News & Notes from Sitterson Hall

Issue Twenty-Four, Spring 1999

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

In this issue

Chairman's corner

I am very pleased to report that our Department's program in graphics and user interaction has been ranked first in the nation by U.S. News and World Report magazine, in its 1999 survey of the nation's best graduate schools. Overall, as a department, we are tied for 21st place.

More good news: the results of the recent external review of our graduate program were very positive indeed. The reviewers, who visited in mid-February, agreed that our research program is distinguished and our graduate education program is excellent. For more details on the reviewers' findings and for their recommendations, please **follow this link.**

Congratulations to **Kevin Jeffay,** associate professor, who has been named S. S. Jones Distinguished Term Professor of Computer Science, effective 1 July 2000. Congratulations also to **Jane Stine,** a member of our Computer Services staff, who was sworn in as chair of the

Employee Form on 6 January after being elected unanimously. See **"Congratulations to..."** below for more details on these and other honors and awards that our faculty, staff, and students have received.

We are in the process of recruiting several new faculty members. We'll introduce you to them in our fall issue.

Spring is a wonderful time to be in Chapel Hill. We will hold our graduation ceremony on Sunday, 16 May in Sitterson Hall, and we welcome all our alumni and friends to attend if you are in the area. Or drop by and visit us anytime!

Stephen F. Weiss

Welcomes and farewells

New Staff

Sue Forrest joined us in January as our receptionist and was promoted in April to secretary for faculty. Prior to joining us, she worked in several secretarial positions, most recently on a temporary assignment in the Department of Digestive Diseases at UNC Hospitals. Sue has bachelor's and master's degrees in music from East Carolina University, and she teaches piano.

Luis Ibanez, researcher, joined us in January to work with the Medical Image Display and Analysis Group (MIDAG). He is helping to develop software tools for image registration, segmentation, and visualization. Luis has bachelor's (1989) and master's (1994) degrees in physics from the Universidad Industrial de Santander in Bucaramanga, Colombia, and a D.E.A degree (1995) from the Universite de Rennes in Rennes, France. Prior to joining us he pursued a doctoral degree at the Departement Image et Traitement de l'Information Ecole Nationale Superieure de Telecommunications de Bretagne, in France.

Thanks and Farewell To . . .

Ophelia Donaldson, secretary, who left in March to join the Department of Economics at N.C. State University as their student services assistant. She had been with us since 1992.

Congratulations to . . .

Graduate School Honors Fellowship Winners

On 25 February, the Graduate School at UNC-Chapel Hill held its first Prestigious External Awards Recognition Dinner at the Carolina Club in the Alumni Center. Graduate students representing more than 30 departments, including 16 from Computer Science (more than from any other department), were recognized for having won external fellowships and grants. Students honored from our Department were **Eric Baker, Rui Bastos** (M.S. 1997), **Brian Blount, Alexandra Bokinsky** (M.S. 1997), **Michelle Clark** (M.S. 1998), **Jessica Crawford, Matthew Cutts** (M.S. 1998), **Carl Erikson, Mave Houston, Wynee Johnson, Benjamin Lok, David McAllister, Manuel M. de Oliveira Neto** (M.S. 1998), **Paul Rademacher, Andrew Thall** (M.S. 1997), and **Andrew Wilson.** Several of them attended with their advisors, including associate professors **Gary Bishop** (Ph.D. 1984), **Kevin Jeffay,** and **Dinesh Manocha,** and **Brent Seales,** visiting associate professor from the University of Kentucky, who was Matthew Cutts's advisor at Kentucky. Dean of the Graduate School **Linda Dykstra,** Provost **Richard J. Richardson,** and Congressman **David Price** addressed the attendees.

From left: Matthew Cutts, Manuel M. de Oliveira Neto, Carl Erikson, Alexandra Bokinsky, Eric Baker, Michelle Clark, Andrew Wilson, and Mave Houston. (Photo: Kevin Jeffay)

Manuel M. de Oliveira Neto (left) with his advisor, Gary Bishop, associate professor. (Photo: Kevin Jeffay)

Stine is Elected 1999 Employee Forum Chair

In January, **Jane Stine,** desktop systems manager, was elected unanimously to chair the Employee Forum at UNC-Chapel Hill for 1999. The forum was created in 1992 to give staff across campus a voice in decisions that affect them. Jane is serving her second year of a two-year term on the committee. As chair, she plans to build on the forum's communications efforts with other campus groups, including faculty, students, and administrators. She will be attending meetings with Faculty Council representatives and student government organizations. As forum

chair, she will also be a member of the new University Priority and Budget Committee, which recommends budget priorities to the chancellor. Jane also plans to solicit ideas from campus employees asking what the forum's direction should be during the next year. Current initiatives include recruitment and retention, parking, hours worked by exempt employees, and benefits and salary issues. For more information on Jane's new role, see **www.cs.unc.edu/Info/Events/News/EmployeeForum.html**

Jane Stine takes the Employee Forum gavel from outgoing chair Linwood Futrelle. (Photo: Dan Sears)

Jeffay Named Distinguished Professor

Kevin Jeffay, associate professor, has been named S. S. Jones Distinguished Term Professor of Computer Science, effective 1 July 2000. The professorship is named in honor of the late **S. Shepard Jones** (1909-1995), former Burton Craige professor of political science at UNC-Chapel Hill. It is one of the Margaret and Paul A. Johnston professorships, a series of chaired professorships in the College of Arts and Sciences that honors retired faculty members. The purpose of the professorships, which were established in 1987 by a bequest in Paul A. Johnston's will, is to acknowledge excellence in research or creative activity and a demonstrated commitment to undergraduate or graduate education on the part of mid-career faculty. Kevin will hold the professorship for five years.

Pizer Awarded Kenan Leave

Stephen M. Pizer, Kenan professor, has been awarded a Kenan Leave for the period January to August 2000. He will spend the time in the Department of Engineering Science at Oxford University. Steve will be working with collaborators in the Medical Image Analysis Group, a subgroup of the Department's Robotics Research Group. He plans to write a textbook entitled, "Principled Image Analysis." Steve will be working closely with his host, **Michael Brady,** and with two other faculty members, **Andrew Blake** and **J. Alison Noble.**

Congratulations also to . . .

- **Gary Bishop,** associate professor, who has been awarded a research and study assignment for fall 1999 (more details in our fall issue).

- **Dinesh Manocha,** associate professor, who has been appointed to the editorial board of *IEEE Transactions on Visualization and Computer Graphics.*
- **Lori McRae,** who was promoted to Computing Consultant II, effective 14 January 1999.

Research highlights

Reality Monster and PixelFlow Commissioned

On 19 March, during Candidates Day, the Department commissioned the SGI Reality Monster and PixelFlow, two significant components of our parallel graphics computing facilities. Faculty, staff, students, and Candidates Day participants gathered in the Machine Room for the ceremony. Also attending from University administration were **Risa Palm,** dean of the College of Arts and Sciences, and **Richard J. Richardson,** provost, along with **Jacqueline Resnick,** director of Proposal Development Initiatives. **Kevin Hidalgo,** a locally-based sales representative from Silicon Graphics, Inc., also attended.

After opening remarks by **Stephen F. Weiss,** professor and chair, **Henry Fuchs,** Federico Gil professor, discussed the significance of the two machines. Our Reality Monster is one of only three such machines to be housed on a university campus, and is the only one in use as a laboratory machine. Henry noted that PixelFlow is unique: it is the only machine of its kind anywhere in the world. Henry praised the many current and former Department researchers who worked to make PixelFlow a reality. He thanked Department and University administrators for allowing such a favorable research climate to flourish.

Developed by Silicon Graphics, Inc., the Reality Monster, an Onyx2(TM) Infinite Reality2(TM) workstation, has 32 processors, 16 gigabytes of main memory, eight raster managers, and eight InfiniteReality2 graphics subsystems. It has been named Evans, in honor of computer graphics pioneer and educator, **David C. Evans.** For more information about the Reality Monster and the projects for which it will be used, see **www.cs.unc.edu/Info/Events/News/RealityMonster.html.**

PixelFlow, a scalable parallel graphics engine, grew out of an idea by **John G. Eyles,** research associate professor, **Steven Molnar** (Ph.D. 1991) adjunct assistant professor, and **John Poulton,** research professor. It was designed and built by researchers in our Department, Division PLC, and Hewlett-Packard Corp.'s Chapel Hill Graphics Lab. PixelFlow machines can be as small as three nodes or much larger. We have assembled configurations as large as 36 nodes. Each node has two PA-8000 processors and 128 megabytes of main memory, as well as a 128 x 64 SIMD processor array and 64 megabytes of texture memory.

From left: Henry Fuchs, Jacqueline Resnick, Dean Risa Palm, Anselmo Lastra, Vernon Chi, John Eyles, Steven Molnar, and Stephen Weiss pose with the engraved ceremonial nut drivers, with which they installed the plaques dedicating the Reality Monster and PixelFlow (Photo: Todd Gaul)

Researchers Study Real and Virtual Walking

During fall 1998, the Walkthrough Project team conducted experiments to compare whether real walking, walking-in-place ("virtual walking"), or "flying" through a virtual environment gives the participant a greater sense of being present in that environment. Their experiments grew out of a 1995 study by **Mel Slater, Anthony Steed,** and **Martin Usoh** of University College London, which indicated that walking-in-place gives people a higher subjective sense of presence than does flying. Martin Usoh, who visited us as a postdoctoral researcher last fall, led the experiment, which replicated the previous study, with the addition of real walking. Also on the UNC-Chapel Hill team were **Mary Whitton,** research assistant professor and project manager for virtual environments research, and graduate students **Kevin Arthur** and **Rui Bastos.**

The experiments were conducted under the UNC-Chapel Hill wide-area ceiling tracker. Participants could walk freely around the virtual scene as if they were in a real environment. The user's head and one hand were tracked using a custom optical tracker developed here by Tracker team members, including **Gary Bishop** (Ph.D. 1984), associate professor, **Stephen Brumback,** research engineer, **Vernon L. Chi,** director of the Microelectronic Systems Laboratory, **D'nardo Colucci,** former research optical engineer, **Kurtis Keller,** research engineer, **Gregory F. Welch** (Ph.D. 1997), research assistant professor, **Philip Winston,** research engineer, and a number of current and former graduate students. **Frederick P. Brooks, Jr.,** Kenan professor, who heads the Walkthrough project, reported that the tracker worked excellently and was sensitive and accurate, like a commercial product at its best.

In addition to confirming the findings of the previous study, researchers found that real walking is better than walking-in-place or flying as a mode of travel. Both types of walking provide a significantly better sense of presence for the user than does flying, but the differences between the two types of walking were not significant. A paper will be presented at SIGGRAPH '99.

nanoManipulator Award

The nanoManipulator team has received $330,000 from the U.S. Army Research Office to purchase a Scanning Electron Microscope to be added to the Atomic Force Microscope, making a combined multimodal instrument. The proposal also provides support from UNC-Chapel Hill

for a graduate student to merge the systems. **Richard Superfine,** assistant professor in the Department of Physics and Astronomy, is the project's principal investigator, and **Sean Washburn,** professor, also of Physics and Astronomy, and **Russell M. Taylor II** (Ph.D. 1994), research assistant professor of our Department, are co-principal investigators.

PixelFlow Cracks Cipher

Last fall, **Gershon Kedem,** associate professor, and **Yuriko Ishihara,** graduate student, of the Department of Computer Science at Duke University used our Department's PixelFlow machine to "crack" the 40-bit cipher commonly used by browsers such as Netscape Navigator and Microsoft Internet Explorer. They also showed that UNIX passwords are very vulnerable to brute force cryptanalysis.

PixelFlow is able to check all 40-bit key combinations used by browsers to form "secure connections" in about 7.5 hours. On average, it finds the key for any "secure connection" that uses 40-bit keys in approximately 3.25 hours. The team's experiments showed that any encryption algorithm which uses 40-bit keys can be easily broken. This ability in a machine such as PixelFlow presents a serious security threat. Many people use the Internet for banking transactions, and almost all transactions use 40-bit RC4 encryption. The researchers report that it is now possible for less than $100,000 to build a machine which can do cryptanalysis 1,000 to 10,000 times faster than PixelFlow, which was not built for doing cryptanalysis.

The researchers also showed that UNIX passwords are vulnerable to brute-force attack. In about 20 hours PixelFlow can, for example, crack all UNIX passwords that use one capital letter in the first position, one punctuation mark, and lower-case letters in all other positions. Other more complex passwords can be cracked in 21 days or fewer. For more information see, **kedem.cs.duke.edu/CipherFlow/.**

IEEE Virtual Reality '99

A number of faculty, students, and alumni attended the IEEE Virtual Reality '99 Conference in Houston, Texas, from 13 to 17 March. **Frederick P. Brooks, Jr.,** Kenan professor, delivered the keynote speech, "What's Real about Virtual Reality?" Our Department had an accepted paper by **Arthur Gregory,** graduate student, **Ming C. Lin,** assistant professor, **Stefan Gottschalk,** graduate student, and **Russell M. Taylor II** (Ph.D. 1994), research assistant professor (see **"Recent and upcoming publications"**). Program committee members included **Henry Fuchs,** Federico Gil professor; **Ming C. Lin; Jannick Rolland,** former research assistant professor, now of the University of Central Florida; alumni **Ron Azuma** (Ph.D. 1995) of HRL Laboratories; **David F. McAllister** (Ph.D.1972) of N.C. State University; **Ulrich Neumann** (Ph.D. 1993) of the University of Southern California; and **Ross T. Whitaker** (Ph.D. 1993) of the University of Tennessee at Knoxville. Ron also co-wrote two papers, one of them with Ulrich (see **"Alumni news"**). Alumnus **Mike Capps** (M.S. 1996) of the Naval Postgraduate School organized the third annual "System Aspects of Sharing a Virtual Reality" workshop and was co-chair of the student volunteers.

Patent Issued

On 8 February 1999, a U.S. Patent (5,870,136) was issued to **Gary Bishop** (Ph.D. 1984), associate professor, **Henry Fuchs,** Federico Gil professor, alumnus **Mark Livingston** (Ph.D. 1998), and **Gregory F. Welch** (Ph.D. 1997), research assistant professor. The patent is entitled, "Dynamic Generation of Imperceptible Structured Light for Tracking and Acquisition of Three Dimensional Scene Geometry and Surface Characteristics in Interactive Three Dimensional Computer Graphics Applications." It is the result of research conducted in connection with the NSF Science and Technology Center for Computer Graphics and Scientific Visualization and the National Tele-Immersion Initiative.

Upcoming Conferences

Several faculty are involved in planning upcoming conferences, including:

- **Fifth ACM Symposium on Solid Modeling and Applications '99,** 9-11 June, Ann Arbor, Mich. **Ming C. Lin,** assistant professor, is a co-organizer and the conference's financial chair. She also co-wrote an accepted paper (see **"Recent and upcoming publications"**).
- **SIGGRAPH/Eurographics Workshop on Graphics Hardware,** 8-9 August 1999, Los Angeles, Calif. **Steven Molnar** (Ph.D. 1991), research assistant professor, is the Program Committee chair; **Henry Fuchs,** Federico Gil professor, and **Nick England,** research professor, are Program Committee members.
- **ACM Multimedia '99,** 30 October-4 November, Orlando, Fla. **Kevin Jeffay,** associate professor, is co-chair of the Program Committee.

For more, see **www.cs.unc.edu/Info/Events/Conferences/**

Recent and upcoming publications

Aliaga, D., J. Cohen, A. Wilson, E. Baker, H. Zhang, C. Erikson, K. Hoff, T. Hudson, W. Stuerzlinger, R. Bastos, M. Whitton, F. P. Brooks Jr., and D. Manocha. "MMR: An Interactive Massive Model Rendering System Using Geometric and Image-based Acceleration," *Proc. Symposium on Interactive 3D Graphics,* Atlanta, Ga., April 1999.

Clark, M., and K. Jeffay. "Application-Level Measurements of Performance on the vBNS," to appear in *Proc. IEEE International Conference on Multimedia Computing and Systems,* Florence, Italy, June 1999.

Falvo, M. R., R. M. Taylor II, A. Helser, V. Chi, F. P. Brooks Jr., S. Washburn, and R. Superfine. "Nanometre-scale Rolling and Sliding of Carbon Nanotubes," *Nature,* Vol. 327, 21 January 1999, 236-238.

Gregory, A., M. C. Lin, S. Gottschalk, and R. M. Taylor II. "A Framework for Fast and Accurate Collision Detection for Haptic Interaction," *Proc. IEEE Virtual Reality Conference,* Houston, Texas, 13-17 March 1999, 38-45.

Hirota, G., R. Maheshwari, and M. Lin. "Fast Volume-Preserving Free-Form Deformation Using Multi-Level Optimization," to appear in *Proc. Fifth ACM Symposium on Solid Modeling and Applications,* 9-11 June 1999, Ann Arbor, Mich.

Lin, M. C. "Fast Collision Detection for Interactive Games," *Proc. Computer Game Developer Conference,* San Jose, Calif., 15-19 March 1999, 603-619.

Parris, M., K. Jeffay, and F. D. Smith. "Lightweight Active Router-Queue Management for Multimedia Networking," *Proc. Multimedia Computing and Networking 1999,* San Jose, Calif., January 1999, SPIE Proceedings Series, Vol. 3654, 162-174.

Rafferty, M. M., D. G. Aliaga, V. Popescu, and A. A. Lastra. "Images for Accelerating Architectural Walkthroughs," *IEEE Computer Graphics & Applications,* 18(6), November/December 1998, 38-45.

Outreach activities

Graphics and Image Demo Days

Jai Glasgow, graphics demo coordinator, reports that more than a thousand people visited the Department during 1998 to participate in one of the two public demonstrations--"Introduction to Virtual Reality" and "Advanced Graphics and Imaging Research"--offered each month by the Graphics and Image Lab. About a third of the visitors were schoolchildren from North Carolina.

Also during 1998, Jai and her assistants created a Web-based educational site **(www.cs.unc.edu/Research/Graphics-Image/vr)** that provides activities for students and pedagogical material for teachers. Teachers and students in classrooms with Internet access can use the site to do a variety of classroom activities prior to visiting Sitterson Hall for their hands-on virtual reality demonstration. In addition to making the outreach program more accessible to those too far away to travel to Chapel Hill, the web site can provide a much greater learning experience for the students who visit later for demonstrations.

Carolina Technology Expo

Our Department's graphics research was among the exhibits at the Carolina Technology Expo held on 24 February at the Student Union at UNC-Chapel Hill. Using the kitchen demo on the Division system, **Jai Glasgow** and graduate students **Chun-Fa Chang, Matthew Cutts** (M.S. 1998), **John Keyser, Tanner Lovelace,** and **Chris Weigle** helped attendees of the Expo to experience virtual reality first hand. Undergraduate assistants **Ira Sykes** and **Alicia Tribble** used

Carnegie Mellon University's "Alice" software **(www.alice.org)** to demonstrate the concept of creating a virtual environment. Our Department's display also featured posters depicting various research projects, including nanoManipulator, Office of the Future, image-based rendering, laparoscopic surgery, and work by the Medical Image Display and Analysis Group. A video compilation of graphics and imaging projects, as well as footage from several SIGGRAPH '99 paper submissions, played throughout the event. Handouts summarizing various graphics and image projects and some introductory information on virtual reality were also available.

The technology fair also featured exhibits from other campus departments, including the School of Public Health, and from local companies, including IBM Corp., Red Hat Software, and Webslingerz. Attendees also heard presentations about both the positive and negative effects of information technology and how it has affected higher education. The event was sponsored by the Faculty Information Technology Advisory Committee, Student Government, and the Office of the Vice Chancellor for Information Technology.

Jai Glasgow helps Cormac Quigley get used to a virtual reality headset at the Carolina Technology Expo. (Photo: Harry Lynch, courtesy of the News & Observer)

Fifth-graders visiting the Graphics and Image Lab from Club Boulevard Humanities Magnet School in Durham, N.C., check out the force feedback arm. (Photo: Todd Gaul)

Special visitors during 1998

The Department hosted a number of visitors during 1998. Among the many visiting researchers were **Jaron Lanier** and **Al Weiss** of Advanced Network and Services, and **Dan Sandin** of the University of Illinois at Chicago who made several visits in connection with the National Tele-Immersion Initiative. In April, visitors from Intel Corp.-- **George Bourianoff,** manager of U.S. Academic Relations, and **Bob Liang** of Intel's Microcomputer Research Lab--visited for presentations on various research areas. Visitors to Walkthrough project members included researchers from the Jet Propulsion Laboratory and the University of Pennsylvania, and **Mel Slater** of University College London. **Wolf Pfannenstiel** of the Technische Universitat of Berlin spent a couple of weeks in August with the Irregular Parallel Algorithms group. **David Pycock** of Birmingham University, England, a researcher in medial loci, visited Stephen M. Pizer in October.

Triangle Distinguished Lecturer Series speakers included **James W. Demmel** of the University of California at Berkeley, **Pat Hanrahan** and **Jean-Claude Latombe** of Stanford University, **Peter Lee** and **Randy Pausch** of Carnegie Mellon University, **Larry Peterson** of Princeton University, and **Krithi Ramamritham** of the University of Massachusetts.

Alumni visitors included **Mark Mine** (Ph.D. 1997) of Disney Imagineering, who spoke at Graphics Lunch in September, and **Ross T. Whitaker** (Ph.D. 1993) of the University of Tennessee at Knoxville, who visited graphics and medical image processing researchers and gave a colloquium in October.

Other special visitors included **Rep. Richard Burr** of North Carolina's Fifth District, who visited in April for demonstrations of virtual reality research. He was accompanied by **Carmen Hooker,** wife of UNC- Chapel Hill Chancellor Michael Hooker, **Dean William Roper** of the School of Public Health, and **Dean Jeffrey Houpt** of the School of Medicine.

Assistant professor Ming Lin describes her research to prospective graduate students at Candidates Day in March. (Photo: Todd Gaul)

May graduation

UNC-Chapel Hill will hold its commencement exercises on Sunday, 16 May at 9:00 a.m. in Kenan Stadium. **Bill Bradley,** the former democratic senator from New Jersey who recently announced his candidacy for president in 2000, will deliver the commencement address. Also at 1:00 p.m. on that day, the Department of Computer Science will hold its own graduation ceremony for students receiving master's and doctoral degrees in computer science, and bachelor's degrees in mathematical sciences with the computer science option. All alumni and friends in the area that day are invited to attend.

Family matters

David Chen (Ph.D. 1998) and **Lynne H. Wu, M.D.,** were married on 10 April 1999 in Bellevue, Wash.

Alice Christina Dempsey was born on 20 January 1999 in Chapel Hill, N.C., to Bert and Molly Dempsey. She has an older sister, Lucy.

Adam Duggan (M.S. 1995) and **Laura Schutz** were married on 20 March 1999 in Chapel Hill, N.C.

Ronnie Harper and **Nicole Williams** were married on 20 February 1999 in Rocky Mount, N.C.

Benjamin Albert Leslie was born on 23 December 1998 in Durham, N.C., to Scott Leslie (B.S. MSci. 1991) and Laura Leslie.

Clare Richardson West was born on 29 January 1999 in Chapel Hill, N.C., to Charles Viles and Emily West. She has an older brother, Bradley.

Brian White (M.S. 1987) and **Sara Peach** were married on 17 April 1999 in Durham, N.C.

Alumni news

MS/PhD Alumni

Ron Azuma (Ph.D. 1995) has several recent papers:
Azuma, R. T. "The Challenge of Making Augmented Reality Work Outdoors," *Proc. First International Symposium on Mixed Reality,* Yokohama, Japan, 9-11 March 1999.

Azuma, R., B. Hoff, H. Neely III, and R. Sarfaty. "A Motion-Stabilized Outdoor Augmented Reality System," *Proc. IEEE VR '99,* Houston, Texas, 13-17 March 1999, 252-259.

You, S., U. Neumann, and R. Azuma. "Hybrid Inertial and Vision Tracking for Augmented Reality Registration," *Proc. IEEE VR '99,* Houston, Texas, 13-17 March 1999, 260-267.

Ron is at HRL Laboratories in Malibu, Calif. *(azuma@HRL.com)*

Mike Capps (M.S. 1996) has an upcoming publication:

Watsen, K., R. Darken, and M. Capps. "A Handheld Computer as an Interaction Device to a Virtual Environment," to appear in *Proc. Immersive Projection Technology Workshop,* Stuttgart, Germany, May 1999.
Mike organized the third annual "System Aspects of Sharing a Virtual Reality" workshop at IEEE Virtual Reality '99 in March. He has been chosen as the technical program chair for the VRML 2000/Web3D conference, and as workshops chair for VR2000. *(capps@vr.edu)*

Mike Carr (M.S. 1991) was recently promoted to group manager at Wavetek, Wandel & Goltermann **(www.wg.com)** in Research Triangle Park, N.C. He is in charge of the department that produces the Domino network analyzer for 10/100Mb Ethernet, Gigabit Ethernet, Token Ring, WAN, and FDDI networks, and is responsible for hardware and software development and response to worldwide reports of problems from the field. Mike and his wife Susie still live just outside Chapel Hill on their eight-acre "mini-ranch," complete with two horses. *(mike.carr@wg.com)*

Dick Craddock (M.S. 1986) was promoted to product unit manager of the Macintosh Internet Products group at Microsoft Corp. in March 1998. Dick's group develops Internet Explorer (IE) and Outlook Express (OE) for the Macintosh. At this year's MacWorld Expo in San Francisco, Mac Outlook Express 4.01 won a MacWorld "Eddy" award, and Mac IE and OE 4.5 were honored with the "Best of Show" award. For more information, see: **www.microsoft.com/mac** *(craddock@ablecom.net)*

John Gauch (Ph.D. 1989) licensed VidWatch, a video signal verification system, from the University of Kansas to Turner Broadcasting in February. VidWatch will be deployed in Central and South America to verify the broadcast of scheduled commercials. *(jgauch@ittc.ukans.edu)*

Lenny Heath (Ph.D. 1985) has a recent publication: Heath, L. S., and J.P.C. Vergara. "Sorting by Bounded Block-Moves," *Discrete Applied Mathematics,* Vol. 88, 1998, 181-206.

Victoria Interrante (Ph.D. 1996), an assistant professor at the University of Minnesota, was a participant in the panel discussion at IEEE Visualization '98 entitled, "Art and Visualization: Oil and Water?" which won the "Best Panel" award. She was recently awarded a Grant-in-Aid of Research, Artistry, and Scholarship from the Office of the Vice President for Research and Dean of the Graduate School of the University of Minnesota. *(interran@cs.umn.edu)*

Chuck Mosher (M.S. 1987) has been promoted to staff engineer at Sun Microsystems, where he is developing a Java framework for data warehousing, decision support, and OLAP. He now works from home and reports that he is loving it. *(chuck.mosher@sun.com)*

Ryutarou Ohbuchi (Ph.D. 1994) has a couple of recent papers:

Ohbuchi, R., H. Masuda, and M. Aono. "Watermarking Three-Dimensional Polygonal Models Through Geometric and Topological Modifications," *IEEE Journal on Selected Areas in Communication,* 16(4), 1998, 551-560.

Ohbuchi, R., H. Masuda, and M. Aono. "Targeting Geometrical and Non-Geometrical Components for Data Embedding in Three-Dimensional Polygonal Models," *Computer Communications,* Vol. 21, 1998, 1344-1354.

Ryutarou is at IBM's Tokyo Research Lab. *(ohbuchi@acm.org)*

Amol Pattekar (M.S. 1998) recently joined Yahoo!, Inc., in Santa Clara, Calif., as a "Technical Yahoo!" with the Search Engine group. He previously worked for the Advanced Graphics Group at Silicon Graphics, Inc. *(amol@yahoo-inc.com)*

Injong Rhee (Ph.D. 1994), an assistant professor at N.C. State University, recently received an NSF CAREER award. *(rhee@eos.ncsu.edu)*

Lev Stesin (M.S. 1998) has left Silicon Graphics Inc., and now works at Yahoo!, Inc. He lives in San Francisco, Calif. *(stesin@yahoo-inc.com)*

Dave Tolle (Ph.D. 1981) resigned from Shell Oil Company in March, after a 17-year career doing computer science research and development. He plans to start his own company, making software to teach mathematics to young children. *(DaveTolle@acm.org)*

Juan Valiente (M.S. 1989) returned to his native El Salvador after graduation. Currently, he is the executive vice-president of Futurekids for El Salvador, Honduras, Nicaragua, and Panama. He has been married to Claudia Castillo since 1991. Their daughter, Alejandra, was born in 1995. Juan recently contributed to the publication, *Basis for the Nation Plan* (January 1999), in a chapter on education. *(java@insatelsa.com)*

John Q. Walker, II (Ph.D. 1991), vice president of development at Ganymede Software, Inc., reports that his company's product, Chariot 2.2, earned a World Class Award from the journal *Network World:* Currier, B. "Chariot Rides to the Rescue," *Network World,* 25 January 1999, 16(4). Ganymede's products measure and monitor the performance of network hardware, software, and applications. *(johnq@GanymedeSoftware.com)*

Undergraduate Alumni

Will Huffman (B.S. MSci. 1995) graduated from Virginia Tech with a master's in systems engineering (with a concentration in electrical engineering and a secondary in business) in July 1998. He works for the Joint Warfare Analysis Center in Dahlgren, Va., doing I/O protect and multi-level security in the Networking and Connectivity Branch. While an undergraduate at UNC-Chapel Hill, Will worked for Computer Services from 1993 to 1995. *(whuffman@jwac.com)*

Fred Lassiter (B.S. MSci. 1981) is completing a fellowship in nuclear medicine this year and will soon begin his second--and final--career in diagnostic radiology/nuclear radiology in Richmond, Va. He is getting married for the first time in June to Elizabeth Tornberg of Newport News, Va. He reports that his late start on things is because, "like all math majors, I was taught to analyze carefully!" *(XrayFred@aol.com)*

Michelle Torian (B.S. MSci. 1998) is at IBM Corp. in Atlanta, Ga. She also volunteers her time to help parents of Atlanta public schoolchildren learn how to use MS Word and the Internet. She reports that the skills she acquired as a COMP 4 lab assistant come in very handy! *(mltorian@us.ibm.com)*

Ann Whitmeyer (B.S. MSci. 1984) recently accepted a position as the chief operating officer of Campbell Alliance Group, a Raleigh-based business development consultancy specializing in healthcare and technology. *(Ann_Whitmeyer@campbellalliance.com, annw@whitmeyer.com)*

Alumnus Leads Real-time Java Specification Process

Greg Bollella (Ph.D. 1997), an engineer at IBM Corp. in Research Triangle Park, N.C., has been chosen by Sun Microsystems to lead the Real-Time Java(TM) specification process. As specification lead, Greg formed the Real-Time Expert Group, which is composed of a core team of industry leaders from Aonix, Cyberonics, Microware, Nortel Networks, QNX, Rockwell Collins, and Sun Microsystems, and an extended team including representatives from Apogee, Carnegie Mellon University, Lockheed Martin, Lucent, MITRE, Mitsubishi, Motorola, NSICom, NIST, Schneider Automation, Thomson-CSF, and Wind River Systems. The group is charged with developing a specification for extending the Java platform with real-time function. Implementations of the specification will give developers the function they need to write real-time applications in the Java programming language. This real-time specification is aimed at broadening the market for Java technologies and moving the platform forward using the collective innovation of the industry.

Greg has been quoted in the press as saying that, "the opportunity for embedded, real-time devices is so huge that it dwarfs the PC market. In order for Java to be accepted in the embedded and real-time systems industry, it is imperative that we develop a real-time Java specification. The Real-Time Expert Group is committed to delivering a unified specification that will address the requirements of a wide range of real-time programming styles and real-time systems." For more information, visit Sun's Java Developer Connection(SM) Web site at **java.sun.com/jdc** and follow the Java Community Process link.

The idea of developing specifications for real-time Java has its roots in our Department. Greg completed his dissertation, "Slotted Priorities: Supporting Real-Time Computing Within General-Purpose Operating Systems," in 1997 under the direction of **Kevin Jeffay,** associate professor. Looking for a way to continue his dissertation work at IBM, where he worked during and after earning his degree, Greg began the effort within the industry to establish a specification for real-time Java. His work led to an industry consortium being formed to look into a standard, then to a much larger standardization effort, and then to a dispute among the big computer vendors as to how the standard should be created and whether Sun should own it. The dispute

has quieted, and Greg's expert group is moving forward and expects to finish the specification by the end of the year. *(bollella@us.ibm.com)*

External review

From 14-16 February 1999, our Department hosted a panel of distinguished scientists who reviewed our graduate program. The reviewers were **James H. Morris** of Carnegie Mellon University, the committee's chair; **Barbara Liskov** of the Massachusetts Institute of Technology; **Lee G. Pedersen** of the Chemistry Department at UNC-Chapel Hill; **Richard F. Riesenfeld** of the University of Utah; and **William Wulf** of the University of Virginia and president of the National Academy of Engineering.

The reviewers' overall assessment was that "the University of North Carolina has a superb Computer Science (CS) department!" They praised the extent of our collaboration with other academic departments, both at UNC-Chapel Hill and at other universities, as well as with industry, and were impressed by the research we are conducting in several areas including graphics and imaging, computer-supported cooperative work, human computer interaction, high performance computing, and scientific visualization, observing that there are also "few but excellent faculty in several other areas of CS." They also praised the Microelectronic Systems Laboratory as a unique asset.

The reviewers recommendations were:

Re-examine the strategy of staying "small and excellent in a few areas":

The reviewers agreed that "a major university should have a 'full service' CS department."
Strengthen and expand research areas other than graphics:
The reviewers recommended that "building in a field allied to graphics and leveraging the excellence there" would be more effective than trying to represent all research areas of computer science. They suggested algorithms allied to graphics and computational geometry, computational geometry, computer-supported cooperative work, high performance computing, human computer interaction, and scientific visualization as potential areas.
Begin designing and planning for a modern undergraduate major. Revive the program for non-majors:
The reviewers considered the creation of an undergraduate major to be "long overdue" (the Department submitted a proposal for an undergraduate major to UNC's General Administration in January). The reviewers voiced concern over whether the university would provide the necessary resources for us to implement both the undergraduate and non-major programs.
Begin an external/internal search for a new chair now:
The reviewers strongly recommended "that the department begin an external search even if, in the end, it chooses an internal candidate. To fail to search externally will always leave open the question of whether a new, compatible, and energetic vision could have been found."

Form a partnership with the College of Arts and Sciences to guide computer education at UNC-Chapel Hill:
The reviewers observed that the College "appears poised to invest in CS. Assertions made about the importance of CS need to materialize in concrete ways, and promises made about resources must be kept."
Change the Department's vision of itself and of its role:
The reviewers felt that "the department must learn to see itself--and have itself seen--as a part of the larger university, with responsibilities to the citizens of North Carolina--not as just an isolated graduate research institute." They noted that the Department has done this very well with regard to research collaborations, but not with regard to undergraduate education.
Department faculty will hold the first of several retreats in May to plan the Department's future.

About News & Notes

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