from Crops to Wheels

ALTERNATIVE ENERGY RESEARCH at MICHIGAN STATE UNIVERSITY
You will discover that we have made some changes to Currents Magazine — in both design and content.

With this new format, each fall issue will focus on a key area of research taking place in the College of Engineering. This issue showcases alternative energy research being carried out in collaboration with colleagues across our campus, at other universities, and in industry. Our innovative, forward-thinking strategies and our team approach are reflected in the work conducted by our faculty and our graduate and undergraduate students.

I must say I am very proud of what we have accomplished.

Our college has hit an all-time high in research dollars received. Our faculty have increased our research awards 50 percent over the past two years. In particular, our research contracts and grants have increased significantly in recent months:

- We received more than $10 million from Michigan’s 21st Century Jobs Fund, a $2 billion initiative aimed at bolstering the state’s economy by helping create businesses that will reshape Michigan’s future. The competition for these funds helped us connect with industry in ways heretofore considered difficult.
- The college is slated to receive more than $12 million of the $125 million that MSU secured in partnership with the University of Wisconsin—Madison to establish the Great Lakes Bioenergy Research Center.
- MSU’s College of Engineering was awarded $5.5 million by the U.S. Defense Department for research in advanced composite materials for air and ground vehicles.
- Most recently, the college received more than $2 million from the U.S. Department of Energy to perform research that couples biofuels with efficient automotive engines.

As we begin celebrating our 100-year anniversary this year, we are naturally engaged in looking back and marveling at the impact our college has had on society. Our centennial is also an occasion for us to contemplate our role in the future and consider how we may contribute toward addressing some of the most pressing contemporary national and international issues.

While the new Currents gives you a more in-depth look at research taking place in the college, it will continue to bring you news about our award-winning alumni, faculty, and students, as well as coverage of events and activities in the college — just as in previous issues.

And finally, in keeping with our responsibility to be good stewards of our environment, this issue of Currents has been printed on recycled 30 percent post-consumer waste paper using environmentally friendly inks.

Let us know what you think of our new look and our new approach; we always value our readers’ feedback.
From Crops to Wheels: MSU a Driving Force Behind Alternative Energy Research

MSU On the Road to Success with Thermoelectric Research

Energy & Automotive Research Laboratories Bring a Vision to Life

DREAM Will Help Engineering Students Achieve Goals

GOLD Club Breakfast

Combating Counterfeiting of Patents and Trademarks

MSU Ignites Research in Structural Fire Engineering

Grotjohn Heads Electrical and Computer Engineering

Goldwater Scholar Focuses on Joint Replacement Materials

Homecoming Activities

Alumni Awards & Accomplishments

Faculty/Staff Awards & Accomplishments

New Faculty

Student News & Accomplishments

Responses to “Looking Back”

Class Notes & Obituaries
Research done in benchtop fermentors like this one allows scientists to predict how commercial-scale fermentations will work. A fermentor grows cells that produce proteins (enzymes) or carry out desired chemical reactions. The MSU College of Engineering’s bioprocessing laboratories use fermentors to optimize microbial production of fuels and chemicals from plant-derived glucose.
It’s an image that has long been associated with good fortune: a gushing oil well, spewing black gold into the air as its lucky proprietor looks on in gleeful excitement.

Today, such an image is more likely to conjure up associations with political turmoil and environmental devastation than guilt-free bounty. With gas prices threatening to top $4 a gallon, turmoil in the Middle East, and growing public awareness about the dangers of global warming, even the most gas-guzzling Americans have grown ambivalent about our country’s dependence on a dwindling fuel source that comes with a heavy political and environmental price tag.

Last year, the United States imported 60 percent of its crude oil, up 10 percentage points from 1992. Every day, Americans consume 60 million gallons of refined gasoline and 17 million gallons of diesel fuel, and demand for fuel is exploding in countries like China and India. Meanwhile, as consumption increases, discovery of new sources is decreasing, creating a looming gap between demand and supply.

For a world with a ravenous appetite for fuel, there is an urgent need to find new ways to drive the world’s cars, power its industry, and supply its products — all without further damaging the environment. For Americans, that need is compounded by fears about national security and a desire for energy independence. The problem’s scope has drawn the attention of everyone from American presidential candidates to international mogul Richard Branson, who’s pledged $3 billion over the next 10 years to develop clean energy sources.

**MSU POSITIONED TO LEAD**

For many fuel-hungry multinational corporations and governments contemplating rising fuel prices and diminishing supplies, the solutions to the world’s energy crisis are percolating in East Lansing, Michigan. The way
forward is brewing in Michigan State University’s labs, churning through its test cells, and growing in its fields.

MSU jumped into alternative energy research partially in response to spiraling gas prices and instability in the Middle East — in the 1970s, that is. Thirty years later, the university offers an unparalleled depth and breadth of research into energy source development, fuel efficiency, and sustainability.

“What sets us apart is the fact that we’ve been thinking about this for a while,” says Carl Lira, associate professor of chemical engineering and materials science. “We’re not on page one trying to catch up.”

Those decades of research experience combine with a broad-based set of programs and attributes — from MSU’s leading role in the fields of agriculture and plant science, to its proximity to the auto industry, to its College of Engineering, home to experts on electrical, chemical, and mechanical engineering — to position the university at the forefront of progress on what many consider to be the most pressing issue of our time.

“There aren’t many places that have the complete portfolio,” says Eann Patterson, chairperson of mechanical engineering. “We can modify a crop’s genes, grow the crop, do the chemical processing, and then stick it in the engine and burn it. We can do the whole thing.”

In fact, not only does the university have “the complete portfolio,” but from the top down, MSU fosters interdisciplinary collaboration, bringing some of the world’s top agricultural economists, plant scientists, chemists, forestry experts, and engineers together to develop innovative solutions (for a complete list of MSU bioeconomy researchers, go to http://bioeconomy.msu.edu/experts.aspx).

“We have meetings where we get engineers in the same room with the geneticist and the crop scientist, who engineer the crop, get the cultivation and conditions right, then give it to the chemical engineer who optimizes the processing, then the mechanical engineer who optimizes the fuel,” Patterson says. “We’ve got the lot. And we’re talking to each other.”

After the initial boom of late ’70s interest in alternative energy, that interest in — and funding for — the research largely dried up once fuel prices normalized. For many MSU engineers, a belief in the value of biofuels and other energy sources meant decades of lonely work and a constant scramble for funding and recognition in the outside world.

Their perseverance is now paying off. The university’s vision and its researchers’ stubbornness means that today MSU finds itself carving out the leading edge of the bioeconomy.

**NO SIMPLE SOLUTION**

Engineers at MSU have their hands in everything from ethanol to solar cells to biodiesel processing to hydrogen extraction. That diversity is key, because unfortunately for oil-addicted consumers, no single, painless solution to the world’s growing energy dilemma exists.

Corn-based ethanol, perhaps the best known alternative to petroleum, has its limitations. There’s not enough land to grow corn sufficient to meet current fuel needs, and people need corn to eat as well as to burn. Corn-based ethanol is currently more expensive than petroleum, and its production can be hard on both soil and air relative to ethanol derived from other plant sources.

“There are no fuel sources at the moment that could supply our total needs,” Patterson says. “There’s not going to be a simple solution; there’s going to be a patchwork. That patchwork will look different from one state to another, depending on local resources.”

The long-term picture is likely to include a number of fuel sources, including ethanol and biodiesel, along with greater use of solar energy and wind and nuclear power. The challenge for researchers is not only to identify and develop effective and sustainable fuel sources, but also to make their use cost-competitive with petroleum in order to make the switch economically feasible.

Recent spikes in petroleum prices have made doing so easier.

“High gas prices are going to give us all the incentive we need [to bring alternative sources online],” says Bruce Dale, chemical engineering and materials science researcher and associate director of MSU’s Office of...
As his colleagues search for ways to harness energy from the earth's bounty, Michael Mackay, professor of chemical engineering and materials science, is looking to the sky for solutions to the global energy crisis.

The answer, he says, can be found in the sun’s rays. Sunlight is by far the largest of all carbon-neutral energy sources. More solar energy strikes Earth in one hour than all the energy consumed on the planet in a year.

Looked at another way, in the United States, each person requires about 2000 calories of energy per day, equivalent to about 97 watts. In Michigan the sun provides, on average, a constant 150 watts of power, or about one to two light bulbs’ worth, in every square meter.

“That’s a reasonable amount,” Mackay says. “We have this energy available to us. Solar is the only energy source that makes sense — you just need storage capacity.”

The challenge is finding ways to channel it cheaply. Silicon-based solar cells, the kind currently in use, are expensive — it can cost more than $10,000 to install solar cells sufficient to fully power a home.

Mackay’s research focuses on developing polymer-based solar cells, which have the potential to be significantly cheaper than the silicon-based variety. He works with nanoparticles, modifying how they self-assemble in polymers. Nanoparticles are put in polymer films that are about 100 nanometers thick — or 1/100 the thickness of a human hair — to absorb the sun’s energy.

When the sun strikes a solar cell it excites the atoms and puts them into a higher energy state called an exciton. The challenge is that the exciton must be formed about 10 nanometers from the electrode to generate electricity before creating heat.

“This is engineering on the nanoscale,” he says. “We need a film that is thick enough to absorb all the sun’s energy but thin enough to let the exciton generate current.”

His approach is to let the nanoparticles assemble in the film to create pillars — like the teeth in a hair comb — yielding many sites for electricity generation.

The cells would need to harness about 10 percent of available energy to be economically feasible; various researchers have managed to achieve five percent efficiency. Mackay says he’s ready to test his structures; if he hits the 10 percent benchmark, the next step is patent approval for his process.

Mackay and his graduate students are working on developing a solar paint — where any surface could be made into a solar cell — and a solar fabric — where each fiber is a solar cell.

“You could weave the fiber into canvas or an umbrella — you could sit on the beach and keep your drinks cold. Or for a tent in your driveway — you could charge your electric-powered car during the day.”

Solar cells can also convert water into hydrogen and oxygen, an area of research that interests Mackay and materials science professor Donald Morelli. Hydrogen is the most abundant natural element and has potential as a clean fuel source.

“But all of the hydrogen on Earth is tied up in water, and to get hydrogen from water takes energy,” Morelli says. “Now we’re chasing our tail. I’m interested in ways to extract the hydrogen without using carbon, and that involves solar energy.”

His research focuses on photoelectrochemical hydrogen production. In this process a semiconducting material is immersed in water. Sunlight incident on the semiconductor is partially absorbed and produces electricity via the photovoltaic effect. This electricity then is used for the electrolysis of the water, producing hydrogen. The materials currently in use are inefficient — their bandgap allows absorption of only a fraction of photons from the sun. Morelli is interested in developing materials more optimally matched to the solar spectrum.

One challenge faced by solar energy researchers is funding: the sun doesn’t have powerful political constituencies and lobbies securing research funding in Congress in the way that crops like corn and soybeans do. But those who see solar power’s potential say it’s time to recognize that the greatest source of energy isn’t in the ground but shining down on us every day.

“We have to turn to the sun,” Morelli says. “It’s one of our only viable long-term energy sources.”
Biobased Technologies. “High gas prices are good — without them we wouldn’t be here.”

**FUELS OF THE FUTURE**

**WHERE WILL THEY COME FROM?**

Though multiple potential fuels of the future exist, perhaps none has gotten the popular attention that ethanol has. E85, an ethanol/petroleum blend, can be purchased in select gas stations around the country, dozens of new ethanol plants are slated to come online in the coming months, and prices for corn, the chief crop used to make ethanol, are jumping in response to growing demand.

But corn’s need for fertilizers and pesticides and its lower efficiency relative to other ethanol crops have spurred research into more efficient biomass sources. It’s work MSU researchers are well situated to explore, literally; Michigan’s agriculture industry is second only to California’s, producing an extensive variety of crops right in the university’s backyard.

Possibilities include not only corn and soybeans — used to make biodiesel — but, much more promising, their abundant stems and leaves, which are generally discarded as waste. Plant biomass each year captures about eight times the energy used from oil coal, natural gas, wind, and water combined. Tapping that energy is complicated but increasingly feasible.

Another promising source is switchgrass, a perennial that has the potential to produce 1,000 gallons of ethanol per acre, according to Dale — more than double the 400 gallons produced from an acre of corn. Given that there isn’t enough cropland in the U.S. to produce enough corn-based ethanol to replace gasoline, switchgrass could become a key biomass source.

Critics of ethanol point to the fact that ethanol production requires more energy than ethanol provides, giving it a so-called “negative net energy.” Dale dismisses such criticism. “Nobody’s comparing ethanol with gasoline. When you do that comparison, you find that gasoline has a worse net energy than ethanol. We have to insist on proper comparisons. Unless we go back to riding horses, we’re going to have to get our fuel from somewhere. No fuel is perfect.”

**FUELS OF THE FUTURE**

**WHAT WILL THEY LOOK LIKE?**

**LEAVES, BARK, STEMS, AND GRASS**

Dale began his research into cellulosic ethanol in the 1970s, looking for ways to turn sugars from plant cell walls into ethanol, cheaply and efficiently.

Cellulose and hemicellulose, the sugars in plants that make their stems, leaves, and trunks tough and rigid, are naturally abundant but difficult to access. Their sugars protect plants against attack by microorganisms, and therefore exclude penetration by water at the molecular level.
Dale’s work focuses on ways to break complex cellulose into simple sugars, which can then be fermented into ethanol. His patented process, ammonia fiber expansion (AFEX), involves pretreating biomass with ammonia, allowing water to penetrate cell walls and microorganisms to attack, facilitating the breakdown into simple sugars. AFEX allows more than 90 percent of cellulose and hemicellulose to be broken down.

The process can be costly, and much of Dale’s work focuses on making it more cost-efficient. That’s getting easier as corn prices have jumped, making corn-based ethanol production less profitable and cellulosic ethanol more attractive.

Dale’s research has moved out of the lab and into production. MBI International, a Lansing-based biotechnology company, is gearing up to process about 3.5 tons of plant material a day using AFEX; once the process is further refined, increasing production will not be difficult, Dale says. Technological progress and increases in funding by government and private ventures lead him to believe the first billion gallons of cellulosic ethanol will be produced within five years. (Dale presented the 2007 Sterling B. Hendricks Memorial Lecture at the American Chemical Society’s fall national meeting in Boston in August 2007. His topic was “Why Cellulosic Ethanol Is Nearer Than You Think: Creating the Biofuels Future.” This presentation is posted at everythingbiomass.org.)

Cellulosic ethanol is promising not only because plant biomass is so abundant and renewable, but also because it’s “greener” than corn-based ethanol and leagues ahead of petroleum. An article in the January 2006 issue of Science states that production and use of cellulosic ethanol emits about 90 percent less greenhouse gases than gasoline. Corn-based ethanol gives off about 18 percent lower emissions.

As Dale works on refining the process for breaking down plant cellulose, MSU plant scientists are finding ways to genetically engineer crops to be more easily broken down, continuing to drive down the cost of processing.

“Oil is getting more expensive and harder to find. And it’s of poorer quality,” Dale says. “The cost and properties of oil are heading in the wrong direction, and the cost and properties of plant materials are moving in the right direction. We’re going to succeed economically with cellulosic ethanol; now we want to make sure we succeed environmentally.”
Dale’s research got a major boost this summer when he, along with a team of researchers from MSU and University of Wisconsin—Madison, received a $125 million grant over five years to establish the Great Lakes Bioenergy Research Center, one of three new U.S. Department of Energy Bioenergy Research Centers. Based in Madison, the center’s research will focus on breeding new varieties of bioenergy crops, developing new processing techniques and microbial agents for breaking down cellulose, improving the processes that convert biomass to energy products, providing an environmental and economic framework for sustaining the biomass-to-fuel pipeline, and integrating new technologies into bioenergy research. MSU will use about $50 million for basic science research focused on converting natural materials to energy.

**Biodiesel**

As Dale focuses on cellulosic ethanol, his chemical engineering and materials science colleagues Carl Lira and Dennis Miller are finding ways to make biodiesel-based fuels that are more efficient and economical than those currently on the market.

Biodiesel is derived from vegetable oil or animal fat. Typically it’s produced in batches by using a catalyst to react the oil or fat with an alcohol. Then it’s blended with regular diesel fuel and used in diesel engines, with B20 (20 percent biodiesel, 80 percent regular diesel) currently the highest blend sold widely.
Batch processing is expensive and can result in an inconsistent product if conditions vary even slightly from one batch to the next. Lira and Miller have developed a continuous, patent-pending process that uses reactive distillation to turn soy oil into biodiesel. The process is cheaper and greener because it produces fewer waste byproducts than batch processing, and its consistency results in a higher-quality product. The duo uses MSU’s reactive distillation facility, which is unique among universities. It has two pilot-scale reactive distillation columns.

Biodiesel processing yields about one pound of glycerol byproduct for every ten pounds of biodiesel. The projected amount of glycerol byproduct from future biodiesel production far exceeds the current demand in the pharmaceutical, food, and plastics industries. Further, the conventional process produces a glycerol stream containing dissolved catalyst that must be separated before the glycerol can be used, increasing the economic costs and environmental impact. In a USDA-funded project, Lira and Miller are working to make the glycerol into a biodiesel fuel component by reacting it in the reactive distillation facility.

Reactive distillation also permits continuous processing. In a continuous process, steady flows of material streams enter and exit the process. With electronic controls, continuous processes require less operator intervention and are more economical. Further, the use of reactive distillation combines the biodiesel production reaction together with the primary separation in a single piece of equipment.

Improving biodiesel’s production process is only one part of making it more economically viable. Impurities in biodiesel’s feedstock oil and its chemical instability at low temperatures create a need for improved properties and different blends for different times of the year. Miller and Lira are participating in a funded three-year project to develop advanced biodiesel-based fuel blends and then work with mechanical engineering professor Harold Schock to test them in the university’s Automotive Research Experiment Station, which Schock directs.

Carl Lira, associate professor of chemical engineering and materials science
“The goal is to have collaboration between fuel creation and fuel performance,” Miller says. “We’ll make the fuels and Schock will let us know how they perform in his engines.”

Improving biodiesel’s performance in cold weather is one of the challenges taken on by Ramani Narayan, University Distinguished Professor in the Department of Chemical Engineering and Materials Science. He’s working on ways to chemically modify biodiesel’s formula to keep it from solidifying in cold temperatures, allowing for blends with a greater proportion of biodiesel.

Together, Miller and Narayan have founded Spartan Biofuels LLC, a biofuels processing and development company. The company works in partnership with Ford Motor Co. for testing and development and with Zeeland Farm Services for soybean feedstock.

Spartan Biofuels, in collaboration with Michigan Brewing Company, operates a pilot-scale plant in Webberville, Michigan, where operations cover all aspects of biodiesel production — from raw material extraction to final product preparation and analysis. Based on its pilot work, Spartan Biofuels plans to build state-of-the-art operations to produce 2 million gallons of biodiesel annually; that amount could increase to 8 million gallons annually in partnership with Zeeland and various fuel distributors.

Finally, the company is a founding consortium member of the federally funded Michigan Biorefining Training Facility, which trains Midwestern workers in biodiesel and related bioprocesses.
"What differentiates MSU is that there’s recognition that entrepreneurship is good for the university and good for the state — that we have to be more than an academic teaching institution," Narayan says. "As a land-grant university, part of our mission is to contribute to the economy of the state."

**BIOMASS: IT’S NOT JUST FOR FUEL**

Step inside Narayan’s office in MSU’s Engineering Research Complex and it looks like he’s chaotically preparing for a picnic with small children; strewn about the tables are mounds of plastic eating utensils, trash bags, and kids’ games with names like Magic Nuudles.

These disparate products, however, aren’t for Narayan’s diversion. They’re his creation, made from bio-based feedstock and mostly available for sale on the market. Narayan has turned his research in renewable feedstock sources into 14 patents and 11 pending patents for technologies that have produced everything from the Biota Spring Water bottle, to packing foam that protects products like the Sony PlayStation 2–Final Fantasy XI game, to toys like the pliable, colorful Nuudles.

Four of the Narayan-developed technologies have been licensed or resulted in a spin-off company. His KTM Industries has annual revenues of $2 million with plans for it to grow to $45 million within five years. His research for another product, which uses a polymer to more effectively deliver eye drops to the eye, has received a National Institutes of Health grant.

“We are now working on making the next generation of fuels, from a renewable feedstock,” he says. “It’s totally paradigm-changing. Everywhere else is petroleum-based. We are leading in this field.”

Indeed, research by MSU engineers into alternative energy sources has implications well beyond fuel.

Dale’s AFEX process for cellulosic ethanol has potential for developing a more efficient animal feed. Using AFEX to pretreat animal feed sources like grass can break down barriers to bioconversion in ruminant animals such as cattle, allowing for a denser, higher-value product. He’s working to develop a supply chain that would center around a regional biomass processing plant that contracts with local farmers, boosting local and state economies and providing opportunities for farmers to invest in the process.

Miller and chemistry professor Ned Jackson are developing catalysts that can convert organic acids to alcohol through hydrogenation; the alcohols can be used to make polymers and antifreeze. Their goal is to make the chemicals, drawn from renewable, nontoxic sources, cheaper than those derived from petroleum, compounding their benefits.

Miller and Jackson also use organic acids as feedstock material to study reactions in water, which they believe
will be the solvent of choice for chemical production for renewables. (Most bio-based products are water-soluble, but petroleum isn’t.) With a substantial grant from the Michigan Economic Development Corporation, the research team — led by Robert Ofoli, associate professor of chemical engineering and materials science, along with Miller, Jackson, and Sherine O’Bare at Western Michigan University — will study the reactions of renewable feedstock in water using nanoparticle catalysts.

Miller is also using reactive distillation to form esters, which result from a reaction between an alcohol and an organic acid. Esters are valuable solvents with a variety of industrial applications — a nontoxic, low-cost alternative to petroleum-based solvents. He’s working with the National Corn Growers Association to commercialize his process of making ethyl lactate by licensing the technology to manufacturing companies that could use it to create cleaning solvents, paint removers, or even fuel additives.

Developing better fuel and fuel sources is only one part of the energy picture. Another is using the energy we have more efficiently and effectively.

The amount of energy that gets lost during use is sobering to contemplate. The United States loses nearly two-thirds the energy it produces and
imports during energy conversion. Energy conversion inevitably produces losses, but significantly reducing those losses is possible. And because transportation is the biggest single user of energy in the United States, making cars, buses, and trucks more efficient is a prime area of research at MSU.

“Automobile engines are not very efficient things at all,” Patterson says. “For every gallon of fuel, only 13 percent actually makes the thing go. How can we do something about that? We need to smarten this thing up so we don’t lose so much energy.”

Patterson points to the PAC-Car II, made by the ETH Zurich research institution in Switzerland, as an example of the potential of transport research; the PAC-Car II gets about 12,000 miles to the gallon. It holds only one person and doesn’t go very fast, but “it shows what you can do,” he says.

And while these tiny, astonishingly efficient cars may not be in our immediate future, cars that get as much as 250 miles per gallon could be, he says, through a combination of hybridization, using energy-efficient European diesel engines, and reducing a car’s weight.

Weight, especially, is a drag on efficiency. But the American public tends to equate weight with safety, even in the face of studies that indicate large SUVs and trucks are often less safe than smaller vehicles. Changing public opinion on super-light vehicles would allow for significant energy gains, Patterson says. “Get rid of all that metal around you and fuel efficiency will skyrocket. The most promising solution is to persuade Americans to drive fuel-efficient small vehicles. They’re around. You go to Europe and they’re all driving teeny-weeny little cars.”

Even the relative clunkers we drive now could be much more efficient within just a few years, thanks to research by Schock and his research team at the Automotive Research Experiment Station, who are testing ways to make internal combustion engines more advanced and better able to utilize the fuels Schock’s colleagues are developing, like ethanol.

“Ethanol has two-thirds the heating volume of gas, so right now you’re getting less for your money with ethanol,” Schock says. “We’re trying to develop engine geometrics that will take advantage of the properties of ethanol and boost efficiency.”

Longer-term, building better engines and utilizing hybridization could lead to a doubling in energy-efficiency within the next 20 years, Schock says. Schock evaluates different fuels’ performance through combustion studies in his lab, using special machinery and mathematical calculations. MSU’s new Energy & Automotive Research Laboratories (see sidebar on page 12) provides two experimental test cells for engine studies and a larger area for a hybrid vehicle powertrain, allowing for extensive experiments on operational engines and powertrains and simulation when there isn’t yet enough data for experiments.
Schock is also collaborating with Elias Strangas, associate professor of electrical and computer engineering; Ron Averill, associate professor of mechanical engineering; and Fang Zheng Peng, professor of electrical and computer engineering, on developing a hybrid bus.

According to the U.S. Department of Transportation, roughly 1,100 hybrid buses were in regular service in 2006. In North America, 42,500 buses and 148,000 medium- and heavy-duty trucks could be replaced by hybrids within the next decade.

Hybrid buses, however, are expensive and usually purchased for their environmental benefits. “Economically, they’re not yet a great investment,” says Strangas, who is leading the MSU hybrid bus project. “Our objective is to remove this obstacle, to make them more efficient and affordable.”

The chief advantage to electric hybrids, Strangas says, is they operate their engines at their most efficient point, using less fuel and emitting less carbon. Strangas’s team is developing ways to improve that peak efficiency point and the system’s synergy.

The MSU-developed bus doesn’t rely on its engine to power the wheels. “Think of a fully electric bus that carries its own generating plant,” Strangas says. “You can operate the power plant whenever you like; if you don’t need it, you can turn it off.” The bus also captures its kinetic energy and cycles it back into its battery, reducing wasted energy and saving on brakes.

The team is researching ways to reduce the engine size, making the bus lighter weight and cheaper. One way to do so is to draw power from both the electric engine and the battery. “How small can we make the engine and how big can we make the battery?” he says. “It’s a question of optimization.”

The team is focused on developing advanced power electronics, electrical machines, and engine controls to make the bus operation smoother and more efficient. Strangas’s project has received funding from the MEDC to work with industry and Kettering University and develop a hybrid bus powertrain for the Mass Transit Authority in Flint, Michigan; the first bus is expected to be on the road this year, with a fully optimized version in operation next year.

Strangas’s research on hybrid buses is designed to cut emissions and maximize hybrids’ efficiency and affordability. But the research’s applicability goes well beyond buses. MSU’s hybrid vehicles team works with auto companies to find ways to adapt its research for automobile components, and is also working on medium- and heavy-duty powertrains to be used in trucks and military vehicles. Military personnel face reduced risk in war zones if their vehicles can get farther...
with a gallon of fuel. And delivery trucks like those used by FedEx and UPS have long routes, similar to buses; using the same powertrain in them as in the bus would "make a lot of sense," Strangas says.

**USING MORE OF THE ENERGY WE HAVE**

Another route to building better vehicles is to design thermoelectric materials that allow waste heat to be captured from exhaust. (See companion article in this issue for a fuller look at MSU’s thermoelectric research.) MSU researchers like Schock; Tim Hogan, associate professor of electrical and computer engineering; Eldon Case, professor of chemical engineering and materials science; and Donald Morelli, professor of materials science, are finding ways to convert waste heat to electricity.

"Our approach is to increase the efficiency of the existing energy processes," says Morelli. "One of our greatest energy sources is energy we’re throwing away."

Morelli works on developing new, cost-effective materials designed to help capture that energy. He focuses on modifying a material’s structure to impede its heat flow, allowing the heat to be converted into electricity, and on creating structures with low dimensionality, increasing the material’s Seebeck coefficient, a measure of its merit as a thermoelectric. His research has near-term applications, primarily in industrial energy processing at power plants that release a large amount of waste into the water and air, and also in vehicles.

Given the amount of energy a car throws away, increasing its efficiency by even 5 or 10 percent could make a "tremendous impact," Morelli says.

"I think we’re going to start seeing applications within the next five years," he says. "Essentially the technology is almost ready to be incorporated."

**CONCLUSION**

From developing better fuels to building better engines, MSU is helping lead the United States and the world toward more environmentally responsible, sustainable and, ultimately, economical ways to power its transportation and industry.

With so many potential fuel sources in the works, and none with the ability to supply all the world’s fuel needs, fuel companies and auto companies will need to take the lead in utilizing fuels that customers can understand and developing flex-fuel vehicles that can be filled up from Maine to California.

But it’s too early to predict just how things will shake out, according to MSU researchers. Despite rising prices and dwindling supplies, petroleum "isn’t going away," Miller says, though he expects ethanol and biodiesel to increase to about a third of the fuel supply in the next 20 years.

In the long run, solar, nuclear, and hydrogen could become more-viable energy sources.

"We live in a trial-and-error society," says chemical engineering and materials science chairperson Martin Hawley. "The economy will sort it out. Politics will play a role, but economics will decide what wins."

"This is a rich research area for the next 20 years," Miller says. "There’s plenty to do."

Alexa Stanard is a Ferndale, Michigan–based freelance writer who first learned about corn’s many wonderful properties during summers spent visiting her grandmother in Iowa.
Harold Schock, professor of mechanical engineering, stands in front of MSU’s new 100-ton hot press. MSU is one of only a handful of organizations with a hot press of this size for research applications.
The MSU thermoelectric team is a diverse group of researchers. They cut across many engineering disciplines and include other MSU researchers as well as businesses and government agencies. "The best thing about MSU is the willingness of researchers to work cross-discipline, cross-campus, all working together," says Timothy Hogan, an associate professor in electrical and computer engineering and one of the primary researchers in thermoelectrics at MSU.

What the researchers have in common is that they are passionate about thermoelectrics and are focused on practical applications for thermoelectric power generation research groups in the world.

The MSU thermoelectric team is a diverse group of researchers. They cut across many engineering disciplines and include other MSU researchers as well as businesses and government agencies. "The best thing about MSU is the willingness of researchers to work cross-discipline, cross-campus, all working together," says Timothy Hogan, an associate professor in electrical and computer engineering and one of the primary researchers in thermoelectrics at MSU.

What the researchers have in common is that they are passionate about thermoelectrics and are focused on practical applications for thermoelectric power generation within a reasonable time frame. What is unique about the thermoelectric research at MSU is that it is not focused on one aspect of the research and development process, but rather includes the entire spectrum from basic research in thermoelectric materials through the development of prototype thermoelectric modules and on to integrating the modules into a practical, functioning thermoelectric generator.

"The strength of the MSU thermoelectric research team is the breadth of expertise," says Mercouri Kanatzidis, professor of chemistry at Northwestern University. "They have the ability to synthesize novel materials, then measure, characterize, and understand their physical properties all in the same institution." He says that the "premier" group for thermoelectric research has been the National Aeronautics and Space Administration’s (NASA) Jet Propulsion Lab (JPL). "I think the MSU team rivals what’s being done at JPL," says Kanatzidis. He can speak with authority because the MSU thermoelectric research started with his groundbreaking work on materials. Kanatzidis was a Distinguished University Professor in chemistry at MSU until 2006, when he left to take the Charles E. and Emma H. Morrison Chair in Chemistry at Northwestern. He continues as an important part of the thermoelectric team at MSU, specializing in property measurements and evaluation of the stoichiometry of thermoelectric materials.

For those not familiar with thermoelectrics, it is the study and application of effects resulting from the interaction of the thermal and electrical proper-
ties of certain types of materials. Using temperature gradients, thermal energy can be used to generate electricity — those are the Seebeck and Thomson effects — or electrical energy can be used to transport heat — that’s the Peltier effect. Thus, thermoelectrics can be used for either power generation or cooling. Many contemporary uses have been for cooling. The current MSU research focuses on the development of devices for power generation to convert waste heat to electricity. Thermoelectric devices are solid state with no macroscopic moving parts. The major advantage of thermoelectrics is that devices based on them are reliable and quiet. The major disadvantage has been poor efficiency.

**EARLY RESEARCH FOCUSED ON MATERIALS**

Thermoelectric research at MSU started in the mid-1990s at the materials exploration level. Kanatzidis, now recognized as a worldwide expert on thermoelectric materials, started with a small team of researchers at MSU. The group was originally looking at novel semiconductor materials, not materials with thermoelectric properties. Eventually the researchers started to look at the chemical properties of these materials. “That’s what chemists do. We make new stuff and look at what this stuff can do,” Kanatzidis says.

In 1998, Hogan joined the electrical engineering faculty at MSU and almost immediately became part of the ongoing thermoelectric work. “Tim, as an electrical engineer, could do more sophisticated measurements of the materials,” says Kanatzidis.

The thermoelectric materials that had been developed prior to Kanatzidis’s work were not very efficient at power conversion, and there had been no improvements in efficiency with these materials for 40 to 50 years. When the new material developed at MSU was tested, the efficiency of the material was double that of previous materials. That’s when other collaborators at MSU were added to the thermoelectric project. Kanatzidis’s original material was a combination of lead, antimony, silver, and tellurium (LAST), which is an n-type semiconductor. The group later discovered that adding tin to the original material (LASTT) yields a high efficiency p-type semiconductor.

Another major breakthrough was the discovery that nanostructures in the materials were important. Because the efficiency of the material was better than expected, the researchers decided to look at why this happened. With the help of Stanley L. Flegler, director of MSU’s Center for Advanced Microscopy, researchers used electron microscopy and discovered that the material was not homogeneous on the nanoscale. The property most affected was thermal conductivity. Good thermoelectric materials have low thermal conductivity.

S. D. Mahanti, professor of physics at MSU, was an early collaborator on thermoelectric research and is involved in the current projects. “Mercouri Kanatzidis asked me to get involved from the theoretical angle,” says Mahanti. That collaboration started more than 10 years ago. “As a physicist, I look at the electronic properties and structures of these complex materials. Can I think of new materials? Can I engineer the properties to improve the thermoelectric properties?” says Mahanti, who sees a direct link between physics and chemistry and believes the partnerships between departments and colleges at MSU has helped to advance the research.

“Thermoelectrics is frustrating. What is good in the right hand is not good in the left hand,” says Mahanti. “There are competing properties and processes that have to be optimized. A major part of my work is to help the researchers understand these competing processes.” Originally the group was working with materials for cooling at low temperatures. A new challenge with the current projects is working with the materials at high temperatures, 700 to 800 Kelvin (or about 430° to 530°C).

**GRANTS FUEL EXPANSION OF RESEARCH**

The MSU research has scaled up over the last five years in the area of power generation. “Through the support of the Office of Naval Research (ONR), and Defense Advanced Research Projects Agency (DARPA), our research really started before the big quest...”
Using Past Research to Build on the Future

The spotlight is currently on thermoelectrics as a source of power generation. However, the fundamentals of thermoelectrics have been known and used for many years. Two men — Thomas Seebeck and Jean Peltier — were the pioneers of thermoelectrics in the 19th century. In 1821, Seebeck discovered that if you place a temperature gradient between the junctions of a circuit made of two dissimilar metals, electric current would flow. In 1834, Peltier found that passing current through a circuit made of two dissimilar electrical conductors caused heat to be emitted at one junction and absorbed at the other. Their discoveries, which are used extensively in thermoelectric research, are called the Seebeck effect and the Peltier effect. In 1851, William Thomson (later Lord Kelvin) used thermodynamic principles to show how the Seebeck and Peltier effects are related. He predicted and then observed what is now known as the Thomson effect. That is, a voltage difference can be established in a homogeneous electrical conductor between two points that are set at different temperatures.

A. F. Ioffee, a Russian physicist, was interested in the development of technical applications of basic research. He predicted in 1931 that semiconductors would play a role in the future, in particular for thermoelectric energy conversion. The Russians continued with research on thermoelectrics through the 1960s, trying to optimize and improve the thermoelectric properties of semiconductor materials.

Several theoretical papers in the 1990s helped to advance the science. One was the development of a theory that nanostructures in the materials could improve their thermoelectric properties. Mildred S. Dresselhaus at the Massachusetts Institute of Technology was one of the principal researchers carrying out this work. Another was Gerald Mahan, professor of physics with Pennsylvania State University, and his collaborators. They predicted the theoretical conditions to get a perfect thermoelectric response.

The research and applications during much of the 20th century focused primarily on the cooling properties of thermoelectrics. The subsequent emergence of new fabrication devices and more new materials with useful thermoelectric properties caused a resurgence of interest in thermoelectrics, especially as a source of power generation.

The National Aeronautics and Space Administration (NASA) has used thermoelectrics as a power source for space exploration for more than 25 years. For missions beyond the planet Mars, the light from the sun is too weak to power a spacecraft with solar panels. Instead, thermocouples are used to convert heat generated by the nuclear decay of a radioisotope into electrical power. NASA has used thermoelectrics as a source of power on various space missions, including Voyagers 1 and 2. With no moving parts, the power sources for both Voyagers are still operating and allowing the spacecraft to return science data after more than 25 years.

“Thermoelectrics is difficult to understand,” says Timothy Hogan, a primary researcher on thermoelectric projects at MSU. “In the 1960s some over-promised what thermoelectrics could do. We have to guard against over-promising.”

The last chapter of the history of thermoelectrics has not been written. The research at MSU and other research centers will continue to expand thermoelectric knowledge. MSU researchers anticipate that their work will become a significant part of future chapters on thermoelectric history.
for alternative energy sources,” says
Hogan, “but that certainly helped to
bring it into the limelight. It also helps
that the U.S. Department of Energy
(DOE) is looking for alternative energy
sources. Thermoelectrics has come on
the radar screen with improvements in
efficiency.”

There are two major efforts in
thermoelectric research at MSU. One
is looking at shipboard applications,
through funding from the Office of
Naval Research (ONR) as part of the
Multi University Research Initiative
(MURI). “A ship has to take fuel with
it and uses fuel not only to move the
vessel, but to run shipboard opera-
tions. If we can come up with devices
or generators to turn waste heat into
electricity to run some of the equip-
ment on the ship, it obviously will
make the ship more efficient,” says
Eldon Case, professor of chemical
engineering and materials science
at MSU. “The Navy is very interested
in these types of applications and
wants a working thermoelectric model
to hold in their hands.” Case is a
materials scientist who has been at
MSU more than 20 years. His part in
thermoelectric research is processing
materials and characterizing the me-
chanical properties of the materials.

The other MSU project involves
using thermoelectrics for diesel engine
applications with funding from the U.S.
Department of Energy (DOE). The am-
bitious goal of this project is to deter-
mine how to recover waste heat from
the exhaust of an over-the-road (OTR)
truck and convert it to electricity to be
used by the vehicle. “Our engineering
group is taking bulk thermoelectric ma-
terials and turning them into devices
for practical applications. We want to
take the devices and integrate them
in an engine configuration to extract
energy from waste heat,” says Harold
Schock, professor of mechanical engi-
neering and director of the Automotive
Research Experiment Station at MSU.

“A loaded OTR truck uses 300 to 350
kilowatts of power to move. It rejects
300 to 400 kilowatts of power as waste
heat.”

Schock’s research at MSU, primar-
ily concentrated on transportation,
spans more than 20 years. His interest
in thermoelectrics started about six
years ago “when it was obvious that
the hunt for alternative energy sources
was going to be part of the energy
mix,” Schock says. After looking at vari-
ous alternative energy research proj-
ects, he decided that thermoelectrics
was “a reasonable option, considering
the huge amounts of energy dumped
into the environment from internal
combustion engines.”

Schock and his research team
have a five-year goal of improving fuel
economy by five percent in an OTR
truck. “This is very significant for a
truck driver in terms of cost savings.
Even a one percent fuel economy
increase can save as much as $1,000
per year,” Schock says. Working with
thermoelectrics at the kilowatt level is something new. Even generators used to power spacecraft generate only a few hundred watts, not kilowatts, of power.

While Schock calls the goal of improving fuel economy "reasonable," he admits there is a lot of work to do. "We need to produce devices that have — and maintain — a high level of efficiency. The devices and the entire system also must be cost effective. We have to use materials that will withstand thermal stress and have good thermal fatigue properties."

Down the road of thermoelectric research, Schock believes that they can improve efficiencies 10 percent using advanced thermoelectric materials and high-efficiency heat exchangers. The researchers are also looking ahead to how their work with diesel engines might have applications for consumer vehicles, especially hybrid vehicles that run on a combination of gasoline and electricity.

DOE, of course, has a strong interest in energy conservation in general, and government agencies, like DOE and ONR, have put an increased emphasis on meeting deadlines and showing progress. "I feel the pressure," says Hogan, whose job it is to produce usable devices. Kanatzidis believes funding tied to progress has a good effect. "It helps the focus. With research it is easy to go in different directions. Sometimes it is easy to lose focus. Insisting on a prototype is useful to the research team," says Kanatzidis. An additional benefit of producing results is that it often leads to additional research dollars.

Hogan calls his group "Hogan’s Heroes," a testament to his sense of humor and the group’s focus on finding a practical use for thermoelectric devices. The group works on electrical and thermal transport measurements of the materials, diffusion bonding, module building, coating experiments, and ZT measurements. ZT is the thermoelectric figure of merit.
is necessary for the high efficiency of a thermoelectric generator and is one of the most crucial factors in this research.

The U.S. Department of Defense (DOD) recently funded a substantial grant to purchase needed equipment for thermoelectric projects at MSU. "This grant will augment our capabilities. It will give us state-of-the-art equipment to extend and enhance our capabilities in fabrication," says Case, who wrote the grant proposal along with Hogan and Schock.

HOT PRESS MAKES PRODUCTION EASIER, FASTER

Schock has also seen dramatic improvements in facilities and equipment. He started his propulsion research 20 years ago in a lab that was only 500 square feet. He has worked for many years in a lab with about 6,000 square feet. Today, Schock and other researchers have a brand new facility. The Automotive Research Experiment Station, previously located off campus, has relocated within the Energy & Automotive Research Laboratories, a 29,000-square-foot, state-of-the-art facility that opened this past summer on campus at the Engineering Research Complex–South. The pride of Schock’s material processing equipment is a hot press whose installation and operation is managed by research specialist Ed Timm. Standing more than 14 feet tall, it is an imposing piece of equipment, but Schock, Timm, and other researchers are more impressed with what it can do.

The process starts with ingots of n-type semiconductor material (in which electrons are the charge carriers) or p-type semiconductor material (in which "holes" are the charge carriers). To improve the mechanical properties of the thermoelectric materials, the respective ingots are ground into powder. "Thermoelectric materials often have a large grain size, maybe a millimeter," says Case. "We can improve the mechanical properties by making the grain size smaller — and uniform. The powder process improves the mechanical properties, but the trick is not to sacrifice the thermal and electrical properties that are important."

The hot press comes into action after the powder is uniform in size. The powder is loaded into a die inside the hot press. The result is a 4-inch...
Only one type (n or p) can be made at a time, but both are needed to create the module. The puck is cut into coins and the coins are then cut into legs, which are used to make the module. A number of modules will be put together to make the final device.

Pressing the powder into a puck makes the thermoelectric material stronger and tougher. “Five years ago we did not understand the mechanical properties of the materials and how important they were. This was not anticipated when we originally started the ONR grant,” says Mahanti.

With the hot press and other equipment in place, it is possible to produce 240 n- and p-type hot pressed legs in one week. Being able to produce materials to meet the needs for testing and evaluation by all groups involved in thermoelectric research is key. The researchers have working modules and an artist’s conception of what the devices will look like. Before the end of the year, they hope to have an actual device.

**FURTHER STUDY WILL BRING REFINEMENTS**

Another important issue is power electronics. If one module in the system fails, electronic controls must isolate this module and manage those that are still operable. A team led by Fang Zheng Peng, professor of electrical and computer engineering, is developing power electronics for this application.

In terms of pure research, the most exciting news for thermoelectric research in 2007, according to Hogan, is a better understanding of the nanostructures in thermoelectric materials. “Groups at other universities are studying thin films, but we are working with bulk materials. There are significant differences, both in the fabrication routes and in the target applications,” says Hogan. “Thin films are best for high heat flow applications, whereas large temperature gradients are more easily established across bulk materials.”

Because the efficiency of thermoelectric generators is proportional to the temperature gradient, there can be a significant advantage for bulk samples in some applications.

The mechanical properties of thermoelectric materials are of great importance in power generation applications. “It’s a challenging environment. It’s not just the thermal environment, but the vibration and other concerns are factors,” Case says. One important aspect to look at with the materials is cracking. “This is a problem with thermoelectric materials. Cracks degrade performance,” says Case.
“Understanding mechanical properties like cracking is all part of the research.” He spent part of this past summer at the Oak Ridge National Laboratory (ORNL) in Oak Ridge, Tennessee. ORNL, the DOE’s largest science and energy laboratory, annually hosts guest researchers who spend two weeks or longer there. Case looked at what damage factors, such as thermal shock and fatigue, can do to materials.

In addition, Fei Ren, a materials science PhD student who is advised by Case and is involved in thermoelectric research at MSU, received a 10-week fellowship to ORNL this summer. It is another indication of the power of thermoelectric research at MSU. “This is very prestigious. There are not a lot of these kinds of fellowships out there,” Case says. Ren’s fellowship was part of an ORNL-sponsored Higher Education Research Experience (HERE) program.

RESEARCH ATTRACTS NEW FACULTY FROM INDUSTRY AND GOVERNMENT

The team approach and forward progress of thermoelectric projects at MSU is attracting new researchers. Donald Morelli arrived in January and is a professor in the Department of Chemical Engineering and Materials Science. He is a solid-state physicist with more than 20 years’ experience in the automobile industry. He originally worked in the research labs at General Motors, then later with Delphi Corporation, developing electronic materials for auto applications. “It was a mix of fundamental research with lots of applications up to and through the production of vehicles. We were one of the first research groups to get involved in the rebirth of thermoelectrics in the 1990s,” says Morelli.

Why leave the business world for a university setting? “The auto industry is changing. It no longer has the luxury of doing the fundamental research needed to develop new technology,” he says. “I am very interested in long-term research to solve our energy problems. MSU has a great thermoelectric program. I am excited about being a part of it.”

He hopes to bring a different, complementary perspective to the research. One key issue that Morelli sees is how universities transfer technology to industry and vice versa. “Universities share information; they publish research and pass the information on to others. Industry does not share. There is a tremendous chasm.” He would like to build a bridge for the exchange of information. Morelli recognizes it will be a slow process and that there are intellectual property issues. “In the long term, I want to smooth that road.”

The newest member of the thermoelectric research team at MSU is Jeffrey Sakamoto. He comes from NASA’s Jet Propulsion Lab (JPL) in California. Sakamoto actually has been involved with thermoelectrics at MSU for some time and sees the move to MSU, where he is an assistant professor in the Department of Chemical Engineering and Materials Science, as a continuation of his work. JPL is a subcontractor on thermoelectric projects at MSU, and Sakamoto has been the senior staff scientist with the thermoelectrics group at JPL.

“One of my goals at MSU is to help bring thermoelectrics up to speed with other alternative energy technologies, such as solar, batteries, and fuel cells,” says Sakamoto. “Thermoelectrics is complex. There is more engineering and design that has to be done. MSU has substantial infrastructure to move forward.” Like the other researchers, Sakamoto points out that MSU has the ability to work at all three stages of thermoelectric research — the development of new materials, the ability to create prototype devices and validate performance, then integrate the devices into a working generator. “It’s a big deal. In this country, no one has the capability to make large-scale thermoelectric generators,” says Sakamoto.

“NASA uses thermoelectrics in spacecraft, but these generators are a few hundred watts, not kilowatts. Being able to do generators on a kilowatt scale will be great.”

Sakamoto is obviously enthused about the research possibilities at MSU, and his new position will give him an opportunity to teach. In addition, Sakamoto and his wife are impressed with the local schools for their three young children. “We liked the schools and the community. It’s a great opportunity for my family to be...”
“Raised in an academic environment,” says Sakamoto.

RESULTS GENERATE STUDENT AND BUSINESS ENTHUSIASM

Thermoelectric research at MSU is also having an impact on students, both in undergraduate and graduate programs. “They are interested in thermoelectrics because they believe it is something important for the future. They feel that they can help with our country’s energy problems and do something for the environment. There is a sense of excitement,” says Case. Schock believes that electrical engineering, materials science, and mechanical engineering students are becoming more inspired because “we are finally at the point where we are able to make real devices and these students can actually do something with these devices, such as figuring out how to use the electricity that is generated.” Mahanti says that students, especially graduate students, benefit from the cross-college collaboration. “They are talking to each other. They are getting a basic understanding of different fields of research. When they get out in business or other research situations, they will have a better perspective of what happens in different areas.”

Even though the thermoelectric research at MSU is a work in progress, it is attracting the attention of businesses, such as the Tellurex Corporation, based in Traverse City, Michigan. This company is making thermoelectric devices for the auto, military, medical, and food industries. One example is cup coolers and heaters. “Successful implementation of these types of devices will result in new ventures that will utilize thermoelectric modules in a wide range of power devices,” Schock says.

THE STRONGEST THERMEOELECTRIC TEAM IN THE WORLD

“We have the strongest university thermoelectric team in the world,” says Schock. “We are able to work from fundamental science principles, to modules, to implementing and demonstrating in everyday applications. Our efforts span the entire gamut from material synthesis to product implementation.”

There are good reasons for MSU researchers to step up to the challenges of making something happen with thermoelectrics. “It is challenging, but it has to happen,” says Morelli. “We have to be smarter about how we use energy. Look at what we have done with energy resources in the last 100 years. What will the next 100 years be like? Traditional energy sources will not be there. We need to solve this problem for our kids and their kids to have a reasonable quality of life. It’s exciting and challenging, but we must solve this problem. We have no choice.”

Jane L. DePriest is a writer and editor who lives in East Lansing, Michigan, with her engineer husband, Leland.
Vision, determination, and teamwork. More than bricks and mortar, these were the key elements in creating the new Energy & Automotive Research Laboratories, dedicated in August. When you look at the glistering structure, which is being filled with the most up-to-date equipment and testing facilities, it is easy to overlook what it took to make the facility a reality. Like most visions, implementing the plans took years of hard work.

Almost a decade ago, Harold Schock, Ron Rosenberg, and George Van Dusen dreamed about expanding facilities to do energy and automotive research. Schock is professor of mechanical engineering and director of the Automotive Research Experiment Station. Rosenberg is the former department chair of mechanical engineering and now associate dean for research and graduate studies, while Van Dusen, at the time, was the acting dean of the College of Engineering. They envisioned a place where 21st century research could be done and a place where students could learn the skills needed for 21st century careers in engineering. That’s where determination played a big role because years passed before the actual construction of the facility started in 2005.

At the time that the early plans were made, the energy crunch that is so evident today appeared to be many years off. “Nearly 10 years ago, our team in the College of Engineering effectively identified the energy challenges we would be facing today and developed plans for a 21st century research facility that would enable them to lead the way toward more environmentally responsible and economical ways to power transportation and industry,” said Lou Anna K. Simon, president of MSU. Simon is credited with signing off on the final plans for construction of the facility. She and many others are part of the team that made it all happen. “The Energy & Automotive Research Laboratories allow us to develop the next generation of solutions at the same time that we’re working on applications to address current global energy concerns,” said Simon.

Eann Patterson, professor and chair of the Department of Mechanical Engineering, calls the building “a world-class facility that puts MSU in an elite group of universities to have this quality of laboratories and equipment.”

Patterson, who became chair of the department before construction on the building began, has been instrumental in seeing the project to completion.

The new facility more than doubled the previous space for energy and automotive research. The new automotive laboratories will seek alternatives to fossil fuels as well as identify ways to realize greater fuel efficiency. The energy laboratories will focus on combustion and will support work in fluid mechanics as well as control, particularly related to hybrid electric vehicles.

The laboratories have also meant a 10 percent increase in faculty. Three new researchers are already working in the new facility. In addition, the College of Engineering has active searches underway for additional faculty. Eventually, the new facility will house 14 faculty and 50 graduate and doctoral students.

Another benefit of having such advanced research and testing facilities is that they bring in grant funding. MSU was recently notified that it will receive more than $2 million from the U.S. Department of Energy to perform research that couples biofuels with efficient automotive engines. Much of this work will be conducted in the new facility.

The research center also increases learning opportunities for graduate and undergraduate students, enabling them to work in labs alongside faculty mentors, doing multidisciplinary research and getting real-world experience.

While the original vision for an outstanding research facility is now complete, it is inspiring other dreams. “Our entire team is working together,” says Satish Udpa, dean of the College of Engineering. “We want to make Michigan a better place to live and work. This facility puts us in a much better position to respond to the needs of the energy and automotive industries.”

— Jane L. DePriest
Fast Facts About This World-Class Facility

- $10 million, 29,000-square-foot research complex
- Original concept was created 10 years ago; construction started in November 2005; dedication was August 24, 2007.
- Laboratories feature powertrain lab and two engine test cells, one of which can accommodate a large SUV or small military vehicle.
- There will also be a cold room to test engine starting and operation in temperatures as low as -40°C.
- A giant hot press is key to ongoing research on alternative energy sources, especially in thermoelectric projects. It is just one of many state-of-the-art pieces of equipment in the facility.
- It is located at Service Rd. and Bogue St., adjacent to the existing Engineering Research Complex, just south of the MSU Clinical Center.

Generous Support Made Facility Possible

Nearly half of the financial support for the Energy & Automotive Research Laboratories was provided by individual and corporate donors, including:

- The Richard H. Brown Foundation
- Consumers Energy Foundation
- Ford Motor Company Fund
- General Motors Corporation
- Hallenbeck Construction Co., Inc.
- Roy H. and Dawn I. Link
- James B. McKeon
- John D. and Dortha J. Withrow

The MSU Provost’s Office and the College of Engineering provided funding as well. There are continuing opportunities for contributions to this facility. For information, please contact Engineering Development at (517) 355-8339 or e-mail egrdevel@egr.msu.edu.
DREAM Will Help Engineering Students Achieve Goals

If you can dream it, you can do it,” Walt Disney once said.

And Rick Brown (BS mechanical engineering ’71) is hoping that his DREAM will help future engineering students achieve their dreams.

Brown recently established the DREAM Endowed Scholarship in Engineering (Dedicated to Recruiting Engineers for America and Michigan). He says that he has merely planted the seed; his intent is that the endowment will grow into a substantial scholarship as other alumni contribute, thus nurturing the project.

He places a high value on ensuring that future generations of students who are genuinely interested in — and show promise in — this field of study are given the opportunity to pursue an engineering education at MSU, regardless of their financial means.

“Technical education is my passion,” Brown says. And he speaks from experience.

Brown served for two years in the Army, then returned to MSU to pursue an education in engineering. “When I decided to get into engineering, I had already earned quite a few credits — most of them in the area of arts and letters. I went to talk to the assistant dean in the College of Engineering, George Van Dusen.”

Van Dusen reviewed his credentials, which, Brown admits, were not all that impressive. Although it was obvious that Brown had more of an aptitude in the humanities (which he had been pursuing), rather than in technical areas, Van Dusen told him: “I’ve seen some veterans do some amazing things. I’ll let you give it a shot.”

“I realized then it was going to be a stiff challenge,” says Brown. “But he motivated me; it was the fear that I might fail.”

Not only did Brown not fail, he graduated with high honors. He has since told Van Dusen, “You have no idea what a motivator you were!”

“Engineering studies and technical experience are the basis for a country’s economic growth and well-being,” Brown says. “The underpinning of a strong economy is technical expertise.

“I certainly hope this scholarship will encourage students to pursue a technical education, earn a degree, and go out and contribute to society. I hope they will recognize the importance of this scholarship and in turn support the university or another technical area of their choice.”

The intent of this endowed scholarship is to provide a permanent and reliable source of funding to help recruit and retain outstanding students — particularly domestic students.

Tom Wolff, associate dean for undergraduate studies in the College of Engineering, says, “From 2001 to 2005, we saw a 35 percent decline in freshmen declaring engineering as a major. Other schools in the country have also seen declines, but the greatest have been at schools that draw students from the state of Michigan and nearby.

“While scholarships have been readily available for MSU students in general,” Wolff continues, “other engineering schools have been able to make better offers than we have. Engineering-
based scholarships will help us draw some of these students to MSU."

DREAM scholarships, which are renewable for up to two years, are available to incoming freshmen and transfer students who are either U.S. citizens or permanent residents.

Scholarship recipients are normally selected during the spring semester, with awards going into effect the following fall. The number of awards and the amounts are based upon available expendable amounts for that year.

Designating the fund as an endowment means that the principal of the gift will be invested and only a portion of the investment earnings will be spent annually to distribute the awards. This allows the fund to be reinvested for growth and eventually helps many more students over time, as opposed to an expendable fund, which is depleted once the original gift is spent.

“I had a desire to help seed and set up a program to attract others to contribute, so we can grow this into a fairly substantial scholarship,” Brown says.

“I don’t think of charitable giving to the College as ‘giving,’ . . . I think of it as ‘returning,’” Brown says. “I got a lot from the university. It’s a privilege, an honor, and a responsibility to give back because I received so much. I hope others will do the same.”

Thus he encourages scholarship recipients to, in turn, pass their DREAM along to other future engineers.

— Laura Luptowski Seeley

To find out how you can contribute to the DREAM Endowed Scholarship fund, please contact the Office of Development & Alumni Relations at (517) 355-8339 or egrdevel@egr.msu.edu.

The Richard H. Brown File

- BS Mechanical Engineering, High Honors, MSU, 1971; MA Business Administration, University of Illinois, 1977
- While attending college from 1960–1964, he worked in various entry-level positions — including office boy, janitor, press operator, welder, bodyman, and assembly line worker. He says he “learned a lot and made some money.”
- He worked part-time as a computer programming tutor and consultant to manufacturers from 1968–1971.
- From 1971–1979, he was promoted through various management positions to manufacturing manager for Allis-Chalmers (subsequently Fiat-Allis Construction Machinery, Inc.).
- In 1979, he joined The Brown Corporation, an automotive parts manufacturing business in Ionia, Michigan, started by his father and uncle in 1948. He served as president and chairman until 1997. While there, he led the change from $6.7 million in sales and serious debt to $100 million in sales and substantial cash reserves, and increased the operation from one facility to five in three states and Mexico.
- He currently volunteers as a business consultant to nonprofit organizations. Past volunteer services have included serving as: president of the Ionia Area Chamber of Commerce and of the Ionia Rotary Club; board member of the Ionia County Planning Commission, the Michigan Chamber of Commerce, and the Manufacturing Skill Standards Council; and chairman of the Precision Metalforming Association and the Precision Metalforming Association Educational Foundation. He also served as a member of the MSU College of Engineering Alumni Board and as president of the Department of Mechanical Engineering Visitors Board.
- His many accomplishments and honors include: varsity letters in gymnastics from Central Michigan University (where he attended for two years), membership in the Phi Kappa Phi All University Honor Society and the Pi Tau Sigma Mechanical Engineering Honor Society, and selection by the Ionia Chamber of Commerce as Member of the Year (1982). In 2001, he received the MSU College of Engineering Claud R. Erickson Distinguished Alumnus Award.
- Most recently, the Richard H. Brown Foundation provided a lead gift to name an energy laboratory in the college’s new energy and automotive research facilities.
- He has three children, four stepchildren, and three grandchildren. He and his wife, Nancy, live in Belmont, Michigan.
The College of Engineering recognized nine alumni who have brought honor to the college through their exceptional achievements, both professional and philanthropic, at a May 5 banquet at the Kellogg Hotel and Conference Center and again at the commencement ceremony on May 6. The recently established Green Apple Teaching Award was also given to a K–12 teacher who has inspired his students to study math, science, and engineering. This awardee was selected from nominations submitted by our graduating senior engineering students.

To read more about the award winners or about the awards, go to the online pdf of the program booklet at www.egr.msu.edu/egr/publications/today/articles/20070529_alum_awds_bklt/2007_alum_awds_bklt.pdf.

For more information on nominating a College of Engineering graduate for an alumni award, please contact the Office of Development and Alumni Relations at (517) 355-8339 or egrdevel@msu.edu.
Applied Engineering Sciences Distinguished Alumni Award

- **Steven J. Trecha** (BS ’80 Engineering Arts/Applied Engineering Sciences) is president and CEO of Integrated Strategies, Inc., a strategic sourcing, supply chain, and logistics consulting firm. An original member of the Applied Engineering Sciences Alumni Advisory Board, he currently serves as chairperson.

Biosystems and Agricultural Engineering Distinguished Alumni Award

- **George H. Wedgworth** (PhD ’50 Agricultural Engineering) is president, CEO, chairman of the board, and a director of Sugar Cane Growers Cooperative of Florida, which harvests, transports, and processes sugar cane and markets raw sugar. He was instrumental in founding the cooperative in the 1960s, as well as the Florida Celery Exchange, the Florida Molasses Exchange, Inc., and the Florida Sugar Marketing & Terminal Association, Inc. He was presented in 2006 with the prestigious Dyer Memorial Award: Sugar Man of the Year, and was inducted into the Florida Agricultural Hall of Fame in 1994.
Red Cedar Circle Award in Chemical Engineering and Materials Science

■ William B. Larson (BS ’53 Metallurgical Engineering) spent his career in research and development for General Motors. He oversaw development work on numerous automotive innovations that led to significant cost savings and are in common use today. He also managed GM’s participation in the National Highway and Traffic Safety Administration’s first safety vehicle program, incorporating the first application of many safety features in use today. He has served on MSU’s Development Fund Board, the materials science and metallurgy visiting board, and the College of Engineering alumni board. He and Barbara established an endowment fund for the college in 1990.

■ Richard V. Pisarczyk (BS ’68 Chemical Engineering) is president of ExxonMobil Research and Engineering Company. He began his career with Mobil Oil in 1968, holding positions of increasing responsibility over the years. Through the merger between Exxon and Mobil in 1999, he was named regional director, Americas, of ExxonMobil Chemical. ExxonMobil has been an MSU donor for 25 years. Pisarczyk and his wife, Mary, established an endowed discretionary fund in 2002 “to encourage progress and excellence within the Department of Chemical Engineering and Materials Science.”

Civil and Environmental Engineering Distinguished Alumni Award

■ Paul H. Woodruff (BS ’59, MS ’61 Civil Engineering) is president of Mistwood Enterprises and the major shareholder in ECOR, an environmental remediation company, and eLab, an environmental analytical laboratory. He founded the Environmental Resources Management Group (ERM) in 1977, which became a $300-million-a-year business and a global leader by his retirement in 2001. He is a board certified environmental engineer of the American Academy of Environmental Engineers and received their Gordon Maskew Fair Award for excellence (1997). He was a Capital Campaign consultant for the College of Engineering, has served on the CEE department’s advisory board, and has been president of MSU’s Philadelphia Area Alumni Club. He and his wife, Marcia, in 1993 established an endowed scholarship for high school graduates qualifying for the Honors College award, or undergraduates who demonstrate excellence within the College of Engineering, the College of Human Ecology, and/or the Honors College.

Computer Science and Engineering Distinguished Alumni Award

■ Honda Shing (MS ’88, PhD ’92 Computer Science), a native of Taiwan, is an entrepreneur and innovative software engineer, specializing in multi-
processor operating system design. In 1998, he co-founded InterVideo, which soon became a leading provider of digital video disc (DVD) software. Their first product, WinDVD, worked on all Windows systems and provided a Lynx DVD software player. The cross-platform advantage led to their company’s becoming the leading provider of DVD software within a year. InterVideo was recently acquired by Corel Corp. of Canada for a reported $198.6 million.

John D. Ryder Electrical and Computer Engineering Alumni Award

George H. Simmons (BS ’73, PhD ’81 Electrical Engineering) is COO of Simpler Networks in Bedminster, New Jersey. He is the past president and CEO of Cibernet, where he managed a turnaround of the venture capital–backed wireless services business, which was recently sold to MACH for over $200 million. He has received many awards, including the Lucent Wireless Explorers Award and the Lucent Wireless CDMA Award. He is on the MSU Black Alumni Endowment Campaign Committee and formerly served on their board of directors. He has served on the electrical engineering visiting board and generously supports MSU through corporate donations.

Mechanical Engineering Distinguished Alumni Award

Donald B. Paul (BS ’68 Mechanical Engineering) is chief scientist for the Air Vehicles Directorate of the Air Force Research Laboratory at Wright-Patterson Air Force Base. He is the recipient of many honors, among them the U.S. Presidential Meritorious Senior Professional Rank Award for lifelong service. He is an ASME and an AIAA fellow and a frequently invited speaker at universities and international technical symposia.

The Green Apple Teaching Award

John W. Plough (BA ’78, MA ’84 Geography; Secondary Education Credential Certification, Michigan State University) has taught at East Lansing High School since 1985. He is the team adviser for East Lansing AP physics students competing in the annual University of Michigan Physics Olympiad. The team placed first in 2004 and 2006, and second in 2005. He received an Excellence in the Art of Teaching Award from the East Lansing Education Foundation in 2006 and an Excellence in Education Award from the Lansing Regional Chamber of Commerce in 1994.

Claud Erickson Distinguished Alumnus Award

Joon S. Moon (BS ’60 Chemical Engineering). The Claud Erickson Award is the College of Engineering’s highest honor. See next page for details about this award and about the 2007 recipient, Joon Moon.
Joon S. Moon, a 1960 graduate in chemical engineering, was honored at the May 5 Engineering Alumni Awards Banquet and again at the May 6 commencement ceremony. He received the prestigious Claud R. Erickson Distinguished Alumnus Award, which is given annually to a College of Engineering graduate who has attained the highest level of professional accomplishment and provided meritorious service to the college and the engineering profession.

Moon is an inventor, an entrepreneur, and a philanthropist. He came to MSU from his native South Korea on the recommendation of an American GI. After MSU, he earned a PhD ('63) in chemical engineering from the University of California–Berkeley, then worked for chemical companies such as Celanese and DuPont. He became a U.S. citizen in 1967. He met his wife, Zaiga, at MSU.

In 1969, he bought a manufacturing company in Howell, Michigan, thus founding Moon Chemical. He went on to form a number of successful companies, through which he developed the chemicals used in several well-known household products. Today, he owns two manufacturing companies that produce household and industrial cleaning products: the Rooto Corp., based in Michigan, and Star Pacific, Inc., based in California. He is also a founder of North Pointe Insurance Co., based in Michigan. As chairman of Mt. Rose Capital, Inc. (a holding company in Vancouver, Washington) he now spends most of his time in start-up capital ventures and investment management.

Moon is described as being "possessed of the highest standard of personal integrity." His own clear values inspire the people and corporations he works with to exemplify good citizenship while achieving their business goals.

He has served on the boards of...
The Claud R. Erickson Distinguished Alumnus Award is given annually to a College of Engineering graduate who has attained the highest level of professional accomplishment, provided distinguished and meritorious service to the College of Engineering and the engineering profession, and engaged in voluntary service at the local, state, national, and/or international level. The award was first given to Claud Erickson in June 1982. Mr. Erickson was a distinguished alumnus and received four engineering degrees from MSU, beginning with a bachelor of science in 1922.

The deadline for 2008 consideration is Friday, January 11, 2008. Nominations not selected will be kept for future consideration.

NOTE: If available, we highly encourage you to submit the candidate’s résumé/CV, letters of support, and relevant news clippings, press releases, etc., with your nomination.

QUALIFICATION CRITERIA
• Graduate of the College of Engineering at Michigan State University. Please list the candidate’s graduation dates and departments.
• Minimum of 20 years’ professional experience in an engineering or engineering-related field. Please provide a short listing of the candidate’s experience.

SELECTION CRITERIA
• Is recognized as a leader in engineering, engineering education, the related sciences, or technical management. Please provide validation.
• Is actively involved in the community and has acted in private life in ways that reflect credit to the individual, to the community, and to Michigan State University. Includes involvement in national engineering or engineering-related technical/professional associations. Please provide validation.
• Has contributed in some meaningful way to the College of Engineering or to Michigan State University. Please provide validation.

NOMINATION FORMS
To request a nomination form, or if you have any questions about the Claud Erickson Award, please contact: Office of Development & Alumni Relations, 3536 Engineering Building, East Lansing, MI 48824; Tel (517) 355-8339; Fax (517) 353-9405; Email egrdevel@msu.edu.

A nomination form may also be downloaded at www.egr.msu.edu/egr/development/alumni/awards/erickson.php.
The ninth annual College of Engineering GOLD Club reunion breakfast was held June 8 in MSU’s Kellogg Hotel and Conference Center. Attendees included 41 engineering alumni who had graduated 50 or more years ago, their guests, and 22 engineering faculty, staff, and grad students. The event was hosted by Lynn Bechtel, a 1991 mechanical engineering graduate and current chairperson of the college alumni board.

100 Years Ago: The Class of ’07

William Minard (’49 electrical) commemorated his father’s graduating class, the class of 1907 — or, as he was raised to say, “the class of ought-seven.” This year is their hundred-year anniversary. Bill’s father, Ray Floyd Minard, used to talk about how he had carried bricks to build the original Olds Hall as part of a summer job while he was a student. He had been living in the original Wells Hall when it burned in ’05. After coming home from a date, he had tossed his clothes on a chair before going to sleep. So he was able to grab those clothes, and nothing else, as he escaped from the fire.

Bill brought along his father’s 1907 yearbook — the Jubilee Wolverine — so called because the 50th anniversary of Michigan State was celebrated that year. [Later on, Michigan State decided to use the date of its enabling legislation (1855) as its founding date, rather than the start of classes (1857). As a result, the MSU centennial was celebrated in 1955, only 48 years after the jubilee celebration.] Bill pointed out several interesting members of his father’s class:

• Professor Claude M. Cade: “Most of you probably had him for surveying.” [Cade taught civil engineering at Michigan State from 1913 to 1951 and received the 1950 “Engineering Teacher of the Year” award. His son, William, earned an MSU engineering degree in 1938 and in 1995 established an endowed scholarship, named for his parents, to benefit Engineering and Human Ecology students.]

• MSU President Jonathan L. Snyder (1896–1915): “Many of you lived in Snyder Hall.”

• Fred C. Jenison, who donated money for Jenison Fieldhouse.
Is This the Chicken Coop?

John McLaughlin (’54, ’79 civil). “My mother was here at Michigan State. She graduated in home economics in 1916. She lived in the women’s dorm — what is now known as Morrill Hall. Back then, male students referred to it as ‘the chicken coop.’

“My wife and I met here, and we both graduated in 1954. We were engaged the four years that we were in school. Today she’s down the hall at the social science breakfast, [although her degree was in home economics. As the university has re-organized, some schools have, unfortunately, gone by the board and been merged into a number of other, different colleges, including hers].”

James Blanchard (’42 civil). “The second Wells Hall, rebuilt after the 1905 fire, was divided into six wards to reduce fire hazards and noise. During Farmers Week, someone put up a sign outside the door of Ward F, where I lived, that said ‘Chicken Exhibition.’ People were coming in through the doors and climbing the stairways looking for the place where chickens were being raised. We had a terrible time trying to tell them, ‘This isn’t the place!’”

On the Wings of Love

Ole Sarto (’42 mechanical). “Michigan State had a civilian pilot training program. I soloed in 1940 and received my private pilot’s license in January 1941. The next summer I offered my girlfriend an airplane ride. She was scared to death, but she decided that if she didn’t fly with me, some other girl would. So having survived that, she’s here 66 years later — my wife, Fran.”

The Well-Dressed Engineer

Al Murray (’57 agricultural). “I think I’m the only Ag engineer here. One thing about campus back in the fifties, we carried our six-guns in our holsters. The six-gun was your slide rule. You had that on your belt. That was back before computers. We worked on the slide rule to get an approximate answer. Now you can press one or two buttons and get an exact answer.”

Martin Saper (’41 mechanical). “Do any of you recognize these?” [holding up a pair of yellow corduroy pants]. “I’m from the class of 1941. Someone decided that senior engineering students should have a uniform, so we wore these all through that year. I thought they would bring back some old memories.”

C. Granville Sharpe, Jr. (’41 mechanical) took careful measurements and sent in the orders for the pants, but they arrived in all the wrong sizes. Sharpe also recalls, “When we were freshmen, President Shaw gave an introductory talk. He explained to our class that there was going to be a new dormitory down at the end of campus — to be called Mason Hall. He said, ‘That’s where the apple orchard is now. You’re all welcome to go down and help yourselves to the apples.’”

A Rose By Any Other Name . . .

John D. (Jack) Withrow (’54 mechanical). “I’d just like to remind all you youngsters — the majority of people here did not graduate from ‘Michigan State University.’” [To see a list of all the university’s names over the years, go to http://keywords.msu.edu/a-z/viewpathfinder.asp?id=7#.]

The Leggat Legacy

John (Jack) Leggat (’40 mechanical). “My father graduated in 1915 from here as an electrical engineer. I graduated in 1940 as a mechanical engineer. I brought my father to his 50th anniversary reunion in 1965. He was not feeling well at the time, but he drove me up here, and we enjoyed ourselves very much.”

I Hope I Get a Good Grade on My Project!

Marvin Schumann (’44 chemical). “Back then, we had senior projects. Dr. DeWitt assigned a term-long senior project, and we had to write a term paper, of course. My good friend, Russell, was allowing the experiment for his project to run over the weekend. On Saturday night, there was a big ‘boom!’ Apparently his experiment involved benzene. It blew out a window in Olds Hall, plus a little other damage.”
You have laboriously conducted research over many months, suffering failures and successes until you finally perfect your new invention — the WonderSpartan™.

Next, your patent attorney prepares a patent application and files it with the U.S. Patent and Trademark Office. After years of negotiations with the patent examiner, your patent finally issues. Your patent attorney has also filed a trademark application, which has been granted by the Patent and Trademark Office. Accordingly, you now proudly advertise your product with its appropriate trademark registration symbol and mark the product with its patent number.

After many years of fighting with the bank for funding, and difficulties in obtaining initial customer interest, you are finally seeing significant sales in the marketplace. You turned a profit a few years ago and your product has become a smashing success.

But then you start seeing occasional eBay® auctions for your products — at a significantly lower price than what your retailers normally charge. Then you begin to receive calls from cus-
tomers who complain about the poor quality of the WonderSpartan® products they bought; after they return the products for a replacement your inspection reveals that these are not from your factory, but cheap imitations. Now you begin seeing Internet Web sites advertising copycat WonderSpartan® products, hundreds of eBay® auctions for these products, and retail stores selling these cheap imitations. Upon further investigation, you learn that some of these competing discounted products are being shipped into the United States from overseas and some higher quality imitations are now showing up.

Welcome to the bold new world of counterfeiting. Copying may be the sincerest form of flattery but the now-evil saying wasn’t supposed to pertain to your hard-earned business — and especially not your dear invention. While caveat emptor, buyer beware, may give some measure of justice to those who purchase the poor quality and significantly discounted imports, the more recent higher quality knock-offs are of even greater concern. These dark alley competitors are unfairly ignoring your patent and intentionally using your trademark without your permission. What do you do now?

**Where Are the Bad Guys?**

You do have some good enforcement options available, but none are perfect. The initial and more practical question is: Where are the “real bad guys” located? In other words, those who are actually manufacturing the counterfeits. And do they have any assets in the United States? While their U.S.-based distributors and retailers are certainly potential enforcement targets, this may simply be “nipping at the tail rather than cutting off the head of the snake.” As long as the U.S. courts have jurisdiction over the counterfeiters or the counterfeit products, then various federal courts may be able to help.

Often it is worthwhile to hire a private investigator to locate U.S.-based retailers and distributors of the counterfeit products. This investigation is not terribly expensive and can often be completed within a couple of months. The level of success often depends on the openness and talkativeness of the targets within the counterfeit distribution chain. The options further open up once a significant U.S.-based retailer or distributor has been identified, and especially once you know where they are warehousing the counterfeits.

**Marshal Seizures**

A seizure can be ordered by a federal court, prompting the U.S. Marshals to enter the warehouse or store to seize the counterfeit products. This action is primarily used with regard to federally registered trademarks. It is intended to prevent consumer confusion, especially with regard to health or safety items, based on blatant counterfeiting and also to prevent the otherwise likely destruction or transfer of the products by the counterfeiters. Counterfeiters take notice when the federal Marshals break down their front door, enter the building with their guns drawn, and walk out with boxes of the counterfeit products and their computers containing their records.

While the seizure may not directly touch the “real bad guy” manufacturer (who is often overseas), the publicity can make other distributors and retailers much more reticent to handle the counterfeit products. It may also cause the manufacturer to change products to those receiving less aggressive attention. Moreover, you will often gain information from the seizure defendant as to his suppliers and customers, which may be helpful in other enforcement actions. It is noteworthy that after the Marshals’ seizure, the court action will turn into a normal federal district court lawsuit, but rarely do these actions go much beyond the seizure due to the “nuclear strike” nature of the process.

**International Trade Commission**

A second option is to bring a “337 Action” with the U.S. International Trade Commission (ITC). Both trademark and patent infringement lawsuits can be brought before the ITC. Jurisdiction over the overseas manufacturer is not important as the ITC has jurisdiction over the counterfeit goods entering the United States. The ITC may enter an exclusion order directing U.S. Customs to prohibit the importation of infringing counterfeit goods and may also issue a cease and desist order against named importers and others who assist, such as U.S.-based distributors and retailers. The ITC, however, acts only to protect the domestic U.S. business of the patent or
trademark owner; in other words, your product must have sufficient U.S.-based manufacturing or engineering.

ITC 337 Actions are fast relative to a normal district court lawsuit. The case will go to a non-jury trial approximately six to eight months after initial filing, and the ITC judge findings will issue about three to four months later. The speed of a 337 Action is a huge disadvantage to a typically foreign defendant (if he or she decides to fight). Nevertheless, monetary damages cannot be recovered from the ITC. Hence, a parallel district court lawsuit will need to be filed if monetary damages are sought, but the district court action is usually stayed pending the outcome of the ITC action.

District Court Lawsuits

The tried and true approach is to sue the counterfeiter, distributor, and retailers in a civil lawsuit in a federal district court. It may be possible to obtain a preliminary injunction early in the lawsuit, which is more likely for blatant trademark counterfeiting than for the patent infringement cause of action unless the patent has previously been litigated. Otherwise, it may be three to five years before the lawsuit reaches trial, after which the inevitable appeals begin.

 Nevertheless, many blatant counterfeiters will not actively fight the lawsuit and a default judgment (i.e., the defendants do not show up to fight), or a consent judgment (i.e., stipulation by all parties that the plaintiff wins) and settlement are quickly obtained. The advantage of the regular federal district court lawsuit is that both injunctive and monetary damages are available. In contrast, the disadvantages are a possible lack of jurisdiction over the foreign defendant, the long time frame for a final decision if the defendant actually fights, and the large legal fees inherent with a patent lawsuit (especially with foreign parties) if the defendant actually fights. Nevertheless, a federal district court lawsuit has often proven very effective at scaring a U.S.-based distributor and retailer into a quick consent judgment and settlement without prohibitive initial legal fees.

Foreign Lawsuits

The foreign counterfeiter can be sued for patent and trademark infringement in his own country if you have an issued patent and registered trademark in that country. The success of such a lawsuit depends on the country, the counterfeiter, and the type of product. Moreover, foreign patent and trademark lawsuits can be much less expensive than their U.S. counterparts, so they should be considered for the right situation.

Conclusion

There are many patent and trademark enforcement weapons available in the arsenal to protect your imitated WonderSpartan® product. By no means are the enforcement mechanisms perfect and there are still many large gaps in the protection landscape when the counterfeiter is overseas and clever. The return on the investment of a lawsuit against small counterfeiters, which can be akin to squashing a gnat with a steamroller, may also be daunting and dissuade you from legal action. But some of the low-cost approaches discussed herein may be appropriate against the many small counterfeiters, with the occasional “nuclear strike” of a Marshals’ seizure thrown in against larger U.S.-based counterfeiters for the publicity value. ☎️

— Monte L. Falcoff

These opinions are the author’s current personal thoughts and should not be attributed to his firm or its clients, or the College of Engineering. Contact Monte at mlfalcoff@hdp.com or (248) 641-6500.
College of Engineering Alumni Receptions have been held throughout 2007 in Chicago, San Francisco, Dallas, Minneapolis, and Grand Rapids to welcome Satish Udpa as the dean of the College of Engineering. During the upcoming year, a number of College of Engineering Alumni Receptions will be held in additional locations throughout Michigan and around the country. Keep an eye on your mailbox and on the Events section of the College of Engineering Web site (www.egr.msu.edu) to see if an alumni reception will be held near you. If you have any questions or would like additional information, please contact Engineering Development & Alumni Relations at (517) 355-8339 or egrdevel@msu.edu.

—Vicki Essenmacher

"Meet the Dean" Alumni Receptions

Dean Satish Udpa (right) visits with alumnus Masaru Kawaguchi (BS Civ Egr 1951) during a College of Engineering Alumni Reception held in San Francisco. This gathering of approximately 50 alumni and guests was held on Sunday, April 1, 2007, to congratulate Satish S. Udpa on his appointment as the eighth dean of the MSU College of Engineering.

PHOTOS BY MICHAEL MUSTACCHI

Hosts Dave (BS Elec Egr 1988) and Janie Mysona with Dean Satish Udpa at the College of Engineering Alumni Reception held at the Olympic Club–Lakeside in San Francisco.

PHOTOS BY MICHAEL MUSTACCHI
Venkatesh Kodur (left), professor of civil and environmental engineering, with Ronald Harichandran, department chairperson.
Fire claims 4,000 lives and injures about 100,000 individuals in the U.S. each year and accounts for more than $50 billion in total losses. Yet, structural fire safety has been one of the least developed research areas in the United States — that is, until now. MSU’s College of Engineering has set out to change all that.

“The collapse of the Twin Towers of the World Trade Center on 9/11 brought international attention to the field of structural fire engineering,” says Ronald Harichandran, chairperson of the Department of Civil and Environmental Engineering. “And our department has positioned itself to be a leader in this area that is so critical to homeland security and economic activity.”

To that end, the college dedicated its new Structural Fire Testing Facility on June 12, the first such facility in a U.S. university setting.

“This is a significant day for Michigan State University,” said Ian Gray, MSU’s vice president for research and graduate studies. “We are introducing another arsenal to our research activities as we move the university forward in terms of research prominence. This world-class facility will be a beacon to bring faculty from other institutions and government agencies to work collectively with our faculty here at MSU.”

The new facility is led by Venkatesh Kodur, a professor of civil and
environmental engineering and one of the world’s leading experts on the effects of fire on materials and structural systems. He has more than 16 years of experience in structural and fire engineering and spent 12 years at the National Research Council Canada just prior to coming to MSU. He was part of the FEMA/ASCE Building Performance Assessment Team that investigated the collapse of the World Trade Center and was recently the keynote speaker at the Advanced Research Workshop organized by NATO Peace and Security Commission in Moscow, Russia.

The Structural Fire Testing Facility features a natural gas–fueled test furnace capable of reaching temperatures in excess of 2,200°F. The furnace will simulate the temperatures, heat transfer, and loads endured by structures in an actual fire. “We have designed a good exhaust system so we are not polluting the air,” Kodur adds.

Housed in an addition to the existing Civil Infrastructure Laboratory, the furnace is 8 × 10 × 5 feet high. Beams up to 13 feet long can be tested — two at a time — while an 8-foot-long section of each beam is exposed to the fire. Slabs measuring 8 × 10 feet and columns about 8 feet in height can also be tested. In addition, connection systems or portal frames can be tested in this facility.

According to Kodur, many of the new, emerging materials that are finding applications in bridges and other structures are less fire resistant than some of the conventional materials we were using fifty years ago. He says, “The only way to move our work forward is through new research and development in the area of structural and materials fire safety.”

Several projects are already underway or slated to begin soon in the new facility.

MSU engineers are working with the National Science Foundation (NSF) and Portland Cement Association on developing solutions and calculation methods for improving fire performance of concrete structural systems. In another project, funded by the American Institute for Steel Construction, the new facility will be utilized to develop performance-based approaches for steel-framed buildings. An NSF and National Institute of Standards and Technology (NIST)-funded project, in collaboration with Princeton University, involves students studying what happens inside a steel-framed building when the beams are exposed to fire.

In addition to research, says Kodur, “We need to better train our engineers in structural fire engineering. This is something that is severely lacking in the United States.

“Fire is a phenomenon that occurs so frequently; you see fire crews responding every day in communities everywhere. Yet, in general engineering curricula across the country, issues related to fire aren’t even addressed,” Kodur says.

“We have been training civil and mechanical engineers and then sending them out to work on this built infrastructure where we’re supposed
to live, work, and function effectively," Kodur continues. But when an event like fire occurs, if a structure is not designed to withstand it, it can be devastating. Take, for example, the nine firefighters who recently lost their lives in a furniture warehouse blaze in Charleston, South Carolina, when the roof suddenly collapsed, less than 30 minutes after the fire began.

“We should be doing everything we can to improve safety in our buildings,” Kodur says. “We design for blast, for wind, for hurricanes, for snow loads — but we never design for fire.

“Engineering curricula need to include fire safety in courses so we can achieve better results,” Kodur continues. “If we use rational engineering approaches, we can achieve much more in this area from the safety point of view — both in terms of saving lives and protecting property.” (Kodur was quoted in an August 24, 2007, *Science News* article; MSU’s new Structural Fire Testing Facility was also referenced. To read the article, visit [http://scienecnwes.org/articles/20070825/bobg.asp](http://scienecnwes.org/articles/20070825/bobg.asp).

“It is critical that we educate engineers who will build better buildings and better infrastructure, and who will go on to train better engineers of the future. Because today’s young people will become tomorrow’s faculty — those who will teach and conduct research in structural fire safety at major universities around the world.”

To address concerns such as these, in conjunction with the dedication of the new lab, a two-day National Workshop on Structures and Fire was held on the MSU campus. The objective of the workshop was to develop long-term research and training guidelines. Kodur initiated, led, and co-chaired the program, which was sponsored by NSF and co-sponsored by MSU and NIST. Sixty scientists and professionals from around the world attended, ranging from New York City firefighters, to representatives from concrete and steel industries, to fire protection consulting companies, to academics from the University of Michigan, the University of California—Berkeley, the University of Texas—Austin, Worcester Polytechnic Institute, the University of Maryland, and Princeton University. Also in attendance were experts from New Zealand, UK, Switzerland, Belgium, and Canada.

“These activities represent a major milestone in our plan to build high-quality programs in the area of safety and security,” says Satish Udpa, dean of the College of Engineering. “It will allow us to perform a systematic study of factors that contribute to the failure of man-made structures when subjected to fire. It will also guide us in developing the next generation of materials and techniques that can withstand malicious attacks on our infrastructure.”

“With Professor Kodur’s leadership and our partnership with industry and government, we expect Michigan State University to be a leader in developing new materials, sensors, and design methodologies that will allow the built infrastructure to better withstand the threats posed by natural and man-made fires,” adds Harichandran.
Mukkamala Receives NSF CAREER Award

Ramakrishna Mukkamala, assistant professor of electrical and computer engineering, has received an NSF CAREER Award for his project: “Integrated Research and Education in Cardiovascular Signal Processing for Automated and Less Invasive Monitoring of Central Hemodynamics.” The goals for this project are to develop and advance signal processing techniques to quantify important hemodynamic measures: cardiac output, ejection fraction, left atrial pressure, and central arterial blood pressure, based on measurements of peripheral blood pressure and/or minimally invasive measurements of right ventricular or pulmonary artery pressure. The project results will impact the development of improved patient monitoring and the development of less invasive measures in cardiology.

The Faculty Early Career Development (CAREER) Program, the National Science Foundation’s most prestigious award for new faculty members, recognizes and supports the early career-development activities of teacher-scholars who are most likely to become the academic leaders of the 21st century. Awardees are selected on the basis of creative career-development plans that effectively integrate research and education within the context of the mission of their institution.

Mukkamala’s educational plan focuses on incorporating biomedical engineering into high school and women’s engineering outreach programs at Michigan State University, introducing the discipline with a novel hands-on project in rudimentary Cardiopulmonary Signal Processing (CSP) and offering a short course on basic signal processing concepts to life scientists.

Dale Selected for Top USDA Honor

Bruce Dale, associate director of the MSU Office of Biobased Technologies and professor of chemical engineering and materials science, was selected as the 2007 Sterling B. Hendricks Memorial Lecturer.

This lectureship was established in 1981 by the Agricultural Research Service (ARS), USDA’s primary research agency, to honor Hendricks and to recognize scientists who have made outstanding contributions to the chemical science of agriculture. Hendricks is most frequently remembered for discovering phytochrome, the light-activated molecule that regulates many plant processes.

Dale presented his lecture, “Why Cellulosic Ethanol Is Nearer Than You Think: Creating the Biofuels Future,” on August 20, 2007, during the American Chemical Society’s fall national meeting in Boston.

An international expert in biofuels, Dale has worked in cellulosic ethanol technology for more than 30 years and invented a breakthrough pretreatment for biomass conversion called ammonia fiber expansion (AFEX). His work has also used life-cycle analysis tools, which include agricultural data and computer modeling, to study the sustainability of producing biofuels. “I feel doubly honored to be recognized for this Lectureship in the agriculture field; as a chemical engineer, to be recognized outside of my field is a great honor,” says Dale.

Growing demands for alternatives to petroleum and rapidly improving technologies will make large-scale cellulosic ethanol a reality much sooner than most people may realize. As a result, agriculture and society will be transformed. Dale’s lecture explores some of the consequences of large-scale biofuel production on sustainability and the opportunity to revitalize rural areas across the United States and the world. (To access the PowerPoint presentation, go to www.everythingbiomass.org/Default.aspx?tabid=443.)

Dale received a BS from the University of Arizona, graduating with Highest Distinction; an MS from the University of Arizona; and a PhD from Purdue University. He holds 14 U.S. and international patents. Dale has published numerous journal articles, books, and papers. In February 2007 he, along with other alternative energy scientists, met with President Bush to discuss biomass and alternative energy production.

To read more about Dale’s work, see the article on pages 2–15 of this issue of Currents.

—Lynda White
Faculty/Staff Awards & Accomplishments

■ **Kris Berglund**, University Distinguished Professor of chemical engineering and materials science and of forestry, was part of a delegation to Sweden to facilitate a transition to a bioeconomy in ways that benefit Michigan and Sweden's economies. The delegation of bioeconomy researchers, state government officials, and business executives traveled from Detroit to Lulea, Sweden, a town just south of the Arctic Circle on August 13. Scientists from MSU joined the governor and others in exploring possibilities in Sweden for growing Michigan's bioeconomy. To read more, go to [www.egr.msu.edu/egr/publications/today/articles/20070814.Sweden-bioeconomy.php](http://www.egr.msu.edu/egr/publications/today/articles/20070814.Sweden-bioeconomy.php).

■ **Mackenzie Davis**, professor emeritus, civil and environmental engineering, was named Educational Professional of the Year by the Michigan Society for Engineering Education (ASEE) 2007 Clement J. Freund Award. In a feature called “Technology: Biometric Recognition,” Jain describes how cutting-edge biometric identification technology will shape the future. For the full story, visit [Nature’s web site: www.nature.com/nature/journal/v449/n7158/edsumm/e070906-04.html](http://www.nature.com/nature/journal/v449/n7158/edsumm/e070906-04.html). Jain is also among the most highly cited authors on ISI’s list ([isihighlycited.com](http://isihighlycited.com)). According to ISI, individuals on the highly cited list comprise less than one-half of one percent of all publishing researchers.

■ **Hassan Khalil**, University Distinguished Professor and associate chairperson of electrical and computer engineering, was named a fellow of the International Federation of Automatic Control for his contributions to singular perturbation theory, nonlinear feedback control, and control education.

■ **Les Leone**, assistant dean for undergraduate studies, was chosen to receive the American Society for Engineering Education’s (ASEE) 2007 Clement J. Freund Award. Founded in 1893, the ASEE is a nonprofit organization of individuals and institutions committed to furthering education in engineering and engineering technology. The Clement J. Freund Award honors an individual who has exerted a profound influence on the betterment of the cooperative education movement. Leone was recognized at the society’s annual conference in Honolulu, Hawaii, in June. For more information, see [www.egr.msu.edu/egr/publications/today/articles/20070510. leone_award.php](http://www.egr.msu.edu/egr/publications/today/articles/20070510.leone_award.php).

■ **Shu-Guang Li**, professor of civil and environmental engineering, has been elected a fellow of the American Society of Civil Engineers (ASCE). His research, especially his innovations in groundwater modeling and his integration of those innovations with GIS and Michigan’s statewide groundwater databases, has led to a “technological leap forward” in the state’s ability to protect its groundwater resources, according to both Elgar Brown, Chief of Drinking Water and Environmental Health for the Michigan Department of Environmental Quality, and Scott Ross, Chief of the state’s Source Water Protection Unit. The ASCE Fellow grade is one of the highest membership grades in the organization, exceeded only by honorary membership, and is held by fewer than 6 percent of the total ASCE membership. Li was also recently elected a fellow of the Geological Society of America (GSA) in recognition of his fundamental contributions to the field of groundwater flow and contaminant transport modeling. For more information, see [www.egr.msu.edu/egr/publications/today/articles/20071010.li_shu-ASCE_fellow.php](http://www.egr.msu.edu/egr/publications/today/articles/20071010.li_shu-ASCE_fellow.php).

■ **Lalita Udpa**, professor of electrical and computer engineering, was selected as a 2007 fellow of the American Society for Nondestructive Testing (ASNT). The award will be presented at the society’s Fall Conference and Quality Testing Show in Las Vegas, Nevada, in November. ASNT helps create a safer world by serving the nondestructive testing (NDT) professions and promoting NDT technologies through publishing, certification, research, and conferencing. A fellow of ASNT has achieved outstanding professional distinction and made continued significant contributions to the advancement of NDT in areas such as management, engineering, science, education, administration, or planning. A candidate for the title of fellow must have at least 15 years of professional NDT experience and 10 continuous years of ASNT membership. Udpa works primarily in the broad areas of nondestructive evaluation (NDE), signal and image processing, inverse problems, and biomedical applications. For more information: [www.egr.msu.edu/egr/publications/today/articles/20070509.lalita_udpa_fellow.php](http://www.egr.msu.edu/egr/publications/today/articles/20070509.lalita_udpa_fellow.php).

■ **Greg Wierzba**, associate professor of electrical and computer engineering, received the Outstanding Teaching Award at the 2007 annual meeting of the American Society for Engineering Education (ASEE), North Central Section, held in March in Charleston, West Virginia. Neeraj Buch, associate professor of civil and environmental engineering, was the 2006 winner. ☎

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**Note:** This content is from the [Currents Magazine](http://www.egr.msu.edu/egr/publications/today/articles/20070509.lalita_udpa_fellow.php) Fall 2007 edition. For the full article, visit [www.egr.msu.edu/egr/publications/today/articles/20070510. leone_award.php](http://www.egr.msu.edu/egr/publications/today/articles/20070510.leone_award.php).
Three engineering faculty members were named University Distinguished Professors in June, in recognition of their achievements in the classroom, laboratory, and community. They were honored at a reception on October 17, 2007.

**Gary Cloud**, Department of Mechanical Engineering, director of the MSU Composite Vehicle Research Center; **Roger Haut**, Departments of Osteopathic Manipulative Medicine, and Mechanical Engineering; Osteopathic Medicine Research & Advanced Study Programs; and **Ramani Narayan**, Department of Chemical Engineering and Materials Science, join six engineering professors who have received this title in the past. (To read more about these awardees, visit [www.egr.msu.edu/story/univ-dist-prof](http://www.egr.msu.edu/story/univ-dist-prof).)

The title of University Distinguished Professor is among the highest honors that can be bestowed on a faculty member by the university. Those selected for the title have been recognized nationally and internationally for the importance of their teaching, research, and public service achievements. Individuals holding the professorship receive, in addition to their salaries, a stipend of $5,000 per year for five years to support professional activities.

The engineering faculty are among ten selected university-wide for the honor in 2007. These individuals bring to 104 the number of MSU faculty members who have been named University Distinguished Professor since the designation was established in 1989.

**New Faculty**

**Guoming (George) Zhu** joined the faculty of the Departments of Mechanical Engineering and of Electrical and Computer Engineering as an associate professor. Prior to coming to MSU in August, he was a technical fellow in advanced power train systems for the Visteon Corporation. He also worked for Cummins Engine Company. Zhu earned his PhD (’92) in aerospace engineering at Purdue University. His BS and MS degrees (’82 and ’84, respectively) are from Beijing University of Aeronautics and Astronautics. His current research interests include adaptive control of electro-pneumatic valve actuators as well as closed loop combustion control of internal combustion (IC) engines.

He will work in the new Energy & Automotive Research Laboratories.

**Jeffrey Sakamoto** joined the Department of Chemical Engineering and Materials Science as an assistant professor. He earned his PhD (’01) in materials science and engineering from UCLA. He earned a BS (’96) in materials science and engineering from Cal Poly, San Luis Obispo, California. Prior to coming to MSU, he was a postdoctoral fellow at the California Institute of Technology and has spent the last six years as an engineer at the NASA/ Jet Propulsion Laboratory in Pasadena, Calif. His research focuses on ultra high surface area ceramics (aerogel) for use in energy-related research, to include thermoelectrics, lithium batteries, and fuel cells. Most of his research has targeted technology development for NASA’s future missions, but recent efforts have focused on large-scale implementation for terrestrial applications. Sakamoto has also been involved with the neuroscience community to develop a cure for spinal cord injuries. He has developed a process for patterning highly ordered, high-aspect-ratio, biocompatible scaffolds for guiding axons in the central and peripheral nervous systems. He is the recipient of NASA awards from the Solar System Exploration Programs Directorate (’04) and Space Act Intellectual Contribution Board (’06) for his work involving thermoelectric technology development for space exploration.
Goldwater Scholar Focuses on Joint Replacement Materials

Robert J. Friederichs, a materials science and engineering junior from West Branch, Michigan, believes baby boomers, who are expected to live longer, will need their joint replacement implants to be more wear-resistant. One of three MSU students to be named a Goldwater Scholar for 2007, he is using his scholarship to investigate the corrosiveness and life expectancies of implant materials and coatings.

Friederichs is the eighth Goldwater Scholar produced by the College of Engineering since 1999; of the eight, six have been chemical engineering and materials science majors. The Goldwater Foundation, a federally endowed agency established in 1986 to honor former Sen. Barry M. Goldwater, awards scholarships to outstanding sophomores and juniors who are planning graduate study and research careers in science, engineering, or mathematics. The one- and two-year scholarships cover the cost of tuition, fees, books, and room and board.

Friederichs says, “Total joint replacements, or TJRs, such as knee and hip replacements, make it possible for people suffering from osteoarthritis and traumatic joint injuries to regain limited joint functions. Wear of TJR implants in the body is a significant factor in shortening implant lifetimes. Increasing the longevity of TJRs by improving their wear resistance has become a primary research focus.”

An Honors College student, Friederichs’s first foray into research was as a volunteer undergraduate research assistant with Melissa Baumann, associate professor of chemical engineering and materials science. He learned the basics of bone cell biology and biocompatibility testing.

In the summer of 2006, he was selected for the MSU College of Engineering Undergraduate Research Internship program, which is designed for junior engineering students. “Despite my first-year status, the faculty, encouraged by my previous work in the classroom and in the laboratory, endorsed my internship,” he says. “I gained valuable insight into the graduate school experience and discovered I enjoyed and have an aptitude for research. Having a quality education is what makes you stand out from the crowd, and this is what MSU has provided me.”

Baumann says, “Rob has been a joy to mentor. Working with graduate students, he has learned how to grow bone-forming cells and measure their ability to attach to materials. This research experience has fueled his ambition to obtain a medical degree and also a doctorate in biomedical engineering.”

Friederichs has been researching diamond-like carbon, or DLC, coatings for biomedical devices in the Fraunhofer Center for Coatings and Laser Applications at MSU. Researchers in the center have recently developed a new type of proprietary DLC coating called Diamor. Friederichs is working with them and Baumann to assess the biocompatibility of DLC coatings that have been applied to biomedical-grade metal implant materials and alloys commonly used in hip and knee replacements. His research on how the bone cells interact with these DLCs will be submitted for publication in a biomedical engineering journal.

“My goal is to continue this research in the hope of improving the quality of life for those suffering from debilitating joint diseases or injury.” He plans to practice translational medicine at the interface between biomaterials development and clinical trials.

Biosystems Student Receives Department of Homeland Security Scholarship

Biosystems engineering student Michael Wiederoder, a professorial assistant in Evangelyn Alocila’s biosensors laboratory, has been selected to receive a prestigious Department of Homeland Security Undergraduate Scholarship. This is the second time a biosystems engineering student has garnered the distinguished award. Wiederoder’s research focuses on creating biosensors that will recognize pathogenic bacteria. He will also be studying extracts from exotic natural products for possible medical applications.

Wiederoder’s scholarship includes tuition and fees, as well as a monthly stipend for the 2007–08 academic year. He also qualified for a weekly summer research internship stipend at a Department of Homeland Security (DHS)–affiliated facility.

The DHS realizes that the country’s strong science and technology community provides a critical advantage in the development and implementation of counter-terrorist measures and other DHS objectives. The DHS Scholarship and Fellowship Program is intended to ensure a diverse, highly talented science and technology community that can develop and implement counter-terrorist measures.

For more information about the awards, go to www.orau.gov/dhsed/.
Five students, four alumni, and a faculty member in the Department of Mechanical Engineering spent spring break 2007 working with a Michigan nonprofit organization, Solar Circle (www.solar-circle.org), to launch an industry in Tanzania that will supply this East African nation with solar ovens manufactured from materials available in that country. These domestic appliances, which harvest the intense heat of the tropical sun, are extremely important to the welfare of the people in this very poor country. Currently, Tanzanians rely on wood fires for cooking. This practice is responsible for deforestation, degraded ecosystems, and smoke-related respiratory diseases that represent the second leading cause of death.

During the 2006–07 academic year, two capstone design teams — advised by Craig Somerton, Department of Mechanical Engineering associate chairperson for the undergraduate program — developed a solar oven specifically tailored for manufacture in Tanzania. After developing several conceptual designs, the teams decided on a box oven design, which consists of a cooking chamber fitted with reflectors that direct sunlight into the chamber. Materials were tested and selected. A key aspect was optimizing the positioning of the reflectors to maximize the delivery of solar energy to the oven. Four different oven configurations were identified that would be tested in Tanzania.

During the 2007 spring break, these teams were able to take the product development process a step further by traveling with Professor Somerton to Ndanda and Masasi, Tanzania, to build the ovens, test them, and refine the design. A key aspect of this trip was to meet the people who will benefit from the oven. "Engineering is about helping people and we met people whose lives will be transformed by this solar oven," Somerton says. The trip was funded by private donors, including a generous gift from the Somerton Family Trust.

Stacie Proctor, a mechanical engineering senior, says, "This was a once in a lifetime trip for all of the students. We met people and shared information on solar ovens but we also went beyond that and just found a connection as people. I know I have made some lifelong friends from this trip and I am changed forever. I hope I left the people I met changed for the better as well."

To view a Lansing State Journal animated feature, go to www.lsj.com/multimedia/lsj07/solar_oven/.
A team of electrical and computer engineering students will head to Mumbai, India, in December as one of 30 finalists in the Mondialogo Engineering Award competition, a worldwide contest run by DaimlerChrysler (since renamed Daimler) and the United Nations Educational, Scientific and Cultural Organization (UNESCO).

The team has designed and developed a medical diagnosis device that would allow patients in developing countries like China to be inexpensively screened for a variety of medical problems.

Faculty facilitator Tongtong Li, assistant professor of electrical and computer engineering, and students Joe Hines, Janelle Shane, Kevin Scheel, Thomas Casey, and Kurtis Hessler teamed up with students from China and Italy on the project.

“The goal of the project was to develop a low-cost, low-maintenance, user-friendly medical device that can perform multiple biomedical measurements for patients in rural areas,” Li says. “The free screening tests can provide immediate medical screening feedback for the patients and help them to determine whether further medical assistance needs to be pursued.” Affordable health care in China is an important issue as health care costs are major contributors to poverty. Although China’s health care system is in a state of reform, lack of health insurance, especially in rural areas, prevents many Chinese people from seeking medical care.

This device designed by the student team performs a number of diagnostic functions; it measures blood pressure, blood oxygen saturation, temperature, and glucose level. Additional features include an online database system for patient records and a wireless infusion bottle monitoring system — tools that would be useful to doctors and other hospital workers.

Available for free use in rural hospital lobbies, the device is designed to be simple and safe enough to be operated by trained volunteers or even the patients themselves.

The five-member team was nominated to proceed to the finals of this worldwide engineering contest. About 3,200 engineering students from 89 countries participated in the competition.

Key factors for submitted projects to advance to the finals were creativity and quality, feasibility, and pursuit of the UN Millennium Development Goals. The intensity of intercultural dialogue and the exchange of knowledge between the trainee engineers also played a crucial role in the assessment.

For more information about the team’s project, go to www.egr.msu.edu/classes/ece480/goodman/spring/group04/index.html. For more about the Mondialogo Engineering Award, go to www.mondialogo.org/5.html?&L=en&ttnews[tt_news]=70.

This is a revised version of an article written by Ike Val Iyioke, University Relations.

New Von Ehr Scholars Named

Four freshmen have been selected to receive Von Ehr Scholarships for the 2007–08 academic year. They are, from left to right: Joseph Valeen of Waterford, Mich. (Applied Egr Sciences); Kenneth Newsted of Westland, Mich. (Mech Egr); Ashley Swartz of Laingsburg, Mich. (Engineering No Pref); and Erik Sundberg of Williamburg, Mich. (Mech Egr).

A $1 million endowed scholarship fund was established in May 2006 by James R. Von Ehr II, a 1972 computer science graduate who has long demonstrated his commitment to MSU and the college through service and philanthropy.

Qualified prospective students — those scoring in the 90th percentile and above on national placement exams and who have a proven financial need — are invited to apply for the scholarships, which are renewable for four years. Incoming freshman applicants are required to write a brief essay that describes their idea of the meaning of “free enterprise,” “liberty,” and “open world markets,” and relate how these principles help to promote creativity and the transmission of technological benefits to different world cultures and society in general.
That was the message that 107 students, faculty, and industry professionals carried home from the inaugural Michigan Celebration of Women in Computing (MICWIC).

The conference, held March 30–31, 2007, at the Kellogg Biological Station in Hickory Corners, Michigan, provided a forum for participants to network and discuss careers in industry and academia, work-life balance, and successful strategies for teaching technology.

Teresa M. Takai, director of the Michigan Department of Information Technology, delivered a strong, positive message about women’s roles in shaping the future of technology during her keynote address. Her talk explored emerging career opportunities for women, including Governor Jennifer Granholm’s economic vision for a technology-based economy in Michigan.

Industry support for MICWIC 2007 made it possible for students to attend at low cost. Sponsors included the Dow Chemical Company, Crowe Chizek and Company LLC, Google, IBM, ACM-W, Eaton Automotive, TechSmith Corporation, and others. Company representatives offered insights and advice to attendees during breakout sessions and later met with students at the conference career fair.

The majority of attendees reported feeling inspired by the conference and were encouraged to seek out other young women to support.

—Kim Thompson

“"The time is right for women in technology-based fields."
The two smiling faces in the photo are engineering faculty members who “moonlight” for enjoyment one night each week playing in the Bluegrass Extension Service band. Dr. Erik Goodman, left, assistant professor of electrical engineering and systems science, picks the banjo. Dr. Ronald Rosenberg, professor of mechanical engineering, is a guitarist for the group.

Five years ago, five interested local musicians started “messing around with bluegrass music.” Goodman and Rosenberg were both members of this original group. According to Prof. McCleur of the mathematics department at MSU, they “dabbled in local television and radio and from there it became big business.” They now have a standing engagement at a local eatery one night each week.

Rosenberg and Goodman were asked about student reaction to seeing their professors in a band. Their reply was, “They aren’t surprised to see us. We invite our classes to come. Their surprise is that we are so good.” Indeed, the Bluegrass Extension Service is considered the second best bluegrass band in Michigan. The first, “RFD,” from Ann Arbor, also claims Dr. Goodman as a member.

—excerpt from Currents No. 23, 1977

**Jim Nietert** (BS ’73, MS ’77 Mech Egr) of Grand Blanc, Mich., writes: “The one in back is Dr. Ron Rosenberg. He was an excellent professor with a sense of humor and true interest in his students. His class was fun to attend. The other one, well it’s not Bob Little, John Foss, or Jim Beck. I’m guessing he wasn’t part of the mechanical engineering department.”

**Lynn Viehmann** (BS Computer Sc ’74) of Gaithersburg, Md., writes: “If memory serves correctly, the musically inclined engineers in the photo are Professors Rosenberg and Goodman. I minored in Systems Science, and worked with Professor Goodman on an independent study project during senior year. Although I can’t remember the name of their band, I saw them perform several times and it was always great fun.

“Streaking” was popular then, and on one particular occasion during a break in the performance at a local East Lansing bar, a streaker (wearing only tennis shoes) ran out of the men’s room and through the crowded tables, looped around, and ran back into the men’s room!”

**Dan Tollis** (BS Mech Egr ’77) of Novi, Mich., writes: “Honest, I was just telling my son the other day about the Bluegrass Extension Service Band that used to whoop it up at the old Peanut Barrel on Grand River on Friday nights when I was an engineering student at MSU. Yes! Those were the days, folks, when you could hear these wild and crazy guys do bluegrass standards with perfection. By golly, they gave us students good times and moments to escape the rigors of our college studies. No one could ever forget them. We appreciated them and loved their music sooooo much.

“Who were they, you ask? That’s BGES member Dr. Ron Rosenberg standing behind Dr. Erik Goodman.

“OK — when’s the reunion tour?”

**James L. Lubkin** (professor emeritus in the departments of Metallurgy, Mechanics and Materials Science, and in Civil and Sanitary Engineering) of Gaithersburg, Md., writes: “By now you must have 100 messages which tell you that the unrecognizable hair creature in front is none other than Dr. Erik Goodman, and that the “wig” in the back belongs to Chairman Emeritus of Mechanical Engineering Ronald Rosenberg. (It’s not really a wig.) They were part of a long-lived bluegrass group called The Bluegrass Extension Service (or something like that). A math faculty member and maybe some others were part of that group, which was very popular. The two in the picture did a lot of research and software development, as well as top-notch teaching.

“Erik Goodman was a pilot and four-passenger airplane owner. He used to ferry the music group around for some of their gigs, and also did official, reimbursed MSU travel using his plane. He was able to show that MSU saved money and faculty time that way. I once accompanied him on a trip to a conference in Toledo, and was allowed to fly the plane for a few minutes (for a newbie, it’s not quite as automatic as driving a car).

“Ron Rosenberg was a cat lover, which alone makes him a worthwhile person in my eyes, whatever else he accomplished. While he was chairman, on three occasions I took students to Germany for a full semester as part of the ME department’s exchange program with the Technical University of Aachen.”

**Andy Paquet** (BS ’73, MS ’74 Chem Egr) of Uniontown, Ohio, writes: “My recollection
is the photo shows Dr. Ron Rosenberg (guitar) and Dr. Erik Goodman (banjo). I think Rosenberg was with the mechanical engineering department and Goodman was with the electrical and computer engineering department. They were original members of The Bluegrass Extension Service. Additionally, the partial image of the fiddle bow has Dr. C. McCleur of the Mathematics Department at the other (unseen) end. They were a remarkably talented group — musically, academically, and personally.

“Lots of great memories of their performances.”

■ Lawrence E. Ciolek (BS Mech Egr ’83) of Saint Johns, Mich., writes: “On guitar is Ronald Rosenberg, current associate dean for research and graduate studies. Next to him on banjo is Erik Goodman, current professor of electrical and computer engineering, and mechanical engineering. The fiddle and bow I believe are those of Charles McCleur, professor of mathematics in the late 1970s/early 1980s.

“I suspect that unless all of them were left-handed, your photo was printed in reverse.

“There were other members at the time; in 1981 also included were Freddie Harris, Steve Ellis, and Scott (Buck) Robinson.

“The Bluegrass Extension Service played many local venues and events around the East Lansing area. They all were (and are) very talented and entertaining. Professor McCleur was the comic relief of the group.

“I was in Honors English class with AnnMarie Kazyaka, who at the time was the president of the Bluegrass Extension Service Fan Club.

“I continue to read and enjoy all publications from the College of Engineering.”

EDITOR’S NOTE: This reader pointed out that we mistakenly printed the photo in reverse in the last issue. Please note that we have restored Ron Rosenberg and Erik Goodman to right-handedness!

■ Steve Schlotz (BS Elec Egr ’79) of Ypsilanti, Mich., writes: “Saw the back of the spring 2007 Currents Magazine and I was amazed to see an old picture of my Discrete Time Systems professor Erik Goodman from approximately 1978. I even saw him perform with his bluegrass band at a local establishment back then. I still remember the strange species of plant he referred to in one of his exams — fulsomia alldontaem. Always a real Joker.”

■ David L. Joyce (BS ’78, MS ’80 Mech Egr) of Cincinnati, Ohio, and vice president of Commercial Engine Operations, GE Aviation writes: “The handsome, musically inclined guitar player in the photo is of course Dr. Ronald Rosenberg, who taught system dynamics, control theory, and vibrations in mechanical engineering.

“One of the smartest and best professors during my experience at MSU, he challenged and connected with the students, both in the classroom and socially.

“His book on system dynamics was very good; I have met a number of MIT graduates who study system dynamics from the same text written by Dr. Rosenberg and Dr. Karnopp at MIT (first edition). They are all very knowledgeable and complimentary of the text.

“As a side note, Dr. Rosenberg was a big Philadelphia 76ers fan, so you wanted to make sure you read the box scores from the night before a test or quiz. There was a good chance the extra credit question would require the information!”

■ Russ Owen (BS ’79, MS ’81 Mech Egr) of Vienna, Va., writes: “Your back cover brought a rush of great memories for me. Pictured are Dr. Erik Goodman and Dr. Ronald Rosenberg in their bluegrass band attire. I can’t remember their band name but they were great and the engineering grad students would wander into town to listen to them frequently in the evening.

“After graduation, Laurie and I asked them to play for our wedding in Bay City, Michigan, and were very pleased that they agreed. My future father-in-law was nervous, though, as he had not heard them before and thought bluegrass to be an unusual request. Erik knew he was nervous and just to wind me up, he opened his performance at the reception with a medley of Chinese folk tunes played badly . . . which had the obvious desired reaction on our host; and my life flashed before my eyes! The rest of the evening is a wonderful memory and they were great. I do miss all of them.” ☛
1960s

- **Michael Bird** (BS ’64, MS ’66, PhD ’69 Elec Egr), an engineering director with GE Aviation, formerly Smiths Aerospace, in Grand Rapids, Mich., received an award from the Royal Aeronautical Society in June 2006 at a ceremony in London for his technical contributions to developing avionics computer systems for military and commercial aircraft. He is currently chief engineer for the GE Aviation computer system on the new Boeing 787. He loves MSU and is a devoted MSU sports fan. The Birds have all graduated from MSU: his wife, Roberta (Black), has an MA in English; his brother, Philip, has a BS in electrical engineering; and his sister, Pat, has a BS in math education.

1980s

- **David Besemer** (BS Comp Sci ‘84) is the chief technology officer for Composite Software, which is headquartered in San Mateo, California. He has lived in Boulder, Colorado, for the last 16 years, except for three years spent in Menlo Park, California, where he helped start Composite Software. He earned a master’s degree in computer science from Rensselaer Polytechnic Institute while also working at General Electric’s Research and Development Laboratory in Schenectady, New York. He and his wife and daughter enjoy all kinds of travel, especially their summertime visits to David’s family home on Har- sens Island in southeast Michigan. dbesemer@besemer.com

1990s

- **Jeff Harper** (BS ’90, MS ’92 Elec Egr) graduated in June from Walsh College in Troy, Mich., with an MBA, management specialization, after 3½ years of evening studies. His high grades earned him a membership in the Delta Mu Delta International Honor Society in Business Administration. He is considering starting a family entertainment business. He is employed by EDS, currently designing software and hardware to support the development of automobile air conditioning systems using alternative refrigerants. He married Kim Shinabarger, whom he met at MSU, in 2006 at the Henry Ford Museum in
Dearborn — after proposing to her at the top of the London Eye. Roller coaster riding is his hobby. He has ridden 628 roller coasters throughout the United States, Canada, and the United Kingdom. jeffharp@sprynet.com

■ Christian P. Leach (BS Elec Egr ’94) recently relocated from Michigan to Texas to begin a new job as paint shop manager at Toyota’s new Tundra plant in San Antonio.

■ Tim Newman (MS ’89, PhD ’93 Comp Sci) was recently promoted to full professor in the Department of Computer Science at the University of Alabama in Huntsville. His interests are in the areas of visualization, especially volume and information visualization; computer graphics; biomedical visualization and image analysis; and computer vision, imaging, and high performance computation.

■ Nalini Ratha (PhD Comp Sci ’96) was recently elected a Fellow of the IEEE. Ratha is a research staff member at the IBM Thomas J. Watson Research Center, Yorktown, N.Y., where he is a member of the Exploratory Computer Vision Group. His current projects include fingerprint analysis and recognition, biometrics system performance evaluation, and enhancing the security and privacy of biometrics authentication systems. He holds 11 patents and has authored over 60 publications, including a popular graduate-level textbook, Guide to Biometrics, and a co-edited volume entitled Automatic Fingerprint Recognition Systems. For his contributions to biometrics, he has received a “Research Division Award” and several patent achievement awards at IBM. At MSU, he was a member of the Pattern Recognition and Image Processing Lab as a student of Anil Jain.

■ Mark Gary Terwilliger (MS Comp Sci ’90) of Sault Ste. Marie, Mich., was promoted to full professor at Lake Superior State University in 2007. He completed a doctorate in computer science at Western Michigan University titled “Localization in Wireless Sensor Networks” in 2006 and recently presented his research at conferences in Baltimore, Md., Hanover, Germany, and Edinburgh, Scotland. mterwilliger@lssu.edu

2000s

■ Jerome Crocker (MS Elec Egr ’01), a senior engineering consultant for Booz Allen Hamilton, won this year’s GEM Student Leadership Award for successfully using a GEM fellowship to achieve outstanding outcomes. After graduating from Morgan State University, he used his GEM fellowship to complete an MS at MSU. He participates in Project CEO at a community development center and works closely with the National Society of Black Engineers (NSBE) and the Society of Women Engineers (SWE), mentoring up-and-coming engineers and encouraging them to start grappling with engineering solutions to today’s national security problems. He also founded an organization that serves as a job conduit for Morgan State University students.

■ Zella Jackson Hannum (BS ’74, MS ’07 Mech Egr) has entered the doctoral program in industrial engineering at Western Michigan University. She was one of three recipients of a fellowship offered by WMU’s Graduate College in partnership with the Michigan Alliance for Graduate Education and the Professoriate. She is an expert in the areas of market research, new product design, advertising and promotion, entrepreneurship and innovation, marketing, and sales management. She has taught at several universities and has written five educational books and more than 100 articles, including The Art of Being an Entrepreneurial Woman, which won her the History Bronze Award from the Writer’s International Network. She has also received the Outstanding Engineering Student Award from the Michigan Inter-Association of Black Business and Engineering Students and a Career Woman of the Year Award from the National Association of Business and Professional Women. She has an MBA in production control from MSU.

■ Maggie Maasberg (MS Civ Egr ’03) was recently promoted to Captain, U.S. Army, at a ceremony at Fort Hood, Texas. She is now assigned to the 36th Engineer Brigade as the transformation plans officer. She returned to Ft. Hood in December 2006 after a one-year tour of duty in the Baghdad area of operations in Iraq with the 62nd Engineer Battalion (Combat Heavy). While there, she was awarded the Bronze Star Medal for her meritorious service as a combat platoon leader. She first served as the earth moving platoon leader in C Company for six months and then as the executive officer for the Headquarters and Support Company. Maggie’s dad, Mike (MS Chem Egr ’77), retired from active duty in 1993 as a Lieutenant Colonel.

■ Arun Ross (MS ’99, PhD ’03 Comp Sci) received an NSF CAREER Award for his proposal “Human Recognition: Models for Biometric Pattern Representation, Individuality, Indexing and Fusion.” Ross is an assistant professor at West Virginia University, where he teaches courses in discrete mathematics, advanced biometrics, and pattern recognition. He is co-author of the Handbook of Multiometrics. ■
In Memoriam

James F. Albrecht (BS Mech Egr ’52) of Livonia, Mich., died April 24, 2007. He is survived by his wife, Betty; son James; daughter Karen; and two grandsons. He was a national accounts manager at Detroit Diesel, General Motors Corp. He loved fishing and sailing with his grandsons and was active in the GM retirees organization, working to protect retiree benefits.

Walter O. Backus (BS Chem Egr ’38) of Viera, Fla., died April 8, 2007, at the age of 92. He worked 35 years for Joseph E. Seagrams in New York City, retiring as corporate vice president. He moved from Stamford, Conn., to Florida in 1973. He was a life member of the Brevard Museum of History & Science and a Mason. He is survived by his wife, Remona; two daughters, Nancy Kitchen of Prospect, Ky., and Carol Cressman of Quakertown, Pa.; four grandchildren and four great-grandchildren. A granddaughter, Koren Marie Kitchen, preceded him in death.

Arthur Bensen Hopperstead, PE (BS Civ Egr ’48) died August 30, 2007, at the age of 82. He began his career with Foster Engineering Co., designing and inspecting bridges in Michigan. In 1950 he was appointed an engineering inspector for the Pennsylvania Turnpike Commission. He was a construction engineer for Dinardo Construction in Pittsburgh, Penn., before he joined Trumbull Corp. of Pittsburgh as chief engineer, later retiring as vice president. He served as president of the Pittsburgh Chapter of the Pennsylvania Society of Professional Engineers. He is survived by his wife, Dorothy; children Diane M. Slimick, Andrea J. Hopperstead, Alan R. Hopperstead, PE, Eric C. Hopperstead; and five grandchildren.

Paul E. McNally (BS Mech Egr ’50) died December 13, 2004. After four years in the U.S. Navy, he worked 38 years at McNally-Pittsburg Manufacturing Co. in Pittsburg, Kans. During retirement, he was an avid woodworker, making lovely pieces of furniture for family and friends. He is survived by his wife, Helen, of 58 years; two daughters, Ginny and Kathy; one son, John; three grandchildren; and four great-grandchildren.

John M. Patriarche (BS Civ Egr ’38), East Lansing City Manager for 28 years, died March 18, 2007, at the age of 89. When he retired in 1976, after a total of 37 years in city government, the former Alton Park in East Lansing was renamed John M. Patriarche Park. During his tenure, Patriarche helped expand the city boundaries and draw businesses to the area. He worked with MSU presidents and students throughout his career. His son, Dennis, says, “He was a man of immense integrity. He cared a lot about the city and the people who worked for him.” Current Mayor Sam Singh says that, 30 years after Patriarche’s retirement, “There’s not a part of East Lansing that [Patriarche] hasn’t touched in one way or another. Our history as a community is so connected to his work.”

Fred G. Tauch (BS Mech Egr ’51) died July 26, 2007, at the age of 90. He was employed by Westinghouse Electric Co. for over 30 years. He spent his retirement years in Knoxville, Tenn., and Columbia, S.C. He is survived by daughter Cathy Keelen, son David Tauch, four grandchildren, and four great grandchildren.

George Edwin Mase of Green Valley, Ariz., died May 11, 2007, at the age of 86. He was a professor of materials science and mechanics at MSU for 36 years and retired in 1991. During World War II he served in the army’s special engineering division and worked on the Manhattan Project at Oak Ridge, Tenn., and Los Alamos, N. Mex. He played baseball for Ohio State University while an undergraduate there and earned his PhD from Virginia Polytechnical Institute. He loved baseball and golf. He is survived by his wife, Eloise, and his children, Carol Mase of Philadelphia, Robert Mase of Tulsa, and Tom Mase (BS Mech Egr ’80, BS Egr Mechanics ’80, visiting associate professor in the MSU Composite Materials and Structures Center, 2000–2006) of San Luis Obispo.

Charles S. Thorne (BS Mech Egr ’51) of Sturgis, Mich., died April 1, 2007, at the age of 81. A resident of Sturgis since 1950, he was a cost estimator at G.F. Business Equipment and was later employed at Economy Market. He loved animals, repairing motors, and sailing on the Great Lakes. During World War II, he served as a navigator and flight engineer in the Army Air Corps. He went to work for Whirlpool in Benton Harbor, Mich., in 1951, and married Mary Lee Purdy of Sturgis that same year. He is survived by Mary Lee, his wife of 55 years; daughters Julie Eames of Sturgis, Barbara Kidzu of Chicago, and Carol Paul of Sturgis; grandsons Alex and Andrew Paul; and step-grandsons Richard and Brandon Eames. Military rites were conferred at an Oak Lawn Cemetery graveside committal by the U.S. Air Force Honor Squad.
Grandparents University is a program that brings grandparents and grandchildren (ages 8–12) together for a three-day educational experience while spending time together on the MSU campus. It gives kids a chance to experience college and see the vast array of educational opportunities available to them at MSU. It’s also a chance for alumni to relive their college days!

The event showcases the academic strengths of MSU while providing lifelong memories of exploring campus and engaging in intellectual challenges. Participants are housed in Holmes Hall, attend classes across campus, and sample the many highlights of MSU.

The program started in June 2006 as an initiative between the alumni associations from the College of Natural Science, the College of Agriculture and Natural Resources, and the School of Packaging. The 2006 program reached capacity within two weeks of the promotional mailing.

This year, the program was supported and organized by nine units, including the College of Engineering. Grandparents University 2007 offered 68 classes involving more than 100 faculty, specialists, graduate students, and undergraduates — all volunteering their time. More than 546 people from 23 states attended.

Evening activities included bowling and billiards at the MSU Union, swimming, ice-skating at Munn Ice Arena, Summer Circle Theater, and special programs at the MSU Museum and the MSU Library.

The program is self-supporting and relies entirely on registration fees to cover all expenses.

For more information or to find out how you can register for Grandparents University 2008, visit http://grandparents.msu.edu/.
LET US HEAR FROM YOU!

NAME (INCLUDING MAIDEN NAME)

STREET ADDRESS

CITY / STATE / ZIP IS THIS A NEW ADDRESS? □ YES □ NO

E-MAIL ADDRESS* TELEPHONE

CLASS DEGREE

OCCUPATION / JOB TITLE

EMPLOYER

BUSINESS STREET ADDRESS

BUSINESS CITY / STATE / ZIP

UPDATE

* □ YES. PUBLISH MY E-MAIL ADDRESS SO CLASSMATES CAN GET IN TOUCH WITH ME.
□ NO. DO NOT PUBLISH MY E-MAIL ADDRESS.

The College of Engineering and your former classmates are interested in you. Please keep everyone informed. Fill out this form (please type or print clearly) and return it along with any photos, news clips, or press releases to: Currents Magazine, Office of Publications and Public Relations, 3412 Engineering Building, MSU, East Lansing, MI 48824-1226; or contact us at editor@egr.msu.edu.

On Saturday, October 13, more than 150 alumni, faculty, students, and friends gathered on the west lawn of the Engineering Building to enjoy a buffet during the late afternoon hours before the MSU vs. Indiana football game, where MSU beat Indiana 52–27.
SU Homecoming 2007 featured a new event this year: the Spartan Regatta. Student teams met Thursday evening October 11 under Spartan Stadium, where they were supplied with piles of cardboard boxes and duct tape and given two hours to build a boat that could carry two people. A total of 52 teams entered, although a few got cold feet when it came to actually launching their shaky vessels in the IM Circle Pool.

A number of the teams were made up of engineering students. Six teams were members of Professor Melissa Baumann’s class, MSE 250—Materials Science and Engineering; she had challenged her students to gain extra credit by entering the competition. One boat was named the SS Bowmann in her honor. Both the first- and second-place boats were created and manned by teams from her class. Some award categories were Speed, Creativity, and Spirit. The boat that won the Titanic — Best Sinking — Award was named “Going Nowhere,” with crew members Brandon Quaranto (Mech Egr junior) and Kevin Tunison (Physiology junior).

TOP: The fastest team with their boat, the “Spartanic, no iceberg necessary.” From left to right, seated: Wouter Brink (Civ Egr junior), Steve Remias (Civ Egr junior), Tom Herzog (Applied Egr sophomore), Jonathan Libby (Civ Egr junior); standing in back, Eric Wickenheiser (Mech Egr sophomore).

BOTTOM: The Spartanic being launched by Wouter Brink (left) and Jonathan Libby. This winning team finished the race in 19 seconds. The second-place team finished in 20 seconds. Libby says, “We never expected to win. We had a simple idea involving buoyancy and sealing everything up, and a good strategy to get across the pool. Our boat was one of the only ones still intact after the race. It dried off and was as good as new.”
Were you a part of this alternative energy–related student project? The year was 1975. Contact us at editor@egr.msu.edu if you have stories or photos to share.