News & Notes from Sitterson Hall

Issue Twenty-Six, Winter 1999-2000

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

In This Issue

Chairman's Corner

Greetings and a happy New Year from Chapel Hill. Our spring semester began with a record-breaking snowfall in late January. Around the Triangle area, as much as 16 to 20 inches of snow fell. The large accumulation of snow and ice forced the University to close for three days.

As many of you already know, **Fred Brooks**, Kenan professor, has won the 1999 ACM A. M. Turing Award. Congratulations, Fred! ACM recognized Fred for his landmark contributions to computer architecture, operating systems, and software engineering. Fred will receive the award at ACM's annual awards banquet in May. See **below** for more information about Fred's lifetime contributions to computer science.

I'm also very pleased to announce that **Voicu Popescu** is the newest recipient of our Alumni Fellowship. See **below** for more about Voicu's research. The Alumni Fellowship is made

possible by generous contributions from alumni and friends. We thank you very much for your support.

We welcomed our newest faculty member, **Ketan Mayer-Patel**, assistant professor, to the Department in December. Ketan recently defended his dissertation at the University of California at Berkeley. See below for more about him.

As we announced in our fall issue, **Gyula Mago** retired recently after 29 years on our faculty. We will hold a reception for him later this spring. All current and former faculty, staff, and students are invited. We will mail out the details and also post them on our web site *(www.cs.unc.edu).*

Thanks to a generous new grant from the Frances C. and William P. Smallwood Foundation, we can continue upgrading the C. Hugh Holman Teleclassroom facilities. See **below** for our plans.

Stay tuned to our web site for the latest news about us, or stop by if you are in the Chapel Hill area.

Stephen F. Weiss

Welcomes and Farewells

New Faculty Appointment

Ketan Mayer-Patel, assistant professor, Ph.D. 1999, California-Berkeley. *Multimedia systems; networking; multicast applications.*

Ketan joined us in January as an assistant professor. He recently defended his doctoral dissertation in computer science, "Parallel Software-Only Video Effects Processing System," at the University of California at Berkeley. His research focuses on multimedia systems and networking. In particular, he is interested in multimedia applications that use multicast communication protocols. This spring he is teaching a seminar, "Topics in Multimedia Systems."

Visiting Researchers

Lutz Kettner joined us in October as a postdoctoral researcher. He is working with Jack Snoeyink, professor. Lutz defended his doctoral dissertation in computer science in September at the Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland. His dissertation work was the study of software design in computational geometry and contour-edge based polyhedron visualization. Lutz's research interests are computational geometry, graphics, and software design.

Daniela Genius joins us from February to December as a postdoctoral researcher. She will work on the TUNE Project with Siddhartha Chatterjee, associate professor. Daniela received her doctoral degree in computer engineering in January from the Universitat Karlsruhe in Germany. Her dissertation work was in cache optimization, which will also be the focus of her research with the TUNE Project. Daniela's other research interests are declarative programming, high performance computing, compilers, and processor architecture.

New Students, Spring 2000

Hamish Carr, Martin Isenburg, Andrea Mantler, Govindra Sampathkumar, and Andrew Zaferakis

New Staff

Scott Russell, administrative secretary for Henry Fuchs, Federico Gil professor, joined us in August. He received a B.A. in Communication Studies from UNC-Chapel Hill in 1998. Previously, he was a residential technician at the Mental Health Association of North Carolina in Raleigh, N.C.

Leaves of Absence

John G. Eyles, research associate professor, **John Poulton**, research professor, and **Stephen G. Tell**, senior research associate, are on off-campus assignment, from December to July. They are building chips for Chip2Chip, a Silicon Valley start-up that is developing silicon technology for high-speed interconnects.

Nick England, research professor, and **Lars Nyland**, research associate professor, are on off-campus assignment at the Corporation for Development of Advanced Technology (see **below**). Nick is on full-time leave for six months, and Lars is on half-time leave for six months.

Thanks and Farewell to...

Todd Gaul, video production specialist, who left in September to pursue freelance video and photography projects. He had worked with us since August 1996.

Gayle Rice, who accepted a promotion to Accounting Technician III at Administrative Information Services at UNC-Chapel Hill in January. She had been with us since February 1998.

Congratulations to...

Sara Bidgood, Waymoth Boyd, Mark Griffin, Tejas Patel, and **Bradley Timmers**, students in the computer science option of the Mathematical Sciences curriculum, who were inducted into Phi Beta Kappa on 22 November.

David A. Plaisted, professor, who has been elected to a three-year term as a trustee of the Conference on Automated Deduction.

To those faculty and staff who reached the following levels of state service during 1999:

25 years: John Thomas
20 years: Timothy L. Quigg
15 years: Donna Boggs, John Halton, David Plaisted, John Smith, and Jane Stine
10 years: Gary Bishop, Kevin Jeffay, and Mike Stone
5 years: Siddhartha Chatterjee, Debra Core, David Musick, Lori Rodman, and Russell M. Taylor II

And to our December graduates:
Ph.D.
Rui Bastos, "Superposition Rendering: Increased Realism for Interactive Walkthrough" (Advisor: Frederick P. Brooks Jr.)
James Riely, "Applications of Abstraction for Concurrent Programs" (Jan F. Prins)
William J. Yakowenko, "Propositional Theorem Proving by Semantic Tree Trimming for Hardware Verification" (David Plaisted)

M.S.
Eric Baker, Lin Cui, Xiaohu Guan, Jeffrey Juliano*, Aditi Majumder*, and Zhiwei Xiao

* On to Ph.D. at UNC-Chapel Hill

B.S. Mathematical Sciences, Computer Science Option
Randol Berger, David Britt, Thomas Byers, Maria Doyle, Amanda Erickson, Jonathon Hayes, Cherie Hipps, Randall Murdock, and Clark Walton

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Alumni Fellowship Winner

Congratulations to **Voicu Popescu**, recipient of the ninth annual Department Alumni Fellowship. The award is supported by the Alumni Trust Fund and is given to Ph.D. candidates in their final year of study, allowing them to work full time on dissertation research.

Voicu is working on his dissertation, "High-Quality Forward Reconstruction for 3D Warping Efficiently Implementable in Hardware," under the guidance of **Anselmo Lastra**, research associate professor. In recent years, many computer graphics researchers have focused on using photographic images as rendering primitives. Image-based rendering (IBR) overcomes the modeling bottleneck associated with rendering from geometric models and promises photorealism at interactive rates. Three-dimensional image warping is a very appealing IBR technique, but quality output images can be reconstructed only by sacrificing interactivity, even when the latest rendering hardware is used. Voicu has produced a high-quality forward reconstruction algorithm for 3D image warping that can be implemented efficiently in hardware.

He and fellow researchers have devised the WarpEngine IBR architecture, which is based on his algorithm. Their experiments indicate that the WarpEngine will be capable of producing high-quality high-resolution images at sustained interactive frame rates.
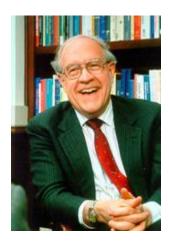

Brian White, Computer Services director, Russell M. Taylor II, research assistant professor, and Frederic R. Jordan, electronics shop supervisor, enjoy the Department's annual holiday lunch in December. (Photo: Claire Stone)

Fred Brooks wins 1999 Turing Award

Frederick P. Brooks Jr., Kenan professor, has received the Association for Computing Machinery's (ACM) 1999 A. M. Turing Award, considered the "Nobel Prize of Computing." The award, ACM's most prestigious, is given to an individual who has made technical contributions of lasting importance to the computer field. ACM cited Fred for his landmark contributions to computer architecture, operating systems, and software engineering--contributions that have stood the test of time and shaped the way people think about computing.

ACM will honor Fred at its annual awards banquet in San Francisco, Calif., on 6 May. A $25,000 prize accompanies the award. Fred will present his Turing Award lecture, "The Design of Design," at SIGGRAPH 2000 in New Orleans, La., on 25 July.

"It is indeed a high honor to be associated with the distinguished computer scientists and great people who have won the Turing Award over the past three decades," Fred said.

Edward Lazowska, award committee chair, said, "Fred Brooks has changed the face of computing: the way we think about computer architecture, the way we engineer software and the way we use 3D interactive computer graphics to advance other fields. Beyond these extraordinary technical contributions, Fred is a true gentleman with enormous personal integrity, whose leadership has shaped our discipline in countless ways. I'm delighted that this long overdue recognition occurred on my watch."

Fred, who coined the term "computer architecture," was project manager for the development of IBM Corp.'s System/360 family of computers and Operating System/360 software. He led the team that first achieved strict compatibility, upward and downward, in a computer family. At IBM, he also was an architect of the Stretch and Harvest computers. With **Dura Sweeney**, he invented a Stretch interrupt system that introduced many of the features of today's interrupt systems.

Fred's early concern for word processing led to his selection of the 8-bit byte, the decision to make the byte the addressable unit, and the inclusion of a full upper- and lower-case character set. All of these concepts are now universal practice.

In 1997, Fred wrote, with **Gerrit A. Blaauw**, *Computer Architecture: Concepts and Evolution.* The book documents and exemplifies the power of their 1960's innovation of thinking about computer design as separable domains: architecture, implementation and realization. Similarly, many of the technical innovations found in OS/360--such as the approach to input/output handling, and the method of transition between supervisor and user modes--are foundations of today's operating systems.

Even more influential, though, according to ACM, is the distillation of the successes and failures in the development of OS/360 that Fred captured in his 1975 book, *The Mythical Man-Month: Essays on Software Engineering.* Today, 25 years, two editions, and 300,000 copies later, the book remains a defining work in the field of software engineering.

Brooks left IBM in 1965 to found our Department, which is now considered a world leader in interactive computer graphics. Here, his research on real-time, 3D computer graphics has propelled that field forward, driven by the goal of creating tools that enable scientists and engineers to tackle problems formerly beyond their reach. Fred's students built the first molecular graphics system on which a new protein structure was solved. They also first proved that haptic displays augmenting visual displays can significantly improve a scientist's understanding of data.

Fred received his undergraduate degree in physics from Duke University in 1953. He earned his master's and doctoral degrees in computer science, under **Howard Aiken**, at Harvard University.

The A. M. Turing Award is the latest award for Fred. In 1994, he was the first recipient of ACM's Allen Newell Award. He won ACM's Distinguished Service Award in 1987 and the John von Neumann Medal from the Institute of Electrical and Electronics Engineers in 1993. In 1995, he received the Franklin Institute's Bower Award and Prize in Science, which carried a $250,000 prize. A decade earlier, he was in the first group of engineers to receive the National Medal of Technology, presented by President Ronald Reagan. In 1986, he received UNC-Chapel Hill's Thomas Jefferson Award, which goes to a person who best exemplifies the ideals and objectives of Jefferson.

Research Highlights

nanoManipulator Project Gets New Microscope

The nanoManipulator Project has added a scanning electron microscope (SEM) to its set of available microscopy techniques. The SEM consists of a vacuum chamber with an electron beam that aims at and bounces off the surface of a substance, scanning a 2D image of that surface. The microscope can measure how much of a particular element is present on the surface.

Project members will install an atomic force microscope (AFM) inside the SEM chamber. An AFM contains a tip that touches down on a surface and scans back and forth, creating a 3D picture of that surface. This type of microscope is useful in measuring physical properties such as stiffness and friction. Adding an AFM inside the SEM will allow scientists to use these microscope systems together, allowing for a wider range of experiments. Graduate student **Adam Seeger** will develop the software system to combine these microscopes into a single virtual instrument that will have the capabilities of both. Researchers will use the system to explore the properties of carbon nanotubes and to build and test novel nanometer-scale electromechanical systems. The SEM was purchased with funds from two U.S. Army Research Office grants, the Graduate School, the College of Arts and Sciences, and the departments of Computer Science and Physics and Astronomy.

Distributed nanoManipulator Demo in Asheville

On 6 December, **Russell M. Taylor II** (Ph.D. 1994), research assistant professor, and **Amy Henderson**, graduate student, demonstrated the Distributed nanoManipulator at a meeting convened by Congressman **Charles Taylor** (N.C. District 11), in Asheville, N.C. The meeting grew out of Congressman Taylor's interest in telecollaborative science and his work with a consortium of educators in western North Carolina to bring technology to the region and to conduct teacher training.

The Distributed nanoManipulator demo was one of six organized by the National Coordination Office for Computing, Information, and Communications and was the only one from a North Carolina university or research institution.

nanoManipulator Team Helps Washington, D.C., Ring in 2000

Members of the nanoManipulator Project team traveled to Washington, D.C., over the New Year's weekend to participate in the "America's Millennium on the Mall" celebration, which featured free demonstrations, performances, discussions and family programs in three Smithsonian Institution museums. Events emphasized the passing of traditions from one generation to another. "Future Visions" was the featured program at the Hirshhorn Museum, where the nanoManipulator team shared the spotlight with seven other groups from academia and private industry. **Russell M. Taylor II** (Ph.D. 1994), research assistant professor, and **Chris Dwyer**, graduate student, of our Department, and **Richard Superfine**, associate professor, **Sean Washburn**, professor, and **Neil Snider**, graduate student, of Physics and Astronomy, gave their demonstration as part of the session on "Glimpsing the Future: Technologies for the Millennium," a series of demonstrations about new technologies that will shape lives in the next century and about the science behind them. Their presentation illustrated how advances in

biochemistry and nanotechnology may guide future efforts to manipulate viruses and DNA. Involving atomic-scale manipulation of biological materials, the demo emphasized why atomic-scale research holds such great promise both for prototyping new materials and for testing the prototypes.

High School Students Study Viruses with nanoManipulator

In November, nanoManipulator Project team members paid a second visit to Orange High School in Hillsborough, N.C., to allow students to see, touch, and push viruses. This time, they scaled back the traditional teaching component in order to give students additional interaction time with the researchers and the equipment. Team members conducted a controlled study of the effectiveness of haptic feedback on the students' understanding of viruses. The team's first visit to Orange High School was in June 1998.

Corporation Formed to Help Commercialize UNC Technology

Nick England, research professor, has founded the Corporation for Development of Advanced Technology (CDAT) to help turn research ideas developed at UNC-Chapel Hill into marketable technology. Nick is CDAT's chief executive officer and is on full time leave from the Department. He recognized the need for an organization such as CDAT, because, although UNC-Chapel Hill has created a wealth of world-class technology, there has been a missing link between that research and the development of new products and companies.

CDAT will set up new companies, help inventors develop prototypes of their ideas, and provide the financial, business, and marketing expertise to turn the prototypes into marketable products. Both the inventors and UNC-Chapel Hill will benefit from the arrangement: inventors will have their research developed and marketed; UNC-Chapel Hill will receive royalties and access to the resulting technology improvements and products. Inventors will retain the majority of the stock in the start-up companies, with CDAT and UNC-Chapel Hill each owning a small percentage.

Nick and **Mary Whitton**, research assistant professor, supplied the initial funding for CDAT, and Nick has been working to secure additional investors. Nick and Mary have started successful companies in the past and bring a wealth of experience to the venture.

Currently, CDAT is negotiating with the University for licenses to three technologies and is forming a new company around each. Its office is on Franklin Street, a short walk from campus, in order to provide the easiest possible collaboration between CDAT and researchers on campus. For more information, visit ***www.nc-cdat.com.***

To fill another gap between research and applications, Nick and Mary are spearheading the formation of the Institute for Development of Advanced Technology (IDAT), a non-profit institute that will be able to partner with UNC-Chapel Hill researchers. IDAT will provide the application development and support services that funding agencies need but that do not fit with the Department's research and educational mission. Funding agencies will benefit by being able to test research ideas in real applications, and UNC-Chapel Hill will benefit from increased opportunities for research funding, plus a speedier application of research results.

EPA Grant Funds Software Engineering Project

David Stotts, associate professor, is the principal investigator on a new three year, $2 million grant from the Environmental Protection Agency (EPA). David and graduate students **Jason M. Smith, Naveen Koorakula**, and others, will collaborate with researchers at the Carolina Environmental Program at UNC-Chapel Hill, and the North Carolina Supercomputing Center to design and produce an architecture that will incorporate models of the environment from such diverse disciplines as weather prediction, air quality, watershed dynamics, biological population and health studies, and chemical interactions. They will use an object-oriented framework to adapt existing and future models to work with each other, allowing the output data of one model to be fed automatically as input data to another. They also will produce new models that are designed for higher efficiency, reliability and error accountability. The resulting system will be used for scientific prediction, analysis, and political policy decision making. The researchers are working with colleagues at EPA sites in Research Triangle Park, N.C., and Athens, Ga., on the initial design.

Recent Conferences

Student Presentations
Ramesh Raskar and **Michael Brown** attended IEEE Visualization 1999, held in San Francisco, Calif., from 24 to 29 October, where they presented the paper, "Multi-Projector Displays Using Camera-Based Registration." Ramesh also attended the Second International Workshop on Augmented Reality, held in San Francisco, Calif., from 20 to 21 October and presented the paper "Table-Top Spatially-Augmented Reality: Bringing Physical Models to Life with Projected Imagery."

Gopi Meenakshisundaram (M.S. 1998) and **Aditi Majumder** (M.S. 1999) attended ACM Multimedia '99 in Orlando, Fla., in November, and presented their paper, "Immersive Teleconferencing: A New Algorithm to Generate Seamless Panoramic Video Imagery." Also attending were **Ruigang Yang** and **Michael Brown**, who presented their paper, "Geometrically Correct Imagery for Teleconferencing." Both papers were co-written with **Henry Fuchs**, Federico Gil professor, and **Brent Seales**, associate professor at the University of Kentucky (see **"Recent Publications"**).

VRST '99
Henry Fuchs was one of two keynote speakers at the ACM Symposium on Virtual Reality Software and Technology 1999 (VRST '99), at University College London in December. He spoke on "Augmented Reality Systems for Surgical Procedures and for Tele-collaboration: Experiences and Future Prospects." **Gregory F. Welch** (Ph.D. 1997), research assistant professor, presented a paper on the HiBall tracker (see **"Recent Publications"**). The paper, co-written with **Gary Bishop** (Ph.D. 1984), associate professor, **Stephen Brumback**, research associate, **Kurtis Keller**, research associate, **Leandra Vicci**, director of the Microelectronic Systems Laboratory, and **D'nardo Colucci**, former research optical engineer now at Alternate Realities Corp. in Minneapolis, Minn., was voted best paper of the conference.

New Contracts and Grants

Sanjoy Baruah, associate professor. "A General Framework for Hard Real-Time Application System Design," National Science Foundation.

Timothy L. Quigg, associate chairman for administration and finance. "Sitterson 011 Multimedia Center Upgrade--Phase II," Frances C. and William P. Smallwood Foundation.

Faculty Research Leaves

Gary Bishop (Ph.D. 1984), associate professor, stayed in Chapel Hill last fall during his research and study leave. In addition to working on several grant proposals, he continued researching an area that has interested him for some time: how to design a computer interface that has no visual display so that it can be used, for example, by someone driving a car, or by a visually impaired person.

Frederick P. Brooks Jr., Kenan professor, is spending his research and study leave this spring as a visiting scholar in the Computer Laboratory at Cambridge University, England, where his host is Professor **Ian Leslie**. Fred will also continue writing his book, *The Design of Design.*

James Coggins, associate professor, recently returned from his Reynolds leave in England, at the Wolfson Image Analysis Unit, part of the Medical School at the University of Manchester. His hosts, **Chris Taylor**, professor and the Unit's director, and **Tim Cootes**, a postdoctoral fellow, along with several of their students, have developed a series of methods for representing shape in images and for matching a known shape to an observed image. James studied both their methods and applications and the methods of others, while developing his ARCTIC distributed programming environment *(www.cs.unc.edu/Research/ARCTIC).* A summary of his accomplishments while on sabbatical is available at *www.cs.unc.edu/~coggins/Sabbatical/.* He also worked on plans for future research *(www.cs.unc.edu/~coggins/Research/Nonlinear).*

Stephen M. Pizer, Kenan professor, is on a Kenan leave this spring. He is visiting various collaborators around the country for extended periods, including colleagues at Brigham and Women's Hospital in Boston, Mass., and at Johns Hopkins University in Baltimore, Md.

Leslie, Caitlin, and James Coggins on their way to high tea at London's Savoy Hotel.

Recent Publications

Anderson, J., and Y.-J. Kim. "Fast and Scalable Mutual Exclusion," *Proc. 13th International Symposium on Distributed Computing,* September 1999, 180-194.

Brooks, F. P. "What's Real About Virtual Reality?" *IEEE Computer Graphics and Applications,* 19(6), 1999, 16-27.

Brooks Jr., F. P. "Aiken and the Harvard 'Comp Lab'," *Makin' Numbers: Howard Aiken and the Computer,* I. B. Cohen and G. W. Welch, eds., Cambridge, Mass.: MIT Press, 1999, 137-142.

Calingaert, P. "Aiken as a Teacher," *Makin' Numbers: Howard Aiken and the Computer,* I. B. Cohen and G. W. Welch, eds., Cambridge, Mass.: MIT Press, 1999, 143-161.

Falvo, M. R., G. Clary, A. Helser, S. Paulson, R. M. Taylor II, V. Chi, F. P. Brooks Jr., S. Washburn, and R. Superfine. "Nanomanipulation Experiments Exploring Frictional and Mechanical Properties of Carbon Nanotubes," *Microscopy and Microanalysis,* 4(5), 1999, 504-512.

Keyser, J., S. Krishnan, and D. Manocha. "Efficient and Accurate B-rep Generation of Low Degree Sculptured Solids Using Exact Arithmetic: I-Representations," *Computer-Aided Geometric Design,* 16(9), October 1999, 841-859.

Keyser, J., S. Krishnan, and D. Manocha. "Efficient and Accurate B-rep Generation of Low Degree Sculptured Solids Using Exact Arithmetic: II-Computation," *Computer-Aided Geometric Design,* 16(9), October 1999, 861-882.

Jones, G. M., R. Superfine, and R. M. Taylor II. "Learning on the Edge: Students Feeling Viruses," *Science Teacher,* 66(7), October 1999, 48-50.

Isenburg, M., and J. Snoeyink. "Mesh Collapse Compression," *Proc. SIBGRAPI '99: Twelfth Brazilian Symposium on Computer Graphics and Image Processing,* 1999, 27-28.

Majumder, A., G. Meenakshisundaram, W. B. Seales, and H. Fuchs. "Immersive Teleconferencing: A New Algorithm to Generate Seamless Panoramic Video Imagery," *Proc. ACM Multimedia '99,* Orlando, Fla., 30 October-5 November 1999, 169-178.

Osoria, M., B. Jayaraman, and D. A. Plaisted. "Theory of Partial Order Programming," *Science of Computer Programming,* 34(3), 1999, 207-238.

Paulson, S., M. R. Falvo, N. Snider, A. Helser, T. Hudson, A. Seeger, R. M. Taylor, R. Superfine, and S. Washburn. "In Situ Resistance Measurements of Strained Carbon Nanotubes," *Applied Physics Letters,* 75(18), 1 November 1999, 3 pp.

Plaisted, D. A., and G. Kucherov. "The Complexity of Some Complementation Problems," *Information Processing Letters,* Vol. 71, 1999, 159-165.

Plaisted, D., and Y. Zhu. *The Efficiency of Theorem Proving Strategies: A Comparative and Asymptotic Analysis,* 2nd ed., Wiesbaden, Germany: Vieweg, 1999, 170 pp.

Raskar, R., M. S. Brown, R. Yang, W.-C. Chen, G. Welch, H. Towles, W. B. Seales, and H. Fuchs. "Multi-Projector Displays Using Camera-Based Registration," *Proc. IEEE Visualization '99,* San Francisco, Calif., 24-29 October 1999, 208-215.

Raskar, R., G. Welch, and W.-C. Chen. "Table-Top Spatially-Augmented Reality: Bringing Physical Models to Life with Projected Imagery," *Proc. Second International Workshop on Augmented Reality,* 20-21 October 1999, San Francisco, Calif., 64-71.

Taylor II, R. M., and R. Superfine. "Advanced Interfaces to Scanning Probe Microscopes," *Handbook of Nanostructured Materials and Nanotechnology,* Vol. 2, H. S. Nalwa, ed., New York: Academic Press, 1999, 271-308.

Welch, G., G. Bishop, L. Vicci, S. Brumback, K. Keller, and D. Colucci. "The HiBall Tracker: High-Performance Wide-Area Tracking for Virtual and Augmented Environments," *Proc. ACM Symposium on Virtual Reality Software and Technology 1999,* University College London, 20-22 December 1999, 1-11. (Best Paper Award).

Yang, R., M. S. Brown, W. B. Seales, and H. Fuchs. "Geometrically Correct Imagery for Teleconferencing," *Proc. ACM Multimedia '99,* Orlando, Fla., 30 October-5 November 1999, 179-185.

In the Media 1999

"North Carolina's Research Triangle Park: An Investment in the Future," a documentary on the history of Research Triangle Park (RTP), featured several short video clips of our faculty, staff, and students at work in Sitterson Hall. The documentary, prepared to commemorate the fortieth anniversary of the founding of RTP, was broadcast on WUNC-TV, the Triangle's local public television station, in November. To purchase a copy of this videotape, send e-mail to *parkinfo@rtp.org.*

Endeavors, the publication that reports on research and creative activities at UNC-Chapel Hill, did a cover story on the Medical Image Display and Analysis Group's (MIDAG) research, in its spring issue. The feature, "The Doctor Will See You Now," included three articles on different research projects and a sidebar on the history of MIDAG and its collaborative research efforts. Read the articles at **http://research.unc. edu/endeavors/spr99/covsty.htm.**

Augmented-reality research appeared in:

Anders, P. *Envisioning Cyberspace: Designing 3D Electronic Spaces.* New York: McGraw-Hill, 1999.

Leonhirth, J. "Developments Make Ultrasound Easier, More Useful," *Biophotonics International,* 6(4), July/August 1999, 34-35.

nanoManipulator research appeared in an article by T. P. Pearsall. "Close Encounters of the Virtual Kind," *IEEE Circuits & Devices,* 15(1) January 1999, 10-16.

The Office of the Future project, parts of which we are doing in collaboration with University of Utah (among other universities), was described in the articles:

Sahm, P. "U. of U. Helping Take Video Conference from Realm of Sci-Fi Into Reality of Hi-Fi: 3-D Video Conference in Works at U. of U.," *The Salt Lake Tribune,* 14 May 1999, E1. **(www.cs.unc.edu/Research/stc/office/media/sltrib.html)**

Saunders, F. "Virtual Reality 2.0," *Discover,* 20(9), September 1999, 32, 34.

An article on virtual reality research at UNC-Chapel Hill and elsewhere in the Triangle appeared in the 8 November *News and Observer* of Raleigh, N.C.

Frederick P. Brooks Jr., Kenan professor, was featured in the article, "Using What They've Learned," in the 31 December *News and Observer* of Raleigh, N.C., in which North Carolinians at the forefront of social change gave their personal recollections on the events that shaped the last century.

Alumni News

Alumni and friends interested in receiving a copy of the Department's latest brochure should send e-mail to **pubs@cs.unc.edu**, or write to us at the address **below**, (Attention: Publications Manager).

M.S. and Ph.D. Alumni

Ron Azuma (Ph.D. 1995) has been promoted to senior staff computer scientist at HRL Laboratories in Malibu, Calif. He, and fellow alumnus **Ulrich Neumann** (Ph.D. 1993) of the University of Southern California, were among the authors on a recent paper: You, S., U. Neumann, and R. Azuma. "Orientation Tracking for Outdoor Augmented Reality Registration," *IEEE Computer Graphics and Applications,* 19(6), Nov/Dec 1999, 36-42. *(azuma@HRL.com)*

David Banks (Ph.D. 1993) is now an associate professor of computer science at Florida State University in its new School of Computational Science and Information Technology. *(banks@cse.fsu.edu)*

Michael Capps (M.S. 1996), a research assistant professor at the Naval Postgraduate School in Monterey, Calif., will present his paper "The QUICK Framework for Task-Specific Asset Prioritization in Distributed Virtual Environments," at Virtual Reality 2000 in East Rutherford, N.J., in March. He was recently married (see **"Family Matters"**). *(capps@cs.nps.navy.mil)*

Ritu Chadha (Ph.D. 1991) is a senior scientist in Applied Research at Telcordia Technologies (formerly Bellcore) in Morristown, N.J. Currently, she manages several projects that use directory-enabled networks technology to manage IP VPNs. She welcomes resumes from graduating UNC-Chapel Hill students. *(chadha@research.telcordia.com)*

R. Kent Dybvig (Ph.D. 1987) was promoted in July 1999 to full professor in the Computer Science Department at Indiana University, in Bloomington, Ind. *(dyb@cs.indiana.edu)*

Victoria Interrante (Ph.D. 1996), an assistant professor at the University of Minnesota, is part of a group that recently won the biggest of the National Science Foundation's Large Scientific Dataset Visualization awards. The group's research involves feature extraction and data mining for the analysis of 3D turbulent flows. *(interran@cs.umn.edu)*

David Luebke (Ph.D. 1998), an assistant professor at the University of Virginia, has received his department's 1998-99 Undergraduate Teaching Award. *(luebke@cs.virginia.edu)*

Tom Palmer (M.S. 1987) has moved to the Internet Software Engineering group at Interpath Communications, Inc., where he is concentrating on interactive technologies and multimedia for the Web. Previously, he did project management and business consulting for Interpath. *(tom.palmer@interpath.net)*

Eric R Vook (M.S. 1987) is working for EMC Corp. in Research Triangle Park, N.C. He works with Fibre Channel technology. He and his wife Lisa have two sons: Hunter, born in 1997, and Trevor, born in September (see **"Family Matters"**). *(vook@dg-rtp.dg.com)*

John Q. Walker II (Ph.D. 1991) still heads product development at Ganymede Software. Among the many awards Ganymede received last year was *Network World's* "World Class Award" for outstanding quality in both its product lines, Chariot and Pegasus. **(www.nwfusion.com/reviews/1220revpegasus.html)** *(johnq@Ganymede.com)*

Undergraduate Alumni

Nevin Fouts (B.S. MSci. 1981), associate dean for information technology at Duke University's Fuqua School of Business, recently announced the Next Generation Client Computing Project to investigate next-generation client computing devices. Local newspapers and the New York Times have reported on it **(www.nytimes.com/library/tech/99/09/circuits/articles/30duke.html).** *(nevin@mail.duke.edu)*

Del Wood (B.S. MSci. 1985) has joined BoxerJam in Charlottesville, Va., as their chief information officer. BoxerJam produces on-line entertainment, mostly in the form of intellectual word games. Del writes that BoxerJam has gained a large and loyal on-line audience since

forming five years ago, and is looking for bright, talented computer science people. *(delw@boxerjam.com)*

Family Matters

Ashlyn Elisabeth Bailey was born on 5 November 1999 in Durham, N.C., to Brendan R. Bailey (B.S. MSci. 1987) and Monica Bailey. She has an older brother, Aaron Archer, who is four years old. *(Brendan.Bailey@southpeak.com)*

Michael Capps (M.S. 1996) and **Laura Saurborn** were married on 10 October 1999 in Flat Rock, N.C. *(capps@cs.nps.navy.mil)*

Elizabeth Grace McInnes Gallmeister was born on 5 November 1999 in Stanford, Calif., to Bill O. Gallmeister (M.S. 1998) and Eleanor Gallmeister. She has two older brothers, Ian, aged six, and James, aged two. *(gallzuck@concentric.net)*

Aditi Majumder (M.S. 1999) and **Gopi Meenakshisundaram** (M.S. 1998) were married on 6 September 1999 in Chapel Hill, N.C. *(majumder@cs.unc.edu, gopi@cs.unc.edu)*

Jordyn Ashley Moore was born on 26 October 1999 in Sanford, N.C., to David B. Moore and Jacalyn Halgrimson Moore (B.S. MSci. 1984). She has an older brother, Jesse Edward, who is two and a half years old. *(jacmoore@interpath.com)*

Nathaniel Priebe was born on 16 July 1999 in Durham, N.C., to Jason Priebe (M.S. 1996) and Kimberly Priebe. *(priebe@wral-tv.com)*

Kathryn Tesh, former administrative secretary, and **Lynn Roundtree** were married on 23 October 1999 in Chapel Hill, N.C. *(kroundtree@acmhddsa.org)*

Trevor James Vook was born on 26 September 1999 in Chapel Hill, N.C., to Eric Vook (M.S. 1987) and Lisa Vook. He has an older brother, Hunter Frederick, who is two years old. *(vook@dg-rtp.dg.com)*

New Smallwood Foundation Grant

The Department has received a second $50,000 grant from the Frances C. and William P. Smallwood Foundation to continue upgrading the equipment in the C. Hugh Holman Teleclassroom (room 011). The Smallwood Foundation funds programs, research, and scholarships in medicine, science, education, commerce, economics, industry, and the arts.

The initial $50,000 grant from Smallwood paid for new cameras and projection equipment, installed last year. The new equipment has improved the quality of our videotapes and broadcasts tremendously. The new grant will finance an AMX control system that will include a touch screen panel and remote controls for lights, screens, and projectors, all on a single console.

John B. Smith, professor, who is leading the committee planning the improvements, said that the new AMX system will be so user friendly that a person giving a presentation will be able to control most of the room's functions alone, instead of requiring the services of an operator in the teleclassroom's control room.

Computer Services News

IMAP E-mail Server Deployed

Last spring, **John Sopko**, UNIX systems manager, and **Murray Anderegg** (M.S. 1991), Linux and e-mail systems administrator, set up a new e-mail server that uses the IMAP protocol. One third of our 840 users are now on the new system, which allows users to handle attachments, to save messages on the server, and to read mail from anywhere (as long as they are connected to the network). The new system provides more disk space for each user and is significantly faster than the old one.

Y2K Preparedness

The entire Computer Services staff helped prepare Sitterson Hall for the year 2000. Staff applied patches to AFS server software, patched or upgraded operating systems on all Suns and HPs, tested the operation of door security systems, verified the phone system would work, obtained patches for call accounting and voice mail systems, patched the Legato backup system, and verified, as much as possible, that other systems would continue to work. Since the new year began, the Department has experienced no significant problems.

100 New Dell PCs Installed

Jane Stine, desktop systems manager, and **William Jiang**, PC systems administrator, with assistance from undergraduate employees and other staff, installed 100 new Dell systems in Sitterson last year. Sixty-eight of the new systems were received as part of an Intel grant.

Additional PC Lab Opens

In August, staff converted room 019 into a new PC lab. Students enrolled in courses that require special software are the primary users of the lab. When there are no special needs, the lab is available to anyone with a Department account.

SGIs Upgraded to Irix 6.5

Duncan Riley, SGI systems administrator, upgraded the operating system on our SGIs to IRIX version 6.5. In doing this, he established a more consistent and supportable installation throughout the SGI fleet.

New Solaris File Servers

John Sopko configured and installed three new dual-processor Solaris file servers, which will be used to back up all Departmental UNIX file server space. Nearly all of the data has been moved from the older Sun servers to the new ones, including all home directories, system data, and research project space.

Old Systems Retired

Last year, Computer Services staff retired all 68040-processor-based Macintosh computers (Quadras) and all but one of the DEC Ultrix systems. Some older Sun systems (SPARC 4 and SPARC 5) and many HP UNIX systems were also retired. Now these older computers are retired, staff can focus on providing better support for newer systems. The next systems to be replaced are the remaining HPs and the older Sun desktop systems, followed by the 200 MHz Dell PCs.

About News & Notes

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Newsletter Staff:
Claire L. Stone, editor, *stonec@cs.unc.edu*
Linda Houseman, *houseman@cs.unc.edu*

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Department of Computer Science
UNC-Chapel Hill
CB#3175, Sitterson Hall
Chapel Hill, NC 27599-3175

General information:
Voice: 919/962-1700
Fax: 919/962-1799
Internet mail: *info@cs.unc.edu*
World Wide Web: *www.cs.unc.edu*

Address corrections, submissions, and for information about our publications: pubs@cs.unc.edu

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