News & Notes
from Sitterson Hall

**The University of North Carolina at Chapel Hill
Department of Computer Science**

PLEASE JOIN US!

All alumni and friends of the department are invited to join us for a ceremony honoring Steve Weiss and his many years as department chair!

**4:30 - 6:00 p.m.
Wednesday,
November 10, 2004
Sitterson Hall**

Chairman's corner

The Department of Computer Science has a new chair! Over the last 15 years Steve Weiss has led the department through tremendous growth and accomplishments, but now it is time for someone else, as he puts it, "to have all the fun."

As the new chair, I welcome your input and suggestions. This is an exciting time for the department. With our recently expanded faculty, we are embarking on some new directions, including building up our undergraduate program. Our alumna and IBM fellow Diane Pozefsky (Ph.D. 1979) has returned to our department part-time to help us expand our relationships with local industry.

We also continue to expand our collaborations with researchers in the Medical School, Biochemistry, Physics, and Environmental Science, among other disciplines. We're part of the Carolina Center for Genome Sciences, which was formed in 2001. The CCGS is a group of UNC faculty from 15 different departments and disciplines who are combining efforts to make major advances in genomics research. The new projects in the Rennaisance Computing Institute led by Dan Reed are further expanding these collaborations.

As an example of these collaborations, we welcome back to the department Ph.D. alumnus Martin Styner, who has taken a position as a research assistant professor. Martin will be splitting his time between our department and the department of psychiatry.

You may not recognize the view from Sitterson Hall these days, as construction continues behind our building on the Science Complex. Plans for the complex include an eventual Sitterson addition.

Congratulations to this year's Computer Science alumni fellowship recipient, Miguel Otaduy. For more about his research, see page 3. The alumni fellowship is made possible in part by generous contributions from alumni and friends of the department.

We welcomed 35 new graduate students to the department this fall, and we are looking forward to a busy year. Be sure to stop by Sitterson if you are in the area!

Jan F. Prins

Welcomes and Farewells

NEW FACULTY APPOINTMENTS

Martin Styner (Ph.D. 2001) returned to the department this summer as a research assistant professor, joint with the Department of Psychiatry. In his new position, Martin is the director of the Neurodevelopmental Research Core, a national research center based in the Department of Psychiatry.

Diane Pozefsky (Ph.D. 1979) has been named research professor of Computer Science, with a joint appointment as research scientist with the Institute for Renaissance Computing.

NEW GRADUATE STUDENTS

Ankur Agiwal, Manoj Ampalam, Brian Begnoche, Michael Brady, John Calandrino, Andrew Chen, Xifeng Fang, Casey Goodlett, Li Guan, Steven Hopper, Kevin Ivarsen, Sasa Junuzovic, David Knott,

Family matters

Eriko Iwasaki and **Bill Baxter** (Ph.D. 2004) welcomed **William Valentine Baxter IV** on August 31, 2004. *(baxter@cs.unc.edu)*

Jen and **Lars Bishop** (M.S. 1996) welcomed **Nadia Marie** on July 19, 2004. She was 6 lbs. and 19 inches, and has (surprise!) red hair. *(lmb@ndl.com)*

Lynne and **Dave Chen** (Ph.D. 1998) welcomed twins **Jacob** and **Elizabeth** on Sunday June 8, 2003, in Rockville, Md. *(dave@chen.net)*

Cindy Hong (B.S.M.S. 1996) married **Jeremy Sternberg** on October 13, 2003, in Kauai, Hawaii. *(hong@cs.unc.edu)*

William (Wm) Leler (Ph.D. 1987) married **Cindy von Ofenheim** on August 14 in Portland, Oregon. *(wm@leler.com)*

Candicelee Autry McDaniel, former front desk receptionist, and her husband **Jason** welcomed their third daughter, **Jasla Gabrielle** on September 29, 2003. She joins big sisters **Selina Kyle**, age 5 and **Sydney Kaitlin**, age 3. *(candicelee_mcdaniel@med.unc.edu)*

Bridgett and **Ransom Murphy** (M.S. 1993) welcomed their first child, **Abigail Faith**, on November 6, 2003. *(gmurphy@lucent.com)*

Diane and **Dan Palmer** (M.S. 1990, Ph.D. 1996) adopted **Katrina Joy Liangting** from China on November 5, 2003. Katie was born on January 2, 2003, and joins older sister **Emily**, who is 4 1/2. *(dpalmer@jcu.edu)*

Michelle and **Terry Talley** (M.S. 1993, Ph.D. 1997) welcomed **Sydney Michelle** on June 8, 2004. At birth, Sydney weighed 4 lbs 11 oz and was 18.5 inches tall. Big brothers **Drew** and **Ethan** welcome their little sister to the gang. *(Terry talley@acm.org)*

Linda and **Greg Welch**, research associate professor, welcomed their second son, **Carlos**, from Guatemala on April 7. Carlos, age 1 1/2, joins big brother **Donal**, age 3. *(welch@cs.unc.edu)*

Congratulations to…

Keith Lee, Jameson Miller, Vincent Noel, Michael Noland, Ipek Oguz, Claire O'Shea, Prashant Pai, Feng Pan, Rahul Prasad, Cory Quammen, Patrick Quirk, Nikunj Raghuvanshi, Rohit Saboo, Jeffrey Schoner, Jason Sewall, Morten Sommervoll, James Swafford, Jeffrey Terrell, Benjamin Wilde, Tynia C. Yang, Qi Zhang, Stefan-Cosmin Zota

Congratulations to…

FACULTY AND STAFF

Gary Bishop, associate professor, and **Guido Gerig**, Taylor Grandy Professor, who were the recipients of the 2003 - 2004 Computer Science Student Association Teaching Awards.

Dr. Frederick Brooks, Kenan Professor, who is the recipient of the 2004 Eckert-Mauchly Award. Administered jointly by the Association of Computing Machinery and the IEEE Computer Society, this award of $5,000 is given for contributions to computer and digital systems architecture where the field of computer architecture is considered at present to encompass the combined hardware-software design and analysis of computing and digital systems.

Katrina Coble, who was promoted to a University Administrative Manager III. Katrina was also named a Tar Heel of the Week by the *News & Observer* earlier this year for her work with the Carolina Blood Drive. You can read more about her work with the blood drive on page 5.

Alan Forrest, computing consultant, who was one of six individual winners of the 2004 Information Technology Awards for outstanding technical support at this year's campus-wide IT Awards Banquet.

Kevin Jeffay, S. Shepard Jones Distinguished Term Professor, and **Sanjoy Baruah**, associate professor, who were the first recipients of the Computer Science Club Undergraduate Teaching Awards. In addition, Kevin was the recipient of the 2004 Edward Kidder Graham Outstanding Faculty Award. The Graham award is sponsored by the senior class, the Division of Student Affairs, and the General Alumni Association.

Missy Wood, administrative staff member, who was the recipient of a Star Heel award.

GRADUATE STUDENTS

Sharif Razzaque, who was the recipient of the 2003-2004 Outstanding Teaching Assistant Award. Awarded yearly, the Outstanding Teaching Assistant receives a monetary award, generously funded by CS alumnus **John Glotzer** (M.S. 2000). Sharif was also recently named to the Royster Society of Fellows from The Graduate School.

Kelly Van Busum, Ph.D. candidate, who begins a tenure track Computer Science Faculty position at DePauw University in Indiana this fall. She will be teaching Graphics and two sections of Data Structures.

December 2003 Ph.D. Recipients: Jessica Renee Crawford Crouch, "Medial Techniques for Automating Finite Element Analysis." (Stephen M. Pizer)

Mark Jason Harris, "Real-Time Cloud Simulation and Rendering." (Anselmo Lastra)

2004-2005 STUDENT FELLOWSHIPS AND SPECIAL AWARDS

Aaron Block	National Science Foundation Fellowship
Andrew Chen	Sandia National Laboratories Scholarship
Greg Coombe	NVIDIA Fellowship
Uma Devi	IBM fellowship
Xifeng Fang	UNC-Chapel Hill Scholars for Tomorrow Scholarship
Todd Gamblin	National Science Foundation EAPSI Summer Fellowship
Russ Gayle	DOE High-Performance Computer Science Fellowship
Gennette Gill	National Defense Science and Engineering Graduate Fellowship
Justin Hensley	ATI Fellowship
Jason Jerald	National Physical Sciences Consortium Fellowship
Sasa Junuzovic	UNC-Chapel Hill Scholars for Tomorrow Scholarship
Keith Lee	National Science Foundation Alliance for Graduate Education and the Professoriate Program Research Assistantship
Brandon Lloyd	National Science Foundation Fellowship
Swaha Das Miller	Carol and Edward Smithwick Dissertation Fellowship
Claire O'Shea	UNC-Chapel Hill Graduate School Merit Assistantship
Peter Parente	National Science Foundation Fellowship
Sharif Razzaque	Ross and Charlotte Johnson Family Dissertation Fellowship
Jeff Schoner	UNC-Chapel Hill Graduate School Merit Assistantship
Josh Steinhurst	National Science Foundation Fellowship
Jeremy Wendt	National Science Foundation Fellowship

Yong-Jik Kim, "Time Complexity Bounds for Shared-memory Mutual Exclusion." (James Anderson)

Anand Srinivasan, "Efficient and Flexible Fair Scheduling of Real-time Tasks on Multiprocessors." (James Anderson)

May 2004 Ph.D. Recipients:
Thomas C. Hudson, "Adapting a Collaborative, Force-Feedback, Graphical User Interface to Best-Effort Networks." (Russell M. Taylor II and Kevin Jeffay)

Andrew Lewis Thall, "Deformable Solid Modeling via Medial Sampling and Displacement Subdivision." (Stephen M. Pizer)

August 2004 Ph.D. Recipients:
Naga Govindaraju, "Efficient Visibility-Based Algorithms for Interactive Walkthrough, Shadow Generation, and Collision Detection." (Dinesh Manocha)

Philip Holman, "Implementation of Pfair-scheduled Multiprocessor Systems." (James Anderson)

Hye-Chung (Monica) Kum, "Approximate Mining of Consensus Sequential Patterns." (Wei Wang and Dean Duncan)

Paul Michael Zimmons, "The Influence of Lighting Quality on Presence and Task Performance in Virtual Environments." (Frederick Brooks)

December 2003 M.S. Recipients:
Abhishek Ghosh, Naga Kiran Govindaraju, Jason J. Jerald, Julien Jomier, Theodore W. Kim, Wesley Francis Miaw, Miguel Angel Otaduy, Andrew Brian Raij, Avneesh Sud, Fang-Yi Tsai, Bingzhao Yang.

May 2004 M.S. Recipients:
Mithun Arora, Eric Paul Bennett, Eric Michael Burns, Megan Michelle Dunigan, Chad Michael Hantak, Bradford Eugene Hinson, Dennis S. Jen, Jun Jia, Huijuan Jiang, Aleksandra L. Krstic, Alan Paul Levicki, Yuanxin Liu, Ajith Arthur Mascarenhas, Kimberly Isobel Noonan, Peter J. Parente, Marcelinus Widita Prastawa, Jonathan W. Robbins, Travis David Sparks, Jason Eliot Stewart, Gabriel Zhi-Jun Su, Gokul Varadhan, Nolan Ryan Walker, Nathaniel C. Williams, Alicia Louise Wright, Hua Yang, Sung-Eui Yoon.

August 2004 M.S. Recipients:
David Renfro Sassen, Abhishek Singh.

UNDERGRADUATE STUDENTS

Lisa Fowler, who was the recipient of the first Charles H. Dunham Scholarship in Computer Science. This merit-based scholarship was founded last year by the Dunham family and SAS Institute Inc. in memory of **Charles H. Dunham**, a 1975 Mathematical Sciences graduate who passed away in 2002. The scholarship is awarded to a rising junior and includes a monetary award and a paid summer internship at SAS. Lisa is co-president of the undergraduate Computer Science Club.

December 2003 B.S. Recipients:
Matthew Ryan McCallus, Jameson Miller, Hiu Ling Wong*, In Hyuk Lee.

May 2004 B.S. Recipients:
John William Bartelme Jr.*, James Anthony Boccardo**, Anthony Scott Buscemi, Elango Cheran**, Douglas Maguire Daniell, Kathleen Ann Delker, Meghan Danielle Dickenson**, Nicole Natasha Duggins, Patrick Michael Dwyer, Jack Louis Enloe, Amy Rae Fox, Brian Elliott Foxx, Brandon David Ganch*, Christopher Figueroa George, Oliver Harris Gray, Robert Heimir Helgason, Jasen Warren Hoover, David James Jack, Paul Jerome Kamen, Steven Y. Kim, Brian Jay Kronengold, Anil P. Kumar**, John Edward Madsen III*, Sunil S. Nagaraj*, Chintan A. Patel, Paul Raffaele Perello, Patrick Jacob Quirk, Joshua Michael Rothenberg, Michael Steven Schmidt, Joseph Louis Sedito**, Anuj Kumar Sharma, Ryan Gilbert Simmen, Leland Burton Smith, Mark Huntington Snyder*, Peter Spalding VanLund**, George Allen Wagner, Braxton Deams West**, Jessica Ryan Whitley, Benjamin Gustav Wilde*, Eric Kevin Wuthenow Jr., Chong Chuan Xiao.

August 2004 B.S. Recipients:
Trung Huynh-Duc, Konrad Reszka.

*With Honors **With Highest Honors

Grants and Contracts

James Anderson, professor (PI), and **Sanjoy Baruah**, associate professor (Co-PI). "Real-time Fine-grained Adaptivity on Multiprocessors: Acoustic Tracking as a Test Case," NSF.

Gary Bishop, associate professor, 2004 Ueltschi Service-Learning Course Development Grant.

Jasleen Kaur Sahni, assistant professor (PI). "CAREER: Reassessing the Foundations of Internet Transport," NSF.

Ming C. Lin, professor (PI). "Physically-Inspired Modeling for Haptic Rendering," NSF.

Ming C. Lin, professor (PI); **Richard Superfine**, adjunct associate professor (Co-PI); and **Russell M. Taylor II**, research associate professor (Co-PI). "Modeling and Simulation of Fibrin Fibers," NSF.

Dinesh Manocha, professor (PI), and **Ming C. Lin**, professor (Co-PI). "Interactive OneSAF Computations using COTS Graphics Hardware," DARPA.

Dinesh Manocha, professor (PI), and **Ming C. Lin**, professor (Co-PI). "Multiresolution Algorithms for Virtual Prototyping of Massive CAD Models," NSF.

Jan F. Prins, professor and chair (PI), University of Maryland, "Unbalanced Tree Search Benchmark," NSA.

Jack Snoeyink, professor (PI). "Collaborative Research: Fundamentals and Algorithms for Streaming Meshes," NSF.

4 Recent publications

Anderson, J., and A. Srinivasan. "Mixed Pfair/ER-fair Scheduling of Asynchronous Periodic Tasks," *Journal of Computer and System Sciences*, 68(1): 157-204, February 2004.

Baxter, W., and M.C. Lin. "A Versatile Interactive 3D Brush Model," *Proc. of Pacific Graphics*, 2004.

Baxter, W., and M.C. Lin. "Haptic Interaction with Fluid Media," *Proc. of Graphics Interface*, 2004.

Baxter, W., J. Wendt, and M.C. Lin. "IMPaSTo: A Realistic, Interactive Model for Paint," *International Symposium on Non-Photorealistic Animation and Rendering*, 2004.

Baxter, W., Y. Liu, and M.C. Lin. "A Viscous Paint Model for Interactive Applications," *Computer Animation and Social Agents*, 2004.

Dwyer, C., R. Taylor, and L. Vicci. "Performance Simulation of Nanoscale Silicon Rod Field-Effect Transistor Logic," *IEEE Transactions on Nanotechnology*, 2(2): 69-74, 2003.

Dwyer, C., R. Taylor, L. Vicci, and J. Poulton. "Parallel Computer Architectures Enabled by Self-Assembly," *Proc. of the 1st Conference on the Foundations of Nanoscience*, April 2004.

Farthing, M., C. Miller, D. Sassen, and J. Prins. "A problem solving environment for subsurface flow and transport phenomena," *International Conference on Computational Methods in Water Resources XV*, Elsevier, 2004.

Fragia, T., and R.M. Taylor II. "Fluid Cloth," *HorizonZero* online publication, Dream Team Project, *http://www.horizonzero.ca*, Issue 15, May/June 2004.

Govindaraju, N., B. Lloyd, W. Wang, M.C. Lin, and D. Manocha. "Fast Database Operations using Graphics Processors," *Proc. of ACM SIGMOD*, 2004.

Govindaraju, N., M.C. Lin, and D. Manocha. "Fast and Reliable Collision Culling using Graphics Processors," *ACM VRST 2004*.

Huan, J., W. Wang, J. Prins, and J. Yang. "SPIN: Mining Maximal Frequent Subgraphs from Graph Databases," *Proc. of the 10th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD)*, 2004.

Huan, J., W. Wang, D. Bandyopadhyay, J. Snoeyink, J. Prins, and A. Tropsha. "Mining Protein Family Specific Residue Packing Patterns From Protein Structure Graphs," *Proc. of the International Conference on Research in Computational Molecular Biology (RECOMB)*, 2004.

Hudson, T., M. C. Whitton, A. Helser, and D. H. Sonnenwald. "Managing collaboration in the nanoManipulator," *Presence*, 13(2), 2004.

Ilie, A., K-L. Low, G. Welch, A. Lastra, H. Fuchs, and B. Cairns. "Combining Head-Mounted and Projector-Based Displays for Surgical Training," *Presence: Teleoperators and Virtual Environments*, 13(2), 2004.

Jen, D., P. Parente, J. Robbins, C. Weigle, R. M. Taylor II, A. Burette, and R. Weinberg. "Investigating Dendritic Spines Using Computer Visualization Techniques," *Proc. of IEEE Visualization 2004*.

Jerald, J. "Latency Compensation for Head-Mounted Virtual Reality." Computer Science Technical Report Number: TR04-015, 2004.

Jones, M. G., T. Andre, D. Kubasko, A. Bokinski, T. Tretter, A. Negishi, R. M. Taylor II, and R. Superfine. "Hands-on Investigations with Microscopic Organisms," *Science Education*, 2004.

Jones, M. G., T. Andre, D. Kubasko, A. Bokinski, T. Tretter, A. Negishi, R. M. Taylor II, and R. Superfine. "Remote Atomic Force Microscopy of Microscopic Organisms: Technological Innovations for Hands-On Science with Middle and High School Students," *Science Education*, 2004.

Jones, G., T. Andre, R. Superfine, and R. M. Taylor II. "Learning at the Nanoscale: The Impact of Students' Use of Remote Microscopy on Concepts of Viruses, Scale, and Microscopy," *Journal of Research in Science Teaching*, 40(3): 303-322, 2003.

Jones, G., T. Tretter, A. Bokinski, and A. Negishi. "Haptic technology and learning," *Haptics-e*, 2004.

Kim, T., and M.C. Lin. "Physically Based Animation and Rendering of Lightning," *Proc. of Pacific Graphics*, 2004.

Kim, T., M. Henson, and M.C. Lin. "A Hybrid Algorithm for Modeling Ice Formation," *Proc. ACM SIGGRAPH/Eurographics Symposium on Computer Animation 2004*.

Lin, M.C., W. Baxter, V. Sheib, and J. Wendt. "Physically Based Virtual Painting," *Communications of the ACM*, August 2004.

Lloyd, B., J. Wendt, N. Govindaraju, and D. Manocha. "CC Shadow Volumes," *Eurographics Symposium on Rendering*, 2004.

Lok, B., S. Naik, M. C. Whitton, and F. P. Brooks Jr. "Effects of Handling Real Objects and Self-Avatar Fidelity on Cognitive Task Performance and Sense of Presence in Virtual Environments," *Journal on Presence: Teleoperators and Virtual Environments*, 12(6): 615-628, 2004.

Mantler, A., and J. Snoeyink. "Banana Spiders: A Study of Connectivity in {3D} Combinatorial Rigidity," *Proc. of the 16th Canadian Conference on Computational Geometry*. Montreal, Quebec. August 2004, 44-47.

Ott, D., and K. Mayer-Patel. "Coordinated Multi-streaming for 3D Tele-immersion," *ACM Multimedia 2004*. October 2004.

Ott, D., T. Sparks, and K. Mayer-Patel. "Aggregate Congestion Control for Distributed Multimedia Applications," *IEEE INFOCOM 2004*. March 2004.

Pan, C., J. Prins, and C. Miller. "A High-performance Lattice Boltzmann Implementation to Model Flow in Porous Media," *Computer Physics Communications*, Vol. 158, No. 2, pp. 89-105, 2004.

Redon, S., M.C. Lin, D. Manocha, and Y.J. Kim. "Fast Continuous Collision Detection for Articulated Models," *Proc. ACM Symposium on Solid Modeling and Applications*, 2004.

Redon, S., Y.J. Kim, M.C. Lin, D. Manocha, and J. Templeman. "Interactive and Continuous Collision Detection for Avatars in Virtual Environments," *Proc. of the IEEE Virtual Reality Conference*, 2004.

Seeger, A., C. Fretzagias, and R. Taylor II. "Software Acceleration Techniques for the Simulation of Scanning Electron Microscope Images," *Scanning*, 25: 264-273, 2003.

Stadermann, M., S. J. Papadakis, M. R. Falvo, J. Novak, E. Snow, Q. Fu, J. Liu, Y. Fridman, J. J. Boland, R. Superfine, and S. Washburn. "Nanoscale study of conduction through carbon nanotube networks," *Physical Review B*, 69(20): 201402, 2004.

Taylor II, R.M., C. Ware, and V. Interrante. "Perceptually-Based Visualization Design," Course notes for SIGGRAPH 2003 course #45, Full-day course on visualization organized by R.M. Taylor II. San Diego. pp. 1-281. July 26-31.

Taylor II, R. M., D. Borland, F. P. Brooks Jr., M. Falvo, M. Guthold, T. Hudson, K. Jeffay, G. Jones, D. Marshburn, S. J. Papadakis, L.-C. Qin, A. Seeger, F. D. Smith, D. H. Sonnenwald, R. Superfine, S. Washburn, C. Weigle, M. C. Whitton, P. Williams, L. Vicci, and W. Robinett. "Visualization and Natural Control Systems for Microscopy." In: *Visualization Handbook*; Edited by C. Johnson and C. Hansen. Harcourt Academic Press. 2004.

Varadhan, G., and D. Manocha. "Accurate Minkowski Sum Approximation of Polyhedral Models," *Pacific Graphics*, 2004.

Varadhan, G., S. Krishnan, T.V.N. Sriram, and D. Manocha. "A Simple Algorithm for Complete Motion Planning of Translating Polyhedral Robots," *Sixth International Workshop on the Algorithmic Foundations of Robotics*, 2004.

Varadhan, G., S. Krishnan, T.V.N. Sriram, and D. Manocha. "Topology Preserving Surface Extraction Using Adaptive Subdivision," *Second Eurographics Symposium on Geometry Processing*, 2004.

Ward, K., N. Galoppo, and M.C. Lin. "Modeling Hair Influenced by Water and Styling Products," *Computer Animation and Social Agents*, 2004.

Yang, R., M. Pollefeys, H. Yang, and G. Welch. "A Unified Approach to Real-Time, Multi-Resolution, Multi-Baseline 2D View Synthesis and 3D Depth Estimation using Commodity Graphics Hardware," *International Journal of Image and Graphics (IJIG)*, 4(4): 1-25, 2004.

Katrina Coble gives back *with heart*

As many as 3,099 people were helped this summer by blood donated at the 16th annual Carolina Blood Drive. The blood drive is the largest single day, single collection site blood drive on the East Coast, and brings together hundreds of donors, volunteers, local vendors and media members.

Katrina Coble, Computer Science director of administrative services, is chairwoman of the 14-person committee that organizes the drive. Earlier this year, Katrina received the University's Robert E. Bryan Public Service Award from the Carolina Center for Public Service for her work with the Carolina Blood Drive. The Bryan Public Service Award honors the memory and accomplishments of alumnus Robert E. Bryan and recognizes individuals who, as representatives of UNC-Chapel Hill, have demonstrated exemplary public service to the state of North Carolina. More recently, Katrina was named Tar Heel of the Week by the News & Observer in Raleigh.

But, like any good leader, Katrina is more proud of the recognition the blood drive committee has gotten than of her individual accomplishments. In October, Katrina will travel to Baltimore, Md., with Anne Webb, Carolina Blood Drive volunteer coordinator, and Jeff Davis, Red Cross senior donor recruitment representative, to accept the 2004 Award of Merit in the education category from the American Association of Blood Banks (AABB). The Awards of Merit are presented annually by the AABB to groups and individuals who have made significant contributions to blood banking and transfusion medicine.

"This award of merit recognizing the Carolina Blood Drive as a premier event is humbling for the whole committee and is particulary impressive for the University," Katrina said. "There are many giving individuals at UNC-Chapel Hill who contribute their precious blood, time and efforts towards the needs of others. This award recognizes them."

Research highlights

Interactive Collision Detection using Graphics Hardware

Naga Govindaraju, Ming C. Lin, Dinesh Manocha

Collision detection is a fundamental problem in several applications such as computer games, virtual reality, robotics, engineering simulations, and physically-based modeling. Collision detection is often one of the major computational bottlenecks in dynamic simulation of complex systems. The problem of checking for collisions between static and dynamic objects has been well studied over the last few decades. Many of these algorithms involve preprocessing and are designed to work well for objects undergoing rigid motion. However, current techniques are unable to perform proximity queries between deformable models or objects undergoing non-rigid motion at interactive rates. Such scenarios frequently arise in computer gaming, cloth simulation, surgical simulation and dynamic terrains.

Recently, graphics processing units (GPUs) are increasingly used for general-purpose applications including scientific computations, global illumination, and database operations. The growth rate of GPUs has been higher than the Moore's Law and the GPUs are becoming more programmable. The GAMMA group at UNC Chapel Hill is developing reliable and interactive algorithms for collision and proximity computation between rigid and non-rigid objects in complex environments using GPUs. These algorithms take into account low bandwidth beween the CPU and GPU and compute a potentially colliding set (PCS) of objects using visibility queries. They involve no preprocessing and the computation proceeds in multiple stages: PCS computation at an object level and PCS computation at sub-object level, followed by exact collision detection between the underlying primitives. Each PCS is computed by using a linear time two-pass rendering algorithm. To overcome the sampling and precision problems in GPUs, the pruning algorithm sufficiently fattens each triangle in the PCS. The fattened primitive is expressed as the Minkowski sum of each triangle with a sphere and is used to perform reliable 2.5-D overlap tests using GPUs. The resulting algorithm is applicable to polygon soup models and guarantees that no collisions will be missed due to limited frame-buffer precision or quantization errors during rasterization. Furthermore, the algorithm can handle environments consisting of thousands of objects or hundreds of thousands of polygons at interactive rates and can also check for self-collisions.

The algorithm has been implemented on a PC with a commodity graphics processor such as the NVIDIA GeForce FX 5900 Ultra graphics card. The resulting system has been applied to different environments composed of a high number of moving objects. These include breaking objects, cloth simulation and deformable models. The algorithm is able to compute all the overlapping primitives in a few milliseconds. The results of this research were presented at ACM/Eurographics Graphics Hardware 2003, ACM SIGGRAPH 2004 and ACM VRST 2004. The GAMMA group has also designed GPU-based algorithms for distance field computation, path planning, database operations and fluid simulation. More details about these projects are available at: *http://gamma.cs.unc.edu/hardware/index.shtml*.

Environment with breakable objects: As the bunny (with 35K triangles), falls through the dragon (with 250K), the number of objects in the scene (shown with a yellow outline) and the triangle count within each object changes. The collision detection algorithm computes all the overlapping triangles during each frame. The average collision query time is 35 msec on a PC with an NVIDIA GeForce FX 5900 GPU.

# Facetop - Transparent Video Interface

Developed by Associate Professor **David Stotts** and graduate student **Jason McC. Smith**, Facetop allows a computer user with an inexpensive consumer webcam to effectively and precisely control the cursor using simple hand and finger gestures. The user sees their image superimposed on the rest of the computer's graphical user interface as a transparent overlay. All "desktop" content can still be seen, but the user appears to themselves as a faint image, as if looking through a window in which they can see their own reflection. The image can be made to fade out completely or become more opaque at any time.

Facetop's utility extends beyond a single user sitting at a terminal. Public presentations often require the speaker to be mobile on a stage or in front of a classroom and unable to directly control the host computer displaying slides onto a screen. Slide advance devices and optical pointer devices such as laser pointers are awkward and easily lost. With Facetop, the presenter appears as a transparent figure "over" the slide content and interacts directly with it, becoming highly visible to the audience. The direct manipulation by the presenter of slide content is a compelling visual cue to the viewers and extends to slide advancement triggered by gestures which facilitates smooth transitions in the speech. At any time, the presenter can choose for their image to fade, creating a pristine slide content view for the audience.

A "distance collaboration" mode allows for two figures to be displayed on the same desktop, ideal for tasks such as pair-programming and truly interactive video-conferencing. This allows two (or more) individuals to work on the same document, on multiple separate desktops, naturally and interactively. This blends the best of video conferencing communication with Facetop's direct gesture manipulation of digital content. In addition, assistive technologies integrate well with Facetop, helping those with impaired vision, hearing and motion to interact with each other and their computer.
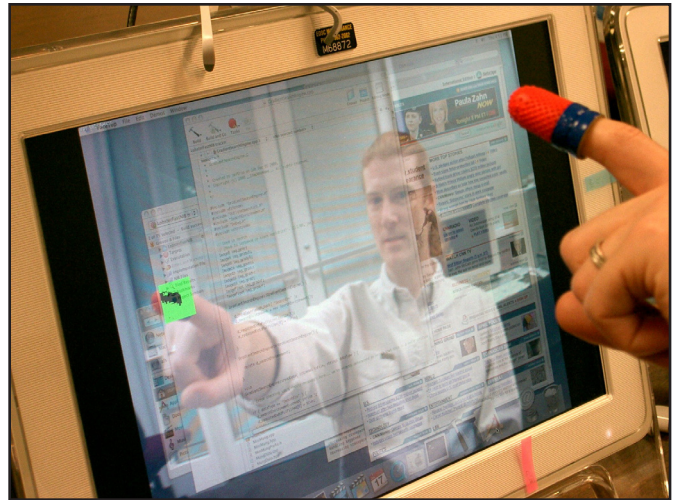

Graduate student **Jason Smith** demonstrates Facetop's single user mode.

Books for the University of Mosul

When Research Associate Professor **Greg Welch** received an email from a student in the department of statistics at the University of Mosul in Iraq asking for his help, he responded immediately. The student found Greg through a "Kalman filter" Web site that Greg maintains with Associate Professor **Gary Bishop**. The student, who was doing research in a related area, told Greg that most of the related books at the university had been destroyed, and asked for help in getting several specific books so he could continue his research. Greg contacted the publishers and authors of the books, who were happy to make donations.

The challenge then, however, was getting the books to the student in Mosul. There was no way to ship them directly, but Greg found a U.S. Marine who knew a translator who knew someone in Mosul who could deliver the books. **Tammy Pike**, receptionist, and **Marie Tarjan**, administrative staff member, helped Greg send the books to the Marine.

Greg later received email from both the student he helped as well as the U.S. Marine who delivered the books, who said it was "good to know that people support what we are doing here" and that he was grateful that Greg and others would help by supporting the education of the people of Iraq. Greg has continued corresponding with the Marine, who, among other things, longs for a McDonald's cheeseburger.
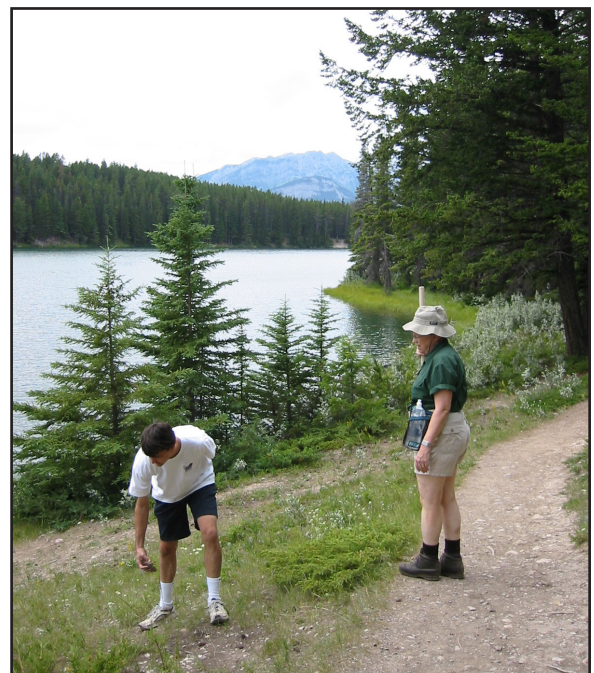
Professor **Jack Snoeyink** looks for skipping stones while J.B. Duke Professor of Biochemistry **Jane Richardson** looks on. The two, along with graduate student **Andrea Mantler** and Duke Professor of Biochemistry **David Richardson**, were attending a conference at Banff International Research Station near Calgary, Alberta, Canada. The photo above was taken during a hiking break. (photo: Andrea Mantler)

M.S. AND PH.D. ALUMNI

Edo Biagioni (Ph.D. 1992) was recently promoted to Associate Professor with tenure at the University of Hawaii at Manoa, Department of Information and Computer Sciences. (*esb@hawaii.edu*)

Alex Blate (B.S. M.Sci. 1999, M.S. 2000) has taken a position as Interoperations Manager at Sylantro Systems in Campbell, Calif., after three years as Director of Quality Assurance at Interval Research in Palo Alto, Calif. Sylantro is a provider of IP PBX and Centrex software solutions to Tier 1 carriers. He still lives in Mountain View, Calif. (*blate@blate.net*)

Michael Capps (B.S. M.Sci. 1994, M.S. 1996) became President of Epic Games, Inc., in Raleigh in April 2004. Epic is best known as the makers of the multi-million selling Unreal computer game series, as well as the Unreal game engine. It's a great mix of research and development for cutting-edge applications on next-generation PC and console hardware. *http://www.unrealtechnology.com.* (*Mike.Capps@epicgames.com*)

Susan Gauch (Ph.D. 1990) has been promoted to Professor in the EECS department of the University of Kansas. **John Gauch** (Ph.D. 1989) is also there as Associate Professor in the Department of Electrical Engineering and Computer Science (EECS) and Associate Chair for Graduate Studies. (*sgauch@ittc.ku.edu, jgauch@eecs.ku.edu*)

Steve Goddard (Ph.D. 1998) has been promoted to Associate Professor of Computer Science & Engineering with tenure at the University of Nebraska at Lincoln.

Gopi Meenakshisundaram (Ph.D. 2001) has been honored with the excellence in teaching award for 2003-04 by the Division of Undergraduate Education at the University of California, Irvine. Further, each graduating honors student is allowed to choose at most one faculty who has had an exceptional impact on the student's education at UCI. Gopi has been nominated for this honor by more than one student for two consecutive years. Gopi has been a tenure-track faculty in the Department of Computer Science at UCI since fall 2001. (*GOPI@uci.edu*)

Daniel Palmer (M.S. 1990, Ph.D. 1996) and colleagues at John Carroll University hosted WASP '03 (Workshop on Agent/Swarm Programming) in cooperation with ACM on October 4, 2003. The one-day workshop featured a poster session for undergraduates, papers from swarm researchers and a tutorial session for advanced high school students. Selected papers from the workshop have been submitted to the ACM Digital Library. Also, Daniel co-authored Extreme Software Engineering: A Hands-On Approach, a textbook introducing the practice of extreme programming in a project-centric course, with Daniel H. Steinberg. The book was published in October 2003 by Prentice-Hall. The textbook's approach was inspired in part by the software engineering course taught at UNC-CH. (*dpalmer@jcu.edu*)

Roy P. Pargas (M.S. 1981, Ph.D. 1982) received the 2003 Award for Innovative Excellence in Teaching, Learning and Technology from the Center for the Advancement of Teaching and Learning in Jacksonville, Florida. Roy is currently an Associate Professor of Computer Science at Clemson University in South Carolina. (*pargas@clemson.edu*)

Chris Schleter (M.S. 1981) is still in Torino, Italy, working as the on-site Project Manager for Swiss Timing (the timing, scoring and results provider) for the 2006 Olympic Winter Games. He went to Athens in early August as the crew chief for baseball and softball for Swatch for the 2004 Olympic Games. This was his 3rd consecutive Olympic Games as Results Manager for baseball. (*sprtstat@ix.netcom.com*)

UNDERGRADUATE ALUMNI

Cindy Hong (B.S. M.Sci. 1996) left ESC Entertainment in October 2003, after working on the Matrix sequels, and started working at PDI/Dreamworks as a lighter in November 2003. She's now working on Madagascar, to be released in May 2005. (*hong@cs.unc.edu*)

Phillip (Byron) Kinnaird (B.S. 2001) took a part time job at UPS as an off-the-street package handler and was soon promoted to UPS Professional Services (PSI), a UPS sub-group responsible for customer systems integration and home-grown solutions for UPS' corporate clients. He says the work is very dynamic and covers a broad range of hardware, operating systems, and integration environments. His office is based out of Richmond, Va., and he is currently pursuing a Master's Degree in Computer Science from Virginia Commonwealth University's School of Engineering, also in Richmond. (*byronkinnaird@yahoo.com*)

Cynthia "Kiki" Pettit (B.S. M.Sci. 1995) was recently on The Learning Channel show "Junkyard Wars" for the second time. She was part of an all-female team for a very special episode -- a race from LA to Las Vegas. She was also recently part of the Fire Arts Festival with her water fountain on fire -- the Firefall. (*http://burningideas.com/firefall*) In addition, she is teaching Special Effects full time at the Academy of Art University in San Francisco this fall. (*kiki@kiki.org*)

FORMER FACULTY AND STAFF

James Coggins, former associate professor and associate chair for academic affairs, has been named Principal Engineer at Alphatech, Inc., of Burlington, Mass. The principal focus of his job will be on automated target recognition in synthetic aperture radar imagery, but he will have a consultative role in other image analysis activities, including tracking, registration, georegistration, and other tasks in optical and video imagery. *http://www.alphatech.com* (*James.Coggins@netiq.com*)

News & Notes
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Let us know where you are and what you are doing so that we can include you in our next issue! Send us information via e-mail to *pubs@cs.unc.edu*; fax it to (919) 962-1799; or mail it to the address below, c/o News & Notes. If you fax or mail your information, please include your e-mail address.

Throughout News & Notes, we list degree information for all our B.S., M.S., and Ph.D. Computer Science and Math Sciences alumni.

Construction on Phase I of the Science Complex, as seen behind Sitterson Hall, is well underway. (photo: Kelli Gaskill)