



# **Technology that touches the world**

COLLEGE OF ENGINEERING,  
ARCHITECTURE AND TECHNOLOGY

OKLAHOMA STATE UNIVERSITY ▲ 1998

# THE WORLD'S BALL PARK

When Mark McGwire hit his 62<sup>nd</sup> home run, baseball fans all over the world cheered. Even the Sooners had to be impressed recently when Oklahoma State University was named by a national publication as the *Best College Buy in America*. That was a home run for OSU! Almost every week a student or a faculty member in the College of Engineering, Architecture and Technology, or an alumnus of the college, “hits a home run.” This issue of *Impact* describes some of the recent “home runs” of our students, faculty and alumni — “home runs” that are touching lives around the world.

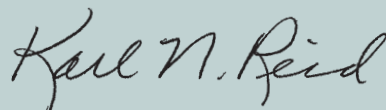
Remarkable changes occur in young people from the time they enter to the time they leave OSU. Read about Annie Forsberg’s work on an Oklahoma transportation project, Jim Cooke’s vision of quality lower- and middle- income housing that maintains the integrity of the environment, Andy McPherson’s role in establishing safety programs in an industrial environment, the heroics of the concrete canoe team, and the successes of architecture students in national design competition.

Cost effective health care is a major concern in the United States and throughout the world. Read about the potential of an artificial pancreas and a new method for ensuring the safe delivery of anesthetics, exciting projects being pursued by chemical engineering professors Randy Lewis and Rob Whiteley.

Research and technology development projects carried out by CEAT faculty have touched many lives. What will be the future impact on our quality of life because of the work of Dee Ann Sanders and John Veenstra on cleaning up oil spills, or the understanding gained by Daniel Storm and Doug Hamilton on animal waste management?

What will be the economic impact of Ranga Komanduri’s new method for polishing ceramic bearings, Don Lucca’s development of diamond grinding techniques for finishing semiconductor materials, or Dan Grischkowsky’s invention of ultra-high performance devices for next-generation information transmission systems? Will the new Advanced Technology Research Center open windows of opportunity for the CEAT to touch lives?

Home runs touch lives, but only for a fleeting time. What really counts are the long-term investments in the lives of young people preparing for a career and for life itself. If we can teach them to fish, they will make us proud with their catch. It is time to cheer for the students, faculty and alumni of the CEAT who have hit home runs this season, as well as those who have learned how to fish and those who already have an impressive catch. They are the best of the best!



Karl Reid, Dean  
College of Engineering, Architecture and Technology



From the Kerr-McGee Seminar Room in the new 165,000 square-foot Advanced Technology Research Center, Dean Karl Reid can reach the world and the world can reach back. This 90-seat facility and two other distance education learning studios feature the latest in telecommunications and multimedia technology made possible by a leadership gift from Kerr-McGee. The studios are equipped with advanced telecommunications capabilities for connectivity to a multitude of sites and offer connections for laptop computers, infrared tracking of the instructor, and audio assistance for the hearing impaired.

# a college that touches lives



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12 HEALTH

The offerings of engineers, scientists and technologists may seem intangible, complicated ... and even distant from the lives of the average individual. But this is simply not so! The OSU College of Engineering, Architecture and Technology continues to build a commitment to research and technology that does touch lives worldwide — and in ways that are sure to surprise many. From the houses in which we live to the roads on which we drive to the medicine that helps us heal, the faculty, students and alumni of the CEAT are helping reinvent the world.

## D E P A R T M E N T S

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IMPACT is a publication of the Oklahoma State University College of Engineering, Architecture and Technology and is designed to provide information on college activities and accomplishments while fostering communication among the CEAT family and friends.

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## I M P A C T

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**ON THE COVER:** They're small, round, shiny and handsome like marbles, but that's where all comparisons end. These ceramic balls used in advanced bearings are the focus of Ranga Komanduri's multimillion dollar research project which has drawn funding from the U.S. Department of Defense and worldwide attention.

## VIP INVITATION

The CEAT wants you to have access to up-to-date information on everything from the continuing development of the Advanced Technology Research Center to the establishment of new academic programs on the Stillwater campus and in Tulsa.

We invite you to be our guest for a VIP visit to campus and the CEAT. Contact Dean Karl Reid by phone at (405) 744-5140, by FAX at (405) 744-7545, or by e-mail at kreid@okstate.edu. If a trip to campus is not possible, visit the CEAT homepage through the OSU Website at www.okstate.edu.

# CEAT *update*

## Tulsa Programs Highlight of New Academic Endeavors

**T**he Oklahoma Legislature recently passed a bill which creates two new entities in Tulsa. OSU-Tulsa will replace the existing Rogers University beginning Jan. 1, 1999. An OU/OSU Research and Graduate Education Center was approved for start up July 1, 1998.

With the new "franchise" in Tulsa comes both opportunity and challenge for OSU and the CEAT. To meet the challenge, the CEAT is expanding degree programs to address the specific needs of working technical professionals. Increased use of telecommunications strategies will ensure effective and flexible course delivery.

Dean Karl Reid says the CEAT faces two distinct opportunities in Tulsa.

"The first is to satisfy the continuing and graduate education needs of place-bound professionals in high-tech firms experiencing rapid growth," he says. "The second is the opportunity to substantially increase the number of professionals in Oklahoma with advanced engineering education, and thereby enhance the competitive strength of Oklahoma technology firms and the attractiveness of Oklahoma for new industry development."

For WorldCom to support continued job growth in Oklahoma and to recruit and retain the highest quality technical talent, the state's premier research institutions have to provide additional degree programs in Tulsa, said a report the firm gave to Oklahoma Gov. Frank Keating.

The college will continue offering master's-level programs in electrical, mechanical, civil and chemical engineering at OSU-Tulsa as previously offered at Rogers University. The CEAT initiated a new bachelor's degree program in electrical engineering this fall to complement the bachelor's degree programs in general engineering and electronics technology first offered in 1990 in partnership with Tulsa Community College. Current plans are to offer a new bachelor's degree program in civil engineering starting in the fall of 1999.


The college has responded to industry requests with innovative programs such as the master of science in telecommunications management, a cooperative endeavor between the CEAT, the College of Business Administration and the College of Arts and Sciences. The CEAT has joined six other OSU colleges to offer a new master's degree in health care administration in response to needs

expressed by health care professionals. The newest program to be developed and offered is the master's in engineering and technology management (MSETM). An industry steering committee has helped set the vision and content of this new program, which is also a cooperative endeavor of the CEAT, the College of Business Administration and the College of Arts and Sciences.

MSETM was designed for practicing engineers and scientists whose careers involve the management of people, projects, technology and strategy. It was unveiled this fall. Approximately half of the 33 new MSETM students live and work in Tulsa. MSETM is delivered statewide via compressed, two-way television, videotape and the Internet.

The CEAT is also addressing needs in Oklahoma City for new bachelor's degree programs. In response to overwhelming demand for technologists with bachelor's degrees, the CEAT, OSU-OKC and Rose State College have teamed to initiate a completion degree program in electrical engineering technology. OSU-OKC and Rose State receive upper-division courses broadcast via two-way compressed video from the CEAT in Stillwater.

ADAM HUFFER



The Tulsa skyline at night – the landscape for many new academic offerings from the CEAT.

# Noteworthy

## Faculty Chosen for Superb Honors



**C. Patrick Koelling**, head of the School of Industrial Engineering and Management • Regional vice president (Chapter Operations Board) of the Institute of Industrial Engineers • Hopes to open communications lines and energize the local and student chapters in Oklahoma, Texas and Kansas, some of which have become inactive • Elected in 1998 to two-year term.



**Lawrence L. Hoberock**, head of the School of Mechanical and Aerospace Engineering • Vice president, Systems and Design Group, American Society of Mechanical Engineers International • Will oversee operations of six technical divisions and promote increased participation in activities by members from industry, academia and government — with a principal focus on manufacturing enterprise • Elected in 1998 to three-year term.



**John Bryant**, AIA Fellow and professor of the School of Architecture • First recipient of the AIA Oklahoma Leadership Award for Education from the state chapter of the American Institute of Architects (AIA Oklahoma) • For leadership while head of the school, innovation in architectural education, internationally-recognized reputation as an educator and scholar, national leadership in continuing education, and early advocacy and leadership of Intern Development Programs • Accepted last spring.



**Bob Heatly**, professor of the School of Architecture • Distinguished Professor Award for 1997 from the Associated Collegiate Schools of Architecture • For “sustained achievement in the advancement of architectural education through teaching, design, scholarship, research and service” • Accepted last spring.



**Suzanne Bilbeisi**, OSU graduate and professor of the School of Architecture • Associated Collegiate Schools of Architecture New Faculty Teaching Award for 1997 • For “excellence in teaching performance during the formative years of an architectural teaching career” and for involvement in a variety of activities • Accepted last spring.



**Don Lucca**, professor of mechanical and aerospace engineering • The international Alexander Von Humboldt Research Award • For his work in ultraprecision machining • Currently working at the research institute at Universität Bremen in Germany • Received in 1997.



**Bill Cooper**, former director of the Office of Engineering Extension and interim director of OSU’s distance learning • Fellow of the American Society for Engineering Education • For maintaining membership in ASEE for at least 10 years and making valuable contributions to engineering education • Received in 1998. ▲

## Who What When Why

## A Knight’s Quest

James F. Knight, FAIA, may be an OSU retiree, but this familiar face of the School of Architecture isn’t quite ready to put away the tools of the trade.

Knight, who retired in June after nearly 20 years on the OSU faculty, has relocated to the western Colorado mountains, where he and his wife, Pam, have designed and built a family home they call Thendara, a Native American term meaning “gathering place.”

Now a licensed architect in Colorado, he plans to do consulting and traveling in the west and southwest regions of the United States and in France and Greece.

“We haven’t even got television yet and haven’t missed it a bit,” he laughs.

Knight first came to OSU as a student, earning a bachelor’s degree in architecture in 1962. While working on a graduate degree at the University of Illinois in 1966, he won the LeBrun and Paris Prize national design competitions, which gave him the opportunity to study architecture in 26 European countries for 18 months.



*Knight*

After 12 years of maintaining a private practice in Champaign, Ill., and a faculty position with the University of Illinois, Knight returned “home” to OSU in 1979. From 1990-96, he served as head of the school. He ended his career doing what he loved most, teaching architectural design.

“My greatest pride is the many students who have graduated and gone on to great happiness and success, and I’m extraordinarily grateful for having worked with a super faculty and staff,” he says. ▲

LISA ZIRIAX

# Bridging the future

OSU and the CEAT have received \$3.5 million from the federal government to further develop the internationally-recognized "smart bridge." This concept uses ground source heat pumps to circulate warm liquid through tubes buried in the concrete deck, eliminating the need for chemical or salt deicing methods that limit traditional bridge-life to about 20 years. Through a link to the Oklahoma Mesonet, the bridge can predict inclement weather and turn itself on to prevent freezing rather than thawing ice already formed, thereby saving energy. An endeavor of OSU and the Oklahoma Department of Transportation, the pilot project on I-40 near Weatherford, Okla., could save both lives and billions of taxpayer dollars.

*Ice-free bridges mean safer highways, lower maintenance costs, longer bridge-life and less environmental injury because chemical deicing of the bridge deck will no longer be required.*

KEATING

Oklahoma Gov. Frank Keating



# environment

STORIES THIS PAGE BY ADAM HUFFER AND LISA ZIRIAX

## this land is our land

Daniel Storm and Doug Hamilton, professors of biosystems engineering, are heading two interdisciplinary studies that address the broad environmental and economic effects of animal waste management. The projects are among many campus-wide that will be of interest to state lawmakers and taxpayers when debate resumes on the growth of Oklahoma's confined animal feeding industry.

With funding from the City of Tulsa and assistance from the Department of Plant and Soil Sciences, Storm is leading a study of the Lake Eucha Basin, a primary source of Tulsa's water supply. He is using computer models to identify and quantify runoff from agricultural fields and forests of phosphorus and sediments. The model is supported by topographic, soils and land use information and detailed soil nutrient levels gathered from soil sampling.



STORM

"Before you can develop any kind of management strategy to address declining water quality, you have to identify all sources of nutrient loading to the lake," he says.

Hamilton has teamed with the Department of Microbiology and Molecular Genetics to identify biological communities that reduce agricultural waste treatment system odors. David Demezas, a microbiologist, is using DNA sequencing to "fingerprint" the microbial communities present in a low odor lagoon.

"We are interested in a diverse community of bacteria that appears to remove many of the odorous compounds in lagoons," Hamilton says.

The Oklahoma Cooperative Extension Service will use the findings to make recommendations to farmers on lagoon and storage pond management.



HAMILTON

## the energy connection



RAMAKUMAR

The impending deregulation of the utility industry has power companies, energy consulting firms and local governments in Oklahoma understandably concerned. A center in the School of Electrical and Computer Engineering seeks to help them ease through what promises to be a jolting transition.

For more than 35 years, the Engineering Energy Laboratory has served the utility industry as a source of information and research assistance.

With deregulation as the primary topic and Lt. Gov. Mary Fallin and Oklahoma Corporation Commissioner Denise Bode as speakers, last year's annual Frontiers of Power Conference was one of the best-ever attended, says Rama Ramakumar, PSO/Albrecht Naeter Professor of electrical and computer engineering and director of the center.

The energy program has attracted more than \$3 million in external funds and has yielded 17 doctoral dissertations, a professorship, almost 10 patents and approximately 300 publications including a textbook.

## TIMELESS TECHNOLOGY ...

**The heat is on** – Since the 1970s, OSU engineers have advanced and brought international-recognition to geothermal/ground source heat pump technology under the leadership of Jim Bose, head of engineering technology, and the International Ground Source Heat Pump Association. Heat pumps are efficient and have the lowest environmental impact of any energy source. Structures using the pumps for climate control include hundreds of schools nationwide and the Oklahoma State Capitol.

**Ever heard of earth-sheltered homes?** – If you knew OSU architecture student Clark Chapman back in the 1950s, you have. Through research, Chapman assessed that such a home should be built into the south- or southeast-facing slope so that the north and west parts become a semi-basement and the south and east face the summer breezes and winter sun. Just a decade earlier in 1943, John E. Kirkham of OSU's civil engineering perfected designs for a home built primarily of common soil and sand. His earthen home, he said, was inexpensive, fire- and bug-proof, strong, perfectly insulated and easily painted. Kirkham actually resided in a home made of the waterproof bricks. ▲

Source: OSU Centennial Histories Series' "Research by Craig Chappell and "Engineering, Architecture and Technology" by James Vernon Parcher.

## cleaning up the place



SANDERS

VEENSTRA

Can microorganisms safely and efficiently clean up petroleum spills and ground water in a predictable time frame without additional human intervention? A study by assistant professor Dee Ann Sanders and professor John Veenstra in the School of Civil and Environmental Engineering at a contamination site in Edmond which is rich in nitrates and sulfates may answer the question and perhaps a few others.

With support from the University Center for Water Research, the professors hope to develop an accurate model to predict the rate of intrinsic bioremediation, the use of microorganisms to return a contamination site to a more natural state. Many microorganisms "breathe" oxygen just as humans do. However, there are organisms that use nitrates or sulfates as we use atmospheric oxygen. In past studies at contaminated sites, engineers added nitrates or sulfates to the ground water. This study uses only the naturally-occurring nitrates and sulfates to supply the bacteria.

"We are trying to predict that future date at which contaminants will have attenuated to an acceptable concentration," Veenstra says. "We want to adapt the predictive models so they can be used by the Oklahoma Corporation Commission to determine site cleanup and closure requirements."

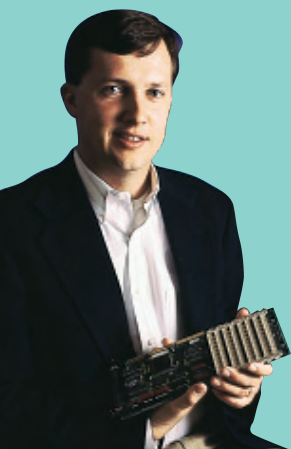
The two researchers are working with two screening models, one of which was adopted this spring by the Environmental Protection Agency. With reliable model predictions of the time required for remediation, the agency will be able to approve the lower-cost microbial methods for some contamination sites.

# Troubleshooting and saving millions

Scott T. Acton of the School of Electrical and Computer Engineering is principal investigator of a collaborative group which is examining an automated inspection system for printed circuit boards manufactured by Lucent Technologies. The project, which has been ongoing for more than two years, is in the latter stages of research, and the group hopes to have a viable tool on the factory floor within a year. The project's economic impact could be in the millions.

*We try to take printed circuit boards that fail and get them to work again. Trying to troubleshoot one is about the hardest thing to do. It takes a lot of time and a lot of money, and there comes a point when you're spending more just keeping these faulty boards around. We're working on an easier way to troubleshoot through thermal imaging, which gives us a cleaner image and allows us to go in and do some additional processing. This is Scott Acton's area of expertise. He knows the tricks of the trade. He's been a real asset to us. We may have eventually made it to this point without him, but it would have taken us a lot longer. He gives us a way to get to the point we want to be at quicker.*

*Darren Tepe, member of the technical staff at Lucent Technologies in Oklahoma City and OSU graduate*



ACTON

## instructors recognized for going the distance



SCHEETS

Ken Case and George Scheets of the CEAT are among the nation's best instructors, according to nontraditional students employed at top firms around the globe. Last year, they received National Technological University (NTU) Outstanding Instructor Awards.

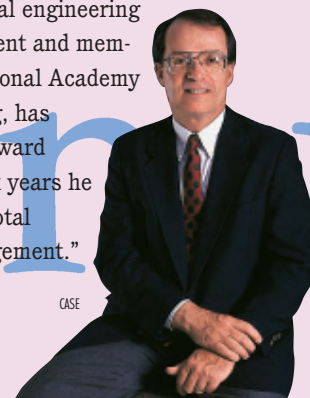
Each year, NTU students rate their instructors through a lengthy evaluation process. Case and Scheets placed in the top 15 out of 309 professors, says Bill Cooper, interim director of distance learning at OSU.

NTU is a consortium of engineering schools at 50 of the nation's leading universities, including OSU. Since the inception of NTU in 1984, more than 1,000 technical professionals from such organizations as IBM, NASA, Hewlett Packard and AT&T have earned advanced engineering and technology management degrees. Programs are broadcast to the workplace via the nation's largest digital telecast network.

Case and Scheets have instructed distance learning courses offered to technical professionals throughout the nation through the NTU network as well as through OSU's compressed-video network.

"Our best faculty are actively involved in teaching adult audiences, and these teachers are an excellent example," Cooper says.

Scheets, professor of electrical and computer engineering, received the award for a fifth consecutive year for his instruction of "Telecommunications Systems" and "Modern Communications Theory." Case, Regents Professor of industrial engineering and management and member of the National Academy of Engineering, has received the award each of the six years he has taught "Total Quality Management."



CASE

telecommunications

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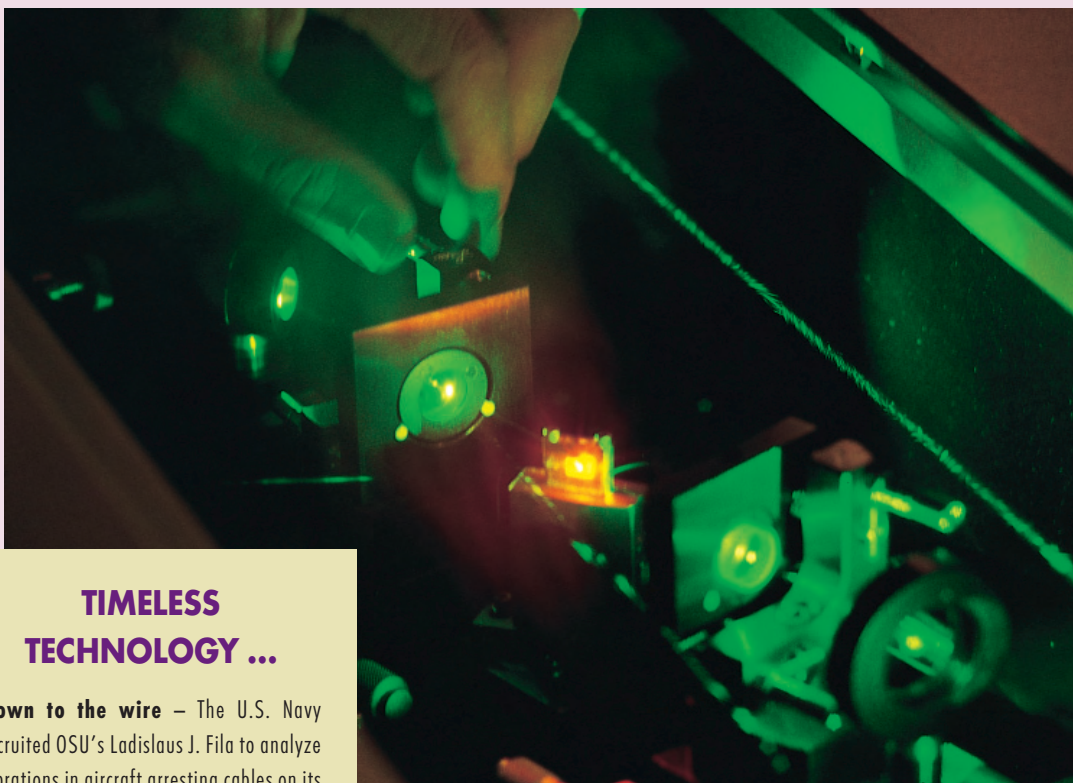
GRISCHKOWSKY

## faster than a speeding bullet

Daniel Grischkowsky, Bellmon Professor of electrical and computer engineering, has developed some of the world's fastest optoelectronic, or laser-driven, circuitry (illustrated below). Grischkowsky, in teaming with researchers at IBM, has demonstrated the possibility to transmit information at enormous data rates approaching one terabit (the amount of memory space required to save an encyclopedia set) per second. In comparison, high performance fiber-optics operate up to five gigabytes per second, a factor of 200 slower.

The researchers are using the technology to explore and develop an interconnect scheme for on-chip communication that supports ultra-dense, ultra-fast digital computing requirements and has capabilities far beyond those of conventional microelectronics.

"The key is that there exists optoelectronic techniques that can provide us today with the waveforms that are representative of what will be required of digital devices 10 to 20 years from now," Grischkowsky says. "This project is not only the foundation for developing ultra-high performance interconnect, but will also lead to new and vital insight into what the characteristics of ideal, ultra-high performance active devices of the future should be."



### TIMELESS TECHNOLOGY ...

**Down to the wire** – The U.S. Navy recruited OSU's Ladislaus J. Fila to analyze vibrations in aircraft arresting cables on its aircraft carriers in 1952. However, the resulting vibration-dampening machines were rendered obsolete by a new system. "... But it was a good experience for us," says mechanical engineer Raymond Chapel, who assisted on the project.

**Listen to this!** – In 1969, Victor W. Bolie of OSU's electrical engineering designed an artificially intelligent electronic ear that converted airborne sounds into the same signal patterns in a computer as those transmitted by the acoustic nerve in humans. Bolie attempted to teach computers to recognize a voice command and react in the proper manner. ▲

## to the nth degree

In response to industry demands, OSU initiated the master of science in telecommunications management (MSTM) degree in 1995. The multi-departmental endeavor, which involves the CEAT and the colleges of Business Administration and Arts and Sciences, has since earned raves from participating students and their employers. To date, MSTM graduates have enjoyed 100 percent placement. In fact, students in the program who come from technical backgrounds such as management information systems, computer science

and engineering often receive job offers before they complete the program.

"Oklahoma companies such as WorldCom and the Williams Companies have been extremely active in hiring graduates, but the program is also drawing out-of-state recruiters, in particular from Cisco, a big networking company on the West Coast, and telecommunications companies in the Dallas area such as Nortel," says George Scheets, a professor of electrical and computer engineering who helped develop the program.

## from sea to shining sea

In an endeavor called Internationalization of Design, students in the School of Biosystems and Agricultural Engineering team with scholars at Wageningen Agricultural University in the Netherlands on senior capstone design projects, and modern communications technologies facilitate their collaboration.

Brian Thomas, an OSU student who worked on one of the projects last school year, says developing a comprehensive report that addresses an engineering problem provided by industry while collaborating across the Atlantic is no simple endeavor.

"We communicated with them every Tuesday over Internet chat lines and held video conferences every couple of months," Thomas says. "We got into FTP sites, and that helped us develop a cohesive final report."

Internationalization of Design is also a student exchange. At the conclusion of the fall semester, WAU students visited the U.S. to meet their counterparts from OSU, and at the end of the spring semester, OSU students traveled to the Netherlands.

# Taking care of business

Who has the biggest, fastest computers around? Most manufacturers hope they do, and the information race is continually on to see who can secure the most efficient hard disk drives to date.

That's why the work of Eduardo Misawa and Gary Young of the School of Mechanical and Aerospace Engineering drew funding from the Oklahoma Center for the Advancement of Science and Technology. The team spent four years developing new control techniques used to store larger amounts of information on hard disk drives. Part of the team's research is proprietary to Seagate Technology. The rest will be public domain.

*Eduardo Misawa and Gary Young worked with our design development engineers at Seagate's Oklahoma City Operations to improve the servo subsystem robustness of one of our hard disk drive models by up to 15 to 20 percent. Specifically, their work will result in faster delivery of our product, greater performance margins and increased customer satisfaction. I think it was a rewarding project for everyone involved.*

*Miran Sedlacek, vice president of design engineering at Seagate Technology's Oklahoma City Operations*



MISAWA and YOUNG, left to right



KOMANDURI

## perfect spheres

Ranga Komanduri, professor and MOST Chair in Intelligent Manufacturing, School of Mechanical and Aerospace Engineering, carefully lifts a lid off of a small cardboard box. He takes a quick look, smiles, and slowly slides the box across the table.

Inside sits the result of Komanduri's multi-million dollar research which has taken six years to reach this point and is still evolving.

These are balls used in advanced bearings and are made out of ceramic, a material far superior to the traditionally-used steel, but a material that is brittle and hard and must be "finished" to within atomic measurements of perfection in order to perform in extreme conditions associated with such machinery as high-speed military aircraft.

It's this finishing process that Komanduri and his graduate students have perfected by using a process known as magnetic field assisted polishing.

"This is probably the best finish on ceramic balls in the whole world," Komanduri says.

Because the technology belongs solely to OSU, the university could profit from manufacturing the balls on a large scale.

The Department of Defense, which funded the research along with the National Science Foundation and, more recently, the Oklahoma Center for the Advancement of Science and Technology, is performing trial tests on the ceramic balls and will have access to the technology without paying royalties.

And there are other possible applications that may come from this "handsome" project.

"Because these balls are pretty, we're talking about using this technique to make artificial gemstones like sapphire, rubies and emeralds," he says.

# enterprise

STORIES THIS PAGE BY ADAM HUFFER AND LISA ZIRIAX

## cutting to the quick



LUCCA

Cutting at one-billionth of a meter is difficult enough to comprehend, let alone attempt. Yet an OSU professor is working to better understand what happens when brittle, semi-conducting materials are cut at nanometric depths.

For Oklahoma companies that produce semiconductors, manufacturing innovations as a result of that knowledge could translate to millions of dollars. A number of firms seek to make high-quality chips for short wavelength, high-intensity light emission for use in green LEDs and lasers. Improvements in semiconductor finishing is necessary before the LEDs and lasers can be developed for use in applications such as data storage, high-definition television and medicine, says Don Lucca, professor of mechanical and aerospace engineering.

With support from the National Science Foundation and the Oklahoma Center for the Advancement of Science and Technology, OSU researchers collaborated with the University of North Carolina at Charlotte and Los Alamos National Laboratories to develop two instruments capable of cutting at nanometric depths. Lucca and his assistants have begun to use them to evaluate analytical models for force and temperature prediction, he says.

"By gaining understanding, then we stand a better chance of designing commercial processes like polishing and diamond turning to achieve the levels of surface roughness needed," he says.



## pet project passes test

Members of OSU's student chapter of the Society of Hispanic Professional Engineers (SHPE) won second place in SHPE's national design competition last spring for creating The Pooch Pass (illustrated above).

The Pooch Pass is an automatic pet door that utilizes a motion detector, a magnetic reader, sensors and a signaler on an animal collar that is no larger than a Rabies vaccination medal. The pass ensures that a pet door will open only for an animal with the correct signal.

"Their device is simple, practical and marketable. It's something many pet owners would use," says Bob Hollrah, coordinator of the CEAT honors and academic programs and chapter adviser.

This is the third consecutive year that the local team made the competition's final cut.

## TIMELESS TECHNOLOGY ...

**Wheels in motion** – In the 1930s, OSU's Gerald A. Hale of mechanical engineering and Holger G. Thuesen of industrial engineering were the driving forces behind the design of the world's first parking meter, unveiled in Oklahoma City in July 1935 and certainly one of the college's most publicized accomplishments to date.

**One of a kind** – Since the 1980s, the world's first and only Web Handling Research Center has been the site of research that translates to less-expensive, higher-quality products such as paper towels, newspapers, books, photographic film and any other product processed in a continuous flexible strip form. Backed by 20 corporate sponsors, the center is directed by Dean Karl Reid. ▲



HENDERSON

## making a firm difference

Less than one year ago, the CEAT and the Division of Agricultural Sciences and Natural Resources teamed with the Oklahoma Alliance for Manufacturing Excellence to develop a network of applications engineers throughout Oklahoma. Since then, small- and medium-sized firms across the state have been able to get the kind of consultation that, until now, only large, urban companies could afford.

According to evaluations by an independent survey, the new program has already created, saved or retained 438 jobs — the bulk of them in rural areas where they are badly needed — and has had a \$33 million-impact on the state's economy.

Jim Henderson (CEAT) and Sam Harp (DASNR) from the Stillwater campus serve as senior applications engineers.

# Above and beyond

Reaching Engineering and Architectural Career Heights (REACH) offers Oklahoma female students a formal exploration of career and educational opportunities in high-tech fields through a variety of activities and contact with female professionals and female CEAT students and faculty. The summer program was created to introduce young women to the traditionally male-dominated areas of engineering, architecture and technology, and is free due to funding from the Oklahoma State Regents for Higher Education, Phillips Petroleum Company, NASA and OSU.

*I signed up for REACH through my high school math teacher. Before I went, I was thinking about a career in engineering because that usually is what's talked about when you like science and math, but I didn't really know what engineering was. During the program, we lived in the dorms for two weeks, and everybody had a roommate, so it gave me a taste of dorm life. Every day they had activities planned for us in all of the disciplines. REACH was really interesting, and it was one of my main reasons for choosing to study industrial engineering. It saved me time because I knew what I wanted to do once I got to OSU, and I also knew people when I got here.*

*Jennifer Talley, industrial engineering sophomore from Deer Creek*



TALLEY

## making it public



HUGHES

Of OSU's more than 40 outreach/continuing education departments, few can boast of sustaining such prolonged success in educating a more culturally and economically diverse audience as OSU's Center For Local Government Technology (CLGT) has for the last 25 years.

The CLGT, an outreach unit of the CEAT, partners with national associations and groups including the Oklahoma Department of Transportation, the Federal Highway Administration, the American Public Works Association and the Bureau of Indian Affairs to deliver technology education and training opportunities to thousands of people each year. Its students include all of Oklahoma's elected county officials and their staff, city and local government officials and tribal governments.

"Most of the things we do are in support of rural Oklahoma," says Mike Hughes, director of the center. "We try to reach every public entity out there and work with them collectively to improve their areas whether county, city and/or school district."

Formed in 1972 with funding from the National Science Foundation, the center's primary endeavors are the County Government Personnel Education and Training Program, the Local Technical Assistance Program, the ODOT Transit Program, the Tribal Technical Assistance Program and Special Programs. The center's activities also include distance learning and direct support of rural economic development.

HICKL

## TIMELESS TECHNOLOGY ...

**Let there be light** – In the 1930s, OSU engineering faculty Edwin Kurtz and Benjamin A. Fisher took a hot topic and turned it into hot research when they studied rural electrification. Their findings helped lead to the modernization of American farms.

**The Jonas Salk of tornado research?** – So dubbed by the *Daily O'Collegian* was OSU engineering professor Herbert L. "Tornado" Jones, inspired by the devastating Woodward tornado of 1947 to study the tricky twisters. By the 1950s, Jones was in charge of a tracking station where he and his staff kept a round-the-clock vigil for the storms. His research led to experiments with technology that pinpointed storms and their paths. ▲

# community

STORIES THIS PAGE BY ADAM HUFFER AND LISA ZIRIAX



Adam Huffer

FORSBERG

## showing lawmakers a thing or two

Students like Anna Forsberg prove that undergraduates should not be underestimated.

This summer, the civil and environmental engineering student had the attention of state lawmakers at the Oklahoma EPSCoR (Experimental Program to Stimulate Competitive Research) Research Day at the Capitol when she was among 30 students from 14 institutions recognized for outstanding research achievements.

The Claremore native was honored for her presentation, "Optimization of Oklahoma's Transportation Network." Her study involved the acquisition of right-of-way properties by the City of Tulsa for road systems expansion.

"I noticed that in road-expansion projects, right-of-way acquisition is a huge part of

project costs, especially in extensively-developed parts of the city," she says.

Forsberg concluded in her study that acquiring land years before it is needed, halting over-development and obtaining public approval of bonds funding early in anticipation of needed expansion can save a city millions of dollars. She conducted the project as an OSU Lew Wentz Scholars Academic Project Award recipient. Wolf Yeigh, professor in the School of Civil and Environmental Engineering, served as her mentor. Forsberg is a three-time winner of the Wentz Award.

She received an Oklahoma State Regents for Higher Education/Oklahoma EPSCoR Undergraduate Research Fellowship Award, the prize given to the top projects at Research Day, to pursue another research topic.

## building a dream

Jim Cooke, fourth-year OSU architecture senior, is designing his "dream home" for the Payne County chapter of Habitat for Humanity, an international organization that provides affordable housing to the working poor.



COOKE

Cooke is a nontraditional student who returned to school a few years ago to pursue his vision of quality lower- and middle-income housing that maintains the integrity of the environment. He has joined forces with the local Habitat organization to help design and develop a piece of property in southeast Stillwater.

When finished, the property will yield four to five modest family dwellings featuring what Cooke hopes will be genuine examples of sustainable design, an architectural ideology in which development maintains the capability of future generations to enjoy the environment while embracing certain structural and aesthetic qualities.

"Sustainable design is not the way we ought to live, it's the way we will live, like it or not. So, there's no time like the present to begin designing for it and working out some of the details," he says.

With the help of fellow architecture student Charles Hickl, Cooke — who is receiving independent study credit for the project — has produced some preliminary schemes (some of which are shown in the photo at right) that include a series of tried-and-true design features which by themselves are rather ordinary but provide a unique package when combined.

"What we're talking about here is a change of consciousness, not a change in technology," says the Shawnee native. "Everything we're doing is relatively low-tech and off the shelf. We're going to have structures that are durable, energy efficient and appropriate to the site with little or no impact on ground water and existing foliage."

Although his design must still meet the approval of the Habitat board and the City of Stillwater, Cooke says he would like to see this unique package of systems become one of Habitat's standard design kits.



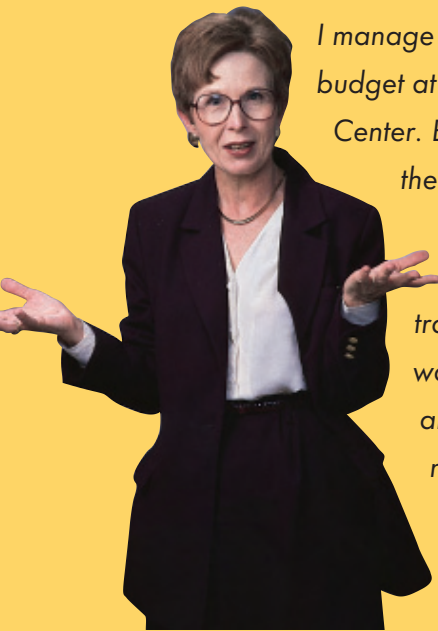
# Handling a healthy demand

To fulfill a rapidly-increasing demand from the health care industry, a health care administration program has been introduced as a degree option under the natural and applied sciences master's program. Michael Branson, professor in the School of Industrial Engineering and Management, coordinates the program, and faculty from seven OSU colleges participate. Based on the master's of business administration, the program features a curriculum related to the management of health care organizations. It is designed to meet the needs of people with clinical or other health-related degrees who hold or will hold administrative/managerial positions in health care settings.

## sweet possibilities

As a replacement for daily insulin shots, scientists have explored the possibility of diabetics hosting artificial pancreases. However, a number of factors are suspected of preventing any artificial pancreas from surviving long.

Chemical engineering professor Randy Lewis believes that nitric oxide, a molecule which controls or affects several biological functions, plays a role in the failure of the artificial pancreas. Through research funded by the National Institutes of Health (NIH), he is working to determine what that role might be.



*I manage an \$18-million budget at Stillwater Medical Center. Before I applied to the health care administration program, I had no business training. My training was all clinical. Now I am a more effective manager in terms of identifying opportunities to control health care costs and providing more*

*user-friendly care to our patients. Every school project I've done has had something to do with my work and has provided improvements for the hospital.*

*Rosa Lee Merz, director of medical imaging and laboratory services at Stillwater Medical Center who is finishing the final phases of the health care administration program*



# health

STORIES THIS PAGE BY ADAM HUFFER AND LISA ZIRIAX



LEWIS

"The cells in the artificial pancreas eventually die," he says. "So, the question is, why are these cells dying? Is nitric oxide responsible for killing them?"

Lewis' research has already shown that nitric oxide is not directly responsible for the cells' death, at least in the short term. Now he is looking into the possibility that nitric oxide depletes the oxygen supply, which then leads to the organ's failure.

When Lewis answers some of these questions about nitric oxide's effect on pancreatic cells, expect excitement from the NIH and biotechnology and biomedical companies hoping to develop artificial pancreases.

## automated anesthetics



WHITELEY

Today, there exists no automated method of delivering anesthetics to patients during surgery or long-term, critical care, but two OSU professors have completed the groundwork for such a system.

Robert Whiteley, associate professor of chemical engineering, and Ron Mandsager, associate professor of veterinary medicine, have demonstrated the viability of artificial intelligence in monitoring depth of anesthesia in a clinical setting. Using Fuzzy Logic, an advanced information processing technology, they showed that a computer could potentially match anesthesia assessments made by a trained anesthesiologist.

The study is in an embryonic stage, and additional studies are necessary, but the professors are confident that others can build on their research.

"You can't control something until you measure it. We've now completed the first step," Whiteley says.

## playing it safe

OSU's fire protection and safety technology program isn't about fire alone. Just ask Andy McPherson.

A senior in the degree program, McPherson is helping keep one Stillwater company and its 1,000 employees safe through an internship he began serving last year.



McPHERSON

He assists MerCruiser's Environmental Health and Safety Department by doing such tasks as conducting regular training classes, investigating accidents, reviewing and updating mandated safety programs, and maintaining a database and filing system in which he tracks about 1,500 products for the hazard communication program.

"Andy does a great job as an intern for MerCruiser and will someday make a great full-time employee for someone," says MerCruiser safety engineer Walt Irwin, who is McPherson's supervisor. "The preparation that Andy has gained from both OSU and past experiences definitely shows."



### TIMELESS TECHNOLOGY ...

**Going with the flow** – Biomedical researcher Robert A. Wills of OSU's chemical engineering designed an artificial blood vessel to replace damaged or diseased vessels in the early 1980s.

**A future of support** – Atmaram H. Soni of mechanical engineering, an expert in spinal support rods, researched irregular curvature of the spine in the 1980s at OSU. In addition to devising a mathematical model which helped others translate instructions for workers lifting heavy objects, he also worked with medical doctors at the University of Oklahoma Health Sciences Center on the design of an artificial knee. ▲



fire protection

BRUNACINI

## chief of hearts

Alan Brunacini has long preached a kind-hearted approach to firefighting to the 1,400 men and women he commands as chief of the Phoenix Fire Department. Countless departments nationwide have also adopted his methods.

For his 20-year career as one of the nation's most respected fire chiefs, "Governing Magazine" named the CEAT graduate one of its 10 Public Officials of the Year in December 1997.

Brunacini's guiding principles are: "Prevent harm. Survive. Be nice." As a result, standard departmental procedure includes sending a van to fires where a counselor, phone service, refreshments, a place to sit and a solid shoulder to cry on are provided, according to the magazine.

"He is probably regarded as the most progressive fire chief in the nation," says Doug Forsman, director of OSU's Fire Protection Publications.

# Studentdigest

## Scholar Recalls Mr. Allen, D.C.

BY KENNETH FULLWOOD

**D**uring my first year in the Phillips Engineering Scholars program, I had the opportunity to do more things than most students do during their entire college career. Many of these activities made a lifelong impression on me.

Meeting Phillips CEO Wayne Allen is one of them. I was nervous when the Phillips Scholars went to the corporate headquarters in Bartlesville to meet him, but then he introduced himself and began talking with us about his experiences at Phillips.

Hearing him describe how he made a mistake as a young employee and thought he was going to get fired helped me relax. I realized that Allen has worked hard to get where he is today and that with God's help and with determination, I can do the same.

Later, I had the opportunity to participate in the Slinky Scientific Shindig academic workshops. As a part of National Engineers Week, I spoke to science and math students at Del City High School about the engineering principles of a slinky and about the road to becoming an engineer. I enjoyed showing them that engineering is a fun and rewarding field. Participating in these workshops gave me the chance to inspire other students to

become engineers through dedication and hard work.

When the school year ended, the activities with the Phillips Scholars program still continued. In May, the Phillips Scholars and several other engineering students traveled to Washington, D.C., for 11 days to learn more about our country's history and our nation's leaders.

I remember how exciting it was to stand on the steps of the Lincoln Memorial where Dr. Martin Luther King Jr. gave his famous "I Have a Dream" speech and to see the U.S. Constitution and the Bill of Rights. The trip gave me the chance to form great friendships with other engineering students outside of the classroom.

I will always remember my first year with the Phillips Scholars program. Phillips Petroleum's commitment to ensuring the academic and professional success of OSU students is a blessing. This program is truly dedicated to developing young people into great students and terrific engineers. ▲

*Kenneth Fullwood, mechanical engineering junior from Oklahoma City, is a member of the first class of Phillips Scholars. Through a gift from Phillips Petroleum, the academic enrichment program — which features a variety of benefits — was established at OSU last year to help recruit and retain talented students who might not otherwise attend college in Oklahoma.*

## Managing a Regional Win

Since the inception three years ago of a construction management contest for the Region V Associated Schools of Construction, students representing the Division of Engineering Technology have competed well against peers from much larger programs. This year, in a new event called the design/build competition, an OSU team toppled the opposition.

The team — Robb James, Kenneth Mowery, Justin Poe, John Priest, Eric VanGilder and Darren Woodard — was asked to evaluate an actual apartment complex renovation and present a proposal for the project. The team designed the renovation, prepared an estimate and proposed a contract.

The students earned a \$1,000 prize from the competition's sponsor, Cadence-McShane Inc., for their first-place finish. Poe and VanGilder received individual presentation awards as did Jason Nunley, a member of the OSU team participating in the construction management portion of the competition.

Mark Pruitt and Dana Hobson, associate professors of construction management, served as academic advisers to the teams. ▲

ADAM HUFFER

Wayne Allen, left, and Kenneth Fullwood, right





# Several Soak up National Awards, Local Recognition

**Thomas Hall**, mechanical and aerospace engineering graduate, pre-med option — 1998 Outstanding Male Graduate as selected by OSU Alumni Association — first CEAT student to receive the honor.



Hall

**Rashad Moore**, senior in the School of Electrical and Computer Engineering — 1998 National Member of the Year of the National Society of Black Engineers — selected out of six finalists representing each of NSBE's national regions — served on NSBE's national executive board as telecommunications chair.



Moore

**Carly Washmon**, senior in the School of Biosystems and Agricultural Engineering — 1998 national president of the American Society of Agricultural Engineers' student chapter, the National Community of Pre-professionals — first female elected to the position.

**Paul De La Cerda**, senior in the School of Civil and Environmental Engineering — winner of the 1998 Hispanic Engineer National Achievement Award for Student Leadership, undergraduate level — acknowledged for service as a role model in technology pursuits.

**Stephanie Lyons**, senior in the School of Industrial Engineering and Management — recipient of the 1998 Richard P. Covert Scholarship presented by the Healthcare Information and Management Systems

Society (HIMSS) — second OSU student to receive the national award this decade.

**Richard Bruce, Brian Callihan and Sean Hockersmith**, seniors in the School of Chemical Engineering — claimed the team title at the American Institute of Chemical Engineers' 1998 National Student Design Competition — second OSU team to win the contest in its four-year history.

**Mike Waltner, Travis Hager and Andrew Shannon**, fifth-year seniors in the School of Architecture — First Place in the Chicago Housing Professional Design Competition — contest involved design of affordable housing and included entries from students and professionals nationwide. ▲

Adam Huffer



*This summer, OSU's Concrete Canoe team placed sixth out of 21 teams at the American Society of Civil Engineers (ASCE)/Master Builders Inc. National Concrete Canoe Competition in Rapid City, S.D. It's the highest finish ever by the local ASCE chapter.*

*OSU participation in the competition is supported by Conoco, Brawley Engineering, the Oklahoma chapter of the ASCE and American Concrete Institute offices of Oklahoma City and Tulsa. Pictured are Brittney Beesley (front) and Sara Markes, women's sprint team members from the 1998 OSU Concrete Canoe Team.*

## Architecture Does it Again ... and Again

Students from the OSU School of Architecture captured three of six awards presented in the 1997 Emily Munson Memorial Student Design Awards Competition.

Anthony W. Layne, a third-year student at OSU, won the competition and accepted the first-place cash award of \$2,000. Todd Brown and Tasha M. Settles, also third-year students, received two of three honorable mentions.

The students entered week-long projects from their third-year design

studio. As instructed by studio critics — OSU Professors Bob Wright, John Bryant and John Womack — the students designed resort facilities using guidelines provided by the fictitious SARA'N Corp.

Also, Brian Nichols, architecture graduate student, recently returned from San Francisco where he picked up a third-place award in the Leading Edge Student Design competition.

The contest entailed planning an actual future housing develop-

ment on 25 acres of rocky desert hills outside Lake Elsinore, Calif. The experience gave Nichols exposure to prominent firms and

OSU architecture students have won or placed in more than 125 national and international design competitions in the last 15 years.

a great launching pad for his thesis project on efficient housing. His design is being displayed in various California cities. ▲

# 1997 CEAT Hall of Fame Inductees

## Share Stories of School, Success

A degree in mechanical engineering from OSU was not what **H.E. "Ed" Cobb Jr.** had planned after World War II. Instead, he had aspirations of studying petroleum engineering in Norman, but a lack of housing there sent him to Stillwater. Soon, all talk of the other school faded, and Cobb stayed at OSU until he graduated in 1949.



Cobb

After working for Deep Rock Oil Corp. and serving aboard the U.S.S. Trathen in the Korean conflict, Cobb – with the support of his late wife, Louise, and three children – made the most important decision of his life by venturing out on his own to become a consulting petroleum engineer.

Eventually, the Toklan Oil and Gas Corp. emerged from Cobb's hard work.

Today, son Patrick is CEO of the company, and son Victor is a petroleum engineer. Cobb enjoys devoting more time to his church, community and family – which includes seven grandchildren. He recently chaired the \$5 million capital funds campaign for the new Oklahoma Methodist Manor health center, and he remains closely involved with OSU.

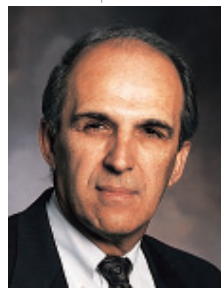
Recalling the milestones of his life, Cobb realizes that heeding the advice of his father to "take advantage of every opportunity to get as much education as possible" influenced his life in ways he never could have imagined.

In 1991, **Donald L. Wickens** became the third chairman and CEO of the Benham Companies – a 90-year-old engineering and construction business which has experienced threefold revenue growth with him at its helm.

Between 1979 and 1989, he sacrificed much of his personal life to travel weekly to Houston and St. Louis to establish new offices for the company. His travels now take him to Moscow, Tokyo and Mexico City where he has been instrumental in establishing international offices.

His attraction to the study of architectural engineering stemmed from his love of arts and sciences, so he chose a career field that blended the two. Later, he returned to OSU for a master's degree in civil engineering, which he earned in 1962.

From his involvement with designs for food and beverage



Wickens

processing systems, he knows about making items such as pretzels, potato chips, dairy products, crackers, and beer. These experiences also taught him about making cans and lids, distributing food, warehousing, and even getting bananas

from trees to the marketplace.

When not working, Wickens loves to fly fixed-wing aircraft and helicopters. Sometimes, he makes lunch hour exciting for Benham employees by taking them for a helicopter ride.

Wickens and his wife, Sylvia, have two daughters and four grandchildren. ▲

# Hershey Awarded Lohmann Medal

**John E. Hershey**, senior member of the technical staff at the General Electric Corporate Research and Development Center in Schenectady, N.Y., was recently named the eighth recipient of the Melvin R. Lohmann Medal.



Hershey

The medal is awarded each year to an alum of the CEAT who has made outstanding contributions to his or her profession and/or contributions to the education of engineers, architects or technologists.

Hershey earned his Ph.D. in electrical engineering from OSU in 1981 under the tutelage of professor Rao Yarlagadda. He also holds degrees from the Massachusetts Institute of Technology, the University of Arizona and George Washington University.

For GE, and previously the Institute for Telecommunications Sciences and the Central Intelligence Agency, Hershey's creative activities have been the development and analysis of data handling methods. He is the inventor or co-inventor on 32 U.S. patents and has filed for 18 others.

His most challenging and intriguing projects have included devising a synchronization methodology for a foreign satellite system and devising an unusual covert communications system.

He is the author or co-author of 44 journal articles, 23 conference papers and four books and has served as an adjunct professor.

The father of three and grandfather of two, and his wife, Anna, live near Albany, N.Y. ▲

VONDA EVANS

ADAM HUFFER

# CEAT *people*



The irrepresible David Pratt, associate professor of industrial engineering and management



James Davis, manager of the MAE North Lab, rests easy now that every chuck key is accounted for.

*Many people offer unique, individual talents in bringing to life the dreams of our students. The members of the CEAT family shown here have done so for many years, and their continuing efforts ensure that new students benefit as much from the OSU experience as you do.*

DEAN KARL REID



The always-distinguished Charles Rich, professor and head of construction management technology



Associate Professor Steven O'Hara and AIA Professor Alan Brunken represent two generations of faculty from the School of Architecture.



"The First Impressions," Diane Caneday, Bob Hollrah and Virgil Nichols from Student Academic Services



Ramona Wheatley has a smile for any civil and environmental engineering student she meets.



"Our students are the few, the proud, the elite," says Marge Johnston of biosystems and agricultural engineering scholars.



A favorite of alumni for more than 30 years and now the children of alumni currently in college, professor of mechanical and aerospace engineering Richard Lowery

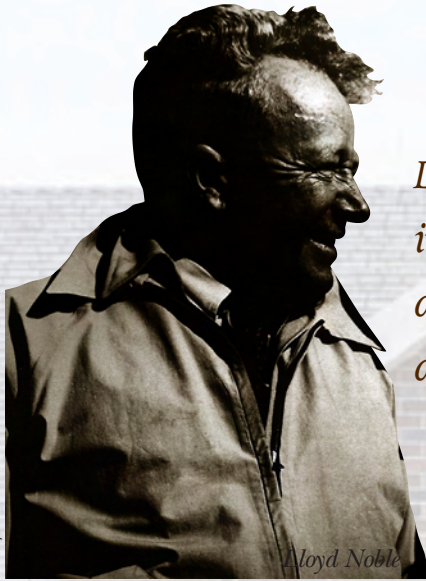


Charles Baker, Pat Swart, A.J. Johannes and Rob Robinson know who really calls the shots in the School of Chemical Engineering.



Rea Maltsberger, Keith Teague and Bennett Basore, stalwarts in the School of Electrical and Computer Engineering

# Window of Opportunity



courtesy Noble Foundation

*Do all the good you can, by all the means you can,  
in all the ways you can, in all the places you can,  
at all the times you can, to all the people you can,  
as long as ever you can.*

MRS. SAM NOBLE TO HER SON, LLOYD

**That is the motto on which Lloyd Noble shaped The Samuel Roberts Noble Foundation  
in honor of his father, whom he called "the most charitable man I ever knew."**

Today, the Noble Foundation is a leader in research in many fields and a major benefactor for Oklahoma State University. The Noble Foundation has opened the window of opportunity many times for OSU, most recently with a \$2 million challenge grant to be used for scientific laboratory equipment for the Advanced Technology Research Center (ATRC). The ATRC provides world-class laboratory facilities in the areas of manufacturing, materials processing, hazardous and industrial waste management, energy storage and conservation, and laser applications in industry and medicine.

*Lloyd Noble — bringing dreams to life — nearly 50 years after his death.*

For more information about the "Bringing Dreams to Life" campaign, contact Marc Thompson, director of development, at (405) 744-3734.

