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IOWA STATE PART OF  
\$320 MILLION NATIONAL  
MANUFACTURING LAB

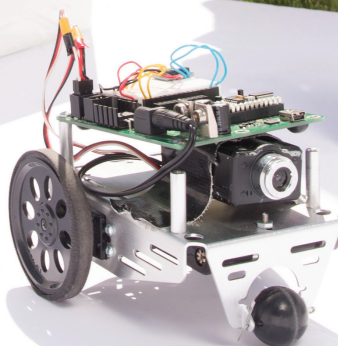
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# Greetings from IMSE!

Dear Alumni, Friends, and Colleagues,

It is my delight to welcome you to the 2014 fall newsletter – where you will learn about the many successes and the commitment of our students, faculty, staff, and alumni to serving and providing valuable contributions locally and nationally ... leading the future of industrial and manufacturing systems engineering ... and having fun! Some points of pride to report: we have more than tripled our research expenditures (productivity) in 3 years, including prestigious competitive funding won from the Department of Defense (DOD), the Department of Energy (DOE), the National Science Foundation (NSF), the Defense Advanced Research Projects Agency (DARPA), and from many industrial partners from around the nation. We have also seen growth in undergraduate enrollment from 270 in 2011 to now, more than 500 in 2014. Growth in graduate enrollments has also risen to more than 180 masters and doctoral students enrolled in IE, Systems Engineering and Engineering Management programs. Our undergraduate research assistantship (URA) program has experienced remarkable interest, growth and successes, with 40% of participating students continuing on to graduate studies in IMSE. We continue to experience tremendous success in preparing and retaining students (95% first-year student retention rate and 90.5% six-year retention rate). In 2014, 94% of students were employed at graduation, and 84% of our undergraduates had internships or coops (the highest rate in the college) by graduation. We have also seen a rise in women among students (undergraduate and graduate) to 31% and among faculty in IMSE, to now at 33%. In this newsletter, as in the past, several faculty, staff, students, and alumni have been nominated and received awards in the College, from the University, and nationally.

Collaboration with industry in research and teaching is very important and a key hallmark of the department. Several companies work closely with us each year, providing projects and opportunities for learning-in-context in the curriculum. Faculty and students are also engaged in industry-focused research projects, many being in the NSF Center for e-Design, a 7 university and 30+ industry member consortium. Major corporations in the aerospace, automotive, agricultural, information technology (IT), and medical device industries are members. Further, in this newsletter, you will learn more about how we were a key player in the Iowa State University's participation, as a Tier I partner, in the new Digital Manufacturing and Design Innovation Institute (DMDII) announced in February of 2014, funded at \$320 million (\$70 million from the Department of Defense and \$250 million from private partners).

It is with much pride that we share our stories and welcome your participation and ideas in our collective mission to contribute and lead the field forward together.

All the best,

Janis Terpenny

Joseph Walkup Professor and Department Chair



## Terpenny gives research overview presentation to Board of Regents

On September 10, 2014, IMSE Chair and Joseph Walkup Professor Janis Terpenny provided the Board of Regents with an overview of some important research that's taking place at Iowa State's campus.

One topic included the Center for e-Design, which Terpenny co-founded and currently directs. She discussed the center's goals to bring high-quality products to market at reduced costs and times through developing research, strategies, and tools, as well as to nurture and cultivate a new generation of engineers, scientists, and business leaders.

Terpenny also presented about the Digital Manufacturing and Design Innovation Institute, where she is a technical lead in the Advanced Manufacturing Enterprise area. The institute is a collaborative center designed to foster innovation and commercialize research between industry and engineering schools.

"I was honored to be invited to present at the Board of Regents meeting," said Terpenny. "I am delighted to share information and points of pride associated with the Center for e-Design, the DMDII and how we are having tremendous impact on the nation's ability to excel in its leadership in product innovation and advanced manufacturing."

Connor Jennings, a graduate student in industrial and manufacturing systems engineering, also presented at the Board of Regents meeting.

## On the cover

IMSE graduate student **Euijung Yang** (right) demonstrates the robot maze research project she is working on to another ISU student. Yang works with Associate Professor **Michael Dorneich**.

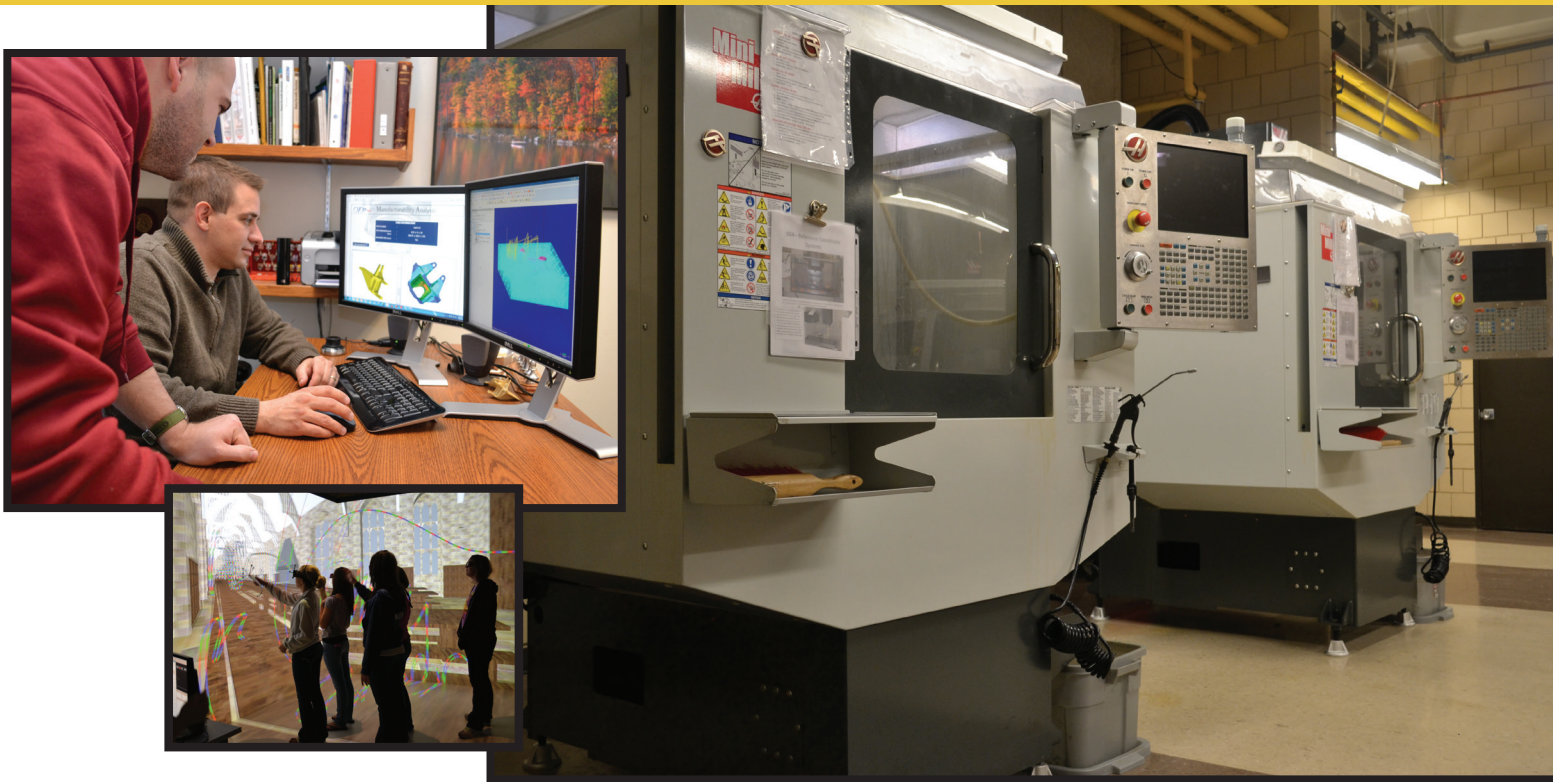
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## Iowa State part of \$320 million national manufacturing lab

Iowa State University is a top-tier partner in a new Digital Lab for Manufacturing to be based in Chicago with affiliated partners across the country.

President Barack Obama announced a \$70 million grant from the U.S. Department of Defense to support creation of the lab by UI LABS, a Chicago-based research and commercialization collaborative. In addition to the defense grant, industry, academic, government and community partners have pledged \$250 million for the lab, creating a \$320 million enterprise.

Iowa State will be a tier 1 partner of the Digital Lab and will conduct research through grants and projects awarded to Iowa State researchers.

"The Digital Lab for Manufacturing is expected to bring significant resources to Iowa State and greatly enable our research programs in these key areas of advanced manufacturing and the emerging economy," said Iowa State President Steven Leath.

The Digital Lab is designed to be the country's flagship research institute for digital manufacturing and design innovation. The idea is to apply computing and data analysis to improve manufacturing machines and factories. The lab will focus on three technical areas: advanced analysis, intelligent machining and advanced manufacturing enterprise.

As a top-tier partner in the Digital Lab, Iowa State will have seats on lab boards and committees, giving the university a voice in the lab's operations and funding decisions. Iowa State also provides the lab with expertise and resources from three university centers: the Center for e-Design, the Virtual Reality Applications Center and the Center for Nondestructive Evaluation.

**Janis Terpenney**, the director of the Center for e-Design and Iowa State's Joseph Walkup Professor and Department Chair of Industrial and Manufacturing Systems Engineering, is expected to provide technical leadership for the Digital Lab's work in advanced manufacturing.

"We are pleased to share our expertise with UI Labs, industry, fellow researchers and educators from around the nation in the new Digital Lab," Terpenney said. "This is public-private partnership on a grand scale; one capable of providing the significant resources and talents to advance research, effect change for manufacturers large and small, and prepare the next generation for the multi-faceted demands for a new type of workforce."

Sarah Rajala, the dean of Iowa State's College of Engineering and James and Katherine Melsa Professor of Engineering, said, "We are very excited about the opportunity to collaborate with an outstanding team of industry, government and academic partners to advance the field of advanced manufacturing and design innovation, and to reinvigorate U.S. manufacturing."

Advanced manufacturing is one of Iowa's largest industries, contributing \$28 billion annually to the state economy. Iowa State works closely with industry, community leaders and educators across the state through partnerships with National Science Foundation Industry/University Cooperative Research Centers such as the Center for e-Design and the Center for Nondestructive Evaluation as well as Iowa State's Center for Industrial Research and Service, the Iowa Innovation Council and education programs in science, technology, engineering and math.

*Contributed by News Service*

## Faculty and staff honors and awards

Associate Professor **Michael Dorneich** was named a senior member of the Institute of Electrical and Electronics Engineers (IEEE). Senior member is the highest professional grade to which members can apply, reflecting experience, professional accomplishment and maturity. This level is attained by only 7 percent of IEEE's 431,000 members.

Professor **Sarah Ryan** presented at the IEEE Power and Energy Society General Meeting in July in National Harbor, Md. The paper, "Scenario Reduction for Stochastic Unit Commitment with Wind Penetration," was authored by Ryan and Ph.D. student Yonghan Feng and named one of the Best Conference Papers submitted.

Associate Professor Emeritus **Doug Gemmill** joined the ISU 25 Year Club, and administrative staff member **Donna Cerka** was honored for her 35 years of service to the university. They were honored at the 79th Annual Banquet of the ISU 25 Year Club in March.

Senior ERD Machinist **Kevin Brownfield** was honored with the College of Engineering Dean's Staff Excellence Award at the 2014 Fall College Convocation. The Deans' Staff Excellence Award recognizes Professional & Scientific and Merit staff members of the College of Engineering who have exhibited contagious dedication and superior service to the College, as well as good will to the University and larger community.



*Doug Gemmill and Donna Cerka celebrate their honors with the ISU 25 Year Club (left), and Kevin Brownfield receives his Dean's Staff Excellence Award from Dean Sarah Rajala (below).*



## Interacting with students and developing better ways of life

"Joining the faculty of ISU," answered **Mingyi Hong** about the best part of his career so far. Hong was recently hired as an assistant professor in the IMSE department.

He decided to join Iowa State's faculty because of the university's strong engineering college and partnerships across departments. "Here I can interact and collaborate with experts in a lot of domains," Hong says.

Beyond working on research projects, Hong looks forward to teaching as well. He will be instructing a course in optimization theory and a class about optimizing large-scale data in different ways.

"I particularly enjoy interacting with students during and after the lectures. Those interactions are key components of the learning process." He also receives valuable feedback from students that he uses to adjust the speed of his lectures.

Hong adds that the academic environment allows him to work on several different projects across the wide spectrum of engineering all at once. That, coupled with his background in electrical and industrial engineering, gives him a unique perspective to make a significant impact.

For example, he can use his knowledge in electrical engineering and systems engineering/operations research to solve a wireless networking problem.

His cross-departmental perspective might also inspire his students to follow a similar path and additionally help build some new research partnerships for the IMSE department.

With research that aligns closely with the courses he will be teaching, Hong focuses on fundamental optimization problems, and their applications such as big data, wireless communications, and energy systems. He enjoys working with big data because, "It is truly an interdisciplinary area, and it can help shape our future."

He adds that optimization is also an important subject, "Hardly any engineering domain can live without proper optimization tools. The main reason that I like those applications is that they are critical for the envisioned 'smart' way of living."

Through his research, he plans to provide a better way of life for people, such as through improvements of the wireless communication infrastructure.

Before coming to Iowa State, Hong grew up in China, where he got his bachelor's degree from Zhejiang University in 2005. He traveled to New York's Stony Brook University for his master's degree, which he received in 2007. He received his Ph.D. from the University of Virginia in 2011. He became involved in research at the University of Minnesota, serving as a postdoc researcher, research associate and research assistant professor.



**Hong**



# Systems engineering and sustainability

**Caroline Krejci** brought her passion for systems engineering and sustainability with her to Iowa State, joining the Department of Industrial and Manufacturing Systems Engineering in January 2014. She was first drawn to industrial engineering because she would work with people and processes, rather than just one component of a big problem. That led to a winding path to her career in systems engineering.



**Krejci**

After receiving her B.S. and M.S. in industrial engineering from Bradley University and Purdue University, respectively, Krejci took a break from academia. That hiatus from school helped her clarify the research area she wanted to pursue.

"I worked in industry for several years, and I was working in systems engineering role. I realized that was what I really enjoy. That is what got me interested in looking at supply chain and supply systems in particular," she said.

After discovering her interest in systems engineering, Krejci attended the University of Washington for her PhD with an adviser who was working in sustainability and less-traditional industrial engineering areas. During this time, she gained an interest in food system failures through books and pop culture, and she realized it was a big problem the world is facing.

"It was something I was really interested in and wanted to learn more about. I started researching sustainability topics while working on my PhD," she said.

Now at Iowa State, Krejci continues to focus on the development of supply chain management policies that support long-term system sustainability. She has two current research interests. The first, which is more theoretical, is the development of multi-agent simulation modeling methods. The second is a much more practical, application-type of research.

"We're going into regional food hubs in Iowa and trying to understand their processes. We then apply systems principles to these food hubs," she said.

However, it is not as straightforward as it sounds, because their mission is not simply to grow the business and make money.

"They also have this social sustainability piece to their business, which is very important to them," she said. "The food hub is trying to keep the farmers viable as well as providing value to consumers. It's a completely new application: how do we make it work?"

This fall, Krejci taught IE 565: Systems Engineering and Analysis, which is a course for students curious about systems engineering, giving an overview of many different aspects of the area. She taught IE 564: Decision Analysis in System Design last spring, which focuses on a handful of techniques for analyzing big, complex, multi-objective decision-making problems.

"We look at large-scale problems that people are having to face in industry and research, which are problems that you can't necessarily tackle with standard optimization techniques," she said.

She enjoyed hearing the feedback from students who had industry experiences after taking the course.

"Students seemed to be able to apply the techniques from the course in their jobs, which is always great to hear."

Krejci said she is excited to be a part of a department with such a variety of research topics, as many industrial engineering departments focus on just one area.

"It's very collegial, and we're covering many different areas," she said. "Having opportunities to collaborate within your own department, and people being so welcoming and willing to think about new ideas, that's been awesome."

## Announcements

### **Richard T. Stone**

was promoted to Associate Professor with Tenure.



**Stone**

**Janis Terpenny** was named the Technical Lead of the Advanced Manufacturing Enterprise area of the Digital Manufacturing and Design Innovation Institute.



**Terpenny**

**Kathy Weaver** joined the IMSE staff as an academic adviser in January 2014.



**Weaver**

### **Doug Gemmill**

retired and became an Associate Professor Emeritus. He continues to teach in the department as a lecturer.



**Gemmill**

The W. Edwards Deming Institute is returning to Ames on September 19, 2015. **Dave Sly** will serve as the local conference chair. The aim of the Institute is to foster an understanding of The Deming System of Profound Knowledge® (SoPK) to advance commerce, prosperity and peace.



**Sly**

# Jacobson honored for many undergraduate achievements

**Benjamin Jacobson**, graduate student in industrial engineering and human-computer interaction, received the 2014 Wallace E Barron All-University Senior Award and was selected to be the Spring 2014 College of Engineering student marshal.

During his time as an undergraduate student at Iowa State, Jacobson made an impact within the student body and Ames community through several leadership roles. He serves on the United Way Story County Board of Directors and is part of the Allocations Committee. He also co-founded and served as co-president of CyServe Council, which unifies service organizations on campus and serves as a liaison between the Story County community and ISU students.

Additionally, Jacobson has served as president of Cardinal Key, president of the student chapter of the Institute of Industrial Engineers, community adviser in the residence hall system for three years, and a peer mentor in the IMSE department. He has been recognized by numerous organizations and received many notable awards, including the Cardinal Court Award.

Jacobson held two internships as a process engineering intern – one at Pepsico (Quaker) and one at Anderson Windows & Doors. At Pepsico, he led an operating team that implemented changeover standards and reduced waste by \$144,000 annually. He also implemented an idea system for production workers that yielded 45 new ideas, eleven of which were implemented by the end of his internship. With Anderson Windows & Doors, he created an optimized standard work procedure and trained the production workers, reducing labor costs by \$100,000 annually. He also simplified the types of packaging materials used in the operation, reducing material costs by \$65,000 annually.

Jacobson is pursuing a degree in industrial engineering and human-computer interaction with a focus on cognitive engineering and technological innovation in education. He hopes to earn his doctorate and work towards making education accessible to all.

"I believe that widespread, easy-to-access education through technology is the best way to break the cycle of generational poverty," Jacobson said. "I view technology as an essential tool to help professors and teachers optimize each student's unique educational path."



## Wallace E Barron All-University Senior Award

Jacobson received the Wallace E Barron Award All-University Senior Award in Spring 2014. The award is an honor of the Iowa State Alumni Association and recognizes five outstanding seniors who display high character, outstanding achievement in academics and university/community involvement and promise to continue these exemplary qualities as alumni.

Jacobson is the fourth industrial engineer to receive the award which began in 1968. He has maintained a 3.98 GPA while also serving as an IMSE peer mentor and teaching assistant, a member of Delta Upsilon Fraternity and a community adviser in the department of residence for three years.

"It is such a tremendous honor to receive this award, but everything I've done is just a small subset of all the great things going on at Iowa State," Jacobson said. "It's easy to work hard and contribute when I'm surrounded by so many passionate students and faculty."

## Engineering student marshal

Jacobson served as the College of Engineering student marshal during the Spring 2014 commencement ceremony. He was accompanied by Leslie Potter, senior lecturer of industrial and manufacturing systems engineering, as he led the engineering class into the ceremony held May 10.

"Working with such caring faculty and staff in the industrial engineering department and with students who have bought into the program has truly been an amazing experience," Jacobson said. "I have the privilege to know many passionate Iowa State engineers and I am always impressed with their adventures at Iowa State. The technical background and leadership skills of Iowa State engineers provides for great potential and I have already seen many student's unleash this potential. The amazing thing is that this is just the beginning. I am excited to see what our 2014 ISU engineering graduates will do and am honored to represent this group!"

# Gilbert and Dorneich are members of teams that received Miller Faculty Fellowships



Gilbert

## 2013-2014 Miller Fellowship

**Title:** Virtual Surgery: New frontiers in medical education

**Proposer(s):** Diana Peterson, Eliot Winer, **Stephen Gilbert**

**Department(s):** Biomedical Sciences, Mechanical Engineering, Industrial and Manufacturing Systems Engineering

**Abstract:** Our goal is to further surgery training by creating realistic fully interactive virtual surgery simulation. Advancing this technology will: 1) create a platform for distance learning of hands-on activities. Distance learning is currently limited to lecture style formats, which excludes active performance training. Our proposal will begin to eliminate this conundrum. 2) Medical Training: Surgical simulations have been shown to dramatically increase the skill of the surgeon, decrease the operational time, and decrease errors. Through virtual surgery, surgeons can practice operations multiple times without the use of cadavers and practice with a variety of complications. Because the virtual environment can be linked to platforms world-wide, surgeons from around the world will be able to interact in the virtual world to learn or share techniques. Success in this proposal will create a prototype for a newly emerging field of hands-on virtual learning that will revolutionize how medicine is taught worldwide.



# Successful IE undergraduate research assistantship program is still growing

In Spring 2013, the IMSE Department, with financial support from Janis Terpenney through the Joseph Walkup Professorship, launched a program unique to the entire College of Engineering at ISU: a department-sponsored undergraduate research assistantship (URA) program. The vision for the program was to establish a process for collaboration between undergraduate students, graduate students, and faculty, where

- Undergraduate students
  - Learn the research process
  - Contribute to research productivity
  - Determine if they are interested in graduate studies
- Graduate students
  - Learn how to mentor
  - Have assistance with research efforts
- Faculty
  - Establish closer working relationships with undergraduate students
  - Are role models for academic scholarship
  - Mentor graduate students on the mentoring process
  - Have a pipeline for potential graduate students

As the numbers tell it, this program has been a fantastic success! Since its inception, the program has had 42 positions filled by 32 different undergraduate students (some have continued for multiple semesters). Twelve different IMSE faculty mentors have created URA positions in their research groups, and more than ten graduate students and post-doctoral mentors have helped teach and develop the undergraduate students' research skills. More than \$40,000 in salary has been paid to the URA students, helping with their college expenses. By the end of the Spring 2014 semester, more than 20% of the URA participants had gone on to graduate studies, which is significantly higher than the overall undergraduate student population, indicating that the URA program is a viable pipeline for students considering graduate studies and faculty looking for graduate students.

In the Fall 2014 semester, more than 30 applications for URA positions were submitted, and the enthusiasm continues to grow. The next public URA poster presentation event will be held in April 2015. Anyone interested in seeing what IMSE's amazing undergraduate researchers are accomplishing are welcome to attend – details will be posted on the IMSE website.

Many thanks to our URA program organizers and leaders, IMSE senior lecturer Leslie Potter and IMSE academic adviser Devna Popejoy-Sheriff, and participating faculty for providing this rich and engaging experience to our students!



*The Miller Faculty Development Fund was made possible by the generosity of F. Wendell Miller. The program supports faculty development proposals that advance the university's strategic plan and is administered by the President's Office and the Center for Excellence in Learning and Teaching.*



Dorneich

## 2014-2015 Miller Fellowship

**Title:** Team-Based Learning Outcomes: Developing a Survey Instrument to Evaluate Student Motivation and Beliefs About Learning

**Proposer(s):** Lisa Orgler, Monica Lamm, Georgeanna Artz, Ann Smiley-Oyen, **Michael Dorneich**, Holly Bender, Sandra Gahn, Sarah Bickelhaupt, Keri Jacobs, and Cassandra Dorius

**Department(s):** Economics, Horticulture, Chemical & Biological Engineering, Industrial & Manufacturing Systems Engineering, Human Development & Family Studies, Education, and Kinesiology

**Abstract:** The goal of this project is to develop a survey instrument to measure the less tangible student learning gains that are anecdotally observed in Team-Based Learning (TBL) instructional settings. These learning gains include growth in areas such as motivation for lifelong learning, professional and workplace preparation, critical thinking and problem-solving ability, and motivation to prepare for class. The data collected from the validated survey instrument developed in this project will be used by more than 20 TBL instructors on campus to make evidence-based, data-driven course improvements that strategically tailor the TBL instructional pedagogy to enhance student learning outcomes in courses taught using TBL. More than 1100 students will be impacted by this project.

# IE 348 students learn history of ISU campus art manufacturing

Industrial engineering students in a solidification processes course learned about the mold making and casting processes used to create art for Iowa State's campus.

Students enrolled in the industrial engineering course IE 348, instructed by Associate Professor **Frank Peters**, attended a lecture in Morrill Hall to "gain another perspective of the processes and capabilities" that they learn about in class, according to Peters. A secondary goal of the lecture is to help students appreciate the art on campus.

"I have students comment now that they will walk past a sculpture on campus and wonder what processes were used to create it," Peters said.

Nancy Girard, Educator of Visual Literacy and Learning at the Iowa State University Museums, spoke to the students about the materials and techniques artists have used to create art displayed on campus. She explained that Iowa State has one of the largest campus collections of public art of any institute in the nation and that molds of art on campus are sometimes made as a security measure or as an educational process.

Girard said that artists often start with a model of their art to use as a proposal for the project as well as a visual reference in creating the final piece. The students were shown various examples of models and molds used by artists whose work can be seen on campus.

"Some students have different learning styles," Peters said. "Seeing examples can help them visualize some of the processes we talk about in class."



Examples of the casting process of sculptures on the ISU campus.



Students in IE 348 learn about casting and art manufacturing processes used on the ISU campus from Nancy Girard of University Museums.

Artists sometimes employ early processes in reproducing art, according to Girard. One example was the pantograph, a tool that was invented in the 16th century for making enlarged copies that are exactly the same as the individual. The tool allows every detail of the original work to be replicated exactly and is still considered to be more accurate than digitally enlarging art by artists and foundries.

Girard said that the museum is always focused on maintaining the artist's integrity in reproducing works and following ethical guidelines. Molds that are created at Iowa State are often marked or destroyed to prevent mass reproductions.

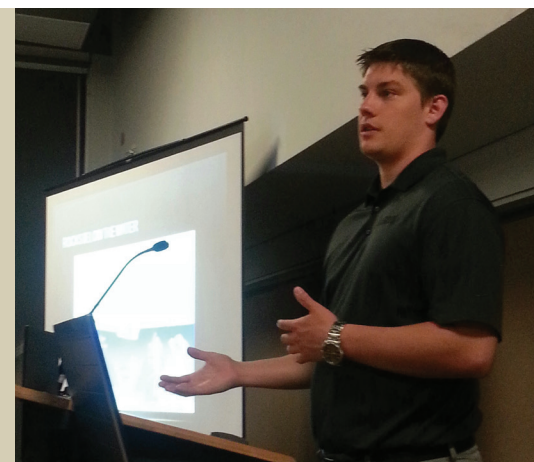
## Kirpes takes second place in national paper competition

**Carl Kirpes**, graduate student in systems engineering, received second place in the IIE Construction Student paper competition this spring.

The paper, entitled "Integrating Project Estimating & Cash Flow Analysis to Develop Companywide Resource Loading Projections," was influenced by work Kirpes completed at GENESYS Systems Integrator in Kansas City. This was his first entry into the competition which is open to both undergraduate and graduate students and design teams enrolled in any school in the United States who are members of the Institute of Industrial Engineers. Kirpes represented Iowa State at the annual IIE Annual Conference and Expo in Montreal, Canada.

"The paper uses an action research approach to identify ways to integrate project estimating with cash flow analysis to develop a companywide resource loading projection mechanism," Kirpes said. "I was delighted to hear the news and grateful that the department was willing to support my travel to represent the Iowa State engineering college and the Department of Industrial and Manufacturing Systems Engineering at the conference."

Kirpes is a graduate of both the industrial and mechanical engineering programs at Iowa State and will graduate with his master's degree in systems engineering in May. He plans to continue his work with GENESYS Systems Integrator.



Kirpes presents his research at the IIE Annual Conference and Expo in Montreal, Canada.



## Student honors and awards

### Three IE students join Cardinal Key

Three industrial engineering students became members of Iowa State's Cardinal Key honor society, an organization established in 1926 to recognize students, faculty and staff at the university for their outstanding leadership, service contributions, scholarship achievements and character.

**Kimbra Bader**, senior, industrial engineering

**Amelia Medici**, junior, industrial engineering

**Alisha Smith**, junior, industrial engineering

### Graduate research excellence awards

#### Fall 2013

**Yanyi He** - Major professor is Lizhi Wang

**Peihan Zhong** - Major professor is Richard T. Stone

#### Spring 2014

**Zhaoyang Duan** - Major professor is Lizhi Wang

**Chenlu Lou** - Major professor is K. Jo Min

**Walter Bennette** - Major professor is Sigurdur Olafsson

**Sarah Gidlewski** - Major professor is Paul Compton

**Jordan Hansen** - Major professor is Paul Compton

### Fawzy receives best poster award

**Mostafa Fawzy**, a graduate student in industrial and manufacturing systems engineering, received an award for presenting one of the top five best posters in the Graduate and Professional Student Research Conference held in April at Iowa State. His poster, "Evaluating Sizing Fast Pyrolysis Unit for Energy Production using Pugh Concept Selection Matrix," represents a framework of evaluation techniques for biofuel plants, using three facility sizes. The top five posters out of over 100 presented were chosen by audience vote.

### Chen and Zhang take second in MOPTA Competition

IE graduate students **Bokan Chen** and **Leilei Zhang** won second place in the MOPTA (Modeling and Optimization: Theory and Application) 2014 competition. They presented their work August 13-15 at Lehigh University and were advised by **Lizhi Wang**.

### Laabs receives award at IIE conference

Industrial engineering graduate student **Heidi Laabs** received second place in the Rapid City Regional IIE Conference Paper Competition. Laabs submitted a technical paper about a class project and presented her work to judges at the conference. Papers entered in the competition were judged based on their depth and originality of subject, written excellence, and excellence of oral presentation.



GSB vice president Mike Hoefer (right) poses with GSB president Hillary Kletscher.

## Hoefer elected GSB vice president

**Mike Hoefer**, a junior in industrial engineering from Cedar Rapids, Iowa was elected vice president of Iowa State's Government of the Student Body for 2014-2015.

As vice president, Hoefer will manage the internal affairs and projects of GSB. He will chair the senate meetings and work closely with cabinet members to ensure completion of key projects and initiatives.

Hillary Kletscher, a junior in biological systems engineering, was elected president of GSB with Hoefer. Their platform included improving the availability of tutoring and supplemental instruction programs, increasing availability of parking on campus on nights and weekends, improving campus sustainability through more recycling options and green projects and creating a student to student online exchange site.

"I'm currently working with a team of Computer Engineering students to create an online student to student marketplace that will allow students to buy, sell, and trade goods like textbooks, furniture, clothing, subleases, and more," Hoefer said.

"In the coming year I plan on continuing to work on projects that improve student life," Hoefer said. "We want students to be involved in all of our projects, and really help shape the way GSB completes projects."

Hoefer worked as an industrial engineering co-op for Rockwell Collins in Decorah, Iowa last spring and summer. He also served as an undergraduate research assistant in the Adaptive Cognitive Systems Lab building a modular flight simulator with Dr. Michael Dorneich. He is currently an ambassador for the IMSE department and serves as the Director of Student Affairs on the Government of the Student Body. This summer Hoefer will perform research abroad at RWTH Aachen University in Germany.

"I chose to study industrial engineering because industrial engineers look at the big picture," Hoefer said. "I enjoy technical problem solving, as well as working with people. Industrial engineering allowed me to combine both of these interests."

Hoefer plans to complete the concurrent B.S. and M.S. in Industrial Engineering at Iowa State, and then pursue a Ph.D. His long term goal is to become an engineering professor with teaching, research, and consulting opportunities.

# Revived IMSE product design course emphasizes teamwork

**Kellie McGrath** learned about the importance of teamwork, something vital to practicing engineers, when she redesigned the Pringles chips can.

The project was for IE 576 Human Factors in Product Design, a graduate-level course that McGrath, a graduate teaching assistant of industrial and manufacturing systems engineering, says was big on team-based learning.

The course re-started this past spring semester after **Michael Dorneich** and **Rick Stone**, both associate professors in industrial and manufacturing systems engineering, teamed up to develop a new approach for teaching it.

Dorneich says there are many theory and method classes in IMSE, so both professors wanted to make Human Factors in Product Design an applied learning class. They discussed different elements and factors each week and then applied them in projects.

These projects assigned students into teams to design and redesign products using concepts from engineering, psychology and physiology.

Before McGrath and her team could go to work on the Pringles chips can, they had to prove there was a problem with the can's design.

They conducted three rounds of surveys and found the small container opening, which limited access, and broken chips were the two areas of concern for Pringles fans.

To address these issues, the group developed three different prototypes that kept the can's original external design with a redesigned interior.

McGrath explained that her team didn't enlarge the can for easier access because the extra space might cause more chips to break during processing and shipping. And they didn't make the can smaller because consumer's access to the chips would be even more limited.

One of the prototypes featured a sliding tray inside the can for the chips to sit on so consumers could slide the tray to access the chips.



*Above: The IE 576 design team of (left to right) Heidi Laabs, Kellie McGrath, Jianqiang Li and Euijung Yang. Right: A table illustrates the differences between their designs of a Pringles can.*

Title	Description	Picture
Prototype 1	Original can with plastic tray	
Prototype 2	Two pringles cans with a twist opening	
Prototype 3	Combination of Prototype 1 and Prototype 2 Two pringles can with a twist opening and a tray	

The second featured a twist design that they created using two cans – “a can inside of a can.” When the can twisted one way, it was closed, but it opened when it was twisted the opposite direction.

“It was similar to the tray design, except the cans became the tray,” she explained.

The third prototype was a combination of the previous two, and it featured both the twist design and a sliding tray. After testing the prototypes, the group found there was a trade off between the designs.

“Where the twist was more difficult to understand initially, it became the preferred design once the test subjects understood it,” McGrath said.

The team's ideas resolved certain issues, but the group had to consider whether the costs to implement the changes justified the benefits.

She explained that the Pringles can is designed also for easy manufacturing. Would spending more money to insert a tray into the can to make it easier to access the chips result in more people buying them?

Stone also noted they needed to consider that “good design means a product should be obvious and easy to use.”

Whether or not the new designs would be economically feasible, McGrath said the project ultimately taught her the value of teamwork.

“It was an incredible experience to see how the ideas we each contributed came together into a final product and report,” she said. “We all had roles that focused on our strengths, and we learned from each other to improve upon our weaknesses.”

*Contributed by ECR*



## IMSE senior leads new ISU student organization

**Steven Way**, senior in industrial engineering, combined his passions for soccer and giving back to others to create a new student organization at Iowa State.

The organization, Pencils of Promise (PoP) at Iowa State University, is a service organization that is part of an international mission to build sustainable schooling programs in four countries around the world: Ghana, Nicaragua, Laos, and Guatemala.

One of those countries is especially important to Way, who is also the club's first president.

"Pencils of Promise at ISU began with a desire to contribute to Iowa State University in a meaningful and lasting way but specially to help the people from Guatemala, which is the country I have lived in for most of my life," Way said.

Way is also a big fan of soccer and he hopes to create fundraisers by playing the sport on Iowa State's campus.

PoP at ISU is already planning a variety of events to help spread awareness and raise funds, including a soccer tournament. Kabongwe Gwebu, PoP at ISU's adviser and a native of Zimbabwe, is excited to see the club grow.

"I would encourage everyone, if they know anyone who enjoys soccer in any capacity, to be encouraged to participate and to look for different messages coming from the organization," Gwebu said. "Seeing work done in developing nations is always a good thing."

"Our goal for next year is to fundraise \$2,500 which will be to support a whole classroom of children so they can have access to education for a year," Way said. "We

encourage students to join the movement of Pencils of Promise because we believe that only working together we can make a difference in the world."

Way said that the national organization Pencils of Promise has built more than 206 schools, impacting more than 20,000 children around the world. The organization also trains teachers, gives out student scholarships, and implements water and health programs.

Way credits many people for their assistance in making the organization a reality. He wished to specially thank **Leslie Potter**, senior lecturer in industrial and manufacturing systems engineering, for her support.

Students can request to join PoP at ISU by visiting ISU's student organization page. To learn more about the national organization and to donate to the cause, visit [fundraise.pencilsofpromise.org](http://fundraise.pencilsofpromise.org).



## IMSE thanks you!

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## Nuts about Hawaii

We meet **Jerry Allen** at the Post Office along the main highway that runs through tiny Pepeekeo, Hawaii. It is raining.

We follow him back along the highway and onto a heavily rutted road that takes us to our destination: acres and acres of macadamia orchards.

There we get out of our vehicles and walk between rows of trees as Jerry explains the growing season (late July through early March), the harvesting (the nuts fall from the trees onto the ground, and his crop is harvested by hand, although some growers use mechanized harvesting tools), and the complex processing of the one of the island's most sought-after resources.

"We're not selling nuts," Jerry smiles. "We're selling Hawaii."

Jerry lives on Oahu in the windward town of Kailua (population 36,513), but his macadamia groves are on the Big Island of Hawai'i. The trees, he explains, need a warm, rainy climate, and the Hilo coast of the Big Island is one of the best places on earth to grow macadamia nuts.

Jerry has lived with his wife, Bev, in the same house in Kailua since 1964. ("Oahu is the most beautiful of the islands," he says.) Following his graduation from Iowa State in 1955 with a degree in engineering, Jerry was a member of the Pacific Air Force in Hawaii and served during the Vietnam War before going to work for C. Brewer & Co. Ltd., a major player in Hawaii's sugar cane industry that had also diversified into the macadamia business. He was part of the team that created the well-known Mauna Loa Macadamia Nut Corporation.

Today Jerry owns, leases, or manages orchards that produce two percent of the entire Hawaiian macadamia nut crop.

About macadamias, Jerry says, "They're delicious. Eat a lot."

*Story by Carole Gieseke –  
Chief Communications Officer,  
Iowa State University Alumni Association*



*Photography by Jim Heemstra*

## Engineering a family balance

**Sandy Blank Carosella's** description of Lancaster County, Pa., was just too good to pass up.

"There is a wonderful mix of the arts scene, agriculture, education, and history here," she wrote in response to our request for story ideas in Pennsylvania. "When you are in Pennsylvania, enjoy. Have a whoopie pie, feel the history, and watch out for horses and buggies!"

She had me at whoopie pie: those smooshy, black and white creations that look like oversized Oreo cookies.

Sandy ('88 industrial engineering) has settled with her family (husband Jim and children Kate, 16, and Joe, 7) in Lancaster after living in Tennessee, Missouri, California, Kentucky, and Ohio. They've been in Pennsylvania for eight years, and Sandy vows that they've finished moving.

She started her career as an engineer (for Quaker Oats and other companies), but when Kate was 18 months old, Sandy decided to quit working full time. She went back to school and earned a master's in education from Xavier University, thinking that teaching would be a good fit for her family's schedule.

"I wanted a schedule similar to my daughter's," she said. But teaching was actually more intense than her old job ("I was constantly improvising," she says), and when her second child was born, she quit.

Now, she says, she's "content to be a mom, room mom, playground monitor, and substitute teacher." She just finished a long-term substitute position at her daughter's school.

Sandy likes the history of Lancaster, with its Central Market (the oldest in the country), museums, arts culture, proximity to larger cities, and "calm setting" of the rolling Pennsylvania Dutch farm country.

And, yes, the whoopie pies, a plate of which greeted us on the kitchen table when we visited Sandy in March. Ah, the joys of travel!

*Story by Carole Gieseke – Chief Communications Officer,  
Iowa State University Alumni Association*





# Watson receives Alumni Medal



Watson

**Stephen L. Watson** (BSIE'67) received a 2014 Alumni Medal from the Iowa State University Alumni Association.

The ISU Alumni Association established this award in 1948 to recognize ISU alumni for long loyal service to the university through alumni-related activities. The Alumni Medal is the premier award given to alumni by the ISU Alumni Association.

Watson is a successful engineer, private investor, and entrepreneur who has launched three successful companies. But despite his tremendous professional success, he has humbly served his alma mater for more than four decades – and the university is a much better place because of it.

Watson is a longtime ISU Foundation Governor and Board director who serves on the Foundation's investment committee and played a key role in guiding Campaign Iowa State: With Pride and Purpose, the largest fundraising effort in university history. His personal giving has significantly benefitted the College of Engineering, including the Engineering Teaching and Research Complex and the endowed Stephen and Beverly Watson Scholarship. A nine-year member and former chair of the College of Engineering's Industrial Engineering Advisory Council, Watson has consistently used his connections in the Boston area to help benefit Iowa State. As a member of the MIT Enterprise Forum's executive board, he helped arrange ISU visits with prominent engineers.

In addition to his involvement at ISU and MIT, Watson has also been active with the boards of Boston University's Photonics Center, the Business and Industries Association of New Hampshire, the Southern New Hampshire Association of Commerce and Industry, and Memorial Hospital of Nashua, N.H. He is also currently a member of the development committee for the Natick, Massachusetts Historical Society.

Watson, a lifelong aviation enthusiast who first learned to fly in Ames, is the current holder of the world speed record for transcontinental flight across the U.S. in a single engine aircraft. He is a member of Order of the Knoll and an ISU Alumni Association life member.

The award was presented at the 2014 Honors & Awards Ceremony on October 10 in the Benton Auditorium of the Scheman Building in Ames.

## Industrial engineering degree leads to a career in medicine

From storming the football field after a win against Nebraska to all of her engineering knowledge "clicking" during thermodynamics, **Susan Heller's** experience at Iowa State was more than she could have ever imagined.

Heller, who graduated in 1981 with a bachelor's degree in engineering operations, says she always knew she could accomplish whatever she set out to do. "I had a single mom and teachers encouraging me to go to college. I went to college and earned an engineering degree, which prepared me to go to medical school."

She adds that her education is something no one can take from her. "Anyone can literally do anything with an education. There's nothing more valuable."

After graduating from Iowa State, Heller worked for two years in industry, where she built the world as an engineer. She still believes engineers have a huge impact on society, and "They are the smartest people I've ever known."



Heller

However, after her friend was in an accident, her plans changed. "I decided to go to medical school. I had never even thought about it before, and now I'm a physician."

She says her Iowa State education did not go to waste, noting that the logic and analysis of engineering helped her to excel in medical school at the University of Iowa. She also continues to use her engineering background for patient diagnosis, "You take the information and analyze and process it to find the answer."

Heller works as a physician at the University of California, Irvine Medical Center (UCI), although she is quick to point out that Iowa State is still "the most beautiful campus I've ever seen."

Her favorite part of the job is helping educate people who are faced with making choices that impact their well being. "Healthcare decisions can be some of the most important decisions of your life, especially if you have something serious."

She has also made extremely rare diagnoses to save more than one life.

"There's no greater accomplishment than saving lives. Giving patients and their families more time with one another is the most rewarding thing I've experienced," she adds.

*Contributed by ECR*



# 2014: A LOOK BACK

Janis Terpenney presented the 2014 Joseph K. Walkup Prominence in Industrial Engineering Award from the IMSE Department to **Wayne Flory** at the Spring Awards Banquet.

Flory is the Vice President of Material and Supply at Rockwell Collins. He earned his bachelor's degree in industrial engineering from Iowa State, and his master of business administration degree from the University of Iowa. Flory also serves on the IMSE Industrial Advisory Council.

The award is named for Joseph K. Walkup, who served as department chair from 1942 to 1973. It recognizes outstanding achievement in the industrial engineering profession.



Undergraduate students (left) and graduate students (right) who received honors gathered at the Spring Awards Banquet.



Michael Dorneich and students participating in the Research Experience for Undergraduates program present their research at the end-of-summer poster session in Howe Hall Atrium.

The IMSE Industrial Advisory Council (below) met in Spring 2014. The council represents IMSE alumni and industrial engineers in the field, and members give feedback on the direction of the department.



IMSE Ambassadors (above) help the department in many ways, including helping with undergraduate open houses and recruitment events as well as Experience Iowa State days.

## Alpha Pie You!

Alpha Pi Mu held an annual fundraising raffle where the prize is the chance to smash a pie in the face of some of our more adventurous faculty and staff.





## A visit back to campus shows impressive display of learning and growing

**C G “Turk” Therkildsen**, a Department of Industrial Engineering alumnus, reflects on how the IMSE department has grown over the years.

My return to Iowa State for the Class of '59 Alumni Days became an awesome experience. I had emailed IMSE after reading the news article about Bob Walkup and his father's motto, "Engineers can do anything. It's that simple." Bob's father, Professor Joe Walkup, was the head of the Department of Industrial Engineering when I graduated. A detailed response to my email offered me a tour of IMSE and meetings with faculty and students while I was on campus for the reunion.



**Therkildsen**

On the afternoon of Thursday, May 15, I visited the IMSE department. I received a warm welcome from Janis Terpenney, IMSE Chair and Joseph Walkup Professor. I was provided a tour of the many outstanding labs by Associate Professor Frank Peters, enjoyed an open forum with several students and concluded with a very interesting conversation with Professor Terpenney that ran well beyond plan.

I can only say the IMSE department is phenomenal. In particular, the labs are unimaginably capable and advanced. Young people graduating ISU IMSE are well prepared to immediately contribute and be productive.

My congratulations to Professor Terpenney, faculty and staff. Together, you have elevated the bar for every engineering discipline.

## Scalf promoted to Senior VP of Engine Products at Donaldson Company

**Thomas R. Scalf**, BSIE'89, has been promoted to Senior Vice President, Engine Products, from his current role as Vice President of Global Industrial Air Filtration. Scalf joined Donaldson in 1989 and has held a number of key roles including Plant Manager in the US and Europe, Director of Operations, and General Manager in the Exhaust and Emissions, Industrial Air Filtration, and Industrial Filtration Solutions businesses before assuming his current role. Scalf earned a bachelor's degree in industrial engineering from Iowa State University and an MBA from St. Ambrose College.

## IE alum takes a look back

A little over fifty years after graduating from Iowa State, many memories are still close to the surface for **John Lanman**, a 1963 graduate in industrial engineering.



**Lanman**

"I think of myself as being extremely interested in data and information, I remember going to the library at ISU and being amazed at the periodical room," Lanman said. "Being exposed to the masses of data and information out there in the world really sticks out as a memory that comes to mind."

Lanman described his upbringing in Van Buren County, Iowa, as small and rural, but his future career would lead to growth and opportunities across the nation.

With numerous job offers after graduation, Lanman chose to begin his career at Maytag in Newton, Iowa, as an industrial engineer. After a few years he moved on to Donaldson Company as an industrial engineering manager.

Ultimately, Lanman returned to Green Giant where he had completed an internship during his time at Iowa State. He was hired as a standards and cost engineer in the industrial engineering department and he later moved to Maryland. As companies began to conglomerate, Lanman became an industrial engineer at a newly purchased meat processing plant owned by Green Giant in Florida.

During his time at the Florida plant, Lanman fell in love with the meat industry. When the plant was sold he was hired to become a production superintendent at a plant in Newberry, South Carolina. He became a maintenance manager at the plant instead. Lanman claimed that he believes his broad skill set from Iowa State worked to his benefit in attaining this position.

A conversation with the plant manager on the floor of the plant one day led to his position as an industrial engineering manager, a department which he started and grew through the next several years. Ownership of the plant changed several times, and it is now owned by Kraft Foods Inc. and is one of Kraft's largest plants in terms of numbers of employees.

Looking back on his career, Lanman still stresses the importance of the lessons he learned at Iowa State, citing a senior project as an example.

"We were given an assignment to build a plant and had to choose a location, create a layout, determine required equipment, and so on. My skills of collecting data to resolve a problem or improve something probably mostly came from my time at Iowa State," he said.

Chuckling, he added that he also learned the value of "checking everything you did twice, three times and then maybe checking it again."

Lanman retired in 1996 but has continued working with the plant for about 20 hours a week, mainly as a process flow expert. Some of his grandchildren are following in his footsteps, pursuing engineering degrees at schools across the nation.

The importance of education is significant to Lanman, and he believes Iowa State is a great place to pursue a career in engineering.

"I feel like the mission of Iowa State, and other engineering schools, is vital to the survival of the human race," Lanman said. "Being a land grant university and attached to agriculture is important. It's amazing that we're basically able to feed the world."

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