

IN THIS ISSUE

WIND ENERGY
MANUFACTURING LAB HELPS
IOWA STATE ENGINEERS
IMPROVE WIND POWER PAGE 2

LESLIE POTTER A FINALIST
FOR IOWA WOMEN IN
INNOVATION AWARD PAGE 3

GUIPING HU DELVES INTO
THE BUSINESS OF BIOENERGY PAGE 4

RAPID MANUFACTURING
PROJECT AWARDED GRANT
FROM MUSCULOSKELETAL
TRANSPLANT FOUNDATION PAGE 5

FANGMANN NAMED 2012
UDALL SCHOLAR PAGE 6

GILBERT COMBINES
INTERESTS IN COGNITIVE
SCIENCE AND EMERGING
TECHNOLOGIES PAGE 8

Professor Sarah Ryan and ISU researchers receive \$1.7 million award to improve electricity markets

Three Iowa State University researchers are working to reduce costs and maintain reliability as more renewable energy is added to the nation's energy grid.

Sarah Ryan, professor of industrial and manufacturing systems engineering; Dionysios Aliprantis, assistant professor of electrical and computer engineering; and Leigh Tesfatsion, professor of economics, mathematics, and electrical and computer engineering, are developing a new approach for scheduling and pricing wholesale electric power. Their goal is to help electricity market managers meet energy demands in the face of new uncertainties arising from the growth of renewable resources such as wind and solar power.

Conventional generators have to be scheduled hours in advance because they need time to be brought on- or off-line and adjust their generation levels. As Ryan explains, today's scheduling methods use single number

forecasts for demand and renewable generation for each hour of the next day.

"This is like deciding whether to go on a picnic based on a weather forecast that only says, 'yes it will rain' or 'no it will not rain,'" she says.

"You can make a better decision, understanding the risks, if you know there's a 60% chance of rain. We are building information about the uncertainty of demand and renewable generation into optimization methods that can use that information."

The result will be better schedules that commit the right slow-start generators in advance and reduce reliance on more expensive fast-start generators to make up for forecast errors.



Ryan

Story continued on Page 3

Greetings from IMSE!

This has been an exciting year with many awards, growth and excitement about the future. In this newsletter, we highlight just some of the accomplishments of our students, faculty, staff and alumni, and several new and continued strengths and distinctions.

We have seen a sharp upturn in research productivity (~ \$10 million in recently granted awards and over \$6 million more under review). Collaboration has been at the heart of much good news with impacts on not only research, but on teaching, space, labs, and more. In this newsletter, you can read about Sarah Ryan's \$1.7 million award to improve electricity markets, Matt Frank's award of \$290,000 from the Musculoskeletal Transplant Foundation for rapid manufacturing methods to create custom bone implants, and much more!

Check us out on the web at www.imse.iastate.edu. Stay tuned for breaking news about the addition of the NSF Center for e-Design along with industry members and the 3 new professors scheduled to join the department in the fall.

We want to hear from you! Contact us about opportunities to participate/collaborate/contribute. Stay in touch and let us know... Are you interested in collaborating on solving pressing challenges facing our nation, near term or longer? Are you interested in supporting or providing experiences for the next generation of graduates? How can we help you? Let us know!

All the best,
Janis Terpenney,
Joseph Walkup Professor and Department Chair

IMSE News is published twice a year by the Industrial & Manufacturing Systems Department at Iowa State University. If you would like to be added to the mailing list, please contact Alex Rausch at arausch@iastate.edu.

Please visit the IMSE website for more information on the department.

www.imse.iastate.edu

Wind Energy Manufacturing Lab helps ISU engineers improve wind power

A laser in Iowa State University's Wind Energy Manufacturing Laboratory scanned layer after layer of the flexible fiberglass fabric used to make wind turbine blades.

A computer took the laser readings and calculated how dozens of the layers would fit and flow over the curves of a mold used to manufacture a blade. And if there was a wrinkle or wave in the fabric - any defect at all - the technology was designed to find it.

That's because the last thing you want is a defect in a 40-meter wind turbine blade when it's spinning in the wind.

"Waves in the fabric are bad because they can't take the load," said Vinay Dayal, an Iowa State associate professor of aerospace engineering.

"And if a blade can't take the load, bad things happen to the turbine," said John Jackman, an Iowa State associate professor of industrial and manufacturing systems engineering.

The two are working with Frank Peters and Matt Frank, associate professors of industrial and manufacturing systems engineering, to operate and develop Iowa State's Wind Energy Manufacturing Lab.

The lab has been open for about a year and was built as part of a three-year, \$6.3 million research project. The study is a joint effort of researchers from TPI Composites, a Scottsdale, Ariz.-based company that operates a turbine blade factory in Newton, and the U.S. Department of Energy's Sandia National Laboratories in Albuquerque, N.M. The researchers' goal is to develop new, low-cost manufacturing systems that could improve the productivity of turbine blade factories by as much as 35 percent.

The lab in Iowa State's Sweeney Hall provides researchers the facilities and equipment they need to:

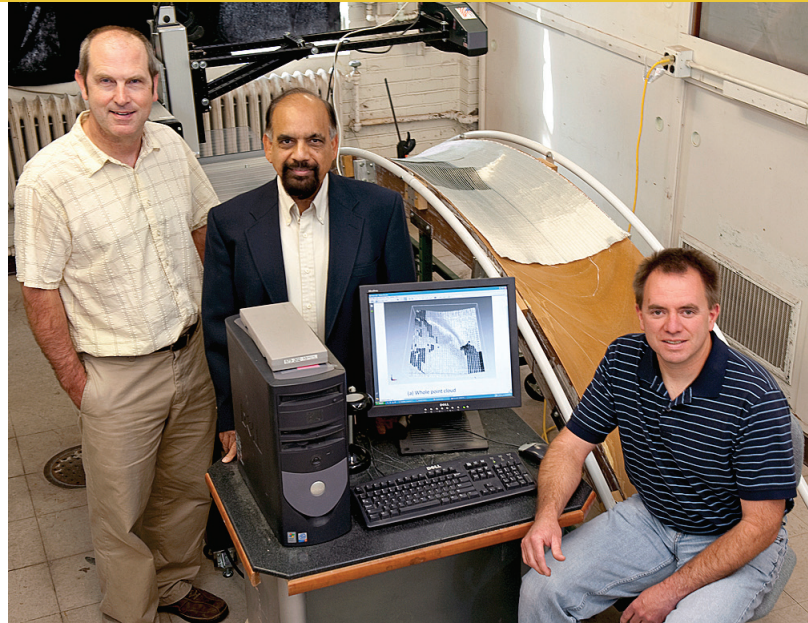
- study how lasers can analyze the fiberglass fabric that's used to manufacture turbine blades
- develop technology for the nondestructive evaluation of turbine blades
- analyze and improve wind blade edges
- make precise 3-D laser measurements of 40-meter wind turbine blades
- and develop new fabric manipulation techniques for automated blade construction.

Dayal said one example of the lab's capabilities is the ultrasound equipment that allows researchers to measure whether there's enough glue to hold the two halves of a turbine blade together - all without cutting into the blades.

The ultimate goal of the lab research is to make wind energy a more cost competitive energy option, Peters said. To make his point, he pulls out a U.S. Department of Energy bar graph that shows the 2010 cost of wind energy was 8.2 cents per kilowatt hour. The department's goal is to reduce the cost to 6 cents per kilowatt hour by 2020.

Peters said the lab can help meet that goal by developing better, more efficient manufacturing methods. The result could be bigger, longer-lasting wind turbine blades. And that could mean more power at less cost.

"Manufacturing in this industry is done largely by hand," Peters said. "Our goal is to find ways to automate the manufacturing."



ISU engineers, left to right, John Jackman, Vinay Dayal and Frank Peters use the Wind Energy Manufacturing Laboratory to find better ways to make components for wind turbines. Photo by Bob Elbert.

And that, said Dayal, also improves quality control in manufacturing plants.

Working with the four faculty researchers are Wade Johanns, Luke Schlangen, Huiyi Zhang and Siqi Zhu, graduate students in industrial and manufacturing systems engineering; and Sunil Chakrapani, a graduate student in aerospace engineering.

Funding for the lab has been provided by TPI, the U.S. Department of Energy and the Iowa Office of Energy Independence. Other lab partners include the Iowa Alliance for Wind Innovation and Novel Development and Iowa State's Center for Industrial Research and Service.

Researchers say the lab has already advanced their understanding of turbine blade manufacturing and is helping to develop automation technologies that could one day be used in manufacturing plants.

"In the early stages of the research there were a lot of investigations to understand all the problems we're addressing," Frank said. "But now we're at that phase where real intellectual property is coming out of the lab."

Contributed by News Service

Leslie Potter finalist for Iowa Women in Innovation Award

The Technology Association of Iowa (TAI) announced IMSE senior lecturer Leslie Potter as a finalist for the 2011 Pioneer Hi-Bred Iowa Women of Innovation Awards. The awards honor women leaders in science, technology and engineering, and Potter was nominated for Academic Innovation & Leadership in the post-secondary category.

Potter was nominated for her use of innovative teaching approaches when developing curriculum. She has integrated real-world applications of lean manufacturing and Kaizen principles within the classroom, providing students with a unique opportunity to apply their engineering lessons. She leads and encourages young people to pursue engineering or technical areas of study through participation in several campus groups.

"This year's winners will be chosen from among an elite group of extraordinary women who are making great strides in science and technology," said Leann Jacobson, TAI president. "These women are advancing Iowa's reputation in the world as a place where innovation is fostered and women's contributions matter."

Nominations were submitted for women from communities across the state. Finalists represent a range of backgrounds: teachers, researchers, technologists, vice-presidents, presidents, CIOs, and CEOs, among other titles. They include scholarship winners and providers. Many nominees are nationally and internationally recognized through various publications, panels, and media outlets. They all represent excellence in innovation and leadership.



Leslie Potter, left, receives her honor from Dawn Ainger, CEO of Genova Technologies, at the Women of Innovation awards dinner.

IMSE program ranked 20th nationally among public institutions

The Industrial & Manufacturing Systems Engineering Department at Iowa State ranks 27th nationally in the U.S. News & World Report's 2013 edition of America's Best Graduate Schools, and is ranked 20th among public institutions.

The ISU College of Engineering ranks No. 43 nationally, and among public institutions, maintained its rank of 25th overall.

"Iowa State's College of Engineering continues to build its reputation by providing quality education and research opportunities for our graduate students," said Gary Mirka, associate dean for undergraduate and graduate education. "We are honored by the high regard in which our peers hold all of our engineering programs."

Continued: Ryan receives \$1.7 million award

Continued from page 1

The Iowa State researchers are among the recipients of a new \$3 million award from the U.S. Department of Energy (Iowa State is the lead institution, and will receive \$1.7 million). Other participants include Sandia National Laboratories, University of California Davis, Alstom Inc., and the Independent System Operator of New England (ISO-NE). The intended users of the new formulation are seven U.S. wholesale electric power markets encompassing more than 60 percent of U.S. generation.

Ryan will lead the effort at Iowa State. A specialist in stochastic optimization, she will develop inputs and scheduling problem formulations to incorporate power grid uncertainties. Aliprantis and Tesfatsion will work with Ryan and other participants to develop and test the new stochastic formulation using an integrated retail and wholesale power system test bed they have constructed. Alstom will then conduct more intensive development and testing of the formulation, with the goal of applying it more broadly in the commercial market.

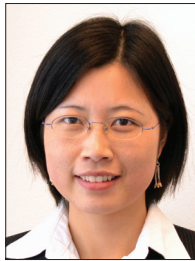
Ryan notes that current U.S. market management systems for electric power cannot effectively accommodate the multiple sources of uncertainty that arise from new resources on the nation's power grid, including new wind and solar power plants. Better means for handling these uncertainties would make the entire power system more efficient and reliable, resulting in lower costs for electric power, and an increased ability to maintain the balance of supply and demand essential for the physical operation of the power grid.

It could also lead to broader economic benefits. "Once we create an integrated power grid that makes the best use of alternative energy sources, I think you'll see jobs and industries grow as a result," she says.

Contributed by ECR

Guiping Hu delves into the business of bioenergy

A year into a new role as an assistant professor of industrial and manufacturing systems engineering, **Guiping Hu** enjoys the added opportunities to help students pursue their own studies, not to mention exploring an unexpected realm of interdisciplinary collaboration.



Hu

Hu, who was promoted from lecturer in January 2010, says her previous experiences teaching undergraduate courses and managing research projects helped ease the transition to assistant professor. Along with different classes to instruct, Hu appreciates building personal connections with her undergraduate and graduate students. "I like working and learning with the students. They continually impress me with their progress," she adds.

By training, Hu is an industrial engineer with a focus on operations research, supply chain management, and systems optimization. Working on the "theoretical side" of industrial engineering, she gathers data about the production processes of a business, ranging from transportation efficiency to crop yield fluctuations, and creates a comprehensive strategic and operational planning model that maximizes output and minimizes expense and negative environmental consequences.

Her system analyses are multi-scale studies, ranging from large-scale system optimization, such as where to place factories and what the best practice for the national energy infrastructure is, to small scale system analyses, concerning which type of equipment or pathway to use, and what the best plant layout should be.

Climate change concerns, high petroleum prices, and government support for renewable energy initiatives, along with Iowa State's commitment to green initiatives, have encouraged Hu to apply her mathematical and supply chain management research in the field of sustainability practices and bioenergy production systems in particular.

With this focus, she investigates the trade-offs between cost-effectiveness and efficiency and environmental sustainability. Her current projects involve assessing best practices to implement sustainability measures such as using alternatives to fossil fuels, particularly in the growing field of bioenergy, where renewable fuels are derived from biological sources called biomass.

With the help of experts in the multidisciplinary field of bioenergy, such as Robert Brown from the Bioeconomy Institute; David Laird and Matt Liebman from the agronomy department; Raj Raman and Kurt Rosentrater from agricultural and biosystems engineering; and Zhiyou Wen

from the food science and human nutrition department, Hu has discovered that determining the most beneficial and sustainable practice means looking beyond what may immediately seem best for the environment.

One way she balances her research is by developing optimization models that take economic evaluations, environmental assessment, and social impact into account.

"Equipment is expensive, and it takes energy to make energy," Hu says. "New technology is exciting, but it may not be the best option once various perspectives are considered."

She adds that strategic planning and operation decisions must be robust enough to counteract any inherent risks and uncertainty, such as yields that differ from year to year, changes in market demand and prices, and long-term environmental stability.

Applying industrial engineering to this field has Hu and her students considering the impact producing bioenergy can have on other forms of fuel already in use as well as facility placement for new bioenergy production plants. Hu explains facility location is particularly important because biomass converted to bioenergy is initially bulky and can be expensive to transport, so the distance from source to refinement facility must be reasonable for the practice to be sustainable.

Currently, Hu is working on a two-year local food project, mapping supply and demand for the U.S. Midwestern region. "If we were to supply our food locally, we could minimize the transportation distance of our diet, which means lowering monetary and resource expenditures," Hu says.

She is also working on a project that reintegrates crop and livestock systems. Historically, livestock and crops were raised together—corn and cows were cultivated on the same farm. It is only in recent decades that these have become separated, and we have yet to see if this separated format is sustainable. "We're looking at tradeoffs—using crops to feed cattle and taking fertilizer from cattle to use on the crops to create a closed-loop system that is environmentally friendly."

With more resources at her disposal in the form of collaboration with students and faculty, Hu sees her work in sustainable practices growing. "I plan to continue bioenergy systems analysis research, from individual reactors and single facility research to large scale facilities network and supply chain system design for bioenergy," Hu says.

Contributed by ECR

Rapid manufacturing project awarded grant from MTF

A collaborative project between Iowa State University and the University of Iowa has received a grant for \$290,000 from the Musculoskeletal Transplant Foundation (MTF).



Frank

Matt Frank, associate professor of industrial and manufacturing systems engineering at Iowa State University, and Thomas Brown, Richard and Janice Johnston Chair of Orthopaedic Biomechanics and professor of biomedical engineering at the University of Iowa, are working to move bone implant fabrication from a one-size-fits-all approach to a totally customizable, automated solution.

The project "Automated shape-matching of custom bone allograft implants," will develop rapid manufacturing methods to create custom bone implants from donated human bones. The implants would be developed for individuals who have suffered a traumatic injury to, or loss of, their bone, such as a soldier who encountered an improvised explosive device or a patient with bone cancer.

Frank is applying the same technology to make the bone implants that he uses to create unique parts for agricultural equipment or military systems that are no longer mass produced. To develop those parts, he develops and implements sets of computer algorithms that analyze a CAD model. The processing data is then sent to a rapid manufacturing machine, and the part is cut from stock material, such as bars of aluminum or steel.

"The challenge we face when applying this method to bone is that the material is amorphous. It's not the same through and through like a piece of steel," Frank explained. "Every bone is unique, and we are working with two completely distinct geometries, one from the patient's bone implant and one from the donated bone."

But the uniqueness of the material is part of why rapid manufacturing technology has such potential. For an implant to be made manually, a surgeon would have to cut, carve, and reshape the bone by hand—a process that takes time and is costly. The other option is to place a standard sized implant into a void that has been reshaped to fit the implant. Rapid manufacturing the implant would allow a more perfect match to be created more quickly and more accurately.

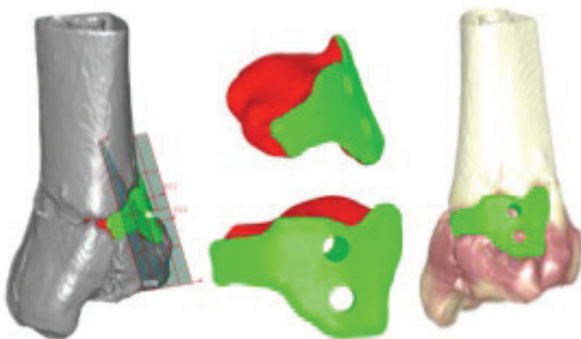
The researchers are currently developing harvesting algorithms that would take into account the different distributions of materials in a bone and the unique geometry of the desired implant. They also have to consider the best location from which to remove the implant so the materials of the implant line up correctly to the patient's bone.

Frank and Brown have support from MTF for three years, by which time the algorithms they create could be implemented at MTF's manufacturing sites, where they typically create standard, one-size-fits-all bone implants. "Once we have this down, unique, individual implants can be made at the touch of a button," Frank added.

Frank and Brown also received the James Russell Neff award from MTF, which is given to the top proposed project each year and reflects the excellence and promise of the project.

Contributed by ECR

A computer image of a bone implant.



Honors and awards

Engineering Student Council honors IMSE staff members

Iowa State's Engineering Student Council honored two IMSE staff members with awards at the Engineering Student Leadership Banquet on April 10. **Devna Popejoy-Sheriff**

was named the Academic Adviser of the Year and **Kevin Brownfield** was named Staff Member of the Year. These awards were decided by the student body of the College of Engineering. Popejoy-Sheriff and Brownfield received these awards for their continued great service and quality experience they are providing to the students.



Doug Gemmill receives Don Grant Faculty Award

The Don Grant Faculty Award for Excellence in Undergraduate Education is given to a faculty member in the department who is recognized by students as having a high impact on undergraduate education in the IMSE department. The 2012 recipient of the award is **Doug Gemmill**. The undergraduate industrial engineering honor society, Alpha Pi Mu, selects the winner of this award.

IMSE alum appointed head of global retail industry business unit of SAP

Lori Mitchell-Keller was appointed a senior vice president and head of the Global Retail Industry Business Unit of SAP. SAP is a German software corporation that makes enterprise software to manage business operations and customer relations. She will be working in Walldorf, Germany, at SAP headquarters. Mitchell-Keller received her bachelor's degree in industrial engineering from Iowa State.

Fangmann named 2012 Udall Scholar

Casey Fangmann's long-standing passion for environmental responsibility has guided him through much of his college career. That passion inspired him to develop a recycling program on campus and to major in industrial engineering with a focus on sustainability. It also helped him become a 2012 Udall Scholar.

The Udall Scholar program, established by the U.S. Congress in 1992, awards scholarships to undergraduate students committed to careers related to the environment or Native American issues. Fangmann was among 80 students from across the country to receive a \$5,000 award.

"I am extremely honored to receive such a prestigious national award," he said. "It recognizes the amount of time and energy I have devoted to something I want to do for a living, and it helps confirm that what I am doing is making a real difference and that I can truly make a career out of it."

While he has always known he wanted to explore sustainable processes, Fangmann spent some time determining the best major to support his interests. The Cedar Rapids native initially enrolled in computer engineering and later switched to electrical engineering before finally deciding industrial engineering was the right fit for his career goals.

He says concepts in industrial engineering, such as statistical analysis of processes, will prove useful in the future. "I want to help organizations in industrial settings become more environmentally responsible and sustainable," he said. "We need to begin shifting the culture of energy consumption among industry employees and start fostering a culture that strongly considers energy in the manufacturing process."

Fangmann is no stranger to making big changes in organizations. As a leader in the GreenHouse Group on campus, he spearheaded an effort to bring recycling to Iowa State's residence halls. The idea originally came to him after seeing large amounts of corrugated cardboard continually being thrown into dumpsters, a wasteful concept to someone from a town where recycling is an essential part of waste removal.

He started investigating why no recycling program existed on campus and discovered that the Resource Recovery Plant in Ames burns trash to create energy. "When I learned that 25 percent of trash doesn't get burned and is still sent to the landfill, I decided to start a recycling program for my community in Martin Hall," Fangmann said.

After managing the program during the fall semester, he was asked to help lead a Department of Residence (DoR) team trying to bring recycling to all students living on campus. Throughout the spring semester, the team developed the process and collected statistics necessary to prove the program could be successful.

The group ran a successful trial program during the last six weeks of the semester, leading the DoR to fund an official recycling program, purchase recycling containers, and establish a transportation contract with Waste Management to take the recycling. The program was implemented across all DoR living areas the following fall.

Surprised by the immediate accomplishments of the program, Fangmann says most initiatives of this size take years of research and testing before being widely adopted. "I am proud our university has made such a strong commitment to the Live Green! Initiative and has empowered students to pursue sustainability projects and research," he said.



Alpha Pi Mu has a successful year

Alpha Pi Mu, the Industrial Engineering Honor Society, aims to recognize top junior senior, and graduate industrial engineering students for their academic achievements, to increase professional development among members, and to promote networking among faculty, graduate, and undergraduate students.

Alpha Pi Mu hosts several activities every semester including volunteering in the Ames community, bowling in the MU, and eating dinner at the home of one of the industrial engineering professors. This year, the group also established a relationship with the University of Iowa chapter of Alpha Pi Mu, and they look forward to growing that relationship in future years.

Left: Alpha Pi Mu members visit the University of Iowa campus in Iowa City.

Fangmann says the incineration plant seems to be an adequate option for the community of Ames, but establishing recycling habits is necessary to help students learn to be more globally responsible, teaching lessons they can take with them after graduating from Iowa State.

With an effective recycling program up and running, the GreenHouse Group is bringing awareness to other areas of sustainability such as energy, composting, and water consumption. When he's not occupied with these activities, Fangmann gets involved in various sustainability conferences, even serving on behalf of Iowa State at several events.

He's a past president of the Green Umbrella, a student organization with liaisons from sustainability groups and departments on campus, that helps coordinate and promote events on campus and in Ames. Additionally, he is a community advisor in DoR, building a community of students who embrace sustainability and collectively get involved on campus.

As a Udall Scholar, Fangmann will attend a conference in August in Tucson, Arizona, with the other winners. The learning and networking event will connect students with similar interests from across the nation.

He will also add a sustainability minor to his course plans; something he says wouldn't have been possible without the scholarship.

After graduating in spring 2013, Fangmann will go to Rockwell Collins, assisting the organization's Global Sustainability Team to reduce the impact of energy on domestic and international facilities.

"I've built an amazing network of people at Iowa State who share my passion for sustainability," he said. "It's been great taking the traditional engineering knowledge and skills we learn in class and applying them in new, unique ways to sustainability projects. I look forward to continuing that at Rockwell Collins."

Contributed by ECR



Casey Fangmann.
Photo by Jim Heemstra

IMSE selects outstanding senior nominee for fall commencement student marshal

The IMSE Department nominated **Paige Ledger** for the student marshal honor at the Fall 2011 commencement ceremonies. Ledger has participated in a wide range of leadership activities, including taking part in the President's Leadership Class as a freshman. She was philanthropy chair of the Freshman Council, an active



Ledger

member of the Engineering Ambassador and Mentor Program, and an Industrial Engineering Student Ambassador, and served as social chair for the Industrial Engineering Honor Society and the sponsorship chair for the ISU Institute of Industrial Engineers organization. She was selected to participate in the Walt Disney World Industrial Engineering Co-op at Walt Disney World, where she spent three terms. She studied abroad at the University of Newcastle in Australia. After graduation, Ledger plans to work for Accenture as a management consultant.

Project Lead the Way helps incoming IMSE student

Project Lead the Way is a program aimed at giving students a head start on a career in engineering. Now, an incoming IMSE student in the program has been honored with an extraordinary opportunity to pursue his dreams.

Sioux City's **Joe Chavez**, senior from North High, has received a full ride scholarship to Iowa State, not just for one year, but if he keep his grades up, it would pay for his education all the way through his Doctorate.

Gilbert combines interests in cognitive science and emerging technologies

Stephen Gilbert's fascination with technology and cognitive science has led him to his current role in the Department of Industrial and Manufacturing Systems Engineering (IMSE), associate director of the Virtual Reality Applications Center (VRAC), and a member of Iowa State's Human Computer Interaction (HCI) research group.

Gilbert, assistant professor in IMSE, started his college career at Princeton University, where the blossoming computer era encouraged him to pursue a degree in operations research.

"I got started in engineering because the engineering building in my undergraduate college had just bought a new cluster of computers with 3D graphics. I was fascinated," Gilbert says. "I asked, 'What do I have to do to get to play with these computers? They responded, 'Become an engineer,' so that's what I did."

With his bachelor's degree in science education from Princeton, Gilbert went on to earn a doctorate in brain and cognitive science from the Massachusetts Institute of Technology while also teaching a variety of courses as a teaching assistant. Gilbert then spent time in the corporate realm, designing software and investigating ways in which the web could enable new forms of learning.

"I entered the corporate world for two reasons," says Gilbert. "One was because my postdoc with MIT's Center for Innovation in Product Development had exposed me to a variety of industries with research and development divisions, so I knew there were a lot of great opportunities out there for me. The other was because it was the middle of the dot-com boom and I wanted to be part of that."

After working for ten years, Gilbert made the move to Ames with his wife, Joanne Marshall, an assistant professor in Educational Leadership and Policy Studies. He ran his own software company at the University Research Park until 2006, when he began helping run the HCI program and doing research at VRAC.

HCI is an interdepartmental graduate program. Gilbert and three other faculty members in the program spend half their time performing HCI work and the remainder in their home departments.

"Part of the reason I like working with VRAC and its HCI program is that it's a very interdisciplinary group of researchers. You can easily find other people to work with who have common interests but different backgrounds," says Gilbert.

More recently, he decided to pursue a tenure position in IMSE as a part of the department's human factors group, still following his overarching interest in technology and the ways in which it can aid or distract from thinking and learning.

Stephen
Gilbert



Gilbert is studying intelligent tutoring systems that analyze a person's actions and provide feedback or instructions on improvement, similar to a human tutor. "My goals are to have coaching systems that will help people in using complex software and simulate training in virtual environments," he says.

While his research addresses issues related to training and education in science and education fields, he has also explored the dynamics of online education. According to Gilbert, one of the biggest challenges in the field today is personalized education, which also resonates with the 14 Grand Challenges of Engineering. The growing movement of personalized education teaches students through the use of two to three minute videos, online discussions and automated quizzes found at institutions like Khan Academy and Coursera. "Offering the just-in-time knowledge that people need will be an interesting challenge," says Gilbert.

He adds that it is important for humans to understand complex systems in the event that a component fails. "If you have too much automation and the human doesn't understand it, he or she can't fix things when they go wrong."

In addition to his research, Gilbert enjoys teaching courses, such as the Cognitive Psychology of Human Computer Interaction and a project-based HCI capstone course.

Gilbert also runs a National Science Foundations Research Experience for Undergraduates (REU) program. The Summer Program for Interdisciplinary Research and Education-Emerging Interface Technologies at Iowa State kicks off its seventh year this summer and has one of the highest numbers of applicants among REU programs nationally.

"The REU students really bond with one another and are involved in some great projects. We hope to entice them to come back for graduate school," says Gilbert. "I enjoy having so many ways to teach other people why they should be excited about human factors and emerging technologies. It's a real passion of mine."

Contributed by ECR

Meeks to retire after 42 years

Howard Meeks is retiring after 42 years with the IMSE Department. His most recent work in the department was with constraint management financial analysis, which involves showing why cost allocation methods such as ABC costing are not only unreliable, but mathematically incorrect. He will be missed dearly by the department and colleagues across the university.

Howard received his BS degree from Iowa State in 1960 in aeronautical engineering, before going on to Ohio State University to receive his MS in mathematics and his PhD in industrial engineering in 1970. He then returned to Iowa State and became an assistant professor in industrial engineering, and was promoted to associate professor in 1975. Howard has also been an academic associate of the A.Y. Goldratt Institute since 1999.

He has devoted himself to maintaining his high standards in teaching, research and student advising over the years, continually working on improving and developing new curriculum and student programs. He was instrumental in establishing a degree in operations research at the MS level jointly with the Department of Statistics. Howard was named Outstanding Academic Adviser in 1978 by the Student Alumni Association.

A dedicated scholar, Howard coauthored two books and numerous publications. He has a broad background in applications-oriented and computer-based operation research subjects. His main research interest area was applied operations research, focused on the applications or solutions necessary for success in manufacturing and service industries.



Left: As a parting gift from IMSE, Howard was given a framed photo of an aerial view of the ISU campus, showing just some of the many buildings in which Meeks has worked during his tenure on campus.

Howard has served on countless committees with the university, college and department, and is also a member of the honorary societies Alpha Pi Mu, Gamma Epsilon Sigma, Phi Kappa Phi and Sigma Xi.

The IMSE Department wishes Howard the best of luck in his future, and thanks him for his many years of dedicated service.

Below: Howard in his earlier days in IMSE.



Herrmann receives Alumni Medal



IMSE alum **Rudy Herrmann** became the 145th recipient of the Iowa State University Alumni Association Alumni Medal, the premier award for alumni given by the Alumni Association. This honor was established

in 1948 to recognize ISU alumni for long, loyal service to the university through alumni-related activities.

Herrmann has been a strong supporter of Iowa State University since his days as an industrial engineering student in the early 1970s. Since his graduation, Herrmann has been involved as a member of the Industrial and Manufacturing Systems Engineering Industrial Advisory Committee and has served as a past Chair of the Engineering College Industrial Advisory Council.

Herrmann will be honored at the university-wide awards ceremony October 26 during the 2012 ISU Homecoming Centennial Celebration.

New staff members join IMSE



Krista Briley

Administrative Specialist

Krista is an administrative specialist in IMSE and serves as assistant to the department chair, and assists with human resources, external relations, and event coordination for the department. She received her BS from Iowa State in journalism & mass communication. Krista comes to IMSE after working for 20 years as a secretary for the Materials Science & Engineering Department at Iowa State.



Alex Rausch

Communications Specialist

Alex creates communications materials for the department, including alumni newsletters and website content as a communications specialist for both IMSE and the Mechanical Engineering Department. She graduated from Iowa State in 2006 with a BS in journalism and mass communication and environmental studies. She has worked at the university in various departments since graduating, including the Ag. & Biosystems Engineering Department.



Kelsey Smyth

Academic Adviser

As an academic adviser, Kelsey assists students with developing their academic plans, answers questions to ISU policies/procedures for students, and coordinates the freshmen learning communities. She holds a bachelor's degree in marketing from Oklahoma State and a master's degree in College Student Personnel Services and Administration from the University of Central Arkansas. Prior to joining IMSE, Kelsey worked as an academic adviser at the University of Central Arkansas.

Senior design lab gets a functional makeover, thanks to business partners

Through donations made by IE441 business partners from the past two years, the senior design lab has been upgraded in terms of equipment, organization, and comfort. The divider between rooms 0016 and 0020 was opened, providing almost twice the amount of square footage in the room. New computers with double flat screen monitors were installed at each workstation. New tables, partitions, and chairs were installed which provide each IE441 team a group space, while at the same time allowing for other courses to use the lab as a classroom. An overhead projector and a flat screen TV will both be installed for academic use as well, providing students a place to dry-run their presentation slides. So far reaction to the capital improvements has been overwhelmingly positive. Senior design students for years to come will be grateful to IMSE's business partners who have so generously contributed to our program through IE441!

Capstone Design partners with manufacturing from around Iowa

During the Fall 2011-Spring 2012 year, Capstone Design has had the privilege of working with some of the most significant and advanced manufacturers in the state of Iowa. During the Fall 2011 semester, five different senior design teams worked with John Deere Des Moines Works in Ankeny, Iowa. During the Spring 2012 semester, ten different project teams were at two different companies and four different sites. Eight teams worked with John Deere Waterloo Works, including four teams at the Westfield Avenue Components facility and four teams at the Donald Street Tractor and Cab facility. Two teams worked with GMT, based in Waverly, Iowa, including one team in Waverly and one at the Nashua facility. Projects were (most appreciatively) all over the industrial engineering spectrum, with both strategic and economic impetuses. Our students were engaged in a significant amount of lean principle application, dealing with quality, capacity, productivity, safety, supply chain, parts presentation, layout, etc. They used Arena simulation, Factory Flow, Systematic Layout Planning, kaizen, FMEA, 5S, root cause analysis, cost/benefit analysis, decision analysis, etc., with methods used appropriately for each project. They honed their skill sets in many ways, including their abilities to define problems and engineer solutions, as well as their abilities to communicate effectively and professionally. Company response continues to be very positive, and IE441 looks forward to more great partnerships in the 2012-2013 academic year!

Student honors and achievements

Nan Gao received second place in the 2011 Production & Operations Management Society College of Sustainable Operations Ph.D. Proposal Award Competition. The Ph.D. Award Competition was started in 2010 to highlight the most promising Ph.D. research projects in the field of sustainable operations and provide visibility to the doctoral students carrying out these initiatives.

Concurrent MBA and IMSE student **Steven Harris** was part of an ISU team that won first place at the 4th Annual MBA Strategy Case Competition at the University of Illinois at Urbana-Champaign. Harris was also given the award for best speaker in the first round. The team was made up of four full-time MBA students from the College of Business at Iowa State.

Carl Kirpes finished second place at this year's IIE Regional Conference Paper Competitions held at North Dakota State University. Kirpes presented his paper "John Deere Des Moines Works 637 Disk Welding & Assembly Line Synchronization" to a panel of three judges on March 2nd of this year. He not only thoroughly impressed the judges, but all of the students in attendance at the Paper Competition as well.

Eleese McLaurin was named the McNair Scholar of the Year for her work on distinguishing the skill level of fencers using biomechanical analysis. The overall goal of the Ronald E. McNair Postbaccalaureate Achievement Program is to increase the number of under-represented, low-income, and first-generation students receiving their Ph.D. The program is dedicated to the high standards of achievement inspired by Dr. McNair's life.

Brandon Moeller was recognized as one of the outstanding new graduate students entering the College of Engineering as a recipient of the Cowell Fellowship. The fellowship is named for Cleo Cowell, a 1932 Engineering College graduate who had a long and distinguished career with John Deere.

Luke Schlagen was honored with the award for Best New Innovation or Technology at the inaugural Innovation Pitch Competition hosted by the Entrepreneurship and Innovation Learning Community. The competition was open to students from all disciplines on campus and drew 21 participants, ranging from freshmen through the graduate level. Four prizes were awarded, with two of them going to engineering students.

Schlagen and IMSE PhD student **Ashish Joshi** are looking to start a company that produces wind blades using a different process from the one used by all other blade manufacturers today. They came up with the idea for the business in Dr. Peters' IE 543X (Wind Energy Manufacturing) as a course project. They began considering the idea seriously and have found a process that they believe would lower the cost of wind blades by 25 percent. Winning the "Best New Technology/Innovation" section of the business pitch competition was their first step in pursuing the idea, and now they have entered the John Pappajohn New Venture Business Plan Competition where they are competing against business plans from across the state of Iowa.

Derrick Stanley, IMSE graduate student, received the National Society of Black Engineers (NSBE) 21st Century Trailblazers Award. Stanley is a systems engineer at Boeing and is also pursuing a graduate degree in mechanical engineering from Columbia University in New York City. The NSBE was established in 1971 to help improve the recruitment and retention of black engineering students. The award was given to Stanley for his contributions to the aerospace community. He was nominated by Boeing and received the award at the National Society of Black Engineers Aerospace Systems Conference in California.

Pan Xu was the first author on the paper "On Optimality of Clustering Through a Space Filling Curve," which was accepted to the Symposium on the Principles of Database Systems (PODS) this year. Xu was a significant contributor to the work, and brought a very keen mathematical insight into these problems. He had the key idea behind the lower bound that was at the heart of the paper. This paper would not be written without his contribution. Xu works with IMSE Assistant Professor **Lizhi Wang**.

Xiang Wu received an ISU Research Excellence Award. The award recognizes graduate students for outstanding research accomplishments as documented in their theses and dissertations. The intent of the program is to recognize "the best of the best" graduating students who have submitted theses and dissertations.

Leilei Zhang and **Siqi Zhu** have been named Harold and Shirley Reihman Scholars. The program was created to provide graduate students with research opportunities that will enhance their educational experience and the productivity of IMSE research programs. The scholarship is named for Harold Reihman, an engineering alum from the class of 1950, and his wife, Shirley. Harold retired as vice president of Ford Motor Company in 1991.

In Memoriam

Professor Emeritus Loran E. Mohr

December 22, 1929-
September 17, 2011

"Loran, as much as my parents, contributed to my successful education."

— David Kading, Manager of Strategic Planning & Marketing, Iowa Health System (BSIE 1982, MSIE 1985)

"Professor Mohr was my instructor for several industrial engineering courses in the mid-1970s. With his great breadth of knowledge, his true gift was simplifying complex topics. That straight forward, practical approach to our field was greatly appreciated by his students. He was a big influence on my success as a young process engineer."

— James Grabenbauer, Director, Process Improvement, Union Pacific Railroad (BSEOp 1979)

Loran E. Mohr graduated from the University of Northern Iowa with a degree in math and physical education. He enlisted in the U.S. Army and after his honorable discharge in 1954, returned to college. Loran graduated from Iowa State University in 1956 with a bachelor's degree in industrial engineering and went to work for Viking Pump Company in Cedar Falls, IA. In 1963, he returned to ISU where he earned a master's degree in industrial engineering and taught until his retirement in 1989. During his tenure at ISU he led the departmental cooperative education program, was the faculty sponsor for the student chapter of AIIE/IIE, and was also in charge of the industrial engineering senior design course.

Loran's professional career was an outstanding demonstration of a successful combination of teaching and working with industry and he had great respect from his colleagues in industry. His honesty, integrity, and passion for teaching also earned him the respect of the students he worked closely with in the program.

The Engineering Council named Professor Mohr Outstanding Engineering Professor in Engineering in 1983-4 and the College of Engineering named him Superior Engineering Teacher in 1984



Mohr

He was named Outstanding Academic Advisor in 1979 by the Student Alumni Association and was recognized for his commitment to the student chapter of AIIE in 1979 and to the student chapter of IIE in 1989. But perhaps most important to him, he was voted Student's Choice for Outstanding IE Professor in 1984-85, 1985-86, and 1988-89.

Professor Loran E. Mohr is greatly missed by his wife of 60 years, Thelma; their two sons, Jeff and Dan (both graduates of the Industrial Engineering department at Iowa State University), their families; his colleagues and friends.

IMSE thanks you!

Roseva Albertson
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