ISE

Industrial and Enterprise Systems Engineering

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NEW FACULTY CHAIR

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PROVIDE HEATHCARE IN AFRICAN VILLAGES

HELPED PUT A MAN ON THE MOON

Institute of Industrial Engineers

North Central Region

ENGINEERING AT ILLINOIS

Message from Rakesh

Rakesh Nagi
Department of Industrial and
Enterprise Systems Engineering
Head & Donald Biggar Willett
Professor Fellow, Institute of
Industrial Engineers.

Dear friends and family of ISE,

It's been a year of great changes and exceptional accomplishments at ISE!

Chief among these is the final implementation of a decision made by ISE and the Alumni Board about two years ago. As of this Fall, the BS General Engineering major (GE) will be known as BS Systems Engineering and Design (SED). Our lead article () explains the rationale for this decision in great detail and I invite you to read it. However, I want to assure our giant family of GE alumni that the change is in name only—the curriculum, the spirit, the program remains exactly the same. Just as we have made some necessary improvements to the Transportation Building to keep it current, it's the same building you remember. The same is the case with the GE major.

Secondly, also starting this Fall, we are breaking new ground by adding a new transcriptable concentration in Advanced Analytics to our master's program in Industrial Engineering (page 2). Within the concentration, we have six new and exciting courses approved for this concentration. Advanced Analytics is a fresh and innovative new field that will prepare those students who participate for the rapidly growing field of big data and data analytics. See for a longer story on this great opportunity for our current and future graduate students.

Most important to us, many of you will recognize the great Jerry Dobrovolny (see the letter from Wally Holmes on page 30). Jerry served as department head from 1959 to 1987. He fought to keep the department alive and thriving, and has continued to mentor and support us ever since. This year, Jerry Dobrovolny has established a $2 million endowed chair. This new chair will attract a superlative and preeminent teacher, scholar, and researcher. See page 5 for an article about Jerry and the opportunities this chair will afford our department, faculty, and students.

All of these exciting developments are affirming our strength as a department and as leaders in Industrial and Systems Engineering. I am proud to be a member of a community that continues to support each other and rise to the challenges we are presented.

Through the efforts and generosity of our alumni, friends, faculty, and staff, ISE will remain strong and continue to launch our students into a wide array of prominent positions in myriad industries around the world.

Thanks for your support.

Sincerely,
Rakesh Nagi

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INNOVATE. SERVE. EDUCATE. ISE.

ENGINEERING AT ILLINOIS

FROM THE MANAGING EDITOR'S DESK

In the last three years, Department Head Rakesh Nagi and our team have made tremendous strides. While the roots of the General Engineering degree stretch back to the origins of the University of Illinois, the ISE department— formed from a merger of the General Engineering and Industrial Engineering programs—is only a decade old. New staff brought on board to help build our student and alumni family include Coordinator of Student, Alumni & Corporate Relations Lee Zerrusen (lzerrus2@illinois.edu); Senior Director of Advancement John Southwood (jfswood@illinois.edu); and yours truly (gillespi@illinois.edu). And let's not forget the Air Force vet who cheerfully keeps our squadron in tight formation—Operations Manager Shawna Graddy. In this time, our graduate ranking in *U.S. News and World Report* has risen two points, our undergraduate ranking at least three points, many alumni have made contact for the first time, and untold improvements have been made to our beloved Transportation Building—but nostalgic alumni need not worry! It's very much the building you remember. Visit and see. Although changes are afoot, grads should know we are maintaining traditions. You are still family. *In honor of the science of systems engineering, I am supplying this issue with myriad external links and cross references, because every ISE story is only an element of the entire system of discovery and education and outreach we embody.*

— William Gillespie,
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and Marketing Coordinator
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Photography by L. Brian Stauffer

GENERAL ENGINEERING MAJOR CHANGES NAME TO SYSTEMS ENGINEERING AND DESIGN

Mike Helenthal

In Fall 2016, the Bachelor's of Science in General Engineering changed its name to the Bachelor's of Science in Systems Engineering and Design. The decision was not made lightly. Much time was spent gathering information, and talking to many students, alumni, and employers before the decision was finalized.

The underlying question has been, as it always is at ISE: "How will this help our students succeed?"

Assistant Director of Undergraduate Programs Heidi Craddock says, "The General Engineering degree as we know it has been a great curriculum since it was created in 1953, and the program has deep roots in design from the time it was originally called General Engineering Drawing (established in 1921). General Engineering was also one of the original five programs on the Engineering campus to be accredited, beginning in 1936."

The GE name, while a legacy, is outdated.

"This coupling of the words 'systems' and 'design' in the name very much coincides with how engineering as a discipline is evolving," says ISE Department Head and Donald Biggar Willett Professor Rakesh Nagi.

While protractors and blueprints were long ago replaced with computers and data analytics, the academically rigorous palette approach of the old General Engineering program won't be changing anytime soon.

Transportation Building, ca. 1930, and in 2016

Under the Systems Engineering and Design banner, students will still learn the breadth of engineering science, they will still choose a specialized focus, and they'll still be asked to apply that specialized information to dream about, create, and maintain advanced systems around the world.

The tried and true approach has led students to practically invent their own specialties—"to reach a little bit out of their normal reach," as Nagi puts it —with graduates going on to such non-traditional engineering jobs as patent law, medicine, policy, and consulting.

"The curriculum base is the same—it hasn't changed with the name," Nagi says. "In systems engineering, the interaction between component parts is more formalized and focused upon. But what we do that's different than other programs is establish pedagogies to show how everything relates to one another. We create a more holistic engineer."

Nagi says department leaders discussed the name change with students, alumni, faculty, and industry leaders, then shepherded the proposal through the requisite campus academic committees to give everyone a chance to weigh in on it.

Craddock explains, "General Engineering students are second to none in their education, work ethic, and experience. The nature of the students ha[s] not changed but times have changed and there are not very many programs named 'General Engineering' in the United States."

For these reasons, Craddock believes, the name change will permit better recognition of our outstanding students and afford them greater opportunities upon graduation.

Saachi Shah, a 2013 General Engineering graduate and member of the ISE alumni board, says she experienced the terminology disconnect as soon as she started applying for post-graduate employment. She had seven offers upon graduation, but she spent a lot of time explaining her credentials to interviewers.

"I always used to be asked 'So, you don't have a specialized major?'" she recalls. "It was the most frustrating question I got. It led me to using 'Systems Engineering' on my résumé anyway, and it seems to have eliminated a lot of the confusion."

Jim Newman, a member of the ISE Alumni Board, says he was surprised when he first heard the degree was changing its name.

"When we were made aware of the proposal, I became a bit nostalgic, saddened, and honestly, slightly defensive," he says.

But then he learned about the student-centric rationale for the change, and that the core mission of the department wasn't changing, but evolving. After those assurances, he jumped on board with both feet.

"Undoubtedly, the change will position our great students to compete more effectively in the job market," he says. "Isn't that what truly matters?"

FOR FURTHER READING

READ THE FULL STORY ONLINE
http://ise.illinois.edu/newsroom/article/general-engineering-name-change

FAQ
http://ise.illinois.edu/undergraduate/systems-engineering-and-design-degree/name-change-faq.html

NEW ADVANCED ANALYTICS MASTERS CONCENTRATION

Mike Helenthal

ISE is taking steps to tame the wild frontier of computer technology. "Computers have never had enough sensors or power to collect and organize data," says ISE Department Head and Donald Biggar Willett Professor Rakesh Nagi.

"It's left us swimming in a sea of data – but now we have to answer: How do we analyze it and find creative ways for leveraging it to make better decisions and create a better world?"

The 2011 McKinsey Global Institute report, "Big Data: The Next Frontier for Innovation, Competition and Productivity," warns of a shortage of "deep analytical" talent that could reach as high as 190,000 unfilled positions in the U.S. by 2018.

This fall, ISE unveils its new Advanced Analytics master's concentration, giving students six new focused course options that teach them how to apply engineering approaches and methods to the analysis and management of engineering and business processes.

Students will learn how to collect, clean, and analyze data; build decision models based on data; and make predictions and decisions.

"We teach how to make data decisions to solve real-world problems, and are giving students more choices for where they can apply this knowledge," Nagi says. "With the concentration, they have a brand-new set of courses that they can custom-design and get the outcome they are looking for."

Associate Professor R.S. Sreenivas, head of ISE's Graduate Studies program, says the department has gone the extra mile to ensure the concentration has real value to students—and employers—after they graduate.

Nagi says the department is trying to fill not only students' needs with the addition of the Advanced Analytics concentration, but society's.

Nagi says the decision to add the concentration was guided by many conversations among industry-involved faculty, as well as reliance on major industry reports explaining the current and future state of the discipline.

"Our objective is to help meet this large demand from the external world to analyze all of the information that's being collected," Nagi says (page 15).

He says Illinois is particularly well-placed to give students the most up-to-date analytics education experience because of the university's neighboring Research Park, which houses industry heavyweights like Yahoo! and InBev.

"We are very fortunate that a number of industry players are right in our own backyard," Nagi says.

"It provides a real opportunity for our students that they can't get just anywhere. We want to open as many doors for students as we can."

FOR FURTHER READING

READ THE FULL STORY ONLINE
http://ise.illinois.edu/newsroom/article/advanced-analytics

NEW DOBROVOLNY CHAIR IN SYSTEMS ENGINEERING & DESIGN

Mike Helenthal

If you are prepared you will always win.

Jerry Dobrovolny is a hero to the ISE community.

Jerry Dobrovolny is the founder of the General Engineering Department, formerly the Department of General Engineering Drawing, which would eventually merge with the Department of Industrial Engineering to become ISE.

He served as head for nearly 30 years.

He is also the benefactor whose generous support makes possible the department's first funded faculty chair in Systems Engineering and Design.

"He spent his whole adult lifetime creating this department," says daughter Janet on behalf of the 93-year-old emeritus professor. "He wanted it to live on for a very long time."

Jerry believed that if you are prepared you will always win.

By high school, Dobrovolny's teachers had noticed that his mathematical abilities were off the charts. They petitioned Jerry's parents, asking them to allow their gifted son to attend the University of Illinois.

It didn't take long for his career at Illinois to take off.

Jerry received his BS in General Engineering at the University of Illinois in 1943.

In December 1944, the department asked him to start teaching a 3-month engineering drawing class to army recruits. He decided to stay.

While teaching in the GED department, he also worked on a navy research project in the department of Civil Engineering, investigating the notch sensitivity of wide steel ship plates that were used to build liberty ships.

In addition, he completed a master's degree in Mechanical Engineering while teaching in GED.

Upon completing his master's, Jerry joined the Department of General Engineering Drawing in 1945 as an instructor and rapidly rose through the ranks to full professor and department head. He served as department head for nearly thirty years, officially retiring in 1987 from what is now known as the Industrial & Enterprise Systems Engineering department.

Under his leadership in General Engineering, he was responsible for a number of new initiatives, including Gamma Epsilon, the General Engineering honor society, and the ISE Senior Design Program (page 36), launched in 1961, which has since been emulated nationwide.

The Jerry S. Dobrovolny Distinguished Professorship Fund will honor this gifted educator, mentor and scholar by supporting and recognizing outstanding faculty members in the Department of General Engineering.

FOR FURTHER READING

READ THE FULL STORY ONLINE
http://ise.illinois.edu/newsroom/article/jerry

APPLY FOR THE POSITION
http://ise.illinois.edu/newsroom/article/dobrovolny-position-announcement

Longtime Department Head Jerry Dobrovolny.
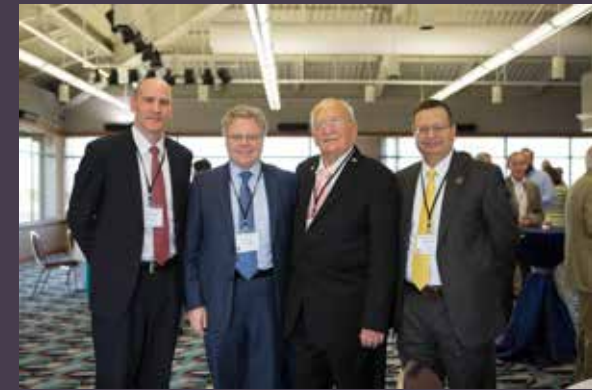
Interim Vice Chancellor for Academic Affairs and Provost Edward Feser, College of Engineering Dean Andreas Cangellaris, guest of honor Jerry Dobrovolny, and ISE Department Head Rakesh Nagi

Dean Wynn Korr of the School of Social Work, Jerry's daughter Janet, and Jerry at Foundation Week, 2015

7th grader Cameron Griffin works with Computer-Aided-Design (CAD) software at ISE.

Jim Leake oversees 10th grader Taylin Martin applying reflective dots to the face of 6th grader Jamaicca Dyer. The scanner will read the locations of these dots and use them to reconstruct a 3D model of Dyer's face.

Product Design Lab T.A. and ISE graduate student Baigalmaa 'Joanna' Batmunkh (center) assists 9th grader Alexa Stallworth.

ISE TEACHES MIDDLE SCHOOL AND HIGH SCHOOL STUDENTS CAD LITERACY

By Mike Helenthal. Photography by Joanna Strauss.

This summer, twelve-year-old Tabyous Little officially joined the Maker Movement.

Little is one of twenty middle-school and high-school students who participated in a six-week CAD Literacy Program offered by ISE and local non-profit Urbana Neighborhood Connections Center (UNCC). Students learned the entire process of using computer-aided design technology to design and create objects of their choice in a University of Illinois computer lab.

"We could make anything we wanted," says Little, who chose to produce a "spinny" top and a car.

Tynaiah McGhee, 11, also became a Maker, but did so on her own creative terms.

She saw the process as an opportunity to show her uniqueness, going out of her way to tweak some of the details of her 3-D-rendered house to ensure it wasn't like the others.

"I didn't make mine like the other kids did," she says. "I kind of explored with it."

Little says he enjoyed the "making" part of the process, but the broader impact the technology will have on his generation's future was not lost on him.

"It could do a lot of good things," he says. "I'd like to learn more about how it all works. How does the process go and how do they get it to actually make the stuff?"

Jim Leake, who developed the new outreach program with the support of the ISE department, says he is pleased it is already inspiring wonder and creativity in the young students – and believes it's the starting point for something much larger.

"We hope there is an impact on even just a couple of these kids," he says, "but this won't be a successful agent of change for the community if it's just a one-time deal. It's vitally important and it's something we'd love to keep going. This is something that can change lives."

Leake is already thinking of ways to improve and expand the program to expose even more students to computer design technology, and has the full support of ISE Head Dr. Rakesh Nagi.

Leake says the intrinsic curiosity that drives the Maker Movement can itself be used as a new tool to show kids the direct connection between computers, design, and the products they use every day.

"We wanted to make this a tangible experience, a way to make a connection with the students," he says. "All of a sudden, everyone can be a designer and everyone can be a maker, and it's all connected to this digital information and knowing how to manipulate it."

In addition to making toys, the students were introduced to facial-scanning technology and shown a documentary on the digital construction process behind a 3-D bust of President Obama.

Likhith Madamanchi (), an ISE graduate student who assisted Leake, says he was amazed at how quickly the young students took to the new technology.

"Most of these kids have never been exposed to CAD before and yet were able to pick it up gracefully after just a few sessions," Madamanchi says. "Kids were very interested in learning CAD to model objects from their own imagination."

Joey Lund, an ISE project assistant, says he felt like the group had made an impact beyond the Illinois campus.

"The fact that the kids were so receptive really affirmed for me the importance of providing such an opportunity to them and to other kids who might otherwise never get a chance to learn those skills," Lund says.

All of the assistants say they fielded several questions from the students, as well as their high-school-age chaperones, about the kind of degree needed to further study the technology.

Janice Mitchell, the UNCC's executive director, says the students who went through the CAD Literacy Program are still talking about it – and hoping there is more to come.

She says the program fits nicely into the center's after-school programs, which serve an average of 50 kids a day ranging from kindergarten to pre-college age. The center is supported by private donations and a host of community partnerships.

Mitchell says that just being exposed to the topics discussed in the CAD Literacy Program gives students a mental edge and mindset they might not develop elsewhere.

"These kids have had an opportunity to experience and be exposed to things that other kids their age may not ever get the chance to see," she says. "That experience is so critical to kids at this age – to know what exists and what the possibilities are."

The center already works closely with Illinois's Fab Lab, which has helped supply three networked computer labs, as well as educational software and other academic opportunities.

Mitchell says the program through ISE is especially valuable because it provides students with a process that reinforces their capabilities, and an actual product they can hold in their hands.

"Our partnership relationship with the university has grown tremendously," she says. "It's important because this is more than just giving kids the opportunity to use a computer, it's about providing instruction so they can use it as a tool. The volunteers from the university have really gone the extra mile."

Mitchell says the sense of empowerment the program brings has the potential to become exponential. "They will go back to school and talk about what they did this summer, and share their experience with other kids," she says. "At this age, you expose them to that which is productive and healthy, and that will help prepare them for the future.

"These kids may be our next engineers, just because somebody lit that spark."

FOR FURTHER READING

READ THE FULL STORY ONLINE
http://ise.illinois.edu/newsroom/article/cad-literacy

URBANA NEIGHBORHOOD CONNECTIONS CENTER
http://www.urbanaconnectionscenter.org/

SEE A VIDEO OF A 3-D MODELING OF PRESIDENT OBAMA!
https://www.youtube.com/watch?v=4GiLAOtjHNo

8th grader Ariana Hopkins holds still for a (painless) scanning of her face into a 3D digital model, which can then be printed in a 3D printer.

Product Design Lab Assistant and ISE undergraduate student Joey Lund (center) works with Daesha Winston and Alexis Stallworth, 9th grader.

6th grader Kam'ron Williams and 7th grader Ronnie Carter display their emerging 3D modeling skills.

ISE FACULTY
HENRIQUE REIS

OUT OF AFRICA
Henrique Reis Draws on the Lessons He Learned in Angola

Doug Peterson

In many ways, Henrique Reis was like any other teenager who loved hot rods in the 1950s and '60s—always tinkering with engines and rehabilitating old cars. But there was one important difference. Unlike most American hot rod enthusiasts, Reis recalls the thrill of riding land rovers in the midst of a thundering herd of wildebeests.

Reis was born in Portugal, but after age two he spent his formative years in Angola, where his family raised their own chickens and were not surprised to see cheetahs, lions, and hyenas in the wild. Reis also learned to be self-sufficient.

"I lived in a low-density area of Angola, so there were no mechanics around," he says. "If something broke, you needed to fix it yourself."

Today, Professor of Industrial and Enterprise Systems Engineering Henrique Reis continues to "tinker" in his University of Illinois laboratory—but it's a different kind of tinkering. For over 35 years, he has turned his talents to the integrity of materials and structures such as wood, asphalt concrete, tires, glass, steel components, and more.

In recognition of a career devoted to the non-destructive testing of materials, Reis has received three major awards in the past year alone. He won the Founders Award from the American Society of Mechanical Engineers, as well as two awards from the American Society for Nondestructive Testing—the 2016 Research Award for Sustained Excellence and the Outstanding Paper Award.

The Outstanding Paper Award was for a research article in the October 2015 issue of Materials Evaluation; this article features some of the research that Reis's lab has done on "rejuvenators" and how they can extend the life of asphalt concrete pavements. He will be recognized at ASNT's 2016 fall meeting.

Reis was first drawn to engineering as a youth in Angola, and he majored in mechanical engineering at the University of Luanda (currently named University of Agostinho Neto) in the country's capital. He came to the United States in 1973, when he travelled to MIT to do his graduate work.

Despite having English language skills that he described as "atrocious" when he arrived in the United States, Reis aced his first four classes and went on to receive his master's degree in 1975 and PhD in 1978, both from MIT. His graduate work was on "dynamic plastic buckling of shells," where he studied the

Professor Victor Giuriutiu from the University of South Carolina presenting Professor Reis with the American Society of Mechanical Engineers (ASME) Founders Award, which is given by ASME's Nondestructive Evaluation, Diagnosis, and Prognosis Division (NDPD).

Reis delivering the Keynote address at the "8th RILEM International Conference on Mechanics of Cracking and Debonding in Pavements" in Nantes, France. RILEM is the International Union of Laboratories and Experts in Construction Materials, Systems, and Structures.

response of shell-like structures to severe transient loads like underwater habitats.

He landed the job at Illinois in 1980, after teaching engineering in Brazil for a year. Since then, he has been teaching courses in advanced strength of materials, materials response, nondestructive evaluation, and design, in which he stresses the need to design components that are easily inspected and monitored. Meanwhile, he says he stumbled "by accident" into the research area that would become his life's work—nondestructive testing of materials and structures.

In the late 1980s, a company asked him to do nondestructive testing of compressed fiberboard to find out which ones swelled the most when exposed to humidity. For this, he received an equipment grant from the National Science Foundation, launching him into a new and productive area of research.

Nondestructive testing does just what it says: it relies on all types of non-invasive procedures, such as ultrasound, to test materials. Reis compares it to visiting a doctor and going through a battery of non-invasive tests to get a diagnosis on your health without exploratory surgery.

In his most recent work, Reis has found a way to detect and assess damage in steel pressure vessels due to high temperature hydrogen attack (HTHA) at oil refineries. As one example of the danger of this mode of failure, a 2010 explosion at the Tesoro Refinery in Washington State was caused by HTHA damage in a heat exchanger, killing seven workers.

"There had been no method to detect this mode of failure before it was too late, but we have found a way, using non-linear ultrasonics," he says.

Whether it's asphalt pavements, steel refinery pressure vessels, or bridges, materials deteriorate—sometimes at alarming rates. Reis says, "If you don't nurture structures such as bridges, if you don't rehabilitate them, the damage keeps accumulating. And it gets to a point at which it's very difficult to rehabilitate."

Reis learned about the importance of maintenance at an early age, when he lived a more isolated existence in Africa, and they had no choice but to take good care of their tools and other equipment. He also learned from a young age to make do with limited resources—a habit he continues in his lab today. He says he always keeps an eye out for laboratories that are shutting down and selling off equipment.

"Any time I see equipment on sale, I try to bargain for it," he says. "There is always room for more equipment."

As he puts it, "Old habits die hard."

FOR FURTHER READING

READ THE FULL STORY ONLINE
http://http://ise.illinois.edu/newsroom/article/out-of-africa

NONDESTRUCTIVE TESTING AND EVALUATION LABORATORY
http://ise.illinois.edu/newsroom/article/doctor-henrique-reis-and-nondestructive-testing-and-evaluation-research-laboratory

Reis in New Orleans with Dr. Gary Georgeson and Dr. Anish Poudel receiving the American Society for Nondestructive Testing's 2016 Research Award for Sustained Excellence.

For two decades, ISE Professor Henrique Reis's Engineering Design Analysis students have competed in an annual balsa wood project. Students attempt to optimize the use of materials in innovative designs by building a structure using only balsa wood and adhesives. The structures, which cannot weigh more than 150 grams, are then put to the test, and an award is given to the structure with the highest load-to-weight ratio. Pictured (top to bottom) Megan McGovern (page 16), John Conway, and Peter Maneykowski demonstrates confidence in his structure. *Photos courtesy of Hi C Photography.*

As told to William Gillespie

WHAT IS SUPPLY CHAIN?

This interview with Xin Chen is meant to serve both as a broad introduction to the topic of supply chain—one of the many facets of industrial engineering—as well as a deep discussion of Professor Chen's recent research.

Xin Chen is an expert in optimization, revenue management, and supply chain management. He was the winner of the INFORMS Revenue Management and Pricing Section Prize in 2009, and the third edition of his book The Logic of Logistics: Theory, Algorithms, and Applications for Logistics and Supply Chain Management *was released in 2014.*

Supply chain is, very succinctly, the movement of stuff from place to place. In supply chain management, you want to develop strategies to make the movement of physical products happen in an efficient way to minimize costs, satisfy your customers, and maintain a good service level.

When you are working on supply chain management and optimization, what sort of elements do you take into account?

There are many. One is risk. You have uncertainty and your demand is unknown. Let's say you have disruption in your supply chain network: that's uncertainty. The other part is the economies of scale. For example, in the manufacturing sector, you want to produce in batches. You don't want to produce just one product at a time, because that's more expensive. Supply chain also affects transportation, because when fulfilling customer orders, you try to avoid half-full trucks. There are other issues that are related, such as economies of scope. That's when you want to combine different products in production and/or replenishment, but do so in an intelligent fashion.

What sorts of science and math do you use in supply chain management and optimization?

Essentially, there are all kinds of optimization models. Modeling, as a measurer of uncertainty, is a very important part of the supply chain. We use a lot of stochastic modeling to determine uncertainty. We use whatever tools are available and sometimes we develop our own tools. Some of these problems have their own distinct structures, so we develop some models and algorithms and theories to deal with these special structures.

How has network computer technology, the internet, and world wide web affected supply chain management or supply chain science in the past two decades?

The impact is huge. Walmart is a good example. They use a very successful strategy called cross-docking. Under this process, logistics are centralized to reduce inventory storage, even though orders are coming from different locations. It also can help a company better manage inventory information in its stores. To have this, you need to have good information flow, which internet technology has provided. Information is crucial to formulating large-scale optimization problems, and you have to have decision support systems to do that. It gives Walmart the ability to support a lot of trucks and to quickly update and transmit information. Another good example is Amazon.com, whose existence attributes to the development of the internet and the development and deployment of advanced supply chain management strategies.

What are some of the current problems in supply chain that your research is focused on?

My work is mainly on managing inventory. In many cases, it involves demand and pricing decisions as well. With whatever product you have and sell online, you can collect information, and now have your own inventory information. If you change the price and the customers respond, you will be making an inventory decision and a pricing decision simultaneously, and that decision should maximize the profit. You have to know the demand or distribution of your product, and how your customers are going to respond to price. Based on that, you can learn their behavior as you develop optimization strategies. Some people call this value chain management.

Have you done supply chain work as an advisor for ISE senior engineering projects? (page 36)

Yes. I have supervised several supply chain projects over the years. One company we've worked with produces all types of customized boxes, for which paper is the main ingredient. Since the delivery of paper orders is quite unreliable and unpredictable, the company ends up storing rolls of papers in its production facility. We helped the company reduce its inventory by 20%. We also helped another company by developing a visualization tool for its logistics systems to facilitate its truck dispatches.

Are there professional organizations you are aligned with in your field?

There's the Institute of Operational Research and Management Science (INFORMS), the Manufacturing and Service Operations Management Society of INFORMS, the Production and Operations Management Society, and the Institute of Industrial Engineering.

You recently received a National Science Foundation grant to study pricing analytics, modeling theory, and algorithms. Tell us about what you're working on.

That research is basically about dynamic pricing, which is the practice of dynamically setting the selling prices of products. When you sell a product, your consumers will see your pricing trajectory and respond to it. The project is using reference price models, in which customers facing dynamic pricing form a sense of "fair" price of a product and make purchasing decisions based on that. In the end, you want to give customers a good deal to entice them to buy your product, but you also want to maximize revenue or profit. The question becomes, "How do we analyze such an operational problem and develop solutions?"

I have another NSF grant looking into supply chain cooperation. The objective is to develop cost allocation mechanisms to incentivize companies to cooperate. There are reasons involving economies of scale for companies to investigate making joint orders. It can help reduce the risk, the uncertainty, and the costs. For example, in cooperative logistics, trucking companies can share their loads and reduce deadheading. Right now we are trying to find opportunities for companies to work with each other by developing effective cost or risk sharing mechanisms.

FOR FURTHER READING

READ THE FULL STORY ONLINE
http://ise.illinois.edu/newsroom/article/xin-chen-supply-chain

XIN CHEN'S RESEARCH PAGE
http://publish.illinois.edu/xinchen/homepage/

SHARP TEACHING AWARD
ALEXANDRA CHRONOPOULOU

The Sharp Outstanding Teaching Award in Industrial Engineering was endowed by a philanthropic gift from Dr. James Franklin Sharp of New York, New York (originally from Chester, Illinois). Dr. Sharp received a BSIE from the University of Illinois in 1959 and a PhDIE from Purdue University. After faculty positions at Rutgers and NYU, and a management position at AT&T, he founded SHARP SEMINARS in New York, which became a leading provider of training for the three-year series of Chartered Financial Analyst (CFA®) Exams.

This award is available for faculty members of the Department of Industrial & Enterprise Systems Engineering who demonstrate undergraduate teaching excellence in industrial engineering.

ANESTHESIA CONTROL

Emily Scott

For nearly 15 years, ISE Associate Professor Carolyn Beck's research has been looking at the anesthesia control problem: how to optimize the amount of anesthesia a person receives in surgery.

Her latest project is in the early stages of developing a product that could wirelessly capture a patient's vital signs and save hospitals time and money while reducing patient risk.

"What we're really trying to do when we do modeling and control with anesthesia is…to optimize or minimize the amount of anesthesia a person gets in surgery," Beck says.

The challenge is to develop multi-input, multi-output models that effectively capture all data so it can be used to design an automated system.

But developing an effective system for anesthesia involves factors beyond machinery and computers.

"In surgery, the surgeon and the anesthesiologist are communicating," Beck says. "The surgeon will say: 'I'm going to start the incision now,' and the anesthesiologist knows something in advance. Then she might turn up the anesthesia just prior to that so the person doesn't go into shock."

This is called a feedforward system—one that is based on previous knowledge. Most automated systems are feedback systems, which respond to an output.

The question, then, is how to involve a person—in this case, the anesthesiologist—in an automated, feedforward control design.

"This is something that the airplane industry has dealt with for years," Beck says. "The autopilot versus the pilot in the cockpit, and how do you go back and forth? How do you make sure when you go from the automated to the actual pilot, the person has the information they need to transition?"

Currently, her research is analyzing how to solve this unique human-machine interface issue.

"We don't want to take the anesthesiologist out of the operating room," she says. "So at this point what we're looking at is, how do you go from a feedback only control design to one that incorporates feedforward information and uses the human in the loop?"

She has been working with a nurse anesthetist at OSF Saint Francis Medical Center in Peoria, Illinois, who has helped her generate a model system that can capture a patient's vital signs wirelessly so they can be displayed on something like an electronic tablet. But deciding which vital signs should be captured and how they can be captured using wireless sensors has been a significant part of the problem.

In the short term, she hopes to be able to design a system that will reduce the amount of anesthesia people receive in surgery, but her work in modeling and control design for these systems can also serve as a test case for other problems.

FOR FURTHER READING

READ THE FULL STORY ONLINE
http://ise.illinois.edu/newsroom/article/anesthesia-control

"MODELING AND CONTROL OF PHARMACODYNAMICS"
http://www.sciencedirect.com/science/article/pii/S0947358015000618

BECK'S RESEARCH PAGE
https://sites.google.com/a/illinois.edu/carolyn-beck/

ROBOTS TO ASSIST SENIORS

Emily Scott

According to a 2014 U.S. Census Bureau study, there are expected to be approximately 80 million people aged 65 and over in the United States by 2050.

To address this need, a group of Illinois researchers, including ISE professor Dušan Stipanović, have developed a project called ASPIRE (Automation Supporting Prolonged Independent Residence for the Elderly), that aims to create personal robots and drones to assist senior citizens in their homes and perform helpful tasks such as retrieving medications.

ASPIRE, which recently received a $1.5 million grant from the National Science Foundation, is led by mechanical science and engineering professor Naira Hovakimyan. The research group's primary objective is to help senior citizens by studying autonomous vehicles and their interactions with humans.

Stipanovic is a member of a sub-team specializing in collision avoidance, along with Venanzio Cichella and Thiago Marinho, PhD students of Professor Hovakimyan.

Stipanović says his main contribution to the research will be working on controlling the vehicles in a safe way—which means getting them from point A to point B without collisions with other objects.

FOR FURTHER READING

READ THE FULL STORY ONLINE
http://ise.illinois.edu/newsroom/article/robots-assist-seniors

"AS AGING POPULATION GROWS, SO DO ROBOTIC HEALTH AIDES." *NEW YORK TIMES*.
http://www.nytimes.com/2015/12/08/science/as-aging-population-grows-so-do-robotic-health-aides.html?_r=0
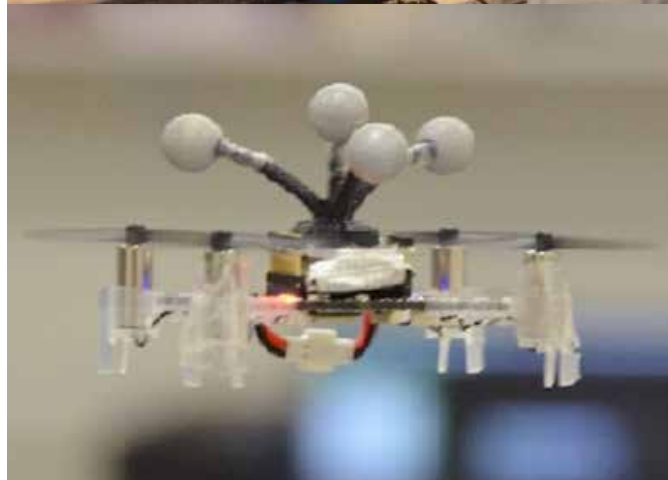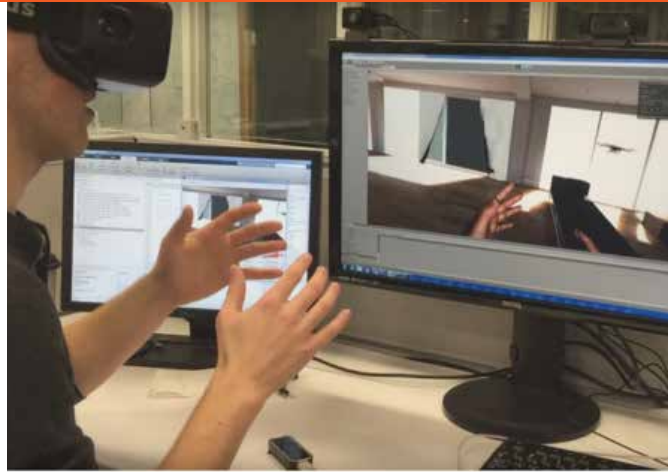
ISE FACULTY
DUŠAN STIPANOVIĆ

Figure 1 and 2 depicts the virtual reality environment used for testing. The researchers implement the control strategy on drones to conduct real flight tests in our indoor lab at IRL, CSL (Figure 3).

ISE FACULTY SEWOONG OH

SOCIAL COMPUTATION

Emily Scott

Assistant Professor Sewoong Oh is the latest ISE faculty member to win a CAREER Award from the National Science Foundation.

His award will benefit his research in social computing and his efforts to improve social computing systems.

Social computing has two sides: aggregating information from individuals and using these contributions to benefit society, such as in the case of Wikipedia; or using people to compute things, such as in the case of crowdsourcing to complete simple tasks on a large scale.

Oh's proposal for the CAREER Award involves research specifically related to crowdsourcing, a labor market increasing in popularity that involves using many people to complete large tasks.

"The idea is that there are a lot of people who have lots of free time and who would like to contribute to a lot of things, but don't know how to," Oh explained.

Companies or individuals may need to complete different simple tasks on a large scale, so they can divide it into small parts and distribute the tasks among many people.

"In crowdsourcing, you have many tasks that you assign to many people," Oh says. "The question we ask is, how can we assign these tasks to the crowd so that when we aggregate the information, we get the most information out of it?"

Another aspect of Oh's research is recommendation systems, which traditionally use ratings from people to make predictions. These systems can be used to rank results from search engines or give recommendations to users on websites like Netflix.

"By just looking at what you've done or what websites you've browsed or what movies you like, I can't tell much about what you'll do next… but by aggregating all this information over the whole crowd in the society, we can try to come up with a way of using the information from other people to tell something about you," Oh says.

Oh says many traditional systems within social computing work well, but one of the important challenges is making algorithms that are based on data that is constantly changing.

"A lot of algorithms that are developed are based on static data," he says. "But in real industry, one of the most important challenges is doing it dynamically."

Oh says the CAREER Award will help him address these challenges while giving him confirmation of the importance of his research.

"It's a very important step for a young researcher like me to be acknowledged… that it's not just me who thinks it's important, but it's other peers and the research community also think that it's something that should be done," he says.

FOR FURTHER READING

READ THE FULL STORY ONLINE
http://ise.illinois.edu/newsroom/article/sewoong-oh-wins-nsf-career-award

NSF AWARD ABSTRACT:
https://www.nsf.gov/awardsearch/showAward?AWD_ID=1553452&HistoricalAwards=false

DISEASE, SOCIAL NETWORKS, AND THE 2016 CAMPAIGN
THE MATH BEHIND THE SPREAD OF IDEAS, PRODUCTS, AND VIRUSES

Doug Peterson

The Spanish flu pandemic of 1918 to 1919 took the lives of an estimated 20 million people as it spread all across the world, according to the United States Department of Health and Human Services. One physician at Fort Devens near Boston said they averaged 100 deaths per day in 1918.

Similarly, the popularity of products and the prevalence of opinions can also spread rapidly, as companies try to determine the secret to crafting viral videos, while politicians in the 2016 campaign use social media to swing voters to their side.

These three things—disease, products, and opinions—are seemingly unrelated, but they all follow similar mathematical patterns when they accelerate through populations, says Rakesh Nagi, department head and Donald Biggar Willett Professor of Industrial and Enterprise Systems Engineering. Nagi and his colleagues have tapped into the core principles behind all of these scenarios, developing mathematical models that analyze how they spread.

It begins with "seeds," Nagi says. Seeds refer to the early starters in a network that begin a cascade, or diffusion, spreading the desired opinions. In the case of disease, seeds are the carriers that spread viruses.

As an example from the marketing world, a company that produces smart phones will try to target specific seeds—influential groups that help spread the word about the product through personal recommendations. After all, Nagi says, "People tend to view product recommendations received from friends more favorably compared to advertisements."

It's all about "influence maximization."

For instance, in a volatile political situation, Nagi says, selecting the optimal seeds means identifying leaders that have the most influence. He cites the example of Afghanistan, where American military strategists tried to reach out to key tribal leaders. If Americans can sway those influencers, the United States maximizes its diplomatic impact, starting a cascade of support.

Nagi's mathematical model, which can be used for many different scenarios, is all about selecting the right seeds and "is possibly the first work that guarantees optimal seed selection," he says.

In addition, the research team has done follow-up work that models the best way to schedule or delay seed selection. In marketing, Nagi says, a company may not want to spend its entire budget up front to influence targeted groups. The company may want to spread out its impact by spending the budget at critical times to activate additional seeds, keeping the cascade of awareness alive or initiating a new cascade. Nagi's model optimizes the scheduling process.

FOR FURTHER READING

READ THE FULL STORY ONLINE
http://ise.illinois.edu/newsroom/article/viral-modeling

A SUBJECTIVE EVIDENCE MODEL FOR INFLUENCE MAXIMIZATION IN SOCIAL NETWORKS
http://www.sciencedirect.com/science/article/pii/S0305048315001425

THE TEMPORAL ASPECTS OF THE EVIDENCE-BASED INFLUENCE MAXIMIZATION ON SOCIAL NETWORKS
http://www.tandfonline.com/doi/full/10.1080/10556788.2016.1214957

ISE FACULTY
RAKESH NAGI

Megan McGovern received her PhDSEE studying Non-destructive Testing and Evaluation under Professor Henrique Reis. Her dissertation is, "Non-Destructive Quantitative Assessment of Oxidation in Aged and Rejuvenated Asphalt Concrete Pavements Using a Non-Collinear Wave Mixing Approach." **She will be joining General Motors Research and Development as a Researcher in their Advanced Propulsion Manufacturing Lab.**

Megan McGovern was Invited to participate in the IIE Doctorial Colloquium, and made the Campus-Level list of Teachers Ranked as Excellent, Spring 2016.

Pranay Devnani received his MSIE studying Decision Systems Engineering with Professor Deborah Thurston. His thesis is "Cloud-Based Sensor Analysis for Customer-Specific Residual Value Estimation for End-of-Life Product Recovery." **He will be joining Apple as a Product Quality Engineer.**

**"I wholeheartedly believe that my ISE undergraduate education was the foundation of my success in graduate school. My undergraduate ISE education gave me a wide breadth in important engineering fundamentals... while still allowing me to focus in on my particular interests via the secondary field option. This was essential to graduate school. Having a concrete understanding of fundamental engineering concepts allows you to solve research problems, which are inherently diverse and often times must be approached from multiple angles."
— Megan McGovern, BSGE 2008, PhDIE 2016**

Jan Vervoorst received his MSSEE in the area of Decision and Control Systems with Professor Naira Hovakimyan. His thesis is "A Modular Simulation Environment for the Improved Dynamic Simulation of Multirotor Unmanned Aerial Vehicles." **He will be joining Ascending Technologies / Intel in Germany as a Senior Research Engineer.**

Shintaro Masuno received his MSFE in May 2015. As a part of his curriculum, he worked on a project with Chicago-based Social Market Analytics Inc., to predict stock market movements with data parsed from Twitter. **He is currently a consultant at Protiviti's Data Management and Advanced Analytics practice, where he helps clients in the financial industry overcome risk management and analytics problems through leveraging on big data and statistical modelling methods.**

Di (Dorothy) Wu received her MSFE in Dec 2015. In the 18-month program, she gained both technical and financial skills through various classes and projects. In the last semester, she did a practicum with CME Group which provided her the opportunity to solve problems in industry. **Currently, she works at Goldman Sachs as a credit risk analyst, where she applies the risk management, derivatives products, and programming skills she's learned in the MSFE program.**
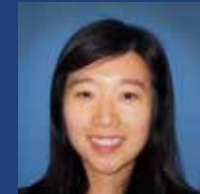
LIKITH MADAMANCHI

LIFE AS AN APPLE INTERN

Likith Madamanchi, who will complete his MSIE this December, began his internship at Apple during the summer of 2015, but when he arrived on the sprawling company campus, his supervisor warned him that "two months wouldn't be nearly enough time to do what you want to do." The supervisor was right. When the last day of Madamanchi's internship came around, he found himself in the middle of a project that he couldn't drop. What's more, he was in China on a business trip for Apple, so he wound up extending his internship several more months to December of 2015.

FOR FURTHER READING

READ THE FULL STORY ONLINE
http://ise.illinois.edu/newsroom/article/apple-internship

Photo by Keilin Jahnke

KEHLIN JANKE

POSTCARD FROM THE FIELD: INVESTIGATING SUSTAINABLE INTERNATIONAL DEVELOPMENT IN ECUADOR

Keilin Jahnke

In May I had the opportunity to travel to Lumbisi, Ecuador to study what makes international engineering design projects sustainable and durable. With a team of other graduate and undergraduate students and three faculty members, we spent two weeks conducting surveys and interviews and learning the cultural, political, and social atmosphere of the Lumbisi. Many international engineering projects (think water distribution systems, water filtration, agricultural irrigation systems, etc.) are rooted in good intentions: technically trained people want to use their skills to help those around the world who are less fortunate than themselves. But sadly, many of these good intentions lead to projects, especially in rural communities, that ultimately fail. The research in Lumbisi is designed to understand the importance of viewing an engineering project holistically, even if it seems purely technical at first glance.

Kehlin Janke earned her MS in SEE in 2014 and is now in the Agricultural & Biological Engineering PhD program.

ISE GRADUATE STUDENT JAMES SCHREINER

Emily Scott

Schreiner, a Lieutenant Colonel with the United States Army, has served for over twenty years on active duty, including tours in Korea, Kuwait, Afghanistan, and Iraq. He earned his bachelor's degree from Marquette University and went on to earn his master's degree at the University of Colorado. He is now an Assistant Professor in the Department of Systems Engineering at the United States Military Academy at West Point. His most recent assignment was as a deputy commander for the U.S. Army Corps of Engineers Chicago District before he was selected for the PhD program at ISE in 2013.

He says he initially liked the program at ISE for its flexibility and mix of industry experts.

"Folks here were willing to work with me and the time constraints the Army provided," Schreiner says. "The faculty is incredibly engaged. On my committee I had a professor from computer science, a professor from education, Professor (Kesavadas)… it was just a really great mix."

During his time at ISE, Schreiner studied an under-researched problem involving the health care industry and emerging proprietary risk technologies. Schreiner's research—in collaboration with Professor Deborah Thurston and OSF Saint Francis Medical Group in Peoria, Illinois, and funded by the Jump Trading Simulation and Education Center—analyzed how new technologies impact the quality of patient discharge decision making by inpatient case managers.

Schreiner and his collaborators employed a series of qualitative and quantitative techniques to look at the health care system and then see how new risk technologies, which are partially integrated into electronic health records, could affect how decisions are made. Schreiner also looked at a set of cognitive biases that could be affected by these new technologies. The aim of the research was to facilitate training and policy strategies which could leverage the new systems in balance with expert-based decision heuristics currently employed.

The research identified problem areas and cognitive processes that could change with the implementation of new technology. The work was recently presented to OSF Saint Francis Medical Center in what Schreiner describes as "almost an advisory role," providing recommendations on how these problems may be mitigated.

Schreiner says he believes that his military career working as a US Army Engineer Officer, performing duties such as developing infrastructures in struggling economies, has parallels to this research.

"Everybody laughs when I say that," Schreiner says. "Building roads and schools and water systems in Iraq is like taking care of a patient here in Peoria, Illinois? Helping to make or facilitate decisions on the health and welfare of a community, or an individual patient do require a heavy dose of expert judgment balanced with normative models. The community and the patient are complex systems which require socio-technical systems to deliver quality decisions. Technologies are meant to enable or reduce cognitive load, so understanding their strengths and weaknesses is important in decisions which might impact the quality of life."

He says his goal when he returns to West Point is to see if there are opportunities to extend his research into the Veterans Administration, where he sees a lot of similar challenges.

FOR FURTHER READING

READ THE FULL STORY ONLINE
http://ise.illinois.edu/newsroom/article/james-schreiner

REBECCA RECK

A HANDS-ON EDUCATOR AIMS AT BOOSTING STUDENT PREPAREDNESS

By Doug Peterson

Rebecca Reck spent much of her eight years in industry designing autothrottles and other controls for business and regional airplanes. As she explains, an autothrottle acts like the cruise control of a car, but instead of freeing a person's foot, it frees a pilot's hands by automatically adjusting the power setting of an aircraft's engine.

The irony is that even though Reck has worked extensively on hands-free controls, she is very much a hands-on person in her own work.

In fact, this ISE alumna has focused much of her academic life on helping students get hands-on engineering experience. She received her PhD in systems and entrepreneurial engineering from Illinois in 2016, and her doctoral work included the development of a $130 hands-on laboratory kit that can do the job of $15,000 worth of lab equipment.

For Reck, it's all about preparing students for their work life ahead.

She mentored incoming engineers when she was an engineer at Rockwell Collins in Iowa, but she noticed that students were entering the workforce with vastly differing levels of preparedness. Reck found that the students who were most prepared came from undergraduate programs where they did considerable laboratory and project work.

"So my focus in teaching has a lot to do with my drive to better prepare students coming out of undergraduate programs to take the kind of positions I had in industry," she says.

Today, Reck is doing just that as an assistant professor of mechanical engineering at Kettering University in Flint, Michigan—a position she took this January while finishing her PhD in ISE at Illinois. Landing the job at Kettering was a homecoming for Reck, who grew up in nearby Fenton, Michigan.

Reck was always drawn to engineering education, but she says she wanted to make sure she had industry experience before moving into academia. So that's just what she did. During her eight years at Rockwell Collins, she completed a master's degree in electrical engineering from Iowa State University through distance education, and then came to Illinois for her PhD.

Reck says she clicked with ISE at Illinois because it was one of the few graduate programs that appreciated her industry experience. "I also liked the flexibility of the systems engineering program at Illinois," she says. "I could shape it toward my interests and get the skills and training I was lacking."

The kit she developed at Illinois was one-third of her PhD, and she created it for the General Engineering 320 class. Students in the class had been sharing six lab stations, each one set up with $15,000 worth of equipment. So she developed a lab kit that cost only $130—roughly the price of a textbook.

An advantage of such portable, affordable kits is that students who are taking online classes can have equipment to do lab work—something that Reck didn't have while doing her master's degree off campus.

"I want to share that passion with students," Reck says. "I figured I could make more of an impact by training the next generation than by being an engineer myself."

FOR FURTHER READING

PROFESSOR RECK'S PORTABLE LAB KIT
http://rebeccaee.com/blog/64-developing-an-affordable-and-portable-control-systems-laboratory-kit-with-a-raspberry-pi

PROFESSOR RECK'S VIDEO DEMONSTRATION OF PORTABLE LAB KIT
https://www.youtube.com/watch?v=kc52rvpZ5Mk
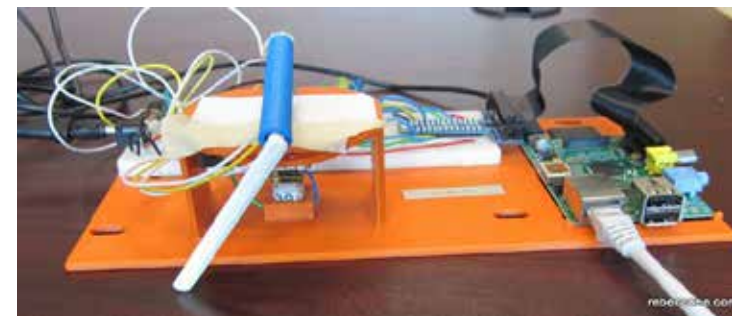
UNDERGRADUATE IIE CHAPTER HOSTS CONFERENCE

Annie Goetz

The University's chapter of the Institute of Industrial Engineers hosted the 2016 North Central Regional Conference on Feb. 25-27, 2016. The conference brought together engineering students, speakers, and companies from across the country for learning and networking opportunities.

The conference had 123 registered attendees and speakers from eight different companies. Participating companies included Deloitte Consulting, FedEx, Rockwell Automation, PepsiCo, Caterpillar, Liberty Mutual and more.

Attendees also had the opportunity to participate in plant tours at five different plants, a technical paper competition, workshops, social events, and a final banquet that closed the conference on Feb. 27.

Students from nine universities were in attendance, including the University of Iowa and the University of Illinois at Chicago, and some traveling from as far as North Dakota and South Dakota.

First row: Sona Kaul, Connie Hong, Dana Keck, Annie Goetz, Jinhao Zhang, Angelica Czarnecka. Second row: Lara Flasch, Josh Weisberg, Kaan Serdar, Nachi Pai, Tom Kukec, John Mancinelli. Third row: Jigar Patel, Mihir Panat.

The conference was organized by the Institute of Industrial Engineers' planning committee of ten students, led by the chapter's president, Nachi Pi. Faculty and administration from the ISE department, including Lee Zerrusen, Professor Richard Sowers, and the chapter's faculty advisor, Dr. Doug King, also helped with planning the conference.

Annie Goetz, vice president of University's IIE chapter, says the plant tours to Caterpillar, FedEx, Watchfire Signs, Rockwell Automation, and Vesuvius, were a success, and that company representatives say they enjoyed having students visit.

"The conference was a huge success. Our conference committee was very pleased with how all the events turned out for the weekend," Goetz says. "Throughout the weekend, we heard multiple attendees saying how much they were enjoying their weekend."

Conference attendees chose manufacturing plants to tour. This group is at the Caterpillar plant in Decatur, Illinois.

JASON GOLDSTEIN

Emily Scott with Lee Zerrusen. Photo courtesy of Fighting Illini Athletics.

Last year, Illinois baseball athlete and industrial engineering student Jason Goldstein was finishing up his junior year when he got an opportunity he'd always dreamed of—a major league offer from the Los Angeles Dodgers.

But Goldstein turned them down. Instead, he decided to stay and finish his degree, a decision that he says may be the best decision of his life.

"I had my shot at getting drafted last year and getting the opportunity to play professionally, which was one of my goals," Goldstein says. "I realized that I had other goals that—after I'm done with my main goal of playing professional baseball—I needed to achieve."

ISE UNDERGRADUATE LARA FLASCH

Emily Scott

Lara Flasch had always known that she was going to attend the University of Illinois at Urbana-Champaign. Coming from a family of Illini fans, it was always her first choice.

She decided to choose Industrial Engineering at ISE for the department's small community and the major's business aspects that have applications in any industry.

"That's kind of like the spirit of engineering, solving any type of problem," Flasch says.

Since her freshman year, Flasch has made extracurricular activities a large part of her college career. She is now a junior and is heavily involved in the Society of Women Engineers (SWE), acting as its outreach director, and she is also an Engineering Council representative for the Institute of Industrial Engineers (IIE).

As outreach director for SWE, Flasch coordinates the society's various outreach programs that connect with young women to get them interested in engineering.

"We're just trying to expose them to engineering and make sure that every kid can see engineering as something that's inspiring and can change the world, and know that they can have engineering as a viable career option for themselves too," Flasch says.

Flasch says that as a child, she didn't really know what engineering was and would have loved to have the opportunities that she now gives to young women through SWE.

Her sophomore year, Flasch interned for Kraft-Heinz in Suffolk, Va., working for their continuous improvement team. In this position, she supported the team as they worked to cut costs and save money for the company.

Last summer, Flasch interned with Nestlé at their Waverly, Iowa plant as an operations management trainee intern.

As she enters her senior year, she says she wants to continue to be as involved as possible and enjoy the opportunities she gets through academics as well as extracurriculars.

FOR FURTHER READING

READ THE FULL STORY ONLINE
http://ise.illinois.edu/newsroom/article/lara-flasch

ISTEM
http://www.istem.illinois.edu/news/mommy.me.swe.html

Lara Flasch works with a couple of young engineers designing an apparatus to protect a real egg, when they compete in the "Egg Drop" competition during the outreach event, Mommy, Me, and SWE. *Photo by Elizabeth Innes, I-STEM webmaster.*

As a female engineering student, Sona Kaul has seen firsthand the underrepresentation of women in STEM (science, technology, engineering, and math) fields.

"You see that girls are so underrepresented in classes, but also in the professional world," Kaul, a junior in Industrial Engineering, says. "It shouldn't be like that."

This belief led Kaul to get involved in MakerGirl, a non-profit, student-led organization founded at Illinois that aims to encourage girls aged seven to ten to be active in STEM fields. They do this through 3D printing sessions where participants examine a problem and then design a product solution using 3D modeling software. Their creations are printed by the end of the session (page 6).

"Not many college campuses even have 3D printing, and in smaller towns… young girls would have no access to 3D printers," Kaul says. "So if we reach those rural areas, I think we can gain a lot of interest from girls who may have never even known about 3D printing or seen it before."

Their goal has been to reach 1,500 girls across the country, and overall get them more interested in STEM fields.

Kaul, who has been involved with MakerGirl since its formation, says she has seen this interest grow among participants in their 3D printing sessions.

"They love it," she says. "We have a ton of girls that come to all of our different sessions, that have been coming every single semester since we started."

Kaul describes a story that a father of one participant told them: "I guess one time he called her his 'baby girl' and she's like, 'I'm not your baby girl, I'm a maker girl!'"

Kaul hopes their organization will gain momentum that will allow them to expand their programs to new people and places. MakerGirl hopes to be able to develop new chapters across the country, and in doing so, address the problem of gender disparity in STEM fields.

ISE UNDERGRADUATE SONA KAUL

Emily Scott

The MakerGirl team ready to go mobile for summer!

FOR FURTHER READING

READ THE FULL STORY ONLINE
http://ise.illinois.edu/newsroom/article/sona-kaul

Frances, Theresa and Mary Ponicki at Illinois. Photo by Emily Scott.

Associate Head of Undergraduate Programs Professor Richard Sowers is overwhelmed with delight to grant an unprecendented three-way tie for first place for the Edward D. Ebert Scholarship to recognize an outstanding Freshman in GE. From left to right: Frances, Sowers, Theresa, Mary.

Ponickis spent their summer vacation taking Spanish language classes in Madrid, then undertaking a research program coordinating with MIT to help bring electricity to rural areas in Uganda and India.

SUPERLATIVE SISTERS

Emily Scott

As identical triplets, Mary, Frances, and Theresa Ponicki realize that their life experiences will be unique.

In their college education, the sisters have embarked on a new life experience that is perhaps even more unique—they all decided to attend the University of Illinois and join ISE.

The decision to join ISE came from their interest in math and science, but they say they wanted a degree that would allow them to have a creative outlet. In their words, the major gave them "a personal side to engineering."

"What we all liked about it in the end is that it lets you kind of create your own path in engineering, you can kind of carve your own way because you can choose your own concentration," Theresa says.

"The campus itself just feels like one big opportunity," Frances says. "You just have to be the one to take that initial step, and people want to help you, which is a really nice, embracing feeling."

Going into their sophomore year and beyond, the three say they all have general ideas for their major concentrations, but they still want to explore the different paths that ISE would allow them to take.

"I just want to walk out feeling like I made the most of those four years," Theresa says.

"I want to make the most of my time here; grow as a student, grow as a person," Frances says. "That's all you can really ask for out of your college education."

FOR FURTHER READING

READ THE FULL STORY ONLINE
http://ise.illinois.edu/newsroom/article/ponickis

ISE SENIOR ENGINEERING PROJECT TEAMS UP WITH MANOR TOOL

by John Creighton

Senior Engineering Project #12, "Draw Tooling Coating Analysis, Testing and Selection for Wear Resistance." From left: Kyle Lee, Matthew Vedova, Mathew Brody, and Tom Simeone.

Manor Tool recently collaborated with ISE on the school's Senior Engineering Project program. A graduation requirement for engineering majors, the class aims to prepare students for real-world industry scenarios they may encounter in their future careers.

For each Senior Engineering Project, small groups of students and a faculty advisor are paired with a local company; together, the teams develop solutions to some of the real-world challenges facing these companies (page 25).

Working with the Manor Tool manufacturing team, a team of ISE students designed, ran, and analyzed their own experiments at the Tribology Lab to study the effects of friction on various processes.

Their main goal was to develop ways in which Manor could increase the longevity of its tooling systems, and then perform statistical analyses to demonstrate how their proposed solutions would equal a cost savings for Manor Tool's customers.

Their work helped Manor to increase the cost-efficiency of their die making process.

This project not only challenged the students to think critically, but also exposed them to the business side of engineering by illustrating what it takes to run a successful company.

FOR FURTHER READING

READ THE FULL STORY ONLINE
http://blog.manortool.com/blog/university-of-illinois-student-engineers-team-up-with-manor-tool

ISE SENIOR ENGINEERING PROGRAM
http://ise.illinois.edu/senior-engineering-program

ISE ALUMNA JOI-LYNN MONDISA

Doug Peterson

SAFE HAVENS: SUPPORTING WOMEN AND MINORITIES THROUGH MENTORING AND MERIT PROGRAMS

When Joi-Lynn Mondisa first arrived on the Illinois campus in the fall of 1996, she says, "The level of competitiveness completely threw me off guard." She also felt academically and socially isolated as a black woman in an engineering program where white males vastly outnumbered women and African Americans.

Some fellow students even questioned her academic credentials, with one person bluntly asking, "So, did you get into this program due to affirmative action?"

It was a tough start. But when this ISE alum entered the Illinois Merit Program for Emerging Scholars, things began to change. The Merit Program is an academic program that focuses on recruiting and retaining students in STEM. It targets students with high academic potential, and has them participate in community-based active learning during their freshman and sophomore years.

"We did the same coursework as everyone else, but we also did additional work, and we met in a group environment," Mondisa recalls. "The Merit Program created a support base and lifelong friendships for me."

This experience became one of the touchstones of her academic research, which has focused on how to better mentor students, particularly women and racial minorities.

Recently, Mondisa began a new position as a professor in Industrial and Operations Engineering at the University of Michigan, and she plans to build on her doctoral research, which examined ways to improve mentoring practices and programs.

After graduating with her bachelor's degree in General Engineering from ISE in 2001, Mondisa entered industry and eventually began teaching as an adjunct faculty member in the Engineering Technology Department at Triton College in River Grove, Illinois. In 2012, she also co-directed GADgET (Girls' Adventures in Design, Engineering, and Technology) Camp, a Triton College summer program for 12- to 16-year-old girls who are interested in STEM subjects. Bivouac Films even shot a short documentary about the camp.

Mondisa spent ten years in industry, working in manufacturing, operations, technical sales, and publishing. But ever since her Illinois days, she had always been drawn to research, so she left her full-time job in 2011 to pursue her master's and PhD in engineering from Purdue University.

Upon completing her PhD, she became a postdoctoral research fellow in the Department of Industrial and Operations Engineering at the University of Michigan. Then, in fall 2016, she assumed a position as assistant professor in the same department at Michigan.

In addition to research and teaching, Mondisa serves as president and co-director of a non-profit organization, the No Longer Forgotten Network, which serves dialysis patients, as well as minority girls.

"I've seen how my experiences have connected across my life, and I am grateful for the educational opportunities that I've had and how they have helped to shape me," she says. "It's been a nice journey."

FOR FURTHER READING

READ THE FULL STORY ONLINE
http://ise.illinois.edu/newsroom/article/safe-havens

THE GADGET DOCUMENTARY
http://www.bivouacfilms.com/

I grew up in Chicago in a family of educators. Like a lot of people applying to college, I didn't know what to choose as my major. "You like math and science," my mom said. "Why don't you put down 'engineering'?" The more I thought about it, the more I liked the idea. Once I arrived, I realized how male-dominated engineering was, but I had two brothers, so that didn't scare me. The course work, however, was extremely difficult. I called my mom after my first calculus test, crying because I was sure I was flunking out of school. Once the grades were posted, I was amazed to see that I passed by the skin of my teeth with a "D." And so I kept at it. Eventually, it got easier. I found subjects that were interesting, but challenging. I liked learning about systems. I liked solving problems.

When I was a senior, General Motors recruited on campus. I was hired as a college graduate-in-training and began my first assignment at a GM truck plant in Pontiac, Michigan. I wasn't really much of a car person growing up, but the plant was equipped with automated processes and robots. It was cutting-edge, and I was ecstatic at the opportunity to work with such interesting technology. I guess GM liked what they saw, because after six months, they offered me the position of maintenance supervisor on the second shift. Although I was nervous, I knew the job had previously been held by a woman, so I thought, "If one woman could do the job, so could I."

That was the first of many positions I held at GM plants, and at each one, I learned something new that proved useful at the next stop. In 2001, after 17 years working in plants, I moved on to GM's worldwide facilities group. The challenge of working across continents, across cultures, and with different laws, customs and priorities became enormously complex.

My current role as executive director of global environmental compliance and sustainability has been tremendously interesting and fun. The road GM has taken to shake its image—the big industrial corporation that makes those "things" that run on fossil fuel—has been difficult, but the company is committed to being a leader in sustainability. We know our customers care about more than cars. They care about how we build them and how we engage with the world around us.

For example, we operate 122 landfill-free facilities and aspire to be a completely zero-waste manufacturer. Last year, we ended the use of coal as an energy source in our North American plants. We continue to invest in renewable energy around the world. In fact, we now use 105 megawatts of renewables—up from 66 last year.

We believe we're part of the solution to climate change. We're the only automaker to sign the Ceres BICEP Climate Declaration stating that addressing climate change presents economic opportunity.

Our 216,000 employees operate with a sustainability mindset. We're committed to serving and improving our communities. I am proud that my team is a part of all this work.

My job is demanding and rewarding, much like one of my favorite pastimes—golf. As a golfer, my goal is to play on all the great courses in the world. But apart from a couple courses in Scotland, I have not been able to work in too many visits, even with all my traveling for GM. My point is that I have learned a lot from golf—perseverance, discipline and fallibility. Most importantly, I have learned that I have the ability to improve, and that's a valuable lesson no matter how you learn it.

ISE ALUMNA MARI KAY SCOTT

As told to Jamie Malanowski

OTHER NEW ALUMNI STORIES ONLINE

MARK OLSON BSIE 1989
http://ise.illinois.edu/newsroom/article/mark-olson

DREW DEPRIEST
http://ise.illinois.edu/newsroom/article/drew-depriest

ISE ALUMNI STEPHEN WINTER

Emily Scott

Dr. Winter, heading for a jungle village to set up a clinic, Northern Amazon, Peru (2013).

Stephen Winter did not originally intend to pursue a career in global health.

Instead, he happened upon his work in international medicine and public service while he was a medical student at Cornell University Medical College and learned of an opportunity to go to Cambodia and provide care at a refugee camp on the border between Thailand and Cambodia.

"I jumped at the opportunity, not out of an interest in public service, but as an opportunity to travel and experience an adventure in an exotic part of the world," Winter says.

His time in Cambodia was a life-changing experience for him and led to his lifetime involvement in international medicine. His career has led him all over the world, to provide humanitarian care in countries such as Rwanda, Ethiopia, Iraq, and many more, and to New York City on 9/11 to set up a triage and medical evacuation station near ground zero.

Prior to his exceptional career that has spanned continents, Winter began his education at the Illinois, earning his bachelor's degree in Industrial Engineering.

"I have so many fond memories of my time at the University of Illinois that is difficult to select just a few," Winter says. "Certainly the thing that stands out above all others was a set of random encounters that allowed me to meet a beautiful young woman as a freshman who eventually became my wife [Eva Chan]. Nothing else quite matches that one."

Winter earned his IE degree in 1972 and went on to earn his master's in system analysis from Stanford University. He went to medical school at University of Michigan Medical College and Cornell University Medical College and trained at the New York Hospital-Cornell Medical Center for Internal Medicine. He then continued to Yale University for a fellowship in pulmonary medicine.

Currently, Winter is the Chief of Pulmonary and Critical Care Medicine at Norwalk Hospital in Norwalk, Connecticut, and is a clinical professor of medicine at Yale University.

In coordination with the Western Connecticut Health Network, Winter is also the medical director of the global health program at Norwalk Hospital.

Winter's career has led him across the globe, but Winter says he can come back and credit his industrial engineering education at Illinois for teaching him how to think like an engineer.

"As an engineer I learned to be quite comfortable with technology and computer systems and how to approach and solve complicated problems" he says.

"It has become quite clear to me that the best preparation for medicine is engineering."

FOR FURTHER READING

READ THE FULL STORY ONLINE
http://ise.illinois.edu/newsroom/article/stephen-winter-bsie-1972

Meeting the director of an orphanage in Monrovia, Liberia (2003).

Field Hospital, Rwanda (1994).

Jungle village in northern Amazon, Peru.

ISE ALUMNUS, APOLLO MISSION ENGINEER
WALTER HOLM

As told to William Gillespie

A very cool Walter Holm working with cryogenic materials to aid the Apollo mission

Dear William Gillespie,

I am responding to your invitation to communicate my career story (page 36). I do not rank with the superb scholars on the cover of the ISE booklet. I feel that I have had an interesting career and I offer it as such. I hope you will agree.

I believe my story shows clearly that an education can reach out in many directions. Looking back, after all these years, my work was exciting and produced positive results. For me, the bottom line was the moon-shot. I didn't do it, but I was part of all those who made it happen.

I came to the U of I on the Korean GI Bill in 1955. My wife and I (she was 7 months pregnant) had a number of residences but eventually settled in G.I. housing across from Memorial Stadium. We lived in tarpaper single-story barracks. I was 25 years old.

My academic life became rocky and I was placed on probation. I considered dropping out. I spoke to Professor Dobrovolny and he decided to back me up. I enrolled in... General Engineering.

When I graduated we had two children. My teenage dream was realized when I was hired by North American Aviation in California. I performed research and development (R&D) on the X-15 manned rocket plane. At the completion of this work I transferred to an affiliate of North American Aviation, Rocketdyne, where I participated in R&D on the Atlas rocket engine.

I was assigned to open, establish, and operate a cryogenic laboratory... Later, I applied for a job with Westinghouse Astronuclear Laboratory and was accepted. We moved back to Nevada and Jackass Flats. At this time, atomic tests were being performed on the range. A "hole" 10,000 feet deep was constructed and an atom bomb was placed at the bottom and exploded. We actually witnessed one of these tests.

In 1964 I was contacted with an unsolicited offer to work as the Super-intendent of cryogenics and propellants at the Apollo test site in White Sands, New Mexico. We tested the Lunar Command Module and the Lunar Excursion Module for the manned moon-shot.

Following the moon-landing I was offered a job at Eastern New Mexico (Roswell) as an instructor, electronics, and accepted. After five years the teaching job was terminated for lack of federal funding.

I am now retired (86 years old). The University of Illinois blessed my life and my career. Thank you Prof. Dobrovolny. Thank you, University of Illinois!

—Walter Holm G.E. '58

P.S. I named my first-born son Jerry in honor of my mentor Jerry Dobrovolny. (page 5)

FOR FURTHER READING

READ THE WHOLE STORY ONLINE
http://ise.illinois.edu/newsroom/article/walter-holm-bsge-1958

Department of Industrial and Enterprise Systems Engineering at the University of Illinois

On September 16, William Chittenden was inducted into the Engineering at Illinois Hall of Fame to honor his ongoing support for the development of engineering professionals through continuing education.

Necessity is not only the mother of invention, it is also the word William Chittenden uses to describe the role of the Illinois's Industrial and Enterprise Systems Department in providing opportunities for humanity to live fuller, longer lives.

It's also the reason Chittenden, who earned his Bachelor's in General Engineering from Illinois in 1950, never lost his connection with the university that provided him the perspective to even consider such possibilities.

"I learned so much at Illinois," he says, recalling a professional career that included his pioneering development of design procedures for nuclear power plants with Sargent and Lundy, and the supervision of design and construction of a number of fossil fuel and nuclear power plants.

He spent his entire professional career with the company and rose to the rank of CEO before retiring in 1991.

He is a fellow of the American Society of Mechanical Engineers (ASME), a fellow of the American Nuclear Society (ANS), and was inducted into the National Academy of Engineering in 1987.

But he never really left Illinois.

"ISE taught business and engineering, which put me in a very good place in my career," he says. "It gave me the ability to not only recognize opportunities, but create them."

To that end, they created the Carol Chittenden Scholarship, awarded annually to an undergraduate student in the Kinesiology and Community Health Department; and the William Chittenden Fellowship, awarded annually to a graduate student in ISE. They also sponsor an award for best graduate thesis relating Engineering and AHS.

The Chittendens were already thinking of Chandrasekaran Jayaraman, the 2009-10 William Chittenden Fellowship recipient, when they first set up the fellowship in 1989.

"The fellowship gave me the freedom to explore different courses, and pursue the kind of interdisciplinary research and inter-departmental faculty collaboration I wanted for my PhD," Jayaraman says. "Such an opportunity is a dream come true for initial stage PhD candidates."

That freedom led to the formation of a collaborative team including Jayaraman, which developed a device to monitor wheelchair users' performance, detect flaws, and educate them about proper wheelchair form. The device informs users early on about how to make adjustments before improper form leads to injury. It's also led Jayaraman to further pursue a career in rehabilitation technologies.

Jayaraman says, "Sometimes you need engineering interventions, and those can take different forms. We love to innovate—it's what we do at ISE—and it's very gratifying to know our research and innovation in this field will help this generation that has helped us so much."

FOR FURTHER READING:

READ THE WHOLE STORY ONLINE
http://ise.illinois.edu/newsroom/article/chittendens

CHANDRASEKARAN JAYARAMAN AWARDED A 2015 ENTREPRENEURSHIP AT ILLINOIS SUMMER FELLOWSHIP
http://ise.illinois.edu/newsroom/article/chandrasekaran-jayaraman

2016 ENGINEERING HALL OF FAME
WILLIAM CHITTENDEN

Carol and William Chittenden and Rakesh Nagi

ISE FACULTY IN REVIEWED OR REFEREED SCHOLARLY JOURNALS

1. Guo, Tinghao and **James T. Allison**. "On the Use of Mathematical Programs with Complementary Constraints in Combined Topological and Parametric Design of Biochemical Enzyme Networks." *Engineering Optimization*, published electronically, to appear in print, 2016. doi: 10.1080/0305215X.2016.1188091

2. Corman, Rebecca, Lakshmi Rao, N. Ashwin Bharadwaj, **James T. Allison**, and Randy H. Ewoldt. "Setting Material Function Design Targets for Linear Viscoelastic Materials and Structures." *ASME Journal of Mechanical Design* 138(5), p. 051402, March 2016. doi: 10.1115/1.4032698

3. Herber, Daniel, Anand Deshmukh, Marlon Mitchell, and **James T. Allison**. "Project-Based Curriculum for Teaching Analytical Design to Freshman Engineering Students via Reconfigurable Trebuchets." *Education Sciences*, 6(1), article 7, February 2016. doi: 10.3390/educsci6010007

4. Deshmukh, Anand P. and **James T. Allison**. "Multidisciplinary Dynamic Optimization of Horizontal Axis Wind Turbine Design." *Structural and Multidisciplinary Optimization*, 53(1), pp. 15-27, January 2016. doi: 10.1007/s00158-015-1308-y

5. Khetan, Ashish, Danny J. Lohan, and **James T. Allison**. "Managing Variable-Dimension Structural Optimization Problems using Generative Algorithms." *Structural and Multidisciplinary Optimization*, 50(4), pp. 695-715, October 2015.

6. Lohan, Danny J., Ercan M. Dede, **James T. Allison**. "Topology Optimization for Heat Conduction Using Generative Design Algorithms." *Structural and Multidisciplinary Optimization*, to appear, 2016.

7. Kharisov, E., **C. L. Beck,** and M. Bloom. "Design of L1-Adaptive Controllers for Human Response to Anesthesia." *Control Engineering Practice*, Vol 44, pages 65-77, November 2015.

8. Bock, A., **K. Chandrasekaran**, J. Koenemann, B. Peis, and L. Sanita. "Finding Small Stabilizers for Unstable Graphs." *Mathematical Programming*, Series B, December 2015.

9. **Chandrasekaran, K.**, L. Vegh, S. Vempala. "The cutting plane method is polynomial for perfect matchings." *Mathematics of Operations Research*, 2016.

10. Yu, Yueshan, Fuqiang Zhang and **Xin Chen**. "Dynamic Capacity Management with General Upgrading." *Operations Research*, 63(6), 1372-1389, November 2015.

11. Hu, Zhenyu, **Xin Chen** and Peng Hu. "Dynamic Pricing with Gain-Seeking Reference Price Effects." *Operations Research*, 64(1), 150-157, February 2016.

12. **Garg, Jugal**, Ruta Mehta, Milind Sohoni, Vijay V. Vazirani. "A Complementary Pivot Algorithm for Market Equilibrium under Separable, Piecewise-Linear Concave Utilities." *SIAM Journal on Computing*, 44(6), 1820-1847, December 2015.

13. Devanur,Nikhil, **Jugal Garg**, László Végh. "A Rational Convex Program for Linear Arrow-Debreu Markets." *ACM Transactions on Economics and Computation* (forthcoming).

14. Dai, Bo, **Niao He**, Hanjun Dai, and Le Song. "Provable Bayesian Inference via Particle Mirror Descent." *Artificial Intelligence and Statistics (AISTATS)*, 2016. (Best Student Paper Award).

15. Du, Nan, Yichen Wang, **Niao He**, and Le Song. "Time-Sensitive Recommendation From Recurrent User Activities." *Neural Information Processing Systems (NIPS)*, 2015.

16. **He, Niao** and Zaid Harchaoui. "Semi-proximal Mirror-Prox for Nonsmooth Composite Minimization." *Neural Information Processing Systems (NIPS)*, 2015.

17. Ma, J. and **H. M. Kim**. "Highly Customizable Product Family Design with Predictive, Data-Driven Family Design Method." *Research in Engineering Design*, pp. 1-17, September 2015.

18. Kwak, M. and **H. M. Kim**. "Modeling Time-Varying Advantages of Remanufacturing: Is a 'Reman' Better than a 'Brand New'?" *Transactions of ASME: Journal of Mechanical Design* (forthcoming).

19. Ma, J. and **H. M. Kim**. "Predictive Model Selection for Forecasting Product Returns." *Transactions of ASME: Journal of Mechanical Design* (forthcoming).

20. Quan, N. and **H. M. Kim**. "A Hybrid Optimization Framework for Unrestricted Wind Farm Layout Optimization." *Transactions of ASME: Journal of Mechanical Design* (forthcoming).

21. Kwak, M. and **H. M. Kim**. "Green Profit Maximization through an Integrated Pricing and Production Planning for a Line of New and Remanufactured Products." *Journal of Cleaner Production* (forthcoming).

22. **Krishnan, G.**, J. Bishop-Moser, C. Kim, and S. Kota. "Kinematics of a Generalized Class of Pneumatic Artificial Muscles." *ASME. J. Mechanisms Robotics*, November 2015. doi: 10.1115/1.4029705

23. Huang, S., **Q. Wang**, R. Batta, and **R. Nagi**. "An Integrated Model for Site Selection and Space Determination of Distribution Centers." *Computers and Operations Research*, October 2015, Vol. 62, pp. 169-176.

24. Gross, G.A. and **R. Nagi**. "Precedence Tree Guided Search for the Efficient Identification of Multiple Situations of Interest: AND/OR Graph Matching." *Information Fusion*, January 2016, Vol. 27, pp. 240-254.

25. Samadi, M., A. Nikolaev, and **R. Nagi**. "A Subjective Evidence Model for Influence Maximization in Social Networks." *OMEGA*, March 2016, Vol. 59, Part B, pp. 263-278.

26. Khopkar, S., **R. Nagi**, and G. Tauer. "A Penalty Box Approach for Approximation Betweenness and Closeness Centrality Algorithms." *Social Network Analysis and Mining (SNAM)*, December 2016, 6(1), 1-13 (forthcoming).

27. Samadi, M., A. Nikolaev, and **R. Nagi**. "The Temporal Aspects of Evidence-Based Influence Maximization in Social Networks." *Optimization Methods and Software* (forthcoming).

28. Date, K. and **R. Nagi**. "A GPU Accelerated Hungarian Algorithm for the Linear Assignment Problem." *Parallel Computing* (forthcoming).

29. Kairouz, P., **S. Oh**, and P. Viswanath. "Extremal Mechanisms for Local Differential Privacy." *Journal of Machine Learning Research*, January 2016.

30. Negahban,Sahand, **Sewoong Oh**, and Devavrat Shah. "Rank Centrality: Ranking from Pair-wise Comparisons." *Operations Research*, 2016.

31. McGovern, M.E., W. G. Buttlar, and **H. Reis**. "Effectiveness of Rejuvenators on Aged Asphalt Concrete using Ultrasonic Non-Collinear Subsurface Wave-Mixing." *Materials Evaluation*, Vol. 73, No. 10, October 2015, pp-1367-1378.

32. McGovern, M.E., W. G. Buttlar, and **H. Reis**. "Field estimation of oxidative aging in asphalt concrete pavements using Non-Collinear Wave Mixing." *INSIGHT— Non-Destructive Testing and Condition Monitoring*, Vol. 57, No. 11, 2015, pp. 625-634.

33. McGovern, M.E., W. G. Buttlar, and **H. Reis**. "Nondestructive Field Evaluation of Aging Levels of Rejuvenated Asphalt Concrete Pavements." *Transportation Research Board Journal* (forthcoming). doi: 10.3141/2576-01.

34. Behnia, B., E. V. Dave, William G. Buttlar, and **H. Reis**. "Characterization of Embrittlement Temperature of Asphalt Materials through Implementation of Acoustic Emission Technique." *Journal of Construction & Building Materials* (forthcoming).

35. McGovern, M.E., W. G. Buttlar, and **H. Reis**. "Field Assessment of oxidative aging in asphalt concrete pavements with unknown acoustic properties." *Journal of Construction & Building Materials* (forthcoming).

36. McGovern, M.E., and **H. Reis**. "Linear and Nonlinear Damage Characterization of Limestone." *Research in Nondestructive Evaluation*, American Society for Nondestructive Testing (forthcoming).

37. Hill, B.C., D. J. Oldham, B. Behnia, E. H. Fini, W. G. Buttlar, **and H. Reis**. "Evaluation of Low Temperature Viscoelastic Properties and Fracture Behavior of Bio-Asphalt Mixtures." *International Journal of Pavement Engineering* (forthcoming).

38. Chandrasekaran, S., N. Somnath, and **R. S. Sreenivas**. "A Software Tool for the Automatic Synthesis of Minimally Restrictive Liveness Enforcing Supervisory Policies for a Class of General Petri Net Models of Manufacturing- and Service-Systems." *Journal of Intelligent Manufacturing*, Special Issue: *Intelligent Manufacturing: New Advances and Challenges* (Invited), Volume 26, Issue 5, October 2015, 945-958.

39. Salimi, E. and **R. S. Sreenivas**. "On Invariant-Based Monitors that Enforce Liveness in a Class of Partially Controlled General Petri Nets." *IEEE Transactions on Automatic Control*, Vol. 60, No. 10, October 2015, 2825-2830.

40. Lee, T-E, H-J Kim and **R. S. Sreenivas**. "Characterizing Token Delays of Timed Event Graphs for K-Cyclic Schedules." *IEEE Transactions on Automatic Control* (forthcoming).

41. Zatezalo, A. and **D. M. Stipanovic**. "Control of Dynamical Systems with Discrete and Uncertain Observations." *Discrete and Continuous Dynamical Systems-Series A*, vol. 35, Sept 2015,

pp. 4665-4681.

42. Stankovic, M. S., S. S. Stankovic, and **D. M. Stipanovic**. "Consensus Based Decentralized Real Time Identification of Errors-in-Variables Systems." *Automatica*, 60, October 2015, pp. 219-226.

43. Rodríguez-Seda, E. J., **D. M. Stipanovic**, and M. W. Spong. "Guaranteed Collision Avoidance for Autonomous Systems with Acceleration Constraints and Sensing Uncertainties." *Journal of Optimization Theory and Applications*, 168, Mar 2016, pp. 1014-1038.

44. Panagou, D., **D. M. Stipanovic**, and P. G. Voulgaris. "Distributed Coordination Control for Multi-Robot Networks using Lyapunov-Like Barrier Functions." *IEEE Transactions on Automatic Control*, 61, Mar 2016, pp. 617-632.

45. Moon, J. S., **D. M. Stipanovic**, and M. W. Spong. "Gait Generation and Stabilization for Nearly Passive Dynamic Walking and Speed Regulation on Flat Ground." *Asian Journal of Control*, vol. 18, 2016, pp. 1343-1358.

46. Shevchenko, I. and **D. M. Stipanovic**. "A Design of Strategies in Alternative Pursuit Games." *Contributions to Game Theory and Management*. Vol. IX (2016), Saint Petersburg State University, pp. 266—275.

47. Panagou, D., **D. M. Stipanovic**, and P. G. Voulgaris. "Distributed Control of Robot Swarms: A Lyapunov-Like Barrier Functions Approach." *Handbook of Research on Design, Control, and Modeling of Swarm Robotics*, Y. Tan (Ed), IGI Global, 2016, pp. 115-144.

48. Reiman, Martin I., Haohua Wan, and **Qiong Wang**. "On the Use of Independent Base-Stock Policies in Assemble-to-Order Inventory Systems with Nonidentical Lead Times." *Operations Research Letters*, Volume 44, No. 4, July 2016, pp. 436-442.

ISE FACULTY GRANTS

1. **Allison, James** (Co-PI), Center for Compact and Efficient Fluid Power, National Science Foundation, "Rheological Design for Efficient Fluid Power," $208,250, 5/2014-4/2016 (PI: Randy Ewoldt, UIUC). (Continuing)

2. **Allison, James** (Co-PI), National Science Foundation, "GOALI: Design with Rheologically-Complex Soft Materials," $450,000, 6/1/2015 – 5/31/2018 (PI: Randy Ewoldt, UIUC). (Continuing)

3. **Allison, James** (Co-PI), Toyota, "Development of Optimization Tools for Integrated Electro-Thermal Power System Design (Phase 2)," $50,000, 2015-2016.

4. **Allison, James** (Co-PI), National Science Foundation, "Engineering Research Center for Power Optimization for Electro-Thermal Systems (POETS)," $18,500,000, 2015-2024, (PI: Andrew Alleyne, 5 PIs).

5. **Allison, James** (Co-PI), National Aeronautics and Space Association Undergraduate Student Instrument Project, "Cooling, Pointing, Annealing Satellite (CAPSat)," $200,000, 2016-2017, (7 PIs).

6. **Allison, James** (Co-PI), Roy J. Carver Charitable Trust, "A Proposal to Establish a New IGB Research Theme in Synthetic Biology," $2,000,000, 2013-2017, (PI, Huimin Zhao, 8 PIs).

7. **Allison, James** (PI), Proctor & Gamble, "Generative Design for Fluid System Topology Optimization," $60,000, 2015-2016 (Continuing).

8. **Allison, James** (PI), MathWorks Inc, "Advancing Undergraduate Design Learning Through Extensive Use of Hands-On Model-Based Design Projects," $40,000, 6/2013-6/2016. (Continuing)

9. **Allison, James** (PI), National Aeronautics and Space Association, "Strain Actuated Solar Array for SC Attitude and Instrument Jitter Control," $200,000, 10/2014-9/2016.

10. **Allison, James** (PI), National Science Foundation, "Toward a Method for Achieving Synergy between Heuristic Rules of Thumb and Quantitative Methods in Engineering Design," $150,000, 8/2015-7/2017.

11. **Beck, Carolyn** (Co-PI), National Science Foundation, "CPS: Synergy: Collaborative Research: Engineering Safety-Critical Cyber-Physical-Human Systems," $742,695, 10/2013-9/2016. (Continuing)

12. **Beck, Carolyn** (PI), National Science Foundation Division of Electrical, Communications, and Cyber Systems, "Computationally tractable graph clustering algorithms for reducing large scale dynamic network models," $151,000, 8/15-8/18.

13. **Beck, Carolyn** (PI), Boeing Information Trust Institute, "Precedence Network Inference from Dynamic and Noisy Data," $75,000, 8/15-5/16.

14. **Beck, Carolyn** (PI), National Science Foundation Cyber-Physical Systems Breakthrough, "Design of Network Dynamics for Strategic Team-Competition," $170,000, 2/16-2/19.

15. **Beck, Carolyn** (PI), National Science Foundation Cyber-Physical Systems Collaborative, "Engineering Safety-Critical Cyber Physical-Human Systems," $190,000, 10/13-9/16.

16. **Chen, Xin** (PI), CMMI, National Science Foundation, "Pricing Analytics: Modeling, Theory and Algorithms," $300,000, 5/2014-4/2017. (Continuing)

17. **Chen, Xin** (PI), National Science Foundation, "Cost/Value Allocation in Supply Chain Operations," $300,000, 2/2015-1/2018 (Co-PI **Qiong Wang**, UIUC/ISE).

18. **Chen, Xin** (Co-PI), National Science Foundation of China, "Research on operation mode and decision optimization for platform based on data driven," ¥1,840,000, 2016-2020.

19. **Chen, Xin** (Co-PI), Hong Kong RGC General Research Fund, "Preservation of Supermodularity in General Parametic Optimization Problems and its Applications in Operations Management," HK$495,728, 2015-2018.

20. **Chronopoulou, Alexandra** (PI), Simons Foundation, "Statistical Inference for Processes with Long Memory and Applications," $35,000, 9/2014-8/2019. (Continuing)

21. **Chronopoulou, Alexandra** (Co-PI), AE3 College of Engineering UIUC, "Reforming ISE's Stochastics Sequence," $75,000, 7/15-6/16.

22. **Kesavadas, T.** (PI), National Science Foundation National Robot Initiative, "Human Cognition Based Control of Industrial Robots," $558,000, 2014-2017. (Continuing)

23. **Kesavadas, T.** (PI), National Science Foundation Smart and Connected Health," Collaborative Research: Cognitive Haptic based Rehabilitation System for Patient-Centric Home," $436,965, 2015-2018.

24. **Kesavadas, T.** (Co-PI), National Science Foundation Cyber Physical Systems Breakthrough, "Towards Resiliency in Cyber-Physical Systems for Robot-assisted Surgery Technology to improve safety of robotic surgery using STAMP theory and simulation," $500,000, 2016-2019. (PI: Ravi Iyer)

25. **Kim, Harrison** (PI), Commercial, John Deere, "Sustainable Product Design," $797,919, 11/2010-10/2016. (Continuing)

26. **Kim, Harrison** (PI), National Science Foundation, "CAREER: Trend-Mining Design - Foundations for Modeling the Mutual Influence between Pre-Life Design and End-of-Life Recovery of a Sustainable Product Portfolio," $412,000, 8/2010-7/2016. (Continuing)

27. **Kim, Harrison** (PI), Hyundai Motor Group, "Database-based analytical target cascading in the optimization of ride and handling (R&H) performance," $120,000, 2016-2107.

28. **Kim, Harrison** (PI), John Deere, "Sustainable Product Design-Phase VI," $120,000, 2015-2016.

29. **Krishnan, Girish** (Co-PI), National Science Foundation Engineering Research Center for Compact and Efficient Fluid Power, "Portable Pneumatically Powered Orthoses," $160,000, 2016-2018.

30. **Krishnan, Girish** (Co-PI), National Science Foundation Engineering Research Center for Compact and Efficient Fluid Power, "Soft pneumatic actuators for soft arm orthosis," $190,000, 2014-2106.

31. **Krishnan, Girish** (PI), National Science Foundation, "CAREER: Design Methodology of Bio-inspired Soft Mechanical Systems," $500,000, 2015-2020. (Continuing)

32. **Kiyavash, Negar** (Co-PI), Multidisciplinary Research Program of the University Research Initiative (MURI), Air Force Office of Scientific Research, "Multi-Layer and Multi-Resolution Networks of Interacting Agents in Adversarial Environments," 2010-2015, $407,208. (PI: Tamer Basar, UIUC). (Continuing)

33. **Kiyavash, Negar** (PI), United States Army Research Office, "Adaptive Exploitation of Non-Commutative Multimodal Information Structure," $1,624,970, 2015-2018.

34. **Marla, Lavanya** (PI), Obama-Singh 21st Century Knowledge Initiative, US-India Education Foundation, "Cooperative-Competitive, Data-Driven, Operational Strategies for Extremely Resourced-Constrained Settings in Emerging Economies," $189,525, 6/2015-5/2018.

35. **Oh, Sewoong** (PI), National Science Foundation, "Fundamental limits in differential privacy," $495,190, 2015-2018.

36. **Oh, Sewoong** (PI), National Science Foundation, "CAREER: Social Computation: Fundamental Limits and Efficient Algorithms," $457,685, 2011-2016. (Continuing)

37. **Oh, Sewoong** (Co-PI), College of Engineering UIUC, "Big-Data Analytics in Resource-constrained Regime: Statistical Limits and Computational Challenges," $30,000, 2014-2016.

(Continuing)

38. **Oh, Sewoong** (Co-PI), National Science Foundation, "EAGER: A Graphical Approach for Choice Modeling," $87,937, 2015-2016.
39. **Nagi, Rakesh**. (Co-PI), Office of Naval Research, "Adaptive Decentralized Resource Optimization," $673,102, Feb 2016 - Jan 2019. (PI: **A. Nedich**).
40. **Nedich, Angelia** (Co-PI), CCF, National Science Foundation, "Controlled Sensing, and Distributed Signal Processing and Decision Making in Networked Systems," $1,069,290, 2011-2016. (PI: Venugopal Veeravalli, UIUC). (Continuing)
41. **Nedich, Angelia** (PI), Division of Mathematical Sciences, National Science Foundation, "Optimization with Uncertainties Over Time: Theory and Algorithms," $183,768, 2013-2016. (Continuing)
42. **Nedich, Angelia** (PI), Office of Naval Research, "Information Structures, Signaling, and Competitively Optimal Policies in Decentralized Online Optimization," $249,000, 2012-2017, (Jointly with PIs: Maxim Raginsky and Cedric Langbort, UIUC.) (Continuing)
43. **Nedich, Angelia** (PI), Office of Naval Research, "Optimization Algorithms for Resource Management: Decentralization, Near-Optimality and the Price of Anarchy," $347,500, 2012-2015. (Jointly with PI: Rayadurgam Srikant, UIUC). (Continuing)
44. **Nedich, Angelia** (PI), Office of Naval Research, "Adaptive Decentralized Resource Optimization," $673,102, Feb 2016 - Jan 2019.
45. **Olshevksy, Alexander** (PI), National Science Foundation, "CAREER Algorithms and Fundamental Limitations for Sparse Control," $400,000, 3/2014-3/2019. (Continuing)
46. **Olshevsky, Alexander** (PI), National Science Foundation, "Achieving Consensus Among Autonomous Dynamic Agents Using Control Laws That Maintain Performance as Network Size Increases," $309,914, 5/2015-4/2018. (Continuing)
47. **Olshevsky, Alexander** (PI), National Science Foundation, "Linearly Scalable Protocols in Multi-Agent Control," $300,915, 9/2014-8/2017. (Continuing)
48. **Olshevsky, Alexander** (PI), United States Air Force (Office of Scientific Research), "Reliable Multi-Agent Control in Failure-Prone Environments via Inhomogeneous Markov Chains," $120,000, 9/2014-8/2017. (Continuing)
49. **Olshevsky, Alexander** (Co-PI), Office of Naval Research, "Adaptive Decentralized Resource Optimization," $673,102, Feb 2016 - Jan 2019. (PI: **A. Nedich**).
50. **Reis, Henrique** (PI), United States Air Force, "Estimating Oxidative Damage in Asphalt Concrete Pavements using Non-Collinear Wave Mixing," $100,000, 1/2016-12/2016.
51. **Reis, Henrique** (PI), ASNT, "Nondestructive Evaluation/Characterization of High Temperature Hydrogen Attack on Carbon Steels," Fellowship Grant, $20,000, 7/2016-6/2017.
52. **Stipanovic, Dusan** (Co-PI), National Science Foundation, "NRI: Collaborative Research: ASPIRE: Automation Supporting Prolonged Independent Residence for the Elderly," $1,295,917, 1/2015-12/2018 (PI: Naira Hovakimyan, UIUC). (Continuing)
53. **Stipanovic, Dusan** (PI), Department of Homeland Security,

"Efficient Surveillance, Rescue, and Threat Detection using Decision Theory and Multi-Objective Control for Multi-Vehicle Systems," $64,000, 2015-2016.
54. **Thurston, Deborah** (PI), National Science Foundation, "Toward a Method for Achieving Synergy between Heuristic Rules of Thumb and Quantitative Methods in Engineering Design," $75,000, 8/15-8/17.
55. **Thurston, Deborah** (PI), Jump, ARCHES, "Patient Discharge Process and Communications Simulation Training," $53,032, 1/16-1/17.
56. **Wang, Qiong** (PI), National Science Foundation, "GOALI: Inventory Management in Assemble to Order Systems: Analysis Policies and Asymptotic Optimality," $349,999, 4/2014-3/2017. (Continuing)
57. **Wang, Qiong** (PI), CMMI, National Science Foundation, "Strategic Planning of Internet Services in the Presence of User-Initiated Innovations: Implications for Network Neutrality," in collaboration with Columbia University, $102,724, 9/2014-8/2017. (Continuing)
58. **Wang, Qiong** (PI), National Science Foundation, "Collaborative Research: Models and Analyses of Industrial Laboratories: Returns Risks and Structural Efficiency with Implications for Sustainability and Science Policy," $261,968, 5/2014-4/2017. (Continuing)

ISE FACULTY CONFERENCE PUBLICATIONS

1. Danny J. Lohan, Masanori Ishigaki, Ercan M. Dede, and **James T. Allison**. "Combined Lumped and Continuum Parameter Design Optimization of Electro-Thermal Systems." ASME 2016 International Design Engineering Technical Conferences, IDETC2016-60218, Charlotte, NC, August 2016.
2. Daniel R. Herber, Tinghao Guo, **James T. Allison**. "Enumeration of Architectures with Perfect Matchings." ASME 2016 International Design Engineering Technical Conferences, IDETC2016-60212, Charlotte, NC, August 2016.
3. Yong Hoon Lee, Jonathon Schuh, Randy H. Ewoldt, and **James T. Allison**. "Shape Parameterization Comparison for Full-Film Lubrication Texture Design." ASME 2016 International Design Engineering Technical Conferences, IDETC2016-60168, Charlotte, NC, August 2016.
4. Anand P. Deshmukh, Marlon E. Mitchell, and **James T. Allison**. "Integrating Model-Based Design and Physical Design Evaluation for Improved Design Education." ASME 2016 International Design Engineering Technical Conferences, IDETC2016-59299, Charlotte, NC, August 2016.
5. Danny J. Lohan, Ercan M. Dede, and **James T. Allison**. "Topology Optimization Formulations for Circuit Board Heat Spreader Design." 2016 AIAA Aviation and Aeronautics Forum and Exposition, Washington, DC, June 2016.

6. Oscar S. Alvarez-Salazar, Jack B. Aldrich, **James T. Allison**, and Soon-Jo Chung. "Strain Actuated Solar Arrays for Precision Pointing of Spacecraft." 2016 AAS Guidance, Navigation, and Control Conference, Breckenridge, CO, February 2016.
7. Christian M. Chilan, Daniel R. Herber, Yashwanth Kumar Nakka, Soon-Jo Chung, **James T. Allison**, Jack B. Aldrich, and Oscar S. Alvarez-Salazar. "Co-Design of Strain-Actuated Solar Arrays for Precision Pointing and Jitter Reduction." AIAA 2016 Science and Technology Forum and Exposition, AIAA-2016-0162, San Diego, CA, January 2016. DOI: 10.2514/6.2016-0162
8. Anand P. Deshmukh, **Deborah L. Thurston**, and **James T. Allison**. "Heuristics for Formulating Design Optimization Models: Their Uses and Pitfalls." 5th International Engineering Systems Symposium, CESUN 2016, Washington, DC, June 2016.
9. P. Pare', **C. L. Beck**, and A. Nedic. "Stability Analysis and Control of Virus Spread over Time-Varying Networks." Proceedings of the IEEE CDC, Osaka, Japan, 2015.
10. D. Katselis and **C. L. Beck**. "Robust Principal Component Analysis via Re-Weighted Minimization Algorithms." Proceedings of the IEEE CDC, Osaka, Japan, 2015.
11. D. Katselis and **C.L. Beck**. "Clustering Sparse and Partially Observable Graphs via Nonconvex Optimization." Accepted to the ACC, 2016.
12. M. Baranwal, P. M. Parekh, **L. Marla**, S. M. Salapaka, and **C.L. Beck**. "Vehicle Routing Problem with Time Windows: A Deterministic Annealing Approach." Accepted to the ACC, 2016.
13. **A. Chronopoulou** and **R. Nagi**. "Online Community Detection for Fused Social Network Graphs." 19th International Conference on Information Fusion, Heidelberg, Germany, July 2016.
14. **A. Chronopoulou**, K. Cross, D. King, and E. Salimi. "Using case studies to enhance critical thinking of IE students." 2016 ASEE Annual Conference, New Orleans, June 2016.
15. Ran Duan, **Jugal Garg**, and Kurt Mehlhorn. "An Improved Combinatorial Polynomial Algorithm for the Linear Arrow-Debreu Market." Proceedings of the 24th Annual ACM-SIAM Symposium on Discrete Algorithms (SODA), 2016.
16. Xiaohui Bei, Wei Chen, **Jugal Garg**, Martin Hoefer, and Xiaoming Sun. "Learning Market Parameters using Aggregate Demand Queries." Proceedings of the 30th AAAI Conference on Artificial Intelligence (AAAI), 2016.
17. Xiaohui Bei, **Jugal Garg**, and Martin Hoefer. "Ascending-Price Algorithms for Unknown Markets." Proceedings of the 17th ACM Conference on Economics and Computation (EC), 2016.
18. Xiaohui Bei, **Jugal Garg**, Martin Hoefer, and Kurt Mehlhorn. "Computing Equilibria in Markets with Budget-Additive Utilities." Proceedings of the 24th European Symposia on Algorithms (ESA), 2016.
19. **Jugal Garg**, Ruta Mehta, Milind Sohoni, Vijay V. Vazirani. "A Complementary Pivot Algorithm for Market Equilibrium under Separable, Piecewise-Linear Concave Utilities." SIAM Journal on Computing, 44(6), 1820-1847, December 2015.
20. Nikhil Devanur, **Jugal Garg**, László Végh. "A Rational Convex Program for Linear Arrow-Debreu Markets," ACM Transactions

on Economics and Computation, 2016

21. **Jugal Garg**, Ruta Mehta, Vijay V. Vazirani, "Dichotomies in Equilibrium Computation, and Membership of PLC markets in FIXP," Theory of Computing, 2016

22. N. Du, Y. Wang, **N. He**, and L. Song. "Time-Sensitive Recommendation from Recurrent User Activities." Neural Information Processing Systems (NIPS), 2015.

23. **N. He** and Z. Harchaoui. "Semi-Proximal Mirror-Prox for Nonsmooth Composite Minimization." Neural Information Processing Systems (NIPS), 2015.

24. B. Dai, **N. He**, H. Dai, and L. Song. "Provable Bayesian Inference via Particle Mirror Descent." Artificial Intelligence and Statistics (AISTATS), 2016.

25. M. Kwak and **H.M. Kim**. "Assessing Time-Varying Advantages of Remanufacturing: A Model for Products with Physical and Technological Obsolescence." ICED15, Milan, Italy, 2015.

26. N. Quan and **H.M. Kim**. "Task-Based LCA for Environmental Impact Assessment of Multiple Heterogenous Systems." ICED15, Milan, Italy, 2015.

27. N. Quan and **H.M. Kim**. "A Mixed Integer Linear Programming Formulation for Unrestricted Wind Farm Layout Optimization." ASME IDETC, DETC2015-46876, 2015.

28. J. Ma and **H.M. Kim**. "Predictive Modeling of Product Returns for Remanufacturing." ASME IDETC, DETC2015-46875, 2015.

29. C. Xiao, D. Farooq, Y. Oo, G. Singh, **G. Krishnan**, and E. T. Hsiao-Wecksler. "Pneumatic Sleeve Orthosis for Lofstrand Crutches: Application of Soft Pneumatic FREE Actuator." 2016 Design of Medical Device Conferences, Minneapolis, MN, April 2016.

30. S. Patiballa, J. Shanley, and **G. Krishnan**. "Estimating Stress Bounds in Early-Stage Design of Distributed Compliant Mechanisms." 2016 ASME International Design Technical Conferences and Computers in Information Conferences, Charlotte, NC, August 2016.

31. S. Satheeshbabu and **G. Krishnan**. "Towards a Constraint-based Design of Soft Robots." 2016 ASME International Design Technical Conferences and Computers in Information Conferences, Charlotte, NC, August 2016.

32. G. Singh, C. Xiao, Y. Oo, **G. Krishnan**, and E. T. Hsiao-Wecksler. "Design and Analysis of Soft Pneumatic Sleeve Arm Orthosis." 2016 ASME International Design Technical Conferences and Computers in Information Conferences, Charlotte, NC, August 2016.

33. S. Satheeshbabu and **G. Krishnan**. "An Automated Method for Mobility Analysis of Flexure Systems." 2016 ASME International Design Technical Conferences and Computers in Information Conferences, Charlotte, NC, August 2016.

34. G. Singh, D. Farooq, C. Xiao, Y. Oo, S. Tawfick, P. Ferreira, B. Slavens, **G. Krishnan**, and E. T. Hsiao-Wecksler. "Project 2F.1: Soft Pneumatic Actuator for Arm Orthosis." 2015 Fluid Power Innovation and Research Conference, Chicago, IL, October 2015.

35. S. Satheeshbabu and **G. Krishnan**. "Mobility Analysis of Flexure Systems using Load Flow Visualization." 30th American Society of Precision Engineers Meet, Austin, TX, November 2015.

36. G. Singh and **G. Krishnan**. "An Isoperimetric Formulation to Predict Deformation Behavior of Pneumatic Fiber Reinforced Elastomeric Actuators." IEEE/RSJ International Conference on Intelligent Robots and Systems, September 2015.

37. M. Baranwal, P. M. Parekh, **L. Marla**, S. M. Salapaka, and **C.L. Beck**. "Vehicle Routing Problem with Time Windows: A Deterministic Annealing Approach." Accepted to the ACC, 2016.

38. **A. Chronopoulou** and **R. Nagi**. "Online Community Detection for Fused Social Network Graphs." 19th International Conference on Information Fusion, Heidelberg, Germany, July 2016.

39. **R. Nagi**, E. Salimi, and **R. S. Sreenivas**. "On the Algebraic Structure of Solutions to Some Livelock-Avoidance Problems in Manufacturing Systems Modeled by Petri Nets." 2016 Industrial and Systems Engineering Research Conference, Anaheim, CA, May 2016.

40. Giulia Fanti, Peter Kairouz, **Sewoong Oh**, Kannan Ramchandran, and Pramod Viswanath. "Rumor Source Obfuscation on Irregular Trees." SIGMETRICS 2016.

41. Weihao Gao, Sreeram Kannan, **Sewoong Oh**, and Pramod Viswanath. "Causal Strength via Shannon Capacity: Axioms, Estimators and Applications." ICML, 2016.

42. Ashish Khetan and **Sewoong Oh**. "Data-driven Rank Breaking for Efficient Rank Aggregation." ICML, 2016.

43. Junegseul Ok, **Sewoong Oh**, Jinwoo Shin, and Yung Yi. "Optimality of Belief Propagation for Crowdsourced Classification." ICML, 2016.

44. Giulia Fanti, Peter Kairouz, **Sewoong Oh**, Kannan Ramchandran, and Pramod Viswanath. "Metadata-conscious Anonymous Messaging." ICML, 2016.

45. **Sewoong Oh**, Kiran K. Thekumparampil, and Jiaming Xu. "Collaboratively Learning Preferences from Ordinal Data." NIPS, Montreal, Canada, December 2015.

46. Peter Kairouz, **Sewoong Oh**, and Pramod Viswanath. "Secure Multi-party Differential Privacy." NIPS, Montreal, Canada, December 2015.

47. S. Hakimzadeh, B. Behnia, W. G. Buttlar, and **H. Reis**. "New Approach in Evaluation of Fracture Properties of Asphalt Binder at Low Temperatures." TRB Meeting, 2016, paper number 16-6906.

48. S. Sun, M.E., B. Behnia, W. G. Buttlar, and **H. Reis**. "Assessment of Low-Temperature Cracking in Asphalt Concrete Pavements using an Acoustic Emission Approach." 8th RILEM International Conference on Mechanics of Cracking and Debonding in Pavements, Nantes, France, June 2016.

49. M. E. McGovern, W. G. Buttlar, M.E., and **H. Reis**. "Effectiveness of Rejuvenator Effectiveness in Restoring Oxidized Asphalt Concrete Pavements." SPIE Smart Structures and Materials, Nondestructive Evaluation and Health Monitoring, SPIE I, March 2016.

50. N. A. Farace, W. G. Buttlar, and **H. Reis**. "Effects of Asphalt Rejuvenator on Thermal and Mechanical Properties on Oxidized Hot Mixed Asphalt Pavements." SPIE Smart Structures and Materials, Nondestructive Evaluation and Health Monitoring, SPIE I, March 2016.

51. S. Sun, B. Behnia, W. G. Buttlar, and **H. Reis**. "Evaluation of Rejuvenator Efficiency in Recuperating Original Embrittlement Temperatures in Asphalt Concrete using Acoustic Emission Source Location." 25th Conference and Workshop on Rheology of Building Materials, East Bavarian University of Technology, Regensburg, Germany, March 2016.

52. B. Behnia, W. G. Buttlar, and **H. Reis**. "Asphalt Embrittlement Analyzer: Development and Implementation." 2016 Annual Meeting Poster Session Presentation, Transportation Research Board Conference, Washington, DC, January 2016.

53. R.M. Reck and **R.S. Sreenivas**. "Assessing an Affordable and Portable Laboratory Kit in an Undergraduate Control Systems Course." Frontiers in Education 2015, El Paso, TX, October 2015.

54. **R. Nagi**, E. Salimi, and **R.S. Sreenivas**. "On the Algebraic Structure of Solutions to Some Livelock-Avoidance Problems in Manufacturing Systems Modeled by Petri Nets." 2016 Industrial and Systems Engineering Research Conference, Anaheim, CA, May 2016.

55. V. Cichella, T. Marinho, **D. M. Stipanovic**, N. Hovakimyan, I. Kaminer, and A. Trujillo. "Collision Avoidance Based on Line-of-Sight Angle." 2015 IEEE Control and Decision Conference, Osaka, Japan, December 2015.

56. A. Zatezalo, **D. M. Stipanovic**, and A. E. Abbas. "Multi-Agent Multi-Objective Control Design with Discrete-Time Information Updates and Preferences." 2015 IcETRAN Conference, Silver Lake (Srebrno Jezero), Serbia, June 2015.

57. P. Devnani and **D. Thurston**. "Cloud Based Method for Improving Residual Value Estimation for End-of-Life Product Recovery." 2016 Industrial and Systems Engineering Research Conference, Anaheim, CA, May 2016.

58. A. Deshmukh, **J. Allison**, and **D. Thurston**. "Heuristics for Formulating System Design Optimization Models: Their Uses and Pitfalls." CESUN 2016 - 5th International Engineering Systems Symposium, Washington, DC, June 2016.

59. Debasis Mitra and **Qiong Wang**. "Modeling and Optimizing Intellectual Asset Production in Industrial Laboratories." IIE Annual Meeting and Expo, Nashville, TN, June 2015.

60. Debasis Mitra and **Qiong Wang**. "Preservation of Best-Effort Service on the Internet in the Presence of Managed Services and Usage-Generated Applications." TPRC 43: The 43rd Research Conference on Communication, Information and Internet Policy Paper, January 2016.

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