Fueling the Future

HOW MSU IS WORKING TO CREATE SUSTAINABLE ENERGY SOLUTIONS
Welcome to T O M O R R O W !

Welcome to the first edition of MSU T O M O R R O W , a publication designed to showcase the breadth and depth of research taking place here at Minnesota State University, Mankato. Through the efforts of Dr. Fernando Delgado and his staff in the College of Graduate Studies and Research, we’ve put together a collection of stories about some of the fascinating, groundbreaking and long-term research going on at MSU.

Consider the new Minnesota Center for Sustainable Energy, an effort led by the College of Science, Engineering and Technology. The MCSE is working on everything from harnessing wind power to creating more efficient biodiesel fuels — and will no doubt affect both the University and the world at large in the near future. If you dread filling your tank as much as I do these days, you’ll be glad to know that the MCSE has your best interests in mind.

There’s also the Force Science Research Center, where Drs. Bill Lewinski and Bill Hudson are studying the human elements of lethal situations. Their innovative work with law enforcement officers from across the country and around the world has been widely touted for its insight into what actually happens in the seconds before a gun is fired. They, too, have the potential for an incredible impact on society.

The truth is, all of our faculty have such an opportunity, through every student they come in contact with. I applaud the efforts of Dr. Marilyn Hart, coordinator of this year’s Undergraduate Research Conference, and of all the other faculty members who encouraged students to take part in the seventh annual event. Once those students develop an interest in academics and research, there’s no telling where they might go and what problems they might solve. We’re proud to help them get started here at MSU.

MSU has long been a place where expectations are exceeded. Students, faculty and alumni say so. The projects described in T O M O R R O W help say so, too. Thank you for your interest in the work taking place here — I hope T O M O R R O W exceeds your expectations!

Sincerely,

Richard Davenport
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About the cover: Professor of automotive engineering technology Bruce Jones stands in one of the many cornfields that helps fuel Minnesota’s ethanol production. In the background is a new ethanol plant in Lake Crystal, Minn. Photo by John Cross.
Fueling the future

MSU’s Minnesota Center for Sustainable Energy focuses on finding renewable sources of fuel.

by Rachael Hanel, ’97, ’04

Bruce Jones eyes the computer closely. Numbers and other data in blue and green scroll across the black screen. The automotive engineering technology professor squints, furrows his brow in concentration and sizes up the information. He makes some adjustments, relaxes a bit and takes a bite of his sandwich.

This research could mean big changes in the effort to create cleaner air. Jones is testing a special blend of diesel fuel that incorporates 15 percent biodiesel and 2 percent ethanol. The blend reduces the amount of fossil fuel that constitutes diesel, decreasing emissions in the process. Therefore, less fossil fuel is used, and the belch from diesel engines contains fewer contaminants.

Jones’ interest in renewable and sustainable energy is not uncommon at Minnesota State University, Mankato. MSU faculty and students have long displayed a commitment to researching alternative forms of energy. During the oil embargo of the 1970s, for example, faculty at MSU created a 50/50 car that got fifty miles to the gallon while going fifty miles per hour. The University’s Minnesota Center for Automotive Research (MNCar) has been testing alternative fuels for years.

But this type of ongoing research took on a pointed focus when the Minnesota Center for Sustainable Energy was established in 2004 at MSU. The MCSE’s mission is to provide research that will move Minnesota toward sustainable energy independence. Right now, Minnesota imports 93 percent of its energy.

Louis Schwartzkopf, professor of physics and director of the MCSE, says oil and natural gas reserves are dwindling quickly. As the population grows, demand will increase while supply decreases. He says our society is driven by oil. This steady demand for fossil fuels also comes from European countries and developing nations such as China and India.

“It behooves us as a society to find some rational way to deal with the decline,” Schwartzkopf says.

Use of fossil fuels also causes problems such as the greenhouse effect and global warming, says John Frey, dean of the College of Science, Engineering and Technology. “For our own self-interests, we need to find a way to go to renewable fuel for energy and the environment,” he says.

Jones says the Center comes at a great time. The current high oil and gas prices spark renewed interest in this type of research. “I’ve received a lot of phone calls from all over the country,” he says. “It feels pretty good.”

Energy in Motion

Although the MCSE is still fairly new, faculty are already excited about its potential. Schwartzkopf says the focus now is finding out how different departments will fit into the overall structure. Construction management, biology, chemistry, physics and all the engineering programs already figure prominently. There’s even the
possibility of extending beyond the traditional sciences into social science and urban studies to study how people live and work.

Scott Fee, professor of construction management and chair of the Interior Design and Construction Management Department, says the MCSE has helped him forge relationships with other colleagues with whom he otherwise wouldn’t have connected. For example, he’s talking with Wayne Allen in Ethnic Studies about the possibility of traveling to Australia and New Zealand to learn how native cultures live through sustainable means, not only when it comes to food and energy, but also in how their buildings are constructed.

“There’s this momentum where ideas are overlapping across disciplines,” Fee says.

One of the MCSE’s first projects is the construction of a wind turbine on campus. The University would use the energy, and faculty and students would be able to conduct hands-on research. Wind turbines are already busy at work on the Minnesota prairie, particularly on Buffalo Ridge in southwestern Minnesota. Frey says studies show the potential for wind energy at MSU is just as strong as that harnessed at Buffalo Ridge.

“The whole concept of wind energy is here for the picking,” Frey says.

Frey also is looking into putting an anaerobic digester plant on campus. Such a unit would convert urban waste into methane gas to be used for energy. Frey says the plant would feed on the massive quantities of food waste that are disposed on campus each day — waste that currently goes to a landfill.

Minnesota is in a prime location for research into renewable energy. Not only do winds whip across the state, but Mankato is in the heart of south-central Minnesota’s intensely agricultural region. Corn, soybeans and other plants, including sorghum and grasses, fuel research into ethanol and other natural energy sources.

The next step is finding money to help fund research. Already MSU works with organizations such as the Minnesota Corn Growers Association and the Department of Commerce; it’s also a member of the U.S. Green Building Council. Minnesota Gov. Tim Pawlenty cited research done at MSU in his plan to use 20 percent ethanol in gasoline, rather than the current 10 percent requirement. The University also works closely with Rep. Gil Gutknecht’s office.

**Just the Beginning**

Fee sees the MCSE as a starting point that will get students interested in studying sustainability issues across disciplines. In the future, students may be able to choose courses in biology, chemistry, ecology, physics and construction management that would give them a broader knowledge base.

“We can harness that into a body of knowledge to help students graduate as managers of resources,” Fee says. “It also helps create more responsible consumers and citizens.”

Frey says that interest is there: Everyone he talks to expresses interest in the MCSE. “This is one issue that resonates the most among everyone. People see it as something we need to do in the near future,” he says.

In the meantime, Schwartzkopf and Frey agree that faculty at MSU are already doing great things. “There are lots of really good people at the university who do and can do research,” Schwartzkopf says. “Not just here, in this department or college, but University-wide. We do top-notch things.”

*Rachael Hanel is a Mankato-based freelance writer and a frequent contributor to MSU’s TODAY magazine.*
THE SCIENCE OF SHOOTING

The Force Science Research Center delves into the human element of lethal encounters with guns.

by Joe Tougas ’86
E very baseball fan has seen it: a long fly ball, hit hard toward the bleachers. The outfielder darts back, his body running full throttle but his eyes focused on the ball’s destination. It’s going to be a close one. The crowd’s shouting, the ball’s rising, then descending toward the fielder’s extended glove and — BAM — he slams into the outfield wall.

“These people make more money in one game than a cop makes the whole year,” says Dr. Bill Lewinski, a professor in Minnesota State University, Mankato’s Law Enforcement program and a behavioral scientist specializing in lethal-force encounters. “And they still hit that wall.”

When the frantic mixture of cops, suspects and guns goes wrong, it’s often the result of decisions made in the blink of an eye — moments in which the officer must decide whether the suspect’s sweatshirt, glove compartment or closet is concealing a gun about to be sprung and fired.

Studying what goes on in the heads of both cops and suspects during those moments is the purpose of the Force Science Research Center, an institute pioneered in 2004 at MSU by Lewinski and Dr. Bill Hudson, chair of MSU’s Electrical and Computer Engineering and Technology Department.

Although the program is still in its infancy, thousands of police officers and trainers around the world are already using it as a resource. From U.S. cops to the British Secret Service, an estimated 150,000 law enforcement officers are taking advantage of the studies and reports pouring out of MSU.

“We’re the place in the world,” says Lewinski from his home near campus, where the bookshelves and entertainment center are packed with textbooks and videos pertaining to police and shootings. It’s been Lewinski’s passion since 1975.

“What’s very clear is that science has never come to the streets,” he says. “People argue about cop shootings all the time, but it’s all opinion.”

In less than a year, the Force Science Research Center has become a fountainhead of new information based on the studies conducted here and an array of consultations in areas traditionally considered outside the scope of cops and criminals. Lewinski is particularly proud of the national board of advisors who have signed on with the Center — national specialists from fields such as optics, psychology, cardiology, psycholinguistics and more. Board members include Phil Hayden, co-creator of the FBI’s SWAT team, and Kevin Gilmartin, one of the more prominent police psychologists in North America.

The Force Science Research Center has gained national attention for its work as well. Lewinski was recently featured on a segment of the CBS news show 48 Hours, after being asked by the Los Angeles Police Department to help analyze an officer’s fatal shooting of a thirty-nine-year-old man at a costume party. When police responded to a call, the man pointed a fake gun at an officer, who in turn fired nine rounds at him, hitting him four times. The case sparked controversy — and CBS’ interest — because the autopsy showed all four shots struck the man in the back. Famed attorney Johnnie Cochran represented the family in a lawsuit.

Lewinski provided an explanation — based on research at MSU — about what moves a suspect makes after pointing the gun. Lewinski’s theory was that the first five shots fired didn’t hit the suspect, which gave the man half a second to turn his back and run, moving into the shots that were being fired through a porch window.

“It does explain how an officer could see the situation and justifiably shoot at the subject that’s presenting the threat,” Lewinski told 48 Hours. “While not excusing the outcome, we’re expecting a lot from someone when they’re facing their own death.”

The Center’s research has been used in five different cases in the past year, and the science studied — and used by trainers — is based more on behavior than ballistics.

“I don’t care about the gun,” Lewinski says. “I need to know the mechanics of the gun, but it’s the human performance elements we focus on.”

The Research Center has multiple components, including the MILO law enforcement simulator, which puts users in a virtual environment with a number of potentially lethal scenarios. While such video-assisted devices have been part of officer training for decades, this new simulator allows the action on the screen to react to the officer’s decisions. Voice commands, such as ordering the suspect to turn around, can be factored in.

The technology, which can be modified by individual police departments to suit their local environments, allows for study of cops’ mental and physical reactions, which are then used in future training.

“I think it’s pretty incredible stuff,” says Mankato Deputy Director of Public Safety Matt Westermayer, who oversees a staff of forty-seven officers. “That technology takes our training to the next level. Its capabilities of being able to measure reaction time — there’s no other technology or training equipment available to law enforcement that comes close to that.”

Such training opportunities are important, Lewinski says. He compares police officers with professional athletes, who are trained exhaustively year-round for what amounts to a ball game. Cops, on the other hand, receive less direct training than pro ball players — and plenty of other less-dangerous occupations as well.

“It requires twice as much training to become a barber or cosmetologist in Minnesota than it does to become a police officer,” Lewinski says.

The simulator is an important part of the Center’s work, but it’s just one component of what really goes on there, Lewinski says. “We’re really focused on all the human elements of this.”

Joe Tougas is a freelance writer and editor in Mankato. He is a regular contributor to TODAY, the magazine for MSU alumni and friends.
Starting Young

The Undergraduate Research Conference encourages students to get involved early in their academic careers

Rainy, gray skies enveloped Minnesota State University, Mankato on a Monday morning in late April. As finals week approached, both students and faculty seemed focused on the work to be done in the weeks ahead.

The quiet mood on campus disguised the activity brewing inside the Centennial Student Union that morning. There, well-dressed, professional men and women presented the results of months, sometimes even years, of research. Topics ranged from the sexualization of female athletes to nontraditional students and computer skills and the genetic differences among natural river otter populations in Minnesota.

But these weren’t faculty presentations. They weren’t even graduate student presentations. At this conference, undergraduate students — twenty, twenty-one and twenty-two years old — did all the work.

The presentations were part of MSU’s seventh annual Undergraduate Research Conference (URC), which began in 1998 as a way to encourage undergraduates to get involved in research. Such conferences already existed at other universities, and faculty wanted to establish a similar commitment to research at MSU. Mary Visser, a professor in the Human Performance department, attended a conference to learn more about URCs and then chaired MSU’s conference from 2000 to 2003.

Faculty play an integral part of the process. Each student works closely with a faculty member to develop projects and do research. Professors also serve as judges and encourage students to participate.

“A lot of faculty work hard to make it a go,” Visser says.

Dr. Marilyn Hart, who has chaired the conference for the past two years, says one goal is to foster a connection between mentor and mentee.

“It’s invaluable for the faculty and students. It’s an intimate relationship. The faculty mentors really know these students,” Hart says. “It strengthens the whole University.”

Scott Olson agrees. The vice president for Academic Affairs told conference attendees at a luncheon that the administration naturally throws its support behind the URC. “Every faculty member treasures research,” he said. “Going through that experience with students is a wonderful experience for the University.”

When Hart took over in 2004, she wanted faculty to promote undergraduate research in all disciplines. Too often, she noted, research is thought to apply only to the scientific disciplines. Hart herself is a biology professor, but she recognized the importance of involving all departments on campus.

The effort paid off. The 2005 URC featured many more projects from across campus. Science, engineering and technology still claimed the most projects at forty-seven, but there also were thirty-five projects in the arts and humanities (compared to just nineteen the year before) and thirty-two in social and behavioral science (twenty-four the year before).

Leah Anderson, an art and anthropology double major, focused her research on student and faculty artists at MSU. She conducted in-depth interviews with twenty-one people, asking them what motivates their art. She’s already thinking of ways to expand her project into a journal article or perhaps even a book.

“It looks good to have this experience,” she says. “If I decide to go on for my MA or PhD, I’ll be less stressed out.”

Anderson’s comments echo precisely why the URC was established in the first place. The main goal, Visser says, is to get students hooked on research as undergrads. That experience benefits them in many ways. “This sets them apart from other students out there looking for the same jobs,” she says. “It’s so powerful.”

Steven Sullivan, who participated in the conference for the third time this year, knows that firsthand. This year, his project focused on genetics, proteins and DNA. The biology and psychology double major is headed to the neuroscience PhD program at the University of Minnesota. While interviewing for different schools, he was told that graduate programs like getting students from smaller schools because they’ve usually had valuable one-on-one time with professors, plus hours and hours of lab time.

“They like to know that it’s not all theory,” Sullivan says. “Here you get hands-on experience in the lab.”

Hart says these “dynamos” doing undergraduate research get a chance to shine here. At a larger university, they might get lost in the shuffle. Sullivan and many other URC alumni are getting into top-ranked graduate programs every year, Hart says.

Visser counts the development of the Conference, and the students who participate in it, as one of her most important accomplishments at MSU.

“One thing that I’m most proud of in my time here is that I helped to get this going,” she says.

Rachael Hanel is a freelance writer and frequent contributor to MSU’s TODAY magazine.
Scholarly Works

The following pages list examples of the scholarly work completed by faculty at Minnesota State University, Mankato during the 2004-2005 calendar years. Although we’ve made every effort to include all publications and performances, this list is not all-inclusive. The names of MSU faculty are in bold.

College of Allied Health and Nursing


Young, P. (2004). Trying something new: Reform as embracing the possible, the familiar, and the at-hand. Nursing Education Perspectives, 25, 124-130.

College of Arts and Humanities


**Exhibitions and Performances**

**Frink, Brian.** Out My Backdoor. Conkling Gallery, MSU Mankato.

**Frink, Brian.** Old Art Old Fart, work from 1979-1984 Brooklyn. 410 Art Project, Mankato, MN.

**Frink, Brian.** Recent Paintings and Drawings. Riverland Community College, Austin, MN.

**Frink, Brian.** Poetry and Art Performance in Recognition of Poetry Awareness Month. 410 Art Project, Mankato, MN.

**Frink, Brian.** Recent Paintings and Drawings. Ridgewater Community College, Willmar, MN.

**Mika Laidlaw.** The 8th International Shoebox Sculpture Exhibition. Taiwan, Guam, HI, WI, CA, PA, OH, SD, IA.

**Mika Laidlaw & Mika Negishi Laidlaw.** two-person exhibition. Strecker & Nelson Gallery, Manhattan, KS.

**Mika Laidlaw.** College Bowl II, invitational exhibition. Northern Clay Center, Minneapolis, MN.

**Mika Laidlaw.** The 2004 International Orton Cone Box Show. Holt/Russel Gallery, Baldwin City, KS.

**Mika Laidlaw.** Starbrick Clay National 2004. Starbrick Clay, Nelsonville, OH.


**Rea Mingeva.** Anderson Center for Interdisciplinary Arts Recent Resident Fellows Invitational Group Exhibition. Anderson Center, Stillwater, MN.

**Rea Mingeva.** Rochester Center for the Arts, Recognized Minnesota Artists Invitational Group Exhibition. Rochester, MN.

**Rea Mingeva.** Solo Exhibition. Central Lakes Community College, Brainerd, MN.

**Todd Shanafelt.** Industrial Strength Ceramics. Charlie Cummings Gallery, Fort Wayne, IN.

**Todd Shanafelt.** College Bowl II. Northern Clay Center, Minneapolis, MN.

**Todd Shanafelt.** The First Taiwan Ceramics Biennale. Yingge International Ceramics Museum, Taipei, Taiwan.

**Todd Shanafelt.** The First Taiwan Ceramics Biennale. Kaoshuing Museum of Fine Arts, Kaoshuing, Taiwan.

**Todd Shanafelt.** Feats of Clay. Lincoln Arts Center, Lincoln, CA.

**Todd Shanafelt.** 4th Premio Internacional de Ceramica Contemporanea. Centro de Artesania De Aragon, Zaragoza, Spain.

**Todd Shanafelt.** Multiple Realities: Six Ceramic Sculptors. Catherine G. Murphy Gallery, College of St. Catherine, St. Paul, MN.

**Todd Shanafelt.** Solo Show. Stretch Gallery, Charlotte, NC.

**Todd Shanafelt.** Clay Modern Group Exhibition. Gulgong, New South Wales, Australia.

**Todd Shanafelt.** Mishmash Redux. Midland Arts & Antiques, Indianapolis, IN.

**Todd Shanafelt.** 34th Annual Ceramics Exhibition. Crossman Gallery, University of Wisconsin, Whitewater, WI.

**Recitals and Concerts**

**Stephen Bongardner (Tenor).** Muskingum University, November 2004; Gustavus Adolphus College, February 2004; North Dakota State University, Fargo, ND, March 2004; University of Wisconsin, Milwaukee, May 2004; MSU Mankato, September 2004; Louisiana State University, Baton Rouge, LA, October 2004.

**David Viscoli (Piano).** Solo Performance, Thursday, March 2004; Bunny Just Piano Festival, MSU Mankato, March 2004; Faculty Trio Recital with Harry Dunscombe and Mary Horozaniecki, MSU Mankato, April 2004; Faculty Trio Recital with Harry Dunscombe and Mary Horozaniecki, Augsburg College, Minneapolis,MN, October 2004; Piano and Violin Recital with Mary Horozaniecki, University of North Dakota, Grand Forks, ND, October 2004; Piano and Violin Recital with Mary Horozaniecki, Concordia College, Moorhead, MN, October 2004.

**Publications of Choral Music**


**Theatrical Productions**

**Bliese, Tom**

*Scene Designer*


**Finocchiaro, Paul**

*Choreographer*


**Hustoles, Paul**

*Producer of all MSU productions.*

*Director*


*Scene Designer*

**SCHOLARLY WORKS**

**Kerr-Berry, Julie**
Artistic Director and Co-choreographer

**Lenoir, Nina**
Director

**McCard, David**
Costume Designer


**College of Education**


College of Science, Engineering and Technology


College of Social and Behavioral Sciences


Going Global

How faculty at Minnesota State University are reaching out to the world beyond southern Minnesota.

Humble. Quiet. Modest. It’s as though Minnesota State University, Mankato is just a little too “Minnesotan” when it comes to bragging about the international reach of research that takes place on campus.

That’s the lighthearted theory offered by Dr. Fernando Delgado, MSU’s dean of Graduate Studies and Research. MSU, he says, has too long been perceived as a local resource, its research accessible and applicable mostly to those in the same area code. That image contrasts sharply with the reality Delgado oversees: MSU faculty, in all disciplines, whose work is published or demonstrated internationally.

For example, Drs. Richard Roiger and David Haglin of the Computer and Information Sciences department, whose work on gamma-ray burst research was recently published in the Chinese Journal of Astronomy and Astrophysics. And Drs. Larry Pearson and Mezbahur Rahman, mathematics and statistics professors whose work was published by the Korean Data and Information Service. Or Branko Colakovic, professor of geography, who was published recently in Yugoslavia and who’s also published a book in Belgrade.

There’s more. Two mass communication professors, Ellen Mrja and Jane McConnell, traveled to Oxford University to present analyses of dwindling press and individual freedoms in the United States. Art professor Todd Shanafelt’s ceramics work was included in exhibitions in Australia and Taipei. Research in MSU’s Law Enforcement department, through the Force Science Research Center (see feature on page six), is gaining international attention for its novel ways of determining what takes place in armed encounters between police and suspects.

Some of MSU’s strongest international connections are also being made through its colleges of Business; Arts and Humanities; Science, Engineering and Technology; and Social Sciences.

Delgado is determined to help MSU escape the image as that nice, quiet institution on the hill. “It’s been taken for granted,” he says. “This university is not very good at telling its story.”

The story, Delgado says, is that MSU faculty are increasingly seeing the need for research that has more than a regional impact — and not just for the sake of prestige. Scott Johnson, the dean of MSU’s College of Business says that research with an international emphasis directly benefits the students.

“Business is becoming the discipline of global topics and international interests,” Johnson says.

Outsourcing jobs and pursuing cheap labor overseas have a direct effect on American businesses, as do the international proposals, such as global currency, that are being debated. All of that makes it imperative for faculty to immerse themselves in the factors taking place beyond Minnesota. In the College of Business, for example, ten exchange partnerships have been established with overseas universities.

Johnson said the benefits to students go beyond the academic arena. Students with instructors who spend time abroad tend to be more informed and less likely to surrender to surface stereotypes, such as the anti-French sentiment that flooded the media in 2003.

Last spring, the College of Business took students on business tours to China, Greece and Austria; five students were living and studying in France during the spring 2005 semester.

About 30 percent of the business college’s faculty do research with an international dimension, Johnson says. “I think it will increase as time goes on,” he adds. “Business is one of the disciplines expected to be out front. It’s always been the nature of business.”

The significance of international study and research is evident in MSU’s own backyard, at businesses such as Katolight, which sells generators overseas and requires its employees to have an understanding of and ability to function effectively in other cultures.

“Even a smaller company has a greater, global outreach,” Johnson says.

Increased media exposure and some public-relations pushes at MSU will likely bring more attention to this shy, sleeping giant stretching across the globe, but the real attention will come as MSU’s prominence in research grows globally.

“Many of our teaching and learning opportunities grow out of our faculty, whose work takes them way outside of these borders,” Delgado says.

The sleeping giant, Delgado adds, has slept long enough. “I’d call it an awakening giant,” he says.
Andy Monson, ’04, BS Physics and Astronomy, shot this photo from the Andreas Observatory on the campus of MSU. Monson is now a graduate student and teaching assistant in the Department of Physics and Astronomy at the University of Wyoming.