NC STATE UNIVERSITY

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2003

ELECTRICAL & COMPUTER ENGINEERING NEWSLETTER

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ABOUT THE COVER

A Tradition of Excellence

Cover Photography: Courtesy of NASA and MIT Lincoln Laboratory

In the late 1950's, communications theory was in the forefront of engineering minds. It was in this "golden age" of communications research that Paul E. Green, Jr. (MSEE '48) made two scientific discoveries that forever changed the landscape of electronic signaling.

After exploring the communication patterns of pseudo-noise waveforms in his MIT doctorate thesis, Green became manager of the Lincoln F9C system, the first operational spread spectrum system. In 1958 he and Bob Price built the Rake Receiver in response to ionospheric multipath difficulties. Drs. Green and Price designed the Rake Receiver to use "selection diversity" to choose its signals. A typical multipath reception technique allows for all basestations to receive signals, but only selects the one with the strongest signal. Since the strongest signal is not always the clearest, the Rake Receiver greatly improves the signal clarity by taking the best bits from the many sources and piecing them together optimally. The Rake Receiver derives its name from the map of its function. By attaching a "handle" to the plot of the multipath returns, a picture of an ordinary garden rake is created.

Green was able to apply his strong background in the pseudo-noise waveforms into his next endeavor: radio astronomy. Green and his team of scientists repeatedly performed radar experiments with Venus finding that the beam from existing radar systems was not narrow enough to resolve features of the planet from an angle. While the direct signals they received were indistinct, the planetary surfaces they measured did send back signals at different Doppler offsets. These offsets viewed at different ranges could make a picture of the echoes as a function of two variables – power as a function of tau (range) and f (Doppler frequency offset). These variables could be used to calculate points of reflectivity which in turn could be combined into a map. Using this "interstellar Doppler radar" methodology the 1989 Magellan mission to Venus was able to produce surface maps similar to aerial photographs of one kilometer resolution.

We are proud to be able to claim Paul E. Green, Jr. as our alumnus and we plan to feature projects of other Distinguished Alumni in future issues of our newsletter. These historic achievements illustrate the tradition of excellence in electrical and computer engineering and the individual contribution of just a few of our many outstanding alumni.

DEPARTMENTAL MESSAGE

Robert J. Trew

It gives me great pleasure to introduce my first alumni newsletter as Head of the Department of Electrical and Computer Engineering. Upon joining the Department in January 2003, I have been surprised and pleased with the record increases in student enrollments, research funding, and program growth.

The current undergraduate student population is approximately 1500 students with computer engineering students now outnumbering electrical engineering students. Our graduate enrollment is a record 507 graduate students, up from 498 last year. Last year 0we awarded 378 B.S. degrees, 247 M.S. degrees, and 17 Ph.D.'s. Although we are one of ten departments in the College of Engineering, our output represented 30% of the B.S. degrees, almost 40% of the M.S. degrees, and 19% of the Ph.D. degrees for the entire college. Our enhanced graduate enrollment and productivity are strong testament to the attraction and quality of our program, but places increasing pressure upon the department to provide the necessary advising, classroom and lab facilities and teaching support.

We are currently understaffed with faculty relative to the size of our student population and compared to our peer institutions, but with strong support of Dean Masnari we are in the process of recruiting and adding some much needed help. Last year we successfully recruited six new faculty members to bring our current faculty count to 49. We are recruiting again this year and hope to add three more faculty members for next fall.

The ratings of our program are strongly affected by research efforts and enhanced ratings will require further development in sponsored research, along with an increase in the award of graduate degrees. I am pleased to report strong growth in external research funding support. Research expenditures have continued to increase and last year hit an all-time record high of $15 million, up slightly from the previous year, for an average of about $340 thousand per faculty member. This level of research funding places us competitively with ECE Departments nationwide. The growth in research funding has been across the board with all centers and programs demonstrating increased funding. This is a strong testament to both the quality of our faculty and to their high level of energy in preparation and submission of successful research proposals. As we position for the future and add new faculty, we are focusing upon support for existing programs and directing attention to new and emerging areas.

I am pleased to report that the construction of the new Electrical and Computer Engineering and Computer Science building has begun on Centennial Campus. This $41 million dollar building will have over 100,000 square feet, wireless capabilities, and will house research and teaching labs, as well as classrooms and faculty/staff/graduate student offices. During this construction period, ECE faculty and staff have left Daniels Hall for satellite offices on Centennial Campus and will move into the new building, with the students, in the fall of 2005. Daniels will be renovated and will become the future home of the First Year Engineering Program.

As we move forward, we face significant near-term challenges. As a state institution, NC State is not exempt from the national and statewide recession and associated budget difficulties. Our operating budget, in particular, has experienced significant state-mandated reductions and, consequently, we are forced to do more with less. However, we remain optimistic that we will survive the current budget difficulties and will continue our current path of growth. Your Department has the intellectual energy, technological strength, and creative vision to continue to thrive and produce accomplished engineers and well-trained and creative scientists. Generous alumni and friends continue to support the department with equipment, research dollars and private funds. Together, our partnership will continue to develop and advance. We shall continue to educate and train engineers and leaders who will transform the state and national economy through technological excellence and innovation. We look forward to working with you and thank you all for your strong support.

Robert J. Trew,
Alton and Mildred Lancaster Professor and Head

UNDERGRADUATE PROGRAM

ECE STUDENTS RECEIVE COMMISSIONS

The Department of Electrical and Computer Engineering would like to congratulate the following students, who were given commissions by the U.S Navy on December 18, 2002.

~ Michael B. Hollingsworth – BSEE '02
~ Richard W. McMunn – BSEE '01, MSEE '02
~ Jonathan B. Cantor – BSEE '01, MSEE '02
~ John E. Dalton – BSEE '01, MSEE '02

The Commissioning Ceremony took place in the Grand Ballroom of the Talley Student Center and included welcoming remarks by Chancellor Marye Anne Fox, as well as oaths of office by Lt. Col. Michael Wawrzyniak & Col. Joseph Fitzpatrick, NC State University, and Capt. Dennis Haines, Duke University.

Frederick Livingston

STUDENT REPRESENTS NC STATE AT NATIONAL CONFERENCE

Frederick Livingston, a senior at North Carolina State University, will be representing the Department of Electrical and Computer Engineering at the 2003 National Conference on Undergraduate Research. Livingston and his presentation of a human-robot interface were chosen from over 2,300 student entries to represent the department. The National Conference on Undergraduate Research is a platform for students involved in all disciplines, ranging from the arts through sciences and mathematics, to come together and discuss recent undergraduate work, both creative and scholarly. It is an annual event, bringing together over 2,000 faculty and students.

ENGINEERING ENTREPRENEUR'S PROGRAM

EEP "virtual companies" Bonsai and CelluLAN were invited to present their prototyped products and business concepts to Steve "Woz" Wozniak, the co-founder of Apple Computer. Bonsai, led by ECE senior Angela De Luca, prototyped an open-source based Internet Access Device (IAD) aimed at bridging the digital-divide in public school education. CelluLAN, led by ECE senior Doug Walters, prototyped a product that would allow customers to use their free long distance cell phone minutes while using their traditional land-line phones at home.

The presentations to Mr. Wozniak, held in the conference room of EEP founder Dr. Thomas "Tom" Kenan Miller III, were both informal and extremely interactive. Mr. Wozniak asked many questions of the teams and gave them several pointers on new product design and development. He also encouraged them to continue their work and to follow their dreams. A small reception followed where Mr. Wozniak shared his start-up experience at Apple with the EEP students.

Left to right: Steve Wozniak (sp)(far left) and Dr. Thomas Kenan Miller, III (far right)pose with the Bonsai and CelluLAN student groups.

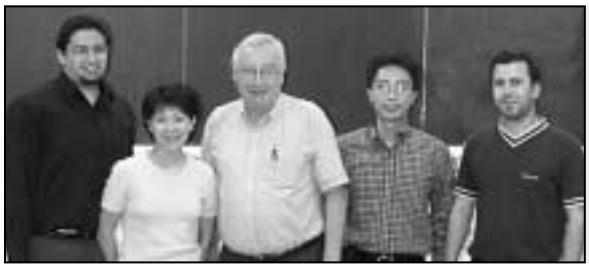
During this semester, ECE students will participate in the Senior Design Project course, collaborating with local industry and campus research groups. This semester's **ECE Design Day** will be held Thursday, December 4, in NCSU Talley Student Center, 11:00am-4:00pm. If you or your organization would like to find out more about ECE Senior Design projects, please call: 919-515-8740.

GRADUATE PROGRAM

The ECE Graduate Student Association (ECEGSA) held a picnic on September 6 as a way for students and faculty to socialize and enjoy a beautiful day. Fun was had by all!

SEMINAR SERIES

The Graduate Seminar Series, hosted by the ECE Graduate Student Association, was held on August 19, 2003 with 17 presenters and an impressive turnout of around 100 students and faculty. The Seminar Series gives students a general idea of research that is being conducted in the department and helps new students identify potential areas of research. The Series provides Masters and Ph.D. students the opportunity to sharpen their presentation skills in a competitive arena. First and second place winners were awarded prizes and all presenters were given critiques of their performance. Several areas of research were presented, including Networking, Controls and Circuits. Alumni are welcome to attend the next Seminar Series, scheduled for March. To find out more about this event, visit the Graduate Student Association website at *www.ece.ncsu.edu/gsa*.



Left to right: Mr. Mazen Kharbutli, second place winner, faculty judges, Dr. Wenye Wang, Dr. Arne Nilsson, Dr. Yan Solihin and first place winner, Mr. Abdessamad Ben Hamza.

FACULTY REPORT

MUTH RECEIVES ONR GRANT

Dr. John F. Muth (PhD Physics '98 NC State University) has been awarded one of 26 grants through the Office of Naval Research (ONR) Young Investigator Program. The Young Investigator Program supports basic research by exceptional faculty at U.S. universities who received a Ph.D. or equivalent degree within the preceding five years.

ONR Young Investigators are among the best and brightest young academic researchers in this country. Young Investigator awards confer honor upon the recipients beyond the research funding being provided. The awards are recognition of their research achievements, potential for continued outstanding research efforts, and strong support and commitment from their respective universities. Dr.Muth will investigate wide band gap semiconductor photonic devices and their applications to short-range underwater optical communications. Photonic devices research will eventually enable optical communications with unmanned underwater vehicles and submarines.

RETINA RESEARCH CONTINUES

Dr. Wentai Liu (PhD Electrical Engineering '83 University of Michigan) continues the study that he began on artificial retina research due to $9 million in funding from the Department of Energy. The study is aimed at developing a microchip electrode array that will provide the optic nerve with simple image information, therefore, improving the eyesight of a visually impaired, or even blind individual. The funding will be spread out over three years and will involve several Department of Energy facilities as well as research from USC and North Carolina State University.

John R. Hauser
(BSEE '60)

HAUSER RECEIVES HOLLADAY MEDAL

Dr. John R. Hauser (PhD Electrical Engineering '64 Duke University) has been awarded the Alexander Quarles Holladay Medal for Excellence by The North Carolina State University Board of Trustees. The Holladay Medal is the highest honor bestowed on a faculty member by the trustees and the university. It recognizes the contributions of faculty members in teaching, research and service. Dr. John R. Hauser has given 37 years of outstanding service in teaching, research and administration to NC State. He became a professor in 1973 and was named distinguished university professor in 1991. His research and publications have played a major leadership role in developing a nationally recognized research and education program in nanoelectronics and photonics through his own research and by serving as the director of several major research centers. He has made major research contributions in several fundamental areas of semiconductor materials and devices, and his results have been documented in two books and more than 150 refereed technical publications.

JEOPARDY FEATURES ECE FACULTY

As a test of pop culture notoriety, it doesn't get much better than being part of the answer on Final Jeopardy. On Wednesday, November 13, 2002, Adjunct Professor **Dave Bradley** did just that. In the third heat of this season's College Championship Quarter Finals, three students faced their Final Jeopardy answer in the category of "Computer History". "IBM Engineer Dave Bradley is called the father of this multi-key combination" was the answer provided to the students. The question, "What is control-alt-delete" was answered correctly by contestant Allison, an accounting major from the University of Cincinnati.

ALUMNI ASSOCIATION CHOOSES OUTSTANDING TEACHERS

The NC State Alumni Association presented18 faculty members with a total of $57,000 in stipends on May 18 at an Alumni Association awards dinner. These stipends served as a reward for the chosen faculty members' exemplary teaching, research, outreach and extension. Among these 18 faculty members were two from the Department of Electrical and Computer Engineering. These individuals were:

~ Dr. Paul D. Franzon
(PhD Electrical Engineering '88 University of Adelaide, Australia)
won two $3,000 yearly stipends for being an Alumni Distinguised Undergraduate Professor.

~ Dr. Gianluca Lazzi
(PhD Electrical Engineering '98 University of Utah)
won a $1,000 stipend for being selected as an Outstanding Teacher by the NC State Senior Class Board of Trustees.

FACULTY APPOINTMENTS

Dr. Robert J. Trew (PhD Electrical Engineering '75 University of Michigan) has been named head of the Department of Electrical and Computer Engineering at North Carolina State University, effective January 1, 2003. He replaces Dr. John R. Hauser, professor of electrical and computer engineering at NC State, who has served as interim head of the department since August 16, 2001.

Trew previously served as head of the Department of Electrical and Computer Engineering at Virginia Polytechnic Institute and State University in Blacksburg, Virginia. From 1997 to 2001 he was director of research for the U.S. Department of Defense, with management responsibility for $1.3 billion yearly in basic research programs. He was on the faculty in the Department of Electrical and Computer Engineering at NC State from 1977 to 1993. He is a member and fellow of the Institute of Electrical and Electronic Engineers (IEEE) and serves on the IEEE Microwave Theory and Techniques Society Administration Committee (ADCOM), where he is vice-president-elect for 2003. He was editor of the IEEE Transactions on Microwave Theory and Techniques from 1995 to 1997 and is currently inaugural co-editor of the IEEE Microwave Magazine. He is also a member of the editorial board of IEEE Proceedings.

Trew is a member of the Materials Research Society, the Electromagnetics Academy, the American Association for the Advancement of Science, Sigma Xi, Eta Kappa Nu and Tau Beta Pi. He received the 2001 IEEE-USA Harry Diamond Memorial Award and the 1998 IEEE MicrowaveTheory and Techniques (MTT) Society Distinguished Educator Award. He has produced more than 140 publications, 14 book chapters and six patents.

Dr. Sarah A. Rajala

Dr. H. Troy Nagle

DR. SARAH A. RAJALA

Dr. Sarah A. Rajala (PhD Electrical Engineering '79 Rice University), professor of electrical and computer engineering and associate dean of academic affairs for the College of Engineering, has been named associate dean for research and graduate programs in the College of Engineering at NC State University,. An internationally recognized expert in image and video processing, Rajala's research interests include engineering education, the analysis and processing of images and image sequences with application to the area of color imaging, image coding/compression, motion estimation and target acquisition and tracking.

DR. H. TROY NAGLE

Dr. H. Troy Nagle (PhD Electrical Engineering Auburn University), professor of electrical and computer engineering at North Carolina State University, has been named interim head of the Department of Biomedical Engineering, effective January 1, 2003.

NEW FACULTY APPOINTMENTS

Dr. Do Young Eun (PhD Electrical and Computer Engineering '03 Purdue University) joined the Department in fall of 2003, as assistant professor of networking. His research interests include decomposition of large networks, QoS estimation, performance evaluation, network topology, and ad-hoc/sensor networks.

Dr. Kevin Gard (PhD Electrical Engineering '03 University of California-San Diego) will join the Department in January 2004, as assistant professor of analog. His research interests include rf/analog integrated circuit design with an emphasis on CDMA mobile transmitter applications.

Dr. Leda Lunardi (PhD Electrical Engineering '85 Cornell University) joined the Department in fall of 2003, as professor of nanoelectronics. Her research interests include semiconductor electronic and optical devices, sub-systems and systems.

Dr. Suleyman Sair (PhD Computer Science '03 University of California-San Diego) joined the Department in fall of 2003, as assistant professor of computer architecture and engineering. His research interests include computer architecture, compiler optimizations, and optimizations for high performance and embedded systems.

Dr. Stephen Walsh (PhD Electrical Engineering '94 Duke University) joined the Department in the fall of 2003, as visiting assistant professor of electrical engineering. Dr. Walsh is teaching a variety of undergraduate courses and in the Engineering Entrepreneur's Program.

IN MEMORIAM

Dr. Walter "Bud" A. Flood, a previous Professor of Electrical and Computer Engineering at North Carolina State University, died February 15, 2003. In 1967, Dr. Flood became Professor of Electrical Engineering at North Carolina State University. He introduced to the department an undergraduate course in radar systems as well as graduate courses in radiowave and optical propagation. In 1981, Dr. Flood took the position at the Army Research Office in Research Triangle Park as Director of the Geosciences Division and retired in 1995. In 1991, Dr. Flood received the honor of being appointed a Fellow of the Institute of Electrical and Electronic Engineers, due to his "contributions to the understanding of microwave and millimeter-wave propagation and scattering by geophysical media."

"Bud" will be remembered not only for his outstanding contributions to the field of Electrical Engineering, but also for his impact as an encouraging professor to many students. He is survived by his wife, Joan and their three children.

FIELDS OF SPECIALIZATION

Members of the faculty welcome interaction with our alumni and friends of the Electrical and Computer Engineering Department. We invite you to contact the faculty in one or more of the discipline areas below for potential research concerns, corporate consulting, or other matters of interest. The department's Web site is www.ece.ncsu.edu, the telephone number is (919) 515-2336, and the fax number is (919) 515-5523. Correspondence may be sent to Electrical & Computer Engineering Department, NC State University, Campus Box 7911, Raleigh, NC 27695-7911.

Analog, RF & Mixed Mode

Doug Barlage
Griff Bilbro
Rhett Davis
Paul D. Franzon
Gianluca Lazzi
Michael B. Steer
Robert J. Trew
Stephen J. Walsh

Computer Architecture & Systems

Winser E. Alexander
Gregory T. Byrd
Thomas M. Conte
Rhett Davis
Alexander G. Dean
Paul D. Franzon
Xun Liu
Eric Rotenberg
Suleyman Sair
Yan Solihin
Stephen J. Walsh

Communications and Signal Processing

Winser E. Alexander
Mo-Yuen Chow
Huaiya Dai
Rhett Davis
Do Young Eun
C. Richard Guarnieri
Alexandra Duel-Hallen
Brian L. Hughes
Hamid Krim
Leda Lunardi
Arne A. Nilsson
Sarah A. Rajala
Mihail Sichitiu
Wesley E. Snyder
Yan Solihin
Doug Y. Suh
Joel Trussell
J. Keith Townsend
Wenye Wang
Mark White

Intelligent Systems & Bioengineering

Mesut E. Baran
James J. Brickley
Mo-Yuen Chow
Edward Grant
C. Richard Guarnieri
Gianluca Lazzi
H. Troy Nagle
Hatice O. Ozturk
Wesley E. Snyder
Mark White

Nanoelectronics & Photonics

Doug Barlage
Griff Bilbro
Paul D. Franzon
C. Richard Guarnieri
John R. Hauser
William C. Holton
Gerald J. Iafrate
Ki Wook Kim
Andrey A. Kiselev
Robert M. Kolbas
Richard T. Kuehn
Veena Misra
John F. Muth
Carlton Osburn
Mehmet C. Ozturk
Meredith L. Reed
Jan Schetzina
Michael B. Steer
Robert J. Trew
D. Ginger Yu
Stephen J. Walsh
Zhibo Zhang
Reiji Zhao

Networking

Mo-Yuen Chow
Huaiya Dai
Mihail Devetsikiotis
Do Young Eun
Paul D. Franzon
Brian L. Hughes
Tony L. Mitchell
Arne A. Nilsson
Douglas S. Reeves
Mihail Sichitiu
Doug Y. Suh
Ioannis Viniotis
Wenye Wang

PARTNERSHIPS & OUTREACH

SPOTLIGHT ON ANALOG ALLIANCE

The Analog Alliance, based within the Department of Electrical and Computer Engineering is a corporate-university partnership created to ensure a supply of highly qualified students with theoretical and practical knowledge in the fields of Analog/RF and Mixed Signal Design. Both local and global Analog Alliance corporations are offered exclusive recruitment opportunities as well as specifically designed student projects. The Department is committed to recruiting young faculty talent and offering comprehensive coursework to provide engineering students the best analog education available.

THIS INDUSTRY-LEAD PHILANTHROPIC ACTIVITY SUPPORTS ADVANCED CIRCUITS' EDUCATION IN THE FOLLOWING WAYS:

~ Support circuits design education infrastructure at NCSU
~ Provide additional resources to directly support circuit design courses
~ Provide scholarships for Undergraduate circuits students
~ Assist in recruiting highly qualified faculty into circuits at NCSU
~ Involve students in Senior Design and Graduate projects

The following companies are original members of the Alliance:
Analog Devices, IBM, Intersil, Renesas Technology America, Inc, RF Micro Devices and the Kenan Instititute for Engineering, Technology and Science.

CSC & ECE BEGIN CONSTRUCTION ON NEW BUILDING

If you haven't seen Centennial Campus lately, you may be surprised. The once pastoral setting is rapidly evolving into a gleaming high-tech mecca while helping the College of Engineering to leave a giant footprint on the new millennium.

NC State University has awarded the construction contract for the second College of Engineering academic building on Centennial Campus. The building is being designed by Perkins & Will of Charlotte, for two departments — Computer Science and Electrical and Computer Engineering. When completed, Building 2 will consist of approximately 110,000 square feet of space for classrooms, labs and offices. The construction of Building 2 began in late 2003 with a completion goal date of early 2005. The approximate cost for this building is projected to be $41 million.

Back on Main (North) Campus, the College is now working on a master plan for a two-phased renovation of Daniels Hall, currently the home of Electrical and Computer Engineering. The first phase will cost approximately $7 million and will relocate the College of Engineering's First Year academic programs to Daniels Hall. The College is able to undertake this much-needed expansion due to North Carolina voters passing a $3.1 billion higher education bond referendum in 2001.

ECE LAUNCHES ALUMNI WEB PAGE

We are excited to launch the inaugural ECE Alumni Web Site for all department graduates. The website features ECE news, featured alumni interviews, ways to get involved and alumni-only services including an online directory, alumni announcements and coming soon, a career corner.

All ECE alumni are available in the searchable database. If you do not want your information available in the database, please log into the database and review your privacy options. You can choose to have certain personal information deemed private or have your entire listing removed. **Removal of your record will remove your access to the database.** For questions and concerns, please contact Christine Cerny at *ece-webmaster@ncsu.edu* or 919-513-3950. You can access the ECE Alumni Website at *www.ece.ncsu.edu/alumni.*

ENGINEERING ACHIEVES!

Engineering students, hailing from a variety of concentrations in the College of Engineering, have taken over the leadership helm at NC State University this year. The students from left to right: Joshua D. Hitzemann (ME) President, Engineers' Council, Anup M. Shah (EE) President, Senior Class, Thushan S. Amarasiriwardena (CSC) Co-Editor, *The Technician* and Erich M. Fabricius (ChE) President, Student Senate. This photograph will be used in a variety of campaigns throughout this academic year.

EXPRESSING OUR APPRECIATION...

Many alumni and corporate friends have helped the Electrical and Computer Engineering Department, in the 2002-2003 academic year, achieve our goals of enhancing student recruitment, providing assistance with diversity issues, helping our faculty's research through grants and equipment donations, and much more. These gifts, which can increase corporate visibility among students and members of the faculty and administration, are vital to the mission of the department.

** Sy Matthews Society*

In 2002, the ECE Department created the Sy Matthews' Society recognizing alumni and friends who gave unrestricted support to the ECE Department. Following the example of Sy Matthews' personal dedication to philanthropy in our department, these individuals help us strengthen our educational foundation and to ensure the academic excellence of the department and its graduates for years to come.

John Michael Barringer
*John Culpepper Baugh
*Mr. & Mrs. Thomas K. Bednarz
*Robert K. Brotherton
*Steven John Bachouros
*Dr. Steven L. Blake
*Keith A. Bowman
*Dr. Chao-Ren Chang
*John D. Chap
*Alan M. Chedester
*Christine Cerny
Analog Devices
*Mark W. Cole, Jr.
Dr. Younho Choung
Duke Energy
*Victor J. Duvanenko
Elizabeth J. Dunnagan
*Phillip R. Epley
Lynn W. Eury
Exxon Mobil Corporation
Mr. & Mrs. E.O. Ferrell, III
*William Peter Graham
Mr. & Mrs. William Gray
*Michael E. Green, Jr.
Dr. John R. Hauser
*Neil H. Hodges, Jr.
*Wendy Kay Hodgin
Mr. & Mrs. William Highfill
*Hunt Signs
IBM
Intersil
K.M. Jones
*Michael F. Kler
*Eugene C. Koonce, Jr.
Kenan Institute
*Jesse C. League, Jr.
*M. Timothy Letchworth
*Stephen C. Lyman
*Thomas N. Mathes
*Dr. Daniel J. Moore
*Keith R. Moore
*J. Mark Mullen
*Michael E. Murphy
Northrop Grumman
NC State Board of Examiners for Electrical Engineers
Object Technology
*Billy B. Oliver
Our Lady of Lourdes School
*Person Education
Proctor & Gamble
*William J. Pearce, Jr.
William J. Pratt
Progress Energy
Square D
Sprint
SRC Education Alliance
*Dr. Joseph E. Sutherland
*Eric A. Staton
*Beverley Eugene Taylor
Simon B. Woolard
*James T. Umbdenstock
Estate of Frederick J. Tischer

ALUMNI REPORT

ALUMNI SPOTLIGHT

J. Turner Whitted

J. Turner Whitted won't take credit for it, but he really should be listed in the lineage of Woody, Buzz, Shrek and Neo, as well as a lot of other computer generated characters in both movies and computer games. Graduating with a PhD degree in Electrical Engineering in 1978 from NC State, Dr. Whitted developed the use of ray tracing to simulate global illumination in computer graphics. He earned his BS and MS degrees in electrical engineering from Duke University.

Dr. Whitted was an adjunct professor of computer science at the University of North Carolina at Chapel Hill from 1983 to 2001. He is cofounder and former director of Numerical Design Limited, prior to which he was a member of the technical staff in Bell Labs' computer systems research laboratory. Dr. Whitted is currently Senior Researcher, Hardware Devices and Graphics with Microsoft.

Q. Are you a native North Carolinian?
A. Yes. I was born in Durham and grew up in Winston Salem.

Q. What factors did you consider in coming to NC State for your PhD?
A. Several. One is the fact that there is an engineering school here. The other big factor was that NC State was willing to take a gamble on me. I wasn't a very good undergraduate student. I was very fortunate that they accepted me. Hopefully, I made up for some of that poor undergraduate record.

Q. How did you become interested in computer graphics research?
A. The easy answer is "I don't remember." Computer Graphics research was a new field and if you became interested, you were part of something that was very new. When I was at Duke for my master's degree, there was a course where I had to actually plot the results and I thought that the plotter results were a whole lot more fun than a whole column of numbers. After that, no matter what I was doing–and I was looking at the stability of control systems, -- plotting the response ended up being the most fun. I kind of forgot about control systems and got into plotting. I guess you'd call that "scientific visualization" today but in those days it was just "plotting the results" and it grew from there.

Coming to NC State was an interesting transition. When I came into the department around 1975 we had wonderful programs in signal processing and computer graphics and there was a tight relationship between them. My real reason for coming into the signal-processing program was to pursue image processing. Somewhere in the middle of that pursuit, I discovered that some functions of image processing used the same mathematics as computer graphics and computer aided design and I switched interests over to the computer graphics side.

Q. The paper you presented in 1980 inspired many programmers to begin to create art and over the years whole entertainment industries have grown out of the science of your original algorithm. What artistic derivative of your work do you enjoy most?
A. Oh gosh, I'm trying to put as much distance between that paper and myself as I can. I can never escape that paper. Artistic derivation, I think that's a bit of an over statement. That paper was a little bit out of the lunatic fringe. It had some nice effects, but those effects are achieved more economically in the real world than they were as presented in that paper. I don't go to the movies and look at the special effects and try to identify anything related to that, certainly. For one thing, that kind of kills the enjoyment but also the special effects are so good that you wouldn't notice it anymore. The most enjoyment I get out of it is seeing peo-

ple duplicate it for their homework assignments. I really get a kick out of that, just seeing the students discover the same thing is wonderful.

Q. You'll be pleased to know then that there are millions of hits on Google of your algorithm in students' homework papers. [laughter] In 1983, you left Bell Labs and with Dr. Robert Whitton founded Numerical Design Limited. Based on your experience with NDL, what advice would you give to young entrepreneurial engineers?
A. There are no two startups that are alike, no two situations or economic climates that are the same. In 1983, it was an interesting time because the mini-computer era was coming to a close, the workstation era was starting up, and the PC era hadn't quite taken hold. The transition to that new technology was the impetus for many new businesses. We saw that the workstation software business was going to be crowded and jumped immediately to the PC business. Now, doing what we were doing on PCs was considered insane, but we didn't have any choice. We had to escape the crowd. Turned out to be the best decision we made– to put our software on PC's. So is there a lesson in that? Well, the general lesson is to be flexible and not so hung up on your original notions that you can't shift gears and change over to something that's going to be more successful.

Q. The move from the entrepreneur culture of Numerical Design Limited to the corporate culture of Microsoft must have been an enormous change for you. What were the most striking differences between the two endeavors?
A. They're not that different. Microsoft, as large and successful as it is, is still an entrepreneurial company and it's a good way to stay in business. The biggest difference in my case was jumping out of the commercial world back into the research world. When I went to Microsoft, I joined Microsoft Research as a chance to jump back into the type of work I had done before starting NDL. I kind of missed it. It wasn't so much a change from the entrepreneurial world back into the commercial world. To me it was a change from the industrial research world that I had left in 1983 into the industrial research world that existed in 1997– and they are not the same. In many ways I am much happier in the new industrial research world where relevance is a big issue. It's something we have to pay a lot of attention to. We want to make sure that our work is strategic and that it has a future. But it's very like coming home in a way.

Q. Over the last decade we've seen Microsoft's emphasis on a graphical user interface greatly increase. What new technology can we expect from graphics research being done now?
A. You're asking, "What will the average person experience?" The PC revolution is sometimes interchangeably called the desktop revolution. It's off the desktop that really makes the difference and we see that now. We have PDAs, we have cell phones, we have any number of things that we carry with us away from our desktop. So the untethering is a huge change, in some ways good and in some ways bad. The fact that we can't escape communication is up to you to decide whether that's good or bad. You can always turn your cell phone off. The fact is that the convenience of being untethered is overwhelming and that's why it's something we can't back away from. So the question of visual interaction in an untethered world is a very different question than how do you interact with a desktop computer and we're trying to ask those questions. I have [so many] papers and talks on this that I can go on forever. [laughter]

And it's not simply a case of looking down into your handheld device and having your desktop reproduced. That's not the experience we're talking about. Let's say, [touching the wall] I just turned a wallpaper into a display (which is technically feasible). So if I no longer have to sit in front of a desktop monitor and I can just talk to my walls and look at the environment and get all the additional feedback I need from that, how's that different? There's a lot of difference. You're focused; in this case you're focused on some smaller area but now you're getting a larger area to focus on. The fact that it's farther away gives you a different perspective and reaction. We don't know that much about the whole range of untethered interaction and to me that's the thing that is most important for us to discover and exploit. It's the whole reason that the hardware devices research group exists at Microsoft. We put an awful lot of effort into the display sides of that. It's wide open. It's an exciting area to work in.

A complete version of this interview is available at http://www.ece.ncsu.edu/alumni/ in the "Featured Alumni" section.

Tom McPherson

Larry Nixon

R.B. Sloan Jr.

ALUMNI IN THE NEWS

Tom McPherson (BSEE '76, MSEE '77) was the featured speaker in the Spring 2003 about Entrepreneur's Lecture. Retired president and CEO of Hatteras Networks, McPherson talked leading both small and large businesses, how he acquired the initiative and leadership skills necessary for a successful start-up, and how it felt to earn the NCEITA award for "Top Venture Capital Invested Company of the Year" after raising $45 million in venture investment.

Larry Nixon (BSEE '64), a former North Carolina State Engineering Foundation Board member, is the 2002-03 president of the Accreditation Board for Engineering and Technology (ABET), Inc. Nixon has served as a member of the ABET Board of Directors and has served on several ABET committees. He is the founding principal and president of the Raleigh firm Bass, Nixon, and Kennedy, Inc.

R.B. Sloan Jr. (BSEE '73) of Mooresville, N.C., has been elected to serve a two-year term in the N.C. Senate. Sloan is one of the seven senators who are NC State alumni.

Grant Giddens (BSEE '97, BSCPE '97) was featured in an interview in the News & Observer on September 17, 2003, about his website, www.retailretreat.com. The website is a way for consumers to find the best prices online for computer equipment and electronics. Giddens currently works for ADC, a telecommunications company, and considers the website a hobby.

CLASS NOTES – ECE

For this information, visit the announcement section of our alumni webiste, www.ece.ncsu.edu/alumni

IN MEMORIAM

Warren S. Mann (BSEE '21) of Middletown, Ohio, died Dec. 9, 2001.

George Williamson Wray Sr. (BSEE '25) of Charlotte died March 14, 2003. A U.S. Army veteran of World War II, he retired from Southern Bell Telephone and Telegraph in 1968 after 43 years.

Forrest Hazel "F.H." Sloan (BSEE '33) of Charlotte died Feb. 2, 2003. He worked 23 years for R.H. Bouligny Co. as an electrical engineer. He retired as senior vice president and chief engineer with Harrison Wright Utility Contractors.

Thomas Samuel Teague Jr. (BSEE '36) of Picayune, Miss., died March 17, 2003.

Robert Scott Runnion Jr. (BSEE '39) of Brulington died Dec. 14, 2002.

William Edward Leloudis (BSEE '42) of Burlington died Dec. 4, 2002. A World War II veteran, he worked for Western Electric until his retirement in 1979.

Walter Huntley McKinnon (BSEE '48) of Wilson died March 10, 2003. He was assistant to the president of Duke Power when he retired in 1987 after 39 years.

James Marcus Yorke Jr. (BSEE '49) of Bryan, Texas, died April 23, 2002. He retired from Houston Light & Power Co. in 1984. During his career, he worked on atomic plants, wind tunnels and strategies to protect installations from earthquake damage.

Ralph K. Younger (BSEE '49) of Sierra Vista, Ariz. Died Feb. 23, 2002.

Benny Aaron Cooke (BSEE '50) of Clemmons died Oct. 24, 2002. A U.S. Army veteran of World War II, he retired from IBM in 1992 after 41 years.

Charles Anderson Idol (BSEE '52, MSEE '56) of Weaverville died June 3, 2002. He was an electrical engineer and inventor. He also was a member of the Operating Reserves for the U.S. Information Agency.

Philip Snowden Johnson (BSEE '56) of Clayton died Oct. 2, 2002. He was retired from the U.S. Department of Commerce.

James Thurman Emery (BSEE '57) of Richmond, Va., died Feb. 17, 2003. A U.S. Army veteran, he retired as an electrical engineer for Virginia Power Co.

Vernon A. "Buddy" Vaughn Jr. (BSEE '57) of Charlotte died April 19, 2002. A Korean War veteran, he worked in the special metals industry, serving as president of Dynamet Sales.

Malcolm V. Britt (BSEE '59) of Rockledge, Fla., died Sept. 22, 2002.

Maurice Talmadge Murray (BSEE '59) of Princeton, N.J., died May 8, 2002.

Calvin Max Miller (BSEE '63) of Atlanta died June 14, 2002. He retired from Bell Laboratories after 20 years to found Micron Optics. He also was an avid pilot.

George Leon Hooks III (BSEE '65) of Fremont died May 11, 2001.

Albert Ahmet Nevruz (PREE '69, MS '70) of Trenton, N.J., died March 12, 2002. He was a research scientist for Union Camp, where he developed a computer system that detected leaks in recovery boilers during the paper-making process.

Gary Lee Jones (BSEE '90) of Raleigh died Nov. 21, 2002.

Mark A. Wagoner (BSEE '94, BSPY '94) died on May 28, 2003 in Denali National Park, Alaska as a result of a plane crash. Mark graduated Summa Cum Laude and following graduation, was employed by Proctor & Gamble in Browns Summit, N.C. from 1994 to 2001. A memorial fund has been established in Mark's honor with the NCSU Caldwell Fellows Program.

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