



News & Notes from Sitterson Hall

Issue Eighteen, Fall 1996

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

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Chairman's corner

This has been an unusual year. The spring semester started with a blizzard; the fall semester began with a hurricane. Hurricane Fran passed almost directly overhead in the early morning of 6 September, downing thousands of trees and leaving most of the area without power and water for nearly a week. The campus lost many beautiful old trees including several two-hundred-year-old trees that surrounded New West Hall (our former home). Fortunately, the legendary Davie Poplar on Polk Place survived and the University lost power for only a few hours. Thanks to the

hard work of **Brian White** (M.S. 1987), Computer Services manager, and his staff, Sitterson Hall was up and running by 10 a.m. the day after the hurricane. For a week, Sitterson was not only our workplace, but was also a home-away-from-home for those needing to recharge batteries, get ice or clean water, take a hot shower, watch a movie, or simply commiserate about how many trees they were going to have to cut up!

A sad note: **Melvin Woods**, who was our housekeeper in New West, passed away on 16 November. Mr. Woods almost single-handedly kept our century-old building neat and clean for many years. He retired from the University in 1984.

On a much happier note: congratulations to **Vernon L. Chi**, Microelectronic Systems Laboratory (MSL) director, one of five winners of the 1996 Chancellor's Award and one of twelve winners of the N.C. Governor's Award (more information in this issue). Congratulations also to our two newest faculty appointments: **Gary Bishop** (Ph.D. 1984) who was appointed as an associate professor effective 1 January 1997, and **Gregory F. Welch** (Ph.D. 1996) who was appointed as a research assistant professor effective 1 September 1996.

We are sorry to say good-bye to two of our faculty, but we wish them well in their new endeavors. **Greg Turk** (Ph.D. 1992), research assistant professor, left in August to accept a tenure-track assistant professorship at Georgia Tech. **Dana Kay Smith**, research assistant professor, left at the end of September to pursue consulting opportunities in human-computer interaction. Read on for more on them, and for other departures.

William V. Wright (Ph.D. 1972), research professor, retired at the end of September; only the second member of our faculty to retire! He will still be around; he plans to keep working with GRIP and to get involved in some MSL projects. We celebrated Bill's years of work and dedication to our Department and to computer science at a retirement party on 30 September.

Good news for our students: beginning this academic year, the University has agreed to cover the costs of health insurance for funded graduate students. The details have yet to be finalized but, as things stand right now, the State will cover insurance costs for those students whose salaries are paid from state funds, while individual grants will have to cover students who are paid from those grants. No decision has yet been made on the source of funding for fellowship students, and it is possible that individual departments will have to find this money themselves. This makes your contribution to the Department all the more important.

Congratulations to our new alumni fellow, **Jacob Furst**. His work is described in this issue. Generous donations from alumni and friends make this fellowship possible. We sincerely appreciate your past support, and we hope we can count on you in the future. As always, we welcome visits from our alumni and friends. Please keep in touch.

Steve Weiss

Welcomes

New faculty appointments

Gary Bishop (1989), associate professor (effective 1 January 1997), B.E.E. Tech. 1976 (Southern Technical Institute), Ph.D. 1984 (UNC-Chapel Hill). *Hardware and software for man-machine interaction; 3D interactive computer graphics.*

Gary has been with us since 1989 when he joined our faculty part time as an adjunct assistant professor. He had previously worked at Bell Labs and Sun Microsystems, and he continued to work at Sun until 1991, when he joined us full time as a research associate professor. Gary's research concerns the interface between hardware and software for man-machine interaction, using real-time systems such as head tracking and image processing, 3D interactive computer graphics, and display mechanisms for virtual and augmented reality. His experience includes academic research, teaching, administration, and service, and industrial product development. Gary will lead the Department's efforts to develop a graduate-level hardware systems curriculum, including hiring additional faculty in the future.

Gregory F. Welch (1996), research assistant professor, B.S. 1986 (Purdue), M.S. 1995, Ph.D. 1996 (UNC-Chapel Hill). *Human-machine interaction; 3D interactive computer graphics; virtual/augmented environment tracking systems; shared virtual environments.*

Greg recently earned a Ph.D. from our Department and now serves as the UNC-Chapel Hill site coordinator for the National Science Foundation's Science and Technology Center for Computer Graphics and Visualization. The five-university organization collaborates on research and education related to computer graphics and visualization. Greg's primary research interests are in hardware and software for human-machine interaction. In particular he is interested in the tracking (sensing), rendering, and display aspects of interactive computer graphics systems.

Visiting faculty

Carlo Sequin, visiting professor, is working closely with several research groups: the walkthrough project, with **Frederick P. Brooks, Jr.**, Kenan professor, et al.; the solid modeling group, with **Dinesh Manocha**, assistant professor; and on shape representation, with **Stephen M. Pizer**, Kenan professor. He is working with graduate students **Alexandra Bokinsky** and **Mark Mine** (M.S. 1994) on user interface issues in immersive virtual environments. Carlo is also working on his sculpture generator project. He is on a year's sabbatical from the Computer Science Division of the EECS Department at the University of California- Berkeley, and is here until the end of the fall semester.

Postdoctoral scholars

Doug L. Hoffman earned his Ph.D. from our Department in 1996. He recently joined the PAPPS (Parallel Alignment and Prediction of Protein Structure) group in the Microelectronic Systems

Laboratory (MSL). He is currently working on the design and development of the DISCO (Dihedral Sequence Comparator).

William D. Ross obtained his Ph.D. in Cognitive and Neural Systems from Boston University in 1994. He works with **Jonathan Marshall**, assistant professor, researching neural network models of visual perception.

New staff

Andrew Ade, administrative secretary to Henry Fuchs, joined us in July. Andy is working on his Ph.D. in Comparative Literature at UNC-Chapel Hill. He has a B.A. from Northwestern University and was a Peace Corps volunteer teacher in Zaire for two years.

Darlene Freedman, administrative secretary to Frederick P. Brooks, Jr., rejoined us in June after working for several months at the School of Law at UNC-Chapel Hill. She previously worked for us as the technology transfer and outreach secretary for the Graphics and Image Lab.

Todd Gaul, video production specialist (part time), joined us in August. He also works part time at WTVD News Channel 11 (ABC) in Durham, N.C. Todd has a degree in mass communications from Elon College. He previously worked at television stations in Raleigh, N.C. and Vail, Colo.

William "J. R." Key, technology transfer and outreach secretary for the Graphics and Image Lab, joined us in March. J. R. has worked previously for UNC-Chapel Hill, most recently at Disability Services, and prior to that for seven years as the house manager and audience development coordinator for Playmakers Repertory Company.

Jane Stine, systems programmer/administrator, joined us in April from the Office of Information Systems at UNC-Chapel Hill's School of Medicine. Jane has a B.S. in Nursing and an M.S. in Library Science (with a concentration in information management), both from UNC-Chapel Hill, and more than 10 years of experience in systems administration on various platforms. She serves as our Macintosh administrator.

Marie Tarjan, secretary, joined us in April as assistant to Prasun Dewan, Kye Hedlund, Jonathan Marshall, John Smith, and David Stotts. She comes to us from the Womble Carlyle Law Firm in Raleigh, N.C., where she worked as a legal assistant.

New students, fall 1996

Eric Baker, Jan Borgersen, Dennis Brown, Sui Chow, Michele Clark, Timothy Culver, Tianli Fan, Aron Helser, Kenneth Hoff, Brent Insko, Rohit Jain, Michael Kart, Kwang-Soo Kim, Sang-Uok Kum, Pawan Kumar, Adam Lake, Man-Chi Leung, Qian Li, Luiz Lima, Boyang Liu, Aditi Majumder, David McAllister, Kori Needham, Amol Pattekar, Paul Rademacher, Vassil Roussev, Victor Sats, Vivek Sawant, Jie Shang, Anshu Sharma, Lev Stesin, Sanjay Sthapit, Rob Thompson, Mark Whitney, Philip Winston, Dongxiang Wu, and Jing Xu.

Median credentials for the 37 first-year students who began our program in fall 1996:

Quantitative GRE: 92nd percentile

Verbal GRE: 79th percentile

(84th with non-native speakers excluded)

Analytical GRE: 90th percentile

GPA (undergraduate): 3.6/4.0

We say thanks and farewell to . . .

D'nardo Colucci, research optical engineer for the MSL, who left in August to work at Alternate Realities Corp. in RTP, N.C. He will continue to work for them when he moves to Minneapolis, Minn., in November. He had been with us since June 1994.

Amy Kreiling, systems programmer/administrator, who left in August to work at SAS Institute, Inc. in Cary, N.C. She manages the SGI systems for SouthPeak Interactive LLC (an independent business venture of SAS), managing projects, and coordinating the evaluation, purchase, and integration of new hardware and software. She had been with us since 1993.

Dana Kay Smith, research assistant professor, who left in October to pursue consulting opportunities in human-computer interaction (HCI). Dana had worked with the Collaboration group since 1990, doing HCI research for the design of individual and group software. She will continue to serve on two dissertation committees.

Kathryn Tesh, administrative secretary to Henry Fuchs, who left in May to work as a program coordinator with the Schizophrenia Treatment and Evaluation program at the Department of Psychiatry at UNC-Chapel Hill. She had been with us since 1991.

Greg Turk (Ph.D. 1992), research assistant professor, who left in August to join the College of Computing at the Georgia Institute of Technology as a tenure-track assistant professor. He is involved with the Graphics, Visualization, and Usability Center. Greg spent two years as a postdoctoral scholar at Stanford University, before joining us as UNC-Chapel Hill site

coordinator for the Science and Technology Center for Computer Graphics and Visualization in 1994.

Fay Ward, administrative secretary to Frederick P. Brooks, Jr., who left in April to work for the Center for Urban Affairs at N.C. State. She had been with us since 1988.

Li-Yun Yu, a postdoctoral scholar with us for two years, who moved in August to the University of Central Florida, in Orlando, where he works at the Center for Research and Education in Optics and Lasers. He still has connections in the Department and will be visiting us from time to time to meet with his collaborators here. (E- mail: yu@creol.ucf.edu)

Bill Wright retires

William V. Wright (Ph.D. 1972), research professor, retired on 30 September 1996, but continues to work with us on various projects. Bill has a long association with our Department. He earned his Ph.D. here in 1972 under the direction of **Frederick P. Brooks, Jr.**, Kenan professor, and joined our faculty the same year as an adjunct associate professor. He became a full-time member of our research faculty in 1990.

Bill's research has included interactive systems for scientific research, visualization of scientific data, and the architecture and implementation of computing systems. He has worked primarily with the GRIP project, which is concerned with the development of computer graphics tools to study the structure and function of biological molecules. In his future work, Bill plans to spend some time teaching himself more about the science that GRIP is trying to serve. He also hopes to become more involved in some of the MSL's ongoing projects.

Bill also plans to take some time to relax and travel. He and his wife, Anne, recently traveled to New England and re climbed the mountain in New Hampshire where they met 42 years ago.

Alumni news

Murray F. Anderegg (M.S. 1991) has joined the Office of Information Services at the School of Medicine at UNC-Chapel Hill. (E-mail: anderegg@med.unc.edu)

Lars Bishop (M.S. 1996) married Jenny Acker at the Redeemer Lutheran Church in Chicago, Il., on 8 June 1996. Lars is currently working at Numerical Design Ltd. in Chapel Hill, N.C. (lmb@ndl.com)

Debashish Chatterjee (M.S. 1990) last year became the development manager for the Database Access and Protocols group at Oracle Corp. in Redwood Shores, Calif. His group is responsible

for interfaces to Oracle's client/server architecture. Debashish reports that the development of the next version of Oracle--Oracle 8--is well underway. He would be happy to recommend other Department alumni, who are looking to do cutting edge product development in databases and client/server technology areas, to other managers at Oracle. (dchatter@us.oracle.com)

James C. Chung (Ph.D. 1993) has been working in the Center for Digital Systems Engineering at Research Triangle Institute in RTP, N.C., where he helps to develop interactive, multimedia training systems. He and his wife, Nancy, and their two children, Abbey and Jesse, recently moved to the new Arcadia cohousing community in Carrboro, N.C. He recently published a paper, co-authored with David M. McLin: "Combining Virtual Reality and Multimedia Techniques for Effective Maintenance Training," *Tools and Techniques for Modeling and Simulation*, D. J. Gerson, ed., *Proc. SPIE 2645*, 1996, 204-210.

Joel Dunn (M.S. 1995) was recently promoted to associate director for systems support at Administrative Data Processing at UNC-Chapel Hill. He has also been accepted into the Ph.D. program at the School of Information and Library Science at UNC-Chapel Hill, and has enrolled part time beginning in fall 1996. (joel_dunn@unc.edu)

L. Annette Foster (M.S. 1975) is currently working on re-engineering projects at Duke University. She leads project teams and provides information technology expertise. She lives in Durham, N.C. (fostera@mail01.adm.duke.edu)

John M. Gauch (Ph.D. 1989) received tenure in the Department of Electrical Engineering and Computer Science at the University of Kansas this spring and was promoted to associate professor.

Kari Hardarson (M.S. 1993) and his wife, Anna Birna, moved to Copenhagen, Denmark, this past spring. Kari works for a start-up company called Cocom (<http://www.cocom.dk>), which makes cable modems.

Ganlin Jin (M.S. 1979) has developed Valise, a free e-mail program that inserts an advertisement into each e-mail message that is sent. Valise works over the World Wide Web so users can read and send mail from anywhere that they have access to the Web. For more information see: <http://www.valise.com>

Pamela K. Johnson (M.S. 1991), married Andreas Bremer on 9 September 1995 in Durham, N.C. They live near Zurich, Switzerland, where Pam works for Silicon Graphics as a specialist on bioinformatics and chemical databases. (pam@basel.sgi.com)

William Leler (Ph.D. 1987) recently had his second book, *3D with HOOPS: Build Interactive 3D Graphics into Your C++ Applications*, co-authored with Jim Merry, published by Addison-Wesley (ISBN 0-201-87025-8). He is now in Banff, Canada, working at the Banff Centre on projects for artistic uses of the web. He invites old friends to visit him, to send e-mail to wm@cris.com, or to visit <http://www.cris.com/~wm>

Mark Lumsden (M.S. 1982) transferred last spring to the newly formed Internet Division at IBM Corp. in RTP, N.C., where he is working in the software advanced design group.

Karl Owen (M.S. 1992) and Susan Buchanan were married on 2 January 1996 at St. John, U.S. Virgin Islands.

Mark Surles (Ph.D. 1992) was described in a recent issue of *San Diego Magazine* as a new breed of entrepreneur. He heads Interactive Simulations, Inc. (<http://www.intsim.com/index.html>), whose molecular modeling program, Sculpt 2.0, won praise in the October 1996 issue of *MacWorld*.

Russ Tuck (Ph.D. 1990 [Duke]) is at Pyramid Technology, where he is lead architect for a future massively parallel processing system. Russ and his wife, Debbi, have two children, four-year-old Daniel and one-year-old Amy. (tuck@pyramid.com)

Alumnus wins SIGGRAPH award

Marc S. Levoy (Ph.D. 1989) was awarded the 1996 SIGGRAPH Computer Graphics Achievement Award for his pioneering work in volume rendering. The award recognizes his invention of a system in which volumes are rendered directly from sampled data without first creating an intermediate surface representation. Marc's work in volume rendering has made a significant impact within the fields of medicine and scientific visualization.

Marc has published more than 40 papers on computer animation, volume rendering, and machine vision that are often cited in computer graphics textbooks. In addition to his initial paper which described the classic volume ray tracing algorithm, Marc has developed several algorithms for increasing the efficiency of volume rendering, including taking advantage of spatial coherence, adaptively refining the image, accounting for the observer's gaze, rendering in the frequency domain, and using a shear-warp factorization. Recently, he has begun to use volumetric techniques to aid in the acquisition of 3D models by using a volume representation to integrate multiple range images.

Marc completed his Ph.D. in 1989 with a dissertation entitled, "Display of Surfaces From Volume Data," under the direction of **Henry Fuchs**, Federico Gil professor. He is currently an assistant professor in the departments of Computer Science and Electrical Engineering at Stanford University. He received the National Science Foundation Young Investigator Award in 1991.

The Computer Graphics Achievement Award is presented annually to recognize a major accomplishment that is still significant and apparent in the state of the art of computer graphics. Marc received the award in August at SIGGRAPH '96, in New Orleans, La.

Undergraduate alumni news*

Humayan Lari's (B.S. 1995) company, Lari Software Inc., has a home page (<http://www.larisoftware.com>). The company's main product, Lightning Draw GX, has been

commercially available for some time. Its latest product is a Netscape Navigator-compatible plug-in, called Electrifier, that provides low-bandwidth graphics and animation based on Mac OS 8 technology. Free authoring and playback software is available through the web site.

Cynthia Pettit (B.S. 1995) reports that she has found her dream job at Pixar Animation Studios in Richmond, Calif. (*kiki@pixar.com*)

**Computer Sciences Options of the Applied Sciences and Mathematical Sciences Curricula.*

Former faculty news

Peter Calingaert, professor emeritus, spent six weeks this summer teaching English in Tbilisi, Republic of Georgia. At home in Chapel Hill, he continues to give individual tutoring in English to speakers of other languages. Peter's extensive travels during this past year include a spring trip to Malaysia, China, Singapore, Macao, and Hong Kong; and an October hiking trip to the Colorado Rockies.

Erwin M. Danziger, former lecturer and former director of Administrative Data Processing at UNC-Chapel Hill, recently became a grandfather for the second time. He reports that, in addition to babysitting, he spends time with his stamp collection. Erwin specializes in stamps from Danzig and other German-speaking areas and invites faculty and alumni who wish to trade or talk stamps to send e-mail to *emd@ga.unc.edu*.

John McHugh, former research associate professor, has been promoted to full professor at Portland State University in Portland, Ore., where he is chair of the Computer Science Department. He was recently awarded two ARPA contracts from the Survivable Systems Initiative--one jointly with **Calton Pu** of the Oregon Graduate Institute, the other with **John Knight** of the University of Virginia. John reports that he introduced a senior capstone course, based on **Fred Brooks's** COMP 145 course, into Portland State's undergraduate curriculum this fall. He is working with our Collaboration group on security for its collaboration bus project.

Former faculty member dies

Carl Victor Page, former assistant professor, died on 2 June 1996 at the age of 58 from complications of pneumonia. Carl, who taught here from 1966 to 1967, was our second full-time tenure track faculty member (after Fred Brooks). He came to us from the University of Michigan, where he had earned two B.S. in Engineering degrees (1960)--one in the then novel field of computer engineering (the first Michigan graduate to claim that specialty)--an M.S. in Communication Sciences (1961); and a Ph.D. in Computer Science (1965).

Carl left UNC-Chapel Hill to join the computer science faculty at Michigan State University in 1967, where he worked until his death. He was a visiting scholar at Stanford University during 1974-75, and a researcher at NASA Ames Research Center in 1978. A prolific scholar, Carl was

a pioneer and world authority on artificial intelligence. A memorial web page has been established at <http://www-pcd.stanford.edu/~page/mem.html>

Web directories for alumni and friends

We are continually adding new information to our web pages. Since the last issue of the newsletter we have introduced an on-line Alumni Directory, which will tell you where many of your former classmates are and what they are up to now. Visit the Alumni home page at <http://www.cs.unc.edu/People/Alumni/>

We are creating a similar directory for our former faculty and staff. We hope to have it running soon.

Alumni fundraising

As much as we appreciate your contributions, we realize that many of you would prefer that the Carolina Alumni Fund not contact you by phone. The Alumni Fund will add you to their "don't call" list if you ask them. To do this, either tell the fundraising representative who calls you in the fall; contact the Fund office directly (Office of Development, CB# 6110, Porthole Bldg., UNC-Chapel Hill, N.C. 27599-6110); or send e-mail to us at pubs@cs.unc.edu and we'll forward your request to them. If you don't want any written correspondence from them, you can ask to be put on the "don't mail" list. Unfortunately, if you do this, we will be unable to send you copies of News & Notes or any other mailings, because we order our mailing labels from the Alumni Office.

Bill Wright: A personal view

by **Frederick P. Brooks, Jr.**

When I was at Duke, there was an annual sophomore calculus contest, for a prize of fifty (big, 1950) dollars' worth of books. The physics and math majors speculated as to which of them would win the coveted prize. Lo and behold, the winner was a sophomore electrical engineer not known to most of us, **Bill Wright!**

Bill, from Greensboro, N.C., was an outstanding undergraduate. He was president of the Engineers' Club, a student legislator, Phi Beta Kappa, Tau Beta Pi, Omicron Delta Kappa, and a cellist in the orchestra. During my senior year, I got a summer job at Bell Labs in Manhattan.

The Duke Placement Director suggested I might want to batch with Bill Wright, who had a similar job. We lived in Greenwich Village, worked on different engineering projects, walked to work, and explored the Big Apple. He was a most congenial roommate--always considerate, always stimulating.

That fall, we both entered **Howard Aiken's** Computation Laboratory at Harvard as NSF Fellows. We lived on the same hall, studied in the same lab, palled around with the same gang of Southerners, and dated the same girl. Bill and I did a joint class project, the random generation of hymn tunes, the first publication for each of us. Bill kept his NSF Fellowship by good grades; I didn't.

Next summer, we got scientific computing jobs with North American Aviation in Los Angeles. Two boys can drive an old car a long way on two round-trip rail fares: Boston to Los Angeles and back via North Carolina, Seattle, New Orleans--13,000 miles in all. We didn't miss a National Park or a dam site. Most interesting work, too--programming the IBM 701 computer in octal absolute machine language.

After our second year of grad school, Bill married **Anne Carleton**. He won a Fulbright fellowship; and they spent a year at the Amsterdam Mathematical Centrum, where he was one of the designers of the X-1 computer.

Back at Harvard, Bill and Aiken didn't see eye-to-eye. Aiken stood 6'3", had Spockian ears and eyebrows, and two little horn-like tufts of hair. When he was upset, you imagined the Devil himself was glaring down at you. So in 1958, all-but-dissertation, Bill joined IBM in Poughkeepsie, N.Y. He was the chief architect of a small binary computer that didn't make it, and later a key architect of the System/360 family. He and **Gerald Ottaway** became the technical cavalry for the project, rushing to aid wherever trouble was. This took them to IBM in Germany for a seven-month assignment, where Bill became chief architect of the System/360 Model 20. This machine was very successful, selling some 10,000 copies and producing billions in revenue. For his efforts, Bill received an IBM Outstanding Contribution Award.

Bill and Jerry also saved the whole 360 project in another feat of technical derring-do. The General Systems Division wanted to build a 1401-compatible successor to the 1401, rather than the 360 Model 30 which was planned for that market segment. This political battle was still raging in corporate back rooms three months before the 360 announcement. The night before the big decision meeting, Bill, Jerry, and I flew to Endicott and worked through the night with **Bill Hanf**, the Model 30 architect, microcoding the Model 30 to emulate the 1401. Next morning we had the result: a Model 30 that could run 1401 programs with a four-fold speedup, or alternately run 360 programs. We sprung the new result at the meeting, and the battle was over.

In 1968, Bill was selected for IBM's Ph.D. program and came here. His presence encouraged us to build an intelligence amplification system. We selected Professor **Jan Hermans** of UNC-Chapel Hill's Biochemistry Department as the most promising collaborator, and Bill built a graphics system for testing protein-folding hypotheses.

After Bill finished his Ph.D. in 1972, IBM decided to make an investment in molecular graphics, and they assigned him, now a member of IBM in RTP, N.C., to be a four-day-a-week member of the new GRIP project from 1973-1979. Bill, **Ed Britton** (Ph.D. 1977), **Jim Lipscomb** (Ph.D. 1981), and **Mike Pique** (M.S. 1980) in 1974 completed the first computer graphics system on which anyone solved a protein structure. In 1979, IBM started a full- scale molecular graphics project in Winchester, England, with Bill as the key technical person. Our projects collaborated, meeting by telephone each week.

After four years, Bill returned to IBM Fellow **Jim Gray's** advanced communications software technology group. He retired from IBM in 1991, rejoining the GRIP project as director. During his leadership, we won two National Institutes of Health competitive renewals, the second for a rare five years, to 2001. So Bill has been a part of the GRIP project for most of the years 1969-1996.

In every job, Bill's colleagues have valued not only his brilliance and rare technical depth, but even more his warm and gentle spirit, his absolute honesty in assessing projects and people, his helpfulness to collaborators, colleagues, and students, and his utter dependability. We wish him every happiness in his retirement, and we hope he will stay active in our science.



Bill Wright looks on as Steve Weiss speaks about Bill's career during his retirement reception on 30 September 1996 at the Carolina Inn in Chapel Hill, N.C. (Photo by Peter Calingaert)

Research highlights

Alumni fellowship winner

Jacob D. Furst is the recipient of the sixth annual Department Alumni Fellowship for the 1996-97 academic year. 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.

Jacob is working with **Stephen M. Pizer**, Kenan professor, on his dissertation, "Marching Ridges and Oriented Medialness." The primary goal of his work is to generate cores for three-dimensional medical images. An oriented medialness kernel is applied to the image, producing a four-dimensional space of medialness. The marching ridges algorithm then identifies generalized maxima of the space, which correspond to medial skeletons of objects in the original image. Jacob's work focuses on the oriented nature of the medialness kernel, which speeds the core-finding algorithm and provides an insensitivity to interobject relationships. Jacob has also developed a generalization of Lorensen and Cline's "Marching Cubes" algorithm that allows him to identify surfaces in a four-dimensional space.

The uses of cores in medical image analysis are wide ranging and include intraoperative registration, portal image registration, segmentation, object recognition, and model and atlas building. Up to this point, however, there has been no satisfactory way of generating cores for three-dimensional medical images.

GRIP project renewal

The GRIP Interactive Graphics for Molecular Studies project at UNC- Chapel Hill has won competitive renewal funding from the National Center for Research Resources (NCRR) at the National Institutes of Health: \$4.43 million during the next five years. **Frederick P. Brooks, Jr.**, Kenan professor, is the principal investigator; **William V. Wright** (Ph.D. 1972) has just retired as project director; **Russell M. Taylor, II** (Ph.D. 1994) and **Mary Whitton**, research assistant professors, are investigators.

For 21 years, the GRIP project has operated one of the two national resource centers funded by NCRR for developing forefront molecular graphics techniques and for harnessing them into prototype research tools that can be used by biochemists studying macromolecules. Our facilities at UNC-Chapel Hill are made available to qualified users, and software is distributed via the Internet.

During the next five years, the team will develop new visualization paradigms for interactive molecular manipulation--including near-real- time force feedback and updated energy minimization--and for molecular docking and interpretation of crystallographic data. The project has shifted part of its focus to "Nanomanipulator" research (a virtual-environment, real-time interface to the scanning probe microscope), which couples real-time visualization with force display capability and allows users to control the microscope probe to feel, place, and dissect the objects imaged.

Other important personnel on the project include **Vernon L. Chi**, MSL director, **Dinesh Manocha**, assistant professor, and **Jan F. Prins**, associate professor and director of graduate studies, from our Department; and **Richard Superfine** and **Sean Washburn** of the Physics Department at UNC-Chapel Hill. Collaborators include **David C. Richardson** and **Jane S. Richardson** of Duke University Medical Center, **R. Stanley Williams** of Hewlett Packard Labs, **Eric Henderson** of Iowa State University, and **Jude Samulski** of the Gene Therapy Center at UNC-Chapel Hill.

DiRT-Intel collaboration

Researchers in our Distributed and Real-time Systems group (DiRT) have begun a joint research project with Intel to investigate the use of a congestion control scheme for multimedia delivery over the Internet. The scheme was developed at UNC-Chapel Hill and is the culmination of research done during the past several years by graduate students **Terry Talley** (M.S. 1993), **Peter Nee**, and **Donald L. Stone** (Ph.D. 1995). The project will involve incorporating UNC-Chapel Hill's congestion control algorithm into Intel's ProShare (TM) video-conferencing product.

The project uses an internal interface to ProShare's codec. The codec, or coder/decoder, is a device that digitizes and compresses audio and/or video for transmission and then decompresses and plays it on the receiver. The DiRT group's algorithm adaptively alters the bit-rate generated by the codec and the manner in which the bit stream is introduced into the network in response to network congestion. It seeks to provide high-performance videoconferencing across networks that provide no support for real-time communication.

HP gets PixelFlow license

In June, Hewlett-Packard Co. (HP) purchased a license for the Department's PixelFlow technology. At the same time, it acquired the Chapel Hill office of Division, Inc., which had been working to develop and commercialize PixelFlow. HP has renamed this office the HP Chapel Hill Graphics Lab, and has hired Division's development team to work in the new lab.

Two of the system's inventors, **John G. Eyles** and **Steve Molnar** (Ph.D. 1991), research assistant professors, are taking a one-year leave of absence from our Department to help transform the technology into a commercial system.

PixelFlow uses a massively parallel processor-per-pixel approach to achieve unprecedented 3D graphics performance that could set new standards in scalability, programmability, and performance. When the system is completed, it is expected to generate virtual reality images faster than any hardware currently available. HP reports that its first PixelFlow-based products should be available sometime in 1997.

In addition to John and Steve, **Henry Fuchs**, Federico Gil professor, and **John Poulton**, research professor, have been the principal investigators for PixelFlow and its predecessors, Pixel-Planes 1 through Pixel-Planes 5. **Nick England**, research professor, and **Anselmo Lastra**, research assistant professor, are senior faculty researchers on the project. Some 50 creative graduate students and staff members have also contributed to the project during the past 15 years.

Distributed software architecture

For many years, research software was developed in our image analysis research by simply copying some existing source code and modifying it to suit new needs. About nine years ago, this model was supplanted by a notion of shared class libraries: large bodies of precompiled C++ classes that provide and organize powerful research capabilities. We have taken the class library

model about as far as it can go. Now we are having difficulties with library maintenance and with the pragmatics of using them: long compile and link times, huge executables, memory limitations. The time has come to develop and propagate a new model for research software--one that will bring our Graphics and Image Lab and Colab researchers in closer touch with each other.

James Coggins, associate professor and associate chairman for academics, is working this year to incorporate distributed systems ideas and tools into the software strategies used in image analysis and graphics. His goal is to work out how we can make the normal, natural way we develop experimental software work for distributed components. To this end, he is developing the ARCTIC Environment, a series of mechanisms and strategies by which distributed computing can be brought relatively unobtrusively into the regular practice of our graphics and imaging researchers. For more detail, go to <http://www.cs.unc.edu/~coggins> and look under the entry for "ARCTIC."

Research and study leaves

During his spring 1996 research leave, **Dinesh Manocha** was involved in transferring the technology of the collision detection system to a number of industries. While continuing his research in geometric modeling, Dinesh also worked on several monographs, including *Applied Computational Geometry*, co-edited with **Ming C. Lin**, adjunct assistant professor, and published by Springer-Verlag.

Jan F. Prins is spending the academic year 1996-1997 as a visiting professor at ETH in Zurich, Switzerland. His host is **Jay Nievergelt**, former professor and chair of our Department. In addition to teaching a class on parallel computing, Jan is implementing techniques for the efficient execution of irregular parallel computations that have been the subject of research over the last few years within our Department's parallel computing group. At ETH, Jan has access to several parallel supercomputers, including the world-class NEC SX-4. He is also continuing work on parallel algorithms for molecular dynamics simulations, in collaboration with researchers at the UNC/Duke/NYU Computational Structural Biology Resource and at ETH's Chemistry Department.

Hanes-Willis visiting professor

John R. Gilbert of Xerox PARC will visit our Department next spring as a Hanes-Willis visiting professor. He will teach an intensive five-day short course on sparse matrix methods from 31 March to 4 April 1997, and will also give a colloquium. **Siddhartha Chatterjee**, assistant professor, will be his host.

1996-97 Distinguished Lecturer Series

The Triangle Computer Science Distinguished Lecturer Series is organized and hosted by the computer science departments at UNC- Chapel Hill, Duke, and N.C. State, and is made possible by a grant from the U.S. Army Research Office. The speakers are:
7 October 1996 **Stanley Zdonik**, Brown University

Host: Duke "Data Data Everywhere"

4 November 1996 **John R. Rice**, Purdue University

Host: N.C. State "Problem Solving Environments for Scientific
Computing"

18 November 1996 **Herbert Edelsbrunner**, University of
Illinois-Urbana

Host: Duke "Complexes, Algorithms, and Modeling
Applications"

2 December 1996 **Bruce Buchanan**, University of
Pittsburgh

Host: N.C. State "Knowledge-Based Learning and Discovery"

3 February 1997 **Robert F. Sproull**, Sun Microsystems
Laboratories

Host: UNC-CH "Digital Interfaces to Services"

17 February 1997 **Randy Katz**, University of California-

Berkeley

Host: UNC-CH

"The Case for Wireless Overlay Networks"

3 March 1997

S. Rao Kosaraju, Johns Hopkins

University

Host: Duke

"Algorithms for DNA Sequence Assembly"

7 April 1997

L. Peter Deutsch, President, Aladdin

Enterprises

Host: N.C. State

"Formality and Computer Languages"

21 April 1997

Ruzena Bajcsy, University of

Pennsylvania

Host: UNC-CH

"The Problem of Signal and Symbol

Integration: A Study of Cooperative Mobile Autonomous Agent

Behaviors"

All talks take place at 4:00 p.m. on the dates indicated, and can be viewed in Room 011 of Sitterson Hall, UNC-Chapel Hill. For directions, detailed abstracts, and biographies check: <http://www.cs.unc.edu/Info/Events/DistLectures/>

Recent conferences

ACM Hypertext 1996

Several Department faculty and graduate students participated in organizing the 1996 ACM Hypertext Conference, held in Bethesda, Md., from 15-20 March. **David Stotts**, associate

professor, was conference chair; **John B. Smith**, professor, participated on a panel; **Michael Capps** (M.S. 1996) and **Brian Ladd**, graduate students, served on the conference committee and organized the student volunteers. Brian also assembled the conference proceedings and designed the cover art. The conference on hypertext and hypermedia theory, systems, and applications had approximately 325 attendees.

Mathematical Psychology

The 29th Annual Meeting of the Society for Mathematical Psychology took place in Sitterson Hall at UNC-Chapel Hill from 1-5 August 1996. 160 people attended sessions on a number of subjects including sensation and perception, learning and memory, measurement and statistics, information processing and performance, neural and learning systems, judgment and decision making, reaction time, and categorization. Many attendees also participated in a workshop on "Games and Behavior." Conference co-chairs were **Jonathan A. Marshall**, assistant professor, of our Department, and **Thomas S. Wallsten**, professor, of the Department of Psychology at UNC- Chapel Hill. **Christina A. Burbeck**, research professor, was on the organizing committee.

SIGGRAPH '96

Approximately 50 of our faculty, staff, and students attended SIGGRAPH '96 in New Orleans, La., from 4-9 August. Our researchers presented six papers (listed below in "Recent publications"). **Fred Brooks** chaired a paper session on "Hierarchical Rendering Techniques" and participated in a panel on "Springing into the Fifth Decade of Computer Graphics: Where We've Been and Where We're Going." More than 100 people turned out for the annual UNC-Chapel Hill Graphics Reunion, which was held on 7 August at Arnaud's Restaurant in the heart of New Orleans's French Quarter.

Vision & Ophthalmology

Attendees at the Conference of the Association for Research in Vision and Ophthalmology included **Stephen M. Pizer**, Kenan professor, **Christina A. Burbeck**, research professor, **Jonathan A. Marshall**, assistant professor, and **George Kalarickal**, **Sean Maher**, and **Charles Schmitt**, graduate students. Five posters were presented by our Department. The conference was held from 21-26 April 1996 in Ft. Lauderdale, Fla.

ACM student contest

A team of three students from UNC-Chapel Hill placed sixth in the Association for Computing Machinery's (ACM) Mid-Atlantic Regional Programming Contest on 16 November 1996.

Donald Ball, senior mathematics major, **Henry Fu**, senior mathematical sciences major, and **David McAllister**, graduate student in computer science, competed with nearly 100 other regional teams to program a set of problems in a limited time. A team from Virginia Tech took first place. Other top ten finishers included Princeton, Swarthmore, Lehigh, Johns Hopkins, Shippensburg, and Duke.

First held in 1970, the annual ACM International Collegiate Programming Contest is the oldest and largest programming competition for the world's universities and colleges. In 1995, more than 1,000 teams took part. Regional winners advance to the contest finals to compete for scholarships (<http://www.acm.org/~contest/>).



Lars Nyland and Jan Prins braving the cold on Mont Blanc in Chamonix, France in August. They had been attending the EuroPar96 conference in Lyon and had a day to spare before returning home. (Photo by Jeff Hollingsworth)

Recent publications

Anderson, J., S. Ramamurthy, M. Moir, and K. Jeffay. "Lock-Free Transactions for Real-Time Systems," *Proc. First International Workshop on Real-Time Databases: Issues and Applications*, March 1996, 107-114.

Bailey, M., D. Johnson, T. Massie, and R. M. Taylor, II. "So Real I Can Almost Touch It: The Use of Touch as an I/O Device for Graphics and Visualization," Course notes, *SIGGRAPH '96*, New Orleans, La., 4-9 Aug. 1996.

Capps, M., B. Ladd, and D. Stotts. "Enhanced Graph Models in the Web: Multi-client, Multi-head, Multi-tail Browsing," *Computer Networks and ISDN Systems*, 28: *Proc. Fifth Annual World Wide Web Conference*, Paris, France, May 1996, 1105-1112.

Capps, M., D. Stotts, J. Duff, and J. Purtilo. "Distributed Interoperable Virtual Environments," *Proc. International Conference on Configurable Distributed Systems*, Annapolis, Md., May 1996, 202- 209.

Cohen, J., A. Varshney, D. Manocha, G. Turk, H. Weber, P. Agarwal, F. P. Brooks, Jr., and W. Wright. "Simplification Envelopes," *Proc. SIGGRAPH '96*, New Orleans, La., 4-9 Aug. 1996, 119-128.

Fuchs, H., A. State, E. D. Pisano, W. F. Garrett, G. Hirota, M. A. Livingston, M. C. Whitton, and S. M. Pizer. "Towards Performing Ultrasound-Guided Needle Biopsies From Within a Head-Mounted Display," *Proc. 1996 Visualization in Biomedical Computing*, Hamburg, Germany, Sept. 1996, 591-600.

Furuta, R., and P. D. Stotts. "Dynamic Hyperdocuments: Replacing the Programming Metaphor," *Communications of the ACM*, Aug. 1995, 111-112.

Garrett, W. F., H. Fuchs, A. State, and M. C. Whitton. "Real-Time Incremental Visualization of Dynamic Ultrasound Volumes Using Parallel BSP Trees," *Proc. IEEE Visualization 1996*, San Francisco, Calif., 27 Oct. - 1 Nov. 1996, 235-240, 490; also our technical report TR96-018.

Gottschalk, S., M. C. Lin, and D. Manocha. "OBB-Tree: A Hierarchical Structure for Rapid Interference Detection," *Proc. SIGGRAPH '96*, New Orleans, La., 4-9 Aug. 1996, 171-180.

Hughes, M., M. C. Lin, D. Manocha, and C. Dimattia. "Efficient and Accurate Interference Detection for Polynomial Deformation and Soft Object Animation," *Proc. Computer Animation '96*, Geneva, Switzerland, June 1996, 155-166.

Krishnan, S., and D. Manocha. "Efficient Representations and Techniques for Computing B-rep's of CSG Models with NURBS Primitives," *Proc. CSG '96*, 1996, 101-122.

Kumar, S., S. Krishnas, and D. Manocha. "Interactive Display of Large Solid Models for Walkthroughs," *IEEE Computer Graphics and Applications*, 16(2), March 1996, 9-11.

Kumar, S., and D. Manocha. "The Power of Coherence: Fast Tessellation of Surfaces" (video), *ACM Computational Geometry Conference*, May 1996, V15-16.

Kumar, S., and D. Manocha. "Hierarchical Visibility Culling for Spline Models," *Proc. Graphics Interface '96*, Toronto, Canada, 1996, 142-150.

Kumar, S., and D. Manocha. "Dynamic Mesh Generation for Parametric Surfaces," *Proc. Fifth International Conference on Numerical Grid Generation in Computational Fluid Dynamics and Related Fields*, Starkville, Miss., 1996, 303-312.

Kumar, S., D. Manocha, W. F. Garrett, and M. C. Lin. "Hierarchical Back-face Culling," *Proc. Seventh Eurographics Workshop on Rendering*, Porto, Portugal, 1996, 231-240; also our technical report TR96-014.

Lee, S.-J., and D. A. Plaisted. "Controlling the Consumption of Storage with Sliding Priority Search in a Hyper-linking Based Theorem Prover," *Computers and Artificial Intelligence*, 14(6), 1995, 563-578.

Manocha, D., and M. C. Lin. *Applied Computational Geometry: Towards Geometric Engineering*, Springer-Verlag, 1996.

Mark, W. R., S. C. Randolph, M. Finch, J. M. Van Verth, and R. M. Taylor, II. "Adding Force Feedback to Graphics Systems: Issues and Solutions," *Proc. SIGGRAPH '96*, New Orleans, La., 4-9 Aug. 1996, 447-452.

Plaisted, D., and A. Sattler-Klein. "Proof Lengths for Equational Completion," *Information and Computation*, 125(2), March 1996, 154-170.

Ramamurthy, S., M. Moir, and J. Anderson. "Real-Time Object Sharing with Minimal System Support," *Proc. 15th Annual ACM Symposium on Principles of Distributed Computing*, May 1996, 233-242.

Singh, R. K., D. L. Hoffman, S. G. Tell, and C. T. White. "BioSCAN: A Network Sharable Computational Resource for Searching Biosequence Databases," *Computer Applications in the Biosciences*, 12(3), 1996, 191-196.

Singh, R. K., and P. Munson. "Sequence-Structure Compatibility using a Four-body Potential based on Delaunay Tessellation," *Intl. Conf. on Protein Folding and Design*, Bethesda, Md., 23-26 April 1996, 197 (abstract).

Singh, R. K., S. G. Tell, and S. J. Bharrat. "Comparison of Raw and Internet Protocols in an HIPPI/ATM/SONET Gigabit Network" *ACM Computer Comm. Rev.*, 26(1), 1996, 18-28.

Singh, R. K., A. Tropsha, and I. I. Vaisman. "Delaunay Tessellation of Proteins: Four-body Nearest-neighbor Propensities of Amino-acid Residues," *Journal of Computational Biology*, 3(2), 1996, 213- 221.

State, A., G. Hirota, D. T. Chen, W. F. Garrett, and M. A. Livingston. "Superior Augmented Reality Registration by Integrating Landmark Tracking and Magnetic Tracking," *Proc. SIGGRAPH '96*, New Orleans, La., 4-9 Aug. 1996, 429-438.

State, A., M. A. Livingston, W. F. Garrett, G. Hirota, M. C. Whitton, E. D. Pisano, and H. Fuchs. "Technologies for Augmented Reality Systems: Realizing Ultrasound-Guided Needle Biopsies," *Proc. SIGGRAPH '96*, New Orleans, La., 4-9 Aug. 1996, 439-446.

Stotts, D., P. Dewan, J. Navon, and J. Munson. "A Three-Level Binding for Collaborative Editing Semantics," *Groupware and Authoring*, Roy Rada, ed., Kluwer Publishers, 1996, 297-324.

Turk, G., and D. Banks. "Image-Guided Streamline Placement," *Proc. SIGGRAPH '96*, New Orleans, La., 4-9 Aug. 1996, 453- 460.

Recent Ph.D. titles

Douglas L. Hoffman, "3D Protein Structure Comparison Using Dihedral Transformations and 1D Pattern Matching" (Raj K. Singh, advisor).

Victoria L. Interrante, "Illustrating Transparency: Communicating the 3D Shape of Layered Transparent Surfaces via Texture" (Henry Fuchs and Stephen M. Pizer, advisors).

Mark Moir, "Efficient Object Sharing in Shared-Memory Multiprocessors" (James Anderson, advisor).

New contracts and grants

James Anderson, assistant professor. University Faculty Research Grant, University Research Council, UNC-Chapel Hill.

James Anderson and **Kevin Jeffay**, associate professor. "Object Sharing Technology for Real-Time Systems," National Science Foundation (NSF).

Gary Bishop, research associate professor, and **Dinesh Manocha**, assistant professor. "Modeling and Interactive Visualization of Complex Datasets," U.S. Army Research Office.

Frederick P. Brooks, Jr., Kenan professor. "Simulation Based Design Program," Lockheed Martin.

Prasun Dewan, associate professor. "Merging in a Collaborative Environment," NSF.

Prasun Dewan and **Kevin Jeffay**. "Collaboration Bus: An Infrastructure for Supporting Interoperating Collaborative Systems," Office of Naval Research (ONR)/Defense Advanced Research Projects Agency.

Henry Fuchs, Federico Gil professor, and **John Poulton**, research professor. "ImageFlow: Real-Time Image-Based Rendering," NSF/Advanced Research Projects Agency.

Jonathan A. Marshall, assistant professor. "Neural Mechanisms That Learn to Represent and Bind Surface Appearance Properties of Visually Interacting Objects," ONR.

David A. Plaisted, professor. "Instance-based Theorem Proving with Semantics and Equality," NSF.

Jan Prins, associate professor. University Faculty Research Grant, University Research Council, UNC-Chapel Hill.

Stephen F. Weiss, professor. "Infrastructure for Research in Collaboration Systems," NSF.

In the media

The Sunday Times of London ran an article in its 7 April 1996 issue entitled, "Surgeons Operate With x-ray Spectacles," which described our work on ultrasound visualization.

The March/April 1996 issue of the *Carolina Alumni Review* includes an article about the late Chancellor J. Carlyle Sitterson and a photograph of him standing outside Sitterson Hall. You can read the article on the Web at [< P>http://www.cs.unc.edu/Info/Resources/Sitterson/Chancellor/](http://www.cs.unc.edu/Info/Resources/Sitterson/Chancellor/) The April 1996 issue of *Endeavors*, published by the Office of Research Services at UNC-Chapel Hill, includes articles about **Fred Brooks** and our virtual reality research. Read them at <http://groucho.admin.unc.edu/pubs.htm>

Channel 17 (WNCN) of Raleigh, N.C., aired a short segment on the Nanomanipulator project on its evening news program on 14 May 1996.

Check your July/August 1996 issue of the *Carolina Alumni Review* for a picture of **James Coggins**, associate professor, talking about virtual reality at a campus reunion enrichment event (page 45). Also, several of our faculty and students are mentioned in the "Short Subjects" column in the same issue (page 7).

On 22 August 1996, a production team from the BBC program "Tomorrow's World" visited to shoot footage for a segment on the ultrasound augmented reality project. The segment, entitled "The Shape Changers," aired on 28 October.

Special visitors

More than 900 people visited the Graphics and Image Lab to view virtual reality demos and demos on the Division system between 1 January and 30 October of this year. Following are some of our other special visitors during the past several months:

John Ambrosiano of the Environmental Programs Group at MCNC gave a talk at Systems Lunch entitled, "Scientific Data Archetypes and Other Concepts for Building Large-Scale, Multi-disciplinary Problem-Solving Environments," on 25 March.

Greg Angelini and **Ken Fast** of General Dynamics visited on 29-30 April.

Ron Azuma (Ph.D. 1995), who is now at Hughes Research in Malibu, Calif., visited on 21 March. He gave a talk at Graphics Lunch: "One Year in Industrial Research: A Report from the Field."

Michael Braun, a senior lecturer in the Department of Applied Physics and director of the Image Handling Laboratory at The University of Technology, Sydney, Australia, was on sabbatical here during May and June. Stephen M. Pizer was his host.

Peter Brooks, a systems analyst at the Institute for Defense Analyses in Alexandria, Va., visited and gave a talk on "New Directions in Advanced Distributed Simulation," on 8 April. Henry Fuchs was his host.

Bill Buxton of the University of Toronto and Alias Corp. visited on 14 March and spoke on "Ecological Design and Bimanual Interaction with Computers." Fred Brooks was his host.

Mani Chandy of Caltech visited on 2 April as part of the Distinguished Lecturer Series. He spoke at N.C. State on 1 April on "Patterns of Specifications."

Michael Cohen of Microsoft Research visited on 2 May and spoke on "The Lumigraph" at Graphics Lunch. Dinesh Manocha was his host.

Tom Conte of N.C. State University presented a systems seminar on 11 March on "TINKER: An Experimental System for Statically Scheduled Instruction-Level Parallel Processing." Jan Prins was his host.

Tom Cormen of Dartmouth University gave a systems seminar talk on "ViC*: A Compiler for Virtual-Memory C*," on 1 May. Jan Prins was his host.

David Dobkin of Princeton University visited on 18 April as part of the Distinguished Lecturer Series. He met with faculty and students and gave a talk entitled, "Applied Computational Geometry: Progress Report."

Yaorong Ge and **Paul Hemler** of the math and computer science departments and the Bowman Gray Medical School Department of Radiology at Wake Forest University visited on 15 August. Stephen M. Pizer was their host.

Gene H. Golub of Stanford University visited on 16 April as part of the Distinguished Lecturer Series. He spoke at N.C. State on 15 April on "Applications of the Theory of Moments to Large Scale Computations."

Michael Hooker, chancellor of UNC-Chapel Hill, visited on 8 May for a tour and demos, and to meet with the faculty.

Barron C. Housel of IBM's Networking Software Division gave a colloquium on "WebExpress: A System for Optimizing Web Browsing in a Wireless Environment," on 20 March. Kevin Jeffay was his host.

Takeo Kanade, director of the Robotics Institute and a professor of computer science and robotics at Carnegie Mellon visited on 11 March. He spoke on "Virtualized Reality: Putting Reality into Virtual Reality." Henry Fuchs was his host.

Hiroshi Mizushima of the National Cancer Center Research Institute of Japan, visited the Graphics and Image Lab on 5 June. He gave an informal talk about his work in telemedicine and virtual reality.

Haruo Noma and **Fumio Kishino** of ATR Communications Research Laboratories in Kyoto, Japan, visited on 12 April. Noma gave an informal talk about his new lab and his work on manipulation methods in virtual space.

Janet Prichard of East Carolina University spoke on "Real- time Databases," on 12 April. James Anderson was her host.

P. K. Sarkar, senior scientific officer at the Bhabha Atomic Research Center of the Indian Department of Atomic Energy, visited on 28 August. He gave a colloquium on "Use of Antithetic Variates for Efficient Monte Carlo Simulations with Geometric Surface Splitting." John Halton was his host.

Richard Shiffrin, professor of psychology and director of the Cognitive Science Program at Indiana University, lectured on "REM: A Model for Explicit, Generic, and Implicit Memory," on 15 March, as part of the Lectures in Cognitive Science Series.

Dick Urban, program manager for DARPA, visited the Head- Mounted Display group on 7 May.

Juergen Wagner of the Fraunhofer Institute for Computer Graphics in Darmstadt, Germany, visited on 10 May. Henry Fuchs was his host.

Yasuyoshi Yokokohji, a visiting researcher at Carnegie Mellon, spoke at Graphics Lunch on 14 March, on "What You can See Is What You Can Feel: Development of a Visual/Haptic Interface to Virtual Environments."

Site visits

The Science and Technology Center (STC) for Computer Graphics and Visualization held its annual site visit at UNC-Chapel Hill from 25-26 June. Participants included a number of UNC-Chapel Hill participants, and about 35 researchers and students from the other STC sites (Brown, Cornell, Caltech and Utah), in addition to several reviewers from the funding agency, the National Science Foundation.

Congratulations to . . .

James Anderson, who has been promoted to associate professor with tenure as of 1 January 1997.

Stephen Aylward, graduate student, who has been appointed as a research assistant professor in the Department of Radiology at UNC-Chapel Hill.

Gary Bishop (Ph.D. 1984), research associate professor, who has received a tenure-track appointment as an associate professor effective 1 January 1997.

Gary Bishop, and **Siddhartha Chatterjee**, assistant professor, recipients of the 1995-96 Computer Science Students Association Teaching Award.

Peter Calingaert, professor emeritus, who has been elected as a Fellow by the American Association for the Advancement of Science. He will be honored for his contributions to research, design, and education in computer science at a ceremony in Seattle, Wash., in February 1997.

Katrina B. Coble, administrative manager, who received her associate's degree in business administration in August from Alamance Community College.

Prasun Dewan, associate professor, who was granted tenure effective 1 January 1997.

John G. Eyles, research assistant professor, who was reappointed for five years as of 1 July 1996.

J. R. Key, technology transfer and outreach secretary for the Graphics and Image Lab, who received his B.A. in communications studies in May 1996 from UNC-Chapel Hill.

Ming C. Lin, adjunct assistant professor, who was reappointed for three years as of 15 June 1996.

Michael North, who was promoted to Systems Programmer/Administrator II effective 29 August 1996.

Claire L. Stone, who was promoted to Information and Communications Specialist I effective 29 April 1996.

David Stotts, associate professor, who was awarded tenure effective 1 July 1996.

Jeannie M. Walsh, lecturer and publications director, who was appointed to a three-year term on the University's Office Environments Advisory Committee.

Turner Whitted, research professor, who was reappointed for two years as of 1 July 1996.

To those faculty and staff who attained the following level of State service as of September 1996:

20 years: **Catherine Perry**

15 years: **Linda Houseman, John Poulton**

10 years: **Debbie Blalock, James Coggins, Carolyn Din**

5 years: **Gary Bishop, Anselmo Lastra, Lars Nyland**

And to our recent graduates:

May 1996

Ph.D.: **Victoria L. Interrante**

M.S.: **Lars M. Bishop, Christopher J. DiMattia, Carl M. Erikson, Keith J. Goldberg, Michael P. Goslin, Chenwei Gu, Juraj Horacek, Merlin P. D. Hughes, Jayant B. Kolhe, Qiang Liu, William R. Mark, Gregory B. Pruett, Jason M. Smith, Narendra C. Tulpule, James L. Van Welzen, Xiaojun Wang, Charles T. White, Scott D. Williams, and Jason R. Wilson**

August 1996

Ph.D.: **Doug L. Hoffman, Mark S. Moir**

M.S.: **David L. Bennett, Michael V. Capps, Patrick D. Conroy, Mark B. Housel, and Jason Priebe**

Fellowships and special assistantships

These students received the following special awards during the 1996-97 academic year:

Eric Baker	National Physical Science Consortium
Dennis Brown	National Science Foundation Fellowship
Michele Clark	National Science Foundation Fellowship
Jacob Furst	Department Alumni Fellowship
Aron Helser	Graduate School Allocated Merit
Assistantship	
Kwang-Soo Kim	Rotary Scholarship
Luiz Lima	PETROBRAS Fellowship
William Mark	Link Foundation Fellowship/Microsoft
Kori Needham	AT&T/Bell Labs and Ford
Fellowship	
Paul Rademacher	National Science Foundation
Fellowship	
Ellen Scher Zagier	Link Foundation Fellowship
Anshu Sharma	Board of Governors Fellowship

These awards were renewed:

Rui Bastos	Brazilian Government Fellowship (3rd year)
Matthew Cutts	National Science Foundation Fellowship (2nd year)
Carl Erikson	National Science Foundation Fellowship (3rd year)
Tom Hudson	Board of Governors Fellowship (3rd year)
Noel Llopis-Artime	Board of Governors Fellowship (2nd year)
David Luebke	IBM Fellowship (2nd year)
Jonathan Munson	IBM Fellowship (2nd year)
Manuel Oliveira-Neto	Brazilian Government Fellowship (2nd year)
Mark Parris	IBM Fellowship (3rd year)

Vern Chi wins Chancellor's and Governor's awards

Vernon L. Chi, Microelectronic Systems Laboratory (MSL) director, is one of five winners of the 1996 Chancellor's Award and one of 12 winners of the 1996 Governor's Award for Excellence. The Governor's Award is given for dedicated service to State Government and to the citizens of North Carolina, in one of five categories: devotion to duty, human relations, innovations, public service, and safety and heroism. It is the highest honor a state employee can receive. The Chancellor's Award is based on the same criteria and is given to permanent employees of UNC-Chapel Hill. Vern won the awards for his innovative role in developing the MSL, and for serving as the original principal engineer for a statewide microwave backbone network that linked the UNC System campuses for teleclassing, teleconferencing, and high-speed data transmission.

Under Vern's direction, the MSL has become one of only a half-dozen university laboratories that regularly produce complete running prototypes of high-performance, state-of-the-art, experimental computer systems. Since it was formed in 1980, the lab has developed nearly a dozen full-scale, operating prototype computing systems, including several generations of Pixel-Planes graphics accelerators, which are used continually as production machines in the Graphics and Image Lab at UNC-Chapel Hill; BioSCAN, a special-purpose machine for DNA and protein sequence analysis; Blitz, a massively parallel image-processing computer; the Ray-Casting Machine, a special-purpose graphics system for mechanical design; PixelFlow, a high-end graphics product; and chips that have been incorporated into the world's first 3D ultrasound scanner.

Vern's colleagues credit the MSL's success to his management style and in-depth approach to problems. "He works deeply to complement the work of the rest of us," observes **John Poulton**, research professor. Vern's breadth of knowledge is so legendary that "Ask Vern" is the standard answer to a difficult question. He has made numerous significant contributions to work in the lab, including his current project, pursuing a novel idea for "clocking" high-performance systems. He has served as an investigator or principal investigator on many of the MSL's projects and has been a mentor to his colleagues and to generations of graduate students.

Family matters

Candice Lee Autry married **Jason McDaniel** on 28 July 1996 in Durham, N.C.

Lars Bishop (M.S. 1996) married **Jenny Acker** on 8 June 1996 in Chicago, Il.

Jesse Otis Ke-Ming Chung was born on 27 January 1996 in Chapel Hill, N.C., to James Chung (Ph.D. 1993) and Nancy Striniste. He has an older sister, Abbey, who is seven years old.

Caitlin Eilis Coggins was born on 2 April 1996 in Chapel Hill, N.C., to James and Leslie Coggins.

Bergen Leigh Holloway was born on 25 July 1996 in Durham, N.C. to Richard (Ph.D. 1995) and Barbara Holloway. She has an older sister, Alexa, who is three years old.

Pamela K. Johnson (M.S. 1991) married Andreas Bremer on 9 September 1995 in Durham, N.C.

Asher Isaak Lines was born on 22 August 1996 in Florence, Italy, to David Lines and Grace Lines-Blaauw.

Anika Nagpal was born on 1 August 1996 in Raleigh, N.C., to Arvind and Ritu Nagpal.

Karl Owen (M.S. 1992) and **Susan Buchanan** were married on 2 January 1996 at St. John, U.S. Virgin Islands.

Anna Turner was born on 13 August 1996 to Doug Turner (M.S. 1988) and Helga Thorvaldsdottir (M.S. 1986).

Amy Tuck was born on 6 November 1995 in Santa Clara, Calif., to Russ (Ph.D. 1990 [Duke]) and Debbi Tuck. She has an older brother, Daniel, who is four years old.

Elizabeth Diane Weaver was born on 5 November 1996 in Durham, N.C., to Kenneth and Stephanie Weaver.

Samuel Eric Welch was born on 8 April 1996 to George and Jennifer Welch. His older brother, Glenn, is two years old.

CSA news

Jacob Furst is the president of the Computer Science Students' Association (CSA) for the 1996-97 academic year. Jacob is assisted by **Carl Erikson**, **Tom Hudson**, **Mike Meehan**, and **Ramesh Raskar**, along with **Sanjay Sthapit**, who is our representative to the University's Graduate and Professional Student Federation.

Recipients of the CSA's second annual teaching award are **Gary Bishop** (Ph.D. 1984), research associate professor, and **Siddhartha Chatterjee**, assistant professor. The award is given annually to two professors to recognize their excellence in teaching.

Computer Services news

New backup system in place

During spring 1996, **John Sopko**, systems programmer, evaluated commercial backup software packages to handle our non- AFS UNIX backups. After a thorough assessment of a variety of packages, John and other staff members decided to select Legato Networker, which we are now using to handle backups of all of our UNIX computers. This software can also backup our Macintosh and PC systems.

In April, John worked with **Frederic R. Jordan**, electronic shop supervisor, to install a 25-gigabyte disk pack and a DLT (about 40 gigabytes per tape with compression) tape stacker to the Sun system that now acts as the backup server. With the help of **Ernest Parker**, computer

systems administrator, John configured the system to back up all of the important non-AFS UNIX files.

The new system replaces one that was written in-house by **John Menges** (M.S. 1990) in the late 1980s. The old system worked well for years but could not handle our current backup needs.

More network improvements

We completed Phase Two of the network upgrade this summer. We now have 17 Ethernet switches installed. These provide dedicated 10- megabit-per-second connections to the Sitterson fiber backbone, allowing much greater bandwidth for connected machines. We have also run fiber to the remaining communication closets.

MasPar decommissioned

The MasPar MP-1 computing system, a massively parallel computer, was decommissioned at the end of August. This system provided 8,192 processors and 512 megabytes of main memory in a SIMD architecture. The system was extremely powerful in its day and provided an interesting programming opportunity. Newer systems can solve similar problems using one or a few very powerful processors rather than a massive array of less powerful processors.

Other News

Lobby museum

A new museum is being planned for the lobby of Sitterson Hall. Museum Committee members **Sherry Palmer**, administrative secretary for the MSL, **Don Stanat**, professor, and **Brian White** (M.S. 1987), Computer Services manager, are working on ideas for its design and contents and are soliciting ideas from the faculty. An architect has been commissioned to prepare a design of what the museum might look like. Plans are to complete the project sometime during 1997.

Groves recovers

William E. Groves, adjunct associate professor, reports that he has been recovering from an attack and robbery in Memphis, Tenn., in March, during which he was shot with an electric stun gun and a handgun. Bill was in Memphis to make a presentation to a group of management personnel on issues related to Internet telecommunication. He was attacked in the parking lot of his hotel after returning from dinner the evening before he was to make the presentation. A bullet is still lodged against his spine and he has not recovered the original feeling in, or use of, his right hand.

About News & Notes

News & Notes is published during each fall and spring semester.

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Last Content Review: 18 December 1996

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