IOWA STATE UNIVERSITY College of Engineering

2017 | Issue Number 1

DEPARTMENT OF INDUSTRIAL AND MANUFACTURING SYSTEMS ENGINEERING

IN THIS ISSUE

Undergraduate research makes a difference

PAGE 8

Seeing the big picture: IMSE student interns at Mayo Clinic

PAGE 12





Letter from the Chair

Warm greetings from Ames,

One of my former colleagues recently posted social media entries on the importance of having good colleagues and of being in a good location for sustained work fulfillment. Upon reading and reflecting on the reactions to her posts and her follow-up comments, I must say that I agree with her premise. No matter what personal goals you have, good colleagues can help support and propel you on your journey to reach those goals. Moreover, a good location can provide connections to nonprofessional activities that add interest, enjoyment, and additional perspectives to your life and help sustain you en route to your goals. My great colleagues at lowa State University's Department of Industrial and Manufacturing Systems Engineering, which is also in a great location in Ames, Iowa, have given me a sense of work fulfillment.

Together, we closed this past spring semester with a breakfast gathering for our graduates. Observing proud parents and family members listen to our graduates recount their most memorable academic and non-academic moments was priceless. Our typical 80% placement rate on commencement day, which consistently increases to 100% two to three months after graduation, makes clear that employers in lowa and beyond along with graduate schools (including ISU) desire our graduates. After ten months with IMSE in my heart and in my head every day, I know now why great outcomes such as full placement are possible. Simply put, IMSE provides the links in a chain of people working collectively toward common goals, many of which are beyond what any individual could hope to achieve alone.

To our alumni I say: feel stronger with us, you have the Cyclone power behind you.

To my colleagues: you are the hearts and minds of IMSE, you are the architects of bright futures. I will remain forever proud to be your colleague.

To the world we serve: expect more, we will not fail.

May the Cyclone power be with you!

Gül E. Kremer

Professor and C.G. "Turk" and Joyce A. Therkildsen Department Chair

On the cover

Undergraduate IMSE students work in the metalcasting laboratory in Black Engineering. This is just one example of the many ways that students get great hands-on training in the IMSE undergraduate curriculum.

IMSENews 2017 | Issue Number 1

Published by the Department of Industrial & Manufacturing Systems Engineering, College of Engineering, 2529 Union Drive, Iowa State University, Ames, IA 50011; www.imse.iastate.edu; imse@iastate.edu

Prepared by Alex Rausch, IMSE Communications Specialist, arausch@iastate.edu

Iowa State University does not discriminate on the basis of race, color, age, ethnicity, religion, national origin, pregnancy, sexual orientation, gender identity, genetic information, sex, marital status, disability, or status as a U.S. veteran. Inquiries can be directed to the Office of Equal Opportunity and Compliance, 3280 Beardshear Hall, (515) 294-7612.

Iowa State engineers will contribute to new Manufacturing USA institute

lowa State engineers are part of a new, \$140 million national manufacturing institute dedicated to reusing materials in ways that can improve the energy efficiency of American manufacturing by up to 50 percent.

The U.S. Department of Energy announced the new institute – the Reducing Embodied-energy and Decreasing Emissions, or REMADE Institute – early this year. The institute will be supported by up to \$70 million in federal funding, subject to appropriations, and \$70 million in cost-shares from more than 100 partners.

REMADE will be led by the Sustainable Manufacturing Innovation Alliance based at the Rochester Institute of Technology in Rochester, New York, according the Energy Department's announcement. REMADE will focus on lowering the cost of technologies that manufacturers need to reuse, recycle and remanufacture metals, fibers, polymers, electronic wastes and other materials.

The energy department estimates that could save billions in energy costs.

Gül Kremer, the C.G. "Turk" & Joyce A. Therkildsen Department Chair in Industrial and Manufacturing Systems Engineering, along with Arun Somani, the College of Engineering's associate dean for research, developed the successful partnership with the Rochester Institute of Technology for REMADE. Kremer said including Iowa State as a partner in the new institute says a lot about university researchers.

"This shows our credibility, commitment and engagement with manufacturer in the state," she said. "The deliverable here is more than scientific papers – it's also knowledge transferred to companies. And so this effort upholds the ideal of a land-grant university sharing its discoveries."

Kremer said the goal of Iowa State research affiliated with the REMADE Institute will be to work directly with Iowa companies to improve their ability to reuse materials and save energy. And, because researchers are working with companies, she said the lag time between laboratory discoveries and manufacturing practices will be much shorter.

Somani said it's too early to know exactly what lowa State researchers will study as partners to the REMADE Institute. But he expects the projects will involve materials recycling and manufacturing processes.



The Energy Department's announcement said U.S. manufacturing accounts for nearly 25 percent of the country's annual energy use. Technologies that reduce the energy needed to produce materials for manufacturing could save up to 1.6 quadrillion British thermal units annually – more than the electricity, oil and other energy consumed by Delaware, Hawaii, New Hampshire, Rhode Island, Vermont and Washington, D.C. combined.

Kremer said the advanced manufacturing and operations research faculty within the department of industrial and manufacturing systems engineering are well positioned to research and develop those energysaving technologies.

"We are the right people," she said. "Our partnership in REMADE will allow for collaboration across the College of Engineering and that could grow across the university. Our manufacturing group is strong and this research can be an engine to take us to higher levels."

The U.S. Department of Energy's Ames Laboratory is also a partner in the REMADE Institute.

Manufacturing USA – also known as the National Network for Manufacturing Innovation – was established in 2012 and now includes 14 research institutes. Each institute has a specific technology focus with the general goal of bringing together academic, industrial and federal partners to increase the competitiveness of American manufacturing.

Three undergraduate education proposals from IMSE researchers receive Miller Faculty Fellowships

Researchers in industrial and manufacturing systems engineering will develop innovative approaches to improve undergraduate teaching with support of recently funded Miller Faculty Fellowships. Three of this year's university-funded proposals include two IMSE projects and one collaborative project, illustrating the department's dedication to excellence in undergraduate education.

"I am very pleased to see the efforts in continuous improvement of IMSE's courses, programs, and learning experiences," said **Gül Kremer**, the C.G. "Turk" & Joyce A. Therkildsen Department Chair in Industrial and Manufacturing Systems Engineering.

The Miller Fellowships provide faculty with opportunities to enhance their scholarly work in the undergraduate academic programs of the university. Researchers with successful proposals will improve the quality of undergraduate curriculum through new approaches to the teaching of current courses or through the development of entirely new courses. The faculty will have up to 12 months to meet the goals of their Fellowship project.

The three funded proposals involving IMSE researchers are:

"Finding a CURE: Course-based Undergraduate Research Experiences for Industrial Engineering Students as a Model for the College of Engineering"

IMSE Investigators: Principal Investigator Leslie Potter, senior lecturer in industrial and manufacturing systems engineering; Co-PI Richard T. Stone, associate professor in industrial and manufacturing systems engineering; Co-PI Devna Popejoy-Sheriff, academic adviser in industrial and manufacturing systems engineering

Since 2013, the Industrial and Manufacturing Systems Engineering (IMSE) Department has supported 10-20 students/semester with one-on-one undergraduate research assistantships (URAs), but faculty resource constraints have plateaued this number. This award will enable the IMSE Department to implement Course-based Undergraduate Research Experiences (CUREs), which will allow more students to address research problems. The program aims to develop students' critical thinking skills and professional skills, like teamwork and communication. IMSE proposes implementing a pilot CURE, reaching 150 students/year with a research experience. A successful model could then be expanded to other College of Engineering departments, potentially reaching thousands of students/year, and supporting ISU's strategic goal of ensuring that students receive an exceptional education, increasing both retention and graduate school enrollment.

"Engaging Students through Online Testing Modules for High-Enrollment Engineering Economics Course"

IMSE Investigators: Principal Investigator **Cameron MacKenzie**, assistant professor in industrial and manufacturing systems engineering; Co-PI **Mike Helwig**, lecturer in industrial and manufacturing systems engineering

Engineering students are trained to study for exams, be able to apply a few formulas to specific types of questions, and answer questions well enough to receive at least some partial credit. The purpose of this project is to engage students more directly through online testing modules that more closely reflect a professional engineering environment. This project will design these testing modules for an engineering economics course which attracts hundreds of students in each semester. A testing module will randomly select questions, and no question will be repeated exactly. A student can continue to take a test until he or she passes the module. Students who pass a module will have demonstrated proficiency in that subject. Students will be required to pass six online testing modules in order to pass the course. A student will need to pass two additional testing modules to earn an A.

"A Better Peer Assessment: Designing a Peer Assessment Protocol to Maximize Fairness"

PI Jane Rongerude, assistant professor in community and regional planning; Co-PI Cassandra Dorius, assistant professor, human development and family studies

IMSE Investigator: Co-PI **Michael Dorneich**, associate professor in industrial and manufacturing systems engineering

Fields as diverse as psychology, sociology, and law recognize that people have implicit biases that negatively impact how they perceive people from disadvantaged groups. Although active learning pedagogies such as TBL are promoted as a strategy for engaging underrepresented students, research suggests that women and students of color do not have the same classroom experience with TBL as their male and white counterparts (Hetter, 2015; Wayland, Walker, and Ferrara, 2014). Little research exists that investigates how these differences play out in the peer assessment process. TBL practitioners have little guidance on how to create peer assessments that are fair for all students. This project seeks to identify the extent to which bias affects peer assessment scores, and to develop peer assessment protocols that maximize fairness. This study will provide immediate, practical suggestions to faculty using peer assessment in their classrooms, thereby enhancing the classroom climate and improving student learning potential.

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.

College inspires innovation

The Exploratory Research Projects program at Iowa State's College of Engineering is supporting faculty members as they gather preliminary data for high-risk, high-impact, novel research ideas. This spring, seven projects will receive grants to explore new research areas, and one of those projects is led by Stephen Gilbert, assistant professor of industrial and manufacturing systems engineering.

Transportation stress modeling to design innovative controls and information

PI: Stephen Gilbert

Co-Pls: Anuj Sharma, associate professor of civil, construction and environmental engineering; Mingyi Hong, assistant professor of industrial and manufacturing systems engineering; Soumik Sarkar, assistant professor of mechanical engineering; Umesh Vaidya, associate professor of electrical and computer engineering; and Michael Dorneich, associate professor of industrial and manufacturing systems engineering

This six-month research effort will model the stress drivers face on the road. Participants will be given a wearable stress measurement sensor and will be asked to drive in certain conditions, both in their own cars and in driving simulators. With a better way to study and monitor drivers' stress, which causes short-term and longterm impacts, researchers can then examine ways to alleviate these problems.

Contributed by ECR

IMSE faculty, students honored at banquet

Peters honored with third Don Grant Faculty Award

Frank Peters, associate professor and associate chair for operations. received his third Don Grant Faculty Award for Excellence in Undergraduate Education, demonstrating his continuous dedication to undergraduate education in IMSE. The award 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 undergraduate industrial engineering honor society, Alpha Pi Mu, presents this award based



Left to right: Anthony Greiter, grandson of Don Grant, Annie Greiter, daughter of Don Grant, Frank Peters, and Mary Margaret Gran, daughter of Don Grant, pose for a picture at the IMSE Spring Awards Banquet at Reiman Gardens.

on voting by graduating seniors. Peters won the inaugural award in 2009, won it again in 2013, and now in 2017.

Grant served as an adviser and instructor in IMSE from 1968 to 1988, and it has been estimated that he worked with more than 3,000 students during his career at Iowa State.

IMSE students recognized for achievements and honors

Students in industrial and manufacturing systems engineering were recognized at the annual IMSE Spring Awards Banquet at the Scheman Building in Ames, IA. Many scholarships that were presented to the students were made possible by generous donors and sponsors of the department. The students are very grateful for the opportunities made available to them from the scholarships.



IMSE graduate students (above) and undergraduate students (below) who received honors and awards gathered at the IMSE Spring Awards Banquet at the Scheman Building in April 2017.





Kremer awarded 2017 Clare Boothe **Luce Scholarship**

Higher Education **Resource Services** (HERS) is pleased to announce that Gül Kremer, the C.G. "Turk" & Joyce A. Therkildsen Department Chair in Industrial and Manufacturing Systems Engineering, was



Kremer

selected to attend the 2017 HERS Institute at the University of Denver from June 18-July 1, 2017. Dr. Kremer was awarded a CBL (Clare Booth Luce) Scholarship that provides full tuition, accommodations, meals and travel to women in STEM higher education to attend the HERS Institute at either the University of Denver or Bryn Mawr College. Kremer will be part of the HERS Luce Program for Women in STEM Leadership.

A key part of the HERS Luce Program is the development of a HERS STEM Community. The goals of the community are to provide support and encouragement to women in STEM and to develop strategies for advancing a diverse cadre of women into STEM leadership roles. Based on experience with HERS alumnae in STEM fields and research on women's leadership paths, HERS has identified the importance of women leaders having structured peer and mentor connections at various stages of their careers. Working together this community of women leaders can thrive and shape a new environment for equality and excellence in STEM higher education.

Kremer will join a group of approximately 60 women leaders from across the United States as part of the HERS Institute at the University of Denver, six of whom were awarded the CBL Scholarships.

> Contributed by University of Denver, www.du.edu

Faculty and staff honors

Frank Peters

Associate Professor and Associate Chair for Operations Peters is the 2017 recipient of the Regents Award for Faculty Excellence, which is a reflection of his commitment to

lowa State, his professional reputation, and his esteem among peers.

Devna Popejoy-Sheriff

Academic Adviser Popeiov-Sheriff is the 2017 recipient of the ISU Award for Academic Advising Impact, honoring her commitment to Iowa State



Peters

and her esteem among peers.

IISE Annual Conference Awards

These awards were presented at the 2017 Annual Conference and Expo of the Institute of Industrial and Systems Engineers.

Matthew Frank (associate professor) Manufacturing and Design Division Outstanding Service Award The award recognizes a division member who has been a leader and has made significant contributions to public and community matters related to the manufacturing engineering profession.

Michael Hoefer (graduate student), Niechen Chen (araduate student). and Matthew Frank



Left to right: Frank Peters, Matt Frank, and Leslie Potter at the IISE Conference with their awards.

Manufacturing & Design Division Best Paper: "Automated Manufacturability, Analysis for Conceptual Design in New Product Development" The paper was recognized for excellence in the manufacturing and design division.

Frank Peters (associate professor) and Leslie Potter (senior lecturer) Lean Division Teaching Award

The award honors the services of a person or group of people who have developed curriculum and disseminated courses in the subject area.

Sarah Ryan

Joseph Walkup Professor Rvan is the recipient of the College of Engineering D.R. Boylan Eminent Faculty Award. The award recognizes faculty of national and international acclaim



Ryan

for dedication to academic excellence through research.

Stephen Vardeman

University Professor Vardeman is the inaugural holder of the Kingland Faculty Fellowship in Data Analytics. He was honored May 2, 2017, in a ceremony in the Campanile Room of the Memorial Union.



Vardeman

Potter recognized for academic innovation and leadership

The Technology Association of Iowa (TAI) recently named **Leslie Potter**, senior lecturer in industrial and manufacturing systems engineering, as a finalist of the Ninth Annual Des Moines Area Community College Iowa Women of Innovation Awards.

The awards recognize and celebrate women in business, government or academia who are leaders in the fields of science, technology, engineering and math (STEM). Potter was nominated for the Academic Innovation and Leadership category.

Throughout her career, Potter has managed nearly 200 student projects while working with more than 20 industrial partners. She also pioneered a program to match undergraduate students interested in research with faculty members, resulting in a significant increase in undergraduate student involvement in research projects. Additionally, Potter helped set up and now manages a collaborative effort with the Department of English to provide industrial engineering majors with technical writing instruction related to their profession.

She has been recognized for her innovation and leadership in numerous ways, including the Superior Engineering Teaching Award, Faculty of the Year Award, the Don Grant Faculty Award for Excellence in Undergraduate Education, and the Outstanding Engineering Club Advisor Award.

Potter has received five grants and has peer reviewed education-related publications related to flipped classroom pedagogy, ABET and accreditation, and engineering communication.



Leslie Potter (right) receiving her Finalist Award from Brian Waller, president of the Technology Association of Iowa.

GENETICS highlights article authored by Wang in April 2017 issue

GENETICS featured an article authored by Lizhi Wang, associate professor of industrial and manufacturing systems engineering, and others in the April 2017 issue. The journal included the summary of the article, "The Predicted Cross Value for Genetic Introgression of Multiple Alleles," in their Issue Highlights section.



The article's authors are Ye Han, John N. Cameron, Lizhi Wang, and William D. Beavis, and the summary of the article is below.

Wang

Han et al. introduce a new metric, the Predicted Cross Value (PCV), for selecting breeding parents. Unlike estimated breeding values, which represent predictions of general combining ability, the PCV predicts specific combining ability The PCV takes estimates of recombination frequencies as an input vector and calculates the probability that a pair of parents will produce a gamete with desirable alleles at all specified loci.

From genetics.org: GENETICS is published by the Genetics Society of America, a scholarly society that seeks to deepen our understanding of the living world by advancing our understanding of genetics.

Ryan editor in chief of The Engineering Economist

Sarah Ryan, the Joseph Walkup Professor in industrial and manufacturing systems engineering, became editor-in-chief of The Engineering Economist in 2017. The publication is published and supported by the Institute of Industrial and Systems Engineers and the American Society for Engineering Education. Ryan has been a member of IISE since 1988, became a senior member in 1997, and was named a fellow in 2013.

Jackman elected VP of technical operations

John Jackman, associate professor in industrial and manufacturing systems engineering, was elected vice president of technical operations for the Institute of Industrial and Systems Engineers (IISE) technical operations board. The IISE is the world's largest professional society dedicated solely to the support of the industrial engineering profession and individuals involved with improving quality and productivity.

Kremer honored with engineering design award

Gül E. Kremer, the C.G. "Turk" & Joyce A. Therkildsen Department Chair in Industrial and Manufacturing Systems Engineering, has been named the recipient of the 2016 Kos Ishii-Toshiba Award for her outstanding contributions to engineering design. Kremer was honored for her leadership, dedication to research and passion for teaching engineering design. Presented annually by the American Society of Mechanical Engineers (ASME) Design Engineering Division, the award recognizes "sustained and meritorious contributions to design for manufacturing and the life cycle."

PAGE 8

MSEnews



Right: Students give IMSE research lab tours.

Left: Presenters from the IMSE Undergraduate and Graduate Research Symposium on April 20, 2017.





Undergraduate research makes a difference

Since 2013, the Department of Industrial and Manufacturing Systems Engineering has been the only department in the ISU College of Engineering to create and offer department-funded assistantships for undergraduate research. Additionally, faculty also hire undergraduate research assistants (URAs) with external grant money, and many faculty-funded students also participate in the program. Between 9-28 students have been hired by faculty each semester since 2013, with a total of 138 semester-long positions filled in the past five years. Students work up to 100 hours/semester with faculty and graduate students as part of research teams.

Sixty-seven different department-funded students have filled most of those positions, for one or more semesters each. Of those 67, more than 22% have gone on to graduate school, and another three more have been accepted for the Fall 2017 semester, making the total more than 26%. This significant percentage shows that having an undergraduate research experience is a proven method for helping students understand the value of and be interested in graduate school.

| Semester | Dept. Funded URA Positions/ Semester | Total URAs Participating Each Semester | Number of Faculty Particinating |
|----------|--|--|---------------------------------------|
| Semester | Jemester | Jemester | |
| \$13 | 11 | 11 | 9 |
| F'13 | 12 | 13 | 10 |
| S'14 | 9 | 9 | 7 |
| F′14 | 10 | 11 | 8 |
| S'15 | 11 | 14 | 7 |
| F'15 | 12 | 14 | 8 |
| S'16 | 11 | 14 | 7 |
| F′16 | 16 | 24 | 12 |
| S'17 | 16 | 28 | 13 |
| TOTAL | 108 | 138 | 18 |

Annual research symposium grows bigger and better

IMSE celebrated a significant milestone in April 2017 with a bigger, better, and bolder research symposium than ever before! Twentyseven undergraduate posters were presented by 36 URAs and 20 graduate students who shared their work from the 2016-2017 academic year with Industrial Advisory Council members, IMSE faculty and students, alumni from industry, faculty from other ISU departments, and outside visitors. Attendees were impressed by the event, by both the quality of the students' professional presentations and the quality of the posters. For the first time, student presentations were judged in different categories.

Undergraduate student honors

Best Overall – Josiah Green (Faculty Mentor: Caroline Krejci) "Simulation Modeling of Human Behavior in Production Systems and Team Dynamics"

Best Poster – Sophia Hetherington (Faculty Mentor: Cameron MacKenzie) "Assessing the impacts of simulation on decision making: Using a hurricane simulation for preparedness"

Best Presentation – Connor Thiesen (Faculty Mentors: Jo Min and Gül Kremer) "Predicting Supply Chain Disruption by Text Analysis: An Illustrative Example of Senkaku/Diaoyu Islands" (Faculty Mentors: Minhoel

| | (Faculty Mentors: Michael |
|--|-------------------------------|
| People's Choice Award – Kate Fjelstad | Dorneich and Caroline Krejci) |
| Collecting Data from Marginalized Populations fo | or Community Weatherization |
| and Sustainability" | |
| | |

Graduate student honors

People's Choice – Hieu Pham (Faculty Adviser: Siggi Olafsson) "Understanding Why NBA Teams with Superior Talent Lose in the Playoffs: A Data Mining Approach"

 Best Overall – Srikanthan Ramesh
 (Faculty Adviser: Iris Rivero)

 "Biodegradable Polymer-Bioactive Ceramic Composites for Guided Bone Regeneration"

 Best Poster – Wanyu Huang
 (Faculty Adviser: Caroline Krejci)

 "Analyzing Residential Weatherization Decisions using Hybrid Simulation Modeling"

Students recognized across the country

In addition to the departmental celebration of IMSE URA work, several undergraduate research students have successfully applied and been accepted to showcase their efforts at state, national, and international levels. The following students have represented IMSE well this past academic year:

Josiah Green

- Research in the Capitol, Des Moines, IA (one of 20 ISU students)
- ISU Undergraduate Research Symposium, Ames, IA

Chase Grimm

- Posters on the Hill, Washington, D.C. (one of 60 students chosen nationwide, and the only ISU student)
- National Council for Undergraduate Research Conference, Memphis, TN

Chase Grimm and Andre Fristo

• Systems and Information Engineering Design Symposium, Charlottesville, VA

Jakob Croghan

• Institute of Industrial and Systems Engineers Conference, Pittsburgh, PA

The students' work is summarized in the Spring 2017 CUR Quarterly, including Katie Volz, Amro Al-Kazimi, and Chase Grimm's papers.

Undergraduate research opportunities to expand

In February, the research team of Leslie Potter, senior lecturer, Rick Stone, associate professor, and Devna Popejoy-Sheriff, academic adviser, all in industrial and manufacturing systems engineering, were awarded a \$15,000 Miller Faculty Fellowship from Jonathan Wickert, Senior Vice President and Provost, for their proposal titled, "Finding a CURE: Course-based undergraduate research experiences for industrial engineering students as a model for the College of Engineering." This highly competitive award was one of only seven awarded across the university (http://www.inside.iastate.edu/article/2017/03/09/miller). Potter, Stone, and Popejoy-Sheriff will be working to implement a change of pedagogy in the sophomore-level required IE271 Human Factors and Ergonomics course. While the same content will be included, it will be learned by students through open-ended research activities rather than through traditional lectures. Research shows that students who have an undergraduate research experience have increased student outcomes such as critical thinking, problem solving, networking, and communication skills, in addition to higher retention and increased consideration of graduate school. Potter, Stone, and Popejoy-Sheriff will be collecting and analyzing data to determine the impact that a CURE has on IMSE students. They will also be drafting a model for other IMSE and College of Engineering faculty who are interested in implementing a similar format.

In addition to the Miller fellowship, Stone, Potter and Popejoy-Sheriff were awarded a \$2,500 proposal from the John Deere Higher Education Funding Initiative to support their work with CURE. Specifically, the funds will be used to purchase equipment that will allow them to include hands-on research experiences to all sophomore level students in their IE271 Applied Ergonomics and Work Design course.

The IMSE Department is very excited and proud to have such a thriving undergraduate research program. The URA students do excellent work and represent the department well. The program is administered by Popejoy-Sheriff and Potter.

Green selected to present at Research in the Capitol Symposium

Josiah Green, senior in industrial engineering, presented his poster at the Research in the Capitol Undergraduate Research Symposium on March 28, 2017. His poster, "Simulation Modeling of Human Behavior in Production Systems and Team Dynamics," was selected from a large pool of applications as one of the top 25 submissions from Iowa State.

He presented the poster to legislators and other guests at the Rotunda of the Capitol Building in Des Moines. The event gives an opportunity for undergraduate students who work with university researchers to present their work, and it showcases the importance of undergraduate research on students' academic careers.

Green's research project was done with Caroline Krejci, assistant professor in industrial and manufacturing systems engineering, and in collaboration with David Cantor, associate professor in supply chain and information systems.

Green said the opportunity was a growing and learning experience for him. He enjoyed learning about the other projects that students presented at the symposium.

"Overall, I was honored to represent IMSE, ISU, and constituents across the Regent's schools who are making Iowa a better place to live through university research," he said.

Below: Josiah Green presents his research project at the Capitol Building in Des Moines.





Engineering makes an impact everywhere, even in marching band

Comparing marching band to engineering may seem like comparing apples to oranges, but **Joseph Schneider**, senior in industrial and manufacturing systems engineering and second-year drum major of the Iowa State University Cyclone Football "Varsity" Marching Band, tells us otherwise.

In fact, he says the overlap between engineering and marching band is one of his favorite parts of the activity. "It seems like a funny thing, but any time you're striving for a continuous improvement, you're definitely using those engineering principles that people learn in all engineering fields."



Schneider was recently a part of the Cyclone Drone project, where a few

Schneider

engineering majors in the ISUCF'V'MB got together and proposed an idea that would have a drone capture a bird's-eye view of marching band rehearsals.

"People will have watched themselves and the form," Schneider comments. "They can see, 'oh I was out of step here', or 'I'm going to make this line this way.' When you're on the field, you have one perspective, but to get that bird'seye view is a whole other thing."

Applying concepts from engineering to marching band opens up a lot of opportunities. Engineering majors in the band help with things like the Cyclone Drone project, but also with things such as creating the band's website, or updating and writing manuals for drum majors and other leadership positions.

Schneider notes that the band is made up of about 40 percent engineering majors, while the rest of the band comes from other colleges.

"That's how the real world works," Schneider remarks. "if you expect to work with only engineers your whole life, it would get a little boring. If you're going to pitch a new idea, you need to be able to explain to everyone why it's useful, not just say, 'I'm an engineer and it works.'"

After graduating this spring, Schneider plans to return to Illinois to work with plastic injection molding for Illinois Tool Works.

"I do think I'll want to be in a leadership or management role at some point in my career," says Schneider, "but I think to be most effective in that kind of role, I want to be on the ground floor as long as I can so I really understand how things work at the main, base level before I start making decisions."

Contributed by ECR



Bonner takes silver in human factors video contest

The Human Factors and Ergonomics Society (HFES) recently announced the winners of their annual video contest based on the question, "How does human factors/ergonomics help people?" **Desmond C. Bonner**, human computer interaction and industrial engineering PhD student with **Michael Dorneich**, associate professor in industrial and manufacturing systems engineering, won second place for his video entitled "That's Human Factors!" The video features students and faculty from IMSE and Human Computer Interaction.









video include IMSE featured faculty Stephen Gilbert (above, left) and Richard Stone (above, right). The video shows many different aspects of the human computer interaction, virtual reality, industrial engineering, and human factors research programs at Iowa State.

Stills from the

Students win honors at national meetings

Dan Hu, graduate student in industrial and manufacturing systems engineering, was a winner of the poster competition at the Power Systems Engineering Research Center Industry Advisory Board Meeting, May 17-19, 2017 at Washington State University in Pullman, WA. Her poster was titled "Analysis of Power System Operational Uncertainty from Gas System Dependence." Hu's faculty adviser is **Sarah Ryan**, Joseph Walkup Professor.



Hu

Christopher Hernandez, junior in industrial engineering, received the John L. Imhoff Scholarship at the 2017 Annual Conference and Expo of the Institute of Industrial and Systems Engineers in Pittsburgh, PA. The scholarship is available to a student pursuing an industrial engineering degree who has made noteworthy contributions to the development of the industrial engineering profession through international understanding.

Graduate student excellence award nominees

The ISU Graduate College honors graduate students for research and teaching excellence, recognizing the "best of the best" graduating students who have submitted theses and dissertations and outstanding achievement in instruction.

Mostafa Amin-Naseri - Teaching Excellence Award, Spring 2017 Davood Hajinezhad - Research Excellence Award, Fall 2016 Ye Han - Research Excellence Award, Summer 2016 Dan Hu - Teaching Excellence Award, Summer 2016 Fikri Kucuksayacigil - Teaching Excellence Award, Fall 2016 Qi Li - Research Excellence Award, Fall 2016 Yihua Li - Research Excellence Award, Spring 2017 Didem Sari - Teaching Excellence Award, Summer 2016 Thomas Schnieders - Research Excellence Award, Spring 2017 Jaipravin Vijayarangan - Teaching Excellence Award, Spring 2017 Euijung Yang - Research Excellence Award, Summer 2016 Minxiang Zhang - Research Excellence Award, Spring 2017

IMSE nominates outstanding seniors for Engineering Student Marshal

Fall 2016: Alicia Guzmán Gutiérrez

Alicia Guzmán Gutiérrez, an industrial engineer from Guaynabo, Puerto Rico, was a George Washington Carver Scholar (2012) and a Tau Beta Pi Iowa Alpha Scholar (2013). She is a founding member of the George Washington Carver Advisory Board's Special Initiatives Committee and served on this group from 2013-2016.

Guzmán Gutiérrez was an undergraduate research assistant for the Department of Industrial and Manufacturing Systems Engineering, where she researched recycling processes to develop an environmentally sustainable end-of-life plan for wind turbine blades (2014) and helped develop the dashboard for manufacturability software as a member of the Rapid Manufacturing and Prototyping Laboratory (RMPL) team.

Spring 2017: Amro Al-Kazimi

Amro Al-Kazimi, an industrial and manufacturing systems engineer from Amman, Jordan, served in several leadership positions while at lowa State, including holding the position of president of Alpha Pi Mu, the Honors Society for Industrial Engineering. Al-Kazimi also worked as an undergraduate research assistant, where he used economic modeling to assess the impact of natural and man-made disasters.

He also gained valuable work experience as a summer intern with PricewaterhouseCoopers in Dubai (United Arab Emirates) and with Unicharm Gulf Hygenic Industries in Riyadh (Saudi Arabia). After graduation, Al-Kazimi plans on attending graduate school.

Sriram Sundararajan, associate dean for academic affairs for the College of Engineering, presents Al-Kazimi with his plaque. Outside of her research, Guzmán Gutiérrez held a wind energy engineering internship (2015) and a transmission planning internship (2016) with Alliant Energy. She also served as a teaching assistant for Engineering System Design, Manufacturing Processes and Specifications (IE 248).

Guzmán Gutierrez also explored Swansea University, Swansea, Wales, in Spring 2015. She will continue her education with a Master of Science in Industrial Engineering at Iowa State University.



Gutiérrez







Seeing the big picture

Jordyn Koenig came to Iowa State as a freshman in undeclared engineering and was looking for a program that matched her interests. Now a junior in the industrial engineering program, she is sure industrial engineering is the right fit.

"I like seeing the whole picture, not just one step in the process. Industrial engineering allows me to look at the system as a whole and concentrate on the bigger picture," Koenig said.

Over the summer in 2016, Koenig was an undergraduate intern at Mayo Clinic in Rochester, MN in a center focused on using research and integrated practice to improve health care delivery systems. She worked as part of the Healthcare Systems Engineering program in the Robert D. and Patricia E. Kern Center for the Science of Health Care Delivery. The Robert D. and Patricia E. Kern Scientific Director for Healthcare Systems Engineering is **Dr. Susan Hallbeck** (BSIE'84).

Left: Koenig working with the lead clinician, Dr. Tom Hellmich, at the Mayo Clinic.

"Even this early in her education, ISU has prepared Jordyn for a professional setting with engineering principles that will carry her through her career," Hallbeck said.

Koenig worked closely with the Emergency Department Clinical Engineering Learning Laboratory (ED-CELL), which embeds engineers in a clinical setting with physicians to co-create solutions to clinical questions and enhance the ED experience for both patients



Hallbeck

and staff. Her focus project for the summer was Interruptions and Workload: The Impact on Emergency Department Residents and Nurses.

As part of this study, Koenig shadowed nurses throughout the entire duration of their shift. Information was recorded about each and every interruption that the nurse experienced. Over 380 hours of data collection observations were made this way. At the end of the summer, these data were then analyzed to determine type, frequency, location, and length of the interruptions. This data will be used to study the effects of interruptions on the cognitive workload of the nursing staff and the implications it has on ED patients.

"It was exciting to experience the medical side of health care engineering. Studying engineering, I never expected to spend much time in a hospital, but it was an eye-opening experience. It was highly rewarding to see the positive impacts engineering had on the lives of the patients and the staff," said Koenig.

Koenig also worked with the Radio-Frequency Identification (RFID) system in the ED where she developed and executed accuracy tests for the newly installed system. Outside of the ED, she analyzed laparoscopic surgical data from an AHRQ funded project and is continuing to work on a systematic review to address the impact of laparoscopic and robotic surgery on surgeon workload and musculoskeletal injuries.

Her experiences over the summer have sparked an interest in ergonomics and health care engineering. She plans to work for a master's degree and is considering a Ph.D. in order to continue research in health care.

IE student mentors robotics team

Erin Mitchell, a former IE 222 student, was one of five college mentors for a high school FIRST robotics team based out of Ames, named Team Neutrino *(teamneutrino.org)*. The team qualified for the World Championships, where they competed against 400 of the top teams from across the world. Mitchell travelled with 30 high school students and the other coaches to the competition in St. Louis, MO, April 26-29, 2017.

Right: Team Neutrino after they won the Chairman's Award at the Minnesota North Star Regional in Minneapolis.



Cerka retires after 42 years

Donna Cerka retired in August 2016 after working 42 years at Iowa State, with the majority of those years spent with IMSE. She worked in the main administrative office of IMSE through multiple building moves, new department chairs, and the comings and goings of numerous faculty, staff, and students. She supported the department's financial processing among other things, and held a wealth of knowledge about the department and university. She is enjoying her retirement with her family, and is greatly missed in the department.

Madden receives Impact Award

Warren Madden (BSIE'61) received the Impact Award by the ISU Alumni Association in Fall 2016. He recently retired from his position as Iowa State University's senior vice president for business and finance after serving the university administration for more than 50 years. After earning his MBA from the University of Chicago in 1965, Madden came back to ISU in 1966 as the university's first contracts and grants officer. He became a vice president in 1984 and senior vice president in 2012.



Madden



A magical adventure

A Disney internship just might be the happiest internship on earth for Iowa State fifth-year senior **Emily Carter**. After all, she's dreamed of working at Disney ever since she can remember. As it turns out, Iowa State was the place that could help make her dream come true.

In the industrial engineering program, Carter found everything she needed to build an impressive résumé. She found courses that challenged her. Leadership opportunities that helped her excel. And, maybe most important, she found professors who encouraged her every step of the way. Said Carter, "The faculty at Iowa State genuinely care about you and want you to succeed."

Through this internship, Carter will provide analytical support to Disney's merchandising, attractions, and entertainment business lines. For her, it's a once-in-a-lifetime adventure. After all, her family has traveled to either Disneyland or Disney World from their home state of Washington every year since she was just 10 months old. As Carter puts it, "How often do you get the chance to work for the best hospitality company in the world while fulfilling a lifelong dream at the same time? I'll look back on this experience for as long as I live."

Sure, Disney might be known as the place where dreams come true. But lowa State also has a reputation for making dreams a reality. No matter if your dream is to land an amazing internship at Disney or a job reporting for TIME magazine — when you come here, you can find a magical opportunity too.

From Iowa State University, www.iastate.edu

VR goes to the Iowa State Fair

Five ISU students spent their Saturday at the 2016 Iowa State Fair promoting Augmented Reality (AR) and Virtual Reality (VR) to hundreds of fair-goers who walked through the 4-H building. Children and parents visiting the booth experienced demos of AR on iPads and VR in the Oculus Rift. Visitors learned about the practical uses of both VR and AR. The team also explained their ongoing research with farming technologies at ISU's Virtual Reality Applications Center (VRAC). Involved in the outreach were Chase Meusel, HCI graduate student; Kaitlyn Ouverson, senior in psychology; Jordan Starkey, senior in industrial engineering; Chase Grimm, junior in industrial engineering; and Carter Engen, sophomore in industrial engineering. Vijay Kalivarapu and Paul Easker, VRAC staff members, helped put the display together.

Right: Chase Grimm demonstrates virtual reality research and promotes the AR and VR programs at lowa State.





In memoriam

Herbert T. David, 89, of Ames, passed away in July 2016, in Winnetka, Ill. Retired professor of statistics at Iowa State University after serving over 40 years. Beloved husband of Carol; dear father of Ted, Chris (Karen) and Carla (Bill) Young; Ioving grandfather of Kyle, Laura, Claire, Caroline, Margaret, William and Charlotte.

IMSEnews

Thank you!

Individual donors to IMSE from October 1, 2015 through June 27, 2017

Abhinav Anand Robert Arnold Darren and Melissa Ash Gordon and Nancy Auguston Phillip Auld Elmer Aurand John Bauer James Bauswell Brett Beckfield Nicholas Berkholtz John and Anna Borchers Larry and Ann Bovenkamp **Robert Bowers** Elaine Bredesky **Richard and Rochelle Brenner** Norman Brinker Mary Brown Mark Bruch and Teresa Brown George Burnet William and Vivian Carter Alan Caslavka Jesse and Marylyn Chapman Henry Chu Harold and Susan Cowles John Croes Rodney and Lois Crouse Dr. Michael Cyr Jeffrey Dahm **Delbert Davenport** David Delagardelle Chester and Elaine Diercks Rui Ding David and Patricia Drew John Dunn Raymond Edlund Scott and Martha Elston John and Marcia Even Edward Farley

Jeanne Faust **Daniel and Marie Fellows Doris Fondroy Thomas Foss** Terry and Mary Lynn Franco John Frederickson **Rollin Geddes** Robert Goodrow Stanley and Debra Grav Carol Green Delmer and Deborah Harris Gailen Hart **Constance Harvey** Peter and Mary Hassler James Hermetet Steve and Nancy Heymann Katherine Hoover Ryan Horak Kim Hyland Mark Jensen Keith and Linda Jessen Donald and Nancy Johnson Robert and Elizabeth Jones Alan Kamphuis Prashanth Karra Patrick and Jane Keily Roy and Linda King Melissa Kruse Sally Landmark Youngrok Lee Dale Leiting Cherng-Tarng Lin Joseph Lipic Randall and Beth Lisbona David Louis Florence Lyman Carol Mackin Ashu Malviya

Andrew and Amanda Marg Kevin and Nancy Mathis **Cindy Matthies** Robert Mayer Justin Mayland **Dennis McComber** Dianne McMullin Helen McRoberts Verlis Miller Paul Monsma Michael and Ann Morrissey Armin Muhamedagic Burnell and Fern Nelson Joel and Beth Norby Jacob Oakland W Reid Odean Richard and Grace O'Leary Jon and Ann Oneyear **James Paisley** Lanny Patten Scott Pauley **Robert Paulson** Donald and Janet Payer Carl Pelzer Thomas and Sonja Penaluna John Peterson Samuel Poe Paige Prepula Mark and Darlene Pullen Thomas and Janet Putnam Carl and Valerie Rausch **Richard and Mary Renk** Frank and Mary Reynolds Thomas Ries Jason Roberts Dennis and Sally Rust James Schlick Barbara Schlueter

Dale and Alice Schumacher Marc and Carolyn Sequeira Lindsey Shaffer Col. Grantland Shipp Alex Sitzmann John Slater David and Melissa Sly Jo Spotts Arlan Stavnheim Harold Steen **Roy Stevenson** Todd and Royanna Stratmoen James and Dail Swanson Nancy Tamashunas C.G. 'Turk' and Joyce Therkildsen John and Kris Tillo E. Alan Troeger Todd Trogu John Tuttle Claire Uldrich Steven Vanek Somchan Vuthipadadon Mitchell Waller **Benjamin Warrick Betty Waters Timothy Weiss Daryl Wells** Bruce Werth Ronald Weuve Wesley White Jason Wiegert **Douglas Wight** Ronald Seeber and Ellen Wilson Jon and Wendy Yanney Michael Youngblut Daniel Zelik Dana and Mary Zimmerman





Fall Welcome Back Picnic

Above, left: IMSE students lined up to get lunch at the 2016 picnic.

Above, right: Leslie Potter, senior lecturer, serves up ice cream treats to the students.

Right: Kevin Brownfield, senior ERD machinist, left, and Frank Peters, associate professor, right, grill up the hamburgers, veggie burgers, and hot dogs at the 2016 Fall Welcome Back Picnic held in the courtyard of Black Engineering Building.

Below, left: All IMSE students were invited to the picnic.

Below, right: Claire Barker, Krista Briley, and HollyTwedt helped serve the food to the guests.







IOWA STATE UNIVERSITY

Department of Industrial and Manufacturing Systems Engineering

3004 Black Engineering Iowa State University Ames, IA 50011-2161

Your support makes a difference

Generous gifts from our alumni, corporate sponsors, and other partners enable the industrial and manufacturing systems engineering department to continue its tradition of academic excellence. Your contributions to the department make a lasting impact on our program and the success of our students through initiatives that include

- Providing scholarships and fellowships for recruiting and retaining students and top-caliber faculty
- Supporting student leadership groups and undergraduate research
- Awarding seed money for new projects
- Funding access to state-of-the-art technology through new equipment purchases and laboratory renovations

Please use this form to contribute or contact the College of Engineering Development: Ryan Harms, at 515 294-0743 or *rharms@iastate.edu* to learn about other ways you can support the department.

|] I would like to contribute to the department in the amount of | | | | | | | |
|---|-------|-------|-------|-----|------|--|--|
| \$50 | \$100 | \$250 | \$500 | \$1 | ,000 | | |
| Other \$ | | | | | | | |
| | | | | | | | |

□ I am interested in information on establishing a scholarship, naming a laboratory, or creating a named faculty position.

I would like information on planned giving.

- ☐ I have included the Industrial and Manufacturing Systems Engineering Department in my estate plan.
- My gift \Box does \Box does not qualify for a company matching gift.

Payment Type

Check enclosed (payable to the Iowa State University Foundation)
 Credit card (please contact the IMSE Department at 515-294-0127)

Please return form and payment to:

IMSE Department 2529 Union Drive Ames, Iowa 50011-2164

We appreciate your support!

We'd love to hear from you!

Please keep us updated on your personal news and career moves.

Name

Address

City/State/Zip

Business Title/Position

Company/Institution

E-mail

Phone

Year(s) of Graduation/Degree(s)

Career activities, professional honors, family information, any other information: