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# ENGINEERING @ NEBRASKA

SPRING 2008



**SPRING BREAK  
AT 35,000 FEET**

**ALSO INSIDE:  
BETTER BRIDGES  
NASCENT NANO**





## FROM THE DEAN >

### To engineer is ingenious

Perhaps you didn't know, but the word "engineer" comes from the Latin "ingenium": to create. We at Nebraska Engineering believe very strongly that this is our main challenge in educating the engineers of tomorrow.

Just to illustrate this point, I'd like to talk to you today about our Power of Red flag. This shows the process whereby ideas for tomorrow are generated in our college.

Four years ago while on a trip to Brazil, I attended a soccer game. After each side scored, fans in the stands opened up enormous flags—the likes of which I'd never seen before. My immediate reaction was, "Why don't we have this at NU?"

Well, it took a couple of years, and a lot of efforts by a lot of people, but we succeeded at getting our flag made. For the past two years, our students have been waving it at opening ceremonies during Husker football home games.

This simple example is intended to let you know—we are not sitting still. We are creating ideas, every day, and those ideas have a mission: to make the Nebraska (and the world) of tomorrow a better place.

From small things that appear big like our Power of Red flag, to really, really big things that appear small—like the new nanofiber developments of Dr. Yuris Dzenis, R. Vernon McBroom Professor of Engineering Mechanics—we are creating the advances of tomorrow.

We invite you to join us in this exciting time for the College of Engineering at the University of Nebraska–Lincoln.

—David H. Allen





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ON THE COVER: Nebraska Engineering senior Dustin Dam (right) floats during a reduced gravity flight with NASA. At left is Amy Schellhase, a NASA contractor who served as mentor for the Nebraska team's experiments. Photo courtesy of NASA.



Editor: Carole Wilbeck | Designer: Clint Chapman | Contributing Writers: Ashley Washburn, Anne Corrigan, J.S. Engebretson  
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Direct correspondence to cwilbeck2@unl.edu; 203 Othmer Hall, Lincoln, NE 68588-0642; telephone (402) 472-0451, fax (402) 472-7792.

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Address Changes: [jcorman@unlalum.nebraska.edu](mailto:jcorman@unlalum.nebraska.edu); telephone (402) 472-4236, fax (402) 472-4635.

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## INTERNET2 ADDS MORE BANG FOR THE CLICK

**U**niversity of Nebraska-Lincoln is the first Internet2 member to take advantage of the Dynamic Circuit Network (DCN) as a part of its development trial.

At its fall 2007 members' meeting, Internet2 announced the completion of a new nationwide advanced network infrastructure. With an initial capacity of 100 gigabits per second (gbps) nationwide and a revolutionary DCN providing dedicated bandwidth-on-demand capabilities, the new infrastructure provides the potential to transform research-focused areas of study.

The meeting demonstrated the DCN's ability to support the networking demands of high energy physicists collaborating on the Large Hadron Collider (LHC) experiment. With one mouse click, Dr. Carl Lundstedt of UNL's Department of Physics and Astronomy set up a 10 Gbps dedicated circuit between the UNL campus and Fermilab in Batavia, Ill. The result was that the data traffic flowing across the shared IP network seamlessly switched over to the DCN and quickly transferred one-third of a terabyte of data (equivalent to the capacity of 40 standard DVDs).

"The LHC experimentation that our campus will be involved in over the next several years brought about an immediate need for us to explore new ways of networking that can support the intense short term demands of our researchers," said Dale Finkelson, network engineer with UNL Information Services. "Internet2's new Dynamic Circuit Network holds the promise of providing cost-effective, on-demand bandwidth that can easily handle these powerful requirements. Not only does the DC network provide a platform for our LHC needs, but it provides a pathway for our community to explore new applications and technologies."

Internet2 members in the science and engineering communities are using high-performance networking for interactive collaboration; distributed data storage and data mining; large-scale, multi-site computation; real-time access to remote resources; dynamic data visualization; and shared virtual reality. The science and engineering communities are also actively engaged in Internet2's middleware and network performance initiatives, among others.

## NORRIS HIGH SCHOOL GRADUATES GET SCHOLARSHIP HELP

**G**raduates of Norris High School have additional help in going to college because of a new endowed student scholarship provided by Robert and Marilyn McDowell of Roca with a gift to the University of Nebraska Foundation.

"I've been thinking about doing this for several years," McDowell said. "I want to give some Nebraska kid a chance to get ahead."

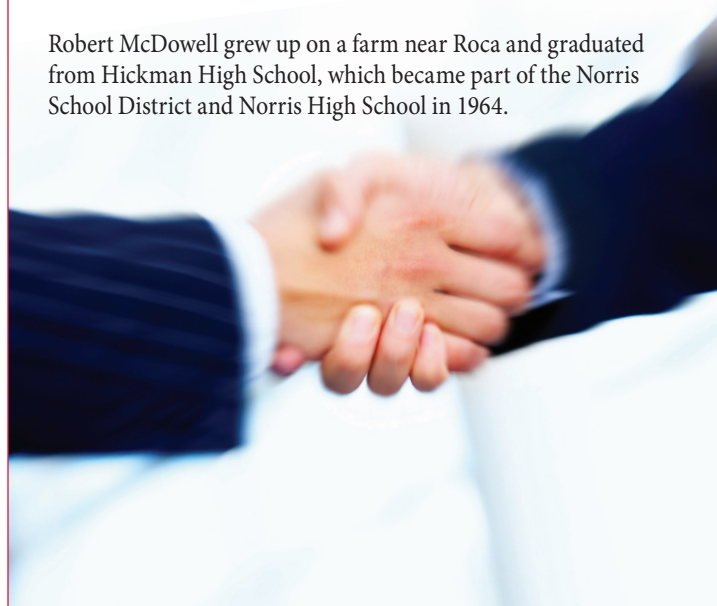
Income from the Robert N. and Marilyn F. McDowell Scholarship Fund will be used to provide one or more scholarships annually to graduates of Norris High School majoring in engineering at the University of Nebraska-Lincoln (UNL).

"We are pleased to be able to offer scholarships to outstanding area students interested in pursuing a career in the engineering field," said David Allen, dean of the College of Engineering. "The McDowells' generosity is truly appreciated, as their gift will enable students from Norris High School to join one of the nation's top comprehensive engineering programs."

The first scholarship will be awarded in the spring of 2008 by the UNL College of Engineering. First preference is given to students studying computer engineering or electrical engineering who have a composite ACT score of at least 27 and demonstrate financial need. The scholarship is renewable each year when the recipient maintains a cumulative GPA of 3.0 or above.

*"I want to give some  
Nebraska kid a chance  
to get ahead."*

Robert McDowell grew up on a farm near Roca and graduated from Hickman High School, which became part of the Norris School District and Norris High School in 1964.





## COLLEGE OF ENGINEERING PARTNERS WITH UNIVERSITY IN INDIA

The University of Nebraska-Lincoln College of Engineering signed a five-year agreement recently to offer a dual-degree program with Anna University in Chennai, India.

The agreement opens opportunities for faculty exchanges, study abroad programs for undergraduate and graduate students, curriculum development and research collaboration. UNL and AU also will be able to submit joint applications for research and educational grants, said David Allen, dean of UNL's College of Engineering.

Anna University specializes in engineering, technology and allied sciences. Doraiswamy Viswanathan, AU's vice chancellor, said the top students from his institution will be encouraged to attend graduate school at UNL.

*Anna University specializes in engineering, technology and allied sciences.*

Namas Chandra, the College of Engineering associate dean of research, said developing partnerships between U.S. and Indian universities can be complicated because of barriers to creating democracy in India. However, Chandra said, forming this relationship was easier because he is an alumnus of the University of Madras, one of the schools AU absorbed when it was founded in 1978.

Allen said international collaboration is essential to being able to compete in an increasingly global economy. Outsourcing to countries such as India and China has become a reality, he said, and students need to learn other languages and cultural skills to succeed in the workforce.

This is the college's second dual-degree program. Since March 2006, the college has offered a dual master's degree in engineering mechanics and materials engineering with the University of Rouen in France.

Growing the international education program is one of the College of Engineering's key priorities. Engineering students are encouraged to participate in at least one international experience before they graduate. UNL faculty lead short-term study abroad trips to France, China, Brazil, Greece and Spain, where students can earn up to four credit hours taking special courses only offered during those trips. Semester-long research programs and international internships also are available. The college hosts a number of exchange students from partner institutions as well.

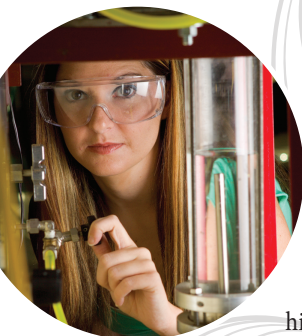
## DEFENSE FUNDING SPONSORS NEBRASKA ENGINEERING PROJECTS

In late 2007, President George W. Bush signed a defense spending bill that included \$31.3 million for Nebraska-related projects. University of Nebraska engineering programs are involved in several of the projects:

- **Bioceramic Bones for Battlefield Trauma (\$1.6 million)** – The university will use this funding to continue research and development of a material that can be used to construct bioceramic “bones” to treat orthopedic casualties suffered by U.S. soldiers. In addition to military uses, bioceramic bone has broad benefit to the greater public, who may experience severe bone damage due to osteoporosis or bone tumors.
- **High Energy Laser for Detection, Inspection and Non-destructive Testing (\$5 million)** – This funding will help develop and improve the performance of high-energy lasers and their ability to inspect the internal condition of jets and military hardware and detect cracks and defects.
- **Protection Against Improvised Explosive Devices (\$4 million)** – This funding will support research on new, advanced materials for use in producing lightweight vehicles and body armor that will be highly resistant to improvised explosive device (IED) blasts. Enhancing the safety of troops and vehicles is vital since IED blasts are the leading cause of injuries and deaths among American troops in Iraq and Afghanistan.



# WISE WOMEN DRAWS COLLEGE-BOUND GIRLS TO PKI



**W**omen can be wise at any age, and WISE Women knows the opportunities in science and engineering.

Eleven young women—high school juniors and seniors from across the state—learned about information science and engineering careers at the fourth Women in Information Science & Engineering (WISE) workshop, last October in Omaha. Each student was accompanied by a school sponsor.

The workshop, referred to as WISE Women, was directed by Ann Fruhling, an assistant professor with UNO's College of Information Science & Technology (IS&T) at The Peter Kiewit Institute, and assisted by Connie Jones, IS&T outreach coordinator.

"Our intent is to expose young women to career opportunities in information technology and engineering at a time when they are making important decisions about their future," Fruhling said. "We were very pleased with this year's participation."

WISE Women began Friday evening with a trip to the Henry Doorly Zoo, where

participants got a behind-the-scenes tour of the zoo's research facilities and heard a presentation by reproductive physiologist Dr. Naida Loskutoff.

Saturday was full of technology sessions at PKI, including lighting and acoustics, bioinformatics, animation and programming, project management and assembling of various computer components. During lunch, the students were joined by faculty members, followed by a career panel of women in information technology and engineering. In a prize drawing, six students each won a computer system.

Letters sent to high schools throughout Nebraska in early September asked school counselors to nominate students for WISE Women. Attendees were chosen from this list of nominees based on ACT scores, grades and overall performance in school.

"We know that women are seriously underrepresented in careers related to information technology and engineering," Fruhling said.



According to a recent report by the National Council for Research on Women, women earned only 18 percent of engineering degrees in 1996, and less than 10 percent of full professors in the sciences today are women.

Funding for WISE Women was provided by the Women's Fund of Greater Omaha, the Women's Fund Little Women grant, Nebraska EPSCoR, The Peter Kiewit Institute, and the College of IS&T.



by Hannah Peterson, '08

**O**ver winter break, around 40 Nebraska Engineering students, two staff members, and four faculty members skipped some snow and shared 10 days in Spain. Their adventure was a chance to see beyond the classroom and experience the evolution of science and technology by being immersed in a global environment.

They explored the cities of Madrid, Burgos, Avila, Segovia, Seville, Cordoba, Toledo, Bugos, Salamanca and Merida.

Kathy Glenn, research coordinator; Marilena Carvalho, international programs coordinator; and Dan Rainbow, a freshman industrial engineering major, spoke in greater detail about their out-of-country experience.

"The purpose of the trip was to expose students to travel around the world and to look at some very good examples of ancient engineering feats," said Rainbow. "We traveled to Madrid and various cities in the western half of Spain and looked at famous sites, cathedrals, and examples of ancient engineering."

The Roman aqueduct, located in the magnificent historic district of Segovia, was one example of ancient engineering and an architectural wonder that has been standing for nearly 2,000 years.





Remarkably well preserved, this impressive construction stretches about 2,950 feet long, and the section where the arches are divided into two levels is about 900 feet tall. It is made of rough-hewn, massive granite blocks that are stacked, amazingly, without mortar or clamps.

Other important monuments visited by the group included the Alcázar, a castle with building that started around the 11th century, and a 16th-century Gothic cathedral.

The trip to Spain was Glenn's first time on a study abroad trip. She accompanied David Allen, dean of the UNL College of Engineering, who has been to Spain four times. There were no guided tours on the trip. Both Allen and Carvalho led each tour and gave the students a well-rounded view related to studies in the college.

For Carvalho, this trip was one of many. "I have traveled abroad seven times just this past year," she explained.

Originally from Brazil, Carvalho is fluent in both Portuguese and English. She speaks some Spanish, Italian and French, and is currently learning Chinese. It is her job to attend each study abroad trip as a much-needed resource. Knowing several languages, she is one of the main translators for the many trips sponsored by the college.

"Most of the students who participated were freshmen," said Glenn. "The trip was designed with the intention of exciting students about studying abroad as well as their futures in engineering."

"There were a few upperclassmen who went on the trip, which was a great opportunity for the freshmen to interact with these students and use them as resources for their future questions pertaining to studies in their particular engineering field" said Glenn.

"The biggest difference was as I expected, acknowledging how old the structures were," Glenn added. "It is a good reminder of the past and the influences that have shaped the United States—so young compared to European civilizations."

Knowledge of the Spanish language was helpful for those studying abroad in Spain, but was not required. Classes were taught in English; however, students were required to prepare for their international trip by taking a six-week seminar that covered basic cultural and language skills as well as general travel information for that region. Each student earned three credit hours toward Global Experiences in Engineering (ENGR 490) at the end of the travel experience.

"I went on the trip because I speak some Spanish and have always wanted to go to Spain," said Rainbow. Admission requirements for freshmen entering the Engineering program include completion of two units (semesters) of foreign language before they enroll in the program.

It can be a great advantage to be bilingual in engineering, Carvalho noted, and studying abroad is a great way to put these skills to practice.

For many students, traveling overseas is the opportunity of a lifetime. Still, it is normal to experience some degree of culture shock when placed somewhere new where the majority of people speak a different language and have other customs, religions, ethnic cuisines, climate and daily routines. By learning about some of these differences prior to the trip, the students are better prepared to cope when they are put in these firsthand situations. However, there are always spur-of-the-moment surprises that teach students to branch out and take risks for themselves.

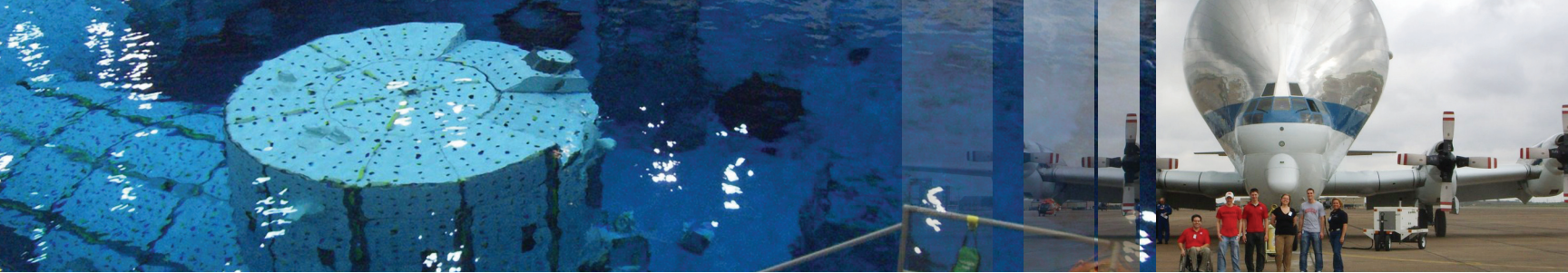
"This was my first time studying abroad, but I had traveled abroad before, so I sort of knew what to expect," said Rainbow. "The closest thing to culture shock was the fact that the Spanish eat very late meals (lunch at 2 p.m. and dinner at 8 p.m., at the earliest) and take a siesta (nap) every day during the afternoon."

"The trip has changed my life because I am even more interested in going back to Europe and I definitely want to go back to Spain two or three more times," Rainbow concluded. "The only thing I would recommend to a student taking this trip in the future is to just go on the trip and enjoy it!"

# ENGINEERING STUDENTS ENJOY SPAIN FIRSTHAND







While college students enjoyed the beaches of South Padre Island, Texas, this spring several Nebraska Engineering students were far above—flying with NASA missions over the Gulf of Mexico and having the time of their lives.



# SPRING BREAK

by Carole Wilbeck

**I**t was a first for Nebraska Engineering: in April 2008 a team of UNL students conducted research aboard high-altitude, reduced gravity NASA flights from Ellington Field in Houston.

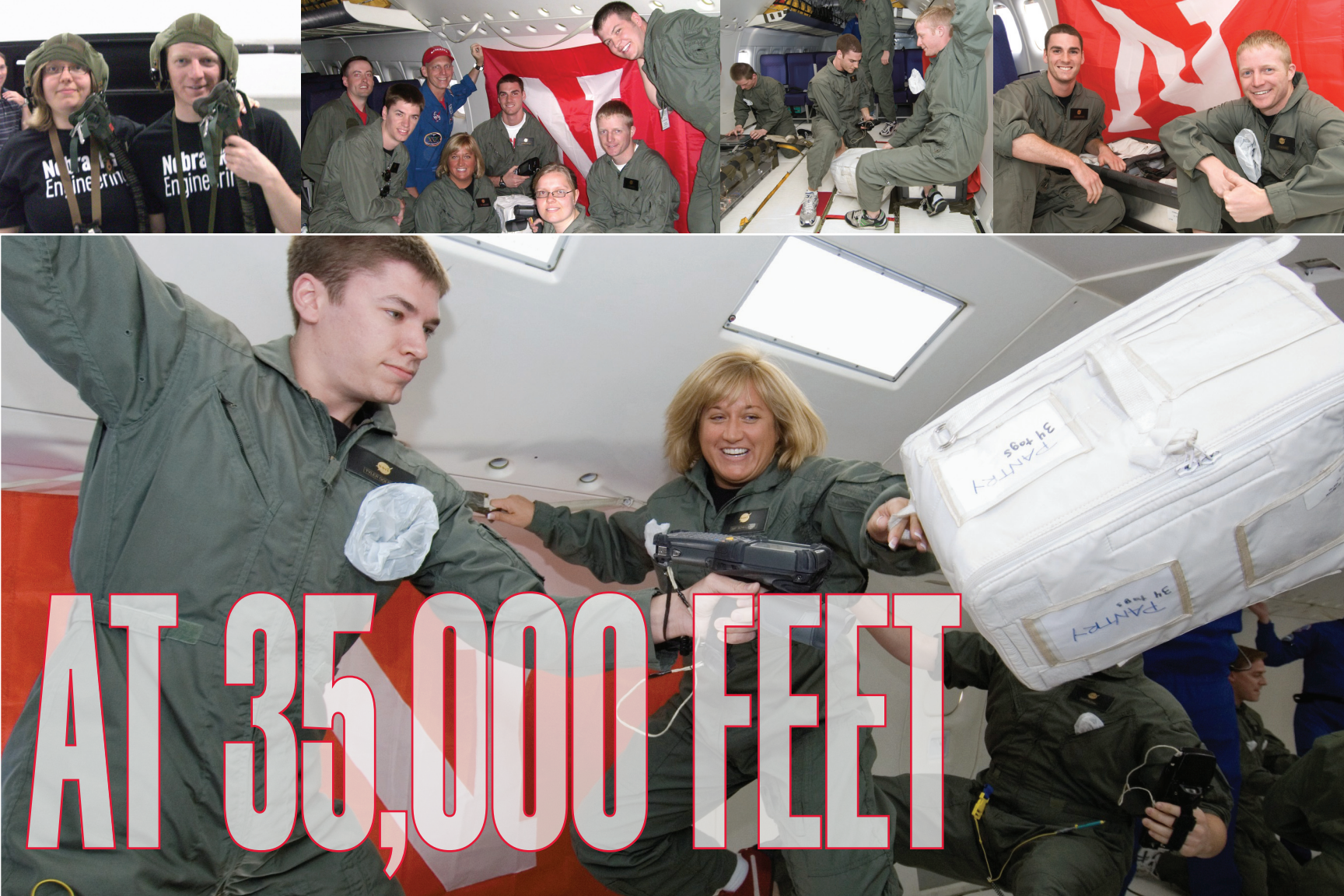
The UNL group—mostly seniors and representing electrical, chemical and mechanical engineering—included Stephen Brogan and Olga Dzenis, both of Lincoln; Lee Redden, Kearney; Dustin Dam, Sidney; Dana Valish, Columbus; and Tyler Goldberg of Alexandria, Minn.

Several well-regarded engineering schools participate each year with NASA research programs. Dam and Brogan both had co-op

experiences with NASA and gathered a UNL group to apply to NASA's "Microgravity University" in the fall of 2007. The UNL team was placed with a study of the "effects of 0G and 1/6G on Radio Frequency Identification (RFID) data accuracy."

All winter they prepared their test materials and procedures: RFID tags, reader and specially fitted container, as well as supply items to test, from toothpaste to t-shirts. With Erick Jones, assistant professor of Industrial and Management Systems Engineering and RFID expert, as adviser, they sought to optimize RFID tag scans on packaging of items used on space missions. Certain metal substances and curved surfaces (for example, tubes of shaving cream or toothpaste and batteries) presented challenges. Pretests were performed in a UNL lab with stationary scanning devices, and at NASA in an underwater environment that simulated reduced gravity.





Key elements were a scan gun—a \$5,000 Teklogics model that looks like a handheld retail device—and a “Flight Storage Fixture” (per NASA guidelines): a footlocker-size carrying case with bolts, buckles and foam-padded edges for security. Various bags and containers, and laptops with software to analyze the data, rounded out the team’s equipment.

In early April, the UNL team traveled to Houston. With another adviser, Lance Pérez, associate dean for academic affairs and graduate programs (and an expert in wireless communications, on which their RFID scans relied), they spent a week touring NASA facilities and meeting heroes like Clay Anderson, astronaut from Ashland, Neb. The mission flights—like “giant roller coaster” sessions—involved parabolic flight maneuvers

with 30 to 40 second intervals of “freefall” (microgravity) when the experiments were performed.

This research helps NASA streamline inventories of International Space Station (ISS) and space shuttle cargo, with efficiency a high priority. For follow-up, the UNL team is preparing a report of their findings and also sharing their experiences with younger students, to foster interest in science, mathematics and the space program.

The story of the UNL team’s amazing experience is best told firsthand, through the words and photos of the participants. Enjoy these excerpts and view more posts at:

[www.microgravity.unl.edu/blog.shtml](http://www.microgravity.unl.edu/blog.shtml)

# MICROGRAVITY BLOG>>>





## WINTER 2008

### PRESENTATION AT WEST POINT-BEEMER HIGH SCHOOL

I had the opportunity to talk about our Microgravity Program to classes at West Point-Beemer High School in West Point, NE—where I graduated in 2004.

I presented a PowerPoint to about 25 Pre-Calc students and about eight Calculus students. [I gave] an overview of the Microgravity program and a description of our project. Then I answered questions the students had about the program, our project, and what engineering is like on the collegiate level. I think the students and teachers enjoyed having me speak about Microgravity and they seemed genuinely interested in what we were doing. I also got the okay from the principal to do a follow-up presentation after our flight week in April.

Overall ... a "Great Success!"

—Stephen Brogan

## SPRING BREAK WEEK IN LINCOLN

While most college kids were hitting the beaches at South Padre Island or the slopes in Aspen, Dustin and I were working on finding foam.

We had an aluminum box made in the Metal Shop at UNL in Nebraska Hall. It is about 40"x10"x16" (I'm not sure of the exact dimensions, but it looks like a horse trough). Inside the box, there are two crossbars separating the 40" span into roughly three equal compartments inside the box. Each of the two end compartments are meant to hold a mock CTB (Cargo Transport Bag, a special 16"x9"x9" duffel bag) which will hold all the tagged items, and the middle compartment needed to be lined with foam so we could hold our reader and any other equipment we need to take up on the flight.

We spent a few days searching hardware stores and department stores but couldn't find what we needed. At each place we would say, "Hey, do you guys have some foam? Like the kind of stuff you see in movies where they open up a gun case and there is a foam cutout for the gun—that kind of foam?" Everyone enthusiastically said, "Oh yeah, the grayish-blackish kind of stuff, right?" Then they would inevitably follow that up with a heartbreaking, "No, sorry, we don't carry anything like that."

We ended up at a guitar store that had just what we needed: 2'x4' foam sheets that were 2" thick. At one of the hardware stores we found some pipe insulation for padding the corners and edges of the box. Back at the lab, I took a T-square and a utility knife to the guitar/gun foam, cutting it to fit our middle compartment, while Dustin padded every single edge and corner of that box.

Lee had handles and straps made so we can carry our box and strap things in, so no bags or foam or readers float away while we're inside the plane in zero-gravity. The box is ready, but doesn't yet have contents—which will change soon!

### TEST ITEMS

Lee and I went to Wal-Mart to pick up a "few" items used for testing--about 133 total!

That sounds like a lot, but I'm counting the Huggies wipes and rubber gloves individually, so the number of items we'll have to tag will be much less: probably around 60-70. For the most part, they were normal items like cotton t-shirts, toothbrushes, and AA batteries. In the end, we settled for a bottle of Suave instead of astronaut (no-rinse) shampoo.

All of this was piled on the desk in Dr. Pérez's lab, awaiting tags. Soon we'll pack and be on our way to Houston for the zero gravity flights.

—Stephen Brogan

## SUNDAY, APRIL 6

After a 17-hour road trip, we arrived in Houston and it's been going great. We had spent spring break in the lab, so this was a welcome change from the all-too-familiar surroundings of Nebraska Hall and the UNL campus. (I love the sights of Lincoln, but everyone needs an escape.)

Our team (Lee, Tyler, Dustin, Dr. Lance Pérez, Stephen, Dana and Olga) gathered at the program's Distinguished Alumni Dinner at Babin's along the Kemah Boardwalk.

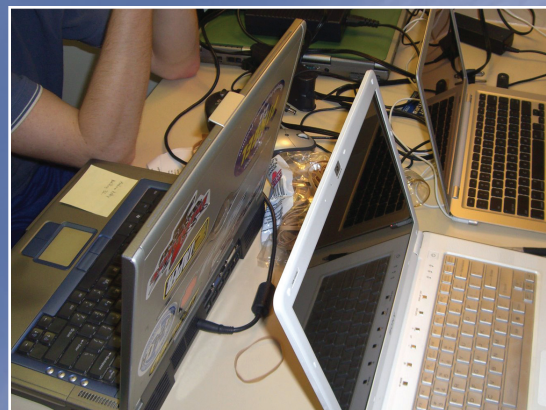
At Ellington Field, there was no time wasted getting acquainted with the equipment and procedures for our experiment. Thursday we spent a very productive day with our mentor, Amy Schellhase, and our adviser, Dr. Pérez. It felt amazing to be there, working on a project that would be flown in zero gravity.

The C-9 "Weightless Wonder" was our plane. We also saw the "Super Guppy" before it took off, which was an altogether unorthodox experience.

Friday was an interesting ride. We spent the morning learning about gas expansion and human physiological changes in de-pressurized environments. After a morning of seminars and a tour of the Neutral Buoyancy Lab facilities (with the 6.2 million gallon swimming pool for simulating zero gravity experiments and training), we visited the hyperbaric chamber.

Olga and Lee had a thrill ride in simulated atmospheric conditions of FL250 (flight level two five zero means 25,000 feet above sea level).

—Stephen Brogan



The "command center" at our hotel



## TUESDAY, APRIL 8

### MEETING CLAY ANDERSON

Today was scheduled as “flight day one” but, due to technical reasons, the flights and experiments were grounded and postponed to tomorrow.

In the meantime we were treated with an opportunity to meet Clayton C. Anderson, the Nebraska astronaut who spent a five-month tour of duty on board the International Space Station in 2007.

We showed Clay Anderson our Microgravity RFID Experiment on the C-9 aircraft. During take-off and landing, the experimenters and crew sat in the seats. The experiments were secured to the white floor of the plane.

—Olga Dzenis



Left to right: Dustin Dam, Amy Schellhase, Stephen Brogan, Lee Redden, Clay Anderson, Tyler Goldberg, Dana Valish and Olga Dzenis



Amy and Olga “hold up” the Weightless Wonder IV

## FLIGHT DAYS!

### FLIGHT 1: MICRO GRAVITY

Amy, Tyler and Dustin were the first to go up. Nebraska led the groups to fly. They looked serious but they were so excited!

To achieve reduced gravity, the C9 flew parabolas, with ascent and descent about 45 degrees to the Earth’s surface.

Everyone did their part to get the experiment done, and they came off the plane like they just had the best time of their lives.

### FLIGHT 2: MICRO GRAVITY

Lee and Stephen were all smiles, boarding the C9. During their flight, they worked hard using the handheld RFID scanner and spinning the Pantry CTB (crew transport bag).

### FLIGHT 3: LUNAR GRAVITY

I was an alternate for my team and, since my group flyers were clear to fly, I was not able to fly during our experiments due to lack of space on the C9. Don’t fret ... the program director arranged for me to assist another team with their experiment during flight 3. This flight was for experiments that needed Lunar Gravity (1/6 of the Earth’s). At the end of the experimental parabolas, the crew let us experience three zero-G (weightless) parabolas and one Martian (1/3 of the Earth’s) parabola.

Boarding the C9, I was very excited. As I experienced my first lunar gravity parabola, my hair suddenly had more volume! We got down to business quickly once we got used to lunar gravity. My responsibility during the experiment was to raise and drop an accelerometer. Towards the end of our parabolas, my group had some time to see how we were responding to the lunar gravity. I did splits in mid-air.

Getting off the C9, I was even more excited than when I boarded the plane. I had a fantastic, once-in-a-lifetime experience that day.

—Olga Dzenis

## RE-ENTERING THE ACADEMIC ATMOSPHERE

Back in Lincoln in late April, Dam and Brogan summarized the UNL experiment’s technical aspects: “The flight experiments seemed to go well. We had one glitch with some hardware but it was a backup item, so we were in good shape. The efficiency of the RFID scans appears to be what we expected: 70-80 percent accuracy on the ‘pantry’ items and 90-95 percent on the clothing items.” They added that in the next step for the research, Schellhase (the UNL team’s mentor during the flights, and employed by Berrios, a NASA contractor) aims to facilitate testing of the findings in the International Space Station.

But the impact went far beyond the data for the UNL group. In the personal realm, the team gained appreciation for the challenges NASA surmounts to advance technology and space exploration, and they are eager to help future UNL teams gain similar experience with NASA.

Above all, they are very proud of their experience—even the “epic” bouts of in-flight nausea (each student reacted differently; some were sickened by the reduced gravity, but a few had problems instead with 2G: the “double-gravity” during pullouts).

Back at UNL, the big challenge for the Microgravity Team was to catch up with their classes—which felt like a “2G” effort. Due to the flight timing, the UNL group missed a week of classes, but it was all worth it, Dam and Brogan reflected.

Dam was pleased that in his ELEC 464 course on digital communications, classes since their return have explained some of the scan challenges, which increased his understanding. He also reported a convenient catchphrase gained at NASA—when distracted in the blur of resuming academic life, he applies a term from flight preparation in the hyperbaric chamber: “I am still a bit hypoxic.”

Most important, looking back shows how their individual and team learning curves—as steep as the flights’ upward arcs—made them better engineers. They recall moments like Test Readiness Review, a 14-person preflight panel of NASA experts that peppered the students with difficult safety questions, but the well-prepared UNL team passed. Having soared over such hurdles, now the members can add “government certified researcher” to their résumés.

Pérez also admired the team’s achievements. He watched with pride as the UNL students ascended and returned, and concluded: “The participation of the UNL team in the 2008 NASA SEED Microgravity Program was a rewarding opportunity that provided our students with a unique experience in applied research and development.”

“NASA scientists, contractors and other students’ teams repeatedly commented on the professionalism, teamwork and diligence of the UNL team,” said Pérez. “The students gained valuable experience in the areas of experimental design, scientific protocol, data robustness and working with government and industry in a scientific enterprise.”

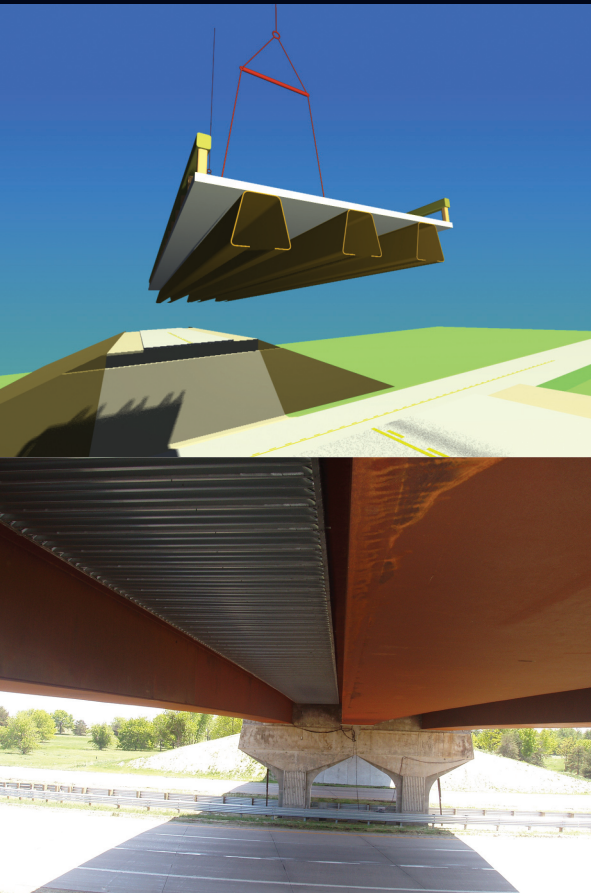


# UNL Experts Gain Funding to Build Better Bridges

by Ashley Washburn, '02







University of Nebraska-Lincoln engineering researchers aim to find ways to make the nation's bridges last longer and to design new ones that last a century or beyond with funding from a new \$2 million grant.

With support from this four-year grant from the National Academy of Sciences' Transportation Research Board, UNL bridge engineering experts will identify technologies and designs to renovate existing bridges and develop guidelines for designing longer-lasting new bridges. It's part of a \$150 million congressional initiative to improve the safety and performance of U.S. highways and bridges.

This research will focus on bridges with spans of 300 feet or less, which include 95 percent of the nation's bridges.

Aging bridges are a nationwide concern. The Interstate 35 bridge collapse in Minnesota in August 2007 raised public awareness of bridge conditions nationwide. Roughly 30 percent of U.S.

bridges are structurally or functionally deficient, said Atorod Azizinamini, the civil engineering professor who will lead this research. Azizinamini, an internationally known bridge researcher, is director of UNL's National Bridge Research Organization, a division of the UNL-based Nebraska Transportation Center.

While replacing all aging or deficient bridges would be ideal, the cost is prohibitive. Finding ways to extend the useful life of rehabilitated, replacement and new bridges using modern materials and construction techniques and technologies is more practical, Azizinamini said.

A highway bridge's typical lifespan is 75 years. This research aims to extend that service life to 100 years or more, Azizinamini said. Increasing the service life could reduce costs significantly. Researchers also will study improved methods for predicting a bridge's lifespan so governments can better plan for maintenance needs.

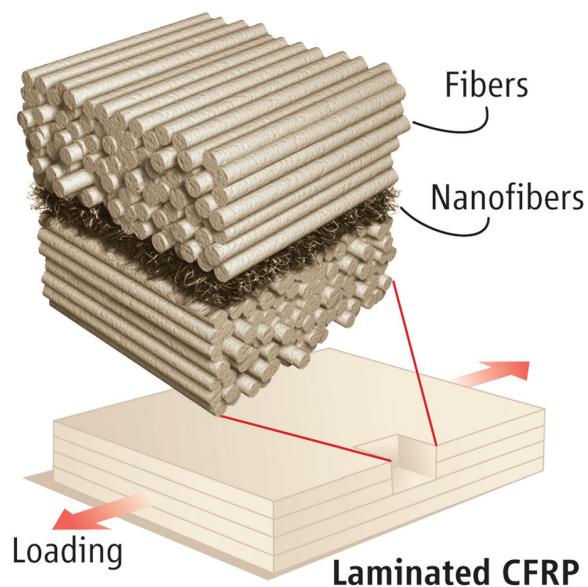
UNL civil engineering professors Maher Tadros and Andrzej Nowak, also leading bridge engineering experts, will collaborate with Azizinamini on this multidisciplinary project along with international consultants.

The project also has an educational component. Graduate students in civil engineering who assist with the research will have the opportunity to work with some of the world's top bridge designers and researchers, Azizinamini said. The UNL team will also work with international consultants and researchers from leading design and construction companies.

Azizinamini said UNL's longstanding collaboration with the Nebraska Department of Roads helped position the university to win this project. This strong partnership has led to innovative road and bridge designs statewide.



# Tiny Fibers, H



Creating a so-called “super nanocomposite” that can revolutionize a range of products is the dream of materials scientists. So far, that’s proved elusive. A University of Nebraska–Lincoln engineer shares that big dream but said he thinks using nanomaterials to strengthen small structures is more promising and cost-effective for the near-term.

Yuris Dzenis, R. Vernon McBroom Professor of Engineering Mechanics, discussed the potential for structural nanocomposites and his UNL-patented continuous nanofiber material in the Jan. 25, 2008 issue of *Science*.

Ten years ago, materials scientists predicted they could use carbon nanotubes to develop an advanced nanocomposite that is 10 times stronger than steel but a fraction of the weight. That hasn’t happened yet, Dzenis said.

Advanced laminated composites reinforced with high-performance fibers—including carbon, ceramic and polymer fibers—represent some of the best structural materials available today, Dzenis said. They are used in thousands of everyday products, including airplane wings, automotive components and even bridge retrofits.

Dzenis said UNL researchers are developing continuous nanofibers, a new class of nanomaterial that offers several advantages over the advanced composite reinforcements currently commercially available, including carbon nanotubes.

His unique product uses continuous, entangled nanofibers, which he compares to the hooks and loops of Velcro, to toughen conventional laminated composites. Used as reinforcement between the layers that comprise laminated composites, the tiny nanofibers stick together to create a strong bond that doesn’t easily chip, fracture or come apart.

“The technology is useful for almost any composite product or structure that requires mechanical integrity and durability,” said Dzenis.

Dzenis said he believes his research is the first to investigate adding small amounts of nanomaterials to strengthen conventional advanced composites to create a blended hybrid product.

“We are using nanomaterials as a secondary reinforcement but one that is very important to the overall structural performance of the materials,” he said.

Less is more when it comes to nano-reinforcement, Dzenis said. Adding only a tiny quantity of continuous nanofibers to a composite material greatly improves its strength and toughness. UNL research showed that these improvements don’t significantly increase the product’s weight or interfere with other composites’ properties.



# uge Potential



***“Nanofibers could strengthen composites used for aerospace and military structures, including airplane frames, body and vehicle armor, sporting goods, marine structures and automobiles.”***

That could make continuous nanofibers a cost-effective option for manufacturing large structures because only a small amount of nanomaterial is required and it can be easily combined with other composite materials already used in manufacturing. Nanofibers could strengthen composites used for aerospace and military structures, including airplane frames, body and

vehicle armor, sporting goods, marine structures and automobiles.

“It shows substantial improvements over what’s being used currently,” he said.

As the name suggests, the minute size of nanofibers is another advantage. They are 10 to 10,000 times smaller than conventional fibers and are more flexible. These characteristics make nanofibers ideal for bonding and strengthening fragile microstructures for which conventional reinforcement isn’t practical, such as thin films, coatings, membranes and larger fibers. Dzenis said this type of nano-reinforcement could be used for dental prostheses and other medical applications.

UNL has patented Dzenis’ continuous nanofiber composite and he continues to develop and refine it. The idea stemmed from his work on advanced aerospace composites and his collaborative research

with Darrell Reneker from the University of Akron. Xiangfa Wu, a UNL research assistant professor, and several graduate students also are involved.

This work is part of Dzenis’ broader research to create super nanocomposites. That’s long-term research but he is developing new design strategies he hopes will yield immediate advances to keep researchers, developers and entrepreneurs excited about developing them.

“In my opinion, a super nanocomposite is still possible,” he said. “It will just require unconventional thinking and approaches.”

*by Ashley Washburn, '02*





# NEW TRACTOR TEST

by Ashley Washburn, '02



**F**arm equipment has changed dramatically since the University of Nebraska–Lincoln Tractor Test Laboratory poured its first concrete track in 1956. That one replaced the original track made of compacted soil.

In the summer of 2007, the aging track was demolished and replaced with a new one that can better accommodate modern tractors, which are wider, heavier and faster than their predecessors.

The new track is made from a special concrete blend that is 12 percent stronger than the concrete used for airport runways, said Roger Hoy, professor of agricultural engineering and director of the lab.

The track also is wider and thicker than the original 22 feet wide, compared to 15, and nine inches thick instead of seven. The new track also features banked edges that will allow the lab to test tractors that travel at higher speeds.

These advancements will make it possible for the lab to test a wider variety of tractors. For example, Hoy said, his staff was able to test a Case IH tractor that would have been too wide and heavy to fit on the old track. In the past, the team would have tested that machine at the Lincoln Airport.

Construction on the track began shortly after Memorial Day and concluded in August. HWS Consulting Group, the Lincoln engineering firm that designed the original track, also designed the new one. Another Lincoln company, TCW Construction, built the new track.

Hoy said he hoped the track would last another 50 years.

“We tried to anticipate what needs we would have in the future,” he said.



UNL is the only university in the United States to have a tractor test lab, which was formed because a state senator purchased a tractor and was unhappy with its performance. Wilmo Crozier introduced a bill in the 1918 Legislature requiring any tractor sold in Nebraska to be tested to ensure it performed as the manufacturer claimed. Thus, the Tractor Test Lab opened in 1919.

Nebraska is still the only state to have such a law, Hoy said, but almost all models are evaluated at the lab anyway. The lab also is the official U.S. testing site for the Organization for Economic Cooperation and Development, which regulates tractor standards worldwide.

On average, the lab tests 25 tractors annually. The lab's operation and maintenance costs, including construction of the new track, are funded through manufacturers' fees.

Ed Heys of the Association of Equipment Manufacturers said the lab is one of the finest of its kind in the world, and added, “Their future looks bright—and busy.”



*“Wilmot Crozier introduced a bill in the 1918 Legislature requiring any tractor sold in Nebraska to be tested to ensure it performed as the manufacturer claimed.”*



# TRACK IMPRESSES





# UNL Online Programs Provide Flexibility for Working Engineers

by Anne Corrigan, UNL Extended Education and Outreach

Three years after earning her bachelor's degree in Mechanical Engineering from the University of Nebraska-Lincoln in 2003, Angel McMullen-Gunn decided she was ready to pursue further education.

She had plenty of options. As an engineer with Hamilton Sundstrand in York, Neb., McMullen-Gunn had the benefit of an employee scholar program that would allow her study time, as well as tuition and book reimbursement, for attending the college of her choice.

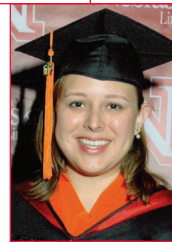
"I needed a flexible program because I work full-time and also have to travel a lot for work," explained McMullen-Gunn. After researching master's programs throughout the country, she discovered the perfect program was offered from her alma mater. She enrolled in UNL's online Master of Engineering, Concentration in Engineering Management program.

Familiarity with UNL's engineering faculty was a big draw for her, but the online courses were also an attractive aspect of the program. Although the online class format took some getting used to, McMullen-Gunn said this was the best part of the program.

"I could go to class in my pajamas on my couch. The professors were also very understanding of work schedules and were willing to work with you. They understand that you are a working professional just like they are."

In addition to providing flexibility, the online format also allowed McMullen-Gunn to work with students from around the world, a collaboration skill she's already put to good use in her current job.

"This was a new hurdle, because I had never worked with so many people to put together a presentation," she said. "Once we learned how to do that, it was a big focus of the program. By the end of the program, I was used to collaborating with people from different backgrounds. This has really helped in my job, as I work with people from many different areas of the world."



***"I could go to class in my pajamas on my couch. The professors were also very understanding of work schedules and were willing to work with you."***

***-Angel McMullen-Gunn  
B.S. ME '03, M.Eng. '07***

McMullen-Gunn said she was also pleased with UNL's program because of the unique combination of engineering and business classes.

"The core courses within the program, such as Total Quality Management and Risk Analysis, have helped me understand the quality side of manufacturing, a pretty important factor in aerospace engineering. The management and business courses helped me prepare capital projects and to understand my employees' responsibilities better and what they need to do their job and what I need to provide them to do so."

Putting that knowledge to work holds an unmatched value.

After failure on a test stand occurred at one of her company's plants, McMullen-Gunn was asked to address why the malfunction occurred.

"I was better prepared to respond to the situation and played a key role in preparing a white paper for the FAA (Federal Aviation Administration). I use what I learned [in the program] daily," she said.

McMullen-Gunn finished the master's program in just 18 months and graduated in August 2007. She believes the program has helped her better position herself with her future career goals, and noted, "You can't always see the benefits immediately, but these programs really help you expand what you can do."

## Students in UNL's Online Master of Engineering, Concentration in Engineering Management program receive:

- Instruction from research-based engineering theories
- Relevant class projects to apply to the workplace
- Business education and management preparation
- A flexible online course schedule

For more information on UNL's online Master of Engineering, Concentration in Engineering Management program, visit <http://extended.unl.edu/mengmgt/alumni>. The College of Engineering also offers an online certification program in Logistics, as well as non-credit options in Six Sigma, Black Belt and Green Belt methodologies.



# ACCOMPLISHMENTS >

## International Honors



### Allen Receives THH PIAN Medal

David Allen, dean of the College of Engineering, received the 2008 THH PIAN Medal from the International Conference on

Computational and Experimental Engineering & Sciences. The award, named for Theodore Pian, a professor at MIT for nearly 50 years, is in honor of Allen's distinguished contributions to computational mechanics of inelastic materials at various length scales. The medal was awarded at the 2008 conference in Honolulu in March 2008.

### Dean Earns Award for International Leadership

Nebraska Engineering's David Allen also was selected a winner of the 2008 Michael P. Malone International Leadership Award by the National Association of State Universities and Land Grant Colleges.

He has been invited to a ceremony at the Commission's Summer Meeting at Portsmouth, N.H. in July. Other winners are John Head of the University of Kansas and Robert Reinstein of Temple University.

Allen, who has served as dean since 2002, personally recruited the first class of engineering students to study abroad in the early 1990s while at Texas A&M University. At UNL, he has continued to engage the interest of a diverse and large segment of the student engineering population. During the past 12 years, he has directed more than 725 students in 25 study abroad programs in 19 countries. These programs were all directed toward the emerging area of engineering study abroad.

"Dean Allen has put UNL's College of Engineering on the map through offering study abroad opportunities across the world to all engineering students and successfully integrating these experiences within the tightly structured engineering curriculum," said Barbara Couture, senior vice chancellor for academic affairs. "Our engineering graduates are prepared to work in international companies and to help Nebraska and the nation compete in a global economy."

Allen has successfully competed for several international grants that help support his

international educational efforts, including three from the Fund for Improvement of Post-secondary Education, and one from the National Science Foundation. He has established successful research collaborations with engineering and applied science faculty in Sweden, Switzerland, France, Brazil, Canada and China. Allen has lived in foreign countries including Italy, France and Australia; during these visits, he taught a variety of engineering mechanics and history of engineering technology courses. His research expertise is in structural and solid mechanics, and he uses this background to interpret and explain the cultural and engineering significance of historical structures throughout the world.

The Malone Award, established in 2000, honors those who further international education in public higher education. The awards, dedicated to the memory of Michael P. Malone (1940-1999), were established to provide national recognition for a career of outstanding contributions that furthers international education at state and land-grant institutions.

"This year's Malone Award recipients have worked tirelessly to promote international education and development," said Peter McPherson, president of NASULGC. "Their focus on international problems speaks well of America's highly-regarded university system and the willingness of our scholars to promote higher education across the globe."

### TRB Best Paper Awarded to UNL Team

At the Annual Meeting of the Transportation Research Board (TRB) in Washington, D.C., in January, four researchers affiliated with the Midwest Roadside Safety Facility (MwRSF) were awarded the 2008 Best Paper Award for TRB Committee AFB20 - Roadside Safety Design. The paper was titled, "Midwest Guardrail System Adjacent to a 2:1 Slope." The authors included Karla Polivka, research associate engineer; Ronald Faller, research assistant professor; Dean Sicking, MwRSF director and professor of Civil Engineering; and Robert Bielenberg, research associate engineer.

### Adams Receives ASEE's DuPont Award

Stephanie Adams, associate dean for undergraduate education, received the American Society for Engineering Education (ASEE) 2008 DuPont Minorities in Engineering Award. The award recognizes Adams' enthusiastic and effective efforts in mentoring women and minorities in engineering, and her energetic advising of engineering organizations that serve underrepresented students. The honor was presented at the ASEE Annual Conference and Exposition in June in Pittsburgh.

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## Graduate Student Receives Student Paper Award

Electrical engineering graduate student Yaoxuan Han received second place in the 2007 International Congress on Applications of Lasers and Electro-Optics (ICALEO) Student Paper Award Contest. Yaoxuan Han presented "Laser-Assisted Diamond Deposition on Copper Substrated using Combustion-Flame Method (M801)." The conference is the largest annual event of the Laser Institute of America and included 566 participants. The first and third place awards were won by German and Russian teams.

## UNL Teams Place Among Top 10 in Regional Programming Contest

Three teams placed in the top 10 regionally at the Association for Computer Machinery International Collegiate Programming Contest held in November 2007 on UNL's city campus. Forty-five teams (featuring three students each) from a five-state region participated in the "Battle of the Brains" contest, which consisted of a five-hour programming exercise.

At this regional contest, UNL teams placed second, third, sixth, 14th and 30th. First place went to a team from Iowa State University, which solved seven problems in 1,222 minutes. The all-senior UNL "Go Big Red!" team finished seven problems in 1,349 minutes. The fourth place sophomore UNL "Incendiary Pigs" team solved six problems in 1,112 minutes.

This contest was one of 16 sites across five states and two Canadian provinces. For the entire region, UNL placed fourth, sixth, 15th, 29th, 35th and 89th out of 210 participating teams.

## Dwyer Named an ACM Distinguished Scientist

Matthew Dwyer, professor of computer science and engineering, has been recognized by the Association for Computing Machinery (ACM) as a Distinguished Scientist. He was one of 20 members recognized by ACM in 2007, which considers the practical and theoretical contributions of its members in computing and information technology.

"Their computing innovations address problems in virtually every industry and make possible advances in communications, health care, finance, entertainment, environmental control, computer security, and many other real-life applications,"

said ACM President Stuart Feldman. "We are proud to recognize these dedicated men and women and to raise their profile in the computing community."

## Martinez Real Gains Youth Leadership Award

The University of Nebraska Omaha's Women of Color Honorees for 2008 included sophomore construction engineering major Anayeli Martinez Real, who received the Youth Leadership Award. Her nomination describes Martinez Real as an "academic trailblazer": the youngest daughter of immigrant parents and the first of her siblings to attend college. She is a role model to other youth of color, especially in the Latino community, and for young women of color who may not have otherwise considered a career in construction engineering. She is recognized for being active in the UNO and greater Omaha community; she earned a Kiewit Scholarship, has been selected for a Kiewit internship, and serves as vice president of the UNO Student Chapter of the Associated General Contractors of America.

## NASA EPSCoR Grant Promotes Collaborative Research on Satellite Contaminant Materials

Working collaboratively is a powerful approach, as evidenced in a \$750,000 research grant to NASA's Nebraska EPSCoR (Experimental Program to Stimulate Competitive Research).

The funded project, to study satellite contaminant materials, includes principal investigator Daniel Thompson and Ned Ianno, both with the UNL electrical engineering department. They are joined by Scott Darveau and Christopher Exstrom from the chemistry department at the University of Nebraska at Kearney (UNK).

They will explore how ultraviolet light helps generate a thin layer of substance on a satellite's exterior, affecting the satellite's thermal controls, Thompson explains.

This team's work not only spans electrical engineering and chemistry faculty at multiple NU campuses, but also connects with NASA's Goddard and Glenn space centers. Tools for the research include Raman spectroscopy and an in-situ ellipsometer, produced by the J.A. Woollam Company, Inc., a Lincoln business with roots in the UNL electrical engineering department.



## Carvalho Earns UNL Parental Recognition

Opening the minds and hearts of students to foreign travel is all in a day's work for Marilena Carvalho, the College of Engineering's international

programs coordinator—but the results can create memorable life experiences. Carvalho received a UNL Parents' Association certificate for having made a significant contribution to the lives of UNL students. She was nominated by Carissa Gengenbach, a senior CHME-ENG major, who was inspired by Carvalho to participate in the France and Brazil programs following her sophomore and junior years. Gengenbach wrote that Carvalho is "always pushing students to expand their horizons, and she is always willing to help them find a way to go on one of the trips, often going to great lengths to do so."

## Dream Team Favors Big Red Engineers

Nebraska Advanced Manufacturing Coalition (NAMC) announced its 2007 Nebraska Career Dream Team in November, honoring 12 young professionals with several from UNL College of Engineering, including:

- Max Porter, B.S. AGEN '07, a design engineer with Behlen Manufacturing Co.
- Chad Essink, a December 2007 graduate with a B.S. in mechanical engineering, and now an intern with Square D/Schneider Electric.

The honorees lunched with Governor Dave Heineman at the governor's residence. "You represent our best and brightest," Heineman said. "It's important that you share your message about the great opportunities in Nebraska." The Dream Team members were also featured during Husker football pregame interviews on the Husker Sports Network.

The Career Dream Team members represent young adults who have had successful pathways to manufacturing and related careers. All were nominated by their companies as examples of talented individuals with outstanding education and skills for today's high-tech careers. Their presence promotes the NAMC's participation in the *Dream It. Do It.* campaign, highlighting skilled workforce opportunities in Nebraska.



## Archaeology Group Digs UNL Engineers' Presentation

A poster presentation featuring the reconstruction of an ancient Roman Temple in Turkey was awarded a second-place prize from the Archaeology Institute of America Conference in January. The twist? It was awarded to a team from the College of Engineering.

Travis Schafer, a graduate student in the Architectural Engineering program at the college's Omaha campus in The Peter Kiewit Institute (PKI), presented the findings of a team of faculty and students from UNL and Clark University. Their work is restoring a Roman temple from the third century C.E. in the ancient city of Antiocheia ad Kragos.

This interdisciplinary project is led by UNL architectural engineering assistant professor Ece Erdogmus, who specializes in mason restructures; Michael Hoff, professor of art history; and Rhys Townsend, associate professor of art history at Clark University, Worcester, Mass. Work began in 2005, when the ruins consisted of a "heap of collapsed marble blocks," Erdogmus explained. Each year, a group of UNL students joins the field work team, including 2007 architectural engineering students Schafer and Mary Naughtin, and UNL art history students Emma Clute and Shana O'Connell.

Three-year funding for the project has been provided by the National Science Foundation and Harvard Loeb Classical Library Foundations, as well as through financial support from UNL. Funds continue to be raised to complete the project.

## Li's Research Enhances Buildings' Systems

A project to develop low-cost plug and play automated monitoring, diagnostics and optimal controls technologies by Haorong Li, assistant professor of architectural engineering, has been awarded \$201,744 from private industrial sponsors.

Retailers are interested in HVAC (heating, ventilating and air conditioning), refrigeration, lighting and electrical system improvements that stem excessive maintenance and unnecessary costs. Li's work will utilize an automated fault detection and diagnosis (AFDD) laboratory, including two environment chambers, at the Peter Kiewit Institute (PKI); this laboratory is the biggest of only a few such labs in the U.S. academic setting. Testing and evaluation will take place in the lab and at field sites, including 18 Target stores.

Earlier this year, Li's project to develop automated FDD technology for commercial building centrifugal chillers was awarded \$152,220 from the American Society of Heating, Refrigerating and Air-Conditioning Engineers.

## Faculty Add Further Honors

- Henk Viljoen, Willa Cather and Charles Bessey Professor of Chemical and Biomolecular Engineering, has received the Commemorative Research Medal from the University of Pretoria, South Africa. Viljoen earned his three degrees from UP, which is celebrating its 100th anniversary this year.
- Yongfeng Lu, professor of electrical engineering, has been elected to the Fellows of the SPIE, an international society advancing an interdisciplinary approach to the science and application of light. Lu, who is also a Distinguished Scholar at the university, was recognized for his achievements in nanoscale laser materials processing. He is regarded for his work on laser surface cleaning, pulsed laser deposition, real-time monitoring of laser interactions with materials, and nano-characterization using a laser-assisted scanning probe microscope.



## Goldwater Scholars Named

Sophomores Aaron Fluitt and Robert Woodward were awarded Barry M. Goldwater Scholarships for 2008-2009 from the Barry M. Goldwater Scholarship and Excellence in Education Foundation. Fluitt, a chemical engineering major, and Woodward, a computer science and engineering major, both plan careers in research. Goldwater Scholars are selected based on academic merit; this year 321 were awarded from a field of 1,035 mathematics, science and engineering students who were nominated by their colleges nationwide.

## Adams departing for VCU

Stephanie Adams has resigned as associate dean for undergraduate education at the College of Engineering, effective Aug. 15, 2008. She will join Virginia Commonwealth University's School of Engineering as associate dean for undergraduate education.

"Dr. Adams has been a dynamic force here," said Dean David Allen, who added: "I personally will miss her greatly. I hope you will join me in thanking her for her tireless efforts on behalf of the college."

The move brings Adams closer to home. "I'm looking forward to being near family and friends, and it will be exciting to help shape an engineering program that's relatively new," Adams explained. "I've enjoyed working with the students and colleagues at Nebraska Engineering and I wish you all continued success."

## In Memory

The namesake for The Durham School of Architectural Engineering and Construction, Charles Durham, died April 5, in Omaha at the age of 90. The third-generation civil engineer grew up in Ames, Iowa and graduated from Iowa State University. He joined Omaha's Henningson Engineering and was active in its growth, becoming president in 1950 when it was renamed Henningson, Durham & Richardson, Inc.

Under Durham's leadership, the company later known as HDR Inc., grew to 1,700 employees with locations throughout the world. The highly-regarded architecture, engineering and consulting (A/E/C) firm has specialized in public works projects including military facilities and hospitals.

After selling the company in 1983, Durham and his wife, Margre, focused on charitable giving that greatly benefits the region; they provided funding for the University of Nebraska Medical Center, the Durham Western Heritage Museum, and The Durham School, part of the UNL's College of Engineering.



## In Memory

**Clarence Foster Burd** died Sept. 28, 2007 at the age of 102. He graduated in 1927 with a B.S. in Civil Engineering from the University of Nebraska-Lincoln. He served in the U.S. Navy during World War II, with construction battalions (the SeaBees) in Washington, D.C.; Davisville, R.I.; and San Diego. He had been employed with the U.S. Bureau Of Reclamation as a civil engineer and retired after nearly 42 years of service. Survivors include son, Donald; daughter, Margaret; five grandchildren and 10 great-grandchildren.

## Former Faculty News

World War II separated **Lyle Young**, who later became dean and professor emeritus of the College of Engineering, from his bride while he served with the U.S. Army Air Corps in the South Pacific. Their marriage endured and now, 65 years later, their newlywed letters form the heart of a book, *Dearest Marguerite: Letters from a Soldier to the Wife He Left Behind*. Marguerite "Marge" Swenson Young compiled the excerpts with photos from the era and a strong sense of the important history they lived. The book, published by iUniverse, can be purchased at area or online bookstores (ISBN: 978-0595470709). This labor of love was one of the couple's many retirement activities in the Lincoln community; they participate in Osher Lifelong Learning Institute (OLLI) classes, play golf, and Lyle is also an artist who carves and paints birds.

Retired mechanical engineering professor **Don Johnson**'s article on "Corrosion Studies on the USS Arizona with Application to a Japanese Midget Submarine" appeared in the October 2007 issue of the *JOM*, published by The Minerals, Metals & Materials Society. It is available online and enhanced at [www.tms.org/pubs/journals/jom/0710/wilson-0710.html](http://www.tms.org/pubs/journals/jom/0710/wilson-0710.html).

**Richard "Dick" Kafonek**, former chair of the College of Engineering's Construction Management department in Lincoln, was recently honored with the Associated Schools of Construction (ASC) Lifetime Achievement Award for significant contributions to construction education. The ASC Board of Directors cited Kafonek's exceptional service to academia, teaching, and the construction industry, and noted this is only the fifth time the award has been presented in ASC's 44-year history.



Kafonek graduated from the University of Nebraska with a bachelor of science degree in civil engineering and holds a Master of Engineering degree from Texas A&M University. He is a registered Professional Engineer and a Fellow within the professional construction organization of the American Institute of Constructors. He served as an officer in the U.S. Army from 1955 to 1976 and led the UNL Construction Management program (now part of The Charles W. Durham School of Architectural Engineering and Construction) for 11 years.

While retired, Kafonek remains active in furthering construction education through the academic accrediting body of the American Council of Construction Education. He has been married 54 years and has four sons, one of whom is a graduate of Nebraska Engineering's Construction Management program.

## 1960s

**Daniel G. Cada**, B.S. EE '64, M.S. EE '72, Cambridge, Md., is retired from service with the U.S. government. He owns and operates a custom cabinet manufacturing company and a personal drink label company. He also enjoys sailing and spending time with his four grandchildren.

**Robert Lowe**, B.S. ME '67, Goode, Va., retired following 40 years of employment with Babcock & Wilcox/Framatome/AREVA, which supplies equipment and services for nuclear power plants. He resides in central Virginia near the Blue Ridge Mountains, and is enjoying golfing and the outdoors.

## 1970s

**Don Wilson**, B.S. AGEN '74, is a production engineer in the Special Projects Group for Chaparral, a small independent oil and gas company in Oklahoma. Although he studied agricultural engineering, his work history includes the fields of petroleum, civil, traffic and forensic engineering. Currently a "well doctor," he looks at the problems in oil and/or gas wells and how to maximize production. When a well is too old to be economical, he ensures that it is properly plugged and abandoned.

**Kathryn (Kit) Farrell-Poe**, B.S. AGEN '79, holds M.S. and Ph.D. degrees from Purdue University. She is currently an extension water quality specialist and professor of Agriculture and Biosystems Engineering at the University of Arizona-Tucson. Based at the Agricultural

Research Center in Yuma, she is also the current Southwest States and Pacific Islands Regional Water Quality Coordinator.

## 1980s

**Kem Ahlers**, B.S. '82 and M.S. '84, MSYM, works in the Building Construction Products Division at Caterpillar in Clayton, N.C. He is the Backhoe Loader New Product Introduction manager, responsible for developing new backhoe loader models, putting them into production, and bringing them to the market. He and his family live in Apex, N.C.

**Jeff Zvolanek**, B.S. IE '86, was the keynote speaker for Nebraska Engineering's E-Week 2008. His topic, "The American Reality," noted the imperative for the U.S. to stay competitive worldwide, and focused on how engineers are critical in this effort. His company, Industrial Maid LLC, continues to thrive in Cortland, Neb. He is also active on the College of Engineering's Executive Advisory Board.



**Darin Sigler**, B.S. MSYM '88, is employed as the plant manager in oilseed processing and commercial animal feed production with ADM Alliance Nutrition. The companies include Ag Processing, Central Soya, and Archer Daniels Midland. He is currently managing the plants in Grand Island and Cozad. He has also been a member of Kiwanis for the past eight years.

## 1990s

**S. Mark Haugland**, M.S. EE '91, moved to Houston after UNL and got his MBA in finance from University of Houston in 1996. He adds he is currently employed by Royal Dutch Shell and making extensive use of training in electromagnetics, advanced math and physics in his career. He appreciates the "very useful education" he has received and notes "no trouble competing with the PhDs from Ivy League schools or elsewhere."

**Bingguang Li**, Ph.D. IMSE '92, an assistant professor of supply chain management and quantitative methods at Harry F. Byrd Jr. School of Business at Shenandoah University in Virginia, received professional designations of Project Management Professional (PMP) from





Project Management Institute (PMI) and Certified Manager of Quality/Organizational Excellence (CMQ/OE) from The American Society for Quality (ASQ). Besides PMP and CMQ/OE, Li also holds the professional designations of C.P.M., CFPIM, CSCP, and FRM. He holds a Ph.D. in industrial and management systems engineering from UNL.

**Tony Kaufman**, B.S. BSEN '98, continues to find new challenges within 3M in Minnesota. He assumed the leadership position of Lean Six Sigma Black Belt in January. Tony is also involved in service as the United Way chairperson for his division (over 500 employees), and in the community with Relay for Life. Tony and his wife recently adopted their second child, Alita, from Guatemala.

**Chet Dawes**, B.S. ME '99, Lincoln, is Business Development manager for Lincoln Composites. He and his family, including wife, Lori, and a son, Mason (2), returned to Lincoln recently after eight years in Ann Arbor, Mich.

**Heather (Wilkinson) Geiger**, B.S. BSEN '99, is a busy mom of three children in Littleton, Colo. Her husband, Neil (B.S. ME '99), works for Lockheed Martin. They have started a business, Off the Record, to transfer vinyl LP's to CD.

**Eric Penne**, B.S. EE '99, is employed with Rockwell Collins in Cedar Rapids, Iowa. He works on Test Equipment Engineering for government systems, primarily military GPS products.

## 2000s

**Carissa (Paus) Swanwick**, B.S. CM '00, Lenexa, Kan., serves as strategic planning program manager for Waddell & Reed Financial Services. Her duties include developing and implementing short- and long-term strategies for the financial advisors division. She is also working on an MBA at the University of Kansas, with a double major in finance and strategic management.

**Adam Royal**, B.S., AGEN '00, is a performance engineer with John Deere. He is working in the Experimental Product Verification and Validation department for self-propelled sprayers in Ankeny, Iowa. He and his wife, Kelly, have two daughters.

**Michael Kimmel**, B.S. BSEN '01, Edina, Minn., is a senior design engineer at Medtronic, Inc. He earned a doctorate in biomedical engineering in December 2007 from the University of Minnesota.

**Sarah Anderson**, B.S., BSEN '02, finished her master's degree at the University of Florida and

is a water resources engineer intern with Jones Edmunds in Gainesville.

**Craig Hanson**, B.S., BSEN '02, was recently qualified as a naval nuclear engineer by Naval Reactors in Washington, D.C. He is a lieutenant serving aboard a nuclear submarine.

**Sheldon Lockhart**, B.S. EE '03, Omaha, is Engineer-Asset Performance/Management with Omaha Public Power District. He is currently working toward a MEng degree in Engineering Management.

**Jonathan Morse**, B.S. '03 and M.S., BSEN '06, continues to enjoy the challenges of life as a Ph.D. student studying Electrical Engineering and Computer Science at MIT, and anticipates doing so for the foreseeable future.

**Tony Dang**, B.S. EE '04 is Direct Marketing Lettershop Supervisor with World Marketing Atlanta. He lives in Smyrna, Ga.

**Adam Huttenmaier**, B.S. AGEN '05, Washington, Ill., is a machine power development engineer at Caterpillar, Inc. He works at the Peoria Proving Ground as a test engineer.

**Linjun Gong**, M.S. IE '06, Plymouth, Minn., is a quality engineer with Ameritek International. He is responsible for quality control and production inspection work, as well as helping develop prospective suppliers and qualifications.

**Jessica Graul**, B.S. BSEN '06, is an engineer-in-training with Parsons in Denver. She is working on remediation projects, many of which involve biological systems to clean up groundwater for the military.

**Isaiah LaRue**, B.S. AGEN '06, passed the Engineer-in-Training exam. He is working as an applications engineer for Smith and Loveless in Lenexa, Kan.

**Nicolaus McCready**, B.S. BSEN '06, is a graduate student at Iowa State University, researching biofuel co-products as performance modifiers in asphalt pavements. He is working with lignin produced from a wet-mill ethanol process, with future work studying bio-oil and cellulosic ethanol derivatives. This new research area has caught the attention of the asphalt and biofuel industries.

**Reggie Rector**, B.S. BSEN '06, is an applications engineer for National Instruments in Austin, Texas.

## Rathsam gains prestigious NSF international fellowship

Jonathan Rathsam, a graduate student in Architectural Engineering at The Peter Kiewit Institute, has been named one of approximately 35 postdoctoral fellows for 2008-09 with the National Science Foundation's International Research Fellowship Program.

"This is a very competitive grant achievement," said his adviser, Lily Wang, associate professor of architectural engineering.

According to the NSF Web site: "The objective of the International Research Fellowship Program (IRFP) is to introduce scientists and engineers in the early stages of their careers to international collaborative research opportunities, thereby furthering their research capacity and global perspective and forging long-term relationships with scientists, technologists and engineers abroad. These awards are available in any field of science and engineering research and education supported by NSF."

Rathsam will use the fellowship to work with Boaz Rafaely at Ben-Gurion University in Beer-Sheva, Israel, on a project titled: "In situ measurement of acoustical absorption using a spherical microphone array."

This will not be the first time Rathsam has traveled outside the U.S. to conduct research. During his doctoral studies at UNL, he has studied with the Acoustics Group at the Technical University of Denmark and with the Institute of Technical Acoustics at Germany's RWTH Aachen University.

Awards Rathsam has earned with UNL include a best student paper for his presentation, "Spatial coverage of reflector panels predicted with and without edge diffraction" at the November 2006 meeting of the Acoustical Society of America, and the 2005 Martin Hirschorn IAC prize from the Institute of Noise Control Engineering.

## Nebraska Engineering Alumni

We want to hear from you!

Enter your career and contact updates at  
<http://engineering.unl.edu/alumni/alumniUpdateForm.shtml>





Courtesy photo

# STEEL OR CONCRETE

**H**ow one chooses his or her career interests is always an intriguing question. For Jim Jirsa, '60 CIVE, of Austin, Texas, the choice actually was a question, posed to him as a new graduate student at the University of Illinois: "Steel or concrete?"

Jirsa didn't really have a preference concerning the engineering specialty, so his adviser marked "concrete," and the rest, as they say, is history. Jirsa is a professor of civil engineering at the University of Texas-Austin, where he is a well-known expert in earthquake engineering and reinforced concrete structures.

Among his many honors and achievements, Jirsa was one of four alumni invited back to UNL's city campus in November 2007 for Masters Week, organized by the Nebraska Alumni Association. He met with students, visited classes in Lincoln and Omaha, and attended a Masters banquet and the football game versus the University of Kansas.

While at UNL, Jirsa also received several other honors. He was named a Distinguished Alumnus of the Department of Civil Engineering, as well as a Chapter Honor Member of Chi Epsilon. As an

undergraduate student, he was a founding member of UNL's chapter of the national civil engineering honor society.

Jirsa's research centers on the performance of buildings and major structures under extreme conditions such as earthquakes or highly corrosive environments. There are 10 faculty involved in the research center, along with approximately 80 students working on projects. The facility is housed in a building that was actually an old magnesium factory located about seven miles from the main campus. The building has a large overhead crane that's ideal for structural testing.

He and his coworkers have completed large-scale testing of structures for the Texas Department of Transportation, as well as working with facilities in Japan and other international locations.

Throughout the years, numerous changes in materials for higher strength concrete and steel, along with more efficient construction procedures, have aided in the effort to create structures that withstand massive forces, Jirsa said.

Construction procedures have also become more efficient and faster, he noted. He works to provide new information to industry leaders concerning these procedures and the use of new materials.

Corrosion protection is another area in which they concentrate. While he notes that it is "difficult to duplicate corrosion as it occurs in the field," it is possible to do lab tests and then evaluate those solutions on different bridge structures.

In his 36th year at Texas, Jirsa is still active in the classroom as well, teaching both undergraduate and graduate courses. He served as chair of the department for five years, but said his research dwindled some and he missed the student interaction.

"I enjoy working with the students immensely," he said. "It's very satisfying to see 'the lights go on' when they learn something new, and exciting to see former students you worked with go on to great things in their careers."

As for Nebraska, he's quick to note that he was here before the days of Bob Devaney and the long-standing football dynasty, but does remember a satisfying win against Oklahoma his junior year.

*by J.S. Engebretson, M.A. '05*



# SCHORR CENTER TRANSFORMS CSE FACILITIES



by Carole Wilbeck

The UNL supercomputer known as Red has moved to a very appropriate new home: adjacent to Memorial Stadium. The other campus super computer, PrairieFire, joins it in a remodeled space that's a significant improvement over prior venues in the former Miller and Paine Building and Avery Hall. Moving in this past winter meant a different (but also very celebratory) kind of "tunnel walk"—with the machines, said Rich Sincovec, Henson Professor and Chair of Computer Science and Engineering.

Located under the stadium's south wing, the June and Paul Schorr III Center for Computer Science and Engineering was redesigned by Michael Penn with Sinclair Hille, architects. The work addressed the project's challenges with several energy efficient approaches:

- screen louvers outside the building allow for varying light levels, and interior sensors control lighting and temperature based on occupancy;
- substantial plumbing and power (formerly used by Husker football laundry) are repurposed to serve the computers' demanding cooling needs, with high-volume primary (campus chilled water) and backup (glycol) systems; and
- 18-inch elevated floors and perforated ceilings in the room housing the supercomputers aid cooling (high-capacity central ventilation also helps air flow around the computers, placed back to back).

From the Schorr Center's flexible cluster workspaces to the generous offices, it's all been "done right," added David Swanson, director of the Research Computing Facility and research assistant professor with Computer Science and Engineering. Most importantly, future hardware additions can be readily accommodated. Swanson noted that nearly 800 processing cores are now co-located in the Schorr Center—and that number that will triple in summer 2008. Yet even now, with a 10-gigabit link to Internet2, "the campus can provide, as an example, for performing arts the high-definition broadcasts that were simply not possible here two years ago."

Echoes of "the sea of Red" crowd noise resonate in the hum of the machine room, as the new (quieter) neighbors in the Schorr Center enjoy their upgraded surroundings. Excitement generated an open house preview in April, but watch for the center's official dedication this fall.

# 40

40 YEARS OF  
COMPUTING  
EXCELLENCE  
1968 - 2008

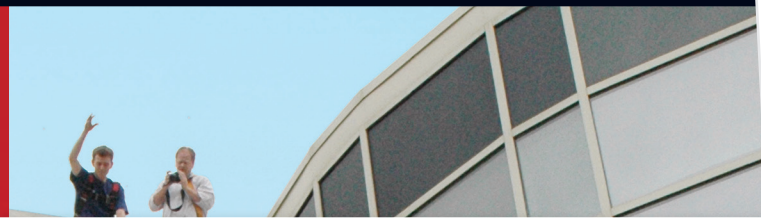
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June and Paul Schorr III  
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## All About the E

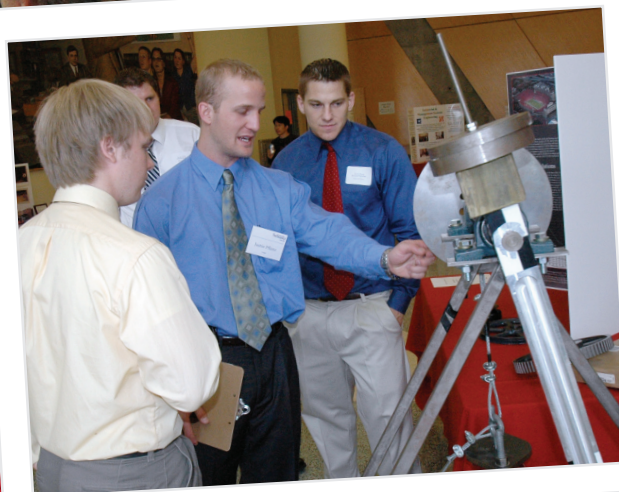
**E**-Week 2008 began with E-lympics and a pancake feed to rev up Nebraska Engineering students with energy to carry them through the week's activities and into finals that followed.

E-Week, in its 95th year as a celebration of Nebraska Engineering, also included such traditions as the "kick-off with a keg (of root beer)" and quiz bowl tournament. The week added some new twists, like a Halo Tournament for fans of the video game.

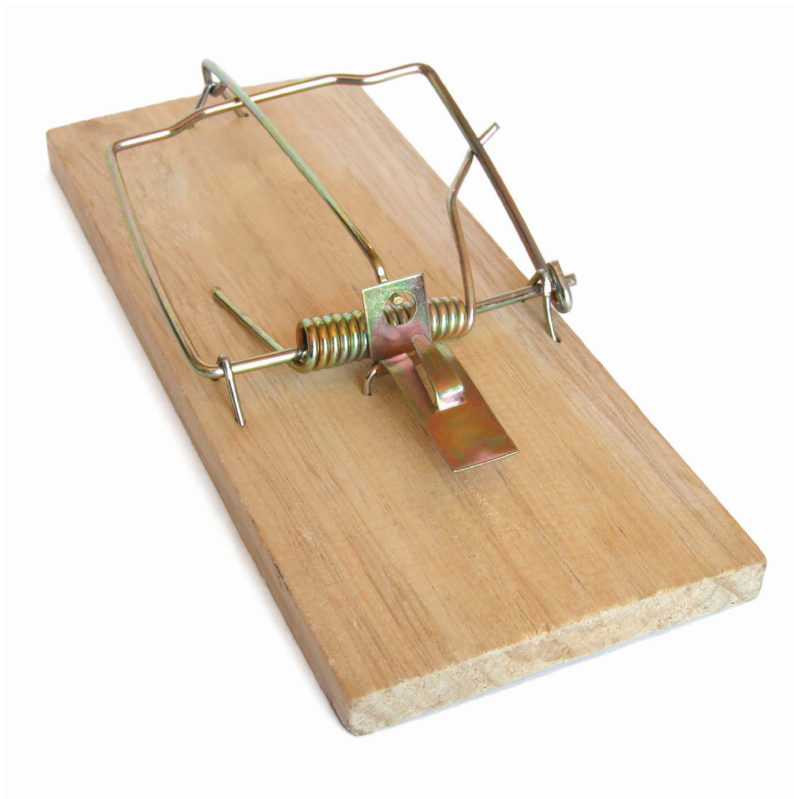
Friday's Open House concluded this year's festivities, with hundreds of high school students and community members viewing Nebraska Engineering presentations at the research fair and senior design competition. The guests caught the spirit and joined in to design and build ping-pong ball launchers and protective devices for an egg drop off the roof of Othmer Hall.



(Above) Stephanie Adams, associate dean for undergraduate education (center), led faculty flippers Jeff Shield, associate professor of Mechanical Engineering (left) and David Jones, professor of Biological Systems Engineering (right) at the Sunday night feast in the Abel Hall dining area, downstairs from the Engineering Learning Community.







## When a better one is built, an engineer will build it.

When a big change comes, an engineer will be involved. Engineers affect our lives every minute of every day. From the cars we drive and the roads we drive them on, to the buildings we work in and the devices we use inside them, somewhere, sometime an engineer had something to do with it.

As an alum of Nebraska Engineering, you can help the next generation of engineers on their road to success.

The University of Nebraska Foundation offers a number of funds to support students, faculty, programs and research for the College of Engineering. You can help by establishing an endowed fund in your name, or in the name of someone important to you.

As you well know, the engineering program is long and difficult. And engineering students can use all the help they can get.

**For more information**, contact Karen Moellering, director of development at 800-432-3216. Or e-mail Karen at [kmoellering@nufoundation.org](mailto:kmoellering@nufoundation.org)



## A Look Back at Commencement 2008

UNL's newest alumni turned their tassels at the Bob Devaney Sports Center on May 10; Mothers' Day was the next day, but one new graduate found an early way to express appreciation. Congratulations to the Class of 2008, and to those of you who completed your bachelor's, master's or doctoral degrees a few years (or decades) ago, let this image return you to your hard-earned moment.

Where are Nebraska Engineers headed for summer jobs and careers? Find a list of their job offers, academic plans and more at [www.engineering.unl.edu](http://www.engineering.unl.edu).



photo: Greg Nathan

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