In This Issue...

Alternative Callings

Grads of Michigan State University’s College of Engineering share how their educations helped lead them in some non-traditional directions

What does a patent lawyer from Chicago have in common with a small business owner and newspaper editor in one of the smallest of Oregon towns? What does a judge and immigration consultant from Montreal have in common with a writer of children's stories in Detroit? What could an orthodontist living in Battle Creek have to talk about with a roller coaster enthusiast from St. Paul?

Plenty.

Each share fond memories of their days as engineering students at Michigan State University. All have swerved slightly from the traditional engineer’s career path, and are following their heart’s calling in ways that are better suited to their talents and abilities. All are using engineering skills in ways they’d never thought possible when they first started their academic careers 10, 20, 30, as much as 45 years ago. And if given the chance to do it again, not one would do it differently.

The College of Engineering has a long and proud history of graduating engineers. Recent records of the Career Services and Placement Office show that 31 percent of bachelor's recipients were hired as automotive and mechanical engineers; 24 percent were hired in the area of electronics and instrumentation; 18 percent entered the research and consulting field; ten percent were hired as chemical engineers; and two percent received government posts. At a time when engineering is considered one of the hottest professions around—where the number of jobs is expected to increase by a quarter million over the next ten years, why then are some engineering graduates choosing another path?

"Engineering is the pre-professional liberal arts degree of the '90s and beyond," says Theodore Bickart, dean of the college. Bickart is a lead voice in a growing school of thought that maintains a degree in engineering can provide a person with skills that are not only useful, but critical to professions that are seemingly unrelated. To Bickart, there isn’t a field today that a knowledge of engineering couldn’t somehow touch, and moreover, enrich.

Steve Noll, Patent Lawyer

Ask Steve Noll. A 1974 graduate of the electrical engineering program, Noll has been a practicing patent lawyer with the firm Hill, Steadman and Simpson for over 20 years. Specializing in patents of an electrical or electro-mechanical nature, Noll works on patent matters for such well-known clients as Siemens and Sony, particularly in the medically-oriented technologies of medical imaging, pacemakers, defibrillators, and ventilators.

"I would say it is essential to have an engineering degree for patent law," he says, gazing at a winter storm from his office window on the 85th floor of the Sears Tower. "I certainly do use all of the things..."
that I’ve learned at Michigan State virtually every day—in talking with inventors or analyzing patents or in general client counseling. I find that, just to be on a communication par with the clients, a background in engineering is absolutely essential to understand the technical details.”

Noll hadn’t always wanted to be a patent lawyer. Like most people, his career path was heavily influenced by family and friends, by trial and error, and by the luck of the draw:

“I had originally been a physics major,” the former National Merit Scholar relates. “I had a roommate in Holden Hall who was an electrical engineering major, but who was planning to go into patent law. So he put the bug in my ear about that. After a couple years, it appeared to me that the jobs that I would most likely get in physics would be teaching jobs, which I didn’t particularly want to do. I decided to switch to electrical engineering—which, although it wasn’t such a big switch in subject matter, I thought it would provide me with more job opportunities.” (As a side note, Noll thinks his former roommate is now an accountant somewhere.) Noll went on to receive his J.D. from Ohio State University in 1977.

Noll says that there are two activities central to every patent lawyer’s day-to-day responsibilities. Getting the patent is the first part; guarding the patent is the second.

"Patent prosecution is what we do when we obtain patents for people by filing applications in the patent office and then arguing with examiners about whether something should be ‘patentable’ or not,” he explains. "The other part of my job is representing clients in lawsuits either to assert their patents against someone else for patent infringement or to defend a client who’s been charged with patent infringement."

Whether arguing, asserting, or defending, Noll says that one of the most important skills he can have is the ability to communicate: to his clients, to examiners, and to jurors. According to Noll, patent lawyers—who have always had the choice to present a case before a judge or jury—have been relying on juries more and more, in part because of the increase in dollar amounts of verdicts awarded by juries, and in part because of the public’s growing use and understanding of current technologies.

"If you’re the patent owner," he says, "the key to the whole lawsuit is making your invention understandable to jurors who may not have completed high school in many cities. And the task for the defendant, if you’re defending against the charge of infringement, is to explain why you do something different from what the patent says and to make that understandable to the jury.”

In addition to the increase in jury hearings, Noll says that he’s also witnessed a rise in the number of patents that are applied for over the years, again, a probable sign of these fast and furious "techno" times. Usually it’s a large corporation who asks his firm’s assistance, but oftentimes it’s an individual who holds an invention on his or her lap in a paper bag. At this point for Noll, understanding is critical. The ability to explain, imperative.

"The standard is that you have to explain your invention so it can be understood by another average worker in a particular technical field," says Noll. "So that means you have to give enough technical information to inform the reader how to use the invention and how to make it. And that can be done with drawings, or circuit diagrams, or equations, or whatever would be the conventional way of explaining it."

One quickly intuits that in a forward-thinking field such as patent law, there is no room for the occasional poseur or slacker. Noll, keenly aware of this, reads insatiably about the latest developments in electronics—not just keeping up, but keeping a virtual synapse ahead of his contemporaries.

Noll enjoys his work because of the challenges it provides him, and he would recommend it to anyone who possesses a passion for technology and a desire to learn. And, he further notes, because engineering is the basis behind all patents, an understanding in some area of engineering—electrical, chemical, civil, mechanical, biotechnological—is the best step one can take to entering this highly promising and lucrative profession.

Will Pitts, Roller Coaster Enthusiast

Will Pitts also uses his engineering skills everyday. He thinks about momentum. He thinks about friction. He thinks about speed. But Pitts, a 1981 graduate of MSU’s mechanical engineering program, has not once thought about cars. Rather, Pitts has dedicated two-thirds of his thirty-plus years to building a scaled-down model of a classic wooden out-and-back roller coaster. In doing so, he has turned a pre-adolescent obsession into a mid-life vocation—and the momentum just continues to build.

"When I was little, I really liked model trains," he says, trying to recount the exact moment when the roller coaster bug bit. "But then I remember driving by a roller coaster, and that was it. Roller coasters are so intriguing—so beautiful. They’re like trains on steroids. I wanted a toy roller coaster, but nobody made one. So I decided to build one myself.”

To hear Pitts describe it, roller coasters have always loomed large in the backdrop of his life. He can’t remember if his first was the Zephyr in New Orleans or the Comet at Hersheypark, but he says with certainty that those were his first two. As for the best,
he unhesitatingly points to the Cyclone at Brooklyn's Coney Island. "That first drop is still considered one of the best. It has set the standard that everyone else tries to live up to, and can't. And it's 70 years old!"

When he was only twelve, Pitts began collecting pictures from magazines, writing letters, and making drawings of roller coasters. He remembers writing to John Allen, the man to whom he attributes the 1976 national "coaster renaissance." He made doodles and sketches. He studied the profiles of hills, deciding what looked proportionally right on paper. He thought about how the hills should be "choreographed"—whether to start with one big hill, leading to several smaller ones, or to have a succession of bunny-hops. At the age of 17, he put his designs to paper.

Pitts never let up on his roller coaster, even during college. It was then that he began cutting small pieces of basswood and spruce for building materials. He worked with Donald Kilner, professor emeritus of mechanical engineering, on a senior independent study that focused on—what else?—roller coasters, soliciting help from then-graduate assistant Gary Burgess for his speed calculations.

"I was going to have the initial drop be 30" high, but I raised it to 33 1/2", because I was afraid it wouldn't have enough momentum to make it around the track," remembers Pitts. "I had applied Burgess's equations to make sure it would work, but until you set it up and run it, you never really know if it's going to make it from point A to point Z. In retrospect, I guess I should have just trusted my calculations."

Not until it was completely finished—a full 16 years after he had built the first section—was Pitts able to find out if his fait accomplis, now dubbed the Avalanche, actually worked. Just days before an exhibition was scheduled to begin at the Science Museum of Minnesota in St. Paul, Pitts and museum staff looked on as the Avalanche was fully assembled and put to the test for the very first time in a museum garage. (Pitts, for lack of space, had kept his coaster harbored in his apartment in sections for all those years and never saw it in all its splinter-clad splendor until this occasion.) "It worked and it worked better than my expectations," relayed Pitts, unable to disguise the exuberance he felt the moment he watched the miniatuire wood cart inch up the power-chain-assisted hill, roar around the 1600 feet of 8-ply wood track, and come to an abrupt stop at the Avalanche's authentic skid brakes. "That's why it's called a roller coaster," says Pitts. "From the initial drop, it's a coasting action."

Pitts had been so intent on finishing the Avalanche that he left a 15-year managerial post with 3M to pursue his life goal full-time as an inventor, artist, and musician. In addition to completing the coaster, he has already dreamed up two gadgets that, if licensed and marketed, could become the very status symbols of 21st-century bachelorhood: a no-fail bathroom cleaner and a guaranteed golf-game enhancer.

Pitts's Avalanche is on display at the Science Museum indefinitely, and, he stresses, it is still for sale. The Guinness Book of World Records, according to Pitts, has conveyed interest in creating a new category for his roller coaster because it is built on hand-laid wood track versus a manufactured steel track for model trains.

Reflecting on the scope of his project, Pitts has this to say: "I had no idea what I was up against. First, I'd say, 'By the time I graduate from college...,' then it would be, 'in five more years...,' and so on. I didn't know what I had gotten into. But I also knew if I didn't finish, I'd always wonder..."

Spoken like a true inventor.

Richard Lord, Engineer/Adjudicator

His voice is charged with energy. His engaging eyes are telltale of the ideas taking shape in his mind. His illuminating smile and solid handshake are expressions of an absolute appreciation for people—of all colors, of all creeds, of all cultures. But unlike the lawyers and diplomats that Richard Lord has been in contact with throughout his years as judge, statesman, and development consultant, Lord does not consider himself a career politician. Richard Lord, a 1953 graduate of Michigan State University, still considers himself—first and foremost—a chemical engineer.

"And what's so unusual about that?" asks Lord, who sees nothing extraordinary about a life's work that..."
blends politics with engineering. To Lord, it’s the most natural combination in the world. Engineers observe. They speculate. They adjust. Whether they’re processing chemicals or visiting with foreign dignitaries.

“I’ve found that a lot of people representing the Canadian and American governments have no knowledge of the potential that many Third-world countries have,” says Lord, who in the late-sixties started the venture CANAFRIC to help spark the economic growth of such underdeveloped African nations as Kenya, Uganda, Nigeria, and the like. “For instance, some of these countries have natural harbors that could be developed to transport resources from the interior to the coast,” he says, “but the politicians would just bypass those places. They couldn’t see how they could be used to enhance the world economy.

"My engineering gave me the discipline to evaluate the things that I see,” he continues. "When I see something, I say, 'Well look at that.' And I start evaluating, what is the potential there? And that's because of my training, you see?"

Lord’s training has taken him to some of the most far-reaching places, trading ideas with the world’s most influential people. He was the communications engineer for Expo ’67 in Montreal, where he designed and built a security system that, among other things, linked hundreds of localized telephones with a headquarters map, tape recording devices, and alarm systems—quite revolutionary for that time. He assisted Canada’s Senate Committee on Poverty by visiting the most remote regions of the country and interviewing residents about their living and working conditions. Lord’s two international companies are still active: CANAFRIC and Richard Lord International Immigration Consultants, Inc., the latter helping Canadian immigrants start life in a new country by investing in favorable business ventures.

Lord also became more and more involved in the legal side of things. He studied civil law at McGill University, and served as judge on the Immigration Appeal Board as well as the Canadian Refugee Board, where he oversaw cases involving refugees from India, Sri Lanka, Pakistan, Kashmir, China, and Tibet. He has been immersed in politics throughout his life, being voted vice-president of the Young Liberals of Quebec, and a year later, vice-president of the entire Liberal party.

Richard Lord has devoted his extraordinary interpersonal and engineering skills to improving the human condition. In so doing, this man—the first black hockey player for MSU and a recipient of the prestigious Hannah Award—has been “skating breakaway” in arenas other than those made of ice, and scoring with dead-on consistency.

"Some people sometimes say that because of your color, things are impossible. They’re not impossible. Maybe they’re more difficult. And it takes a little more ingenuity. And that’s a good test," he says sagely.

"I mean, if you have bags and bags and bags of money, it makes no difference. You have to leave it behind. So the thing is this: You have a certain amount of time to do as much good as you can and then pass it on. Sometimes the challenges you’re given tie you up in overcoming them, but in the end, that’s what makes your life really enriched.”

Roger Bandeen, Orthodontist

Roger Bandeen doesn’t remember the exact day when he said "goodbye" to megabytes and "hello" to overbites. The 1972 computer science graduate had been forging a career path that would eventually, he hoped, combine aspects of his computer skills with the pilot training he had received in MSU’s Air Force ROTC. In the July that followed his graduation, however, something happened that would become for him a turning point. While Bandeen was becoming more and more adept in the cockpit at Vance Air Force Base (AFB) in Enid, Oklahoma, Richard Nixon pulled U.S. troops out of Vietnam.

"There were a lot of combat-proven people coming back home,” he describes of that emotional, war-weary time. "We had a surplus of pilots. So they were fairly generous in letting people—against their will or with their will—out of pilot training. With about two or three weeks to go, I was told that I’d be flying a desk instead of an airplane.

For the next several years, the Air Force took full advantage of Bandeen’s computer expertise, specifically in the areas of performance evaluation and enhancement. He was assigned to the electronic systems division at Hanscom AFB in Massachusetts, to the Air Force Weapons Lab at Kirtland AFB in New Mexico, and to other high-level bases around the country.
"There's a lot of time on the road, a lot of long hours in a lot of places where I couldn't talk about my job. It was a top-secret, clandestine type of life and I just—that wasn't me. I'm more of a people person," he shares.

Perhaps it was during one of his long roadtrips that thoughts of a career change crept into his mind. He enrolled in dental school at the University of Michigan in 1977 and worked hard to become one of the top graduates of his class. By his third or fourth year, Bandeen was attracted to orthodontics, the area of dentistry concerned with straightening teeth and repositioning jaws, because of the similarities between it and another of Bandeen's interests, mechanical engineering.

"I saw that there were a lot of things in orthodontics that were similar to engineering in terms of force delivery systems," says Bandeen, "so that appealed to me." By "force delivery systems," Bandeen is referring to such things as tension, force curves, stress, and strain—anything that moves teeth and dissolves bone. Roughly 70% of America's teenagers and more and more adults know these systems intimately as braces, wires, retainers, and headgear.

After receiving his M.S. in orthodontics from University of Michigan in 1983, Bandeen, who was paying for part of his schooling under the Armed Forces Health Profession Scholarship Program, owed four more years to Uncle Sam. He was sent to Korea, where he served both as a doctor in a M.A.S.H. (Mobile Army Surgical Hospital) unit and as a rapid deployment team leader.

"I was orthodontist by day and rapid deployment team leader on weekends and at night, and whenever we had an exercise going on. So I had a chance to see the demilitarized zone closer than I wanted to," he remembers. "But that was a controversial time," he says, citing such events as the bombing of a memorial ceremony in Burma, where four South Korean cabinet members were killed; the downing of Korean airliner Flight 007 over Sakhalin Island; the seizing of the embassy in a huge crater wearing a jet black space suit. His helmet was so shiny that from his neck up, the stars reflected a figure that appeared to be human-like, sitting atop the edge of an actual facial photograph taken with digital photography, with the X-ray, which has also been scanned and digitized. And we do computer analysis in terms of the facial structure, soft tissue structure, and dental structure. From that, we can do some growth prediction, treatment prediction, surgical prediction, and so on. We can do more interpretation this way, from pre-treatment, all the way to a post-treatment result."

Bandeen has maintained strong ties to the College of Engineering, in part because of the encouragement and support he received from his adviser, William Abbett, and Associate Professor John Forsyth when he was just starting out. Recently, he and his wife Nancy established The Marion L. and Harriette I. Bandeen Endowed Scholarship Fund in honor of Bandeen's father, a 1939 electrical engineering graduate, and his mother. "Dad had to work while he went through school, and he always said how nice it would have been to have a scholarship," says Bandeen, who worked as many as three jobs at one time to fund his own education. "This is a way to give some young man or woman an opportunity that he or she might not have."

Pamela Hurtt, Children’s Story Writer
"Who's there? Excuse me, who's there?" Cardamom replied. He managed to shift his weight, turning himself around, getting a clearer view of where the voice came from. He saw a figure that appeared to be human-like, sitting atop the edge of a huge crater wearing a jet black space suit. His helmet was also black and so shiny that from his neck up, the stars reflected around his head until his helmet looked like the galaxy itself—Pamela Hurtt, The Spice Rack series

Pamela Hurtt, a systems engineer for a major Detroit utility company, finds her work both interesting and challenging. Each day, the 1986 Department of Electrical Engineering graduate helps teams of coworkers resolve issues related to performance and productivity by leading them through a precise and
time-proven methodology. Each evening, when she arrives home from a full day of data-gathering and root-cause analysis, Hurtt spends a few hours of quality time with her husband and two children, and then gets busy on something that she has been quietly mulling over. No, she isn't thinking about the perfect solution to a problem that a department at work is experiencing. Those issues will wait until tomorrow. Hurtt is thinking about a group of imaginary children called the Spice Rack Kids.

"A lot of the people I know who have strong math and science skills also have strong artistic skills," Hurtt says, logically explaining her desire to put ideas to paper. "It just seems to tie together. I've always written, and what started happening was, when I had children, it kind of reawakened—this need to write. I wanted to write things for them."

Hurtt and longtime friend Nancy Tolson, along with illustrator Karlynne Scaggs, dreamed up the Spice Rack series in 1990, naming their characters for the distinctive seasonings that decorate many a would-be chef's pantry. Cinnamon Stick, Kusambi, Cardamom Pod, Papriko, and Sage & Aniseed undergo experiences that are at once humorous, whimsical, magical—and most importantly, educational. The stories are designed to supplement various topics of study in the elementary-school curriculum, such as science and cultural issues, and have become a popular addition to elementary-school curriculum, such as science and cultural issues, and have become a popular addition to

Through her stories, Hurtt puts a name and a face on subjects that are usually covered one day, quizzed the next, and just-as-quickly forgotten. She discusses technological advances by introducing students to African-American inventors, including Lewis Latimer, Elijah McCoy, and Matt Ziegler. She helps grade-schoolers learn lesser-known facts about the Solar System through an adventure led by L.C Mac, a character who represents African-American astronaut and Challenger crew member Ronald McNair.

Hurtt is using her engineering degree in two very different, but equally important ways: she is applying her analytical and problem-solving skills to help resolve issues for industry today. And she is using her understanding of science and her ability to communicate to excite the scientists, engineers, and community leaders of tomorrow.

"It's a way of tying in the sciences—exposing them to children—to help create an interest at a young level," says Hurtt.

Valerie Kramer, Newspaper Publisher, Video Store/Computer Store/Print Shop Owner

It all started with a crystal radio kit, a gift from her father. That toy, perhaps forgettable to some children, triggered an interest in electronics and later, computing, that would become a familiar theme in Valerie Kramer's life. The precocious youngster quickly progressed to building her own crystal radios from scratch, disassembling radios and televisions for parts. "I basically spent most of my free time and money on electronics for the next seven or eight years," says Kramer.

A National Merit Scholar, Kramer moved from her parent's home in Cleveland, Ohio, to enroll in the electrical engineering program at Michigan State. By the end of her first quarter, however, Kramer had "fallen in love with computers," and she switched her major to computer science, with minors in electrical engineering and mathematics.

Kramer continued to define her preferences and strengths after college as she landed jobs in Ohio and later, California. She preferred working as an applications programmer to working as a systems programmer because, she says, she was more into "building" than "tearing down." (She explains that as an applications programmer, she would write computer programs that would be in service for years; as a systems programmer, however, she would install and maintain an operating system, only to reinstall an entirely new one months later.) She preferred mini-computers and PCs to mainframes because she felt PCs were more powerful, with features and capabilities that far surpassed the ponderous mainframes. She preferred programming on her own to supervising whole departments of people. She preferred a little peace and quiet.

"We decided to leave Los Angeles and move to rural Oregon—from a population of ten million to a population of 1000," she describes from her business, The Fun Zone, the complacent mewing of Kramer's cat, Mickey "the mouser," detectable over the fiberoptic line.

Kramer and her husband Evan moved to Port Orford, Oregon—the oldest and westernmost town on the Oregon coast—in the spring of 1990, with the desire to write articles for trade magazines. They soon started a newspaper in their home with the use of a copy machine, and later, after deciding to open a video rental store in town, they moved everything into the store, including the newspaper business, a print shop, and a computer store.

Now, the robin's-egg blue building on Highway 101 is one of the most active spots in Port Orford. Kramer
and her employees might be repairing a computer problem one minute, locating a copy of Annie Hall the next, and writing an article for this week’s edition of Port Orford Today! a half-hour after that.

"It takes a lot of creativity, a lot of persistence, and a lot more persistence," says Kramer describing in surprising few words what many small-business hopefuls have never been able to achieve. "It's amazing how much you can learn if you just take the trouble to find some books and magazines on the subject," she continues, "and I think that's probably where a lot of people fall down. They just jump into something and don't try to do any research first. That goes for just about anything—whether you're starting a business or starting anything else. Preparing yourself for something is very important."

Kramer credits her computer science degree with laying a foundation that has helped her keep up with the times, not only in the computer side of the business, but in all areas—even newspaper publishing and design.

"The paper is something we are actually producing, something that wasn't there before, something that lives for a while," she says with satisfaction. "Our logo says we're the most popular paper...and considering the number of people who read and save every issue, I think we can legitimately claim that title."

New Development Director Helps Alumni Get Reacquainted with College of Engineering

Mark Brower, director of development, isn’t always easy to track down. If he’s not on the road visiting with an alumnus, he’s on the phone chatting with one. If he’s not giving an MSU graduate a walking tour of the college’s laboratories and centers, he’s visiting the laboratories himself, learning as much as he can about new research programs going on in the college.

In fact, in the six-plus months since joining the College of Engineering, Brower has immersed himself in the college’s people and programs, and become, in a sense, an engineering alumnus’s answer to one-stop shopping.

"I want this office to be the first place our alumni look for up-to-date information about the college and its current programs," says Brower. "I want this to be a place where new relationships can be built and fostered among alumni, faculty, and students."

Brower comes to the College of Engineering with a wealth of knowledge about fund-raising, about engineering, and about MSU. He earned a bachelor of arts degree from the College of Social Science and a certificate from the multiple-perspectives teaching program in the College of Education. While at MSU, he worked in University Development with the telemarketing program, where he was the top student fund-raiser for 1989 and 1990.

After graduation from college, Brower worked as a development officer for such institutions as the American Public Works Association in Washington, D.C.; Villa Julie College in Stevenson, Maryland; and GMI Engineering and Management Institute (now Kettering University) in Flint. While at GMI, Brower raised a record $6.2 million in gifts and pledges during the 1997 Class Reunion Gift Program, a ten-fold jump from the previous year.

Brower believes strongly that alumni play an important role in the success of an academic institution, and he is working hard to develop more opportunities for graduates of the college’s seven departments to get involved. Already, he is assembling a network of alumni volunteer coordinators to help build a broader base of support, as well as planning special events in cities throughout Michigan and across the country for alumni to experience what’s new in the college.

"It is important to increase our outreach efforts to alumni, and bring people back to get involved," he says. Brower can be reached at (517) 355-8339 or by e-mail at browerm@egr.msu.edu.

College’s New Web Page Makes it Easy to Keep In the Know

http://www.egr.msu.edu

There’s a new “bookmark” to set on your Web browser. The college’s new home page was launched this past April, and along with its new look, there are new features that make it easier for visitors to keep up with what’s new in the College of Engineering. Some of the features include:

- A “Class Notes” section, where you can update your personal information and check up on lost classmates;
- Calendars detailing activities for alumni, students, faculty, and staff;
- A “Current News and Information” section, providing the latest publications on-line, and details of breaking news about faculty research.

Please check in from time to time to see what’s new!
Research:
Chemical Engineering Professor Helps Corn Move Off the Cob, and Into the Salt Shaker
by Sue Nichols, University Relations

Corn isn’t just a food that sits on the cob waiting to be salted. Professor Kris Berglund has discovered a way to turn corn into a salt substitute that lacks both sodium or the bitter taste that plagues other salt substitutes.

HälsoSalt™ is made from cornstarch that is fermented to produce lysine, a salty amino acid. Berglund, a professor of chemistry, chemical engineering and biosystems engineering, and his research team devised a way to turn powdered lysine into a crystal, so it looks and acts like salt—it sprinkles, it dissolves, and it cooks. His research associate is Hasan Alizadeh.

HälsoSalt™ was among the products featured last fall at the National Marketplace for the Environment conference and trade show, sponsored in part by the U.S. Department of Agriculture, which provided some research funding.

For consumers, this means a natural salt substitute and a palatable way to reduce intake of added salt in the diet. For the economy, it promises a new market for corn growers.

"It is exciting to have developed a no-sodium salt substitute that tastes good," Berglund said. "This will help people to reduce their sodium intake without feeling deprived."

Salt substitutes currently on the market have two weaknesses that Berglund set out to solve. One kind of substitute simply includes less sodium. Consumers ordered to greatly reduce or eliminate consumption of salt must use these products with care or not at all. Another form of salt substitute relies solely on potassium, which has an unpleasant taste. Lysine masks the taste of potassium in addition to providing salty flavor. Michigan State University has a U.S. patent pending on the product, which is owned by Berglund.

"The discovery that lysine monohydrate masks the bitter taste of potassium was a surprising achievement," Berglund said. "Equally important was the development of a crystallization process that results in lysine that looks like salt."

The salt market is a lucrative one. It is estimated that Americans consume as much as 10 pounds of salt per year.

Likewise, corn is plentiful across the nation. Corn already is used on 4,000 different products, from animal feed to sweeteners to pharmaceuticals and textiles.

HälsoSalt™ was developed in part through the MSU Corn Utilization Initiative, which recognizes there’s more to corn than just food and feed. Besides the salt substitute, Berglund and others are working to develop polystyrene-like materials and non-polluting chemical additives. The Corn Marketing Program of Michigan also funded the research.

FACTS about HälsoSalt™ by Sue Nichols

What does HälsoSalt™ mean? HälsoSalt™ is Swedish for "healthy salt." This name reflects its positive dietary contribution.

Is HälsoSalt™ natural? Yes. HälsoSalt™ is a physical mixture of potassium chloride, a naturally occurring salt approved for food use; lysine, an amino acid essential for human nutrition; and succinic acid, a naturally occurring acid found in many fruits.

What is the HälsoSalt™ connection to corn? Lysine is produced from corn.

Who funded the research that led to HälsoSalt™ development? The research by Professor Kris Berglund and Hasan Alizadeh was funded by the U.S. Department of Agriculture, the Corn Marketing Program of Michigan, and MSU’s Crop and Food Bioprocessing Center/Research Excellence Fund.

Does HälsoSalt™ require any special handling? Sometimes under humid conditions, HälsoSalt™ clumps a little. A quick shake breaks up the clumps easily.

Is HälsoSalt™ approved for human consumption? LEC TECH, Inc. has independent verification on file of HälsoSalt™ safety as a food ingredient.

How much HälsoSalt™ should be used to replace regular salt? A good place to start is with the same amount as regular salt and adjust it to personal taste.

Can anyone use HälsoSalt™? Individuals having diabetes, heart or kidney disease, or receiving medical treatment should consult a physician before using any salt substitute or alternative.

What is the relationship between potassium and hypertension? HälsoSalt™ contains potassium, which has been the subject of many medical studies. Such studies indicate potassium is important in relieving hypertension and may help prevent it in some individuals.
A nil Jain, chairperson of the Department of Computer Science, understands how criminals think. The soft-spoken man with the easy smile talks about such seamy practices as impersonation and fraud as if they were everyday occurrences. And statistics say he's right. Billions of dollars are lost each year from the fraudulent use of welfare benefits, credit cards, cellular phones, and bank accounts. Moreover, with people increasingly choosing to buy and sell everything from automobiles to stocks and bonds over the Internet, the gate has been opened wider still for abuses to occur.

It all boils down to one question: How do we know if someone is who he says he is? The answer, according to Jain, has been right at our fingertips and as plain as the nose on our face. The answer is biometrics.

Jain, who is co-editing a book titled *Biometrics: Personal Identification in Networked Society* with Ruud Bolle and Sharath Pankanti (PHDCPS ’95) of the IBM T. J. Watson Research Center (to be published December, 1998 by Kluwer Academic Publishers) describes biometrics as the measurement of certain physical, physiological, or behavioral characteristics that exhibit the following properties: universality (everyone has one); uniqueness (it is different for different people); permanence (it doesn’t change much over time); and collectability (it’s quantifiable). Our voices, facial features, fingerprints, eyes (iris and retina), ears, hands, body heat emissions (thermograms), DNA, and smell, and the way we walk, strike a keyboard, and sign our name are all being studied today as potentially useful biometrics tools. Jain and his students, Lin Hong, Yatin Kulkarni, and Salil Prabhakar, in the Pattern Recognition and Image Processing Laboratory have been funded by IBM for the past three years to conduct a variety of studies related to fingerprint matching, face recognition, and speaker verification.

When discussing biometrics, one first needs to differentiate between the ability to identify someone and the ability to verify someone. In identification, the database size is immense and the processing time large; in verification, the database size is effectively one, so the processing time is small. In identification, the true identity of the person is unknown.

"Let’s say they book you for something," offers Jain, sounding a little like Joe Friday minus the monotone. "Someone takes your thumbprint, and they attempt to match your print against the whole FBI database to find out who you are. With verification, you tell them who you are, and the computer will either confirm or deny that claim.

"For instance," he continues, "I go to an ATM machine, and say ‘I’m Anil Jain.’ The biometrics system is going to capture my fingerprint, my face, or my iris pattern along with the information stored on my card, and match one against the other."

Jain and his students have been working to resolve four problems that are commonly associated with the use of fingerprints in identification and verification: how to match two often imperfect fingerprints; how to make a bad fingerprint image better; how to increase efficiency; and how to increase accuracy.

"Fingerprints are matched based on some characteristic points, called minutiae points," explains Jain, referring to the ending and branching points on the ridges and fissures of the finger that are scanned, mapped, and added to the database. "A good-quality fingerprint may consist of 60 or 70 such points," he says, conceding that a good-quality fingerprint is not always easy to obtain. According to Jain, the number of minutiae points can change dramatically based upon the amount of pressure exerted, the amount of oil present on the skin surface, or even the presence of a paper cut. For this reason, he and Ph.D. student Hong have developed algorithms that allow inconsistencies to exist between two images, yet that still recognize the two prints as originating from the same person.

"This is probably the most important work that we’ve done to date," says Jain about his and Hong’s matching algorithm, which he describes as both efficient and robust. "Efficiency is very important," he says, "because the whole verification process should take between one and two seconds on an ordinary PC."

The two researchers have also developed an image-enhancement program, which enables them to remove any unnecessary “noise” from a poor-quality thumbprint while extracting its distinguishing features. MSU and IBM have applied for seven patents for the development of these two procedures.

One way that Jain’s research group is attempting to...
Charles Bachman III, BSME '48, recently retired as chairman of the board and founder of Bachman Information Systems, renamed Cayre Technologies. (Cayre Software is a NASDAQ company employing 350 people.) Bachman is an expert and innovator in the field of computing. He developed Integrated Data Store, the first commercially successful database management system, and is widely known for the Bachman Diagrams and forward and reverse engineering, which are frequently used in data modeling and database design activities. Bachman has received numerous awards throughout his career. He was given the Turing Award by the Association of Computing Machinery in 1973, and elected a Distinguished Fellow by the British Computer Society in 1978. He received the Life Achievement Award from the Massachusetts Software Council in 1996. This past fall, Bachman was featured in the "Wizards and Their Works" exhibition sponsored by The Computer Museum and the Association for Computer Machinery, in Washington, D.C. and Boston.

Joseph Bornstein, MSAE '49, is retired from his position with the Natural Resources Conservation Service and has pursued photography in earnest in a self-started business called Bornstein Photocards. Bornstein’s photo of almost perfectly circular ice formations on Lake Champlain received an honorable mention in a photo contest sponsored by American Agriculturist magazine, and in the Lake Champlain Maritime Museum annual marine photography exhibit in 1996. Bornstein lives in Burlington, Vermont.

Matthew Thomas Bower, BSCE '96, is a volunteer for the Peace Corps in Mohale's Hoek, Lesotho (in southern Africa). As a water development specialist, Bower is responsible for getting water to rural villages. Bower says that he lives in a village with none of the luxuries he had in the states. "I love the challenge!" he adds.

Robert Brandell, BSME '84, is teaching mathematics (always with an engineering bent, he reports) at Calvert Hall College, a private, college-preparatory high school in Baltimore. After working three years as a process engineer for General Motors, Brandell worked in crisis intervention in Toronto, Rome, and Anchorage. Brandell earned an M.Ed. from Loyola College in Maryland. During the summer, Brandell enjoys traveling up and down the east coast, visiting sites of colonial America and the American revolution.

Andrew Bullock, BSCE '81, is employed with Eli Lilly and Company in Indianapolis. Bullock was recently promoted from senior process automation engineer to head of the process automation department at the company's Clinton Laboratories facility.

Raymond Chesney, BSCE '97 (with high honors), recently received his commission as a naval officer after completing Officer Candidate School in Pensacola, Florida. During the 13-week training, Chesney received instruction in such subjects as navigation, ship-handling, engineering, and naval warfare and management.

Joseph Colucci, BSME '58, is president of Automotive Fuels, Consolidated, Inc. Colucci retired from GM's R&D Center in October 1995 as executive director of materials research, and formed a consulting business, which keeps him busy.

Edward (Ted) Del Solar, BSCE '51, is in equipment development for Sun Air Filter Recycling Company in Westmont, Illinois. Del Solar started the company seven years ago, and now the company belongs to his son Bruce. Del Solar will continue to develop and build machines to clean engine air filters.

Leroy Dell, BSCE '66, was awarded Chapter Honor Member of Michigan State University's Chi Epsilon Society, the national civil engineering society. Dell was elected to the honor society as a student, and was one of 34 individuals elevated to chapter honor members since the start of the MSU chapter in 1951. Dell founded the professional consulting firm Dell Engineering, Inc. in 1978. Headquartered in Holland, the firm consists of over 65 professionals and offers a full range of engineering, environmental consulting, and material testing services.

Sean Deuby, BSEE '82, is living in Plano, Texas. Since graduating from MSU, Deuby worked at Texas Instruments, where he was a principal architect of their worldwide Microsoft Windows NT computer network. He has recently left TI to take a position at Intel as the Windows NT architect of their new Fort Worth microprocessor fabrication facility. Deuby speaks internationally on NT topics and is writing a book on NT network design and support for Macmillan Technical Publishing. He can be reached at spdeuby@flash.net.

Michele Dorian, BSCE '79, is president of Dorian Construction, Inc., a commercial and industrial general contractor in the metro-Detroit area.

Paula Dynda, BSCE '97, has recently accepted a position as a project engineer with Orchard, Hiltz & McCliment, Inc. of Livonia, Michigan. Dynda is part of OHM’s transportation group, preparing plans and
specifications for several road improvement projects. Dynda will also be developing stage construction plans for traffic, signing, and alignment alternatives for clients in southeast Michigan.

A. Fazel Famili, PHDAE ’82, is a senior research officer in integrated reasoning with the National Research Council of Canada in Ottawa, Ontario. Famili is also founding editor-in-chief of an electronic journal, Intelligent Data Analysis, a peer-reviewed journal in artificial intelligence that covers such topics as visualization, data pre-processing, data engineering, database mining techniques, fuzzy logic, etc. Famili encourages us to visit the WWW site at http://www.elsevier.com/locate/ida.

Drew Floyd, MSCE ’84, is senior vice president of Spencer White and Prentis. He recently relocated from the Boston area to Washington, D.C. to manage the Mid-Atlantic regional office.

John E. Francis, BSCHE ’92 (biomedical engineering option), is an M.D. resident in general surgery at Blodgett/St. Mary's Hospitals in Grand Rapids. Francis has recently returned from Niger Republic in West Africa, where he worked for 2 1/2 months in a 100-bed hospital in the sub-Sahara bush. Francis will graduate from MSU College of Human Medicine with an M.D. this May. He will be returning to Africa to work for an additional five weeks, and then begin residency in Grand Rapids in July.

Ned Harrington, Ph.D., BSME ’53, is president and CEO of Harrington’s deEssex, Inc. in Ann Arbor. Harrington, a consulting engineer, is overseeing the construction operations of Detroit’s new Tiger baseball stadium.

Robert Hill, BSCHE ’55, is a self-employed patent attorney living in San Francisco. Hill reports that he still enjoys the practice of intellectual property. He also has branch offices in Fremont and Los Gatos.

Richard E. Hintz, BSME ’73, is a manager of S6W Fluid Systems for Westinghouse. Hintz, who lives in West Mifflin, Pennsylvania, is managing a group of engineers to develop a new reactor and integrated propulsion plan design for the SEAWOLF Class submarine for the U.S. Navy.

Makoto Hoki, PHDAE ’73, is a professor in the Department of Bioproduction and Machinery at Mie University in Tsu, Japan. Hoki will be assuming the position of president of the Asian Association for Agricultural Engineering for the 1998-99 term.

Debra Kalmbach, BSCHE ’76, has been promoted to manager of Nutrilite Food Supplements by the Amway Corporation. In her new position, Kalmbach is responsible for the growth and development of the supplement line for the U.S. market. Kalmbach and her family reside in East Grand Rapids.

Dale Kirk, MSAE ’54, retired in 1982 as a professor at Oregon State University after 40 years of service. Since 1982, Kirk has done some consulting and volunteer work. He also enjoys working with service groups.

Ann (Mey) Larmore, BSCPS ’81, is a product design supervisor in instrumentation for the Ford Motor Company and Visteon Electronics in Dearborn. Larmore is also in her second year of University of Michigan’s MBA program, and says that she is busy juggling work, school, and three children.

Carl Floyd Larson, BSCHE ’39, is a retired civil engineer living in Essexville, Michigan. Presently, he serves as consultant for Larson Salvage Company, a family business.

Daniel Lauderback, BSCE ’86, has been admitted as an associate partner in Andersen Consulting of Chicago. Lauderback joined Andersen Consulting in 1988, and was promoted to manager in 1992. Lauderback specializes in helping large-scale informational technology organizations optimize their business processes and applications, improving corporate efficiency and flexibility.

Neil Maguire, BSMSE ’91, is employed with Meritus Consulting Services in Dearborn. Maguire received an M.S. degree in mechanical engineering from GMI in 1994, and an MBA from Oakland University in 1997. He left a position with Delphi-E after six years there, and is now a business process consultant for manufacturing industries.

Jonathan Meyer, MSEE ’97, is an environmental engineer with Black & Veatch in Chicago. Meyer is responsible for designing treatment systems and researching and testing new treatment technologies.
Richard Seif, BSEE ’71, has been appointed president and CEO of Lincoln Electric Canada, a subsidiary of The Lincoln Electric Company of Cleveland, Ohio. Seif has been with Lincoln Electric since 1971, beginning as a technical sales representative in St. Louis, and moving to such positions as manager of the Salt Lake City District office, manager of district sales in Cleveland, director of marketing, and corporate vice president. Seif will be located at the company’s Canadian Headquarters in Toronto.

Jesse Shearin, BSCHE ’85, is in his thirteenth year with PPG Industries, having worked in various roles and locations in the areas of production, process development, and operations planning. After four years as materials and operations planning manager of PPG’s Resin Development Center, Shearin has recently accepted the position of quality facilitator at PPG’s Coatings Research and Development Center. In his new assignment, Shearin will be responsible for the enhancement of the quality improvement process, and the continuance of R&D’s ISO 9001 certification. Shearin, his wife, Natalie, and their three children reside in Glenshaw, Pennsylvania, a suburb of Pittsburgh. His most exciting moment in 1997 came when MSU’s football team finally beat up on local favorite Penn State, much to the dismay of most of Shearin’s neighbors.

Eric Steele, BSCPS ’96, is living in Denver. Steele was recently promoted from sales consultant to applied technologist at Oracle.

Renée Szostek, BSCPS ’87 (Honors), is a graduate student in the Department of Epidemiology and Public Health at Yale University. After graduating from MSU, Szostek earned B.A. degrees in both physics and astronomy from the University of Iowa, and later, a master of science in biomedical engineering from Northwestern University. She also served as a graduate student at the University of Chicago in the Department of Geophysical Sciences. Presently, Szostek is studying the epidemiology of microbial disease. Her thesis research involves genotype sequencing and computer analyses of genotype sequences of the group A streptococcal bacteria to determine evolutionary relationships and to construct a phylogenetic tree. Szostek has received numerous awards and fellowships, and is published in prestigious biophysical and biochemical journals. She is also
student editor of the Yale Journal of Biology and Medicine. Szostek writes, "Although I have attended many different schools since my graduation from Michigan State, my heart still belongs to MSU!"

Henry G. K. Tyrrell, BSME ’50, is retired from both his military and civilian responsibilities, and is now happily living in Sun City, Arizona. Tyrrell writes that he has been there for 14 years, and especially enjoys his environs from May to October, when the "snowbirds" have gone north.

David Ukrop, BSME ’94, is an engineering group manager for General Motors in Pontiac. Ukrop is working in product engineering for GM’s truck group, which deals with exhaust systems for trucks with gas engines.

Elizabeth A. (Buschlen) Unger, BSME ’61, is vice provost of academic services and technology, and dean of continuing education at Kansas State University in Manhattan, Kansas. She has been in this position since 1995.

Randal Van Portfliet, BSCE ’77, has been appointed by the Michigan Department of Transportation (MDOT) as district engineer for the Upper Peninsula. In his new position, Van Portfliet oversees all planning and operations of the 15-county region. Van Portfliet began his career at MDOT in bridge design in 1977. Until his promotion, he served as district traffic and utility engineer, where he was responsible for all phases of traffic operations, including oversight of traffic controls, safety operations, and bridge repairs within the western half of the Upper Peninsula.

James Weber, BSEE ’73, has recently been named partner at CEREX Advanced Fabrics, L.P. CEREX is a manufacturer of custom-engineered nonwoven fabrics used in a variety of settings, including industry and medicine. Weber has held the position of director of manufacturing at CEREX since 1993, after joining the company as plant engineer in 1991. Prior to joining CEREX, Weber worked in the paper industry for 18 years, primarily with Procter and Gamble Paper Products Company in a number of locations around North America. Weber lives in the Pensacola area with his wife Cathy, and children, Heidi, Erika, and Jimmy.

Matthew T. White, BSME ’90, is a research engineer with the IBM Corporation in Campbell, California. White received his Ph.D. in mechanical engineering from the University of California at Berkeley in the spring of 1997.

Tom Wieser, BSME ’83, is a consultant and project manager for the RWT Corporation in Mount Prospect, Illinois. RWT is the developer and seller of OnTrack, a manufacturing execution and finite-capacity scheduling software. He manages the implementation and integration of the software. In 1992, Wieser received a joint master’s degree from the Kellogg Graduate School of Management and the McCormick School of Engineering at Northwestern University. While at Northwestern, Wieser was awarded the Dean’s Distinguished Service award. He resides in Evanston.

Kainam Wong, MSEE ’90, received his Ph.D. in electrical engineering from Purdue University in 1996, and was a senior professional staff member at Johns Hopkins University, teaching the applied physics laboratory from 1996 to 1998. Wong recently accepted a tenure-track assistant professorship at Singapore’s Nanyang Technological University. His e-mail address is ektwong@ntu.edu.sg.

Obituaries
Clyde M. Hyde, Ph.D., BSEE ’55, died February 5, 1998 at his home in Chesterbrook, Penn. after an illness. He was 74. Hyde was co-founder of Shared Medical Systems Corporation, and later, vice-president of Upsher Laboratories in Omaha, Neb. He was also a faculty member and chairperson of the electrical engineering department at the University of Nebraska. Hyde is survived by his wife, Delores Krieg Hyde, two daughters, four stepsons, and many grandchildren and great-grandchildren.

(Fingerprint Matching—continued from page 9)

Accuracy. "We have combined face and fingerprints, and that integration has resulted in better performance than just using face or just using fingerprints," Jain reports.

Jain suggests that as we learn more about the science of biometrics, the public will grow more and more accustomed to scanning their fingerprints and swiping "smart" cards—cards carrying a computer chip filled with personalized information—through computerized readers. He predicts that biometrics ID check stations will be popping up readily at airports, grocery lines, ATM machines, phone booths, international borders, and perhaps right at our own PC. Although he acknowledges that a number of concerns have been voiced related to the issue of privacy, he asserts that biometrics can actually help protect an individual’s privacy when properly used.
1998 Withrow Awards

On April 2, faculty and staff gathered to honor individuals in the college who have demonstrated teaching and scholarly excellence.

Recipients of the 1998 Withrow Teaching Excellence Awards were Larry Segerlind, professor of agricultural engineering (third-time recipient); Daina Briedis, associate professor of chemical engineering; Thomas Wolff, associate professor of civil and environmental engineering (third-time recipient); Betty Chang, associate professor of computer science; Donnie Reinhard, electrical engineering professor; Eldon Case, associate professor of materials science and mechanics (third-time recipient); Craig Somerton, associate professor of mechanical engineering (second-time recipient).

The Withrow Distinguished Scholar Award went to Kalinath Mukherjee, materials science and mechanics university distinguished professor, and John Weng, assistant professor of computer science. The 1998 Withrow Exceptional Service Award went to Abdul Esfahanian, computer science associate professor.

1998 Withrow awardees are (back, l-r): Larry Segerlind, Kalinath Mukherjee, John Weng, Tom Wolff, and Craig Somerton; (front, l-r): Donnie Reinhard, Abdul Esfahanian, Betty Cheng, and Daina Briedis. (Not pictured: Eldon Case.)

Shanblatt Receives Fulbright

Michael Shanblatt, professor of electrical engineering, was awarded a Fulbright grant for a combined lecturing and research post at the National University of Science and Technology (NUST) in Rawalpindi, Pakistan. While there, Shanblatt will be teaching the graduate level course EE 813, Advanced Logic Design, and training NUST faculty and students in the use of VHDL, a hardware description and modeling language for digital circuit design. Shanblatt also will be collaborating with NUST faculty on research involving computer-aided design algorithms for integrated circuit layout, utilizing VHDL. The grant will take place from October, 1998 through April, 1999. Shanblatt will be accompanied by his wife Stephanie and his daughters Emily and Elisabeth.

University Awards Engineering Faculty

On Tuesday, February 10, Michigan State University’s annual awards convocation was held to honor faculty who demonstrate excellence in the areas of research, teaching, and community outreach. Kris Berglund, professor of chemical engineering, chemistry, and biosystems engineering was presented the Distinguished Faculty Award for his pioneering work in crystallization. His work has led to improved industrial crystallization processes, products of higher purity, and better process control. Ronald Averill, associate professor of materials science and mechanics, and Diane Rover, associate professor of electrical engineering, were presented Teacher-Scholar Awards for their skill in the classroom and their scholarly promise. Averill is well known for his ability to teach complex topics relating to structural mechanics in ways that continuously emphasize fundamental engineering concepts. Rover is highly regarded for her ability to communicate in the classroom and for her ongoing research in the field of computer engineering.

Saul Awarded Engineer of the Year, Outstanding Engineer

William Saul, professor of civil engineering, has been named Outstanding Engineer in Education; Fellow; and Engineer of the Year for 1998 by the Michigan Society of Professional Engineers (MSPE). Saul, a member of the National Society of Professional Engineers since 1984, is an expert on the design and analysis of structures. Saul advises MSU’s student chapter of MSPE.
Graduate students in the areas of environmental engineering and composite and polymer materials will have an easier time pursuing their educational and career goals, thanks to two grants that have been awarded to the college by the U.S. Department of Education this April.

The grants are part of the Department of Education’s Graduate Assistance in Areas of National Need (GAANN) fellowships program, a program started in 1988 to provide assistance to graduate students in the areas of physics, biology, geosciences, chemistry, engineering, computer science, and math. The program is especially targeted to help those students who are members of under-represented groups in these fields of study, namely women and ethnic minorities.

Tom Voice, David Wiggert, and Susan Masten, faculty members in the Department of Civil and Environmental Engineering, will be collaborating on a $176,500 fellowship program designed to restructure environmental engineering education around a framework known as risk assessment/risk management. This paradigm identifies that environmental problems are best addressed by considering the health effects, the science and engineering aspects, and the social context of the problem.

Students enrolled in the program will receive training in the basic physics, biology, and chemistry of environmental systems, in the quantitative and design skills necessary to develop engineering solutions for environmental problems, and in the related subjects of environmental health and toxicology, and environmental policy, economics and management. The intent is produce graduates who understand not only the technology, but can delve into how large environmental systems interact, how contaminants directly and indirectly affect human and environmental health, and how science and the many, sometimes conflicting societal issues are weighed in order to develop sound public policy.

"The training of environmental engineers is evolving from a traditional equipment-design focus, to a model where graduates have understanding in the scientific processes and technologies, as well as abilities to best address a community’s concerns," says Voice, director of the project. "We also see this as a prototype for a proposed environmental science program at MSU, in which specialization in one of the basic science areas is substituted for the engineering course work."

The risk assessment/risk management fellowship program will provide up to eight fellowships, with emphasis on multidisciplinary study, faculty mentoring, student collaboration, and a comprehensive learning experience, including field work and international study. A supervised teaching component, directed by Masten, will provide the students with the experience and feedback they need to become superior educators and practitioners.

In the second GAANN fellowship project, Krishnamurthy Jayaraman, professor of chemical engineering, and Gregory Baker, associate professor of chemistry, have joined together on a program that artfully addresses two growing national needs: a need by industry for affordable products fabricated from high-performance composite materials and polymers, and a need by undergraduate students for up-to-date academic training in these areas.

The $100,800 graduate education in polymers and composites fellowship program is a collaborative venture of the Department of Chemical Engineering and the Department of Chemistry that will create four fellowships (two per department) for doctoral students who have interest and expertise in the polymer sciences. Students will receive in-depth training through interdisciplinary research, industrial research internships, and undergraduate mentoring. To help strengthen the students’ communication abilities, the fellowship requires two semesters of teaching over a period of five years, as well as participation in Science Theatre, a student organization that travels to area elementary, middle, and high schools, and demonstrates fundamental scientific principles through exciting, easy-to-construct experiments.

The goal of the program is to produce a well-trained group of doctoral students who, through their individual research, can address industry’s most urgent and compelling questions, and through their teaching, can expand the availability of courses and topical workshops that are offered to students and the public in this promising field.

"New applications for polymers rarely involve the use of pure, single-component materials," says Jayaraman. "Instead, they use multiphase polymer systems such as laminates, multi-layer films, blends, and composites. Understanding how to design and process these complex materials requires advanced interdisciplinary training in synthesis and processing of polymers and composites," he says, "and we will educate a new crop of Ph.D.s to be more versatile in this area."

Each fellowship provides a $15,000 living stipend for the student, as well as $10,200 in institutional support. The grants have been approved for one year, with the possibility of renewal for an additional two years.
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