Computer Science undergraduate students in the AURICS program study typhoon conditions in Southeast Asia on the responsive workbench, a 44-inch display capable of projecting 3D stereo images.

New Program Attracts Top-Notch Computer Science Students

How do you convince the very best computer science students in the country that it's worth their while to enroll in a university program, and stick with it until graduation?

In the face of rapidly changing technology, many of today's students are honing their computer skills to a fine edge before leaving high school. Although an influx of bright, talented and enthusiastic students is a boon for places like the Department of Computer Science at North Carolina State University, attracting these students is proving to be a difficult challenge. Stiff competition is coming both from traditional venues, like other universities and academic departments, and from high-tech firms like Lucent, IBM, Cisco and Red Hat, that are scrambling to hire computer-savvy workers.

One answer is a new opportunity being offered to the very brightest students in the computer science department — the Accelerated Undergraduate Research in Computer Science (AURICS) program. The brainchild of assistant professor Robert St. Amant, AURICS is designed to excite and challenge students by offering them a chance to participate in research projects beyond the scope of their normal coursework.

NC State Engineers Developing Desktop 3-D Laser Printer

Industrial Engineering assistant professor Denis Cormier was spending his lunch hour running through the Centennial Campus of NC State University when the idea came to him to use an ordinary office product in a most extraordinary way. Aware of how expensive it is for small manufacturers, entrepreneurs and industrial designers to produce plastic prototypes of products they hope to market, Cormier wondered if the ubiquitous laser printer could be programmed to generate three-dimensional, full-color plastic models as easily as it prints paper documents.

So he and colleague Jim Taylor, also an assistant professor in the College of Engineering's industrial engineering department, set to work designing the software and hardware that would transform ordinary polystyrene printer toner into hard plastic 3-D objects. Harvey West, a materials engineer, is the third member of the development team.

One reason the professors' work is so tantalizing — attracting the attention of big printer-industry companies such as Hewlett-Packard — is that the cost to buy a prototype-producing printer would be very low. Machines currently used to produce plastic parts — collectively referred to as rapid prototyping processes — are expensive, ranging from $60,000 to $500,000. "A 3-D laser printer could likely be produced at a price point that would target the personal desktop market," says Cormier. "A desktop 3-D laser printer costing $3,000 or less would be quite attractive in numerous situations."

In fact, say Cormier and Taylor, their process could create entirely new markets, including one in which children could conceivably download a CAD model of a race car or action figure from a company's website and then "print" it out on their special laser printer equipped with the "slicing" software that Cormier and his team have developed.

Here's how the Cormier-Taylor-West prototype process works: Although the image that a conventional laser printer produces appears to be flat, the toner deposited on the paper has a measurable thickness. If images are repeatedly printed one on top of the other, then the image gradually gets thicker and thicker, resulting in a solid piece of plastic. Instead of using a paper tray, the prototype 3-D laser printer includes a platform to support the object. Customers would buy the printer hardware and NC State-developed software, which tells the customers' CAD program how to configure the object as the toner is applied to the build platform.

"If you develop this type of capability, you can eventually get to the point where you can

Engineering College Spawns Spinoff Successes

Earning the label of "small-business incubator," the College of Engineering at NC State has spawned entrepreneurial companies that have become big fish in the Wall Street pond. These companies include Cree and Nitronex, Inc., developed by students in the Department of Materials Science and Engineering. Stingray Software, AuctionRover.com, Accipter and DaVinci Systems were founded by young graduates from the Department of Electrical and Computer Engineering.

Recognizing the potential for technical opportunities, the Department of Materials Science and Engineering developed a program, Technical Education and Commercialization, which teams technology students with management students.

Students who become entrepreneurs have intangible qualities in addition to skills in technology and management, says Robert F. Davis, Kobe Steel, Ltd. Distinguished University Professor of Materials Science and Engineering. "These are students with defined goals, significant drive and fearless attitudes," he said. An entrepreneurial student also needs a graduate research degree, as well as a source of money to invest and the willingness to risk the investment, Davis said.

"Eric Hunter (a founder of Cree) wanted to form a company the day he arrived for graduate school," Davis said. Hunter collaborated with a student group that made several breakthroughs in the development of silicon carbide electronics technology. They subsequently founded Cree. Last year two NC State graduate students, Kevin Linthicum and Thomas Gehrke, were working on gallium nitride-based materials when they figured out a novel way to eliminate their defects for use in electrical devices. Their work became the basis for the formation of the Nitronex Corporation.

Thomas K. Miller, interim vice provost for distance education and learning technology and director of NC State's Engineering Entrepreneurs' Program, also says entrepreneurial students are clearly different, with "driving ambition." Their question, Miller said, is not "what courses do I have to take to get a good job?" but "what do I have to do, academically and otherwise, to be a success on my own?" He recalled Scot Wingo, one of the founders of Stingray Software, who, after being admitted to the master's program in computer engineering, came looking for a research assistantship, not with a traditional resume, but with a demonstration of software that he and his colleagues had created. "He wanted to show us what he could do," Miller said, "and he did an excellent job of selling himself to us." Wingo banded with two other students from the graduate school, Dean Hallman and Aris Buinevicius, to form Stingray Software, a company that makes tools for software development. Wingo and Buenivicious left Stingray to found AuctionRover.com, which sold just eight months after it was founded for $166 million. It is now a subsidiary of GoTo.com.

Two NC State alumnae, Donnie Barnes and Erik Troan, saw the potential of Linux and joined Marc Ewing and Bob Young in building a fledgling software company called Red Hat in 1995. In 1999 Red Hat went public with a stock offering of $96.6 million. Red Hat is now considered the leading provider of products and services based on open-source technologies.

Bill Nussey and Chris Evans, student entrepreneurs, were studying electrical and computer engineering when they set up DaVinci Systems in their dorm. Creating technology and software to add value to computers connected to networks, Evans and Nussey built DaVinci into the third largest e-mail software company in the world. Evans, who was interested in creating digital music, composed music with multiple parts that could be played over the network. Nussey subsequently earned a business degree from Harvard and most recently built Atlanta-based iXL into a billion-dollar company. Evans founded Accipiter, a company that produced technology for advertising on the Internet. He sold Accipiter for more than $50 million.

If the trend continues, the CEOs of tomorrow's most innovative businesses are in NC State's Engineering Entrepreneurs and TEC programs right now, learning team-building, problem-solving skills that will help them in their business careers, whether or not they become multimillionaires.

Earthquake Research Links NC State, Japan

The sixth floor of an office building is a terrifying place to be during a major earthquake. However, thanks to the work of engineers from a consortium of institutions, including NC State and Osaka University in Japan, tall buildings will someday be much safer during earthquakes.

Mohammad N. Noori, head of mechanical and aerospace engineering at NC State University, and two colleagues from Japan, Tadatoshi Furukawa and Arata Masuta, are working at NC State this year to develop structural materials that can withstand the shaking associated with earthquakes. Many aspects of earthquake mitigation are being studied through the Japanese Disaster Prevention Research Institute (DPRI) in a truly cooperative effort.

Research at NC State involves Shape Memory Materials (SMAs), a class of materials that has been manipulated to exhibit a high damping, or dissipation of energy through motion, capacity. Such materials have the potential to withstand vibration much better than conventional materials. Challenges associated with production of SMAs include determination of material composition, difficulty of thermomechanical processing, fatigue life and cost and scale.

Noori noted, "The Japanese about six or seven years ago implemented a concept called structural control to build intelligent, earthquake-resistant structures. These actively controlled systems were the first generation of smart structures. Japan is the only country in the world where this technology has been implemented in structural systems. They're intelligent systems — not in the sense that they're autoadaptive but in that they can resist an earthquake by adjusting themselves. This initiative is going to take it to the next step, which is completely intelligent structures."

The main goal in the next 10 years is to develop new concepts of structures that are intelligent, self-repairing and autoadaptive.

"We have a great undergraduate program. I would say it's the best in the state and probably near the top nationwide." says St. Amant. "But, for our very best students, courses alone aren't going to fully tap their potential. AURICS is meant to fill that gap." Last year the top 29 students from the incoming freshman class were invited to participate in the program. "Entry into AURICS is very competitive," St. Amant added. "All of the students had SAT scores over 1540." AURICS students are introduced to the computer science faculty and their research projects and are encouraged to participate in anything that catches their interest. This offers the students a tremendous opportunity for hands-on instruction in leading-edge areas like optical networking, e-commerce, graphics and animation and artificial intelligence.

"Students participating in AURICS have the potential of becoming state and even world leaders in computer science," says Alan L. Tharp, Alumni Distinguished Professor and head of the computer science department. Tharp noted that two former undergraduate students, Jennifer Nolan and Luke Zettlemoyer, received the Outstanding Undergraduate Award in Computer Science from the Computing Research Association in 1996 and 2000, respectively.

"Our students were chosen over competitors from places like MIT, Brown, Stanford and Berkeley," Tharp said, "so clearly we've already shown that under-graduates from NC State are among the very best in the country."

A special research lab has been built exclusively for the AURICS students. Equipped with state-of- the-art equipment, including PCs with multiple flat-panel displays and high-speed graphics and networking cards, a Silicon Graphics (SGI) workstation, a Sony Playstation® programming environment and industry-strength development software, the lab offers everything the students need to tackle their chosen research projects. It also serves as a place for hanging out to discuss the latest goings-on in the computer world or ponder where the future might take them.

In addition to the lab, students have access to even more sophisticated equipment through their faculty mentors. Examples include network testing equipment

AURICS is a highly competitive program that allows students to participate in research projects beyond the scope of their normal coursework.

from companies like Cisco, Nortel, Lucent and IBM; a motion capture system that uses a body suit to record movement as someone walks, runs or dances; and a 44-inch stereo workbench that can produce realistic 3D images that appear to "float" in space in front of the viewer.

Most of the AURICS students are already involved in research. Antonio Carpio, from Greensboro, is focusing on computer hardware and different computer languages. He likes three-dimensional technology. "It takes so much knowledge to take images from a 3D world and display them on a two-dimensional screen," he said. Carpio began programming before he started at NC State. He says he likes to get immediate results, "no plotting, testing or analyzing — go straight for the target." Christopher Healey, an assistant professor and one of Carpio's mentors, smiled when he heard Carpio's gung-ho statement. "He's really excited and enthusiastic about what he's doing," Healey said; "That's what AURICS is all about."

Ryan Smith, who grew up in Asheville, is interested in artificial intelligence and the graphics side of programming. One project he's looking into is using an off-the-shelf video game console — the Sony Playstation® — to do things other than run games. If an inexpensive and easy-to-use console were capable of performing sophisticated tasks like education and learning, computer animation or scientific visualization, it could open up the world of computing to an entirely new audience. This goes hand-in-hand with Smith's desire to make computers more accessible and user-friendly, "to make it seem that a human is on the other side."

Another project that interests Smith is one being run by assistant professor Michael Young, an expert in the field of artificial intelligence. Young is developing an "interactive narrative" for use in educational software. Rather than restricting people to cryptic queries or difficult-to-use commands, Young's programs allow users to talk in plain English, with the computer responding in kind. In one example, the story of Beowulf is told with the computer screen as the stage and eight or nine individuals acting as characters inside the play. Rather than retelling the same story every time, the software allows the characters to interact and make

Open Source Links NC State, Red Hat and IBM

A briefing session to announce a joint initiative among NC State, Red Hat and IBM was held October 18, 2000, in the Alumni Building at NC State. IBM and NC State have worked together recently to develop open source technology using mainframe computers. According to Barry W. Eveland, IBM vice president and senior North Carolina executive, IBM believes strongly in open source, and he is enthusiastic about the platform provided by Red Hat Linux in this initiative. In conjunction with the Red Hat University Program, Red Hat and NC State will advance the application of open source software by integrating the Red Hat Linux open source operating system into NC State's Eos computing environment. As Matthew J. Szulik, president and chief executive officer of Red Hat, said, "The revolution takes place in academia," and Red Hat therefore values their association with a major university such as NC State as they move forward with their University Program. Visitors and media representatives were able to view the results of the new initiatives in a demonstration at the College of Engineering's Student Computing Center Laboratory in Room 100 Leazar Hall.

Computer Scientists Lead E-Commerce

As "dot-com" companies capitalize on the surging popularity of e-commerce — buying, selling and exchanging products and services via the Internet — headlines tout the business and investment opportunities in the online world. But the public doesn't get much exposure to the emerging technologies that make buying paperbacks, getting physician referrals or researching gas grills possible. The people who spend hours working algorithms or creating appealing graphical representations are the unsung heroes of e-commerce, and several of the leading experts teach in the Department of Computer Science at NC State University.

"There's a lot of work that goes on behind the scenes," observes Munindar Singh, associate professor of computer science, who recently led a project to create a shopping engine technology that is currently licensed to a local company. "There are several new ideas in that technology, for which NC State University has filed a provisional patent. It not only can

Laser - continued from front page

Instead of using a paper tray, the 3-D laser printer includes a platform to support the object. One bonus is that the product could be printed in full color by simply using a color laser printer engine, something prohibitively expensive using currently available rapid prototyping methods.

customize everything," notes Taylor. "The term is 'mass customization.' One of the biggest costs to manufacture anything is the development of the tooling and fixtures — this process would help the manufacturer produce goods without that overhead. And with all of that capability, you could actually redistribute manufacturing from factories to homes or other sites. The long-term future is you can use this process to revolutionize manufacturing."

More traditional users of prototypes would likely be the first customers of the 3-D laser technology: mechanical designers, architects and even students, looking to produce models for homework projects. If approved by the US Patent Office, the university will likely license the process and software to a commercial manufacturer.

present information from several merchants but also offers a unified shopping cart and an integrated checkout."

One of Singh's major research interests involves trust, which he distinguishes from security. "Roughly, security deals with controlling access to your information, whereas trust depends on whether other parties use that information appropriately," Singh says. Security without trust is meaningless, he explains, because keeping your information safe won't help if, when you do reveal it to someone, that turns out to be someone you shouldn't have trusted. Singh and his students are researching cooperative means of increasing trust in the Internet. Users can systematically share knowledge about the people and companies that they deal with.

The decentralized nature of referrals contrasts with current Internet approaches for finding information. Such approaches are based on directories or recommender services, both centralized, says Singh. He is working on personal computer assistants that will help people use electronic referral networks to find the most precise, reliable information with as few messages and referrals as possible.

Another professor, Peter Wurman, focuses on auction theory and automated negotiation, areas that combine the disciplines of artificial intelligence and economics. Says Wurman, "People usually think of auctions as, say, art for sale at Sotheby's, but there are hundreds of other types of auctions. The stock market is an auction. In fact, by using different combinations of rules, we have come up with 25 million versions of distinct auctions."
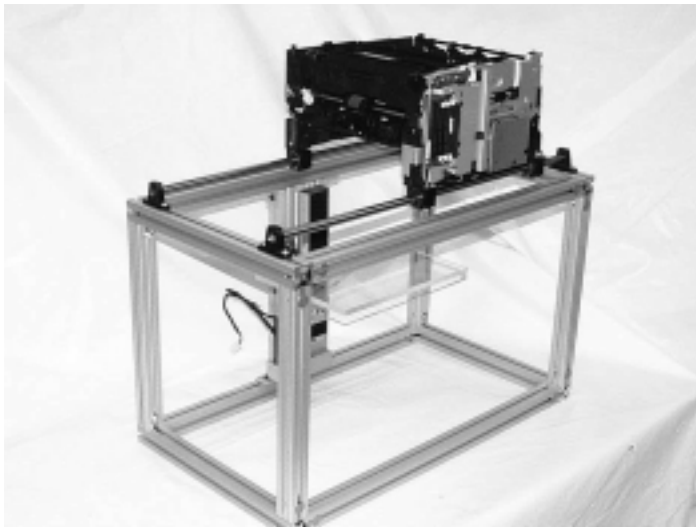
Technology transfer opportunities for software that can make online auctions faster, easier and more accessible are enormous, notes Wurman. "We will see auctions for more things, in both the business-to-business and business-to-consumer space." That's because competition will compel many traditional merchants to offer products via auction format. And by working on such consumer-friendly auction technologies as personal trading agents, Wurman and his team are leading the way for a consumer-driven e-commerce climate. Soon software will be widely available for purchase or download that will search multiple sites for the best deals and negotiate and pay on the user's behalf.

Wurman is co-director of NC State's e-commerce partnership, an interdisciplinary initiative with the College of Management whose membership includes 12 high-tech companies. In addition to the exposure such an initiative gives the university as a whole, it's a boon to the fast-growing computer science department, observes Alan Tharp, head of the department.

"What's interesting about NC State is that we have the largest e-commerce concentration on our faculty of any other university I know of in the country," he notes. "We saw the e-commerce trend coming several years ago and focused our faculty hiring on such emerging areas. We offer three courses directly related to e-commerce, and as we hire more faculty and resources, we'll add more courses." At pre-registration for fall 2000, dozens of students were turned away from those popular classes. One popular course hadn't even debuted yet, but students clamored to get in, just based on the title and description: "Launching the E-Commerce Enterprise."

"Look for the creators of tomorrow's Amazons, eBays and Yahoo!s to emerge from this department," predicts Tharp. "The benefit to North Carolina is the companies that will spin off from here — that's how Silicon Valley developed, from the graduates of local universities."

Notes

- Ana (Annie) I. **Antón**, computer science, received an Early Career Faculty Development (Career) Award from the National Science Foundation (NSF), June 2000. The award of $220,000 will support the project, "Towards Estimating Requirements Coverage: Managing Scenarios and Goals in Requirements Evolution."

- B. Jayant **Baliga**, Distinguished University Professor of Electrical Engineering, received the 16th R.J. Reynolds Tobacco Company Award for Excellence in Teaching, Research and Extension in a ceremony held November 1, followed by his lecture, "Trends in Power Discrete Devices."

- In January 2000 the UNC Board of Governors gave the College approval to plan a **Biomedical Engineering BS degree** program.

- Gregory **Byrd**, electrical and computer engineering, and Fengmin Gong of MCNC were awarded $1.5 million from DARPA for the joint research project, "Yalta: A Collaborative Space for Secure Dynamic Coalitions."

- Xiuli **Chao** was named co-director of the graduate program in operations research, August 2000.

- Ndaona **Chokani**, mechanical and aerospace engineering, received the Provost's African-American Professional Development Award for 2000.

- Donald J. **Dudziak**, nuclear engineering, is an alumni inductee, Phi Kappa Phi.

- Peter S. **Fedkiw** was named associate department head of chemical engineering, August 2000.

- John J. **Grainger** became interim department head of electrical and computer engineering, September 2000.

- Edward **Grant**, electrical and computer engineering/Center for Robotics and Intelligent Machines, was elected senior member of IEEE. He was also elected Fellow of the Institution of Mechanical Engineers, UK.

- Also, **Grant** and Abdelfattah M. **Seyam** (Textile and Apparel Technology Mgt.) were awarded $499,839 by DARPA for a joint research project in "computational fabrics."

- Christina M. **Hammock** of Jacksonville, a senior in electrical engineering, received the Faculty Senior Scholarship for 2000-01.

- Richard R. **Johnson**, mechanical and aerospace engineering, received a Fulbright Scholar grant.

- Dennis H. **Kekas** was named Director of Networking Technology, May 2000.

- Peter K. **Kilpatrick** was named head of chemical engineering, January 2000.

- Carl C. **Koch**, materials science and engineering, received a 2001 Fellow Award from The Minerals, Metals and Materials Society.

- Hamid **Krim**, electrical and computer engineering, received an Early Career Faculty Development (Career) award from NSF in February 2000. The award of $220,000 will support the project, "Smart Nonlinear Diffusion: A Probabilistic Approach."

- Jerome P. **Lavelle** (PhD IE '92) was named assistant dean for academic affairs, June 2000.

- The WolfWare team received the Award for Outstanding Service to Teaching and Learning. WolfWare is a Web-based course management system designed to improve and simplify online course development and delivery. Team member Ellen **McDaniel** is Web and User Services Coordinator for the College.

- Thomas K. **Miller** III, associate dean for distance education and information technologies, became interim vice provost for distance and technologically enhanced learning at NC State, July 2000.

- Tony L. **Mitchell**, assistant dean of engineering student services and director of minority programs, was elected to serve a three-year term on the administrative committee of the IEEE Education Society.

- **Nuclear Engineering** was recognized by the National Organization of Test, Research and Training Reactors for a half-century of service to nuclear reactor research.

- Willie A. "Tony" **Pearson**, video communications services, won a State Employee Incentive Bonus for his money-saving idea of replacing a tungsten lighting system with long-life fluorescent fixtures designed for television use.

- The College of Engineering received a 2000 Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring in Washington, D.C., in September from NSF. Representing the College were Sarah A. **Rajala**, associate dean, academic affairs; Tony L. **Mitchell**, assistant dean of engineering and director of Minority Engineering Programs; and Laura J. **Bottomley**, director, Women in Engineering program.

- J. Michael **Rigsbee**, head of materials science and engineering, was elected Fellow of ASM International, the Materials Information Society.

- Sami H. **Rizkalla** (MS CE '74, PhD CE '76), Distinguished Professor of Civil Engineering and Construction, was appointed director of the Constructed Facilities Laboratory, August 2000.

- William G. **Scott** Jr. has been named Director of Information Technology, July 2000.

- Albert J. **Shih**, mechanical and aerospace engineering, received an Early Career Faculty Development (Career) award from NSF for his project, "Cost-Effective Precision Form Grinding of Advanced Materials." NSF will provide $200,000 and other opportunities.

- Munindar P. **Singh**, computer science, and Brian L. **Hughes**, computer and electrical engineering, each received awards from NSF: Singh received $476,574, for computational principles of trust; Hughes, $308,807, for differential modulation in space and time.

- Thirty industrial engineering seniors from the Universidad Catolica Andres Bello (UCAB), Caracas, Venezuela, attended a Manufacturing Practicum this summer, conducted by the Department of Industrial Engineering. James B. **Taylor**, industrial engineering - NC State, and Vicente Napolitano, industrial engineering - UCAB, were leaders of the practicum, supported by Black and Decker.

- James R. **Wilson**, head of industrial engineering, received the 1999 Operations Research Meritorious Service Award.

- NC State University's course CSC 513, "Electronic Commerce Technology," was ranked number two in search engine Google's ranking of most valuable e-commerce course sites available on the Web. Instructor for the course, Peter R. **Wurman** of computer science is co-director of E-commerce@NCState. NC State also holds the number one spot on the rankings list with College of Management's Michael A. **Rappa**'s course, "Managing the Digital Enterprise."

- James H. **Young** was named head of biological and agricultural engineering, May 2000.

Foundation Notes

- CEO of Petty Machine Co., Inc., Larry Kenneth **Petty** (ME '54), of Gastonia, has endowed a $100,000 gift to support the Ben Franklin Scholars program.
- Richard C. **Harrington** (ME '77), general manager, American Residential Services, Winston-Salem, endowed $50,000 to fund scholarships for juniors and seniors in the heating, ventilation and air conditioning curriculum.
- B.D. **Rodgers** (CE '49), chairman, Rodgers Building Inc., Charlotte, endowed $50,000 to establish the merit-based B.D. and Patricia Rodgers Scholarship for civil engineering students.
- David **Ferrell**, **IBM**, presented $35,000 to the College to support resources needed in designing and building robots for a national robotics competition sponsored by the FIRST (For Inspiration and Recognition of Science and Technology) project founded by ASME. IBM, NC State's College of Engineering and Southeast Raleigh High School are partners in the project to raise awareness among high school students of the impact science and math have on technology.
- Ryan C. **Pratt** (EE '00) presented a gift of $31,500 from the Pratt Family Foundation, Inc. to fund scholarships for students pursuing an undergraduate degree in electrical and/or computer engineering, with first preference to students from Guilford county.
- The **Alcoa Foundation** has given a $30,000 grant to support the Engineering and Computer Science Summer Institute, a new program to introduce middle school and underclass high school students to engineering and computer science. The gift was presented by Bruce A. **Cox**, Badin Works Manager of Alcoa, Inc. of Badin.
- Quint **Barefoot** of Greensboro has endowed $25,000 to establish the Robert M. Barefoot Scholarship in honor of his father. The scholarship will be awarded to chemical engineering students based on merit and need.
- Alfred P. **Norwood** (CE '49) of Pittsboro endowed a $25,000 gift to support the Alfred P. Norwood chapter of Chi Epsilon honor society in Civil Engineering.
- Donald M. **Scoggin** of Rockwall, Texas, has endowed a gift of $25,000 to establish the William E. Clark Scholarship in memory of his father. The scholarship will be awarded to electrical and computer engineering students from eastern North Carolina.
- In October the NC State Engineering Foundation elected Craig M. Wardlaw as president of the board of directors. They also elected five new board members and re-elected three members to the board. New members: Quint M. **Barefoot**, Greensboro; R. Kelly **Barnhill**, President, Hendrix-Barnhill, Greenville; Ron **Brown**, President, Brown's Builders Supply, Rose Hill; J. Phil **Kennett**, President, Wood Armfield Furniture, High Point; Barbara H. **Mulkey**, President, Barbara H. Mulkey Engineering, Inc., Raleigh. Returning: Berry G. **Jenkins**, Jr., Director - Highway Heavy Div., Carolinas AGC, Inc., Raleigh; Michael D. **Killian**, Vice President and General Manager, Ashland Chemical Co., Foundry Products Div., Columbus, Ohio; C. Robert **Rhodes**, Managing Partner, Rhodes and Mason, Greensboro.

College Names Distinguished Engineering Alumni 2000

(Left to right) Hugh M. **Duncan** (IE '55) of Charlotte, Michael D. **Killian** (ChE '68) of Columbus, Ohio, and John T. **McCarter** (NE '73) of Sao Paulo, Brazil, accept congratulations from Dean Nino A. Masnari as Distinguished Engineering Alumni for the year 2000. **Duncan**, a native of Shelby, retired as president of his company, Southern Precision Spring Co., Inc., which he purchased in 1964 and changed from a financially troubled organization to a profitable one during the very first year. In 1997 he established an endowed professorship in mechanical engineering in honor of his father, Dean F. Duncan (BSME '23). The gift represents the first time in the College's history that a professorship was endowed by a single individual. **Killian** is vice president and general manager of Ashland Specialty Chemical Company's Foundry Products Division. A native of Waynesville, he is a member of several University associations, is on the board of directors of the Engineering Foundation and is a key member of Chemical Engineering's alumni industrial advisory board. He is a long-time supporter of and generous donor to the College. He was instrumental in the establishment and success of a five-year fundraising campaign to renovate Riddick Laboratories. **McCarter**, a native of Philadelphia, Pennsylvania, and former resident of Hickory, is president and CEO of GE Latin America of Sao Paulo, Brazil. In 1997 he endowed the Mr. and Mrs. John T. McCarter Sr. Scholarship. He has received numerous awards, both in business and for service on the boards of charitable organizations. A loyal supporter of the College, he serves on the board of the Engineering Foundation and is GE's executive liaison to the University.

Barnes' $500K Gift Supports Entrepreneurs

Donald (Donnie) J. Barnes (Computer Engineering '95) and his wife, Ashley (IE '95), have pledged $500,000 for the endowment of the College's Engineering Entrepreneurial Program (EEP), initiated to teach engineering and computer science students skills in product development, organization, management, finance and marketing to help students start or join small entrepreneurial high-tech companies. As a student, Barnes participated in EEP for seven semesters. Soon after graduation, he became the fourth member of the high-tech group forming the Red Hat Software company.

Angelo Scholarship Awarded

Jonathan L. Rice of Winston-Salem has been selected as the fourth recipient of an Ernest James and Ethel Hudgins Angelo Scholarship in the College of Engineering. Dr. E. James Angelo Jr. and his brother William E. Angelo established the scholarship in memory of their parents. Recipients must be from Forsyth County, demonstrate an interest in the environment and pursue an engineering degree that will give them the opportunity to work to protect the environment.

CP&L Supports Nuclear Engineering

Carolina Power and Light Foundation, Inc. awarded a grant to North Carolina State University of $391,000, of which $333,000 will go to the College of Engineering. A large proportion of the grant is designated for programs in nuclear engineering, such as the Young Scholars, high school outreach and other programs, and for renovations to Burlington Nuclear Engineering Labs.

Corporate Partners Programs Underway

This past summer, the Engineering Foundation launched a new initiative, the Corporate Partners Program (CPP) [affiliated with the e-Partners program in Computer Science and Industrial Partners Program (IPP) in Mechanical and Aerospace Engineering]. The CPP is a collegewide program designed to help industry with their placement needs, enhance their image and visibility and facilitate short- and long-term collaborations with the College of Engineering. More specifically it will serve to foster more effective communication and a closer interaction between the companies and the academic departments from which they recruit students. Companies may partner with as few or as many departments as they choose. The CPP has already received the support of industry. The following companies having joined so far: ABB, Air Products, Alcatel, Analog Devices, Andersen Consulting, BASF, Caterpillar, Eaton Corporation, Exxon / Mobil, Fuji Chemical, GE, Gillette, HiddenMind Technologies, IBM, Intel, Intersil, John Deere, Make Systems, Mitsubishi, Motorola, National Starch & Chemical, Network Appliance, Nortel Networks, RF Micro Devices, Rohm & Haas, SAS Institute, Southeast Interactive Technology Funds, Square D Co., and Westinghouse. For more information please contact Nahid Bozorgi at nbozorg@eos.ncsu.edu.

Ralph E. Fadum, 1912-2000

Ralph E. Fadum, dean emeritus, died July 12, 2000, in Raleigh. He was 87. He served as dean of the School of Engineering from 1962 to 1978. He served as head of the Department of Civil Engineering from 1949-1962. He was professor emeritus of civil engineering.

Fadum was born in Pittsburgh, Pennsylvania, on July 19, 1912. He received his bachelor's degree in civil engineering from the University of Illinois and his master's and doctoral degrees in soil mechanics and foundation engineering from Harvard University. He taught at both Harvard and Purdue University before joining NC State's faculty. Purdue awarded him an honorary doctorate of engineering in 1963.

Throughout his career, his contributions had considerable impact on national goals of engineering education and the engineering profession, as well as on his students and colleagues. His distinguished record in supporting excel-

Fadum

lence in engineering education and his pioneering work in soil mechanics and foundation engineering were recognized in 1975 by his election to the National Academy of Engineering, the highest distinction conferred on an engineer.

Fadum, a member of numerous scientific, professional and honorary societies and a Fellow of the American Society of Civil Engineers, was awarded the Holladay Medal for Excellence in 1995. In April 2000 he was designated a Fellow of the Professional Engineers of North Carolina in a ceremony attended by family, friends and colleagues. As a PENC Fellow, Fadum is nominated to become a Fellow of the National Society of Professional Engineers, as well.

Anyone wishing to leave a memorial to Dean Fadum may send contributions made out to NC State Engineering Foundation, Box 7901, NC State University, Raleigh, NC 27695. Please indicate "Ralph Fadum memorial" on the check.
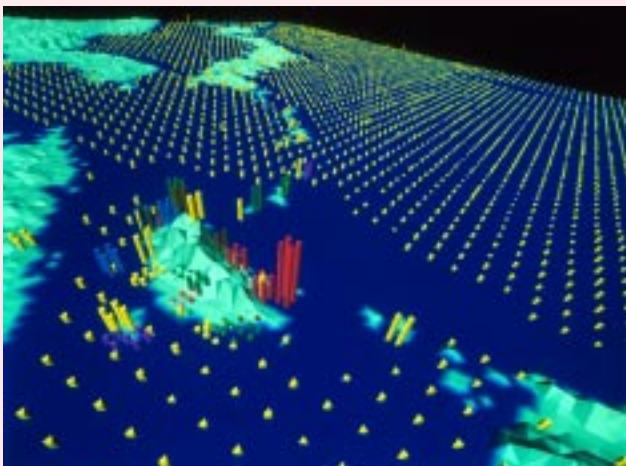
AURICS - continued from page 3.

changes as it develops. At the same time, care is taken to ensure that the overall experience remains true to the underlying plot.

The group of tall, dense, red and purple texture elements show typhoon Amber centered over Taiwan in 1998. Daily windspeed, sea-level pressure and precipitation readings are represented using height, density and color, respectively.

"The goal is to make the environment as unobtrusive and believable as possible," said Young. "You shouldn't feel like your actions or the computer's responses are restricted or scripted. Instead, it should be a simple, natural, enjoyable interaction between you and the other characters."

Tharp concluded by noting that AURICS isn't only about theoretical research. Students learn practical, real-world skills in areas that are highly prized in industry, giving them a leg up on a good job after graduation. It also means companies get a chance to interact with students before they finish their degrees. Some of the research projects the students are working on already include industry collaboration.

In addition, Tharp noted, companies will often tell him, "We need some top-notch students to help with this problem," or, "We're interested in finding out what your students are learning about networking." AURICS participants are obvious candidates to fill these roles. Given the strong demand for skilled computer scientists, a partnership between the university and industry is advantageous for both sides.

"Students get a chance to see what they like before they graduate," said Tharp, "and companies have an opportunity to build a relationship with a highly skilled individual who may turn out to be a potential employee. It's a win-win situation."