Virginia Ayres is really small-minded. So are Syed Hashsham and Jun Nogami. These three MSU researchers, and others like them, are taking the field of engineering and breaking it down to its most base levels—down to where atom collides with atom and DNA strand clings to DNA strand. For them, understanding the minute promises nothing short of the monumental.

What's so great about being small?

When one considers the trends for electronic devices over the years—from laptops to Palm Pilots to cell phones—it should come as no surprise that small is getting to be big these days. Scaling up means sizing down.

"That's one of the big reasons why computers keep getting faster and cheaper," asserts Jun Nogami, associate professor of materials science and mechanics. "We can get more onto a single chip and use less power." Nogami says that, for the past 15 years, computer chips have doubled their capacity every 18 months—a phenomenon known in the field as Moore's Law. He is studying just how far we can go in this direction by growing atom-sized wires—yes, atom-sized—to perhaps serve as conductors in tiny circuits.

Sleeker design and less power usage are just two reasons why Ayres and colleague Dean Aslam in the Department of Electrical and Computer Engineering, and Richard Enbody and others in the Department of Computer Science and Engineering are teaming with David Tomanek in the physics department to study the application of nanotubes in flat-panel displays, among other devices. Nanotubes, named for their infinitesimal size occupying the nanometer range (10^-9 or one billionth of one meter), are hollow, carbon-based tubes that exhibit unique properties in such areas as strength and conductivity. They're also becoming the singular hot topic in engineering circles worldwide.

Environmental engineering, too, is made more powerful by going small. Syed Hashsham, assistant professor of civil and environmental engineering, is applying a new procedure in bioengineering, the microarray technique, to problems in bioremediation and microbial ecology. Through this technique, Hashsham is able to examine the gene expression of a type of bacterium that is capable of breaking down carbon tetrachloride, a suspected human carcinogen. By focusing on the microscopic, Hashsham is able to more clearly see the big picture of how a groundwater contamination problem can be cleaned up in a Michigan community.
Do-it-yourself assembly

Whether we're discussing atom-sized wires, nanotubes, or DNA microarrays, there is one unifying feature that allows engineers to work with such inconceivably small components. How small, you ask. So small that a carbon nanotube long enough to span the 250,000 miles between the earth and moon could fit inside a poppyseed. So small that researchers wonder if a wire made of atoms will have trouble squeezing through enough electrons to carry a current. So small that 10,000 genes can now be scrutinized on a one-square-centimeter chip. The feature is self-assembly.

Self-assembly is the way things naturally happen at the molecular level—where forces so strong and steadfast cause atoms to share electrons with other atoms, and messenger RNA (mRNA) to attach, nucleotide to nucleotide, to its complementary DNA strand. The engineer may set the conditions for the structures to form, but it's the structures themselves that do the forming.

"That's important," says David Tomanek, a renowned physicist who is collaborating with engineering researchers in the area of nanostructures. "Our tools are too clumsy. We can grow the structures, and we can talk about their applications, but we cannot machine them."

"I don't do anything other than put the metal atoms down and let them run around and find each other," explains Nogami about his atom-sized wires. "In this way, we can produce something that is much finer than what is produced through any of the current methods."

By "current methods," Nogami is referring to lithography, the process patterned after commercial printing where microchips are etched based on their exposure to light. Nogami explains that, although the size of features in an integrated circuit should, by logic, be no smaller than the wavelength of light, manufacturers are somehow pushing that limit.

"The latest generation of microprocessors have features that are about one-third the wavelength of ordinary light, and they want to go down to about one-tenth the wavelength of ordinary light," he says. "They're talking about something that's only about 15 atoms wide, but they don't know how they're going to get there—not to that point."

Because of self-assembly, we can get to that point. What's more, we can let nature handle the hard work, while scientists and engineers are free to concentrate on the applications.

A (micro)array of possibilities

We already know that a bacterium by the name of Pseudomonas sp. strain KC—KC, for short—has the unique ability to break down carbon tetrachloride into carbon dioxide and water. For several years, Craig Criddle, former MSU professor of civil and environmental engineering (now at Stanford University), James Tiedje, university distinguished professor in microbiology, Michael Dybas, adjunct assistant professor, and others have demonstrated this phenomenon with great success at a contaminated aquifer in Schoolcraft, Michigan.

Now, Syed Hashsham, Criddle's former post-doctoral student at Stanford and now a faculty member at MSU, wants to learn more about why it's able to do this. His hope is to apply what he discovers to other bioremediation projects at similarly contaminated sites in Michigan and beyond.

According to Hashsham, the cause for KC's unconventional behavior is buried deep within the organism's DNA—the way KC is programmed to respond when conditions are right.

To find the answer, Hashsham is employing the microarray procedure, a revolutionary technique developed at Stanford that allows scientists to determine whether the thousands of genes present on a genome are expressed or not. The premise is: Just because DNA codes for something doesn't mean it actually happens. For example, although all the cells of a eucaryotic organism carry the same genetic information nucleus to nucleus, a liver cell acts very differently than a nerve cell, or a plant's epidermal cell than a phloem cell. The differences can be attributed to the turning "on" of some genes and the turning "off" of others.

Hashsham contends that a host of other complicating factors can contribute to whether a gene is expressed or not, some factors being present in the environment itself. Furthermore, he points out that a bacterium is far more than the sum expression of its individual genes.

"It's like the game of chess," he explains. "It's made up of individual moves, which are very simple to understand; but then the whole game becomes very complex where you can't describe it by the individual steps. In terms of DNA, mRNA—all these things are very well understood. But when you look at the whole cell...we have physics laws, we have other laws; well, there are 'living matter' laws, and we just haven't figured it all out yet."

Hashsham's goal is to pinpoint which of KC's genes are being expressed under certain environmental conditions—high pH, low pH, high nitrate, low nitrate, and so on. If he succeeds, Hashsham can gain a more complete understanding of what's actually happening at the cellular level, and therefore, what conditions are necessary for KC to do its thing.

Complicating the matter is that in pure cultures, KC may act in a very predictable way; in mixed cultures, however, such as the Schoolcraft aquifer, where hundreds of microorganisms may be competing for resources, it may behave quite differently.

"If you know the genes, and you have only one culture, you can determine the expression of those genes," he says. "However, in mixed microbial populations, it's not that simple because of..."
common genes—genes that may be present in KC as well as other populations. In those cases, how do we know which organism's genes are being expressed? We want to be able to track from which microorganism the gene is coming."

With the microarray technique, everything hinges on the messenger RNA (mRNA). The reason for this is that mRNA, the string of codons transcribed from a strand of DNA, ultimately synthesizes a protein, which, in turn, carries out a specific function. By logic, the presence of mRNA tells us that a gene has been expressed and its associated function was required by the organism.

"By studying the mRNA, we're getting the message that was being processed inside the cell—what the cell was thinking," says Hashashm.

"Put another way, Hashashm is finding out what KC "knew" and when it knew it.

Starting with mRNA and working backward, Hashashm reconstructs a DNA strand—referred to as complementary DNA (cDNA)—through a process called reverse transcription. Because gene expression is determined by comparing the activities of two different test samples, he creates cDNA in this way for each sample. At this time, the cDNA is also labeled with fluorescent dye: Cy3 for the first sample and Cy5 for the second.

In the mean time, known gene sequences—amplified DNA strands from pure cultures of KC—are spotted on a glass slide like old-fashioned dot candy on paper. A single spot on a slide may contain millions of double strands of DNA, each representing all or part of one gene. With the assistance of a microrobot, thousands of genes can be precisely spotted on a slide at one time. The slide is then subjected to "hybridization," where, under specific conditions in a controlled environmental chamber, the known DNA strands are allowed to pair with the cDNA.

Gene expression is determined by comparing the degree to which the two samples' cDNA—now labeled and bound to their matching DNA—fluoresce under a laser scanner. If both samples express a gene equally, the spot fluoresces yellow; if the Cy3-labeled sample is expressed in greater quantities than the second sample, the spot fluoresces green; and if the Cy5-labeled sample is expressed in greater quantities, the spot fluoresces red. In this way, Hashashm can discern from which species, KC or another, a common gene is expressed in a mixed population, among other things.

"This technique allows us to work 1000 times faster than what we were able to do before," tells Hashashm. "That's the difference. There may be around 4000 genes in a bacterial cell, and we can look at the expression of all those genes together, as opposed to looking at only two or four or ten by other methods."

But that's just one experiment. Hashashm hopes to see microarrays and other microbiological techniques increasingly put to use in the environmental engineering curriculum.

"This is where I want environmental engineers to go," Hashashm says. "I want students who are studying environmental engineering to be able to understand molecular biology, to integrate such information with other environmental parameters for predictive purposes, and to be able to use it to protect and improve the environment."

The absolutely, positively, no-holds-barred, world's smallest wire

"And I would like to build up a knowledge about this relationship, atom by atom."

Nogami explains that at the current pace that the semiconductor industry is moving, and using current production methods, an integrated circuit will achieve its smallest possible size in approximately 2008. By building a knowledge base from the other direction—from the atomic scale up to the nanometer scale—Nogami can determine at precisely what point a group of atoms begins to function as a unit in the desired way.

"We need a paradigm shift in order to keep going the way we're going," says Nogami. "The advantage of this system is that I literally know where every single atom is. That's its attraction."

To grow the wires, Nogami lays down a vapor of metal atoms—sometimes gallium, sometimes indium or tin—on top of a silicon surface. Searching for loose, dangling electrons, the new metal atoms bind to other metal atoms as well as their adjacent silicon atoms in a pattern that is distinctively unidirectional. The result is a beautifully straight chain of metal atoms, or, as Nogami sees it, a new wire.

Nogami and his students are studying two things: first, they want to understand how materials grow atom by atom, and second, they want to measure the electrical properties for these very small
wires, as well as ultra-thin films—the kinds of components that would be incorporated into an integrated circuit.

"If we can understand the properties of the wire, then we can start doing things that will bring it closer to what's in a real device," he says.

Nogami is doubtful that a wire the width of one atom will be stable enough to be useful on a microchip. He does believe, however, that by incrementally increasing the size of wires, from one atom to two atoms to ten, he can attempt to answer the ongoing question, "How small can we go?"

"We need to figure out what the one-atom wires do or try to figure out ways of making ten-atom wires that have more of a chance to be usable in a real device," he says. "All kinds of processing steps go on in the construction of a real device," he cautions, "and the creation of these wires is just one step. They still have to survive everything else."

**Nanotubes: one-upping the buckyball**

Remember the buckyball? The carbon-based molecular structure that gained fame in K-12 classrooms everywhere when Richard Smalley, a professor at Rice University, won the Nobel Prize in Chemistry for its discovery. The problem was, as much as Tom Brokaw and Bill Nye sang its praises, no one could really tell what the buckyball could be used for. We're still trying to figure it out, in fact.

N anotubes, once considered the waste material that sat at the bottom of chambers used for making buckyballs, are being looked at with newfound respect by physicists, electrical engineers, and computer and materials scientists. What's more, their applications seem to be growing as fast as the nanotubes themselves.

In the world of carbon—to scientists, one of the truly fascinating worlds around—basic forms include graphite, flat sheets of carbon atoms; diamond, perfect tetrahedral arrangements of carbon atoms; and buckyballs, soccer-ball-like structures, the largest and most common form composed of 60 carbon atoms tightly linked together in hexagons and pentagons. Nanotubes are not a new form of carbon; they simply combine the molecular configurations of graphite and buckyballs, taking advantage of the properties of both. The tube is formed when two ends of graphite join together—like chicken wire around a post—and half a buckyball attaches at each end. Although nanotubes could feasibly grow to lengths ad infinitum, the simplest model looks something like a quilted cold capsule. Simple? Hardly.

"The synthesis of buckyballs and nanotubes generally produce very small quantities," explains David Tomanek, professor of physics at Michigan State who has co-authored papers with Smalley and Sumio Iijima, the discoverer of nanotubes. He and electrical and computer engineering associate professors Virginia Ayres and Dean Aslam are embarking on a project to grow and study nanotubes for use in consumer-related applications.

"One way to grow them is by shining a laser beam on evaporating graphite; the other is by creating a carbon arc between two graphite electrodes. Both techniques produce very little," he explains. "Only recently, however, someone produced beautiful arrays of nanotubes using a process called plasma deposition. Suddenly, people are saying, isn't plasma deposition used by those people in diamond films?"

True. And that's where Ayres and Aslam fit in. For years, they have been loyally employing this method to grow and study diamond films for use as sensors, microelectromechanical systems (MEMS) devices, and electron- emitters. In plasma deposition, a "plasma" or chemical mixture consisting of carbon-rich gases such as methane, is subjected to intense energy—sometimes microwaves, sometimes hot filaments—that converts the molecules into atoms, which, in turn, form layers of polycrystalline diamond. Already, Ayres has discovered that if she tweaks the growing conditions for diamonds in very controlled ways in these very same reactors, nanotubes will form instead.
Bart and Mike Wallace is interrogating yet another wrongdoer. Applied to FED technology, molecule-sized nanotubes would emit the electrons instead of the electron guns, with the precision of one nanotube per pixel. The result would be a television the depth of a framed print that, if Ayres and Aslam have it their way, uses far less power than present-day FED’s, where silicon does the electron-emitting.

A material’s ability to emit electrons is defined by two things: one, the electrical field at the surface (translation: the number of electrons that are buzzing around), and two, the amount of work required to coax the electrons out, called the work function.

Aslam says that for materials with high work functions, like silicon or most metals, sharp edges must be formed to amplify the electrical field at the tip. "If you use a material that has almost zero work function—and that's diamond—then you don't have to make a tip," he says. "But," he adds quickly, "if you can make a tip on top of that..."

"Better still!" volunteers Ayres jovially. "This is a good thing because to generate the field that takes the electrons out, we need a power supply, so one of the things that we want to do is reduce that power supply requirement. Otherwise, we have a thin screen, but an enormous, massive power supply. We've defeated our purpose."

For their project, Ayres will be studying the fine line that exists between diamonds and nanotubes by examining the conditions necessary for their growth. Aslam will be conducting the field-emission studies and examining some of the most pervasive questions, namely what is the principal electron-emitting mechanism, and why is emission from diamond, though low in work function, non-uniform in pattern? To Enbody, the "zero" state, to the other, the "one" state, computer memory could be derived at the smallest known scale.

"This has the potential of making a memory that's 1000 times smaller than what we have," he says.

Enbody and Toomanek's other idea, nano-Velcro, or the micro-fastener system, makes use of a nanotube's inimitable strength, 100 times stronger (and ten times lighter) than steel, and its temperature-resistance, up to 3000 degrees Kelvin (nearly 5000 degrees Fahrenheit). They are proposing a hook and loop system, similar to the Velcro flap on a tennis shoe, that uses nanotubes instead. To Enbody and Toomanek, nano-Velcro could be used to manufacture anything—from.space shuttles to micro-robots—and would require the same force necessary to form diamond to pull the two sides apart.

Exciting as the prospects are, we're still at the beginning phases—where researchers are simply trying to grow the nanotubes, to shape them, and to handle them.

Nevertheless, MSU's team is the picture of optimism. "This is about research. This is about the next century. This is where we are going," says Toomanek.

Major gift for MSU engineering advances computer-aided design

In addition to their use in field emission displays, nanotubes show promise for other applications, insists Richard Enbody, associate professor of computer science and engineering. He and Toomanek have applied for two patents that make creative use out of several of the extraordinary properties of nanotubes. One is nano-memory; the other is nano-Velcro.

"Since all computers are based on the binary system, they only have two states: you can call one of the states 'zero' and one of them 'one,'" explains Enbody. "Therefore, any computer memory, whether it's on a CD ROM, or floppy disk, or hard drive, or RAM, has two states: on and off—zero and one. That's the whole basis for computer memories." Enbody and Toomanek reason that by putting a buckyball inside a nanotube, and by getting the buckyball to slide from one end, the "zero" state, to the other, the "one" state, computer memory could be derived at the smallest known scale.

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the CAD database that is central to all these different disciplines. If working simultaneously on a problem," explains Chalou. "That is the starting point for many of the college's undergraduate degree programs. Chalou says parametric modeling not only saves time and reduces error, it makes concurrent engineering possible, for students to make use of "parametric modeling" as they undergo the beginning, however. Of greater importance is the opportunity for students to make use of "parametric modeling" as they undergo the entire design process. With parametric modeling, students can tweak the dimensions, orientation, and shape of any given feature—a.k.a. the model's parameters—and immediately witness how those changes affect the overall design. If a student opts to up the size of an engine, say, the program can either alert her that there will be interference with the hood, which she'll need to fix later, or, if the two features are linked, the program will resize the hood accordingly.

Robert Chalou, academic specialist for the Department of Materials Science and Mechanics, instructs Engineering Graphic Communications, the Unigraphics-based freshman design course for students who design and build cars capable of surmounting mogul-style hills and traversing 80-foot-deep lakes, are looking forward to putting one of the new work stations to use. According to Jeremy Short, a senior engineering mechanics major and veteran member of MSU's mini-baja team, the parametric modeling feature would have come in handy for the team as it prepared for last year's competition. "Maybe...," he smiles, "maybe."

Students also are able to test their designs, calculating such properties as fatigue, vibration, or stress and strain, and making sure the drawing will work before they actually build the prototype. Short says the new work stations will help make future mini-baja cars more competitive because students will be able to concentrate on the big picture. "Back in the old days, we'd add the front suspension, and then we'd add the back suspension, but we never really saw the car as a whole. We didn't actually see it as a car... well... until it's ever on the car."

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"This year," he adds resolutely, "with Unigraphics, we're putting everything—I mean, every nut and bolt is going to be drawn before its ever on the car."

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Industry representatives contend that with the new 3-D solid modeling software, students will graduate with a more thorough understanding of the entire manufacturing process, from design, to analysis, to production, thus making students more marketable to employers. For Short, however, the more immediate question is, Will the high-end software and hardware help MSU garner the number one spot during this year's competitions? "Maybe...," he smiles, "maybe."
MSU graduates join profession’s elite in National Academy of Engineering

MSU graduates Bernard I. Robertson (MBA ’76) and Ronald K. Leonard (M SAE ’58) have been named members of the National Academy of Engineering for 1999. The two men were honored at a ceremony that took place this past October in Washington, D.C.

"That was really the first formal business training I'd ever had," he says. "The role of the engineer in this industry has changed a lot over the years. The technical emphasis is still as high as ever, but there is a lot more emphasis on being a businessperson: knowing the cost of components for your system, understanding the economies of scale, knowing business ramifications, understanding intellectual property—a lot of things that weren't traditionally part of the engineer's role."

Robertson points to his work on exhaust emissions and turbochargers for mainstream cars as two of his most noteworthy achievements. He adds that he has witnessed many changes in automotive engineering during his years with Chrysler, and now DaimlerChrysler.

"The thing that I worked on when I first started that were cutting edge are now in a museum," he laughs. "And the field of electronics—we had no electronics on vehicles until 1977. Now, gosh, we can hardly do anything without them."

Robertson says that one of the biggest changes in the automotive industry is its reliance upon teams versus individuals to carry out a project. "The mentality is that it does not do any good for an individual to succeed unless the whole team succeeds," he says.

Robertson, originally from Worcester, England, joined the Chrysler Corporation immediately out of college as part of a company program that allowed him to work and study in the United States. Although he returned to England to share his newfound expertise in reducing exhaust emissions, Chrysler soon called him back to the states to continue his exhaust work here. He went on to earn an MBA from Michigan State in 1976.

Leonard describes his recent honor with remarkable humility: "Here I was, a kid from the country, who went to Iowa State and Michigan State, and who worked—not in research, not in fiber optics or space exploration—but toward the solution of ordinary, everyday problems."

"Getting this recognition for those things is really satisfying," he says.

Bernard Robertson, senior vice president of Engineering Technologies and general manager of Truck Operations for DaimlerChrysler, was equally thrilled with his selection.

Leonard, who has a bachelor's degree from Iowa State, describes his graduate study at Michigan State as the most defining educational experience he’s had. "It was a stimulating, creative, innovative type of environment—where you could do your thing, yet always under the watchful eye of your major professor."

Surprisingly, Leonard and his major professor, Wesley Buchele, have maintained their friendship for 40 years. "He still keeps looking over my shoulder and giving me all kinds of advice!" Leonard laughs.

Despite his successes, Leonard describes his recent honor with remarkable humility: "Here I was, a kid from the country, who went to Iowa State and Michigan State, and who worked—not in research, not in fiber optics or space exploration—but toward the solution of ordinary, everyday problems."

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Other Michigan State University alumni who are members of the NAE include: Thomas W. Dakin (M S ’38—deceased), Essex E. Finney, Jr. (PH DAE ’63); Robert B. Fridley (PH DAE ’73); Ronald E. Goldsberry (M S Chemistry ’66, PH D Chemistry ’69); Edward E. Hagenlocker (M BA ’82); Carl W. Hall (PH DAE ’52); Donald B. Keck (BS Physics ’62, M S Physics ’64, PH D ’67); Benson Lamp, Jr. (PH DAE ’60); Christopher L. Magee (M BA ’79); William F. Marcuson III (M SCE ’64); Morton B. Panish (M S Chemistry ’52, PH D ’54); Robert J. Schultz (BSM E ’53, M BA ’69); William E. Splinter (M SAE ’51, PH DAE ’55); Robert C. Stempel (M BA ’70); and Jaw-Kai Wang (M SAE ’56, PH DAE ’58).

The National Academy of Engineering, originating in 1964, is a member of the National Academies, which includes the National Academy of Sciences, the Institute of Medicine, and the National Research Council. Election to membership is one of the highest professional honors an engineer can receive. Members have distinguished themselves in business and academic management; in technical positions; as university faculty; and as leaders in government and private engineering organizations. There are currently over 2,000 members.
Imagine “noodling” with a Nobel Laureate, or going tête-à-tête with a celebrated “techno-wonder.” Intriguing as it may seem, most of us would envision the conversation to be heavily one-sided—like talking to someone who has all the answers.

Not so, says Janie Fouke, dean of MSU’s College of Engineering and editor of the newly published book Engineering Tomorrow: Today’s Technology Experts Envision the Next Century. According to Fouke, today’s greatest technological minds have definite views about the future, but they also have a lot of questions—the heartfelt, introspective kind.

In Engineering Tomorrow, Fouke and co-authors Trudy E. Bell and Dave Dooling compile the opinions, reflections, and musings—some earnest, some amusing—of 50 of the world’s most eminent researchers about the social impact of present-day and future technology. (A total of 100 researchers were interviewed for the project.) Their remarks are profound and sometimes surprising.

“I didn’t expect so many of the experts to focus on environmental matters, but that area turned out to be a big concern for many of them,” Fouke notes. In addition to a chapter on the environment, Engineering Tomorrow includes chapters on such consumer-relevant matters as communications, entertainment, medicine, transportation, exploration, defense, and education. In a separate section, the book covers infrastructure issues, including structures and devices, systems and management, and computers and software.

Another strongly emergent, if not surprising, message of the book is the contrast between how science is funded today and how it was funded decades ago. Many of the senior scientists voiced concern that today, funding sources seek fast answers to short-sighted questions, as opposed to years ago, when research was supported for research’s sake.

“You can never tell when you’re halfway to a discovery,” says Fouke, who asserts that our most modern technological advances are based predominantly upon research that was performed back in the 1950s.

Engineering Tomorrow includes thought-provoking discussions from such visionaries as co-inventor of the Internet Vinton G. Cerf (ironically, pronounced “surf”), Wilson Greatbatch, inventor of the implantable pacemaker, and Charles H. Townes, co-winner of the 1964 Nobel Prize in physics for inventing the technology that led to the laser. The questions they pose are of the variety that could inject life into a middle school classroom discussion or a casual dinner party: What is the most environmentally sound way to dispose of consumer electronic products? How can we ensure that technology is humane and not inane? Will cars ever have jet fighter controls? Will humans live in cities floating on the oceans? How can we reduce the body count from war?, and If you could “uninvent” a technology, what would it be? (Roger D. Pollard, an expert on microwave semiconductor devices, does not supply the most predictable response to this last question— nuclear weaponry; to Pollard, the technological nemesis to society is spreadsheet software!)

Fouke’s book is an extension of her philosophy about all things scientific: make it understandable so that no one is left out of the discussion.

“It’s our responsibility to explain to other people why our work is important,” she says, her voice suffused with emotion. “If our grandmothers can’t understand it, then how can we expect our neighbors to support our efforts in research and education, much less the government to appropriate funding for it?”

Engineering Tomorrow: Today’s Technology Experts Envision the Next Century is published by IEEE Press, the book publishing arm of the Institute of Electrical and Electronics Engineers, Inc. Proceeds are donated to the IEEE Foundation to fund the organization’s efforts in student education, from K-12 to college levels. To Fouke, advancing student education, through the book’s message as well as its proceeds, are perhaps the most important aspects of the project.

“When you have people of this stature talking about things we as a society practice and believe, it’s a rare opportunity indeed,” she says. “And we’ve been able to capture these values and beliefs so that students today can better understand what the issues are and make more enlightened decisions as a result.”

College seeks email addresses

The College of Engineering would like to send periodic updates of college activities to our alumni via email. Please send us your email addresses at:

addressupdate@egr.msu.edu

Janie M. Fouke

The College of Engineering would like to send periodic updates of college activities to our alumni via email. Please send us your email addresses at:

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George Van Dusen, former assistant dean for undergraduate studies and interim dean of engineering, is retiring after 35 years of brilliant service to all who hold an undergraduate degree in engineering from Michigan State University.

After receiving a bachelor’s degree in education from Indiana State University, and master’s degrees in education from Indiana State and Purdue Universities, Van Dusen joined the College of Engineering in 1964 as assistant to the dean. At Michigan State University, he continued his educational endeavors, earning a Ph.D. in educational administration in 1969.

Van Dusen initiated some of the college’s foremost programs, including the academic advising program, honors program, Cooperative Engineering Education Program, and Residential Option for Science and Engineering Students. In 1968, he helped establish the Engineering Equal Opportunity Program (now Diversity Programs Office) by creating the first minority scholarship; in 1973, he started the Michigan State University chapter of the Society of Women Engineers.

“I was given the freedom and the flexibility to start those programs,” recalls Van Dusen, when asked how he was able to achieve such success. “I was given the support to do it and the encouragement to do it and the resources to do it.”

Van Dusen has been instrumental in charting the undergraduate curriculum at the college and university levels. He served on MSU’s Committee on Undergraduate Education and semester-transition committee, and helped create the engineering arts program and the biomedical engineering option in the Department of Materials Science and Mechanics. Recently, he led a college effort to restructure degree programs to comply with guidelines set by the Accreditation Board for Engineering and Technology.

Throughout his career, he adamantly pledged his allegiance to the thousands of students who aspired to become practicing engineers.

“I really wasn’t interested in getting away from the students and faculty,” he says, describing a time in his career when he had to decide whether to stay in the college or try for higher administrative posts at the university. “That’s not my make-up. I’m more interested in being where the action is.”

Van Dusen and his wife, Gloria, live in Williamston, where they run a flourishing antiques business. They’ll celebrate retirement in regal style with a trip to Greece this spring.

Ford donates $5 million to automotive research

A contribution from the Ford Motor Company Fund totaling $5 million over five years will support construction of two new facilities at Michigan State University that will enhance MSU’s research capabilities in areas critical to the automotive industry.

The grant will be used to build two laboratories located within MSU’s Biomedical and Physical Sciences Building, which is currently under construction. The Ford Materials Research Laboratories will house the National Science Foundation Center for Sensor Materials and the Center for Fundamental Materials Research. These laboratories will support basic research on chemical and physical sensing materials for automotive and other applications. The Ford Physical Sciences Instructional Laboratory will be used to teach undergraduate students in the new facility.

The contribution also will be used to construct the Ford Engine Dynamometer Laboratory, which will be part of a new structure to house the Automotive Research Experiment Station (ARES). This new laboratory will enable students and researchers to study the emissions and performance of new engines, including those that operate on alternate fuels, as well as the performance of fuel cells.

“Ford and the automotive industry have always been leaders in collaborating with universities to advance research and education in automotive engineering and technology,” said MSU President Peter McPherson. “With this contribution, the Ford Motor Company continues to play a critical role as a leader in supporting research that will benefit our graduates, the automotive industry and other areas of scientific research.”

“O ur continued collaboration with Michigan State University is truly a win-win situation,” said Daniel Coulson, Ford director of accounting and Ford Motor Company executive sponsor for MSU. “Not only are we contributing to research that will lead to improvements in the auto industry, we are also helping to further the educational mission of the university.”

“As we continue planning for our next capital campaign, Ford Motor Company has stepped forward from the start with a significant leadership gift,” said Charles Webb, MSU vice president for university development.

“We appreciate our long-standing partnership with Ford.”

In addition to this contribution, Ford Motor Company will continue its ongoing support to the university and its students through a wide variety of scholarship and fellowship programs. Ford also provides assistance for study abroad programs, actively supports MSU’s Executive Education program, and collaborative research efforts. Ford is a major recruiter of MSU graduates and presently employs approximately 2,300 MSU alumni.
Alumni Patents

In the summer, 1999, issue of Currents, we asked alumni who had ever been awarded a patent for an innovation that they conceived or helped conceive to send in that information. The response was overwhelming. Graduates from as early as 1926 reported patents for such era-defining inventions as coated wire, an air-conditioning system, an ice maker, a xerographic developing apparatus, a system to communicate digital data by telephone, and a superconductor transmission line. What follows are the technological contributions of some of MSU’s inventive alumni. Companies who are assigned all or part of the inventions listed are included in parentheses following the individual’s name.

(8) Orville Adler, BSCE ’33—Copper clad wire and method of preparing same (1943); coated wire (1943); electrodeposition copper upon steel wire (1947); rubber-coated steel object (1948); method of operating continuous electroplating system (1951); brass-plated, rubber-adherent steel wire (1959); reinforcing wire (1960); method of making filters (1966).


(6) Thor G. Bank, BSEE ’41—Multi-phase trip indicator with common reset (1955); thermal trip device (1956); switching device with L-shaped contactor bar (1957); cover interlock assembly (1958); shading coil and guide bearing (1959); time delay device for circuit breakers (1959).

(1) Donald E. Buckley, BSME ’72—(Eaton Corporation) Enhanced fan and fan drive assembly (pending).

(4) Rick L. Bunch, BSEE ’72—Permanent protective cover (1992); normal direction heater for compressor crankcase heat (1993); positive temperature coefficient start winding protection (1994); suction accumulator assembly (1998).


(6) Thor G. Bank, BSEE ’41—Multi-phase trip indicator with common reset (1955); thermal trip device (1956); switching device with L-shaped contactor bar (1957); cover interlock assembly (1958); shading coil and guide bearing (1959); time delay device for circuit breakers (1959).

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(1) Donald E. Buckley, BSME ’72—(Eaton Corporation) Enhanced fan and fan drive assembly (pending).


(2) Scott Christy, BSEA ’82—Roller contact switch and smart book using same (1997); multi switch/membrane switch assembly (1997).

(26) William E. Clark, BSME ’54—(Carrier Corporation, Cooper Industries) Anti-surge control for fluid compressor (1963); refrigeration apparatus (1966); apparatus for controlling refrigerant flow in a refrigerating machine (1966); refrigerant flow control including refrigerant agitation (1967); apparatus and method for controlling refrigerant flow in a refrigerating machine (1967); refrigeration machine and method of operation (1968); air conditioning system (1976, 1977); regulator for a damper assembly (1979); system powered damper blade assembly for use in an air conditioning system (1980); VAV terminal local control loop (1984); method of operating a variable volume multizone air conditioning unit (1985); thermostat transducer (1985); variable volume multizone unit (1985); air terminal—air handler interface (1985); thermostatic transducer (1987); method for controlling an air distribution system using delta-T (1990); differential temperature control (1996); insulating liner for an electrical public assembly (1992); electrical plug assembly (1992); co-authored six additional patents.

(4) Janice E. Coté, BSEE ’80—Auxiliary folding seat hinge arrangement (1987); vehicle backrest attachment arrangement (1990); attaching arrangement for vehicle cushion (1984); one-piece actuation button for vehicle seat recliner (1992).

(3) Jerry Dagher, BSEE ’82—Multi-port LAN switch for a token ring network (1997); system and method for transporting high-bandwidth signals over electrically conducting transmission lines (1996); multi-data rate selectable equalizer (1991).

(1) Nicholas M. Esser, Jr., BSEE ’68—System for communicating digital data on a standard office telephone system (1988).


(1+) Ronald J. Fredricks (formerly Fedorowicz), BSEE ’63, MSEE ’64—Opto-electronic aid for alignment of exterior vehicle mirrors to minimize blind-spot effects (1997); authored other patents but they are assigned to industry; continuation-in-part pending on automotive mirror.

(3) Larry A. Gildea, BSME ’86—(Zenith Data Systems, IntelliMedia Corp., Resources, Inc.) Drive platform assembly with rotatable mounting; digital presentation system for displaying; all sports training tether for a ball.

(6) Charles A. Hansen, BSME ’66, MSME ’67—Tank wagon (1972); back hoe swing arm cylinder hydraulic circuit (1980); adjusting mechanism for tractor linkage (1987); method of controlling clutches (1992); compound steering mechanism (1994); power shift transmission with overlapping ranges of ratios (1994).


(3) William R. Hunt, BSEE ’42—Wire tensioning device (1950); bearing support and lubrication arrangement for use in a dynamoelectric machine (1965); rotating machines having end thrust cushioning arrangements (1974).

(1) Clyde M. Hyde, BSEE ’55, MSEE ’56—Sideband intermediate frequency communications system (1962).

(1) Philip A. Lenton, MSCE '43—Method of making carboxyalkylcellulose ethers (Canadian patent, 1957).


(9) Harold S. Mawby, BSEE '57—Sound attenuating air discharge terminal device (1970); refrigerator door hinge (1985); ice door mechanism (1985); ice maker (1986, 1987, 1987); ice dispensing mechanism (1986); refrigerator compressor mount (1990); refrigerator mullion construction (1990); refrigerator door construction (1994).

(1) Barbara Parcells, BSME '93—(Hewlett-Packard) Gas flush to eliminate residual bubbles (1999).

(44) Delmer G. Parker, BSEE '55, MS Physics '60—(Xerox Corporation) Switching detector (1972); AC corona charging device (1973); developing apparatus (1975); electrostatic development method using magnetic brush configuration transport (1975); corona current measurement and control arrangement (1975); extension of xerocography to full color printing employing additive RGB + K colors; developer housing heater using a centrally heated mixing auger; xerocography tandem architectures for high speed color printing; switchable dual wavelength flood lamp for simplified color printing architecture based on xerography; development combination exposure and recharge scheme to eliminate development defects in two pass process color xerocography; optically switched commutator scheme for hybrid scavengerless segmented electroded donor rolls; scavengerless development apparatus including an electroded donor roll having a tri-contact commutator assembly; development scheme for three color highlight color tri-level xerography; donor rolls with capacitively cushioned commutation; donor rolls with magnetically coupled (transformer) commutation; commuting method for SCD donor roll bias; means for controlling tri-level inter-housing scorotron charging level; optical switching scheme for SCD donor roll bias; pre-transfer treatment to increase transfer latitude in tri-level xerography; compact magnetic bead pick-off device; hybrid development scheme for tri-level xerography to black plus two colors; selective pre-transfer corona transfer with light treatment for tri-level xerography; preferred toner/carryer properties; adaptive bias control for tri-level xerography; white level stabilization for tri-level imaging; tri-level xerography using a MICR toner in combination with a non-MICR toner; highlight color imaging apparatus (2); single pass highlight color printer including a scavengerless developer housing; tri-level highlight color printing apparatus with cycle-up and cycle-down control; developer apparatus for a highlight printing apparatus; ramped developer biases; highlight color printer; magnetizing apparatus for a magnetographic printer; development system; method for developing latent electrostatic images; magnetic mixing apparatus and process; magnetic microfield donor system; magnetic brush crossmixing system; developer roll; spatially programmable electrode-type roll for electrostatographic processors and the like; arrangement for stabilizing corona devices; coated roll for magnetic brush development and cleaning systems.

(1) David W. Pierce, BSMET '49—Fume-collecting hood for electric furnace (1960); a system for measuring the length of rolling-mill product (1962).


(2) David W. Pierce, BSMET '49—Fume-collecting hood for electric furnace (1960); a system for measuring the length of rolling-mill product (1962).


(16) Gerald R. Stanley, BSEE '65—High-power, high-fidelity solid state amplifier (1970); graphic equalizer circuit (1973); high power bridge audio amplifier (1974); low-level preamplifier circuit (1979, 1980); thermal protection circuit for the die of a transistor (1982); oscillator having a sixteen-bit signal generation utilizing an eight-bit processor (1986); grounded bridge amplifier protection through transistor thermo-protection (1986); method of fault sensing for power amplifiers having coupled power stages with normally alternate current flow (1987); switchable DC power supply with increased efficiency for use in large wattage amplifiers (1988); sixteen level power supply with asynchronous controller (1991); slow rate control in a multi-level switch (1995); switch-mode power supply for bridged linear amplifier (1996); opposed current power converter (1997).

(1) William D. Staples, BSEE '49—Method and means for testing inductors (1950).

(3) Clinton Stroh, BSAE '79—Feed reverser for a combine header (1987); tractor hydraulic reservoir heating element (1997); front steer axle beam (1998).


(8) Ernest J. Tauch, BSCE '26—Process for the production of chlorosulphonates (1940); sulphuric acid manufacture and apparatus therefor (1942, 1946); manufacture of sulphamic acid (1946, 1946); process for producing ammonium sulfamate (1947); process for copolymerizing maleic anhydride and styrene (1949); two-stage process for sulfamic acid manufacture (1958).


(7) Larry R. Wright, BSEE '65—Transmission time limiting (1969); power amplifier including plurality of transistors operating in parallel (1969); noise blanker circuit including rate bias and rate shutoff circuitry and audio blanking (1972); impulse noise blanker including broadband level sensing (1973); audio frequency squelch system (1975); blanker inhibit circuit (1977); radio receiver blanker gate (1980).
David A. Becker, BSCE ’86, was appointed to regional engineer–design, for the western region of the Norfolk Southern Railway Company. He is responsible for the railway’s civil design group, and manages New York, Pennsylvania, Ohio, Illinois, Indiana, and M ichigan.

Donald R. Borchardt, BSME ’59, is retired from his position of engineering program manager for Boeing Space and Communications in Anaheim, California. Borchardt is now doing independent consulting in ocean engineering and system safety.

Navy Ensign Leo S. Bourque, BSCE ’98, recently graduated from Basic Civil Engineer Corps Officer School in Port Hueneme, California. Bourque received instruction in engineering management, network analysis, financial management, and the navy’s organization.

Richard L. Bracci, BSEE ’72, has been named to the board of directors for Giffels Hoyem Basso, LLC, in Troy, M ichigan. Bracci is vice-president and director of electrical engineering, and has managed the design and implementation of technology systems in over 3100 interactive classrooms. Bracci and his wife M are reside in Sterling Heights, M ichigan, with their children John, 19 (who attends M SU ), and M att, 22.

Butch Braun, BSEE ’76, was appointed plant superintendent of Consumers Energy’s D.E. Karn Units one and two near Essexville, M ichigan. Braun, a 23-year Consumers Energy employee, is responsible for the operation, maintenance, and performance of the two units, which generate up to 500 megawatts of electricity. About 100 employees are assigned to the coal-fired units.

James E. Bruinsma, BSCE ’93, and Paula K. Dynda, BSCE ’97, have been named project engineer and transportation engineer, respectively, with the firm Finkbeiner, Pettis & Stout, Inc., in N ov i, M ichigan. Bruinsma was honored last year as a recipient of the K. B. Woods Award for best research paper in construction technology by the National Transportation Research Board. Dynda is experienced in surveying, materials testing, and traffic data collection.

Navy Lieutenant j.g. Ivan A. Finney, BSME ’94, took part in a six-month deployment to the Mediterranean Sea, Arabian Gulf, and Adriatic Sea last year while assigned to the aircraft carrier USS Enterprise. During the deployment, Finney’s ship participated in two high-profile operations: Operation Southern Watch, to enforce N AT O sanctions against Iraq and to monitor the no-fly zone there, and O peration D esert Fox, a 70-hour assault on Iraqi military targets.

William R. Fleury, BSME ’74, is president of Controlled Project Management, Inc., which currently provides services for Consumers Energy and D etroit M edical Center. Fleury reports that he has enjoyed an exciting career covering nuclear power, fossil fuel power, pharmaceuticals, and various other projects across the United States. He and his wife Pam have four sons: Brandy, 26; Corey, 21; N icholas, 16; and Benjamin, 14. Fleury’s son N icholas is an auto racing enthusiast, who, at the age of 15, routinely won feature and heat races for super mini-trucks during Dixie M otor Speedway’s 1999 season.

David Godshall, BSCE ’95, earned a master’s degree in chemical engineering from Virginia Polytechnic and State U niversity, and is now pursuing his doctoral degree there.

Robert T. Gorski, BSCE ’94, is a design engineer with BRW, Inc., and working with a team on the reconstruction of M-39. The American Consulting Engineers Council and M ichigan Concrete Paving Association are honoring the team for work they performed on the design and construction of I-275.

Richard L. Graham, BSCE ’59, recently retired from his position as corporate director and chairman of Professional Engineering Associates, Inc., in Troy, M ichigan. After graduating from M SU , Graham worked for the city of Lansing, and later, the city of M ount P leasant, where he served as a city engineer until 1964. He then moved to the city of Troy, where he was director of public works and city engineer until 1980. Graham has been leading Professional Engineering Associates for the past 19 years. The company will be managed by Joseph M. Muller, John C. Seelbach, BSCE ’79, and Wendy E. Graham, one of Graham’s two daughters. Graham’s other daughter, Jill Graham Morena, BSCE ’79, works with M DOT as an engineering specialist in litigation and risk management.

James Grant, BSCE ’92; MSCE ’96, was named the recipient of the first ASCE (American Society of Civil Engineers) “O utstanding Young Civil Engineer” award. Grant performs environmental remediation and geotechnical design engineering with N TH Consultants, Ltd., in Detroit.

John A. Holmstrom, BSCE ’83, has been named vice-president–chief estimator, for The Christina Company, a Lansing-based construction services firm. Holmstrom, who has been with Christina since 1987, will be responsible for overseeing all of the company’s hard dollar and conceptual estimating pursuits. With branch offices in Grand Rapids and Ann Arbor, Christina is managing projects in 27 states. Projects include Michigan State University’s Biomedical and Physical Sciences Building and GM’s national dealership image program.
Fraser S. Howe, Jr., BSCE '74, is project manager for Gee & Jenson Engineers, Architects, Planners, Inc., in Maitland, Florida. He was recently named president-elect of the East Central Florida Branch of the American Society of Civil Engineers.

Sam Jenio, BSME '69; MBA '80, is vice-president of customer development for TRW, Inc., Chassis Systems in Sterling Heights, Michigan. Jenio is responsible for sales, program management, and applications engineering for all worldwide activities.

Ian MacKellar, BSCHE '91, is a production engineer with Pharmacia and Upjohn in Kalamazoo, Michigan.

Paul McNally, BSME '50, worked for McNally Pittsburg M Manufacturing (MacPitt) in Pittsburgh, Kansas, beginning in August, 1950. McNally was an expert tool designer, coordinator of a preparation plant in India, and a contract engineer.

James H. Oliver, MSME '81; PHDME '86, was honored this past November by ASM E International (the American Society of Mechanical Engineers) for outstanding achievement in mechanical engineering. He received the Gustus L. Larson Memorial Award, which was established in 1974 to honor the ASM E Fellow and founder of Pi Tau Sigma. Oliver, who is on leave from his associate professor position at Iowa State University, serves as director of product development at Engineering Animation, Inc. (EAI). EAI is a software company, with approximately 1000 employees, that specializes in visualization tools to facilitate enterprise-wide communication.

Wendy Worth Pickard, BSEA '88, is director of clinical product management for Electronic Healthcare Systems (EHS), a point-of-care software company focused on the ambulatory care market, in Birmingham, Alabama. She and husband Todd Pickard (also an MSU alumnus) have one daughter, Katelyn, who is two years old.

Michael D. Schwartz, BSCE '95, has joined the law firm of Baker & Daniels as an associate resident in the Fort Wayne, Indiana, office. Schwartz, a member of the intellectual property team, represents clients in the preparation and prosecution of U.S. patent applications.

Kevin A. Singel, BSEA '85, was recently promoted to director of applications at Andersen Consulting, in Denver, Colorado. He is currently working in business process management at Cyprus Amax Minerals.

Joseph F. Sovis, BSEE '92, opened a new engineering firm in Lansing that specializes in mechanical and electrical engineering services for facilities. Sovis is vice-president and owner of M atrix Consulting Engineers, Inc.

James P. Steiger, BSCE '75, has joined Delphi Technologies, Inc., as a technology leasing executive. Steiger is responsible for out-licensing of Delphi's intellectual assets, as well as protecting them from unauthorized use. Steiger invites alumni to contact him at james.p.steiger@delphiauto.com.

Raymond Tadgerson, BSCE '73; MS Sanitary Engineering '78, president and CEO of Capital Consultants, Inc., Engineers (CCE) of Gaylord, Lansing, and Grand Rapids, was honored by the Foundation for H aslett Schools with its annual Inspiration Award. Tadgerson directs the "Lansing Works, Keep GM !" campaign, and has served on the Department of Civil and Environmental Engineering Board of Visitors. In 1996, he was named "Engineer of the Year" by the Grand Valley Chapter of the Michigan Association of Professional Engineers.

Mark W. Taylor, BSME '78, was named manager of engineering systems—bearings in the Timken Corporation, Canton, Ohio. Taylor started his career with the company in 1978 as an associate engineer.

Lawrence T. Wong, PHDME '70, has become chief executive of The Hong Kong Jockey Club after concluding a 32-year career with Ford (Lio Ho, Taiwan) in 1995. The Hong Kong Jockey Club is a not-for-profit organization with over 4500 full-time employees and an annual turnover of U.S. $12 billion.

OBITUARIES
Donald S. Boston, Sr., BSCHE '37, died on June 23, 1999, at the Fort Walton Beach Hospital in Florida. Boston was a member of Alpha Chi Sigma and Phi Lambda Tau fraternities.

B. F. Sandy Coggan, BSEE '39, died on August 22, 1999, at the age of 81. Coggan's venerable career in aerospace included becoming chief development engineer for the B-29 bomber at General Motors, and later, vice-president and general manager of Convair, where he oversaw a 45,000-person workforce in the production of military and commercial aircraft and missiles. Coggan was the recipient of the first M SU Distinguished Alumnus Award in 1959.

Ray C. Edwards, BSME '42, died April 28, 1999, at the age of 79. He was a member of Tau Beta Phi and Phi Lambda Tau fraternities, as well as ASM E. He worked as manager—engineering of the Mining Systems Division at Allis Chalmers until his retirement in 1983.

Karen Hayes, MSENE '94, died in May, 1999, in Seattle, Washington, at the age of 29. Hayes, a former resident of Hamburg, New York, was employed with Black and Veatch, an international engineering company in Seattle.

Eugene J. Lenar, BSME '52, passed away at the age of 77 in June, 1999. Born in Muskegon, Michigan, Lenar was vice-president of technical services for Pelton Casteel in Milwaukee, Wisconsin, before he retired. His wife Mary notes that he remained a loyal Spartan football fan.
Faculty and Student Honors

Bruce Dale serves as presidential adviser in bioproducts

Bruce Dale, professor and chairperson of Michigan State University's chemical engineering department, is playing a lead role in advancing the use of agricultural and other biological resources for energy, and industrial and consumer products. Dale shared the podium with President Clinton at the Presidential Event on Bio-Energy and Bioproducts held last August at the U. S. Department of Agriculture.

Dale's expertise and advice were also requested by Senator Richard Lugar (R-Indiana) in drafting the National Sustainable Fuels and Chemicals Act (S.935), now being considered in Congress. These bills authorize a major national research effort to develop the scientific and engineering knowledge that will allow us to economically use agricultural and forestry products to meet many more of our needs.

CSE graduate is Outstanding Female Undergraduate Student

Natalia Hernandez-Gardiol, computer science and engineering graduate, was honored with the Computing Research Association (CRA) Outstanding Female Undergraduate Award 2000. The CRA annual awards program recognizes undergraduate students who show outstanding potential in areas of importance to computing research.

Hernandez-Gardiol was selected based on her undergraduate research in artificial intelligence and work in several MSU labs. She developed two components for an identification system for the Pattern Recognition and Image Processing Lab and created a visualization tool for robots in the Genetic Algorithms Lab and the Autonomous Agents Laboratory. Hernandez-Gardiol will receive her award and $1,000 cash prize at a conference later this year.

Engineering faculty honored by university

On Tuesday, February 15, Michigan State University's annual awards convocation was held to honor faculty who demonstrate excellence in research, teaching, and community outreach.

Herman Hughes, professor of computer science and engineering, was presented the Distinguished Faculty Award for his recognized leadership in high-speed network traffic management and modeling. Hughes has designed schemes for addressing quality-of-service issues central to Asynchronous Transfer Mode (ATM) network technology.

Neeraj Buch, assistant professor of civil and environmental engineering, and Sridhar Mahadevan, assistant professor of computer science and engineering, were presented Teacher-Scholar Awards for their skill in the classroom and their scholarly promise. Buch is praised for introducing effective new teaching techniques and exploring instructional innovations that guide students to become active and self-directed learners. In addition to his excellence in the classroom, Mahadevan has been tremendously successful with his research in artificial intelligence, initiating four multi-million-dollar research projects that unite faculty from the Colleges of Engineering, Natural Science, and Social Science.

Cloud receives Frocht Award

The Society of Experimental Mechanics (SEM) honors committee has unanimously selected Gary Cloud, professor of materials science and mechanics, as the winner of the 2000 Frocht Award. The Frocht Award acknowledges the outstanding achievement of an educator in the field of experimental mechanics.

Cloud uses optical and electronic techniques to solve problems in geomechanics, biomechanics, composites, fracture mechanics, fastening, and nondestructive evaluation.

Cloud, a past president of SEM, will formally receive the award at the SEM 2000 Spring Conference, to be held in Florida.
Alumni were in full force and decked in their green and white for activities held by the Office of Development and External Relations this past fall.

A golf outing sponsored by alumni in west Michigan was held September 22, 1999, at Egypt Valley Country Club in Ada, Michigan. Over 80 people attended, raising $16,860 for the West Michigan College of Engineering Alumni Scholarship Fund.

On October 9, alumni supporters who belong to MSU's giving clubs were invited to a breakfast celebration before the start of the MSU versus University of Michigan football game. Attendees enjoyed sharing stories about their years at MSU, and hearing from students and faculty about the positive ways that their gifts are being used. After the celebration, the group proceeded to Spartan Stadium, where MSU defeated U of M 34–31.

Koenig, Pierce establish endowed professorship

Roger Koenig, BSEE ’76, and his wife Nancy Pierce have donated approximately $1.5 million to the Department of Electrical and Computer Engineering to create a new endowed chair professorship. Koenig, the son of Herman Koenig, professor emeritus and former electrical and computer engineering department chairperson, has named the Dr. Herman E. and Ruth J. Koenig Electrical and Computer Engineering Endowed Chair in honor of his parents. By doing so, Koenig is recognizing his father’s past scholarly and academic leadership contributions and both parents’ long-term devotion to MSU and the electrical and computer engineering department.

Currently Koenig and Pierce are CEO and CFO, respectively, of a relatively new, very successful company called Carrier Access Corporation, in Boulder, Colorado.

Charles Moore leaves legacy to engineering library

Charles Moore, a 1935 chemical engineering graduate and a longtime supporter of the College of Engineering, passed away this past winter.

Moore, a retired farmer in Toledo who always valued libraries, had donated $62,000 in September to help make physical improvements to the Anibal Engineering Library.

“We have been here for over ten years, and things tend to get worn with the number of students that come through here,” says Tom Volkening, library administrator. New carpeting and compact shelving to allow more books to be placed in one area are firsts on Volkening’s wish list for the library.

“We always said, ‘Wouldn’t it be nice if we could...’ but we never expected to get such a substantial donation,” says Volkening.

In addition, Moore established a multimillion-dollar trust that will also be used toward the library.
Let Us Hear From You!
The College of Engineering and your former classmates are interested in you. Please keep everyone informed. Fill out the form below and return it along with any photos, news clips, or press releases to: Currents Editor, Office of Publications and Public Relations, 3412 Engineering Building, Michigan State University, East Lansing, Michigan 48824-1226.

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Credits
Editor: Jenny Cotner
Photographers: Mark Bell, Bruce A. Fox

Currents is a tri-annual publication of the College of Engineering at Michigan State University.