News & Notes

Fall 2011 ◆ Issue Forty-eight

CompSci @ Carolina

Dear Friends,

Fall has arrived in Chapel Hill, and with it, a new crop of graduate and undergraduate students. This summer was a busy one. In August, we launched a new department web site, just in time for the new school year. If you haven't visited the new *www.cs.unc.edu*, be sure to check it out!

Also in August, we welcomed Assistant Professor Vladimir Jojic to the department. Vladimir is an addition to our bioinformatics and computational biology research group and an associate member of the Lineberger Comprehensive Cancer Center.

Unfortunately, this summer we said farewell to our long-time colleague and alumus Greg Welch, who joined the faculty of the University of Central Florida. He maintains a part-time appointment here, however, and will continue to collaborate with faculty and students.

Congratulations to Research Professor and alumna Diane Pozefsky, who was recently named to the Women in Technology International Hall of Fame. You can read more about Diane on page 2.

Congratulations also to Professor Steve Pizer, on being recognized as a Fellow of the Medical Image Computing and Computer-Assisted Intervention (MICCAI) Society at this year's meeting. MICCAI is the premier society in the field of medical image computing. You can read more about Steve's honor in the Fall 2010 *News & Notes*.

This year's alumni fellowship recipient is Stephen Olivier. You can read more about his research on page 3, and, as promised in our last issue, you can also learn more about ways you can support the department.

We'd love to have you visit! Please be sure to stop by the department whenever you are in the area.

Anselmo Lastra

MAKING HIGH-SPEED NETWORKS FASTER

For more than two decades, Internet applications have been relying on the standard transport protocol TCP (Transmission Control Protocol) to make best usage of available network resources. However, even the state-of-the-art TCP variants now fail to scale to high enough network speeds to meet the requirements of the computational science communities. To address this problem, Associate Professor Jasleen Kaur and her research team have decided to do away with the traditional TCP framework of operation and create a novel paradigm that can be scaled to even Terabit-and-higher speeds.

The standard TCP framework tries to figure out how fast it can send data by sending some packets at a particular rate and seeing if those packets make their way through the network or not. This probing is done for a time duration of about the round-trip time (RTT) of the network path (RTT-scale probing). Depending on whether the packets make their way through or not, TCP scales up or down the rate at which subsequent packets are sent. Due to the large RTT-scale used for probing, even the best of current protocols have trouble achieving several Gigabits-per-second (Gbps) speeds without the risk of serious congestion collapse on the network.

Kaur's approach sheds the legacy RTT-scale framework and instead designs the *packet-scale congestion control paradigm*. This new paradigm enables the protocol to operate at fine timescales and at a frequency close to the frequency of packet transmissions. The paradigm relies on two main ideas. The first is *fine-scale probing*, which generates finely-controlled inter-packet spacing at the sender and observes changes in these at the receiver to estimate the current available bandwidth in the network. The second is *probing-without-overloading*, which

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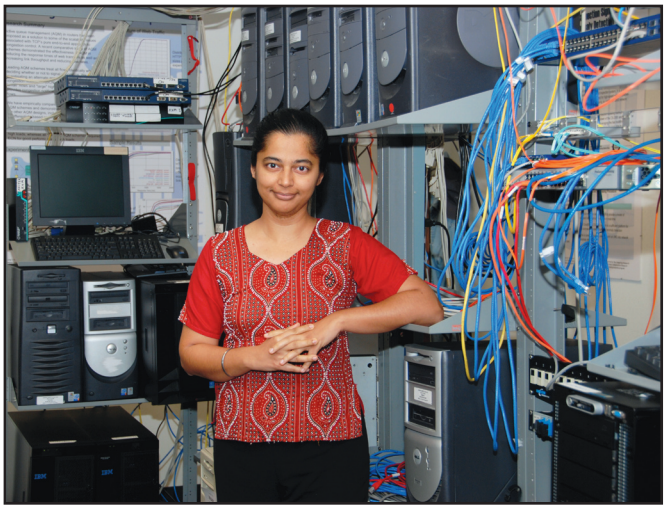
exploits the fine-scale of probing to probe for a wide range of sending rates within an RTT, without causing persistent queuing at bottleneck links. The paradigm also helps truly achieve RTT fairness and friendliness to conventional TCP traffic — two goals that have so far remained elusive to high-speed transport protocols.

To test this new paradigm, Kaur is partnering with the Renaissance Computing Institute (RENCI) to use their Breakable Experimental Network (BEN), a regional optical network test bed for experiments with disruptive networking technologies. BEN can also be connected to the National Lambda Rail (NLR), the high-speed research network that connects universities across the U.S. This allows the researchers to use the machines in the computer science department as servers and clients and emulate very long distance network paths by setting up a path beginning in the networking lab at UNC, going through BEN to the NLR through several cities across the U.S. and returning to BEN and to the lab in the CS department.



Kaur has recently received two National Science Foundation grants to support the research on the paradigm. The focus of the first grant is on investigating research challenges including the sensitivity of the paradigm to "noise" in the end-to-end delays experienced by packets, the implementation of fine-scaled inter-packet spacing in current end-systems, and the stability, sensitivity and fairness of the paradigm under highly-aggregated and stressful traffic conditions. The second grant is for developing a production-quality ultra-high speed implementation of the paradigm on the Linux operating system, and deploying it on the infrastructure of three scientific research projects. Prof. Don Smith is a co-PI on this project. The targeted infrastructures are those of the UNC Institute for the Environment, Carolina Center for Genome Sciences, and the Los Alamos National Lab.

More information about this research is available at: *http://rapid.web.unc.edu*

DIANE POZEFSKY NAMED TO WITI HALL OF FAME

Research Professor and alumna Diane Pozefsky has been named to the Women in Technology International (WITI) Hall of Fame for 2011.

Diane earned her Ph.D. from UNC in 1979 and then worked at IBM for 25 years. While at IBM, Diane worked on the design of networking architectures and their product implementations. Her 25 patents earned her the title of IBM Master Inventor in 1996. When she was named an IBM Fellow in 1994, there had only been one other woman previously given the honor. Her contributions were also recognized by her peers as they elected her to the IBM Academy of Technology and to two terms on the Academy's governing council.

When she retired from IBM in 2004, Diane returned to UNC as a faculty member.

"Since coming back to UNC, Diane has been most committed to undergraduate education and to teaching the computer science courses for non-computer science majors – indeed, for students scared of technology," said Dr. Fred Brooks, Kenan Professor of Computer Science and department founder. "Equally valuable has been her teaching our graduate and undergraduate COMP 523: Software Engineering Laboratory, to which she brings experience no one else on our faculty can touch. I created this course based on my own industry experience. I taught it 22 times; she does it better."

Photo by Mary Lide Parker, College of Arts & Sciences

Diane's work with undergraduates has not gone unnoticed. She has won the undergraduate teaching award, voted on by the department's graduating seniors, three times, most recently in May 2011. She was also instrumental in establishing an internship component to the computer science education and in getting the combined B.S.-M.S. program up and running.

Diane is one of five inductees into the WITI Hall of Fame for 2011. The WITI Hall of Fame was established in 1996 by WITI to recognize, honor, and promote the outstanding contributions women make to the scientific and technological communities that improve and evolve our society. WITI is the leading trade organization for women in technology.

HOW YOU CAN SUPPORT THE DEPARTMENT OF COMPUTER SCIENCE!

With the continued cuts in state funding, the Department of Computer Science depends on the support of our alumni and friends today more than ever. Some of you may wish to make general gifts to the department without a designation. To those of you who select this option, we say thank you! Others may wish to designate your gift for a particular program. If this describes you, there are a number of ways you can support the department. Here are four examples:

1. The Computer Science Alumni Fellowship is awarded each year to a Ph.D. candidate in his or her final year of study. This award allows students to work full time on dissertation research. Recipients are selected based on the quality of their research and service.

2. The Stephen F. Weiss Award for Outstanding Achievement in Computer Science was established in 2010 and is awarded annually to a rising senior in computer science who has already demonstrated significant accomplishments.

3. Enabling technology research is the passion of professor and alumnus Gary Bishop (Ph.D. 1984). Programs you can support include Maze Day, an annual free-to-attend event which brings blind and visually impaired children, and their parents and teachers, to visit the department for a day of experiencing fun and educational computer applications developed especially for them, and Tar Heel Reader, a web-based collection of free, easy-to-read, accessible books on a wide range of topics. You can find out more about Gary's research on his web site: *http://www.cs.unc.edu/~gb/*

4. The Graduate Student Lounge needs renovating! It's the one place in Sitterson Hall and Brooks Building where students can escape from work to play Foosball, watch television, or just catch a nap, but it's showing signs of wear and tear. The lounge needs new furniture, game tables, and so on.

To donate to the department, you can make checks payable to the UNC Computer Science Department, and mail them to:

Department of Computer Science
CB# 3175, Brooks Computer Science Building
UNC-Chapel Hill
Chapel Hill, NC 27599-3175

ALUMNI FELLOWSHIP RECIPIENT - STEPHEN OLIVIER

Stephen Olivier is the recipient of the 2011-2012 Computer Science Alumni Fellowship. This fellowship is awarded annually to a Ph.D. candidate in his or her final year of study, allowing the student to work full time on dissertation research. Generous contributions by alumni and friends help to make this fellowship possible.

Power and speed-of-light limitations have given us processors that offer multiple computing cores instead of a single, but faster, processor. Hence parallel execution is now the principal route to increased performance. However parallel programming models are still quite rudimentary and oriented toward details of the parallel processor architectures rather than addressing parallelism in a problem-centric framework. Task parallel programming is a high-level shared memory programming paradigm well suited to the construction of adaptive and recursive algorithms in scientific computing and other areas. The computation to be performed is presented in the form of interdependent tasks created in the course of program execution in an input-dependent fashion that often cannot be analyzed a priori.

Stephen is working with Professor Jan Prins to develop efficient task scheduling strategies that balance load among the processors while preserving locality of reference among tasks on modern shared memory systems, with their complex cache hierarchies and non-uniform memory access characteristics. A subset of these strategies is transparent to the programmer, while others allow the programmer to express explicit locality constraints to inform the scheduler. Working with Alan Porterfield at RENCI, Stephen has implemented his task schedulers using the open-source Qthreads multi-threading library, distributed by Sandia National Laboratories, to run full-size task parallel applications expressed using the OpenMP standard.

Evaluations demonstrate improvement in parallel speedup on benchmark OpenMP task parallel applications over existing state-of-the-art schedulers in the Intel and GNU OpenMP run time systems. Stephen has also developed performance analysis techniques to measure run time overheads, non-local data access costs, and load imbalance. His Unbalanced Tree Search (UTS) benchmark evaluates the scalability of dynamic load balancing strategies on a wide range of parallel systems, from multi-core machines to clusters of thousands of processors.

DEPARTMENT NEWS

WELCOME

New Faculty

Vladimir Jojic is an assistant professor doing research in bioinformatics, computational biology and machine learning, and an associate member of the Lineberger Comprehensive Cancer Center. He joined the department in August. Vladimir earned his Ph.D. in computer science in 2007 from the University of Toronto. Prior to joining the department, he was a postdoctoral researcher at Stanford.

New Staff

Joe Ping-Lin Hsiao joined the department in May 2011 as a research engineer working with Russ Taylor and the CISMM group.

Jodie Turnbull joined the department as Student Services Manager in May 2011. Previously she had served as the administrative manager in the Department of Marine Sciences.

Visiting Researchers and Faculty

Wenxi Liu is a Visiting Scholar from the City University of Hong Kong visiting Dinesh Manocha from September 1 - November 30, 2011.

THANKS AND FAREWELL

Edgar Lobaton, postdoctoral researcher working with Ron Alterovitz, left the department in August 2011. He is now an assistant professor in the Department of Electrical and Computer Engineering at North Carolina State University.

Herman Towles, senior research associate, left the department in July 2011.

Jur van den Berg, postdoctoral researcher working with the GAMMA group, left the department in May 2011. He is now an assistant professor in the School of Computing at the University of Utah.

Greg Welch (Ph.D. 1996), research professor, has accepted a joint position in the Institute for Simulation & Training and the Department of Computer Science at the University of Central Florida. Greg is maintaining a part-time appointment at UNC as he continues to collaborate with faculty and students here. The move offers a great opportunity to pursue ideas he has for "physical-virtual reality," in the context of simulation, training, and education.

CONGRATULATIONS

Faculty and Staff

Jan-Michael Frahm was named an assistant professor, tenure-track, in July 2011.

A paper co-authored by Postdoctoral Researcher **Adrian Ilie** (Ph.D. 2010) and Research Professor **Greg Welch** (Ph.D. 1996) received second prize in the Best Paper Awards at ACM/IEEE International Conference on Distributed Smart Cameras 2011. The paper was titled "On-Line Control of Active Camera Networks for Computer Vision Tasks."

Catherine Perry, accounting manager, celebrated 35 years of continuous state service on August 31, 2011.

UPCOMING CONFERENCES

Ketan Mayer-Patel is local arrangement chair for the ACM Multimedia Systems (MMSys) 2012 conference, to be held in Chapel Hill on February 22-24, 2012.

RECENT SPONSORED RESEARCH AWARDS

Automatic Quantitative Analysis of MR Images of the Knee in Osteoarthritis. PI: Marc Niethammer. National Institute of Arthritis Musculoskeletal Skin Disease.

CSR: Small: A Comprehensive Framework for Real-Time Multiprocessor Synchronization. PI: Jim Anderson, Co-PI: Sanjoy Baruah. National Science Foundation.

EAGER: Automatic Reconstruction of Typed Input from Compromising Reflections. PI: Jan-Michael Frahm, Co-PI: Fabian Monrose. National Science Foundation.

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

III: Small: Supporting US-Based Students to Attend the 2011 IEEE International Conference on Data Mining (ICDM 2011). PI: Wei Wang. National Science Foundation.

NSF Support for the 2011 USENIX Security Symposium, Financial Aid; August 2011; San Francisco, Calif. PI: Fabian Monrose. National Science Foundation.

SDCI NET: Development of an Ultra-high Speed End-to-end Transport Stack based on the Packet Design Paradigm. PI: Jasleen Kaur Sahni, Co-PI: F. Don Smith. National Science Foundation.

SDCI Sec: New Software Platforms for Supporting Network-wide Detection of Code Injection Attacks. PI: Fabian Monrose, Co-PI: Montek Singh. National Science Foundation.

SHB:Small:Computing Robot Motions for Home Healthcare Assistance. PI: Ron Alterovitz, Co-PI: Dinesh Manocha. National Science Foundation.

STTR-Interactive Acoustic Simulation in Urban and Complex Environments. PIs: Dinesh Manocha, Ming Lin. Impulsonic, Inc.

TC: Small: Server-side Verification of Client Behavior in Distributed Applications. PI: Michael Reiter. National Science Foundation.

Travel Support for Workshop on Modeling, Simulation and Visual Analysis of Large Crowds. PI: Dinesh Manocha. National Science Foundation.

Women in Bioinformatics Initiative at ACM BCB 2011 - Conference Support. PI: Wei Wang. National Science Foundation.

ALUMNI NEWS

M.S. and Ph.D. Alumni

Rodger Blair (M.S. 1969) and his wife, Charlene, retired from their respective jobs at McKesson Corporation and Shady Side Academy on June 10, 2011. They then packed up their goods and moved 1900 miles to Las Cruces, N.M., where they had previously purchased a home in 2010. Rodger reports that they love it there. He is currently writing the business plan for his new business, SofTechMetrics, LLC, a software process management consulting company. He says they have found a great church in their new city, Sierra Vista Community Church, and that Charlene will be teaching English as a Second Language (ESL) at the church to Spanish-speaking adults. Rodger is keeping busy with his own volunteer work as a mentor to two men: a 29-year-old man who served two tours of duty in Iraq on the front lines and a 56-year-old Lakota Sioux Native American man. He says that the mentoring is most enjoyable. (*rcblair@hotmail.com*)

Steve Bellovin (Ph.D. 1982) recently published a paper on cryptologic history titled, "Frank Miller: Inventor of the One-Time Pad." (*Cryptologia*, 2011, vol. 35, issue 3, pp. 203-222) An article about his research was published in the New York Times in July and can be read at *http://www.nytimes.com/2011/07/26/science/26code.html.* (*smb@cs.columbia.edu*)

Chuck Mosher (M.S. 1987) was recently promoted to Manager, Public Sector Middleware and Cloud Solutions Architects at Red Hat. He joined Red Hat when his former company, MetaMatrix, was acquired in May 2007. The industry-leading data integration technology pioneered by MetaMatrix has now been released as an open source-based product, the JBoss Enterprise Data Services Platform. (*chuckm@bellsouth.net*)

Ray Van Dyke, J.D., (M.S. 1989) has been appointed the Chair of the Professionalism and Ethics Committee of the American Intellectual Property Law Association, and recently published an article on patent reform entitled "Patents Shrugged Redux." His wife Diana was the recipient of a 2011 Golden Heart Award for her novel *Spy in the Mirror.* (*vandykelaw@aol.com*)

Randy Brown (M.S. 1990) was recently promoted to Director, Virtual Heroes Division, of Applied Research Associates. Randy has been with Virtual Heroes since its inception in 2004 and through its acquisition by ARA in 2009. Virtual Heroes creates real-time, immersive, interactive 3D training and education environments using the Epic Unreal game engine. He is still happily married to Alli who has supported him through all of this. (*randy@virtualheroes.com*)

Yen-Ping Shan (Ph.D. 1990) has created a golf training aid (a hobby project of his). He says he would be happy to send any department faculty, staff, student or alumnus a free one. To take him up on his offer, contact Shan via the "Contact Us" link at the bottom of the *www.surewrist.com* link and indicate that you are affiliated with the department. (*ypshan@bizwoh.rr.com*)

Thomas Lassanske (M.S. 2002) is now serving as Technical Producer for id Software's next "Doom" title. (*tlassanske@gmail.com*)

Mark R. Lindsey (M.S. 2003) presented the paper "What Went Wrong? Negative Results from VoIP Service Providers" at the ACM IPTComm 2011 conference. Mark is an engineer at ECG, a consulting firm focused on supporting telephone companies as they build VoIP networks. He and his family live in Raleigh, N.C. (*lindsey@ec-group.com*)

Shelby Funk (Ph.D. 2004) was recently promoted to associate professor with tenure at the University of Georgia, Department of Computer Science. (*shelby@cs.uga.edu*)

Miguel Otaduy (Ph.D. 2004) and his students received the Best Student Paper Award at the World Haptics Conference 2011. The paper, titled "Haptic Navigation Along Filiform Neural Structures," was also among the finalists for the Best Paper Award for the conference. Miguel also recently received a highly competitive ERC Starting Grant from the European Union for his project Animetrics. The award totals €1.3 M over five years. (*miguel.otaduy@urjc.es*)

Theodore (Ted) Kim (Ph.D. 2006) recently moved from Canada where he was a faculty member at the University of Saskatchewan to join the University of California at Santa Barbara as an assistant professor in the Media Arts and Technology Program. (*kim@mat.ucsb.edu*)

Eric Bennett (Ph.D. 2007) and his team at Microsoft released Photosynth for iPhone in April 2011. Photosynth is a mobile panorama capture and sharing app. Eric was the lead program manager for the entire project. Since its release, there have been more than 4 million downloads of the app, which is the highest rated panorama app in the iTunes App Store. (*ericb@mac.com*)

Aaron Block (Ph.D. 2008) is an assistant professor at Austin College in Texas. Last school year, he taught a class on making iPhone Apps for Austin College, and as a final project, his students constructed and released an Austin College iPhone App to the iTunes App Store. You can read more about the project at *http://www.austincollege.edu/39171/college-releases-student-made/* (*adblock@gmail.com*)

Marc Macenko (M.S. 2009) recently started his second year of law school at UNC. He is planning to be a patent

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attorney focusing on software patents and trying to help innovators in academia. He will graduate with his J.D. in 2013. (*macenko@gmail.com*)

Paul Merrell (Ph.D. 2009) worked as a postdoc at Stanford University since graduating from UNC, but recently started a job at Google. He also recently presented a paper at SIGGRAPH Asia and SIGGRAPH. (*pmerrell@cs.unc.edu*)

Mark Neyer (M.S. 2009) is now the CTO of a company called Popover Games. The company makes multiplayer card games for the web with iPhone and Android versions soon to follow. He is currently living in Kiev, Ukraine, where the company's outsourcing firm is based. (*mark@markpneyer.com*)

Undergraduate Alumni

Michael White (B.S.M.Sci. 1988) was recently promoted to associate professor with tenure in the Department of Linguistics at the Ohio State University, where he works on language technology. (*mwhite@brutus.ling.ohio-state.edu*)

Steve Cotton (B.S.M.Sci. 1997) has worked in the video gaming industry since graduating from UNC, first for Red Storm Entertainment, then for Microsoft, and most recently (since 2004) for Bungie in Seattle. (*www.bungie.net*) He reports that he is happy to talk to any future grads or alumni who might be interested in learning more about working in the booming video gaming industry. (*scotton@bungie.com*)

Paul Suh (B.S.M.Sci. 2000) will be presenting at the National Institute of Science and Technology's 7th Annual Security Automation Conference in Arlington, Va., October 31 – November 2, 2011. Paul will be covering "Emerging Trends in Automated Continuous Monitoring Operations Research" as part of the Continuous Monitoring Track. Please refer to *http://scap.nist.gov/events/index.html* for more information on registration and the latest conference details. (*suh_paul@bah.com*)

Charles Campbell (B.S.M.Sci. 2001) recently joined the startup company Socialvest (*www.socialvest.us*) as full-time CTO. The founder of Socialvest is UNC Computer Science alum **Adam Ross** (B.S.M.Sci. 2001). Socialvest allows shoppers to donate a portion of the money they spend to charities of their choosing. The company recently raised $1 million in Series A funding. (*charles_campbell@alumni.unc.edu*)

Michael Jay Manalo (B.S.M.Sci. 2001) graduated with his Ph.D. in Counseling Psychology from the University of Georgia on August 6, 2011. He is now working as a postdoctoral fellow at a psychology private practice in Athens, Ga. (*michael.jay.manalo@gmail.com*)

Nick Carr (B.S. 2002) is finishing his clerkship with Chief Justice Parker of the N.C. Supreme Court, and will be moving to Greensboro to become a patent attorney with Patterson & Sheridan, LLP, where he will be focusing on software and technology patents. (*nickc@email.unc.edu*)

Mark Huntington Snyder (B.S. 2004) completed his Ph.D. in Computer Science in July 2011 at the University of Kansas. He recently started work as a Term Assistant Professor at George Mason University in Fairfax, Va. He says it sure is nice getting back to the east coast! (*muddsnyder@yahoo.com*)

Friends of the Department

Liyun Yu, a postdoctoral fellow in 1994-1996 working with Steve Pizer, was promoted as a senior member of ACM in 2010 and a senior member of IEEE in 2011. He was also elected as a board member and second vice president of the InfraGard East Carolina Chapter from 2010-2011. He is currently a systems specialist working in the Department of Radiation Oncology at UNC. (*liyunyu@med.unc.edu*)

FAMILY MATTERS

Thomas Lassanske (M.S. 2002) and his wife, Roraima, welcomed a daughter, Chloe Sofia, on Feb 8, 2010, in Rockwall, Texas. Chloe joins big brother, Christopher, age 5. (*tlassanske@gmail.com*)

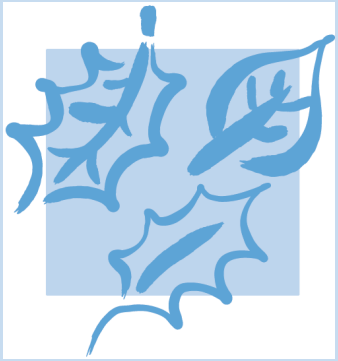
Mark Lindsey (M.S. 2003) and his wife, Hayden, welcomed a son, Simeon, in June 2010. Simeon joins big brother, Oren, born in 2007. (*lindsey@e-c-group.com*)

Charles Campbell (B.S.M.Sci. 2001) and his wife, Johnavae, welcomed a daughter, Charlyse Elaine, on April 10, 2011, in Chapel Hill, N.C. (*charles_campbell@alumni.unc.edu*)

Jeff Terrell (Ph.D. 2009) married Emily Nisch on May 7, 2011, at Ayr Mount in Hillsborough, N.C. (*jeff.terrell@acm.org*)

Michael Stewart (B.S. 2007) married Emily Mays on July 9, 2011, at Tanglewood Park in Clemmons, N.C. (*michael@thegreatmichael.com*)

Brian Clipp (Ph.D. 2010) and his wife, Rachel, welcomed a son, Robert Boyles, on August 29, 2011, in Durham, N.C. (*bclipp@cs.unc.edu*)



RECENT PUBLICATIONS

Alhadidi, A., L. Cevidanes, A. Mol, J. Ludlow, and M. Styner. "Comparison of two methods for quantitative assessment of mandibular asymmetry using cone beam computed tomography image volumes," *Dento Maxillo Facial Radiology*, Sept. 2011, vol. 40, no. 6, pp. 351-357.

Alterovitz, R., S. Patil, and A. Derbakova. "Rapidly-Exploring Roadmaps: weighing exploration vs. refinement in optimal motion planning," *Proc. of the IEEE International Conference on Robotics and Automation* (ICRA), May 2011, pp. 3706-3712.

Antani, L., A. Chandak, M. Taylor, and D. Manocha. "Direct-to-indirect acoustic radiance transfer," *IEEE Transactions on Visualization and Computer Graphics* (TVCG), 2011.

Bastoni, A., B. Brandenburg, and J. Anderson. "Is semi-partitioned scheduling practical?," *Proc. of the 23rd Euromicro Conference on Real-Time Systems*, Porto, Portugal, IEEE Computer Society Press, July 2011, pp. 125-135.

Brandenburg, B., and J. Anderson. "Real-time resource-sharing under clustered scheduling: mutex, reader-writer, and k-exclusion locks," *Proc. of the International Conference on Embedded Software*, Taipei, Taiwan, ACM Press, Oct. 2011.

Derbakova, A., N. Correll, and D. Rus. "Decentralized self-repair to maintain connectivity and coverage in networked multi-robot systems," *Proc. of the IEEE International Conference on Robotics and Automation* (ICRA), 2011.

Eastwood, B., L. Mair, and R. Taylor II. "A structured illumination method for microscope stage tracking," *Proc. of the International Conference on Image Processing, Computer Vision, and Pattern Recognition*, 2011, pp. 201-207.

Elliott, G., and J. Anderson. "An optimal k-exclusion real-time locking protocol motivated by multi-GPU systems," *Proc. of the 19th International Conference on Real-Time and Network Systems*, Nantes, France, Sept. 2011.

Elliott, G., and J. Anderson. "Real-world constraints of GPUs in real-time systems," *Proc. of the First International Workshop on Cyber-Physical Systems, Networks, and Applications*, Toyama, Japan, IEEE Computer Society Press, Aug. 2011.

Fronczek, D., C. Quammen, H. Wang, C. Kisker, R. Superfine, R. Taylor II, D. Erie, and I. Tessmer. (2011). "High accuracy FIONA-AFM hybrid imaging," *Ultramicroscopy*, 2011, vol. 111, no. 5, pp. 350-355.

Guy, S. J., S. Kim, M. C. Lin, and D. Manocha. "Simulating heterogeneous crowd behaviors using personality trait theory," *ACM SIGGRAPH/Eurographics Symposium on Computer Animation* (SCA), 2011.

Kenna, C., J. Herman, B. Brandenburg, A. Mills, and J. Anderson. "Soft real-time on multiprocessors: are analysis-based schedulers really worth it?," *Proc. of the 32nd IEEE Real-Time Systems Symposium*, Vienna, Austria, IEEE Computer Society Press, Dec. 2011, to appear.

Liu, C., and J. Anderson. "Supporting graph-based real-time applications in distributed systems," *Proc. of the 17th IEEE International Conference on Embedded and Real-Time Computing Systems and Applications*, Toyama, Japan, IEEE Computer Society Press, Aug. 2011.

Lobaton, E., J. Zhang, S. Patil, and R. Alterovitz. "Planning curvature-constrained paths to multiple goals using circle sampling," *Proc. of the IEEE International Conference on Robotics and Automation* (ICRA), May 2011, pp. 1463-1469.

Lovewell, R., and J. Kaur. "Impact of cross-traffic burstiness on the packet-scale paradigm," *Proc. of the 18th IEEE Workshop on Local and Metropolitan Area Networks* (LANMAN 2011), Chapel Hill, NC, Oct. 2011.

Mills, A., and J. Anderson. "A multiprocessor server-based scheduler for soft real-time tasks with stochastic execution demand," *Proc. of the 17th IEEE International Conference on Embedded and Real-Time Computing Systems and Applications*, Toyama, Japan, IEEE Computer Society Press, Aug. 2011.

Mollison, M., and J. Anderson. "Virtual real-time scheduling," *Proc. of the Seventh International Workshop on Operating Systems Platforms for Embedded Real-Time Applications*, Porto, Portugal, July 2011, pp. 33-40.

Niethammer, M., G. Hart, D. Pace, P. Vespa, A. Irimia, J. van Horn, and S. Aylward. "Geometric metamorphosis," *Proc. of the Conference on Medical Image Computing and Computer Assisted Intervention* (MICCAI), 2011, to appear.

Niethammer, M., Y. Huang, and F. Vialard. "Geodesic regression for image time-series," *Proc. of the Conference on Medical Image Computing and Computer Assisted Intervention* (MICCAI), 2011, to appear.

Olivier, S., A. Porterfield, K. Wheeler, and J. Prins. "Scheduling task parallelism on multi-socket multicore systems," *Proc. of the International Workshop on Runtime and Operating Systems for Supercomputers* (ROSS 2011), ACM, Tucson, Arizona, May 2011, pp. 49-56.

Pan, J., and D. Manocha. "Fast GPU-based locality sensitive hashing for K-nearest neighbor computation," *International Conference on Advances in Geographic Information Systems* (GIS 2011), 2011.

Pan, J., L. Zhang, and D. Manocha. "Collision-free and curvature-continuous path smoothing in cluttered environments," *Robotics: Science and Systems* (RSS), 2011.

Pan, J., S. Chitta, and D. Manocha. "Probabilistic collision detection between noisy point clouds using robust classification," *International Symposium on Robotics Research* (ISRR), 2011.

Paniagua, B., A. Alhadidi, L. Cevidanes, M. Styner, and I. Oguz. "Mandibular asymmetry characterization using generalized tensor-based morphometry," *IEEE Symposium on Biomedical Imaging*, 2011, pp. 1-4.

Patil, S., J. van den Berg, and R. Alterovitz. "Motion planning under uncertainty in highly deformable environments," *Proc. of Robotics: Science and Systems*, June 2011.

Peck, T., H. Fuchs, and M. Whitton. "An evaluation of navigational ability comparing redirected free exploration with distractors to walking-in-place and joystick locomotion interfaces," *Proc. of IEEE Virtual Reality*, Singapore, Mar. 19-23, 2011.

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Accounting Manager Catherine Perry celebrated 35 years of continuous state service on August 31, 2011. All but two of those years have been in the Department of Computer Science. Catherine joined the department as a secretary in August 1978. Prior to joining the department, she worked for two years as a tape librarian in the Computation Center in Phillips Hall.