University of Houston Cullen College of Engineering

[ParamETErs]

Fall 2003

Dean's Message

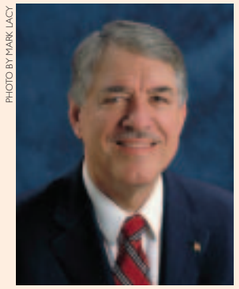

PHOTO BY MARK LACY

As I write this message, our college is experiencing mandated state budget cuts and a "tightening of the belt." But even in these difficult financial times, there is a sense of excitement for our programs. First, we're all excited about the recent hire of our new University of Houston Chancellor and President, Dr. Jay Gogue. We are confident of attaining new heights at the University, and your College of Engineering will strive to be the leader in making this possible.

Adding to our excitement are the significant strides we are making in our educational, research and outreach programs. One of the keys to our success has been our research effort, which is approaching an all-time high. Our faculty have attained an unprecedented 68-percent increase in grants and contracts between fiscal year 2002 and 2004—a notable accomplishment for our faculty and a major step toward the Tier One goal.

In addition, we are working very closely with several regional entities to establish the Houston InfoCom Technology Center, which will enhance the communications and first-response capabilities across the greater Houston region for homeland security, emergencies, flooding and other crises. I'll report more on this later as the program develops.

Meanwhile, our outreach educational activities have also increased significantly. A new five-year, $1.5 million National Science Foundation (NSF) grant represents the latest step in our efforts to enhance our engineering curriculum and increase the pool of prospective students. On a national average, only two out of every 100 high school graduates go on to complete a college engineering degree. Through this new initiative, we are increasing our efforts to address the problem locally. With an additional $435,000 NSF grant, we will also develop a program for high school teachers to broaden their knowledge of research and engineering. This program, the Research Experiences for Greater Houston High School Science and Math Teachers (RET), will be launched next summer.

In partnership with area high schools, we have joined the Infinity Project, a national award-winning program to foster increased interest in engineering at the high school level. Infinity—a challenging, interactive computer-based course—was created to help high school students see the real value of math and science in preparing for an engineering degree. Now expanded to 13 states, UH will be the primary provider in the greater Houston area. Our team of faculty and high school teachers is currently developing our program for Houston. Key to our success (and our profession's future success) will be our ability to excite students about engineering as a field of study and career. So far, 250,000 students have been reached nationwide. Our local involvement will bring the program to Houston.

Finally, as this issue of *Parameters* demonstrates, the UH Cullen College of Engineering is a major player in the realm of environmental engineering. In the future, we expect not only our environmental research but also our energy-related environmental research and our clean energy research to expand significantly to meet the future needs of Houston and the region.

In short, even in the face of budget constraints, we continue to move forward, consistent with our Tier One objectives. Confidence is high for the days ahead!

Sincerely,

Raymond W. Flumerfelt, *Dean*
Elizabeth D. Rockwell Endowed Chair

pa·ram·e·ter

Pronunciation: pə-'ram-ə-tər
Function: noun
Etymology: New Latin, from para- + Greek metron measure
Date: 1656

1: a. an arbitrary constant whose value characterizes a member of a system (as a family of curves); also: a quantity (as a mean or variance) that describes a statistical population
b. an independent variable used to express the coordinates of a variable point and functions of them—compare PARAMETRIC EQUATION
2: any of a set of physical properties whose values determine the characteristics or behavior of something
<parameters of the atmosphere such as temperature, pressure and density>
3: something represented by a parameter: a characteristic element; broadly: CHARACTERISTIC, ELEMENT, FACTOR
<political dissent as a parameter of modern life>
4: LIMIT, BOUNDARY—usually used in plural
<the parameters of science fiction>

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Director
Angie Shortt

Editor
Brian Allen

Graphic Designer
Harriet Yim

Photographer
Jeff Shaw

Contributing Editor
Kristyn Fuller

Contributing Writers
Tara Mullee
Amanda Strassner

Contributing Photographers
Phil Busby
Jonathan Cobb
Mark Lacy
Kaye Marvins
Thomas Shea

Contact us:
Office of Communications
Cullen College of Engineering
University of Houston
E316 Engineering Bldg 2
Houston, Texas 77204-4009
Phone 713.743.4220
Fax 713.743.4231
E-mail parameters@egr.uh.edu
www.egr.uh.edu

Engineering the Environment
The UH Cullen College of Engineering has a rich tradition of accomplishment in environmental engineering, especially in the realm of drinking water purification, as our cover art illustrates. National Academy of Engineering member Jim Symons led UH faculty into the spotlight in the 1980s. Today the college is a leader in designing improvements in drinking water filtration, groundwater protection, soil contaminant remediation and air pollution.

Plans to begin a new Biomedical Engineering Program at the University of Houston cleared one last administrative hurdle this summer when the Texas Coordinating Board granted its approval for a new undergraduate program in the field. The program was launched this semester at the UH Cullen College of Engineering.

New BIOMEDICAL ENGINEERING PROGRAM Launched at UH

"This new program is a significant step forward for our university and our neighboring institutions in the Texas Medical Center," says Raymond Flumerfelt, dean of the Cullen College of Engineering. "The enhanced research efforts will ultimately lead to clinical improvements and reduced costs for our nation's health care industry."

The college already has a successful master's program in biomedical engineering. The new undergraduate program provides UH with an opportunity to build on current ties to the Texas Medical Center and enhance research and internship opportunities for its graduates and students, Flumerfelt says.

The introduction of an undergraduate degree program in biomedical engineering also enhances UH's efforts in establishing a greater multidisciplinary environment, says Art Vailas, UH vice chancellor and president for research. "Bioengineering typically offers greater collaboration across colleges and builds institutional partnerships with other universities, government and industry," he says. "This program builds upon UH's strengths associated with material science, biological and behavioral sciences, and computational science."

The curriculum, which will include several new courses, strikes a careful balance between the study of life sciences and engineering sciences, creating a new path to graduate level education in a broad range of fields, says Matthew Franchek, director of the new program and chair of the Department of Mechanical Engineering. Because UH is located near the world's biggest medical district, the Texas Medical Center, opportunities for collaborations and partnerships will increase in the future, Franchek says.

"Biomedical Engineering is a technical path, somewhat like pre-med, but it leads to a much broader range of things," Franchek says. "Our students might go on to graduate school, medical school or law school. The possibilities are extremely broad, and especially so because of the balanced way we've structured our program. That's what makes us unique."

The program, which will be housed and administered in the Department of Mechanical Engineering, is already generating excitement and interest among students and faculty at UH, says Franchek.

"This program is so amazing," he says. "It's a tribute to the commitment of the faculty for advancing this knowledge base, this application area. If we don't have collaborative, sharing responsibility and partnership, if we don't all see how the good impacts us as a college, as a university, we could never build this program."

The program will focus on biosensing and bioanalytics, two areas that show promise for delivering new technologies to improve clinical care and dramatically reduce health care expenses, Franchek says. Finding ways to detect, predict and prevent illnesses, especially expensive catastrophic illnesses such as heart attack and stroke, will become increasingly valuable as health care costs continue to mushroom.

Americans spent $1.4 trillion on health care in 2001, which translates into 14.1 percent of the gross domestic product.

"We are hitting the national agenda where we should be," Franchek says.

The future of biosensing and diagnostic devices is, and will continue to be, an emerging technological field with long-term potential, both in the medical field and homeland security.

From the biochemical perspective, the human body makes thousands of proteins that govern everything from our moods to how well we digest milk. Unraveling those details and developing the necessary technology to monitor the levels of those proteins will enable greater accuracy in deploying the right medications to the right locations in the body—something Franchek calls "targeted medicine deliver."

In addition, with its focus on biosensing and bioanalytics, the curriculum also does something very few bioengineering programs do well: It prepares bioengineering undergraduates to enter existing job markets with only a bachelor's degree in bioengineering.

"Biosensing technologies already exist and are being used more and more everyday," says Adam Capitano, assistant professor of chemical engineering and a member of the curriculum committee. "That means corresponding job opportunities are available for our graduates who want or need to enter the job market immediately, without obtaining any advanced degrees. What happens to the fate of our undergraduates is very important to us."

The program opened to students in Fall 2003, and enrollment is limited to an elite group of students, which Franchek expects to grow from less than 20 students in the first year to 165 students within five years. The college will be applying for a Ph.D. program in biomedical engineering this fall.

For more information on the new program, contact Charlotte Palm at 713-743-4502 or visit www.egr.uh.edu/bioe/.

Matthew Franchek, director of the new Biomedical Engineering Program and chair of the Department of Mechanical Engineering.

National Science Foundation Funds Outreach Education Programs at UH

The University of Houston Cullen College of Engineering has received a $1.5 million grant from the National Science Foundation (NSF) to retain and recruit students. The grant, which begins in December 2003, is a part of the foundation's efforts to boost national graduation rates in the areas of science, technology, engineering and mathematics.

The grant will fund "STEP—AHEAD: Access to Higher Education through Academic Retention and Development at UH," which will spawn an assortment of programs featuring highly interactive and collaborative learning methods. The grant builds upon previous success within the Department of Electrical and Computer Engineering (ECE), which laid the groundwork with its Redshirt Camps and workshops that encourage students to teach each other while instructors facilitate the learning process. In addition, 'GRADE' Camp (Girls Reaching and Demonstrating Excellence in Engineering), which garnered much popularity with its summer 2003 attendees, teachers and parents, will continue to introduce high school females to the excitement of engineering.

Another proposal that also received funding from NSF, the Research Experience for Greater Houston Science and Math Teachers (RET), is a $435,000 summer research program designed to infuse 12 bright teachers with enthusiasm toward research that is subsequently shared with their respective high school classes during the school year. Participants will make important contributions to the department's ongoing research efforts.

Stuart Long, associate dean for educational activities and professor, is the principal investigator for the STEP project; Fritz Claydon, chair and professor of ECE, is principal investigator for the RET project. Long and Claydon—along with Program Director Jenny Ruchhoeft, who manages both programs—are working with a number of faculty members in the college to fully implement these newly funded programs.

For more information, visit www.egr.uh.edu/news/0903/?e=nsf.

Houston area high school students, Toni Smith and Linda Fox, learned to design, build and program a Lego Robot to autonomously maneuver through a maze during 'GRADE' Camp (Girls Reaching and Demonstrating Excellence in Engineering) in June. A total of 44 high school girls encountered electrical engineering at two camps last summer. The first week's participants are pictured below.

PHOTOS BY JONATHAN COBB

Engineering Alumni To Raise Money For Pavilion

A new partnership of 17 former presidents of the Engineering Alumni Association are raising $15,000 to build a pavilion on the Cullen College of Engineering's designated slab of concrete outside the Northwest entrance of Robertson Stadium.

"Right now it is just a concrete slab where the Engineering Alumni and friends congregate," says Tom Sofka (1975 BSCE). "We need to go the next step and erect a pavilion."

Groups and colleges who have already been successful in building pavilions have drawn funds from their alumni groups. The simple structures are generally open on the sides, but protect groups from excessive amounts of sun or rain that might blow through on game days.

A recognition plaque inside the pavilion will recognize any donation of $100 or more. For more information or to participate, contact Tom Sofka at 713-827-7273 or visit the Pavilion Fund Project website at www.macroenterprises.com/pavilion/.

First Jacket Investiture for Engineering Leadership and Entrepreneurism Program

The Engineering Leadership and Entrepreneurism Program (ELEP), launched in the UH Cullen College of Engineering in Spring 2003, recently held its first Induction Ceremony and Jacket Investiture for students.

David Cabello, senior partner of an intellectual property law firm that he helped establish and former senior vice president, general counsel and secretary for Compaq, addressed students at the ceremony. Cabello described how engineering graduates could be successful in the business world and their responsibilities as future leaders.

ELEP is one of only a handful of its kind in the country, and represents a recent trend toward incorporating business concepts into engineering programs. The program prepares engineering graduates to be more successful when assuming leadership roles in their companies and facing real-world business challenges. With the second program beginning in Fall 2003, there are now 46 students enrolled in the program.

An essential component of the program is the Mentor/Student Pairing, which matches an industry leader with a student. Current mentors include Bill Addington, Durga Agrawal (1969 MSIE, 1974 PhD IE), Brij Agrawal (1988 BSME), Charles Beyer (1972 BSCE, 1977 MCE), Rick Bowen, Terry Cheng (1970 BSEE, 1972 MSEE), Ty Eckley, William Fendley (1971 BSCE), Carlos Garcia (1997 BSChE), Ron Harrell, Robert Hawkins, Chuck Hendee, Rick Holdren, Kevin Hunt, Alok Jain, Larry Keast, Michael Lacy (1985 BSCE), Melvin Lesiker, Janet Peters, John Pothanikat (2001 BSChE), Allen Rhodes, Bill Rogers, Ashok Shah, Ravi Singhania and Dan Watkins.

For more information, visit www.egr.uh.edu/elep/.

Top: Engineering Leadership and Entrepreneurism Program instructors Hamid Parsaei, Bill Sherrill and Donald Engelstad (far right) with Dean Raymond Flumerfelt and special guest David Cabello at the first Induction Ceremony and Jacket Investiture on Sept. 30.

Bottom: The first students in the Engineering Leadership and Entrepreneurism Program include (front row) Nadia Aftab, Hieu Cao, Oyindamola Johnson, Jimena Santalla, Mary Saulog, Adriana Murillo, Jonathan Richards and On-Na Yeung; (back row) Joel Roberts, Mazen Baltagi, Leonard Chandra, Dirk Calderon, Torrey Leger, Sunil Chacko, Rocco De Grazia, Kevin Helm, Daniel Lizmi, Joel Severson, Keith Moreno, David Warne and Bret Thompson. Not pictured: Michael Fatayergi, Edward Jones, Niraj Patel and Marcha Thomas-Blades.

New Engineering Career Center Offers Employment Resources to Engineering Students

Valery Potakh, sophomore mechanical engineering student, discusses internship possibilities with Jason Berrio (2000 BSME) of South Texas Project Nuclear Operating Co. at UH Chapter of the National Society of Black Engineers' 28th Annual Career Fair Sept. 25.

The UH Cullen College of Engineering recently launched the Engineering Career Center, which will offer assistance, advice and job leads for engineering students, says Director Vita Como. "Opportunities for our students to begin building work experience are going unfulfilled, and it's our job to help them seize those opportunities and begin developing their careers before graduation."

The center provides full-time, intern and co-op employment information, job listings, assistance with resumes, interview scheduling and interview training. As the center expands its services over the next few months, it will provide a web-based interface for students and employers. For more information on the center, contact Vita Como at 713-743-4216 or vcomo@uh.edu.

Engineering a Better Environment

Features By Brian Allen | Photos by Jeff Shaw

Is cleaning up the environment a big job?

The Environmental Protection Agency alone has an annual budget of $7.6 billion. Private industry also spends billions addressing environmental problems and preventing further damage to the environment.

Cleaning up the environment is a massive undertaking, and engineers at the University of Houston are playing a crucial role in the nation's effort to get the job done efficiently and effectively. UH innovations are driving change in the way industry and government will protect the environment in the years to come. UH technologies are opening the door to better, more affordable methods of treating and cleaning contaminated soil and water. And more breakthroughs are in the pipeline.

Today, the UH Cullen College of Engineering is doing work across a multitude of environmental areas. The Department of Civil and Environmental Engineering is conducting groundbreaking research in water purification and filtration for drinking water, groundwater protection, soil contaminant remediation, and advanced air and water monitoring systems. The Department of Chemical Engineering is also heavily involved with environmental research, including clean air initiatives to address nitrogen oxides, ozone, smog and industrial hydrocarbon emissions.

In the realm of environmental engineering, the college has a rich tradition of leadership and accomplishment. That tradition was built in large part on the efforts of Cullen Distinguished Professor Emeritus Jim Symons, who served as Chairman of the Department of Civil Engineering and Director of Environmental Engineering during the mid eighties. A member of the National Academy of Engineering, Symons is author of the popular book, "Plain Talk About Drinking Water," which is now in its fourth edition and has sold more than 122,000 copies. His research has led to major improvements in drinking water quality worldwide.

Inventing efficient, affordable ways to solve the worst environmental problems is an immense and complicated challenge. UH engineers are not only working on the problem, they are delivering the kind of innovations needed to prevail.

Air Quality in Houston

UH Engineers Set Sights on Improving

Reducing the nation's energy consumption while simultaneously improving urban air quality is a tall order. One possible solution that University of Houston engineers are working on is diesel fuel emissions technology for cars, trucks and other mobile vehicles.

Diesel fuel burns much more efficiently than gasoline, so the development of effective diesel emissions technology offers great promise for reducing energy consumption. In theory, if more vehicles used diesel fuel, the drop in energy consumption would be dramatic and the production of carbon dioxide—which is often associated with global warming—would plunge.

The main problem with diesel engines is they emit chemicals that can lead to the formation of smog, and smog is serious business in most urban areas, including Houston. Houston and the surrounding eight-county region must not only reverse current exceedances, it must prepare to meet more stringent air quality standards expected from the Environmental Protection Agency in 2007. If the area fails to comply, it stands to lose $1 billion annually in federal funding for highway and transit projects, and sanctions that could substantially impair economic growth.

As part of its ongoing diligent efforts to meet the challenge, the City of Houston awarded a $3.8 million contract to the University of Houston Cullen College of Engineering last year to test new technologies that may reduce emissions from the city's fleet of 2,800 diesel-powered vehicles.

The focus of the five-year project, headed by the Department of Chemical Engineering, is to conduct diesel emission research, technology development, testing and data analysis. Capital and in-kind contributions from the university will bring the total project value to $4.6 million.

Michael Harold and Mickey Rooks with Steve Dornak, Senior Staff Analyst, Mayor's Office of Environmental Policy; John Shelander, Division Manager, Public Works Fleet Services; Victor Ayres, Coordinator of Select Air Quality Initiatives, Mayor's Office of Environmental Policy. The photo was taken at the city's Renwick facility where they do work on city vehicles. These vehicles will soon be tested in the new diesel emissions facility.

Emerging technologies offer promising possibilities for reducing the polluting emissions found in diesel engine exhaust, according to Michael Harold, professor and chair of the Department of Chemical Engineering and the principal investigator on the air quality project. "It will be UH's task to systematically evaluate the effectiveness of these technologies, especially in reducing nitrogen oxides."

Nitrogen oxides, or NOx, are precursor chemicals that react in the atmosphere to form ozone, a key component of smog. Common sources of NOx include cars, trucks, marine vessels, power generation and industrial processes.

In general terms, air quality in the United Sates has been improving steadily over the last 20 years, Harold says, but during this period our air quality standards have become more stringent, and public expectations for cleaner air have gone up accordingly. On the other hand, people still need to take the ozone exceedance days seriously. "Those with asthma and other respiratory problems can really be affected," he says. "Ozone is definitely a bad player and can cause lung damage and exasperate breathing difficulties."

Although most heavy-duty trucks are diesel-powered, less than one in a hundred passenger vehicles in the United States is operated on diesel fuel. That combination creates a significant part of the ozone problem, says Harold. "Data from the Texas Commission for Environmental Quality (TCEQ) shows that non-gasoline powered vehicles contribute about 25 percent of the NOx emissions in the greater Houston area. So it's pretty clear that diesel vehicles and mobile equipment, while being far fewer in number, contribute a disproportionate share of the NOx."

UH engineers will help the city determine what technologies to acquire and how to retrofit its fleet to reduce NOx emissions. "But even when that is accomplished," Harold says, "they're going to have to continually monitor the emissions from their vehicles. And this facility will certainly provide that for them."

The facility will house a testing laboratory located at the University Business Park, a Schlumberger-owned property, where an existing structure will be retrofitted. "The location is convenient for university researchers and City of Houston employees, and there is room for expansion," Harold says.

UH is already a major tenant at the property. The design phase for the new laboratory has been completed and construction has begun. The facility is expected to be up and running by early 2004, Harold says.

The new laboratory will feature a 500-horsepower alternating current chassis dynamometer, which will enable testing of heavy-duty diesel vehicles, such as garbage trucks or dump trucks. A sophisticated analytical system will monitor the exhaust in a real-time, continuous mode. As the speed of the vehicle is altered up and down, the system will track the emissions—including NOx, hydrocarbons, carbon monoxide and particulates.

Adjunct Chemical Engineering Professor Charles Rooks, the director of the facility, says UH engineers have an opportunity to play a unique and much-needed role for the city as it grapples with how to improve air quality: "The City of Houston will pay us not only to run the facility but to provide them with advice about what actions to take and which devices to purchase. The word we use for our role is 'honest broker' because we have no vested interest in any of those emissions control devices."

The city is truly out ahead of everyone in the state in its effort to curb the NOx emission problem, according to Rooks. "The city's contribution to the NOx problem is approximately one half of one percent," he says, "and yet they are out here leading the cause. I think the reason they're out here leading is they are trying to set an example for industry and other municipalities."

UH Chemical Engineering Professor Vemuri Balakotaiah will be heavily involved in the research effort at the new laboratory. Key contacts for the City of Houston include Jon Vanden Bosch, Director, Public Works; Dr. Pamela Berger, Director, Mayor's Office of Environmental Policy; Carl Bowker, Assistant Director, Public Works; John Shelander, Acting Assistant Director, Public Works; Steve Dornak, Staff Analyst; and Victor Ayres, Coordinator of Select Air Quality Initiatives. ■

NEW TECHNOLOGIES UNDER DEVELOPMENT

One technology UH engineers are studying is called the "NOx trap" technology. The idea came out of Toyota back in the mid 1990s, says Harold. "There's a lot of active research, mainly in private industry, to develop this technology. At UH we are doing fundamental research of the NOx trap in the laboratory, with the intent to test the technology at the vehicle scale once we get the facility up and running."

NOx trap technology literally traps the NOx that is contained in the vehicular exhaust stream on an absorbent. The trapped NOx is converted to harmless molecular nitrogen by a catalytic process involving a small amount of fuel or hydrocarbon, which is intermittently injected into the exhaust stream.

A typical diesel vehicle can have 20 to 30 percent better fuel economy than a gas-powered vehicle, but if fuel is used to help convert the NOx to nitrogen, then it has to be a small amount or the technology will not be economically viable, Harold says.

"The injected fuel is the reactant that reduces the NOx to nitrogen," explains Harold. "If the required fuel is too much then the fuel economic advantage of diesel will be diminished."

To find out more, visit www.egr.uh.edu/parameters/.

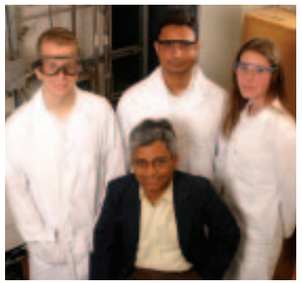
Chemical Engineer Develops Foam-Based System TO SUPPRESS TOXIC VAPORS

When trucks load and unload gasoline, harmful vapors can escape from the surface of the rising liquid. The same problem arises when oil tankers load and unload oil or other chemicals.

University of Houston Chemical Engineering Professor Kishore Mohanty is developing a solution to this problem. He and his students are in the final stages of developing vapor-suppressing foam that can be sprayed into a tanker or any similar reservoir. As the tanker is filled from the bottom, the foam will ride atop the liquid's surface, creating a kind of frothy protective blanket that seals in the toxic vapors.

"When you are loading oil or gasoline or a lot of other chemicals, some vapor comes out," Mohanty says. "If you don't do anything as you are filling up, that vapor will come out into the atmosphere and you don't want that."

Mohanty's solution was to develop very strong surfactant foam, one that doesn't break down in the presence of oil. "And we've done that," says Mohanty. "What surfactant you use makes a difference in how stable the foam is."



Ryan Borelo, Pankaj Singh Gautam, and Alena Brow with Professor Kishore Mohanty

Mohanty and his team are spending a lot of time in the lab measuring things such as surface tension, interfacial tension and viscosity. "We look for molecules that have a fluorine atom, because fluorinated surfactants apparently are good at stopping oil from breaking down the foam," Mohanty says. "But it typically makes very thin foam, and if it's too thin it's not going to stop the vapor from going up."

Working closely with Mohanty is third-year graduate student Pankaj Singh Gautam, who has been heavily involved throughout the project.

"We want a kind of foam that is flexible enough so that it completely covers the surface of the oil," says Gautam, "so fluidity is important. The foam also should be stable in the presence of oil. Most of the foams, especially the aqueous foams that we're talking about, are not stable in the presence of oil. Most of them collapse within a couple of hours."

Time is critical to the development process because the typical time period for which loading or unloading occurs can be a few hours to half a day or more. That means Mohanty's foam must be stable for a period of at least 10 hours. "They should also be able to cut down the emission of hydrocarbons by a significant degree—70 to 80 percent—even at the end of 10 hours," Gautam says. "The objective of this study is to generate a foam formulation, to make a foam using surfactant, viscosifier and a stabilizer."

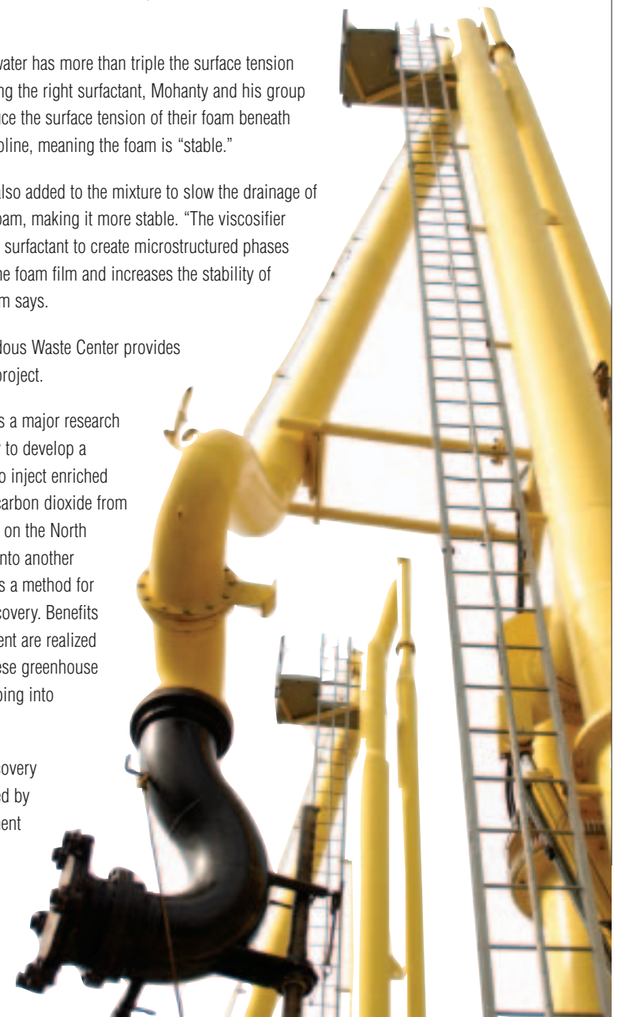
Normally, plain water has more than triple the surface tension of oil, but by using the right surfactant, Mohanty and his group were able to reduce the surface tension of their foam beneath that of oil or gasoline, meaning the foam is "stable."

Viscosifiers are also added to the mixture to slow the drainage of liquid from the foam, making it more stable. "The viscosifier interacts with the surfactant to create microstructured phases that strengthen the foam film and increases the stability of the foam," Gautam says.

The Texas Hazardous Waste Center provides funding for this project.

Mohanty also has a major research project underway to develop a feasible system to inject enriched natural gas and carbon dioxide from a mature oil field on the North Slope of Alaska into another nearby oil field as a method for enhancing oil recovery. Benefits for the environment are realized by preventing these greenhouse gases from escaping into the atmosphere.

Mohanty's oil recovery research is funded by the U.S. Department of Energy. ■



CHEMICAL ENGINEERING PROFESSOR Tackles Ozone Problem with Affordable New Technology for Power Industry

Roughly a third of the nation's fossil fuel is consumed for electrical power generation and industrial process heat. And when the exhaust from that fuel is vented into the atmosphere, it typically produces several pollutants, including nitrogen oxide, or NOx, which is an ozone precursor and a major contributor to urban smog.

If NOx emissions from power plants could be prevented, a major battle against the formation of ground-level ozone would be won.

UH Chemical Engineering Professor James T. Richardson is working on an innovative solution to the ozone problem that may stop the odious compound before it ever gets started. His new catalytic combustion design presents the power industry with an affordable combustion alternative that virtually eliminates NOx emissions by ensuring that most of it never gets created in the first place.

The current primary technology for generating power is the natural gas-powered turbine, which generates a combustion gas from a burner at very high temperature—higher than 1,500 degrees Celsius, Richardson says. "You've got this gas under high temperature and high pressure, and it's expanding in a turbine, which is a rotating device," he explains. "The hot gas expanding on the turbine blades makes them rotate."

Ordinarily, NOx is formed in the burner at 1,500 to 1,700 degrees Celsius, and then air is introduced to cool the exhaust to about 1,300 before it is introduced into the turbine. Richardson's technology enables him to use lower temperatures in the combustion process, which means NOx formation is very nearly eliminated.

Although current technology already exists to effectively remove the NOx from power plant emissions, the expense of implementing that technology has prevented it from widespread industry use. That approach, called Selective Catalytic Reduction, or SCR, relies on a trap-and-treat approach. Richardson's plan, in contrast, circumvents the very creation of NOx, and does so at a projected one-fourth the cost of SCR technology, Richardson says.

"Our approach prevents the formation of NOx at the front end, that is, before the gas goes into the turbine and after it has been combusted," Richardson says. "To do that we have to decrease the combustion temperature down to below 1,200 or 1,300 degrees Celsius, at which point very little NOx is formed."

Catalysts must have a high surface area to be effective, and high temperatures tend to reduce surface area. So the real challenge, says Richardson, has been developing stable catalysts that withstand the high temperatures necessary to run the turbines of a power plant. "Catalytic combustion works fine if the temperature is low," he says, "but we have to get the temperature up to 1,200 (Celsius) to operate the turbines. When the temperature is that high, all kinds of bad things happen to the catalyst. But we think we have found a way around that problem."

Richardson's research is funded by the State of Texas Advanced Technology Program and the Gulf Coast Hazardous Substances Research Center. ■

UH Engineers *Develop* Fast-Track Method to *Purify* Drinking Water

Opposites attract.

While that old adage may not always hold true in romance, it holds up nicely in particle physics: Negatively charged particles are attracted to positively charged particles, and vice versa.

The predictable dance between particles and their electrons—together with simple Brownian diffusion—is at the core of a process called ion exchange, a process environmental engineers have relied upon for years to remove nitrates and other contaminants from drinking water.

Researchers at the University of Houston Cullen College of Engineering are dancing new steps to that old tune, as they use ion exchange technology in combination with original biological techniques to solve a widespread and growing water contamination problem.

The offending chemical is perchlorate, a thyroid toxin that UH Environmental Engineering Professor Dennis Clifford calls "the contaminant of the decade."

Perchlorate is an oxidant used primarily in solid rocket fuel, and has been manufactured and used by the U.S. military, the space program and associated contractors since the 1940s. It has been linked to cancer and thyroid problems in adults and mental retardation and tumors in infants. Five years ago, the U.S. Environmental Protection Agency placed perchlorate on its list of contaminant candidates. Today the agency is weighing scientific evidence to determine the maximum contamination level. In other words, they're deciding how much perchlorate is too much perchlorate.

The EPA has currently identified 75 perchlorate releases in 22 states, including Arizona, California, Texas, Nebraska, Iowa, New York, Maryland and Massachusetts. Some estimates indicate the Colorado River, the main water source for approximately 15 million homes, contains perchlorate at a potentially dangerous level of seven parts per billion.

While the political battle is heating up over who will pay for the remediation, or clean up, Dennis Clifford and Debbie Roberts, engineering professors in the UH Department of Civil and Environmental Engineering, are fine-tuning a new water treatment process for perchlorate that is much faster and far less expensive than those currently in use. And perhaps best of all, their method not only removes perchlorate from water, it converts the contaminant into a nontoxic chloride, a component of table salt.

With their new system, contaminated water passes through a resin material that looks like tiny beads about the size of sand grains. The resin has a high affinity for perchlorate—it attracts perchlorate due to the electrical charge and the geometry of the perchlorate ion. As the water passes through the resin, perchlorate attaches itself to the resin beads, which are later rinsed clean with a brine solution and then reused.

"Each one of the beads of the resin is a complex polymer with positively charged sites balanced by chloride, a negatively charged mobile anion," says Clifford. "When perchlorate comes in contact with the resin, the perchlorate goes in and the chloride comes out, because the resin beads much prefer perchlorate to chloride. Natural diffusion drives the exchange, which is simply a rearrangement of charged anions.

After the resin is saturated with perchlorate, a brine solution, containing a huge excess of chloride ions is introduced to wash the perchlorate from the resin. Then the problem becomes what to do with the contaminated brine. Fortunately, UH engineers have the answer: use bacteria to degrade the perchlorate into a non-hazardous substance.

"Ion exchange will remove perchlorate from water," says Roberts, who is working with Clifford on the biological component of the system. "That's the easy part. The problem is getting the perchlorate out of the brine. That's where the biological treatment comes in, which is why this project has received a lot of attention. The biological treatment changes the perchlorate into chloride, which is not harmful."

To implement the biological component of the treatment, bacteria are introduced into the spent brine, the solution that was used to cleanse the resin. But these are no ordinary bacteria. This particular culture uses perchlorate for energy the same way people use oxygen. In addition, this culture is robust enough to survive in the high-saline solution.

One of Clifford's doctoral students, Charles Liu now working for Pall Corporation, won the 1996 American Water Works Association Dissertation Award for his work on the identification and development of the biological approach. That work, which is based on removing nitrate contamination from drinking water, is now being applied to perchlorate removal.

"It took my most recent doctoral student, Tony Tripp, a lot of work to determine which resins were most effective," Clifford says. "Some resins actually won't let go of the perchlorate once it's on the resin, and so you can't regenerate them. Getting the correct resin and trying to find the right culture, one that degrades perchlorate in high salt, was not easy. The organisms that will degrade perchlorate are ubiquitous, they're basically everywhere, but finding one that could tolerate the salt was much more difficult."

Eventually, Clifford and Roberts learned how to grow the culture and keep it stable and growing. "We invented a novel way to keep the culture alive in high salt," Roberts says. "We will seek a patent on that method now."

Not only will their new method degrade perchlorate, it will do so much faster than its closest competitor. "Ours is fast—all of the perchlorate can be gone in six to eight hours," Roberts says. "By comparison, our competitors need 30 to 60 days to accomplish the same results. We found the right culture and the right growth technique, and now we're studying the culture to really understand it and see what its possibilities are, how stable we can keep it over long, long periods."

Fieldwork on the research has been done in LaPuente, California, near Los Angeles. "Perchlorate is a huge problem in groundwater in the L.A. area," says Clifford. "Not only are they water short, but what they have is contaminated."

The American Water Works Association provided the initial funding for this research, which has been on the fast track from the lab to a real-world application.

"Now we're scaling this up to full scale," says Clifford, one of the world's leading experts in ion exchange technology. "We've done the bench scale studies here at UH. Then we did the pilot-scale studies with Montgomery Watson Harza Engineers at LaPuente. Now, the water district at LaPuente is on a fast track to further scale up the process because they really need to use the water from the contaminated well. Very seldom do we go this quickly from the bench to the treatment."

For more information on the perchlorate contamination problem, visit www.epa.gov/safewater/ccl/perchlorate/perchlorate.html. ■

Research in Membrane Filter Technology May Lead to Cleaner Drinking Water

As natural sources for drinkable water become scarcer, the need for advanced water filtration becomes increasingly valuable to society. One UH engineer is addressing that need by studying the intricacies of membrane filter technology.

Engineering professor Shankar Chellam with Ph.D. Students Wendong Xu, Ramesh Sharma, Yongki Shim and Pranav Kulkarni

University of Houston's Shankar Chellam, an assistant professor of environmental engineering, is conducting research that has received national recognition and funding for its originality and its extremely high relevance to the needs of future generations.

"As you move away from using the more pristine water supplies, you need more advanced purification processes. In addition, even with existing water supplies, we are learning more and more about chemical and microbiological risks that may be present in the environment. Any way you look at it, you may be forced to invent better water purification methods," Chellam says.

Four of Chellam's doctoral students—Ramesh Sharma, Wendong Xu, Yongki Shim and Pranav Kulkarni—are conducting research designed to uncover how membrane filters interact with various contaminants, including viruses, bacteria and organic materials, with the hope that such information will help engineers devise more efficient filters, perhaps even for large-scale use by major municipal water districts.

"Ultimately, the cost of membrane technology will go down and make it more feasible to be used for large-scale implementation," Chellam says.

Last year, Chellam received a $375,000 CAREER grant from the National Science Foundation to pursue his membrane studies. CAREER grants are awarded each year to promising young faculty nationwide. The Texas Higher Education Coordinating Board and the Texas Hazardous Substance Research Center also have supported his research. ■

A Closer Look at HOUSTON'S AIR QUALITY

Although Chellam's primary expertise is in water purification, he has also undertaken an ambitious project to determine what elements, primarily metallic components, are floating in Houston's air.

Working in collaboration with Matthew Fraser at Rice University, Chellam has developed a unique method to measure the elemental composition of particulate matter suspended in the air.

"No one has done this in the Houston area," says Chellam. "We're detecting several elements that are in the air. The overall purpose of this research is to figure out how to improve our air quality, and to determine where we need to focus our air pollution management resources."

To date, most of the country's air quality monitoring and research has focused on nitrogen oxide, which is a key component in ground-level ozone, carbon monoxide and other gaseous contaminants. Very little information has been collected on metals in the atmosphere, partly because they are present only in trace levels and consequently difficult to detect, but also because medical science is just now unraveling the connection between prolonged exposure and chronic health problems in humans.

"Studies have shown that particulate matter that are 2.5 microns and smaller in size are the ones that cause deleterious health problems in humans," Chellam says. "They call this substance 'PM 2.5.' A lot of the work nowadays in air pollution is figuring out what is in this PM 2.5. Do they cause lung cancer? Do they cause asthma? What's in it? What are the problematic components in PM 2.5?" To learn more about this, Chellam's research group is speciating PM 2.5 into its individual metals.

Historically, the problem in detecting several metals has been that their concentrations are extremely low, only a few nanograms per cubic meter. To address this difficulty, Chellam's research used an advanced method called inductively coupled plasma-mass spectrometry. "Not many groups have these capabilities," he says. "It's a relatively new method, and one of the problems we had to address was how to get from the air phase to the liquid phase."

Chellam used what he calls "unfriendly chemistry" involving hydrofluoric acid and hydrogen peroxide to break down the sample. Using specialized Teflon containers, they heat the sample using microwave radiation to extremely high temperature and pressure. "We 'cook' the filter and break it down into the acid phase, and then, after appropriate dilution, we analyze it," he says.

It was one of Chellam's master's students, Pranav Kulkarni, who solved the problem of how to handle the extremely corrosive hydrofluoric acid. He developed a method to add chemicals together to form the hydrofluoric acid inside the Teflon container. After the acid is formed and is used to separate the sample into its metallic components, they neutralize it and then they're able to analyze it. Kulkarni won a presidential fellowship award from UH for his outstanding work.

Once the sample is analyzed, Chellam and Fraser used a mathematical method called positive matrix factorization to identify the sources of contaminants. The group is funded by the Texas Air Research Center. ■

Engineer **Troubleshoots** Wireless Approach for City Communications System

UH Environmental Engineering Professor Ted Cleveland recently helped develop and document a wireless database management system that promises to streamline work processes for city health inspectors in Houston.

The new system demonstrates how an "off-the-shelf" personal data assistant, or PDA, can help field inspectors access centrally located databases on city water quality, thereby reducing paperwork, eliminating travel time to and from the office, and enhancing effectiveness in the field by providing real-time access to case histories and other data.

If the new wireless approach is adopted, inspectors for Houston's Department of Health and Human Services will not have to drive back to the office to file reports, which are currently logged in handwritten notebooks. The wireless approach provides online instantaneous data capturing that will enable inspectors to improve enforcement by having access to the database when in the field. The result could also help the city maintain more complete records, add more teeth to the inspectors' enforcement efforts and save the city money.

"The trick was getting the communications protocols set up correctly," Cleveland says. "It turns out, for instance, that if you enter the area code as part of the telephone number then it works, but if you enter the area code in the field designated for the area code, it won't work. Once you solve the communication issues the rest of it is reasonably straightforward for a person who has reasonable skill in database management and programming."

Apart from that supplied by the manufacturer of the product, no specialized software was needed for the system, Cleveland says.

"The other issue on the software side was the handling of errors," Cleveland says. "There are always going to be data entry errors. They can be handled elegantly or inelegantly. If one simple error locks up the system, then that's a problem. We developed what we believe is an elegant way to handle those errors." ■

Research Helps Establish Acceptable Levels for Contaminants

Professor Bill Rixey works with Xiaohong He, post-doctoral student, who is preparing to concentrate water samples containing ultra low levels of benzene and MTBE using a purge and trap concentrator for quantitative analysis by gas chromatography/mass spectrometry.

How do various contaminants move through the soil and groundwater? What are acceptable levels of contaminants in soil? What level can you keep in soil and still be protective of human health?

These are the kind of important questions for which Bill Rixey, associate professor of civil and environmental engineering, is seeking the answers. Much of his research ultimately has impact on determining the cost and the best strategy for protecting groundwater from contamination.

"Let's say you spill gasoline. Unless you remediate the source, you're likely to have to keep treating the groundwater for decades. A major emphasis in this whole area today is to reduce cost while still being protective of the environment. We already have an effective technology for taking care of groundwater problems—that's the pump-and-treat technology. But, this becomes only a containment technology if you don't treat or remove the source. We know how to do pump and treat of groundwater very well. But it can be a very expensive option. Some of the important issues today are: 'How do we reduce the cost?,' 'When can you turn the remediation treatment off?' and 'When do you have to remediate in the first place?' Also, it's important to know what the acceptable levels are because that impacts cost too."

It would be a costly mistake to try to achieve a level of one part per billion (ppb) when 10 ppb is acceptable for human health and the environment. Engineers are now realizing that some contaminants come out of soil matrices at a very slow rate, which makes them very difficult to remediate. But that also may mean they don't impact the environment as much. Rixey is looking closely at the rate-limited release properties and evaluating what they may mean to remediation. His work is part of an overall effort by the Environmental Protection Agency and other regulatory agencies to determine more scientifically what acceptable levels of contaminants in soil should be.

Some of Rixey's most recent research has also focused on MTBE (methyl tertiary-butyl ether), a chemical compound that is one of a group of chemicals commonly known as "oxygenates" because they raise the oxygen content of gasoline.

"MTBE is an oxygenate fuel additive that went into gasoline in the early 1990s as part of the Clean Air Act Amendments—a certain amount of oxygen had to be put into gasoline," Rixey says. "It was good for the air emissions, but unfortunately it dissolves very easily in water and it doesn't attenuate, it doesn't degrade. And it's more difficult to treat than the other compounds."

Rixey and his research associates are seeking deeper understanding into the dissolution characteristics of MTBE. They are studying why plumes of MTBE tend to remain present in the soil a lot longer than scientists and engineers originally predicted.

"We do laboratory column experiments, and we also do two-dimensional experiments where we introduce heterogeneity," Rixey says. "It's suspected that subsurface heterogeneity has a lot to do with why MTBE doesn't attenuate or degrade as quickly as expected."

Industry wants to know why MTBE remains in the soil longer so it can plan its overall remediation strategy for treating MTBE plumes and to be more precise when deciding how long to keep its remediation processes turned on. Consequently, the outcome of Rixey's research may have a big impact on remediation cost.

"The perception has been that MTBE is so soluble that it's going to disappear very quickly and you don't have to remediate very long," Rixey explains. "That's not happening and we'd like to understand why."

At the same time, Rixey is also doing some research on alternative remediation processes for MTBE. "We're looking for a better way to treat it," he says. "We're looking at an in situ catalytic process for the remediation of MTBE that uses heterogeneous acid catalysts to enhance the hydrolysis of MTBE in water. Potentially, you could use it in the ground as a sort of reactive barrier placed somewhere downstream of the contamination. Other options would be to use it in an above-ground treatment process."

Rixey is also working with Associate Professors Hanadi Rifai and Debbie Roberts on an MTBE treatment project investigating the use of ORC (oxygen releasing compounds) to oxygenate groundwater to support potential biodegradation of MTBE.

As industry moves away from using MTBE as a fuel additive, one of its replacements is ethanol, which may pose other kinds of problems to the environment. Rixey and his group are looking to unearth the most important features of ethanol and its effects on the other components present in gasoline. "One concern about ethanol is it makes other components more soluble in water," he says, "and it could affect the attenuation or degradation of benzene and make the plumes of benzene longer." ■

Ph.D. student Bryan Luper is preparing samples obtained from the field for subsequent measurement of the release properties of benzene and other hydrocarbons from soil.

UH Engineers Transform Used Vegetable Oil into

Powerful Cleansing Agent

for Toxic Waste Sites

Some of the world's toughest environmental contaminants may have finally met their match, thanks to the ingenuity of two UH engineers who recently discovered a way to convert simple used vegetable oil into a powerful new cleansing agent, called a biosurfactant.

Cumaraswamy Vipulanandan, chairman and professor of civil and environmental engineering, combined used vegetable oil with specially chosen bacteria to create a new surfactant strong enough to remove chlorinated dense non-aqueous phase liquids, or DNAPLs, from toxic waste sites.

"We are using used vegetable oil which is supplied from restaurants and homes," says Vipulanandan. "We take that, put it through a biological process, biotransformation, and make a biosurfactant, which is like a soap material. It reduces the surface tension of water. When you wash your hands with the soap, what the soap does is reduce the surface tension so the water can wet your hand and remove the oil and contaminants. Our surfactant works in the same way to remove toxins from soil."

More than half of the country's worst toxic waste sites may be contaminated with chlorinated DNAPLs, according to one study conducted by the Environmental Protection Agency. Recent studies also show that current techniques for cleaning up chlorinated DNAPLs are not getting the job done effectively. In addition, the current pump-and-treat technology relies on chemical surfactants, which are expensive and are toxic to the microorganisms in the ground.

"Some chemical surfactants can become contaminants themselves, whereas our biosurfactant will biodegrade over time," Vipulanandan says. "It doesn't leave a residue behind."

The new product looks a lot like a soft soap but acts more like "super soap" when pumped into contaminated soil. The process takes something that would normally be a waste product—used vegetable oil—and converts it to something extremely useful and does not harm the environment.

"People have used vegetable oil to make soap, but they put it through a chemical process; they had to heat it up to really high temperatures," Vipulanandan says. "But our process is at a low temperature. What is unique about this is that we produced this under non-aseptic conditions. We don't have to sterilize any of the equipment, and that simplifies the process a great deal."

Another unique feature is the bacteria, which UH engineers adopted from contaminated soil over a period of time, and the fact that the entire process can be completed on site.

Vipulanandan is working with Kishore Mohanty, professor of chemical engineering, to develop a complementary technology to dechlorinate the DNAPLs once they're solublized. Using a novel micro-emulsion technique, Vipulanandan combines surfactants formed into tiny spheres to create iron nanoparticles with a strong affinity for chlorine. When mixed into the contaminated water, these nanoparticles convert the chlorinated DNAPLs into a non-toxic state by removing the chlorine. The two technologies could, in theory, be combined at one site to treat contaminated soil and water directly where they are found.

"First, we can apply the biosurfactant to the contaminated soil, which will then dislodge and solublize the chlorinated DNAPLs," Vipulanandan says. "Then we can treat the resulting contaminated water with our nano-iron, which degrade the contaminants into nontoxic form. This could make cleanup of toxic waste sites a lot easier," says Vipulanandan.

Research and development of the biosurfactant is funded by a grant from the Gulf Coast Hazardous Research Center and the Advanced Technology Program of the Texas Higher Education Coordinating Board. ■

How much **DIOXIN** is in the Houston Ship Channel? That's a tough question, but an important one because dioxins are highly toxic to humans.

How toxic? Studies have shown that significant short-term exposure can cause liver damage, weight loss and wasting of glands important to the body's immune system. Long-term exposure may cause reproductive problems, birth defects, behavioral abnormalities, alterations in immune functions and cancer.

What are dioxins? Dioxins are a group of chemical compounds that form as a result of combustion processes such as industrial or municipal waste incineration, and from burning fuels such as wood, coal or oil.

University of Houston's Hanadi Rifai is head of a $3.2 million study funded by the Texas Commission on Environmental Quality to determine whether dioxin levels in the Houston Ship Channel exceed the maximum contamination level set by the Environmental Protection Agency nine years ago.

"What we found that no one knew before was that indeed dioxin concentrations in the channel water do exceed the standard," says Rifai, associate professor of environmental engineering at the UH Cullen College of Engineering.

Rifai samples the water because there is a governmental water quality standard, but in fact the health impact comes primarily from consuming seafood that is exposed to the dioxin. "We don't drink ship channel water, but we consume seafood from the bay," Rifai says. "The EPA standard is based on seafood consumption. So somehow you have to make the connection between what's in the water and what you eat in the seafood, and that's why this project is so interesting and so complex."

Rifai and her graduate students used new technology—high volume sampling—that pumps large quantities of water through a resin, which is then removed and analyzed for dioxins and other chemicals, such as PCBs.

"The Texas Commission on Environmental Quality was interested in having us look at PCBs at the same time, because there's been some concern from the health department about the presence of PCBs and pesticides in tissue samples from the bay and the ship channel," Rifai says. "We found that PCBs are not so bad, as far as the water concentration. They only exceed the standard in a couple of the segments of the Houston Ship Channel."

Engineer Uncovers Evidence of DIOXINS in Houston Ship Channel

The high-volume units are necessary because they are looking for such small concentrations that a standard water quality sample would not detect it. Once the sample is collected and quantified, Rifai simply divides the amount of dioxin by the volume to get a value for concentration.

She and her associates are also gathering sediment, fish, crab and water all from the same spot and trying to make the connection between the distribution of the dioxin and the various media.

"Most of the health-based calculations about what's safe and what's not safe rely on, not hypothetical numbers, but relationships between the media," Rifai says. "How does a molecule of dioxin distribute itself? What goes into the sediment? What goes into the water? What goes into the fish? So we're trying to revisit some of those assumptions and one of the ways to do that is to look at the concentrations in all the media and see how it distributes itself."

For more than a year, Rifai has also been looking for dioxin concentrations in ambient Houston air, and her data indicate that dioxin is present. "We have enough evidence that we've determined that dioxin is present in the air. Now we would like to determine where it's coming from."

By combining a study of water and air for the same toxin—called "wet and dry deposition sampling"—Rifai is trying to establish the source. "The idea is that the dioxin in the air is going to be emitted from stacks from industry, from any type of facility that has a stack. How does it get into the ship channel? Is it because the particles deposit on the ground and then get carried into the run off during rain events? Or is it because when it rains the dioxin particles are actually raining right on top of the Houston Ship Channel?"

At the same time, Rifai is also one of the few researchers worldwide who is looking at dioxin in industrial effluents, the treated process water that is discharged directly into the channel. Rifai has sampled 50 such facilities and when the results are calculated she will report exactly how much dioxin is in the effluents of those facilities. ■

Professor Hanadi Rifai examines water samples with researcher Monica Suarez and Steve Kennedy of Parsons.

PHOTO BY MARK LACY

Faculty Promotions

Betty Barr (ECE) was promoted to associate professor. She received the Career Teaching Award from the college.

Keh-Han Wang (CEE), **Nicolaos Karayiannis** (ECE), **C. Richard Liu** (ECE) and **Jeffery Williams** (ECE) were promoted to full professor.

New Faculty

Christine Ehlig-Economides joined ChE as a professor. She will continue as director of the petroleum engineering program. Previously, she was an adjunct professor and global account manager/consultant for Schlumberger Oilfield Services. She received her Ph.D. in petroleum engineering from Stanford University in 1979, M.A.T. in mathematics education and M.S. in chemical engineering from the University of Kansas in 1974 and 1976 respectively, and B.A. in math-science from Rice University in 1971.

Ali Kamrani joined IE as an associate professor. Previously, he was an associate professor in the Industrial and Manufacturing Systems Engineering Department at the University of Michigan-Dearborn. He was also founder and director of the Rapid Prototyping Laboratory and adjunct professor of industrial and manufacturing engineering at Wayne State University. He received a Ph.D. in industrial engineering in 1991, M.E. in engineering mathematics and computer science in 1987, M.E. in electrical engineering in 1984, and B.S. in electrical engineering in 1983 from the University of Louisville.

Maher Lahmar joined IE as an assistant professor. He received a Ph.D. in industrial engineering from the University of Minnesota in 2003, M.S. in industrial engineering and operations research and B.S. in industrial engineering from Bilkent University in Turkey in 1997 and 1995 respectively.

Dmitri Litinov joined ECE as an associate professor. Previously, he was a research scientist at Seagate Research and an adjunct professor of physics at the University of Miami. As part of his research team at Seagate, he has 26 utility patent applications pending and 76 provisional patents. He received a Ph.D. in applied physics and a M.S. in electrical engineering from the University of Michigan, Ann Arbor in 1999 and 1997 respectively, and a B.S. in applied physics from the Moscow Institute of Physics and Technology in Russia in 1992.

Pradeep Sharma will join ME as an assistant professor in January 2004. Previously, he was a research scientist for General Electric Corp. R&D. He is a chartered physicist with the Institute of Physics in London. He received a Ph.D. in micromechanics from the University of Maryland in 2000 and a B.S. in mechanical engineering from Maharaja Sayajirao University of Baroda in India in 1994.

Li Sun joined ME as an assistant professor. Previously, he was a postdoctoral fellow in the Materials Research Science and Engineering Center at Johns Hopkins University. He received a Ph.D. and M.S. in materials science and engineering from Johns Hopkins University in 2002 and 1999 respectively, and a B.S. in physics from Nanjung University in China in 1993.

Faculty Awards

Neal Amundson (ChE) was one of four individuals to receive an honorary Doctorate of Humane Letters during UH's May 9 commencement ceremony.

Vemuri Balakotaiah (ChE) and **Karolos Grigoriadis** (ME) received the UH Excellence in Research and Scholarship Award.

Richard Bannerot (ME), **Demetre Economou** (ChE), **Reagan Herman** (CEE), and **David Jackson** (ECE) received the Outstanding Teaching Award from the college.

Shankar Chellam (CEE) received the Junior Faculty Research Award from the college.

Tom Chen (IE) and **David Murphy** (ChE) received the Outstanding Lecturer Awards from the college.

Dennis Clifford (CEE) received the Fluor-Daniel Faculty Excellence Award.

Charles Dalton (ME) received the Service Award from the college.

Demetre Economou (ChE) was named Fellow of the American Vacuum Society. He was also selected as the 2002 recipient of the Sigma Xi Faculty Research Award at UH.

Christine Ehlig-Economides (ChE) and **John Lienhard** (ME) were inducted into the National Academy of Engineering.

Osman Ghazzaly (CEE) and **David Shattuck** (ECE) received the El Paso Energy Corporation Faculty Achievement Award.

Karolos Grigoriadis (ME) received the W. T. Kittinger Teaching Excellence Award.

Fazle Hussain (ME) was elected to the Bangladesh Academy of Sciences. He was featured as one of ten in Shell's tribute to Asian-Americans during Asian Heritage Month in May 2003. He was named chair of the Fluid Dynamics Divison for the American Physical Society.

John Lienhard (ME) received the 2002 Freedoms Foundation Award from the Freedoms Foundation at Valley Forge.

Stuart Long (ECE) was named Educator of the Year by IEEE Region 5. He also received the 2002 Outstanding Faculty Award from the Houston Alumni Organization.

Dan Luss (ChE) received the Best Applied Paper Award for 2002 from the South Texas Section of the American Institute of Chemical Engineers for "Influence of Product Abosrption on the Operation of a Reverse Flow Reactor," which he co-authored with Rohit Garg and Abdul Garayhi.

Haluk Ogmen (ECE) received the Senior Faculty Research Award from the college.

Michael O'Neill (CEE) received the 2002 Distinguished Service Award from the Deep Foundations Institute and the KAPP Award from American Society of Civil Engineers.

(Continued on page 24)

O'Neill Leaves a 'DEEP FOUNDATION' and Legacy at UH

By Angie Shortt

"An icon in the area of pile foundation research, Mike was a tireless and fearless researcher who had the appreciation for both theoretical modeling and full-scale experimental verification, a unique and rare combination which was the trademark of PROFESSOR O'NEILL," said Cumaraswamy "Vipu" Vipulandandan, chair of the Department of Civil and Environmental Engineering.

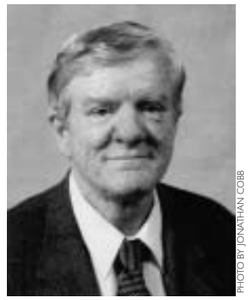


PHOTO BY JONATHAN COBB

MICHAEL W. O'NEILL 1940–2003

Michael W. O'Neill, Hugh Roy & Lillie Cranz Cullen Distinguished Professor of Civil Engineering at the University of Houston, made exceptional contributions to the deep foundations industry, and his findings still shape government regulations and industry practice across several areas, including deep water drilling, drilling on expansive soils and strengthening bridge foundations in flood-prone areas. O'Neill passed away Aug. 2 from a heart attack at the age of 63.

Professor O'Neill touched the lives of many friends, students and colleagues. *"His ability to teach was a gift that not all teachers have,"* said Douglas Emery (1985 BSCE), chief highway engineer for S&B Infrastructure, Ltd. *"He could take a complex subject and present it in a way that everyone could understand. He was an inspiration to me and many of my colleagues."*

"His ability to present engineering principles clearly and with persuasion during his classes and lectures are a testament to his greatness as an engineer and an instructor," said Michael Lithman (1977 MSCE, 1985 MBA), vice president and chief financial officer of Ellis & Associates, Inc. in Jacksonville, Florida.

O'Neill held a B.S., M.S. and Ph.D. in civil engineering from the University of Texas at Austin. He had more than 40 years of experience in applied research and consulting in deep foundations, soil properties, engineering design and field testing of foundation systems.

"Mike was among the leading foundation engineering experts in the U.S., and his work in the area of deep foundations is seminal and remains his lasting legacy," said Stein Sture, associate dean of the College of Engineering and Applied Science at the University of Colorado.

He won numerous honors and awards, including the Distinguished Service Award from the Deep Foundation Institute. From the American Society of Civil Engineers (ASCE), he received the Walter L. Huber Civil Engineering Research Prize, State-of-the-Art in Civil Engineering Award, Martin S. Kapp Foundation Engineering Award, and was named the Karl Terzaghi Lecturer. O'Neill served as chair of the UH Department of Civil and Environmental Engineering, chair of the Executive Committee of the Geotechnical Engineering Division of ASCE and in numerous other leadership positions.

In addition, O'Neill published more than 200 papers and peer-reviewed reports on foundations and soil mechanics. He was the co-author of a reference book on foundations for vibrating machines and the current Federal Highway Administration manual on drilled shafts.

"To the academic and engineering world, he will be remembered as a world class authority who has made a lasting impact on the art and practice of deep foundation engineering," said S.T. Mau, dean of Engineering and Computer Science at California State University, Northridge, who was a visiting professor in 1984 when O'Neill was acting department chair. *"I will always remember Mike as an accomplished scholar and engineer, a devoted educator and administrator, and above all a gentleman."*

A memorial fund has been established for O'Neill for scholarships. To contribute, send checks payable to the UH/Michael O'Neill Memorial Fund to the **Civil and Environmental Engineering Department, N107 Engineering Bldg. 1, Houston, Texas 77204-4003.**

"Basically, what I've been trying to do during my career," said O'Neill in an interview given last October, *"is understand the behavior of deep foundations in just about every aspect: dynamic, static, the effect of installing the foundation on the soil properties, monitoring scour, how foundations interact with each other through the soil, group effects, how to enhance capacity and electro-osmosis."* ■

Benjamin Ostrofsky (IE) received the President's Award for Merit and was named a fellow of the Society of Logistics Engineers.

Gerhard Paskusz (ECE) was named Fellow of the American Society for Engineering Education.

James Symons (CEE) received the 2003 Edward J. Cleary Award from the American Academy of Environmental Engineers.

Peter Vekilov (ChE) and **Oleg Galkin** (ChE) had their work showcased on the cover of the Feb. 14 issue of *Science* magazine. Vekilov's findings were reported in the journal *Proceedings of the National Academy of Sciences of the United States of America.*

Donald R. Wilton (ECE) received the Distinguished Alumnus Award from the ECE Department at the University of Illinois at Urbana-Champaign.

Staff Awards

Brian Allen, **Angie Shortt** and **Harriet Yim**, in Engineering Communications, received 13 recognition awards for the college's recruitment brochure, magazine, website and other materials. The International Association of Business Communicators (IABC) District 5 presented two Silver Quill Awards of Excellence to the college for the Marvels of Engineering recruitment brochure. IABC/Houston presented four Bronze Quill Awards of Merit to the college for the *Parameters* magazine and the Marvels of Engineering. The Public Relations Society of America (PRSA/Houston) presented the Silver Excalibur Award to the college for the Marvels of Engineering. From the Council for Advancement and Support of Education (CASE) District IV, the college won two Grand/Gold Awards and an Achievement Award for the Marvels of Engineering, a Grand/Gold Award for Engineering Leadership & Entrepreneurism Program's website, and Special Awards for the Neuro-Engineering Series writing collection and the *Impact* newsletter.

Sharon Gates, ChE advising assistant, was elected as an academic affairs representative to UH Staff Council.

Angie Shortt, communications director, was elected president of the UH Staff Council.

Student Awards

Kathleen Akkerman, **Amyn Andharia**, **Marco Camacho**, **Ching Leung Chan**, **Marco Flores**, **Tanya Fox**, **Enedelia Franco**, **Reynaldo Guerra**, **Ngoc Pham**, **Paul Michael Rico** and **Jimena J. Santalla** were selected to receive University Scholars Program scholarships for a semester of research.

Lorena Basilio was awarded the Best Presentation Award at the GPS 2002 meeting of the Institute of Navigation in Portland, Oregon, this fall. Her paper was titled "Defining the Effective Radiation Point for a Microstrip Patch Antenna."

Madhuchhanda Bhattacharya was awarded Best Poster Paper by Kinetics, Catalysis and Reaction Engineering Division of the American Institute of Chemical Engineers (AIChE).

Monica Greak was named the Outstanding Junior by the Texas Society of Professional Engineers during Engineer's Week.

Timothy Kennedy was one of 15 finalists invited to present in the student paper competition at the 2003 IEEE International Symposium on Antennas and Propagation. His paper was titled "Modification and Control of Currents on an Electrically Long Monopole Using Magnetic Bead Loading."

William Langston was named a semi-finalist in the student paper competition at the IEEE's Microwave Theory and Techniques Society's annual International Microwave Symposium in June 2003. His paper was titled "Fundamental Properties of Radiation from a Leaky Mode Excited on a Planar Transmission Line."

Chidiogo Madubike (ECE) received the Outstanding Graduate Student Instructor Award from the college.

Dimple Pajwani was named the Outstanding Senior by the Texas Society of Professional Engineers during Engineer's Week. She also received The Wilbur L. and Judy L. Meier Award from the college.

Luigi Saputelli's doctoral dissertation on a proposed self-learning reservoir management system recently claimed second place in the Society of Petroleum Engineers' 2003 Gulf Coast Regional Paper Contest.

Wade Schoppa received the 2002 Andreas Acrivos Dissertation Award in Fluid Dynamics from the American Physical Society.

The UH Chapter of **Institute of Electrical and Electronics Engineers (IEEE)** received the Outstanding Large Student Branch Award from IEEE Region 5. They also received the Student Branch Membership Growth Award from the IEEE Regional Activities Board and the IEEE-Houston Section Award for most student participation at the 2002 section meetings. In 2002, UH membership grew by more than 300 percent.

The UH Chapter of the **Institute of Industrial Engineers** was recognized as the Best Student Chapter at the Region 5 IIE Student Conference.

UH students placed third in the 2003 American Society of Mechanical Engineers Design Competition.

Key:
ChE — Department of Chemical Engineering
CEE — Department of Civil & Environmental Engineering
ECE — Department of Electrical & Computer Engineering
IE — Department of Industrial Engineering
ME — Department of Mechanical Engineering

Houston Entrepreneur Prepares to Launch **New Software Product** for **Medical Industry**

By Brian Allen

"Even when I was a kid, I always knew I was going to be an engineer," says Houston entrepreneur Jeff Beauchamp (1969 BSME, 1973 MSME).

An early indication came at age 13, when Jeff streamlined his paper route by inventing "contraptions" to attach to his bicycle so he could deliver more newspapers faster without circling back to reload.

"It sorted itself out pretty quickly, and I have no idea why," says Beauchamp from his new offices at the Houston Technology Center, where he has just launched a software product that may revolutionize the way hospital personnel access patient information.

Beauchamp's startup software company, Datalign®, has recently licensed its information management technology from The University of Texas M. D. Anderson Cancer Center and is in the early stages of product rollout.

"There are seven of us," says Beauchamp, "and it's just a mad scramble. We don't have enough resources, we don't have enough time, we don't have enough people, and the team is doing a marvelous job."

Datalign's new software, ClinicStation™, is a Web-based point-of-care decision support tool that provides clinicians with immediate access to real-time information about a patient. ClinicStation improves quality of care, patient safety and clinician efficiency by visually integrating relevant information—reports, notes and images—from different hospital systems into a simple, unified view for clinicians, Beauchamp says. Administrators also use ClinicStation to improve billing efficiency and accuracy.

"You would think that every hospital on the planet would already have this kind of tool, but very few of them do," he says. "Without a tool like ClinicStation, most clinicians are forced to deal with a complex and confusing array of information systems that require them to either request information and receive it later, typically on paper, or take the time to learn how to use multiple systems and then access each one individually. Most clinicians simply don't have time for that."

Starting a new company and turning it into a multimillion dollar business won't be easy, but Beauchamp has done this before. He is the founder of a 25-year-old thriving business, Intermat, that heralded the dawn of the information age by placing high value on not only the data, but the meta data and the very definition of "good data."

Beauchamp, who graduated from Houston's Lamar High School before attending UH, had been working at Fluor when the idea for Intermat took shape in 1978.

"The whole idea was to improve the quality of the data that we delivered to our clients so that they could do a better job of managing their MRO (maintenance, repair and operations) inventory," he says. "The problem was that the industry didn't value information to the degree that industry values it today. It was not generally recognized that data were a corporate asset."

Through the early years of the enterprise, Intermat provided an information management service. Then technology improved. PCs became available and the company shifted toward software development that eventually reshaped an industry.

"What we were all about was meta-data, which is information about information, or data about data," Beauchamp explains. "We created uniform, consistent meta-data, and clear guidelines on the kinds of data that were associated with the meta-data. We wound up with a tool that is installed all over the world and is the de facto standard that people use when describing MRO materials."

In the quest to provide better data, Beauchamp realized there was no adequate definition for good data, let alone better data. From that point on, he focused on trying to figure out what good MRO data would be. "We came up with a concept that allowed us to build a framework that people could use consistently," Beauchamp says. "They could use it and the results would be, if not identical, then similar enough that a person in another country, speaking another language, could catalog items successfully and in the same way."

"Everything I do is using my engineering education," he says. "I don't design machines any more, but I'm a machine designer at heart. I love to design. And I certainly use my education in the way I approach and solve problems."

—Houston entrepreneur JEFF BEAUCHAMP

In the process, Intermat minimized duplication, identified obsolete and redundant material, and rendered descriptions in such a way that an ordinary person—someone unskilled in any particular kind of material—would be able to recognize and catalog the items correctly.

In 1997, when Beauchamp sold Intermat to Strategic Distribution Inc, a NASDAQ-listed company, there were approximately 100 employees. Two years later, when SDI sold Intermat to another company, there were more than 250 employees. Then business slowed in the tech-market downturn, and Beauchamp had the opportunity to re-acquire the company. Now his new chief executive officer is turning around and revitalizing the business, learning as he goes from the founder himself.

"As a relatively young businessman, I have been fortunate to call Jeff a mentor for the past five years," says Blair Garrou, CEO of Intermat since January of this year. "As Intermat celebrates its 25th anniversary—a milestone that few technology companies achieve—Jeff's indelible mark on the organization is still apparent: patience, persistence and vision. I would personally recommend any individual, from student to business manager, to recognize these as the traits of any solid business, especially those that have survived as long as Intermat."

Beauchamp, who sits on the UH Cullen College of Engineering Leadership Advisory Board and plays an active role with the Engineering Leadership and Entrepreneurism Program, says he has relied on his UH education throughout his career, and still does. "Everything I do is using my engineering education," he says. "I don't design machines any more, but I'm a machine designer at heart. I love to design. And I certainly use my education in the way I approach and solve problems." ■

CLASS NOTES & ALUMNI NEWS

::::: 1970's :::::

AVINASH CHANDER AHUJA (1970 MSPE) was Chancellor of the Realm at the Coronation 2003 of "The Golden Jubilee Court of Historical Legacies," part of the 2003 Buccaneer Days Celebration in Corpus Christi. He formed Magnum Producing and Operating Co., an oil and gas production and exploration company, in 1987. He immigrated to the U.S. in 1968 for graduate school at UH, and became a citizen in 1975. He belongs to several professional engineering organizations and is on the board of the American Diabetes Association. He serves as an honorary board member of the Corpus Christi Area Council for the Deaf and holds memberships in the Coastal Bend Indian Association, the Foundation Circle of South Texas Institute for the Arts and the President's Council for both Del Mar College and Texas A&M University-Corpus Christi. Ahuja and his wife, Peggy, have been married for 28 years. They moved to Corpus Christi in 1981 and have two children, Ranika and Rajan.

TANDY O. LOFLAND (1971 BSME, 1973 MBA) was listed in the 2003 Heavy Hitters List of the *Houston Business Journal*. He is president of Intergroup Realty Inc., which was ranked as one of the country's top hotel brokers by *Hotel Business* magazine. He has been involved in the development and marketing of numerous commercial projects in the U.S., Europe, Caribbean and Latin America since 1980. Projects and transactions in recent years include development of one of the largest mixed-use, master-planned developments near Walt Disney World, consisting of several thousand hotel rooms, hundreds of time share units, multifamily, retail, restaurants and a dinner theater. For the past 17 years, Lofland has focused on hotel, resort and tourism projects, especially representation of buyers for single assets and portfolios of full-service luxury and upscale properties such as Hilton, Radisson, Sheraton and Crowne Plaza. He and his wife, Ellen, have two children, Tandy and Catherine.

J. B. MALLAY (1972 BSME) joined SSRCx as commissioning development manager for the Houston office.

WILLIAM L. SOESTER (1973 BSME) was named vice president of engineering for J. Ray McDermott, a subsidiary of McDermott International Inc. Soester, who has over 28 years of successfully managing the design and construction of capital projects, will be responsible for worldwide engineering, which includes J. Ray Engineering, Mentor Subsea and SparTEC. He is also responsible for implementing global oversight and best practices in our engineering groups to better support our internal and external customers for a leading provider of solutions for offshore field development worldwide. Previously, he was with Fluor for 12 years where he was most recently executive project director responsible for a major FPSO project. Soester spent over 10 years of his career with Saudi ARAMCO executing both on-shore and offshore projects. He is a registered mechanical engineer.

RAJ AGNIHOTRI (1978 PhD ChE) is owner of ProcessBiz Technologies, which is comprised of two companies, one in the U.S. and the other in India. ProcessBiz Technologies has two products —an enterprise management and process intergration system, and retail automation systems.

::::: 1980's :::::

ALLAN SCOTT (1980 BSME) is director of bond projects for the Humble Independent School District, where he is responsible for facilities planning and construction. Allan can be reached at allan.scott@humble.k12.tx.us.

DANIEL O. WONG (1983 BSCE, 1985 MSCE, 1988 PhD CE) was recognized at the Asian Chamber of Commerce Gala on March 21 for his personal successes. He is president of Tolunay-Wong Engineers, Inc. and was elected as a council member for the City of Sugar Land. Daniel can be reached at dwong@tweinc.com.

ABDELDJELIL "DJ" BELARBI (1986 MSCE, 1991 PhD CE) was appointed by Missouri Governor Bob Holden to serve on the Missouri Human Rights Commission, which is under the Department of Labor and Industrial Relations. Belarbi represents the Democratic Party and the 8th Congressional District of the State of Missouri. Belarbi is a civil engineering professor at the University of Missouri-Rolla and is internationally known in structural engineering. He has published more than 60 technical papers in international journals and conferences, and is the recipient of more than 20 awards and honors for his work. Belarbi started his journey in the western part of Algeria and moved to the U.S. in 1983. He is married to Samira and they have three children: Sihem, Hishem and Yasmine. He can be reached at belarbi@umr.edu.

HARI PONNEKANTI (1989 MSME) was named vice president of equipment products engineering at Intevac, Inc. Previously, he was at Applied Materials, where he has worked since 1994, most recently as the director of engineering, New Product Development, Dielectric Systems and Modules Group. While at Applied Materials, he led the engineering development of chemical vapor deposition products, most notably the Producer® CVD system. According to Applied Materials, the high-productivity Producer®

ALUMNI NEWS BRIEFS

Distinguished Engineering Alumni Awards

The Engineering Alumni Association honored Jesse Gonzalez (1969 BSCE), chairman of the board of SpawGlass Construction Corp., and Manmohan S. Kalsi (1969 MSME, 1975 PhD), president of Kalsi Engineering, as Distinguished Alumni at the 2003 Distinguished Engineering Alumni Awards Dinner on June 6 at the Four Seasons Hotel. Siddika Demir (1993 BSCE), Six Sigma Black Belt for the Bechtel Corporation, received the Distinguished Young Engineering Alumna Award; Raymond J. Scheliga (1979 BSME), principal of Scheliga Engineering, received the Roger Eichhorn Leadership Service Award; and civil engineering professor Osman Ghazzaly received the Abraham E. Dukler Distinguished Engineering Faculty Award. Astronaut Bonnie Dunbar (1983 PhD), who received the Distinguished Engineering Alumna Award in 1991, gave the keynote address. For more information about the honorees or to nominate someone for the 2004 awards, visit www.egr.uh.edu/alumni/?e=awards.

EAA hosted the 2003 Distinguished Engineering Alumni Awards Dinner on Friday, June 6. Pictured are (front row) Bonnie Dunbar (1983 PhD), Distinguished Alumni Jesse Gonzalez (1969 BSCE) and Manmohan Kalsi (1969 MSME, 1975 PhD), Young Alumnus Siddika Demir (1993 BSCE), and Professor Osman Ghazzaly; (back row) Honoree Raymond Scheliga (1979 BSME), Dean Raymond Flumerfelt and EAA Past President Billy Cooke (1978 BSCE). PHOTO BY PHIL BUSBY

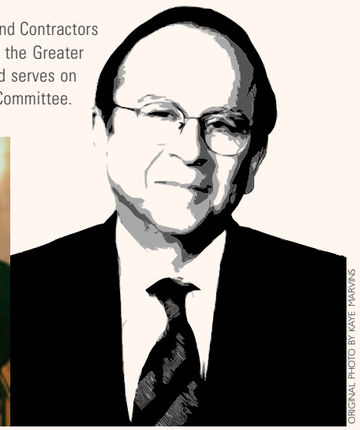
Jesse Gonzalez [Distinguished Alumnus Award]

Jesse Gonzalez's career at SpawGlass spans 34 years. He began there as a high school youth working in the field and later as a college student while attending UH. He started as a project manager after graduating in 1969 with a bachelor's degree in civil engineering and moved through the ranks to become vice president of construction. Since 1979, he has held the position of president of SpawGlass or at one of the SpawGlass Companies. He is now chairman of the board of SpawGlass Construction Corporation. His leadership has consistently kept SpawGlass ranked among the City of Houston's Top 10 General Contractors.

Gonzalez is a registered professional engineer, is past president of the Associated Builders and Contractors of Houston, serves on the board of the Associated General Contractors, and is chairman of the Greater Heights Chamber of Commerce. He is a life member of the Houston Alumni Organization and serves on the UH Civil & Environmental Engineering Industrial Advisory Board as chair of the Education Committee.

Gonzalez is married to Terry, his high school sweetheart, and they have four children, Tony, Felicia, Michael and Damon.

With honoree Jesse Gonzalez (second in front row) is his daughter-in-law Paola Gonzalez, wife Terry, daughter-in-law Rosie Meyers, (second row) son Michael Gonzalez, daughter Felicia Gonzalez-Beaver, daughter-in-law Amanda Gonzalez, son Anthony Gonzalez, (back row) son-in-law Michael Beaver and son Damon Gonzalez. PHOTO BY PHIL BUSBY



ORIGINAL PHOTO BY KAYE MARVINS

is one of the industry's most successful CVD platforms and supports a wide range of dielectric CVD applications. Ponnekanti received his bachelor's degree in mechanical engineering from Andhra University in India.

::::: 1990's :::::

CHARLES E. JONES (1990 BSME) was named S/B Executive Vice President and chief operating officer of Hydril Company, where he will be responsible for Hydril's business segments, premium connections and pressure control equipment, as well as SubSea MudLift Drilling LLC. He has 16 years of experience at Hydril, having rejoined the company in 1998, and serving most recently as vice president of pressure control. Charles is also a graduate of the Harvard Business School Advanced Management Program.

DOUG KIRKPATRICK (1995 MSEnvE) was recently promoted to assistant portfolio manager at Janus Capital Management. He will assist two co-portfolio managers of Janus Worldwide Fund, where he will help with idea generation, stock selection and portfolio construction. Kirkpatrick joined Janus in 2001 as an equity research analyst working closely with the entire international team. Prior to joining Janus, he was an analyst for the investment firm Artisan Partners LP. He also worked for Kellogg Brown & Root, a division of Halliburton, as an environmental engineer. He graduated from Rice University with bachelor's degrees in mechanical engineering and political science. In addition, he earned his MBA from the University of California at Berkeley. He has also earned the right to use the Chartered Financial Analyst designation.

::::: 2000's :::::

KRISTINA CARR (2003 BSChE) is a process engineer for Dow Chemical in Freeport, where she worked as a co-op student for four semesters. She graduated cum laude in May 2003.

::::: MARRIAGES :::::

RANDALL COLLUM (2001 BSChE) married Elizabeth Grahmann on July 12 at St. Theresa's Catholic Church. Randall is a reservoir engineer at BP and can be reached at collumr@bp.com.

MIRANDA LALAJ (2002 BSChE) married Raymond Bruce Fosdick on May 31 in Houston. Miranda is owner of MathMaidEz, a math and science tutorial service. During the spring, she spent seven weeks at the NASA headquarters recovery site as a consulting engineer. Miranda can be reached at miralalaj@mathmaidez.com.

KELLI BABIN (2003 BSChE) married James Mancuso on Dec. 28, 2002 in Baton Rouge, Louisiana. Kelli is an associate engineer with Lyondell-Equistar.

::::: BIRTHS :::::

SHARONI CHAUDHURI SRAJASHEKAR (2000 BSChE) and husband Navin welcomed home Keya on June 24. She weighed five pounds, 12 ounces and measured 18 1/4 inches long. Sharoni is a process engineer at Foxboro and can be reached at srajashekar@foxboro.com.

::::: DEATHS :::::

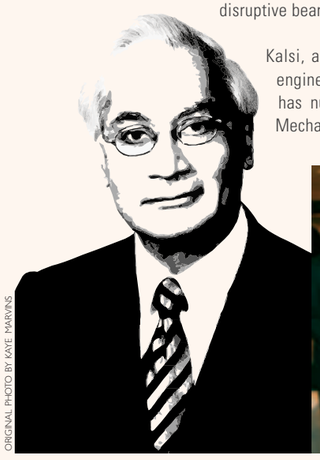
WILLIAM LEE "BILL" SMITH JR. (1951 BSME) died June 15, 2003 at the age of 77. A veteran of WWII, European Theater, and Purple Heart recipient, he was a Master Mason with the Pasadena Masonic Lodge No. 1155 A F & A M. While at UH, he met and married his future wife, and started his family and career in Houston. Early in his career he worked for Sinclair Oil in various engineering and operations capacities in both Pasadena, Texas and Chicago. He joined Fluor Corporation in Houston as a project manager and managed various petroleum refinery projects in the USA, Canada, Russia and Saudi Arabia until his retirement. Preceded in death by his wife of 48 years, Betty Moon Smith. He is survived by daughter Cynthia A. Bradshaw and husband Elliott, sons Michael L. Smith and wife Cindy, and Marcus J. Smith; grandsons, Darren M. and Todd W. Smith, and Kevin Bradshaw all of Houston, and brother Roy E. Smith, wife Barbara and nephew Robert "Bobby" V. Smith of Trussville, Alabama.

JERROLD "JERRY" L. GRAHAM (1958 BSME, 1958 BS Math) died July 13, 2003 at the age of 74. He was a graduate of Reagan High (member of the "Heights Lunch Bunch"), and served in Korea as a lieutenant in the Army. Graham was an elder in the La Porte Community Church and also served nine years as a La Porte school board member. He was an aerospace engineer and retired in 1994 from Lockheed. Survived by wife, Helen;

ALUMNI NEWS BRIEFS

Manmohan Singh Kalsi [Distinguished Alumnus Award]

Entrepreneur, engineer, inventor and artist, Manmohan Singh Kalsi is a good example of what results from an intersection of high standards and self-discipline. As president of Kalsi Engineering, Inc., a high technology consulting and special products company that he founded over 25 years ago, Kalsi continues to personify the Cougar spirit of excellence, hard work and respect. His successful business is internationally recognized for providing innovative, state-of-the-art solutions that include several industry-significant guides that have improved the safety and reliability of nuclear plants, and disruptive bearing and sealing technologies that have enabled long-reach and severe-service drilling.



ORIGNAL PHOTO BY KAYE MARVINS

Kalsi, a native of India and Texan by choice, received his master's degree and Ph.D. in mechanical engineering from UH in 1969 and 1975. He is a registered professional engineer, holds 25 patents and has numerous publications and awards to his credit. Kalsi is chairman of the UH Department of Mechanical Engineering Industrial Advisory Board.

Kalsi and his wife Ise, who met as students at UH, have three children, Isken, Carle and Indira, and six grandchildren with a seventh on the way.

With honoree Manmohan S. Kalsi (middle, front row) is his sister-in-law Sunita Kalsi, wife Ise, (second row) brother Inderjeet S. Kalsi, daughter's in-laws Karen & Skip Ward, son-in-law Chuck Ward and daughter Isken Kalsi Ward. PHOTO BY PHIL BUSBY

Siddika Demir [Distinguished Young Engineering Alumna Award]

Siddika Demir is a Six Sigma Black Belt and civil engineer at Bechtel Corporation. Demir graduated from UH with a bachelor's degree in 1993, with University Honors and Honors in major, and with a master's degree from Purdue University in 1996, both in civil engineering. Her leadership as a student was acknowledged with the Cullen College of Engineering Outstanding Student Service Award.

After starting professional life at Bechtel in Houston, Demir held various leadership positions in the Society of Women Engineers (SWE), including the presidency of the Houston Area Section in 1999–2000. She was instrumental in bringing record-breaking attendance to the annual SWE National Conference in Houston.

At work, Demir's technical and leadership skills were noticed early, and she was selected for rotational assignments. She is currently working at the headquarters office in San Francisco as a Six Sigma Black Belt, an internal consultant on work process improvements, where she leads project teams in corporate finance. Her career and extracurricular achievements were recognized by the national Distinguished New Engineer award from SWE, as well as UH Outstanding Young Alumni and Houston Engineers Week Young Engineer of the Year awards. For her professional achievements and dedicated community service, Demir was featured in the Houston Chronicle in an article titled "Engineer Makes Mission of Promoting Engineering."

With honoree Siddika Demir (middle) is her sister Semahat Demir, friends Sevim & Hayapi Balkani and husband Emre Velipasaoglu. PHOTO BY PHIL BUSBY

children, Jerry Graham, Jr. & wife, Leslie, Janet Chadick & husband, Cliff, Jeff Graham, and Joel Graham & wife, Toni; brothers, Kenneth, Frank and Paul Graham; grandchildren, Emily and Clifton Chadick, Justin, Jillian, Jade and Austin Graham.

BERNICE F. "BERNIE" SHELL, JR. (1960 BSPE) died May 17, 2003. He was at home with Nancy Lou, his beloved wife and best friend, at his side. Bernie retired in 1998 as president of Peter Paul Petroleum in Houston. He was a Life Member of the Houston Alumni Organization and a member of Arden Presbyterian Church in Asheville. He is survived by his wife, Nancy Louise Shell; his brother, Ed Shell, and wife Jane; children: Shawn Baker, and husband Don, Michael Shell, Tom Shell, Melissa Smith, and husband Billy, Scott Smith, and wife Pamela, and Susy Smith, and husband Brad; grandchildren: Ashley and Brent Shell, Austin Smith, Tim and Luke Smith, and Zachary and Parker Smith.

JUSTIN RAY KING (1971 BSME) died July 17, 2003 at the age of 53. A native Houstonian, King was a graduate of Reagan High School and UH. He worked in the oil and gas industry for over 30 years, including nearly 23 years with Arco. Most recently, King was president and chief executive officer of KEDS LLC, a company specializing in the development of hydrocarbon reservoir analysis software. He was also a deacon and usher at Second Baptist Church. He is survived by his best friend and wife of 34 years, Marilynn; parents, Mildred and Zach; daughter, Lana; son, Michael; daughter-in-law, Rhonda; and granddaughters, Cameron and Mackenzie.

EDWIN LEE TUCKER, JR. (1972 BSEE) died July 5, 2003 at the age of 58. He was employed at different places for HL&P, and the last 11 years at the South Texas Project. He is survived by his wife Wanda; daughter Veronica Tucker; granddaughter Emily; and three step-grandchildren.

PETER "PETE" WILLIAM DOBROLSKI (1980 BSCE, 1997 MA) died April 19, 2003 at the age of 46. He graduated from Power Memorial High School in New York City where he was a track and field standout. A professional engineer, Peter worked for the City of Houston for 21 years, culminating as senior assistant director. The work he completed tremendously improved the water and wastewater systems in the areas of reliability and maintainability. He then worked two years as an associate at Malcolm Pirnie, Inc. and later as a consulting engineer. He accomplished many successful projects involving effectiveness and efficiency and earned a national reputation for innovative work practices. He co-authored four books and delivered dozens of speeches on these issues. He served as assistant scoutmaster and scoutmaster for Boy Scout Troop 549 over 14 years. He is survived by his wife, Susan Dobrolski; parents, Chester and Lorraine; sister, Chris Shand; and nephew, Spencer Dobrolski, the son of his late brother Paul and Denise Dobrolski.

Key:

AeroE — Aerospace Engineering
BioE — Biomedical Engineering
ChE — Chemical Engineering
CE — Civil Engineering
ComE — Computer Engineering
EE — Electrical Engineering
EnvE — Environmental Engineering
IE — Industrial Engineering
ME — Mechanical Engineering
PE — Petroleum Engineering

CLASS NOTES & ALUMNI NEWS

CLASS NOTES

Send us your alumni news about new jobs, promotions, honors, moves, marriages, births, etc. Attach additional news clips or photos separately. Please include a self-addressed stamped envelope if you want your photos returned.

All Class Notes should be sent to:
Parameters Magazine, UH Cullen College of Engineering
E316 Engineering Bldg 2, Houston, TX 77204-4009
E-mail parameters@egr.uh.edu or visit www.egr.uh.edu/parameters

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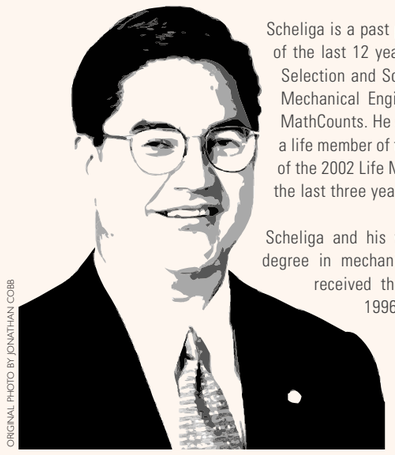
Day Phone_____
E-Mail Address _____
❒ Permission to print my e-mail address with my Class Note.
News _____

ALUMNI NEWS BRIEFS

Raymond Scheliga [Roger Eichhorn Leadership Service Award]

Raymond Scheliga graduated in 1979 with a bachelor's degree in mechanical engineering from UH after transferring in 1977 from the U.S. Naval Academy. Since graduation, most of his professional experience has been in the oil and gas industry, working for a major oil company, manufacturing companies and engineering firms. He is now a principal of Scheliga Engineering, a consulting firm. Scheliga also participated in the design and construction of both Minute Maid Park and Reliant Stadium.



ORIGINAL PHOTO BY JONATHAN COBB

Scheliga is a past president of the UH Engineering Alumni Association and has served on the board for 10 of the last 12 years. He has served on, and served as chair for, the Homecoming, Distinguished Alumni Selection and Scholarship committees. Scheliga has been the board liaison to the American Society of Mechanical Engineers (ASME) student section, a judge at the Regional Science Fair and a judge at MathCounts. He serves on the UH Department of Mechanical Engineering Industrial Advisory Board. He is a life member of the Houston Alumni Organization and serves on the HAO Board of Directors. He was chair of the 2002 Life Member Campaign and has been the public spokesman for Operations School Supplies for the last three years.

Scheliga and his wife, Beverly, who also has a bachelor's degree in mechanical engineering and MBA from UH and received the Distinguished Young Alumna Award in 1996, have a junior Cougar, Ann.

With honoree Ray Scheliga is his wife Beverly, daughter Ann, mom Mary Scheliga, (back row) friends Chris Whitney, and Lisa & Darryl Linton. PHOTO BY PHIL BUSBY

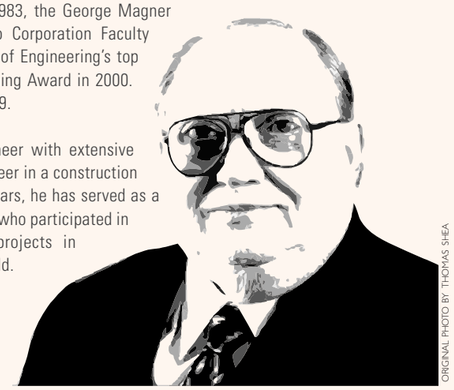
Osman Ghazzaly [Abraham E. Dukler Distinguished Engineering Faculty Award]

Osman Ghazzaly is professor and associate chair of the UH Department of Civil and Environmental Engineering (CEE). Osman received a bachelor's degree from the University of Cairo in 1958, a master's in 1963 and Ph.D. in 1965 from the University of Texas at Austin. He joined UH as an assistant professor of civil engineering in 1966 and has been on its faculty ever since. Osman also held faculty positions at the University of Cairo, Texas Tech University and part-time at Rice University.

Ghazzaly held several positions in CEE during the past 37 years, including associate chairman of undergraduate studies, director of graduate studies, undergraduate and graduate student advisor. In recognition of his accomplishments in teaching and service, he received the UH Teaching Excellence Award in 1983, the George Magner Award for Excellence in Undergraduate Advising in 1994 and the El Paso Corporation Faculty Achievement Award in 2003. He was also the recipient of the Cullen College of Engineering's top teaching award, The Kittinger Award, in 1978 and 1992, and the Career Teaching Award in 2000. The ASCE student chapter named him Professor of the Year 12 times since 1969.

He is a licensed professional engineer with extensive professional practice as a civil engineer in a construction company in Cairo, Egypt. Over the years, he has served as a geotechnical engineering consultant who participated in numerous onshore and offshore projects in Texas and other locations in the world.

Honoree Osman Ghazzaly with his wife Karina. PHOTO BY PHIL BUSBY



ORIGINAL PHOTO BY THOMAS SHEA

FIONA WOLSTENHOLME

Engineering Student Dances Her Way INTO GRADUATE SCHOOL

Dancing engineers may not be common, but Fiona Wolstenholme (2003 BSEE) won't let that stop her. She recently completed her bachelor's degree in electrical engineering and began graduate studies at the University of Houston this fall in the same field.

As Wolstenholme makes her way toward a master's degree at the UH Cullen College of Engineering, she will seek to balance her schedule to make time for her pursuit of dance.

Last summer Wolstenholme reached new heights in her artistic accomplishments when she traveled to Buffalo, New York, where her own piece of choreography was performed in the International Jazz Dance Congress—a gathering of the world's most prominent companies, dancers and choreographers of the jazz dance style.

Wolstenholme, a graduate of Clear Lake High School, is not only a performer and choreographer; she is also a dance teacher. Last summer she taught dance classes in the inner-city Houston area neighborhoods for a program called Families Under Urban and Social Attack, or FUUSA, which is a community-based nonprofit agency that provides youth prevention, adolescent and adult substance abuse treatment, supportive services to the homeless and other benefits for at-risk youths. This fall, she will be performing with a modern dance company called Psophinia.

Combining academic studies and dance studies is nothing new to Wolstenholme, who was a full-time apprentice with the Houston Metropolitan Dance Center. While pursuing her undergraduate degree, she worked 30 hours per week with dance, took classes full-time and worked part-time to support herself. Where does she find the motivation for such a busy schedule? "I want to know as much as possible and be the best that I can in everything I do," Wolstenholme says. "I like learning and growing—period."

As an undergraduate she was involved in other groups and activities at UH, including Tau Beta Pi and Eta Kappa Nu, two engineering honor societies. She was also on the Student Advisory Committee. As a sophomore Wolstenholme participated in the Research Experience for Undergraduates program, studying with Fritz Claydon, professor and chair of Electrical and Computer Engineering. It was during this time that Wolstenholme began to learn how to conduct upper level research.

"I learned how to organize my lab books, find reference materials related to a specific research topic and be proactive in the pursuit of information," Wolstenholme says. "I found that—unlike in school courses—the information you need is not at your fingertips. You may not even know what it is that you need to know! A large amount of preparatory research—such as reading other scientific papers and teaching yourself specific and necessary computer or mathematical skills—has to be done before you can even start on a project."

Wolstenholme also studied abroad during her sophomore year at UH in England, where she gave free dance classes to younger children. She said she enjoys introducing others to different types of dance, which is why she seizes every opportunity to do so, even in other countries.

"At first, I didn't like the idea of teaching dance, but now I'm enthused because I get a chance to create choreography," Wolstenholme said. "You also get a chance to impart all of the knowledge you have and at the same time, you see your own errors and can teach yourself."

Her time for teaching may be limited due to her work in the graduate program. Ironically, Wolstenholme never planned on becoming an engineer when she was younger and now she wants even more education in the subject. Wolstenholme, whose father is a thermal engineer, decided to enter the engineering program because her parents said that a scientific career was promising.

"In high school I was really good in English, and although I made A's in science courses, I really wasn't good at it," Wolstenholme said. "I wasn't even allowed in the honors math program."

This led her to fear college math courses. Despite this fear, she made all A's in UH advanced math classes. She had no problem keeping up with the other students who had taken advanced math courses in high school. "I think it's how much you put into it when you're here," Wolstenholme said.

Wolstenholme, who is happy to have chosen engineering, decided to go to UH for its diversity, proximity and affordability.

"I enjoyed the exposure to a wide range of very diverse people," she says. "I liked going to a large college where there were many people so very unlike myself. For the first time in my life, I had a close group of friends that were truly multicultural—and we enjoyed discovering things about one another's lifestyles and backgrounds."

■ *By Tara Mullee*

PHOTOS BY MARK LACY

2003 UH Cullen College of Engineering Alumni Events

Second Thursday of Each Month

Engineering Alumni Association Board Meetings
All engineering alumni are welcome
5:45 p.m.
Dean's Conference Room (E421 Engineering Bldg 2)

October 25

Engineering Alumni Association Tailgate
October 25: UH vs. TCU
5 p.m. Tailgate, 7 p.m. Kickoff
West side of Robertson Stadium, UH campus

November 8

Homecoming Brunch
Honoring engineering alumni from 1960–1969
11:30 a.m.–1 p.m.
The Commons, Engineering Bldg 1
RSVP to Adele Rena at erena@uh.edu or 713-743-4202

Engineering Alumni Association Tailgate
UH vs. Southern Miss
Tailgate cost: $15 adults, $5 kids, free under age 6
1 p.m. Tailgate, 4 p.m. Kickoff
West side of Robertson Stadium, UH campus
RSVP to Amy Bailey at ambailey@central.uh.edu or 713-743-0828

November 29

Engineering Alumni Association Tailgate
UH vs. UAB
2 p.m. Tailgate, 4 p.m. Kickoff
West side of Robertson Stadium, UH campus

For more information about any of these events, call 713-743-4200, e-mail alumni@egr.uh.edu, or visit www.egr.uh.edu/events.

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