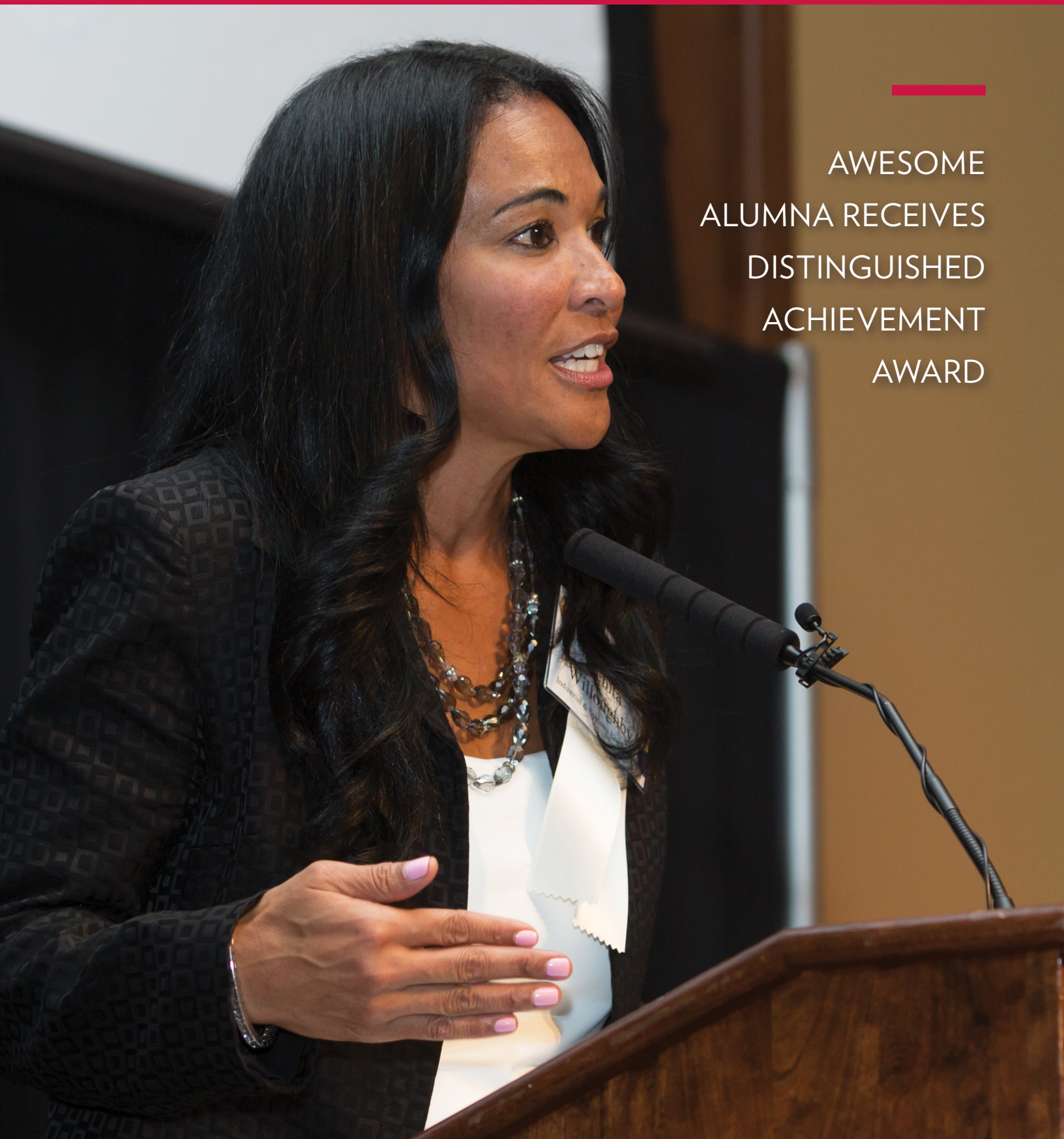
FALL/WINTER 2017

INDUSTRIAL AND SYSTEMS ENGINEERING

UNIVERSITY OF WISCONSIN-MADISON



AWESOME ALUMNA RECEIVES DISTINGUISHED ACHIEVEMENT AWARD

CHAIR'S MESSAGE

Jeffrey Linderoth

Greetings and welcome to our fall 2017 newsletter!

The ISyE department at UW-Madison continues to thrive. As just one indicator, *U.S. News and World Report* ranks ISyE 5th in the nation for our undergraduate program and 8th for our graduate program. This is a testament to our wonderful alumni, students, staff and faculty. You all truly continue to help us succeed.

In the newsletter, you'll find many familiar faces, but also a new one—our newest assistant professor Gabriel Zayas-Caban. Gabriel received his PhD at Cornell and comes to us from a postdoctoral position at the University of Michigan. In his research, he develops and employs mathematical models to analyze and improve medical operations and medical decision-making. Gabriel will be an important contributor toward ISyE's long-standing world leadership on health systems engineering.

Our students continue to receive remarkable educational opportunities, including collaboration with local industries to provide experiences that are impossible to replicate in the classroom. Our student groups continue their tradition of excellence with gold level achievements. Our alumni continue to give back to our department, both financially and through their mentoring efforts. As seen in our cover photo, one such alumna, Denita Willoughby, returned to UW-Madison to offer her career insights to both ISyE students and students throughout the College of Engineering. During her visit, Denita shared how she used her degrees in IE and business to become recognized as one of California's most successful businesswomen. In addition, former chairs and students are contributing to our education endeavors with substantial gifts that enable our department to send students to prestigious conferences and augment the student experience.

There are many other indications that our department is flourishing. We have a record number of undergraduates in the department and we have recently launched two new accelerated master's programs, one in systems engineering and analytics and one in human factors and health systems. Additionally, we are actively looking to hire two new assistant professors this upcoming year. Honestly, we couldn't fit all the great things happening here in the department in this newsletter, so please visit our website (engr.wisc.edu/ie), Facebook (www.facebook.com/ISyE.UWMadison), and Twitter (@uwisye) to keep up to date with all the latest news from ISyE!

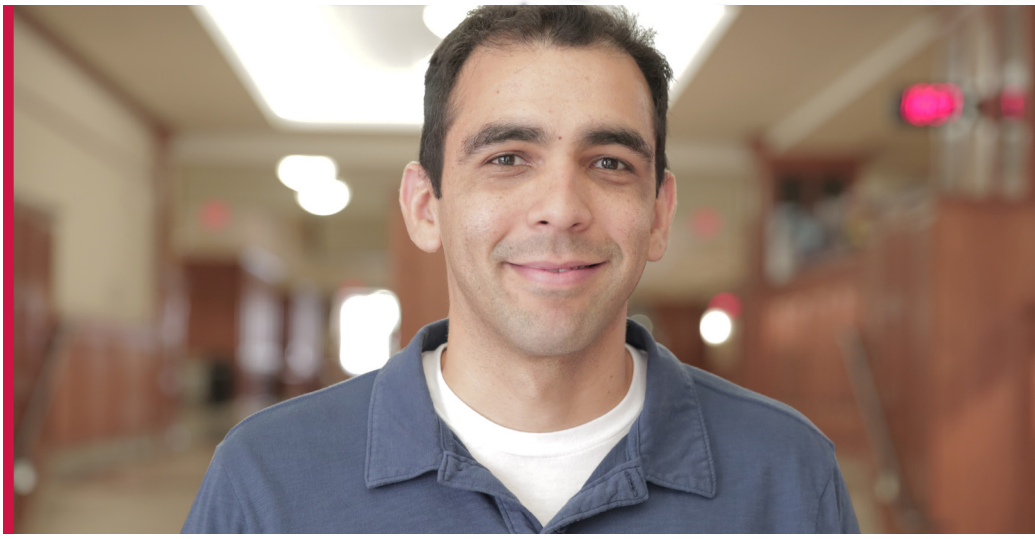
Finally, thanks for everything you do to support this great university, and the Department of Industrial and Systems Engineering specifically. I look forward to connecting with you soon. Please feel free to drop me an email, give me a call, or stop by 3270 Mechanical Engineering if you are back on campus.

ON, WISCONSIN!

Jeffrey Linderoth
Professor and Chair
linderoth@wisc.edu • (608) 890-1931

FOCUS ON NEW FACULTY: GABRIEL ZAYAS-CABAN, USING MATH SKILLS TO IMPROVE MEDICAL DECISION-MAKING

You don't have to be a math whiz to be a good physician. But a mathematician may be able to help a physician make better decisions every day.



For example: Should I transfer a patient from one hospital to another when her illness becomes more severe? Should I triage or immediately treat a patient who just arrived in the ER? Can I adjust my inpatient rounds schedule to better align with the ER's typical patient flow?

Developing quantitative tools to help answer these kinds of questions is the research focus of Gabriel Zayas-Caban, who joined the department as an assistant professor in August 2017.

With his wife, Amy Cochran—a postdoctoral fellow in biostatistics and medical informatics at UW-Madison—he moved to Madison from Ann Arbor, where both completed postdoctoral fellowships at the University of Michigan after earning PhD degrees in applied mathematics at Cornell University.

"We keep telling our friends that Madison has everything that makes Ann Arbor great, but twice as much," Zayas-Caban jokes, alluding to Madison's twice-as-large population.

His passion for math began as a high school junior in Columbia, Missouri, where his family relocated in 2003 so that his mom could pursue a PhD in accounting. Until then, he and his two older siblings—a musically talented brother and a sister who earned her own PhD in industrial and systems engineering at UW-Madison—had grown up in Mayagüez, Puerto Rico, where his dad worked as an engineer and his mom taught college-level accounting.

After completing his bachelor's degree in math at the University of South Florida, Zayas-Caban continued with graduate school at Cornell, where his interest in healthcare applications of operations research emerged. He developed an optimization algorithm for allocating emergency medical service vehicles after catastrophic events such as hurricanes, and he analyzed the process of triaging or treating patients in emergency departments.

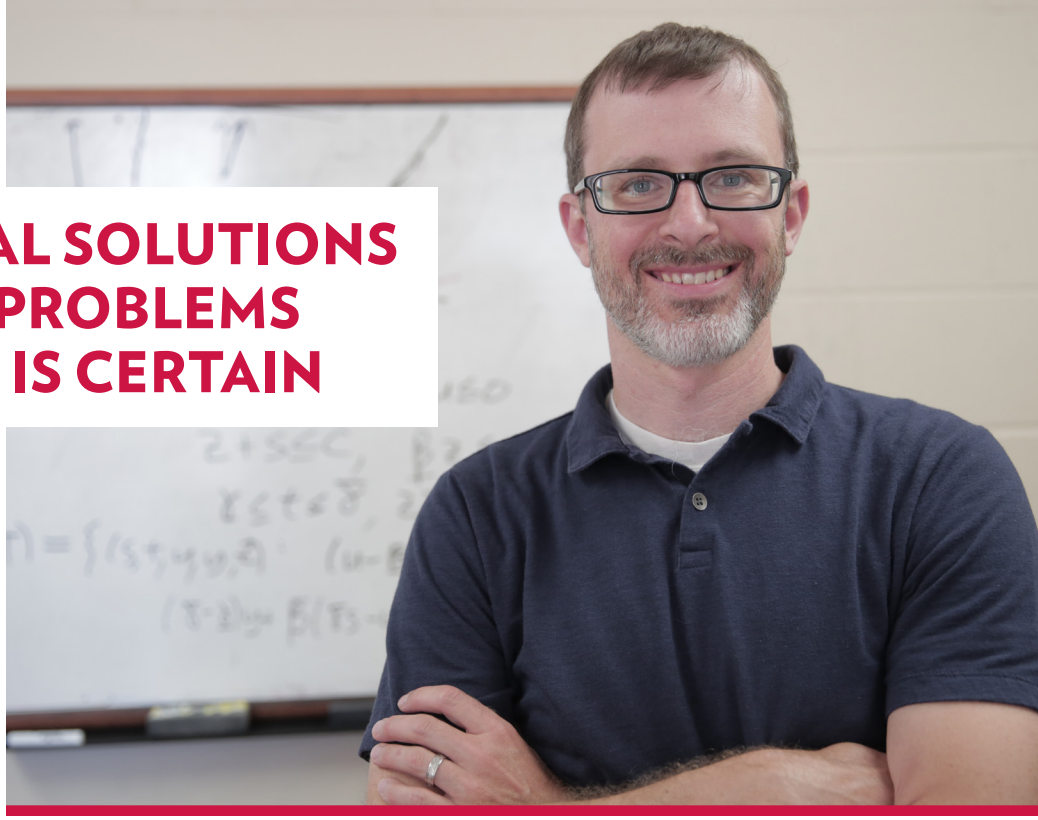
As a postdoctoral fellow at the University of Michigan, one of his projects involved newborn screening, which is performed on nearly four million babies born annually in the United States. All 50 states participate, but the test details vary between states.

"We carefully analyzed the process by which blood samples for genetic testing are sent from the birthing hospital to the state's public health laboratory, which runs tests for more than 50 single-gene defects and then mails results to the family's pediatrician," Zayas-Caban explains. "Next, we plan to develop a smartphone app that will make the process faster and more efficient."

Some of the motivation for this project came from a 2013 investigative report about newborn screening by the *Milwaukee Journal Sentinel*, which found that the consequences of delayed or misleading test results—though rare—may be grave enough to prompt lawsuits against pediatricians: A rapid diagnosis of single-gene metabolic disorders can make the difference between a baby growing up healthy or suffering permanent damage to her brain or other organs.

The scheduling process for newborn screening is an example of a so-called queueing system—and for Zayas-Caban, a powerful illustration of the potential for systems engineers to help reduce adverse health outcomes. This makes him a great fit for the recently established Wisconsin Institute for Healthcare Systems Engineering that is directed by his colleague Pascale Carayon.

"I think modeling people's average behavior in a queueing system and combining it with each patient's unique clinical data can improve patient flow and other types of medical decisions," Zayas-Caban says. "At UW-Madison, I look forward to many new opportunities to collaborate with engineers and physicians on designing better healthcare systems."



FINDING OPTIMAL SOLUTIONS FOR PRACTICAL PROBLEMS WHEN NOTHING IS CERTAIN

Making decisions under uncertainty is something we do all the time: When, for example, should I leave work to take my child to soccer practice, not knowing how road construction will affect traffic?

But these everyday decisions tend to involve problems of a smaller scale than, say, preparing for the next season of forest fires or protecting multi-million-dollar IT infrastructure from cybersecurity threats.

For that kind of decision support, companies and government agencies alike might seek out stochastic optimization expert Jim Luedtke.

He uses mathematical models to help decision-makers sift through multiple actionable items, each associated with a certain cost, that contribute to an overall solution for their problem—say improved cybersecurity. This solution has to match a given budget—which may change over time—and account for the inherent uncertainty of the many smaller yes-or-no decisions that make up the total.

> **"There is a big demand in industry for students who receive this kind of training. This is especially true when we're pushing the frontiers on the types of problems our models and algorithms can solve and the areas to which they apply."**

"If you have a sequence of 300 yes-or-no decisions, the number of possible combinations is larger than the number of atoms in the universe, so you can't manually sort through all of them," Luedtke notes. "But the models we build actually can consider all of these, and do so very fast, thanks to a toolbox of mathematical tricks."

The research he conducts with his colleague Laura Albert informs government efforts to defend federal computer systems against cyberattacks. This means accounting for so-called adaptive adversaries: Once decision-makers put into place a certain combination of defense strategies, smart hackers may detect what's already in place and cleverly choose their next attack to work around it; this increases the level of complexity the researchers have to build into the model.

They also have to consider many different kinds of attacks, beyond malicious software. "We need to consider security risks in the supply chain for a manufactured IT component, such as an adversary hiding a computer chip in a piece of hardware," Luedtke says. "This can be addressed by more elaborate quality-control procedures for the manufacturing process, or by switching to a more trustworthy supplier, which may increase costs."

In this example, it is difficult to measure the ultimate success of decision support systems: Once a decision has been made, nobody will ever know what may have happened if that decision had not been implemented. But other applications, such as renewable energy, are not hampered by this lack of counterfactuals.

Here, the uncertainty of the power-generating process is due to the energy source itself: We don't know ahead of time how much wind will blow or how much sun will shine the next day. But when system operators switch to a new optimization tool to balance energy supply and demand, they can directly measure whether their cost decreases or whether power outages and other undesirable outcomes happen less frequently than before.

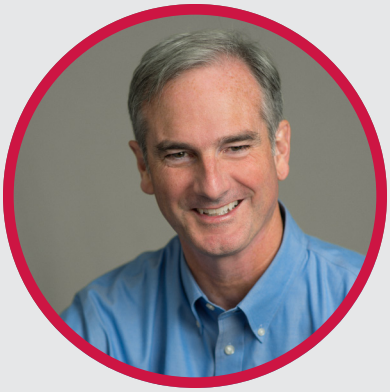
Thanks to the rapid growth of technology and computer power, the interest in decision support systems has grown as well. Some of Luedtke's methods have been implemented in software packages that companies and agencies around the world use to make daily decisions about optimizing their workflow.

"There is a big demand in industry for students who receive this kind of training," he says. "This is especially true when we're pushing the frontiers on the types of problems our models and algorithms can solve and the areas to which they apply."

TAKING ACTION AGAINST OPIOID AND OTHER SUBSTANCE USE DISORDERS

In the United States, 24 million people have a substance use disorder, yet only 4 million are in some form of treatment for their addiction to alcohol, illicit drugs or opioid painkillers. ISyE researchers have now joined the effort to close that gap.

With a new $3.8 million grant from the U.S. Department of Health and Human Services, a team at the Center for Health Enhancement Systems Studies led by senior scientist Todd Molfenter became a member of the national network of Addiction Technology Transfer Centers (ATTCs) in October 2017.



Todd Molfenter

The Great Lakes ATTC, which includes researchers at the School of Medicine and Public Health and the Collaborative Center for Health Equity, plans to improve the quality of, and access to, addiction treatment and recovery services in six Midwestern states: Wisconsin, Illinois, Indiana, Michigan, Minnesota and Ohio. Combating the opioid epidemic is one of the center's top priorities. Although the problem is not unique to the United States, Americans consume about 80 percent of the world's opioid painkillers.

"When the rise of opioid prescriptions began in the 1990s as a concerted effort toward improving the management of chronic pain, the addictive properties of prescription opioids were greatly underestimated," Molfenter says.

During the next 20 years, the number of these prescriptions tripled, as did the number of deaths from opioid overdoses. Many accidental deaths happen after people have stayed off their painkillers for a week or two and then go back to the same dose they took before; with opioids, that kind of accidental overdosing is often fatal.

As an important part of implementing quality improvements in treating opioid use disorders, the center will promote medication-assisted treatment, which is a deviation from the field's traditional focus on behavioral therapy.

"Research has shown that medications like buprenorphine greatly improve the likelihood that patients will achieve long-term recovery, but many providers have been slow to embrace this form of treatment," says Maureen Fitzgerald, the Great Lakes ATTC's communications manager. Buprenorphine is a partial opioid receptor agonist, meaning it "fills up" about half of the cell receptors that opioids would otherwise attach to. This results in reduced cravings while still providing some pain benefit and relief from withdrawal symptoms.

While the opioid epidemic has generated many recent news headlines, other addictions haven't gone away. "The state of Wisconsin recently established new priorities in its 'Healthy Wisconsin' initiative and three of them concern substance use disorders: binge drinking, tobacco, and opioids," says Fitzgerald.

The researchers will build upon their highly successful history with mobile apps for addiction treatment support.

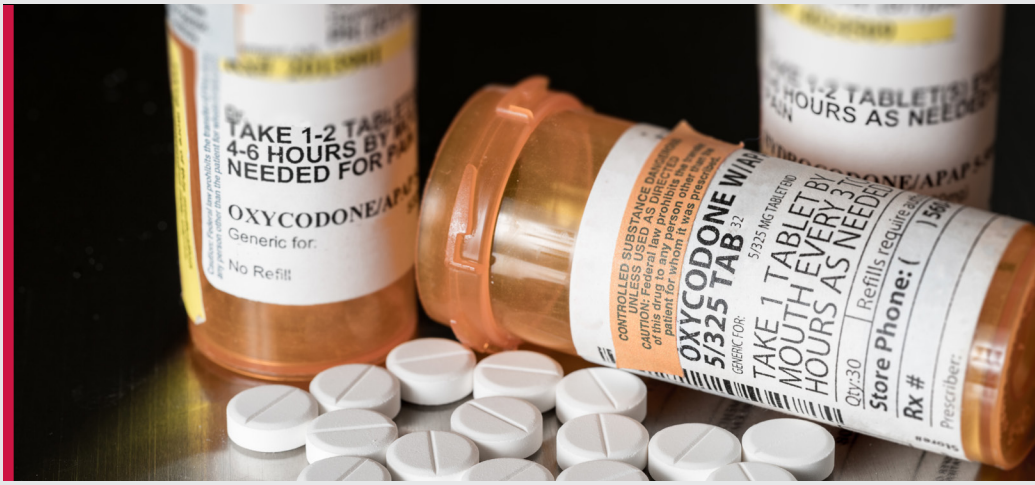
These apps allow family members, friends and professional healthcare providers to assist patients with abstinence efforts when face-to-face contacts aren't feasible.

In order for quality improvements to be effective, you need people to implement them—which is why the Great Lakes ATTC's workforce development efforts are just as important.

"To address the current shortage of treatment providers, many agencies need help with recruiting and retaining employees," Molfenter says. "Our goal is to attract more people to the field by promoting evidence-based training guidelines, providing technical assistance, and building relationships between the schools that train people and the agencies that employ them."

The new training guidelines will also emphasize improved treatment access by underserved populations. For rural parts of the Midwest, telemedicine may help close service gaps, while urban areas present a different set of challenges with persistent racial disparities and language barriers for Hmong and Hispanic populations.

"We know that some of these populations approach substance use disorders differently than white populations," Molfenter says. "That's why culturally informed treatment is so important in reducing the social disparities in access to care that exist today."



During the last two decades, the number of deaths from opioid overdosing has tripled.

AWARD-WINNING ACADEMIC-INDUSTRY PARTNERSHIP BENEFITS IE STUDENTS

Ananth Krishnamurthy

Few students get a chance to present their research project to the senior leadership team of a multi-million-dollar company and work with its business intelligence team to turn that project into one of its frequently used decision support tools.

But that kind of opportunity is available to industrial and systems engineering students in Ananth Krishnamurthy's group, thanks to a multi-year partnership among National Oilwell Varco (NOV), a global manufacturer of oil drilling equipment, UW-Madison, Penn State University, and Texas A&M University.

"This provides industry-driven projects that are outstanding in terms of complexity, accountability and challenge," says Krishnamurthy, who has spearheaded this partnership since 2011. "There is no way that I could replicate this kind of experience in a classroom."

Other companies and one of the field's largest professional societies have taken note.

At the annual meeting of the Institute of Industrial and Systems Engineers in May 2017, the academic-industry partnership received the I[5] Award for implementing ways to improve their organizations with ideas learned from the previous year's IISE conference.

The partnership grew out of NOV's mentorship in the Center for Quick Response Manufacturing that Krishnamurthy directs. The land and offshore rigs that NOV produces may cost up to $1 billion and contain pretty much every single tool for drilling oil.

"This is a very challenging industry for several reasons," Krishnamurthy explains. "Its business model requires highly customized manufacturing where the knowledge you have gained from one site—say Brazil—doesn't transfer well to another site, say Norway. The equipment NOV builds is very large, so transportation is another formidable task, and any kind of failure is extremely expensive."

Repeated demand and large volumes typically reduce lead times and improve the efficiency of manufacturing processes. Lacking these features, NOV's supply chain is already more complicated than that of many other industries, but layered on top of that are the oil market's notorious up-and-down swings.

An offshore semi-submersible oil rig. As part of a multi-year partnership with NOV, ISyE students help develop tools and methodologies for improved supply chain management. *(Photo courtesy of NOV)*

> **"I believe that custom-engineered manufacturing has a bright future in the United States and that this kind of training will serve our students very well in many different job sectors."**

To cope with these swings, the company often needs to decide if, when and with whom to subcontract. This means weighing the logistics of outsourcing a job and working with a new contractor against the cost of purchasing its own machines—not knowing if and when that capital investment may be recovered because of the equipment's highly intermittent use.

Since 2011, more than a dozen graduate students and several undergraduates have worked on solving these kinds of problems for NOV, while also benefiting the Center for Quick Response Manufacturing more broadly. The "quick" in its name refers to reduced lead times and a faster response to business cycles, all while keeping costs low.

An example NOV project is an insourcing/outsourcing optimization tool that former PhD student Ashesh Kumar Sinha—now an assistant professor of industrial and manufacturing systems engineering at Kansas State University—developed with former master's student Thomas Davich, who now works for internet technology giant Google. It is actively being used by several NOV facilities around the world.

For Krishnamurthy, the NOV partnership—which will continue through 2020—is a win-win for all sides.

The company receives new supply chain management tools and may hire students as already well-trained employees; the professors can use the projects as research and teaching material; and the students benefit from internships and hands-on job experience.

"Seeing your students succeed is the best measure of your own success as a faculty member," Krishnamurthy says. "I believe that custom-engineered manufacturing has a bright future in the United States and that this kind of training will serve our students very well in many different job sectors."

MEET DENITA WILLOUGHBY: 2017 DISTINGUISHED ACHIEVEMENT AWARD RECIPIENT

Department Chair Jeffrey Linderoth, Distinguished Achievement Award recipient Denita Willoughby, and College of Engineering Dean Ian Robertson

We honored Denita for her inspiring track record in sales, supply chain management and government affairs, and for her passion for developing leaders and improving education among youth.

Denita Willoughby

Vice President, Sempra Energy
BSIE '88 (MBA Harvard)

What has had the greatest impact on your success?

The minority engineering program. Classes were centered around time management, interviewing skills, resume writing, study habits, things like that. I remember them telling me it was important to get a tutor. And I remember saying to them, "No, I'm a really good student. I'm pretty smart. I don't think I need a tutor." They were like, "No, you don't understand. Smart people get tutored. You are going to need a tutor." And they identified these different locations on the campus where you could go and get tutoring services for free. They also talked about the power of study groups. The skills and the lessons were invaluable and positioned me for success, and I don't know if I would have succeeded without the program.

It was such a positive experience in my life. Being an African-American female in engineering, I really think UW got it right—the support structure, the personal outreach. When I talk at universities and to faculties, I share that these programs work. If people are really committed to getting minorities and women into STEM fields, UW-Madison is a great example.

What's your fondest memory of your time on campus?

When I was on campus, Rodney Dangerfield was filming *Back to School*. I got paid really good money just to be an extra walking up Bascom Hill. It was the only time I got to be an actress. That was a lot of fun.

How did your experience in the College of Engineering shape your career path?

IBM had loaned an executive to the minority engineering program who would always talk about her experience at IBM. I thought it sounded like the perfect place to work. I worked at IBM as a marketing rep and so I felt like it was a great way to use my engineering degree in a technical area but not be an engineer. My engineering degree helped establish and build credibility, even when I was a sales person in the aerospace and manufacturing industry. The school gave me the required skills and the confidence to be competent in an engineer's world. I could be thrown into any situation and know how to solve the problem.

When I left IBM to go to business school at Harvard, I thought it was going to be so hard. But I told myself, "You have an engineering degree from UW-Madison; nothing can be harder than that." And I was absolutely right. It was hard, but UW-Madison engineering is no joke.

Of what professional accomplishment are you most proud?

I do a lot of mentoring and coaching, and I'm really proud of the difference that I see that it makes. A lot of people helped me, coached me, guided me or gave me opportunities. And it really makes me proud to look at all the people whom I have helped develop and navigate their careers.

What advice would you give engineering students today?

Enjoy this time in college because it goes really fast. The most important thing is understanding what makes you happy. Don't get too hung up on what your major is. Think about the skills that are transferrable. Think about the end game and you can't go wrong having an engineering degree. I have never met anyone who regretted having an engineering degree.

ALUM RONALD DALEY CAME FOR THE CHEESE AND LEFT PREPPED FOR SUCCESS

Ronald Daley

Tasty cheese curds and the engineering fountain were big selling points for Ronald Daley when he toured the UW-Madison campus in 2008.

As a high school junior in Chicago, Daley was only vaguely aware of Wisconsin until one of his mentors noted its great engineering program and lively sports scene. But when he came for a tour, he instantly fell in love with the campus and the school spirit he sensed.

He enrolled in fall 2010, has been a Badgers fan ever since, and credits his bachelor's degree in industrial engineering with his professional success thus far.

"It was the classes I took, the mentoring from Professor Laura Albert, the Badger Bracketology project she led outside of class, and my membership in the National Society of Black Engineers that developed me into the kind of engineer I am today," Daley says.

As one of four children of Jamaican immigrants who came to the United States in 1980, he loved math and science in high school and already knew as a freshman that he wanted to pursue an engineering degree in college. But it took exposure to the whole range of engineering disciplines—and a summer internship at GE Healthcare in 2012—to find his true passion.

"For part of my internship, I worked with industrial engineers on improving the manufacturing process for a GE Healthcare product," Daley remembers. "This involved regular interactions with the operators who actually built the product, and I found that much more interesting and rewarding than designing it."

Continuous process improvement still ranks high on his weekly to-do list at Accenture, the Chicago-based consulting company where he has worked since 2015 as a business and technology analyst and where he is using the skills he learned in college virtually every day. That includes not only data analytics knowledge from Professors Laura Albert, Kaibo Liu and Shiyu Zhou, but also the teamwork he learned in the senior design class, ISyE 450, in which students tackle real-world projects provided by Madison-area businesses.

"Leveraging the strength of each person in a team to accomplish a shared goal is what I do all the time in testing the data analytics platform we have developed for our business clients," Daley explains. "I typically supervise a team of analysts who verify the platform's functionality and make sure all of its features work as intended."

Informed by his own experience, his advice to current students is this: Be persistent on your journey of continuous improvement and never give up on yourself and the pursuit of happiness.

This is one of the biggest lessons Daley learned from his involvement and leadership roles with the Alpha Phi Alpha Fraternity, Inc., and the National Society of Black Engineers, which provided family-like support while he pursued his degree. He believes joining organizations like these is especially important when few directly observable role models for minority students exist on campus.

Today, he is that kind of role model for others: He helps a nephew who is interested in computer engineering learn programming languages, and leads his company's inclusion and diversity recruiting efforts at UW-Madison, a role that allows him to return to campus several times a year. It also earned him recognition as one of Accenture's outstanding employees in 2017.

Though his career keeps him plenty busy, Daley still finds time to pursue a few hobbies, including beer brewing—which, of course, started in Madison—and rooting for the Badgers football team. But his Wisconsin allegiance will only go so far: "Being from Chicago, it's against the law to be a Packers fan," he says.

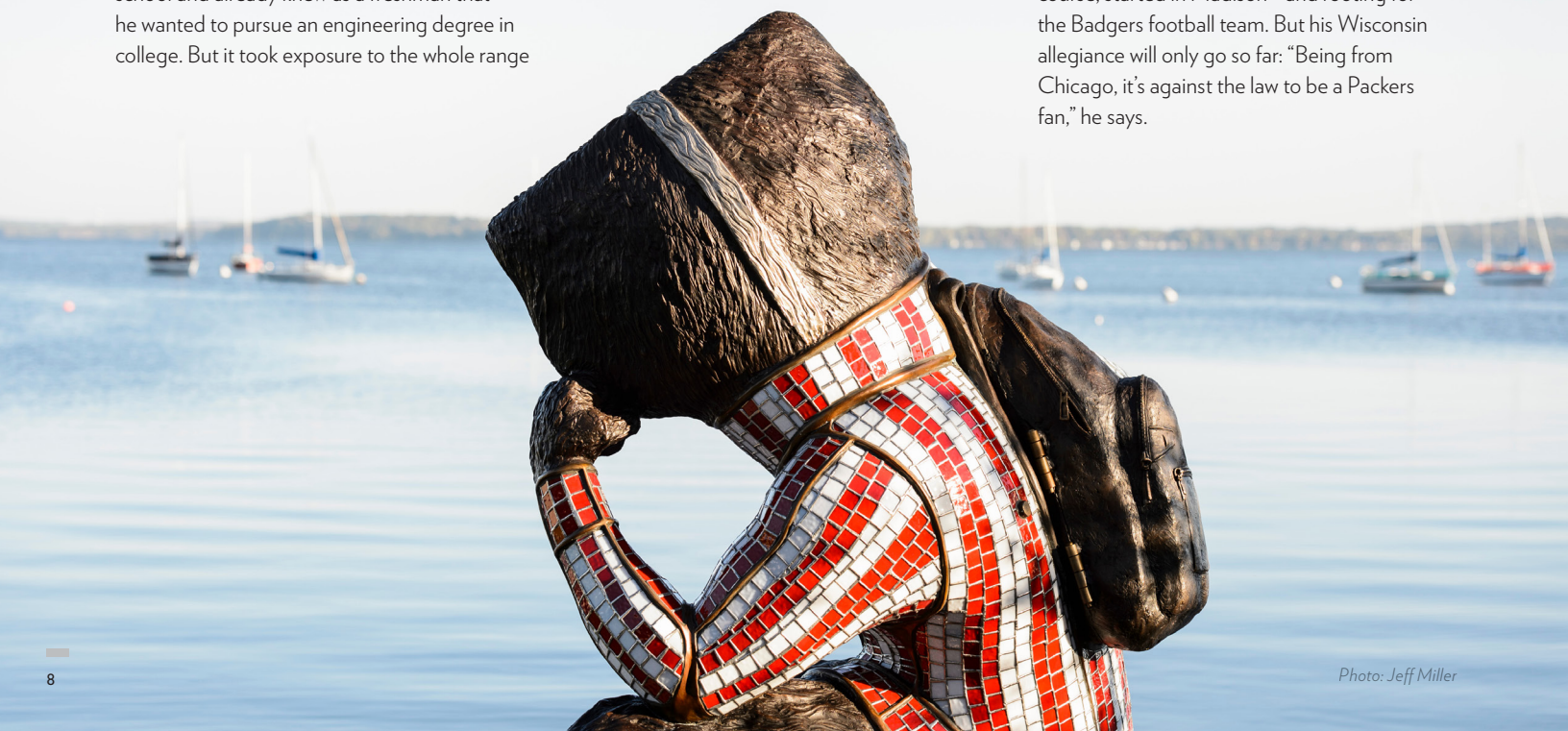


Photo: Jeff Miller

RETIRED CHAIR STILL GIVING BACK

Harry Steudel

Former department chair Harry Steudel, with the help of his former student Indra Widjaja, is extending the Student Support Fund he initiated in 2008.

Steudel had pledged $5,000 in funds to the UW Foundation if they could be matched. In March 2017, Widjaja accepted the challenge.

"Having served as chair of the ISyE department for nine years, I came to appreciate the importance of being able to support activities that enrich the student experience beyond the classroom," Steudel says. "Supporting students to travel and attend professional conferences to present their work, providing some funds to help our Badgerloop team travel to their competition, or sponsoring a classical music concert given by our graduate students at Union South are a few examples of activities that help foster professional growth."

When Steudel established the fund in 2008, he issued a similar matching-gift challenge. With generous support from ISyE faculty and staff, the fund was able to kick off with $20,000.

Such generosity is not uncharacteristic of Steudel, who says his mission is to improve people's lives by acquiring and sharing valuable knowledge, skills and resources. "The honor and privilege of being a professor in ISyE has been a rich environment in which to carry out this mission," he says.

That work has not gone unnoticed: In April of 2015, he was honored with a citation from the Wisconsin Legislature recognizing his life's work at UW-Madison.

Steudel first came to UW-Madison in 1964 as an undergrad in mechanical engineering. "My fondest memories are of the many friends I made in my classes and the willingness of the faculty and staff to support me in achieving my goals," he says. "It was a time of lots of hard work as well as fun."

Though he now is retired, he is staying very busy. He lists his hobbies as golfing, gardening, cooking, traveling and spending time with his wife Carol.

"Since officially retiring in January 2009, I have also taught numerous classes for the ISyE department when they needed some additional instructional resources, and I continue to this day to teach a course called *Quality Engineering and Management* as part of the online Master of Engineering Management in the Department of Engineering Professional Development."

Steudel stays involved because as a professor and department chair, he says he has been able to make a huge difference. "I have been able to improve the lives of thousands of students, contribute to the profession, and help many Wisconsin companies improve their quality and efficiency through my outreach activities," he says.

ALUM REWARDS MULTITALENTED STUDENT

Michael Yadgar is looking to recognize well-rounded students.

Alum Michael Yadgar, who received bachelor's degrees in IE and statistics in 1992, and his wife Susan have established the Michael J. and Susan E. Yadgar scholarship to recognize an IE undergraduate student who is focused not only on academics, but also on work outside of the classroom.

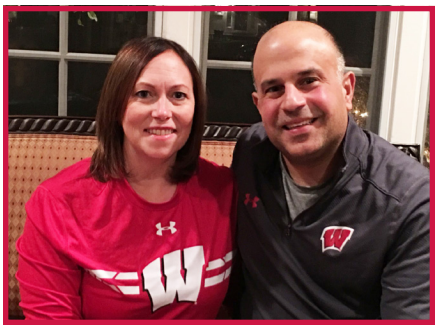
"The scholarship is intended to recognize those students who are well-rounded in terms of their experience at the UW," Yadgar says. "Meaning academically as well as in the community and socially. I want someone who is hopefully proving him or herself to become a future leader. The UW really gave me a well-rounded experience, and I'm hoping to recognize similar individuals with this scholarship."

Yadgar knows a bit about being a leader. During his time at UW-Madison, he held leadership positions, including president of Delta Tau Delta fraternity. Today, he is a Principal for the global professional services firm EY (formerly Ernst & Young) —a position he says he can do thanks to the skills he learned at UW-Madison.

Yadgar notes three major lessons he learned at the university: "Number one, to push myself a little harder to rise to the challenge," he says. "Second is how to team with people. And third is how to solve problems. All three of those have always been pervasive in my career and if I didn't have those skills, I wouldn't be as fortunate as I am today."

Yadgar's interest in students who can demonstrate wide sets of skills is a result of the educational curriculum he completed at the UW.

"I think industrial engineering is a good balance between quantitative and qualitative aspects of a profession," he says. "It's as much about design and creativity as it is about mathematics and science. There are multiple ways to solve problems in industrial engineering and I always liked the ability and creativity to do that."



Michael and Susan Yadgar

GOLD AWARD FOR HFES STUDENT CHAPTER

From left to right: Graduate students Siddarth Ponalla, Dustin Weiler, Nadia Doutcheva and David Azari show off the gold award at the HFES annual meeting in Austin, TX.

At the fall 2017 meeting of the Human Factors and Ergonomics Society (HFES), a team of undergraduate and graduate students received the gold tier of the Outstanding Student Chapter Award. The award was established in 1999 to recognize student chapters that have made significant contributions to the discipline, to HFES as a professional organization, and to their campus and community during the previous academic year (2016/2017). UW-Madison was one of 14 universities—and the only one in Wisconsin—to receive the gold award this year.

The current president of the HFES student chapter is Morgan Price and its faculty advisor is Professor Robert Radwin. The science of ergonomics and human factors analyzes abilities and limitations to design systems, organizations, jobs, machines, tools, and consumer products for safe, efficient, and comfortable human use.

For their award application, the students summarized their accomplishments in eight different categories: outreach and volunteerism, information dissemination, social activities, guest speakers, recruitment, collaboration with other organizations, field trips, and mentorship.

Highlights of these activities included networking with five academic and industry guest speakers; a field trip to bb7, a Madison-based product development and design consulting company; a joint research conference with the student chapter of the Institute for Operations Research and the Management Sciences (INFORMS); and both leadership and participation in three campus and community outreach events that were of particular interest to K-12 students and their families.

At the fall 2017 meeting of the Institute for Operations Research and the Management Sciences, graduate student **Raed Al Kontar** won the "best student paper" award in the Quality, Statistics and Reliability section of INFORMS, for his paper "Nonparametric Modeling and Prognosis of Condition Monitoring Signals Using Multivariate Gaussian Convolution Processes." Raed is advised by Professor Shiyu Zhou.

Undergraduate Scholarships

Victor W. Bergenthal Scholarship
- Jacob McReynolds, Anna Mathieu, Collin Peters, Grant Tesdahl

Gilbert and Genevieve Buske Scholarship
- Ryan Behm, Taylor Bruns, Emily Laborde, Adam Schmidt, Tyler Wambeke

Fred W. and Josephine Colbeck Scholarship
- Kelsey Connors, Samantha LeBlanc, Dylan Weber

Dean's Engineering Undergraduate Scholarship
- Kalley Anderson, Rachel Degardner, Julian Plant, Andrea Polis, Nalla Krishna Vardhan Reddy, Dominic Thompson

Martha Helen (Bergland) and George Walker Dollmeyer Scholarship
- Morgan Adkins, Nicholas Aho, Tyler Behle, Charles Fatunbi, Andrew Ochoa, Kyle Raddatz, Siddarth Ramesh, Tanapat Ratanaruengjumerune, Michael Tobin, Andrew Trafton, Andrew Trotter, Jacob Volcensek, Ethan Young

Carl and Henry Grotophorst Scholarship
- Eric Fleming

W.G. Kirchoffer Memorial Scholarship
- Jonathan Hartung, Kylie Hellenbrand, Inigo Ayala Roche

Frank and Marilyn Roberts Scholarship
- Greg Betman, Colin Freidel

Jeanne and Thomas Snodgrass Scholarship
- Andrea Polis, Elizabeth Svigelj

Roland E. Stoelting Scholarship
- Srivar Jalan

Anthony and Alice Thistlewaite Scholarship
- Ashley Hellenbrand, Alexis Quintero, Inigo Ayala Roche, Dominic Thompson

John Deere Foundation Scholarship
- Jesse Parritz

Richard W. DeWitt Scholarship
- Rebecca Graven

Eric Victor Streich Memorial Scholarship
- Rachel Degardner, Srivar Jalan

Graduate Scholarships

Rea C. and David H. Gustafson Scholarship
- Ali Hajjar, Bat-Zion (Betsy) Hose, Hyo Kyung Lee, Soovin Yoon

Antoinette Derjani-Bayeh Scholarship
- Abigail Wooldridge

Industrial and Systems Engineering Graduate Support Endowment Scholarship
- Nadia Doutcheva, Megan Salwei, Xiaochen Xian, Chao Wang

Proctor & Gamble Professor in Total Quality **Pascale Carayon** was named a member of the Committee on Improving the Quality of Health Care Globally of the National Academy of Sciences, Engineering and Medicine. The committee is charged with assessing and improving healthcare quality in low-resource areas, and Pascale is its only engineer. This fall, she also received the "Extra Mile Award" from the Department of Medicine in the UW School of Medicine and Public Health, which recognizes a faculty member outside the department who has made significant contributions to its success.

Emerson Electric Quality and Productivity Professor **John Lee** and Bilge Mutlu, an associate professor of computer science, psychology and ISyE, received a grant from Toyota's Collaborative Safety Research Center to study emerging autonomous and connected vehicle technologies. Their one-year $450,000 project "Theory of communication between drivers: Enhancing social interaction," aims to make the interactions of autonomous vehicles with cars and pedestrians safer and politer. John, with co-authors Christopher Wickens, Yili Liu and Linda Ng Boyle, also published the third edition of the popular textbook *Designing for People: An Introduction to Human Factors Engineering*.

Assistant Professor **Nicole Werner** received a $175,000 grant from the National Science Foundation for an informal caregiving project. She will create a web-based platform as a resource for family members and friends who care for vulnerable patients with chronic health conditions at home. Nicole was also named a KL2 scholar under the UW Institute for Clinical and Translational Research KL2 program, which is funded by the National Institutes of Health through a Clinical and Translational Science Award.

Professor **Shiyu Zhou** is a co-investigator on a $1.5 million grant from the National Science Foundation whose principal investigator is Deyang Qu, at the University of Wisconsin-Milwaukee. The goal of the project is to determine if the mass-production of water sensors with inkjet printing can be scaled up to become competitive with traditional manufacturing methods.

The Wisconsin Institute for Healthcare Systems Engineering has added three associate directors to its leadership team: Elizabeth Meyerand, professor of biomedical engineering and medical physics, and ISyE professors **Oguzhan Alagoz** and **Jingshan Li**. Beth has excellent knowledge of many university constituencies and will help facilitate collaborations with the UW Institute for Clinical and Translational Research. Oguz leads ISyE's health systems group and is an expert in applying operations research principles to medical decision-making in organ transplantation, breast cancer and infection prevention. Jingshan specializes in control systems engineering in both manufacturing and healthcare and helps several clients in Wisconsin and beyond improve their workflow and healthcare delivery processes.

The International Conference on Risk Analysis, Decision Analysis and Security was held in July 2017 at Tsinghua University in Beijing, China, in honor of **Vicki Bier**. It was organized by Mavis Chen and Jun Zhuang and attended by many of Vicki's collaborators and former students.

Associate Professor **Jim Luedtke** is the UW-Madison principal investigator on a new $3 million grant from the U.S. Department of Energy that is part of its new program for mathematical multifaceted integrated capability centers. The center is directed by Argonne National Laboratory and also includes the University of Chicago, Pacific Northwestern National Laboratory and Lawrence Livermore National Laboratory. The UW-Madison project, "MACSER: Multifaceted mathematics for rare, high impact events in complex energy and environment systems," includes co-principal investigators Jeff Linderoth, Victor Zavala (chemical and biological engineering) and Bernie Lesieutre (electrical and computer engineering), as well as Michael Ferris and Stephen Wright (computer sciences). The team will investigate mathematical methods for assessing the impact of high-impact rare events in energy systems, such as the electrical power grid or natural gas distribution network. The overall goal of the five-year project is to design and operate these energy systems to withstand and recover from events like hurricanes or the polar vortex.

ALUMNI NEWS

Co-led by chief information officer **Edward Kopetsky** (MS IE '81), a team at Stanford Children's Health and Lucile Packard Children's Hospital received the Enterprise Nicholas E. Davies Award of Excellence from the Healthcare Information and Management Systems Society (HIMSS). The award recognizes outstanding achievement in using health information technology to improve patient outcomes.

Patrick Quirk (BSIE '79), who received the College of Engineering's Distinguished Achievement Award in 2015, was appointed executive chairman at Silicon Valley-based Pramata, a commercial relationship operations company. Patrick will play a key role in Pramata's sales and strategic alliances, drawing upon more than 25 years of experience as a leader of high-tech software companies.

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TWO FACULTY MEMBERS HONORED WITH PROFESSIONAL SOCIETY AWARDS

Robert Radwin

Two ISyE professors were recently honored with professional society awards.

Professor **Robert Radwin** received the Jack A. Kraft Innovator Award from the Human Factors and Ergonomics Society (HFES) for his efforts to extend and diversify the application of human factors and ergonomics principles and methods to new areas of application. Radwin is also affiliated with the Department of Biomedical Engineering, the Department of Orthopedics and Rehabilitation and the Wisconsin Institute for Discovery.

Radwin's research focuses on the physiological and biomechanical aspects of work, with the goal of improving the design of jobs, equipment, tools, products, and environments to maximize human capabilities and minimize physical stress and fatigue. Radwin received the award in October 2017 at the HFES annual meeting in Austin, Texas.

Alberto Del Pia

Assistant Professor **Alberto Del Pia** and his co-author Aida Khajavirad at the University of Texas at Austin, won the Young Researcher Prize from the Institute for Operations Research and the Management Sciences, the leading international association for operations research and analytics professionals.

This prize is one of the highest honors for optimization researchers in the early stages of their career. Established in 1998, it is awarded annually for an outstanding paper in optimization published in a refereed professional journal within the four calendar years preceding the year of the award.

Del Pia is also affiliated with the Department of Computer Sciences, the Department of Mathematics and the Wisconsin Institute for Discovery. He researches theoretical and algorithmic aspects of mixed-integer optimization, with a special emphasis on linear and polynomial functions. Del Pia and Khajavirad received the prize in October 2017 at the INFORMS annual meeting in Houston, Texas.