned Ground Vehicles. PI: Jan-Michael Frahm. The National Center for Manufacturing Sciences.

Genome Dynamics: Evolution, Organization and Function. PIs: Wei Wang and Leonard McMillan. Jackson Laboratory.

HCC-Small: Interactive Auditory Displays. PI: Ming Lin. National Science Foundation.

Low-Resolution Interiors & Interfaces Can Achieve High-Resolution Accuracy. PI: Jack Snoeyink. Duke University/National Institutes of Health.

Optimal Control for the Analysis of Image Sequences. PI: Marc Niethammer. National Science Foundation.

PetaFlops Acoustic Simulation. PI: Dinesh Manocha. National Science Foundation.

Department News, continued from page 9

Real-Time Stereo-Vision Processing and Algorithm Development for Application to Space Rendezvous Operations. PI: Jan-Michael Frahm. Texas A&M/National Reconnaissance Office.

RI: Medium: Robust Intelligent Manipulation and Apprenticeship Learning for Robotic Surgical Assistants. PI: Ron Alterovitz. Case Western Reserve University/National Science Foundation.

RI: Small: Modeling and Recognition of Landmarks and Urban Environments. PI: Jan-Michael Frahm. National Science Foundation.

Human Movement Lab, continued from page 2

In developing this interdisciplinary lab, Segal drew in professors Henry Fuchs, Greg Welch and Mary Whitton. “This collaboration is very exciting,” says Lewek. “The lab really got going when Mary got involved—she and I came up with some really good ideas.” Whitton’s long experience in effective virtual environments is a foundation of the research plan. “What we’ve done is to put a VE system in to give people something to look at,” she explains. “We’ve installed a three-wall projector system, as well as a head-mounted system. The cool

Supporting Complex Real-Time Workloads on Multicore Platforms. PI: James Anderson. US Air Force Office of Scientific Research.

TC: Large: Collaborative Research: Trustworthy Virtual Cloud Computing. PI: Michael Reiter. National Science Foundation.

TC: Small: Collaborative Research: Scalable Malware Analysis Using Lightweight Virtualization. PI: Fabian Monrose. National Science Foundation.

Prasun Dewan, Jasleen Kaur, Ming Lin, Leonard McMillan and Wei Wang all received REU supplements to existing NSF awards.

part is that patients have never before had visual feedback to show them the effect of the asymmetry in their walking.”

Research collaboration is always encouraged in the computer science department, and the Interdisciplinary Human Movement Research Lab is an excellent example of the benefits to both departments. Lewek says, “We have the problem, you have a potential solution, and we can measure it. Two disciplines are able to make something happen that neither one of us could do alone.”



A stroke rehabilitation patient uses the dual-belt treadmill.

FAMILY MATTERS

Chris Weigle (Ph.D. 2006) and **Michele Clark Weigle** (Ph.D. 2003) welcomed Nathan Andrew on 14 March 2009 in Norfolk, Va. (weigle@cs.unc.edu, mweigle@csnet.cs.odu.edu)

Martin Styner, Research Assistant Professor, and his wife, Maya, welcomed Nathan Peter on 26 March 2009 in Durham. Nathan joins big brother, Max, age 2. (martin_styner@ieee.org)

Graduate student **Jeremy Wendt** and his wife, Heather, welcomed a son, Liam Jesse, on 29 March 2009 in Chapel Hill. Liam joins big brother, John, age 5. (jwendt@cs.unc.edu)

Tabitha Peck, graduate student, and **David Borland** (Ph.D. 2007) were married on 18 April 2009 in Chapel Hill. (tpeck@cs.unc.edu, borland@renci.org)

Daniel Parker (B.S. 2008) and Jamie Richardson were married on 23 May 2009 in Chester, Va. (dkparker@email.unc.edu)

Ben Lok (Ph.D. 2002) and his wife, Laura, welcomed twins Sophia Pui Ming and Brandon Yu Ming on 25 July 2009 in Gainesville, Fla. (lok@cise.ufl.edu)

Graduate students **Xiaoxiao Liu** and **Li Guan** were married on 1 August 2009 in Chapel Hill. (sbaronxx@cs.unc.edu, lguan@cs.unc.edu)

Mark Harris (Ph.D. 2003) and Lakshmi Kerr were married on 25 October 2009 in North Stradbroke Island, Queensland, Australia. (harrism@gmail.com)

RECENT PUBLICATIONS

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News&Notes

DEPARTMENT OF COMPUTER SCIENCE
COLLEGE OF ARTS & SCIENCES
THE UNIVERSITY OF NORTH CAROLINA
CB# 3175, BROOKS COMPUTER SCIENCE
BUILDING
CHAPEL HILL, NC 27599-3175

EDITOR

KELLI GASKILL
gaskill@cs.unc.edu

WRITER

GINNY TURNER

GENERAL INFORMATION

VOICE: (919) 962-1700

FAX: (919) 962-1799

E-MAIL: info@cs.unc.edu

WEB: www.cs.unc.edu

ADDRESS CORRECTIONS, SUBMISSIONS,
AND FOR INFORMATION ABOUT OUR
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In August the UNC BASE-IT (Behavior Analysis and Synthesis for Intelligent Training) project spent a week in Princeton, NJ, at Sarnoff Research Labs, with their partners from the Naval Postgraduate School and Sarnoff, preparing for a September year-end meeting and integrated system demonstration for the sponsors (the Office of Naval Research) and the transition partners (US Marine Corps TECOM, PM TRASY, TTECG, and TSD). The UNC team members are those wearing labels in the group photo, along with former UNC visiting scholar Amela Sadagic. The 'Marines' in the back row are actually Sarnoff employees playing Marines for system testing. The September demonstration included real Marines as shown in the bottom image. Project information can be found at www.movesinstitute.org/base-it/index.html.



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