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Industrial Engineering Annual Report

Industrial Engineering

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2018

## State of The Department Report, 2017-2018

University of Arkansas, Fayetteville. Department of Industrial Engineering.

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UNIVERSITY OF  
ARKANSAS

College of Engineering  
*Industrial Engineering*



2017-2018  
**INDUSTRIAL ENGINEERING**  
*State of the Department Report*



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## **Producing Leaders That Will Solve Tomorrow's Engineering Challenges**



UNIVERSITY OF  
ARKANSAS

College of Engineering  
*Industrial Engineering*

## FROM THE DEPARTMENT HEAD

As we begin the 2018-2019 academic year, we pause to reflect and review the accomplishments of the past year. We are eager to share with you in this report an overview of IE at the University of Arkansas by highlighting the outstanding achievements and significant accomplishments of our program including those of students, alumni, faculty and staff.

The expected campus enrollment for the fall 2018 term is expected to exceed 27,000! The college and department continue to experience growth as well. There are more than 200 undergraduates (sophomore-senior) and over 70 graduate students in our program. Plus, we continue to have strong enrollment (over 750 students) in our Master of Science in Operations Management (MSOM) program, our newly established Engineering Management program and our Project Management graduate certificate program.

Faculty and staff members continue to bring visibility for our program through notable honors. Art Chaovalitwongse received the Award for Technical Innovation from the Institute of Industrial and Systems Engineers (IISE) and was recently appointed the Department Editor in the Health Informatics area of the *IISE Transactions on Healthcare*. Haitao Liao received the IISE QCRE Division's William A.J. Golomski Best paper award from RAMS and the 2017 Alan O. Plait Award for best tutorial at RAMS. The team of Xiao Liu and Art Chaovalitwongse received the Best in Physics Award from the American Association of Physicists in Medicine. Ashlea Milburn received the 2017 *IISE Transactions on Healthcare Systems Engineering* Best Paper Award. Heather Nachtmann was the recipient of the Wellington Award from IISE. The Wellington Award recognizes outstanding long-term contributions to service in the field of engineering economy. In addition to all of these, we are excited to report that Kelly Sullivan was selected for the National Science Foundation CAREER Award for his research on improving the reliability of wireless ad-hoc sensor networks.

Research activity is increasing and gaining national recognition with our recent successes. This past year, the department had 12 external grant awards with a cumulative total exceeding \$2.9 million. Our research centers continue to thrive. MarTREC, directed by Heather Nachtmann, received an additional \$1.4 million-dollar grant from the U.S. Department of Transportation. The new J.B.



Hunt Innovation Center of Excellence, under the direction of Chase Rainwater, continues to provide tremendous collaborative research opportunities for industrial engineering, computer science, and business school faculty. Our Center for Excellence in Logistics and Distribution (CELDi), under direction of Manuel Rossetti, continues to add partner schools and companies.

We celebrated many student successes during the past year. Two of our seniors, Rachel Holmer and Grace McGee were selected as Seniors of Significance by the Arkansas Alumni Association. Seventy-one graduating seniors from across the University are recognized for their academic achievements, leadership skills, extracurricular activities and community service through this program.

We hope you enjoy reading about the department activities and successes. If you are in the area, please stop by and visit the department.

Sincerely,

A handwritten signature in black ink that reads "Edward A. Pohl". The signature is fluid and cursive, with a large initial "E" and "P".

Edward A. Pohl, Ph.D.  
Department Head and  
21st Century Professor of Industrial Engineering

# RECORD CAREER AWARD YEAR!

It's a record year for the University of Arkansas College of Engineering! We're thrilled to have **SEVEN** faculty members win National Science Foundation Faculty Early Career Development (CAREER) awards.

I look forward to the groundbreaking outcomes these grants are funding:

- Dr. Michelle Bernhardt-Barry will pursue research into biomimicry in soils for use in construction.
- Dr. Qinghua Li will develop an automated system that helps utility companies analyze software patches.
- Dr. Tim Muldoon will develop a probe that can create high-quality images of living tissues in the human gastrointestinal tract.
- Dr. Gary Prinz's CAREER project centers on how newly-developed 3D-printed steel can be optimized for use in structures.
- Dr. Benjamin Runkle will pursue sustainable irrigation strategies for rice production.
- **Dr. Kelly Sullivan** will investigate ways to improve the reliability of wireless ad hoc sensor networks.
- Dr. Yue Zhao earned his CAREER award to research software in silicon carbide motor drives.

The successes of these early career faculty are directly contributing to our **Carnegie R1 Doctoral University** classification and our guiding priority to make the University of Arkansas a premier research institution. But, their CAREER awards are about more than research – each one reflects the teaching innovation these faculty show in educating engineers and encouraging young minds to pursue science, technology, engineering and math degrees.



I invite you to visit [engineering.uark.edu/nsf-awards](http://engineering.uark.edu/nsf-awards) to meet our 2018 CAREER award winners and learn more about their awards.

Warmly,

John English  
Dean - University of Arkansas College of Engineering



## It's a record!

# 7 NSF CAREER Awards!

**Michelle Bernhardt-Barry**, assistant professor of civil engineering

**Qinghua Li**, assistant professor of computer science and computer engineering

**Tim Muldoon**, assistant professor of biomedical engineering

**Gary Prinz**, assistant professor of civil engineering

**Ben Runkle**, assistant professor of biological and agricultural engineering

**Kelly Sullivan**, assistant professor of industrial engineering

**Yue Zhao**, assistant professor of electrical engineering

## CAREER AWARD

Assistant professor Kelly Sullivan was having quite a week. On Friday, April 27, Sullivan and his wife welcomed their second child into the world, a healthy baby boy. That Monday, April 30, Sullivan received word from the National Science Foundation he'd received the organization's most prestigious grant for young faculty members. It's a weekend Sullivan said he'll never forget. "In the same week, I experienced one my life's most significant events and one of my career's most significant events."

The Faculty Early Career Development Program is described by the NSF as the "most prestigious awards in support of early-career faculty who have the potential to serve as academic role models in research and education and to lead advances in the mission of their department or organization." The funding amount is \$500,000 over five years.

For Sullivan, who is a third-generation University of Arkansas engineering graduate, the CAREER award means an opportunity to dive deeply into a subject he's passionate about.

### Making sense of network reliability

Sullivan's research focuses on wireless ad hoc sensor networks, and the applications are about as wide as any research can be. Anything that can be tracked with a sensor that reports back to a central system falls within the scope.

That includes devices that track forest fires, observe changes in ecosystems, and detect terrorist threats, such as biological, chemical and nuclear attacks. Sullivan's CAREER award research is focused on making sure those networks operate efficiently and reliably over time for the companies, governments and other organizations that rely on them.

"Sensors observe the environment and transmit back activity," Sullivan said. "Sensors can be expensive and prone to failure over time. That's where the importance of network reliability comes in."

Research into sensor network reliability isn't new, but Sullivan's



proposal is because it views the network as a system that can be reconfigured over time. The most common metric engineers use to measure sensor network reliability neglects the engineer's ability to make changes to the network as it degrades, Sullivan said.

"My thought is that the network can still serve some, albeit reduced, function, even after some number of sensor failures," he said. "This raises questions about how the initial network should be designed, and what actions should be taken to ensure the network remains in good health over time. For instance, after a number of sensor failures, it may make sense to deploy new sensors into the network in order to restore its functionality."

For Sullivan's purposes, he'll focus on failures caused by sources that are mostly random in nature.

The problem, Sullivan said, is there are major mathematical and computational hurdles to understanding how the network will evolve over time as sensors fail. Dealing with random,

*We need to be able to describe and analyze reliability in that new sense. And once we can describe it, the question becomes 'can we optimize it?'*

evolving networks will require advancing and merging cutting-edge computational and mathematical methodologies.

"We need to be able to describe and analyze reliability in that new sense," he said. "And once we can describe it, the question becomes 'can we optimize it?'"

Optimizing a network, whether it's a group of earthquake sensors or a system for detecting smuggled nuclear material, means taking into account a few factors. Cost is key to helping a network move from concept to execution, but reliability is equally important. A cheap network that breaks immediately is useless. However, a network with several backups may be too expensive to be practical.

Sullivan's research aims to equip engineers to design cost-and reliability-efficient networks. By managing the network actively as it evolves, it may be possible to improve reliability and reduce costs throughout the entire life of the sensor network.

### A storied history

Sullivan's journey to the CAREER award began at North Little Rock High School. Like many high school students, Sullivan was unsure what he would study in college. Then, he said, he met a recruiter from the University of Arkansas Industrial Engineering Department.

"After listening to the recruiter's presentation in my calculus class, I said 'that looks like fun,' and the rest is history, I guess," Sullivan said.

But the history extends beyond that in the Sullivan family. Sullivan was the third generation in his family to enroll in the University of Arkansas College of Engineering. His grandfather graduated with a degree in agricultural engineering, and his father graduated from the civil engineering department.

Sullivan enrolled at the Fayetteville campus as an undergraduate honors student in 2003 and ultimately completed his master's at the U of A in 2008. His doctoral studies took him to the University of Florida, where he began the research that ultimately led to his CAREER award.

"I've been in industrial engineering all along," Sullivan said, "but there's been an evolution of interest. I've always been interested in networks, collections of objects and the connections between them."

Whereas Sullivan's CAREER research focuses on failures that are randomly occurring, his work at Florida focused on protecting

networks from outside attacks. This was a natural field of study for Sullivan, who has long been a fan of board games.

"Board games are about making decisions under competition, and that's what this kind of network optimization is about," Sullivan said. "You're weighing tradeoffs and making decisions while also anticipating the actions and reactions of another party."

### Training the next generation of researchers

An honors student himself during his time at the University of Arkansas, Sullivan's CAREER award also includes plans for two new honors courses in the College of Engineering.

Sullivan said he chose to focus on honors curriculum because of the experiences he had as an undergrad.

"Being an honors student here was a major reason why I pursued a Ph.D.," Sullivan said. "It's your first experience into the research process, and you have a much more in-depth, personalized experience."

*Being an honors student here was a major reason why I pursued a Ph.D. ... You have a much more in-depth, personalized experience.*

The first course in Sullivan's proposal is a sophomore-level seminar course that equips students to identify a research topic and faculty mentor. The course brings together students from different disciplines to learn about the research process and gain exposure to interdisciplinary research topics.

The second is a junior-level course in which students will write research proposals seeking real funding. Sullivan said the course plans to target the Student Undergraduate Research Fellowship, or SURF, as well as funding from the University of Arkansas Honors College. A similar program within the industrial engineering department has resulted in an increase in successful grant applications, something Sullivan said he hopes to see college-wide.

### What it means

For Sullivan, a third-generation University of Arkansas engineer, second-time dad and now a CAREER award winner, the experience has been a whirlwind.

"It's really exciting," he said. "It's an honor. More than that, it's a great opportunity to do the research I really want to do, pushing boundaries and taking this work in a new direction."

*Contributed by: Nick DeMoss  
College of Engineering  
Director of Communications*

# CAREER AWARD

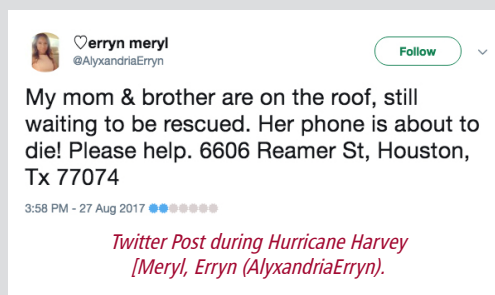
When a disaster strikes, emergency managers need information, and they need it fast. Accurate information regarding the locations and needs of impacted populations is essential when planning how to deliver the right support to the right people at the right place and time. Traditionally, information has been reported through official channels, such as 911 call systems.

However, recent disasters have seen the public posting their urgent needs to social platforms such as Twitter and Facebook once those 911 lines become overwhelmed. The Twitter post below is one such example. As part of her 2016 CAREER Award entitled "Information Accuracy and the Use of Social Data in Planning for Disaster Response," Ashlea Milburn continues to answer questions around the usefulness of this class of social data for disaster response logistics planning. Specifically, she is working to identify disaster scenarios where the integration of data streams from social platforms during response planning improves the effectiveness of resulting plans.

To ensure the practical relevance of her research, Milburn has been networking with emergency response practitioners who can help guide and shape the research. Her research has been presented locally to officials as well as officials from across the state at the Arkansas Emergency Management Conference in 2017 and will be presented again in 2018. These efforts have helped her research team define a real-time urban search and rescue planning model, for which they are currently devising solution approaches.

Milburn's CAREER grant includes significant outreach and education components. In both 2017 and 2018, Dr. Milburn led sessions at camps hosted by the University of Arkansas College of Engineering. These camps were attended by rising 5th through 8th grade girls. In the sessions, campers completed an activity designed by Dr. Milburn where they assumed the role of an emergency manager. They were presented with a set of locations requiring relief supplies; some of which were communicated through traditional channels such as

911, and some of which were discovered through social platforms.



They were asked to plan a vehicle route to visit as many points as possible, without knowing in advance the accuracy of the social data. An interactive spreadsheet tool created by graduate students in Milburn's research team was used to support their work. The participants report learning more about disaster response and becoming more interested in it as a result of the activity.

*More information about the research progress to date associated with this ongoing award can be found in the following publications.*

*Kirac, E., & Milburn, A. B. (2018). A general framework for assessing the value of social data for disaster response logistics planning. European Journal of Operational Research, 269(2), 486-500.*

*Mullin, E., & Milburn, A.B. (2018). Disaster response routing with social data in stylized demand scenarios. IISE Annual Conference Proceedings.*



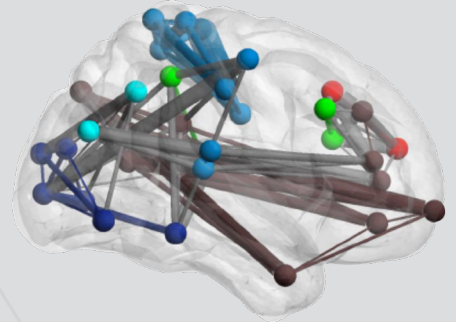


## FURTHER RESEARCH ENDEAVORS



With a new NSF grant under the BRAIN initiative, professor **W. Art Chaovalitwongse** and his collaborators at the University of Washington Medical Center (UWMC) are developing machine learning techniques for brain imaging and stimulation to show that differences in brain anatomy underlie individual differences in network connectivity and cognitive task performance. Their preliminary papers in this area have been published in *IEEE Transactions on Neural Systems & Rehabilitation Engineering* earlier this year and will appear in *INFORMS Journal on Computing* later this year.

At the University of Arkansas for Medical Sciences, Chaovalitwongse and his collaborators are developing an opioid risk prediction tool to address the current epidemic crisis of opioid abuse and overdose. The work is funded by a grant from the Translational Research Institute. The team has recently licensed their Intellectual Property to a leading behavioral training company, which uses their technique to predict adverse outcomes among prescription opioid users in clinical practice settings.



Chaovalitwongse's close collaboration with Medical Physicists and Radiation Oncologists at UWMC continues to lead to several successful endeavors. Their joint paper at the Annual Meeting & Exhibition of the American Association of Physicists in Medicine (AAPM) received the Best in Physics Award in the Joint Imaging-Therapy track. They have several papers accepted for oral presentations at prestigious conferences including SPIE Medical Imaging, the American Society for Radiation Oncology (ASTRO), and AAAI Conference.

In the past year, he published fifteen journal papers and nine proceedings at top conferences, licensed one new intellectual property, secured three new grants, and received Distinguished Faculty Award by Facebook and the IISE Technical Innovation Award. He was invited to give research talks at Facebook, Amazon and Air Force Institute of Technology. He gave keynote presentations at VISTEC Data Science & Engineering Symposium and the Ministry of Energy of Thailand. His work is also cited by HealthImaging.com.



Continuing her research into optimization for a variety of applications, including drone and electric vehicle swap stations, transportation, and infrastructure interdependence; assistant professor, **Sarah Nurre** has had a successful year. She is currently working with the J.B. Hunt Innovation Center of Excellence examining new and emerging supply chains. Over the past year, she has worked with colleagues from the Sam M. Walton College of Business, the College of Engineering, and industry professionals from J.B. Hunt. This interdisciplinary collaboration ensures we examine problems from multiple perspectives and stay grounded in helping J.B. Hunt.

Sarah has also advanced her thread of research examining infrastructure restoration and infrastructure interdependencies. Funded by the Engineering Research and Innovation Seed Funding Program through the College of Engineering, Sarah examined new interdependency classifications for the under-studied agriculture infrastructure sector. Working with Assistant Professor Benjamin Runkle from Biological and Agriculture Engineering, and Assistant Professor **Kelly Sullivan** and M.S. Student John Doerpinghaus from Industrial Engineering, the team conducted numerous interviews with agriculture stakeholders across the state of Arkansas. Given the success of the project, the team has recently been awarded a project from the Maritime Transportation Research and Education Center that will examine the interactions between agriculture and transportation.

Since 2015, Sarah Nurre has worked with assistant professor, Sarah Hernandez from Civil Engineering, examining truck parking shortages and quantifying how hours of service regulations impact truck parking. Their team has been awarded a project from the Arkansas Commercial

Truck Safety and Education Program. In this project, Nurre and Hernandez will quantitatively determine priorities for expanding truck parking, enhancing facilities, and introducing new truck parking locations. One main deliverable of this project will be an interactive web-based GIS tool with an optimization engine that enables policy makers to conduct what-if analysis regarding truck parking.

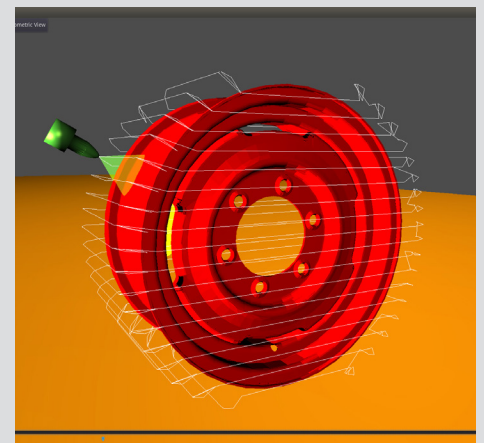
Overall, Sarah's research team consisting of two M.S. students, three Ph.D. students, and one undergraduate honors researcher has had great success over the past years. Additionally, this past summer, she advised a Mexican exchange student who contributed to her work examining optimal decisions for operating a drone or electric vehicle battery swap station.

In addition to these research successes, Sarah was awarded the Department of Industrial Engineering Outstanding Service to Students award and the INFORMS Volunteer Service Award.



Assistant Professor **Harry Pierson** worked with Red River Army Depot (RRAD) over the last year toward development of a collaborative robotic pressure washing system. The pressure washing work center at RRAD is an extreme example of a low-volume, high-variability industrial task that defies automation via traditional approaches. By combining human intuition and experience with robotic automation, Pierson's team is developing new methods for automating such environments. The project supported two graduate students and one undergraduate in 2017-18, and has resulted in three conference papers, one undergraduate honors thesis, and four conference presentations.

In 2018 Pierson was awarded a Summer Faculty Fellowship from the Air Force Research Laboratory and spent 10 weeks conducting research on site in the Materials and Manufacturing Directorate at Wright-Patterson Air Force Base. The research is developing an additive manufacturing (3D printing) process for carbon-fiber reinforced thermosetting polymers, which possess better strength and higher service temperatures compared to existing additively manufactured polymers. The work proved that additive manufacturing provides comparable, and in some cases better, mechanical properties than traditional processing methods. When fully developed, the process will allow the Air Force to support its warfighters with novel, lightweight structural components that cannot be produced via traditional manufacturing processes.



In collaboration with Professor **Haitao Liao**, Pierson is also investigating ways to improve the speed and precision of additive manufacturing processes. The work is developing methods for parallel processing by printing with multiple tools, novel inspection methods, and ways for 3D printers to "learn" from prior experience. The research supported one Ph.D. student in 2017-18 and so far has resulted in three journal publications and one conference paper.



# CURRENT GRANTS

**A**s it relates to scholarly activity, the department productivity included submission of 34 proposals and 12 grant awards with a cumulative total of more than \$2.9M. Total research expenditures exceeded \$1.8M. During 2017-2018, the following research grants were active. The principal investigator is listed in **bold**.

**Chaovalitwongse, W. Art**, National Science Foundation, \$45,205, "Network Optimization of Functional Connectivity in Neuroimaging for Differential Diagnoses of Brain Diseases," 2017-2018

**Chaovalitwongse, W. Art**, National Science Foundation, \$112,375, "Decision Model for Patient-Specific Motion Management in Radiation Therapy Planning," 2017-2018

**Chaovalitwongse, W. Art**, University of Arkansas for Medical Sciences, \$18,870, "Development, Validation, and Implementation of an Opioid Risk Prediction," 2017-2018

**Chaovalitwongse, W. Art**, National Science Foundation, \$150,000, "NCS-FO: Collaborative Research: Relationship of Cortical Field Anatomy," 2017-2021

Gattis, Jim, and **Justin Chimka**, Arkansas State Police, \$313,338, "Seat Belt, Motorcycle Helmet, & Child Restraint Survey," 2011-2018

**Chimka, Justin**, U.S. Department of Transportation, \$119,334, "Climate Impacts on Lock Use and Performance," 2016-2018

**Chimka, Justin**, Bekaert Corporation, \$33,070, "Maintenance Time Studies," 2017

**Geunes, Joseph**, U.S. Department of Defense, Pine Bluff Arsenal, \$39,566, "Baselining Visit for Best Practices Recommendations," 2017-2018

**Liao, Haitao**, National Science Foundation, \$176,860, "Automated Knowledge Discovery in Reliability and Healthcare from Complex Data with Covariates," 2016-2019

**Liao, Haitao**, Heather Nachtmann, and Xuan Shi, National Science Foundation, \$200,000 "EAGER: SSDIM: Data Simulation for Interdependence Modeling," 2017-2019

**Milburn, Ashlea**, National Science Foundation, \$500,000, "CAREER: Information Accuracy and the Use of Social Data in Planning for Disaster Response," 2016-2021

**Milburn, Ashlea**, Arkansas Dept of Higher Education, \$3,325, "SURF Award, Anna Hudgeons," 2017-2018

**Nachtmann, Heather**, and Kevin Hall, U.S. Department of Transportation, \$7,00,000, "Tier 1 Maritime Transportation Research and Education Center," 2013-2022

Hall, Kevin, and **Heather Nachtmann**, U.S. Department of Transportation, \$325,983, "Region 6 UTC—with OKTC," 2013-2018

**Nachtmann, Heather** and Justin Chimka, US Department of Transportation, \$67,362, "Support Secure and Resilient Inland Waterways," 2016-2018

**Needy, Kim**, Ken Walsh and Thais Alves (San Diego State University), Construction Industry Institute, \$314,764 total of which, \$87,942 is the Arkansas portion, "Achieving Zero Rework through Effective Supplier Quality Practices," 2012-2018

**Needy, Kim**, and Robert Ries (University of Florida), Construction Industry Institute, \$603,988 total of which \$176,820 is the Arkansas portion, "Creating Standards for Industry-wide Quality Metrics," 2013-2020

**Nurre, Sarah**, U.S. Department of Transportation, \$34,585, "The Dependence of Infrastructure Restoration on Transportation Networks," 2016-2018

**Nurre, Sarah**, and Sarah Hernandez, Arkansas Highway Department, \$88,176.55, "Evaluation of WIM Auto-Calibration Practices and Parameters," 2017-2018

**Parnell, Gregory**, and Ed Pohl, National Science Foundation, \$139,613, "Quantifying Resilience to Enable Engineered Resilient Systems," 2016-2018

**Parnell, Gregory**, Ed Pohl, Eric Specking, Engineering Research Development Center, \$189,433, "Engineered Resilient Systems Frameworks and Quantification," 2017-2018

**Pierson, Harry**, National Science Foundation, Red River Army Depot, \$60,000, "Collaborative Robotics," 2016-2018

**Pohl, Ed**, Haitao Liao, and Kelly Sullivan, US Army, \$120,035, "Resource-Constrained Accelerated Reliability Growth Testing Technology," 2016-2018

**Pohl, Ed**, Haitao Liao, and Kelly Sullivan, US AFIT, \$72,670, "Science of Test Research Consortium," 2018

Reeves, Carol, **Ed Pohl**, Bob Beitle, Cynthia Sides, National Science Foundation, \$49,930, "I-Corps Comm STEP," 2017-2022

**Rainwater, Chase**, Walmart Foundatoin, \$202,495, "Poultry Excellence in China: Improving Food Safety in Poultry Supply Chain," 2016-2018

**Rainwater, Chase**, Toyota Material Handling, \$59,850, "The Impact of Emerging Logistics Paradigms on Material Handling System Functional Requirements," 2017-2018

**Rainwater, Chase**, Frank Liu, Xiao Liu, Susan Gauch, Sarah Nurre, Joseph Geunes, Xintao Wu, J.B. Hunt Transportation Inc., \$2,750,000, "J.B. Hunt Center of Excellence," 2017-2022

**Rainwater, Chase**, and Jackson Cothren, U.S. Department of Energy, \$534,769, "Autonomous and Rigorous Photogrammetric Localization," 2016-2018

**Rainwater, Chase**, and Heather Nachtmann, U.S. Department of Transportation, \$61,529, "Optimal Dredge Fleet Scheduling - Phase II," 2016-2017

**Rossetti, Manuel**, National Science Foundation, \$189,800, "I/UCRC for Excellence in Logistic & Distribution, Phase III," 2012-2018 Phase III," 2012-2018

**Rossetti, Manuel**, National Science Foundation, I/UCRC Defense Logistics Agency, \$60,000, "Simulation Modeling of Bulk Petroleum Supply Chains," 2016-2017

**Rossetti, Manuel**, Medtronic, \$60,000, "Supply Chain Analysis with Healthcare Manufacturing and Distribution Net", 2017-2018

**Rossetti, Manuel**, Defense Logistics Agency, \$60,000, "CELDi Membership Renewal," 2017-2018

**Rossetti, Manuel**, National Science Foundation, \$8,000, "Research Experience for Undergraduates," 2015-2018

**Rossetti, Manuel**, Kim Needy, Carol Gattis, and Ed Clausen, National Science Foundation, \$597,316, "Student Integrated Intern Research Experience (SIIRE) a Pathway to Graduate Studies," 2012-2018

**Rossetti, Manuel**, National Science Foundation, \$199,917, "PFI Air-IT: Fast Multi Echelon Optimization via Grouping," 2017-2018

**Zhang, Shengfan**, Arkansas Department of Higher Education, \$4,000, "SURF Award, Rachel Holmer," 2017-2018

**Zhang, Shengfan**, National Science Foundation, \$20,000, "Research Experience for Teachers," 2016-2018



*2018 Technical Innovation in Industrial Engineering Award from the Institute of Industrial and Systems Engineers  
Joseph Hartman, IISE Immediate Past President, Jamie Rogers, IISE President-elect and CFO,  
W. Art Chaovalitwongse and Tim McGlothlin, IISE President.*

# FACULTY ACHIEVEMENTS & SERVICE

The University of Arkansas Teaching Academy and the Office of the Provost recently announced the Industrial Engineering Department as the second annual recipient of the Daniel E. Ferritor Award for Departmental Excellence in Teaching. A faculty committee made the selection based on applications submitted by academic departments last fall.

The Industrial Engineering Department was selected because of its sustained commitment to high-quality teaching, student learning, faculty development and student success.



Professor and holder of the 21st Century Research Leadership Chair in Industrial Engineering, **W. Art Chaovalitwongse**, has been appointed as a department editor in the Health Informatics area of the *IISE Transactions on Healthcare Systems Engineering Journal*.



Chaovalitwongse was awarded a National Science Foundation grant under the Integrative Strategies for Understanding Neural and Cognitive Systems program to push the frontiers of brain science on individuality and variation of cognitive systems.

Additionally, he was recognized at the Institute of Industrial and Systems Engineers (IISE) annual conference in Orlando, Florida with the Award for Technical Innovation in Industrial Engineering. The award honors a single innovative technical contribution to the industrial engineering profession that may be recognized in any of several forms, including theory, design, application, implementation and leadership.



Professor **Haitao Liao** had a successful year receiving the 2017 IISE QCRE William A.J. Golomski Best Paper Award, the 2017 PHM-Harbin Best Paper Award, 2017 Alan O. Plait Best Tutorial Award and the Arkansas Academy of Industrial Engineering Outstanding Faculty Award.

New faculty member **Xiao Liu** was recognized for the 2017 Best Paper Award from the Prognostics and System Health Management

Conference and he received the 2017 IBM Outstanding Technical Achievement Award. Along with **Art Chaovalitwongse**, he received the Best in Physics Award from the American Association of Physicists in Medicine.



**Ashlea Milburn** was the recipient of a 2017 Best Paper Award by *IISE Transactions on Healthcare Systems Engineering*. She is also the 2017-2018 recipient of the John L. Imhoff Endowed Chair in Industrial Engineering.

**Heather Nachtmann**, Associate Dean for Research, Professor and Director of MarTREC, received an additional \$1.4M grant from the U.S. Department of Transportation. The grant will be used on a wide range of ongoing research with MarTREC. She was appointed to the Earl J. and Lillian P. Dyess Endowed Chair in Engineering in January 2018 and was the recipient of the Wellington Award by IISE. The Wellington Award recognizes outstanding long-term contributions and service in the field of engineering economy that enhance the visibility of the engineering economy division of Institute of Industrial and Systems Engineers.



University of Arkansas Provost Jim Coleman has appointed Dean **Kim Needy** as interim vice provost for research and innovation, effective



January 3rd, 2018. Needy has served as dean of the Graduate School and International Education since 2014 and will continue in that role. "I am pleased to announce that Dr. Needy will be guiding us through this transition and co-chairing the search committee to help us identify an excellent new vice provost for research and innovation," said Coleman. "She is an experienced leader with a strong connection to the campus and to our research program." Needy was also the recipient of the 2017 Best Paper Award at the 25th Conference of the International Group for Lean Construction.

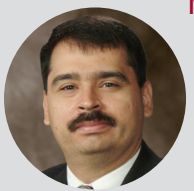


**Greg Parnell**, research professor in the Department of Industrial Engineering, has been named chair of a Transportation Research Board/National Academy of Engineering study on the safety and risks associated with offshore oil and gas operations. The committee will review safety progress since the Macondo Well Deepwater Horizon Blowout in the Gulf of Mexico in 2010. The committee is composed of experts in petroleum engineering, offshore operations, offshore safety and regulation, safety management systems, risk assessment, organizational psychology and remote sensing technologies.

**Chase Rainwater**, associate professor of industrial engineering, was honored recently for his outstanding support of the Don Tyson School of Innovation Robotics Team. Rainwater received the Compass Award on December 2nd, at the Arkansas FIRST Tech Challenge Championship in Mountain Home, Arkansas.



The award "recognizes an adult coach or mentor who has given outstanding guidance and support to a team throughout the year, and demonstrates to the team what it means to be a gracious professional," according to FIRST Tech Challenge organizers.



**Manuel Rossetti**, professor of industrial engineering, has received a National Science Foundation Grant for almost \$200,000 from the Partnerships for Innovation: Accelerating Innovation Research-Technology Transfer program, "PFI:AIR-TT: Fast multi-echelon optimization via grouping."

The PFI:AIR-TT program supports research to overcome technology barriers or knowledge gaps in the transformation of fundamental science and engineering discoveries into market-valued solutions.

Researchers are expected to develop a proof of concept, prototype, or scale-up of the prototype that addresses real-world constraints and provides competitive value in a potential application space. During the course of the AIR-TT award, it is also expected that the team advances their understanding of business as it relates to their technology, and that students are engaged to learn about innovation and technology translation.

**Kelly Sullivan** received a research grant for \$500K from the National Science Foundation Faculty Early Career Development Program (CAREER), to improve the reliability of wireless ad hoc sensor networks. His funding will also provide opportunities for undergraduates at the University of Arkansas to write research proposals and apply for real funding for their projects.



**John White**, distinguished professor of industrial engineering and chancellor emeritus at the University of Arkansas, was honored with the 2017 Charles and Nadine Baum Faculty Teaching Award from the Arkansas Alumni Association. An alumni of Ohio State's doctoral program, White was also honored with a Distinguished Alumni Award for his contributions to the advancement of engineering education by the College of Engineering Education at The Ohio State University.

Assistant professors, **Shengfan Zhang** and **Sarah Nurre** were recognized with the 2017 Institute for Operations Research and Management Science (INFORMS) Volunteer Service Award.



## SERVICE

### Cassady, C. R.

*Journal of Risk and Reliability*, Associate Editor, 2008-2017  
FIRST LEGO League Arkansas, Regional Co-Director, 2015-2017  
FIRST LEGO League Razorback Invitational, Tournament Director, 2015-2017

### Chaovalitwongse, W. Art

*IISE Transactions on Healthcare Systems Engineering*, Associate Editor, 2014-2017  
*IISE Transactions on Healthcare Systems Engineering*, Area Editor, 2017 – present

### Chimka, Justin

*Economic Quality Control*, Editorial Board Member, 2015, 2016  
*International Journal of Quality Engineering & Technology*, Editorial Board Member, 2015  
*International Journal of Six Sigma & Competitive Advantage*, Editor, 2015, 2016, 2017  
*Stochastics & Quality Control*, Editorial Board Member, 2017

### Liao, Haitao

*IEEE Access – Complex System Health Management*, Special Issue Guest Associate Editor, 01/2017 – present  
*IISE Transactions*, Associate Editor, 01/2017 – present  
*Journal of Quality Technology – Big Data Applications in Reliability*, Special Issue Co-Editor, 1/2017-4/2018

### Liu, Xiao

*Quality and Reliability Engineering International*, Associate Editor, 2016 – present

### Milburn, Ashlea Bennett

Health Systems Engineering Alliance, Treasurer, 2015-2017

### Nachtmann, Heather

American Society for Engineering Education, Engineering Research Council Member, 2015 – present  
American Society for Engineering Management, Past President, 2017  
American Society for Engineering Management, President, 2016-2017  
Arkansas Department of Transportation, Advisory Council for Transportation Research Member, appointed by Director, 2009 – present  
*Engineering Management Journal*, Associate Editor, 2012 – present  
Transportation Research Board, Marine Transportation System Research and Technology Conference Ad Hoc Committee, 2017-2018  
*The Engineering Economist*, Associate Editor, 2004 – present

### Needy, Kim LaScola

*The Engineering Economist*, Book Editor, 2004 – present  
*Engineering Management Journal*, Associate Editor, 2002 – present  
American Society for Engineering Management, Past-President of the Council of Engineering Management Academic Leaders, 2016-2017  
American Society for Engineering Education, Board of Directors, Engineering Management Division, 2015-2017  
Institute of Industrial and Systems Engineers, Governing Board of the Body of Knowledge (BoK), 2016-2018  
Graduate Record Examination, Diversity, Equity and Inclusion Committee, 2017-2020  
Conference of Southern Graduate Schools, Executive Committee, 2016-2019  
Conference of Southern Graduate Schools, Host Committee Co-Chair for the 2018 Conference, 2017-2018  
Conference of Southern Graduate Schools, Faculty Awards Committee, Chair of Committee in 2016, 2015-2017

### Nurre, Sarah

Women in Operations Research and Management Science (WORMS), President, January 2017 – present

### Parnell, Greg

National Academy of Sciences Study, Chair, 2017  
INCOSE Foundation, Stevens Doctoral Award Committee, 2017  
International Council on Systems Engineering (INCOSE), Fellows Selection Committee, 2016-2019  
Ramsey Award Committee, Decision Analysis Society, 2017

### Pohl, Edward

American Society for Engineering Management (ASEM), Regional Director, 2014-2017  
*IEEE Transactions on Reliability*, Associate Editor, 2014 – present  
IIE Society of Engineering Management, Board Member, 2014-2017  
Informs Analytics Conference, INFORMS Selects Committee Program Committee, 2014 – present  
*Journal of Risk and Reliability*, Associate Editor, 2005 – present  
*Quality Technology & Quantitative Management*, Associate Editor, 2012 – present  
Reliability & Maintainability Symposium, Board of Directors, 2014 – present  
Society of Reliability Engineers, President, 2017-2018  
*The Journal of Military Operations Research*, Associate Editor, 2002 – present

### Pohl, Letitia

American Society of Engineering Education (ASEE), Industrial Engineering Division, Division Chair & Past Division and Awards Chair, 2013-2017

**Rainwater, Chase**

Institute of Industrial and Systems Engineers (IISE), OR Division Board of Directors, 2015 – present  
 Institute of Industrial and Systems Engineers (IISE), Scholarship Committee, 2016 – present  
 Institute of Industrial and Systems Engineers (IISE), OR Division, President Elect, 2017  
 Industrial and Systems Engineering Research Conference (ISERC), Program Chair, 2017-2018

**Rossetti, Manuel**

*International Journal of Modeling and Simulation*, Associate Editor, 2017  
*Journal of Defense Analytics and Logistics*, Editorial Advisory Board, 2017

**Sullivan, Kelly**

*Operations Research Letters*, Associate Editor, 2016 – present

**White, John A.**

ASEE National Engineering Economy Teaching Excellence Award Committee, Member, 2015-2018  
*The Engineering Economist* (jointly published by ASEE and IIE), Editorial Board, 2014-2017  
 World Trade Center Arkansas, Member, Board of Advisors, 2007 – present

**Zhang, Shengfan**

Institute for Operations Research and Management Science (INFORMS), Section on Public Sector OR, Junior Vice President of Programs, 1/2017 – 12/2017



*2018 Wellington Award from the Institute of Industrial and Systems Engineers  
 Kim Needy, Dean - Graduate School and International Education, University of Arkansas,  
 Heather Nachtmann, Associate Dean for Research and MarTREC Director  
 and Jerome Lavelle, North Carolina State University.*



# PUBLICATIONS

In 2017 the faculty of the Department of Industrial Engineering at the University of Arkansas contributed two books, four book chapters, thirty-six refereed journal articles and thirty-one other presentations and contributions. The faculty authors are indicated in bold face type.

## Books

**Parnell, G. S.**, Editor, *Trade-off Analytics: Creating and Evaluating the Tradespace*, Wiley Series in Systems Engineering and Management: Wiley & Sons, Hoboken, NJ, 2017

Ricke, S., G. Atungulu, **Rainwater, C.** and S. Park, *Food and Feed Safety Systems and Analysis*, Academic Press, Cambridge, MA, 2017

## Book Chapters

**Liao, H.**, Y. Zhang and H. Guo, "An Erlang-Coxian-Based Method for Modeling Accelerated Life Testing Data," *Advances in Through-Life Engineering Services*, Edited by Redding, L., Roy, R. and Shaw, A., Springer International Publishing, Switzerland, 2017, Chapter 11, pp. 165-186

Hamidi, M. and **H. Liao**, "Maintenance Outsourcing Contracts Based on Bargaining Theory," *Optimization and Dynamics with Their Applications*, Edited by Matsumoto, A., Springer International Publishing, Singapore, 2017, Chapter 12, pp. 257-279

Ricke, S., J. Hacker, K. Yearkey, Z. Shi, S. Park and **C. Rainwater**, "Unraveling Food production Microbiomes: Concepts and Future Directions," *Food and Feed Safety Systems and Analysis*, Elsevier, Cambridge, MA, 2017, Chapter 19, pp. 347-374

Thompson, D., **C. Rainwater**, J. Di and S. Ricke, "Student Cross-Training Opportunities for Combining Food, Transportation, and Critical Infrastructure Cybersecurity Into an Academic Food Systems Education Program," *Food and Feed Safety Systems and Analysis*, Elsevier, Cambridge, MA, 2017, Chapter 20, pp. 375-391

## Refereed Journal Articles

Alaswad, S., **C.R. Cassady**, E.A. Pohl, and X. Li, A Model of System Availability under Imperfect Maintenance, *Journal of Quality in Maintenance Engineering*, Vol. 23, No. 4 (2017): 415-436

Won D., W. Kim, **W. Chaovalitwongse**, and J.J. Tsai, Altered visual contrast gain control is sensitive for idiopathic generalized epilepsies, *Clinical Neurophysiology*, Vol. 128, No. 2 (2017): 340–348

**Chaovalitwongse, W.**, D. Won, O. Seref, P. Borghesani, M.K. Askren, S. Willis, and T.J. Grabowski, Optimization of Local Network Connectivity of Functional Brain Imaging to Detect Biomarkers of Cognitive Decline, *IEEE Transactions on Neural Systems & Rehabilitation Engineering*, Vol. 25, No. 7 (2017): 1079–1089

Yuan, M., K. Deng, and **W. Chaovalitwongse**, Manufacturing Resource Modeling for Cloud Manufacturing, *International Journal of Intelligent Systems*, Vol. 32, No. 4 (2017): 414-436

Chou, C.A., **W. Chaovalitwongse**, C. Lee, and T.O. Bonates, Multi-Pattern Generation Framework for Logical Analysis of Data, *Annals of Operations Research*, Vol. 249, No. 1 (2017): 329-349

Chaovalitwongse, P., K. Somprasonk, N. Phumchusri, J. Heim, Z. Zabinsky, and **W. Chaovalitwongse**, A Decision Support Model for Staff Allocation of Mobile Medical Service, *Annals of Operations Research*, Vol. 249, No. 1 (2017): 433-448

**Chaovalitwongse, W.**, C.A. Chou, Z. Liang, and S. Wang. "Special Volume on Applied Optimization and Data Mining," *Annals of Operations Research*, 249, No. 1 (2017): 1-3

Yuan, M., S. Cheng, and **W. Chaovalitwongse**, Multi-objective Optimal Scheduling of Reconfigurable Assembly Line for Cloud Manufacturing, *Optimization Methods and Software*, Vol. 32, No. 3 (2017): 581-593

Gattis, James L., **J. R. Chimka** and Andrew Evans, Access Spacing Based on Turning-Vehicle Acceleration, *Transportation Research Record*, Vol. 2618 (2017): 1-7

Mance, Christopher M., Kash Barker and **J. R. Chimka**, Modeling reliability with a two-sided power distribution, *Quality Engineering*, Vol. 29, No. 4 (2017): 643-655

Needham, Erin M., **J. R. Chimka**, Michael De Volder and Julian L. Fairey, THM, DHAN and TONO precursor adsorption by modified CNT and CNT micropillars, *Environmental Science: Water Research & Technology*, Vol. 3, No. 6 (2017):1042-1051

Needham, Erin M., Adrian Fernandez de Luis, **J. R. Chimka** and Julian L. Fairey, Revealing a size-resolved fluorescence-based metric to track oxidative treatment of TONO precursors in waters from wastewater treatment plants, *Environmental Science & Technology Letters*, Vol. 4, No. 6 (2017): 228-333

Hill, B.W., B.A. Pesnell, P.D. Ward, V.A. Rhame, J.S. Beers, K.L. Dougan, **C.S. Gattis**, E.A. Specking and E.C. Clausen, UASEP: Introducing K-4 Students (and Teachers) to STEM, *Transactions on Techniques in STEM Education*, Vol. 2, No. 4 (2017): 4-11

- Limon, S., O.P. Yadav, and **H. Liao**, A Literature Review on Planning and Analysis of Accelerated Testing for Reliability Assessment, *Quality and Reliability Engineering International*, Vol. 33, No. 8 (2017): 2361-2383
- Fathi Aghdam, F., **H. Liao**, and Q. Huang, Modeling Interaction in Nanowire Growth Process toward Improved Yield, *IEEE Transactions on Automation Science and Engineering*, No.14, Vol. 2 (2017): 1139 - 1149
- Sun, F., X. Li, **H. Liao**, and X. Zhang, A Bayesian LS-SVM Method for Predicting the Remaining Useful Life of a Microwave Component, *Advances in Mechanical Engineering*, Vol. 9, No. 1 (2017): 1-9
- Jin, T., H. Taboada, J. Espiritu, and **H. Liao**, Allocation of Reliability-Redundancy and Spares Stock under Uncertain Fleet Expansion, *IJSE Transactions*, Vol. 49, No. 7 (2017): 737-751
- Li, R., M. Li, **H. Liao**, and N. Huang, An Efficient Method for Evaluating the End-to-End Transmission Time Reliability of a Switched Ethernet, *Journal of Network and Computer Applications*, Vol. 88 (2017): 124-133
- Shahraki, A.F., O.P. Yadav, and **H. Liao**, A Review on Degradation Modeling and Its Engineering Applications, *International Journal of Performability Engineering*, Vol. 13, No. 3 (2017): 299-314
- Hu, J., Z. Jiang, and **H. Liao**, Preventive Maintenance of a Batch Production System under Time-Varying Operational Condition, *International Journal of Production Research*, Vol. 55, No. 19 (2017): 5681-5705
- Hu, J., Z. Jiang, and **H. Liao**, Preventive Maintenance of a Single Machine System Working under Piecewise Constant Operating Condition, *Reliability Engineering & System Safety*, Vol. 168 (2017): 105-115
- Milburn, A.B.**, C. McNeill, Quantifying supply of home health services for public health emergencies, *Home Health Care Management & Practice*, Vol. 29, No. 1 (2017): 20-34
- Milburn, A.B.**, E. Kirac, M. Hadianniasar, Growing pains: a case study for large-scale vehicle routing, *INFORMS Transactions on Education*, Vol. 17, No. 2 (2017): 75-84
- Kilinc, M., **A.B. Milburn**, J. Heier Stamm, Measuring potential spatial accessibility of home healthcare services, *Socio-Economic Planning Sciences*, Vol. 59 (2017): 13-25
- Gedik, R., E. Kirac, **A.B. Milburn**, C. Rainwater, A constraint programming approach for the team orienteering problem with time windows, *Computers & Industrial Engineering*, Vol. 107 (2017): 178-195
- Nachtmann, H.**, M. Gonzalez, E. Pohl, Time Driven Activity-Based Costing for Healthcare Provider Supply Chains, *The Engineering Economist*, Vol. 62, No. 2 (2017): 161-179
- Oztanriseven, F., and **H. Nachtmann**, Economic Impact Analysis of Inland Waterway Disruption Response, *The Engineering Economist*, Vol. 62, No. 1 (2017): 73-89
- Paul, N.R., B.J. Lunday, and **S.G. Nurre**, A Multiobjective, Maximal Conditional Covering Location Problem Applied to the Relocation of Hierarchical Emergency Response Facilities, *Omega*, Vol. 66, Part A (2017): 147-158
- Nurre, S.G.** and J.D. Weir, Interactive Excel based Gantt Chart Schedule Builder, *INFORMS Transactions on Education*, Vol. 17, No. 2 (2017): 49-57
- Chowdhury, S., A. Emelogu, **S.G. Nurre**, L. Bian, and M. Marufuzzaman, Drones for Disaster Response and Relief Operations: A Continuous Approximation Model, *International Journal of Production Economics*, Vol. 188 (2017): 167-184
- Colombi, J.M., L.D. Buckle, J. Black, and **S.G. Nurre**, Optimal Launch Manifesting for Heterogeneous Disaggregated Satellite Constellations, *Journal of Spacecraft and Rockets*, Vol. 54, No. 3 (2017): 582-591
- Cilli, M., **G. Parnell**, R. Cloutier, and T. Zighd, Measuring Perceived Risk of Pitfalls Associated with Systems Engineering Tradeoff Analyses, *Engineering Management Research*, Vol. 6 (2017): 68-83
- Pierson, H.** and M. Gashler, Deep Learning in Robotics: A Review of Recent Research, *Advanced Robotics*, Vol. 31, No. 16 (2017): 821-835
- Talafuse, T., **E. Pohl**, Small Sample Reliability Growth Modeling Using a Grey Systems Model, *Quality Engineering*, Vol. 29, No. 3 (2017): 455-467
- Parsa, P., **M.D. Rossetti**, S. Zhang, and E.A. Pohl, Quantifying the Benefits of Continuous Replenishment Program for Partner Selection, *International Journal of Production Economics*, Vol. 187 (2017): 229-245
- Gedik, R., **S. Zhang**, and C.E. Rainwater, Strategic level proton therapy patient admission planning: a Markov decision process modeling approach, *Health Care Management Science*, Vol. 20, No. 2 (2017): 286-302
- Capan, M., A. Khojandi, B. Denton, K. Williams, T. Ayer, J. Chhatwal, M. Kurt, J.M. Lobo, M. Roberts, G. Zaric, **S. Zhang**, J. S. Schwartz, From Data to Improved Decisions: Operations Research in Healthcare Delivery, *Medical Decision Making*, Vol. 37, No. 8 (2017): 849-859
- Refereed Conference Proceedings**
- Zhu, Z., Y. Xiang, S. Alaswad, and **C.R. Cassady**, A Sequential Inspection and Replacement Policy for Degradation-Based Systems, The 63rd Annual Reliability and Maintainability Symposium, Orlando, Florida, January, 2017.
- Cao, Y., W. Li and **W. Chaovallitwongse**, Hybrid Comprehensive Learning Particle Swarm Optimizer with Adaptive Starting Local

Search, *Proceedings of the Eighth International Conference on Swarm Intelligence, Springer Lecture Notes in Computer Science (LNCS)*, Fukuoka, Japan, August, 2017.

Day, S.E., M.B. Spraker, L. Wootton, D.S. Hippe, **W. Chaovalitwongse**,

M. Hoff, L.M. Halasz, and M. Nyflot, Radiomic Features Extracted from Magnetic Resonance Imaging (MRI) Are Associated with Clinical Outcomes in Low-Grade Glioma, *Proceedings of the American Society for Radiation Oncology (ASTRO), International Journal of Radiation Oncology, Biology, Physics*, 99(2): E69, 2017, San Diego, California, September, 2017.

Spraker, M.B., L. Wootton, D.S. Hippe, **W. Chaovalitwongse**, M.W. Macomber, T.R. Chapman, S. Pollack, E.Y. Kim, and M. Nyflot, Radiomic Signature Extracted from Magnetic Resonance Imaging Predicts Outcomes in Soft Tissue Sarcoma, *Proceedings of the American Society for Radiation Oncology (ASTRO), International Journal of Radiation Oncology, Biology, Physics*, 99(2): S79-S80, 2017, San Diego, California, September, 2017.

Thammasorn, P., L. Wootton, E. Ford, **W. Chaovalitwongse**, and M. Nyflot, Deep Convolutional Triplet Network for Quantitative Medical Image Analysis with Comparative Case Study of Gamma Image Classification, *Proceedings of the 2017 International Workshop on Biomedical and Health Informatics* in conjunction with the IEEE International Conference on Bioinformatics and Biomedicine, Kansas City, Missouri, November, 2017.

Wu, W., L. Pierce, **W. Chaovalitwongse**, S. Pipavath, P.D. Lampe, A.M. Houghton, P.E. Kinahan, Ability of Texture and Shape Features to Classify Indeterminate CT Lung Nodules with and without Contrast Enhancement, *Proceedings of the IEEE Nuclear Science Symposium and Medical Imaging Conference*, Atlanta, Georgia, October, 2017.

Xiao, C., P. Zhang, **W. Chaovalitwongse**, J. Hu, and F. Wang, Adverse Drug Reaction Prediction with Symbolic Latent Dirichlet Allocation, *Proceedings of the Thirty-First AAAI Conference on Artificial Intelligence (AAAI-17)*, San Francisco, California, February, 2017.

★ Aghdam, F. and **H. Liao**, Reliability Study on High-K Bi-layer Dielectrics, 63rd Annual Reliability and Maintainability Symposium, Orlando, Florida, January, 2017.

Chen, D., X. Li, R. Kang, and **H. Liao**, Accelerated Acceptance Sampling Plan with Asymmetrical Information, 2nd International Conference on System Reliability and Safety, Milan, Italy, December, 2017.

★ **Liao, H.** and S. Karimi, Comparison Study on General Methods for Modeling Lifetime Data with Covariates, The 2017 Prognostics and System Health Management Conference, Harbin, China, July, 2017.

Zhang, X., L. Sun, **H. Liao**, and E. Pohl, Improving Resilience Capability of a Multi-Channel Condition Monitoring System Subject to Partial Failures, 10th International Conference on Mathematical Methods in Reliability, Grenoble, France, July, 2017.

Zhang, Y., Y. Peng, L. Wang, S. Wang, P. Wang, and **H. Liao**, Aircraft APU Failure Rate Prediction based on Improved Weibull-based GRP, Prognostics and System Health Management Conference, Harbin, China, July, 2017.

★ **Liu, X.**, C. T. Tan, and D. Pare, A Case Study on the Modeling of System State Degradation for Data Center Cooling Systems, Prognostics and System Health Management Conference, Harbin, China, July, 2017.

★ Alves, T., P. Desai, **K. L. Needy**, and A. Hegwood, Impact of supplier evaluation on product quality, 25th Conference of the International Group for Lean Construction, Heraklion, Greece, July, 2017.

Garay Sianca, A., **S.G. Nurre**, C.L. Castros Salas, and H.R. Alvarez, Data Processing on Larger Interdependent Networks: An Application for Infrastructure Preparedness and Restoration, 6th Engineering Sciences and Technology International Conference, Panama City, Panama, October, 2017.

**Parnell, G.**, S. Goerger, E. Pohl, Reimagining Tradespace Definition and Exploration, American Society for Engineering Management International Annual Conference, Huntsville, Alabama, October, 2017.

Small, C., **G. Parnell**, E. Pohl, S. Goerger, C. Cottam, E. Specking, and Z. Wade, Engineered Resilient Systems with Value Focused Thinking, 27th Annual INCOSE International Symposium (IS 2017), Adelaide, Australia, July, 2017.

Small, C., **G. Parnell**, E. Pohl, S. Goerger, C. Cottam, E. Specking, and Z. Wade, Engineering Resilience for Complex Systems, 15th Annual Conference on Systems Engineering Research, Redondo Beach, California, March, 2017.

Specking, E., C. Whitcomb, **G. Parnell**, S. Goerger, E. Pohl, N. Kundeti, P. Berry, Trade-off Analytics for Set-Based Design, Design Sciences Series: Set Based Design, Washington, DC, September, 2017.

Brown S., A. Woods, **H. Pierson**, and G. Parnell, An Operations Management Perspective on Collaborative Robotics, American Society for Engineering Management International Annual Conference, Huntsville, Alabama, October, 2017.

Jin, Y., **H. Pierson** and H. Liao, Concurrent Fused Filament Fabrication with Multiple Extruders, Annual Industrial and Systems Engineering Research Conference, Pittsburgh, Pennsylvania, May, 2017.

Cox, D. and **M.D. Rossetti**, Simulation Modeling of Alternative Staffing and Task Prioritization in Manual Post-Distribution Cross Docking Facilities, *Proceedings of the 2017 Winter Simulation Conference*, Las Vegas, Nevada, December, 2017.

Parsa, P., **M.D. Rossetti**, S. Zhang, Multi-Stop Truckload Planning, Annual Industrial and Systems Engineering Research Conference, Pittsburgh, Pennsylvania, May, 2017.

**Rossetti, M.D.** and H. Pierson, Analysis of Material Flow in a High-mix, Low-volume Job Shop: A Case Study, *Proceedings of the*

*American Society for Engineering Management 2017 International Annual Conference*, Huntsville, Alabama, October, 2017.

Shbool, M. and **M.D. Rossetti**, Physician Preference Items – a Decision Making Framework, Annual Industrial and Systems Engineering Research Conference, Pittsburgh, Pennsylvania, May, 2017.

★ *Indicates Best Paper Award*



**2017 IISE QCRE William A.J. Golomski Best Paper Award**  
*Om Yadav, Professor, North Dakota State University, Haitao Liao and  
Joel Nachlas, Emeritus faculty, Virginia Tech.*

# DEPARTMENT FELLOWS

The title Fellow is used to describe the highest level of membership in most professional societies. Requirements to achieve the level of Fellow vary among organizations. Fellows are typically nominated by other Fellows, have demonstrated exceptional achievement in their field, and devoted service to the organization. The Industrial Engineering Department proudly recognizes faculty who have achieved this prestigious status.

## American Society for Engineering Education

Kim Needy  
John White

## American Society for Engineering Management

Kim Needy  
Heather Nachtmann  
Edward A. Pohl

## Institute for Operations Research and the Management Sciences

Greg Parnell  
John White

## Institute of Industrial & Systems Engineers

Richard Cassady  
John English  
Heather Nachtmann  
Kim Needy  
Edward A. Pohl  
Manuel Rossetti  
John White

## International Council on Systems Engineering

Greg Parnell

## Lean Systems Society

Greg Parnell

## Member of the National Academy of Engineering

John White

## Military Operations Research Society

Greg Parnell

## Society for Decision Professionals

Greg Parnell

## Society of Reliability Engineers

Richard Cassady  
Edward A. Pohl



# UNDERGRADUATE OVERVIEW



The objectives of the undergraduate program in the Department of Industrial Engineering at the University of Arkansas are to produce graduates who, within just a few years of graduation, can: (1) successfully apply core industrial engineering knowledge and skills for industrial or public sector organizations, (2) successfully pursue advanced professional degrees, graduate studies in industrial engineering, professional training, or engineering certification, and (3) demonstrate professional and intellectual growth as managers and leaders in industrial engineering, society and their communities. Our curriculum includes not only industrial engineering courses, but also courses in engineering science, computer science, mathematics, physical science, english, economics and other social sciences, humanities and fine arts. Richard Cassady, Professor of Industrial Engineering, serves as the Chair of Undergraduate Studies.

Students enter our program as sophomores, as all freshman College of Engineering students participate in the First-Year Engineering Program. Directed by Richard Cassady, the First-Year Engineering Program includes two semesters of academic coursework, peer mentoring, professional development, academic advising and academic assistance programs. Since the First-Year Engineering Program was implemented in 2007, second-year retention (in engineering) of first-year engineering students has increased from approximately 60% to approximately 70%. Roughly 12% of retained First-Year Engineering Program students choose industrial engineering for their sophomore year.

More information on the undergraduate program can be found at <http://industrial-engineering.uark.edu/academics/undergraduate-program/index.php>.

## Capstone Symposium

The undergraduate Capstone Experience course groups students in teams and matches the team with an industrial partner. Every student pursuing the Bachelor of Science in Industrial Engineering at the University of Arkansas is required to complete the two-semester course. In our second academic year of a two-semester Capstone Experience, we can report tremendous positive feedback from both the student participants and sponsor agencies. The additional time provides more data collection and analysis and better deliverables to the sponsor.

During the 2017-2018 academic year, 73 students participated in the experience as part of 14 teams of three or four students. The student teams were matched with an industrial partner in mid-October. Each team was led by a student project manager and was advised by a member of the industrial engineering faculty. The experience was coordinated by professor Richard Cassady.

During the second eight weeks of the fall 2017 semester, the teams conducted analysis and background research on their industry partner and the issues that were of interest to that partner. They then developed a detailed understanding of the process or system of interest and obtained the data necessary to conduct a preliminary analysis into the issues faced by the industry.



The teams then conducted extensive data analysis and visualization into the issues faced by the partner and defined meaningful objectives for their work. The performance measures they used to measure their success in achieving the objectives, and the deliverables they would provide to their partner were reviewed, as well as plans for the implementation of recommendations and ongoing decision support.

Each team then identified a detailed list of tasks, including data analysis, mathemati-

cal and/or computer modeling, and cost and/or financial analysis, to achieve their project objectives.

During the spring 2018 semester, through performance measures, they assessed their success in achieving the team objectives and created their project deliverables. They also documented information necessary for their industry partner to properly utilize the deliverables.

The experience concluded with a Capstone Symposium. Industry partners and faculty advisors approved each team's Project Final Report and Presentation prior to the symposium. At the symposium, student teams participated in interactive exhibit sessions and delivered detailed technical presentations about their projects.

This year's Capstone Symposium was held on May 2nd at the Fayetteville Town Center in Fayetteville, Arkansas. Students setup their research in an exhibit/poster session fashion and were available to give an overview and answer questions regarding their project.

Break-out presentations were also provided, where students covered the course of their research and recommendations to their industry partner. Each team delivered a 35-minute presentation during one of four concurrent tracks. A 15-minute Q&A session followed each presentation.



Judges were selected from former alumni, industry, faculty, and graduate students to review the presentations and research. During lunch the industry partners, faculty advisors, and judges were recognized. Students and teams were awarded on their projects at an award reception at the end of the day.

#### Team Awards

- Best Overall Project Award – Anna Hudgeons, Shay Brown, Austin Kuklenski and Cody Lawrence for their project, *Instituting a Worker Scheduling Tool for the Pre-molding Process*, for LM Wind Power. Faculty advisor – Haitao Liao.
- Outstanding Achievement in Data Analysis – Trenton Cason, Monica Briselden, Andrew Doner and Brittany Miller for their project, *Increasing Business Won and Reducing Turnaround*

*Time by Modifying ArcBest's Bid and Proposal Processes*, for ArcBest Corporation. Faculty advisor – Manuel Rossetti.

- Outstanding Achievement in Modeling – Grace McGee, Danarius Broadway, Anginay Jones and Garrett Tallman for their project, *Increasing Tractor Utilization Using Scripted Integer and Linear Programming Outstanding Achievement in Cost/Financial Analysis*, for J.B. Hunt Transport, Inc. Faculty advisor – Xiao Liu.
- Outstanding Achievement in Decision Support – Teresa Nguyen, Carson Alsup, Sarah Belcher and Ricky Ng for their project, *Reducing Manual Decisions in the Trailer-to-Door Allocation Process*, for Walmart Supply Chain. Faculty advisor – Sarah Nurre.



Arkansas Food Innovation Center. Team Members: Project Manager – Justin Taylor, Brisa Bartczak, Karla Castro, Craig Gifford. Faculty Advisor – Chase Rainwater.

*Improving Accuracy of Appointment Capacity Forecasting Utilizing Predictive Modeling*: Industry Partner – J.B. Hunt. Team Members: Project Manager, Brittany Watts, Amanda Beard, Seth Briley and Matthew Turner. Faculty Advisor – Ashlea Milburn

*Predicting the Cost of Driver Pay to Increase the Accuracy of Future Bids*: Industry Partner – J.B. Hunt. Team Members: Project Manager, Caine McLeod, Jackson Goodman, Zachary Osiecki and Foster Pollock. Faculty

Advisor – Art Chaovalitwongse.

*Increase Productivity in the Molding Process Through a Blade Tracking Tool and Identification of Main Causes for Rework*: Industry Partner – LM Wind Power. Team Members: Project Manager, Maria Camila Ruiz, Jose Bracamonte, Daniel Ostrand and Barbara Stanzola. Faculty Advisor – Haitao Liao.

*Providing Insight on Automated Passenger Counting Data to Improve Bus Utilization*: Industry Partner – University of Arkansas Transit and Parking. Team Members: Project Manager, Allison Morast, Blake Dougan, Victoria Goethel and Austin Talley. Faculty Advisor – John English.

*Simplifying Campus Parking for Increased User Satisfaction and Improved Decision Making*: Industry Partner – University of Arkansas Transit and Parking. Team Members: Project Manager, Ryan Sanders, Mireille Ineza, Christopher Manjarrez and Jacob Washkowiak. Faculty Advisor – Art Chaovalitwongse.

*Improving Patient Flow by Reducing Emergency Department Length of Stay*: Industry Partner – Veteran's Health Care System of the Ozarks. Team Members: Project Manager, Olivia Goss, Brooks Langdon, Ali Madere and Dominic Pacitti. Faculty Advisor – Ed Pohl.

*Reducing Cardboard Contamination Throughout the VHSO by Redesigning the Facility Layout*: Industry Partner – Veteran's Health Care System of the Ozarks. Team Members: Project Manager, Fallon Haaser, Aliyah Conley, Brian Sloan and Deondre Taylor. Faculty Advisor – Shengfan Zhang.

*Tracking Goods Not for Resale in the Backroom of Walmart Stores*: Industry Partner – Walmart Inc. Team Members: Project Manager, Peter Scheele, Nour Abu-Safe, Savanna Kis and Timothy O'Toole. Faculty Advisor – Justin Chimka.

### Individual Awards

- Outstanding Project Managers: Tony Woods, Allison Morast, Anna Hudgeons.
- Outstanding Team Members: Grant Waller, Matt Turner, Savannah Kis.
- Outstanding Faculty Advisors: Manuel Rossetti, John English, Haitao Liao.
- Outstanding Industry Partners: Jaclyn Johnson – Walmart, Matt Yarbrough – Walmart, Adam Klausung and Alex Wong – J.B. Hunt.

### Projects at the 2018 Capstone Experience Symposium

The following additional projects were presented at the 2018 Capstone Experience Symposium:

*Increasing Cross-Dock Efficiency by Improving Door Assignments*: Industry Partner – ArcBest Technologies. Team Members: Project Manager, Aaron Bowden, Charles Elliott, Royal Hart, and Olivia Weekley. Faculty Advisor – Kelly Sullivan.

*Calculating Forklift Replacement and Assessing Alternatives*: Industry Partner – ArcBest Freight. Team Members: Project Manager, Brian Meyer, William Beckman, Nicolas Rork and Tyler Wiggins. Faculty Advisor – Tish Pohl.

*Improved Food Production Operations: Advancements in Facility Layout, Job Scheduling and Data Management*: Industry Partner –



*Revamping Workforce Management Processes for Increased Associate Utilization:* Industry Partner – Walmart Inc. Team Members: Project Manager, Anthony Woods, Spencer Kilgore, Hunter Pauling and Grant Waller. Faculty Advisor – Greg Parnell.

*Redesigning Dry Grocery Category Adjacency:* Industry Partner – Walmart Inc. Team Members: Project Manager, Jennifer Watson, Kelly Green and Bryce Rohr. Faculty Advisor – Joe Geunes.

*Improved Decision Support in Walmart's Fresh Produce Modular Design:* Industry Partner – Walmart Inc. Team Members: Project Manager, Chase Kilty, Cherylyn Garcia and Elizabeth Laster. Faculty Advisor – Joe Geunes.

*Allocating Products to Channels in the Item Discovery Funnel:* Industry Partner – Walmart Stores Inc. Team Members: Project Manager, Rachel Holmer, Harrison Gilker and Juan Marino. Faculty Advisor – Ed Pohl.

## Highlights

The Arkansas Alumni Association honored its fourth class of Seniors of Significance during a reception at the Janelle Y. Hembree Alumni House in December 2017. Seventy-one graduating seniors were honored. The students were selected from more than 600 nominations and represent each academic college. The Seniors of Significance are selected based upon their academic achievements, leadership skills and extracurricular campus and/or community service.

Two Industrial Engineering seniors were selected for this honor, Rachel Holmer and Grace McGee.



Rachel minored in Spanish and studied abroad in Spain. She served as vice president of the U of A Chapter of Alpha Pi Mu, the industrial engineering honor society. While at the university, Rachel has also worked with the Engineering Student Council and Tau Beta Pi. Besides her coursework, Rachel

has been involved in research all four years of college, contributing to several different projects. Through her involvement in research, she has been able to travel to exciting places to present research at conferences, from Anaheim, CA to Delhi, India. In April 2017, she received the Undergraduate Research Award, awarded to one student in the department by faculty vote for contributions to departmental research efforts. To fund her senior thesis, Rachel was awarded a State Undergraduate Research Fellowship. She is working to build a predictive model for HPV infection risk in young adult females. In May of 2017, she received the UPS Scholarship

for Minority Students, a nationally competitive scholarship awarded by the Institute of Industrial and Systems Engineers. The past two summers Rachel has interned with the Walmart Logistics Engineering team in Fort Worth, TX and New Braunfels, TX. Rachel makes it a priority to volunteer weekly for Potter's House Academy, a community program aimed at improving K-12 students' performance in school through authentic relationships and tutoring. On being chosen as a Senior of Significance, Rachel commented, "It is an incredible honor to be recognized as a Senior of Significance. My four years at the U of A have shaped how I see the world, and those around me. I cannot imagine a better community for students to come to learn and grow as individuals. I only hope the impact of my contributions come close to the impact the university has had on me."



Grace was quick to get involved on campus as a freshman, becoming a member of the Chi Omega Fraternity, joining The Wells Project RSO, and participating in undergraduate engineering research, ending the year with the Outstanding Freshman Award from the Freshman Engineering Program. Grace spent the following summer serving as a R.O.C.K. Camp Mentor in Ponca, Arkansas which she credits as one of her most valuable experiences at the University. Determined to be involved within the College of Engineering, Grace served as vice president of the industrial engineering honor society Alpha Pi Mu, the University Relations Coordinator of Society of Women Engineers, and a Peer Mentor for the First-Year Engineering Program and numerous other positions. Off campus, Grace volunteered weekly at The Salvation Army as a meal server. During the summer months, Grace worked for John Deere as a Reliability Engineer (2016) and for Cummins as a Supplier Quality Improvement Engineer (2017) and participated in a study abroad program to Cape Town, South Africa (2017). She graduated in May with a minor in finance and completed another internship with Cummins as a Project Engineer during summer 2018. In fall 2018, Grace will work for a nonprofit in Galway, Ireland before continuing in her engineering career in early 2019 as a proud alumna of the Department of Industrial Engineering. After learning of her selection as a Senior of Significance, Grace remarked, "It is an honor to be learning from the faculty, staff, and students who make up this campus and an honor to add to the history of this University. Over the past four years, I have been surrounded by Razorbacks who have challenged me to think deeply, work diligently, cheer wildly, and live passionately. I will forever be grateful for my time at the University of Arkansas."

## Other Undergraduate Achievements

- Junior Emily Matlock was awarded the John L. Imhoff Globalization Scholarship from Alpha Pi Mu;

- Senior Grace McGee was the recipient of the Robert and Jean Dryden Service Scholarship presented by Alpha Pi Mu;
- Senior Rachel Holmer was recognized as the Overall College of Engineering Outstanding Senior;
- Anna Hudgeons, was selected as a College of Engineering First Ranked Scholar for achieving a 4.0 on all course work completed at the U of A;
- Olivia Goss, Rachel Holmer and Anthony Woods were all selected as College of Engineering Senior Scholars for having achieved a perfect 4.0 on all course work, including some transfer work;
- Nate Hemby received the Gilman International Scholarship to complete a study abroad experience in Sweden;
- At the IISE annual conference our students were well represented among award recipients. Clay Ferguson received the CISE Undergraduate Scholarship while Nathan Clark and Alexandra Gentile received the Dwight D. Gardner Scholarship; and Alexander Hendrickson received the Harold & Inge Marcus Scholarship;
- Luke Turner, Kyle Kraichely and Olivia Ohlstein, placed third out of 58 teams in the IISE/Arena Student Simulation Competition held at in conjunction with the Institute of Industrial and Systems Engineers Annual Conference in May 2018;
- Senior Emily Matlock received a Critical Language Scholarship to student critical language abroad. She studied Japanese in Japan during summer 2018;
- The departmental Sophomore Scholar Award was presented to Nathan Clark;
- Freshman Patrick Dougherty received the ArcBest Corporation Outstanding Freshman Award; and
- The University of Arkansas Student Chapter of the Institute for Industrial and Systems Engineering (IISE), received the Gold Award for 2017-2018.
- The U of A Student Chapter of Alpha Pi Mu came in second for the Outstanding Chapter Award 2017-2018.

## Honors Experience

The honors experience in our department is designed for students who are also enrolled in the University of Arkansas Honors College. The experience includes a minimum of 12 credit hours of honors courses, as well as an undergraduate research project that culminates with a thesis. In 2017-2018, seven undergraduate students completed the Honors College experience in our department:

Student	Thesis Title	Advisor
Olivia Goss	Transportation and Distribution of Strategic National Stockpile Supplies in a Public Health Emergency	Ashlea Bennett Milburn
Rachel Holmer	Developing an HPV Infection Risk Prediction Model for Adult Females	Shengfan Zhang
Anna Hudgeons	Dispensing Medical Countermeasures in Public Health Emergencies via Home Health Agencies and Points of Distribution	Ashlea Bennett Milburn
Grace McGee	Modeling Commodity Flow as a Statistical Function of Lock Unavailability and Usage	Justin Chimka
Ryan Sanders	Effective Resource Utilization in Arkansas Public Schools	Shengfan Zhang
Justin Taylor	Understanding The Decision-Making Process of Local Level Emergency Managers and Future Impacts of Social Data	Ashlea Bennett Milburn
Anthony Woods	Developing an ergonomic model and automation justification for industrial spraying operations: A case study	Harry Pierson

# GRADUATE OVERVIEW



**G**raduate course offerings of the Department, as well as research opportunities for Industrial Engineering graduate students, continue to grow and diversify. A sampling of our graduate students' published work, highlighted in this section, illustrates the range of research interests being pursued under the guidance of our faculty. Also featured in this section is our professional graduate program in Master of Science in Operations Management and our newest program Master of Science in Engineering Management.

For students pursuing graduate studies in the field of Industrial Engineering, we offer several options with respect to degree, area of specialization, and full-time or part-time studies.

Graduate degrees for on-campus students are offered in two areas:

- Master of Science in Industrial Engineering (M.S.I.E.)
- Doctor of Philosophy in Engineering (Ph.D.)

In addition to traditional degree options, the Department offers a Master of Science in Operations Management (MSOM) and the Master of Science in Engineering Management (MSEM).

Our faculty's wide range of expertise provides opportunities for study in a variety of areas such as:

- Transportation, Logistics & Distribution
- Healthcare Systems Engineering
- Reliability, Maintainability & Quality Engineering
- Engineering Management
- Manufacturing & Automation

These areas continue to be supported by the following research centers and laboratories:

- Center for Excellence in Logistics and Distribution
- Mack Blackwell Rural Transportation Center
- Maritime Transportation Research and Education Center
- ReliaSoft Risk, Reliability and Maintainability Research Alliance
- Arkansas Security Research and Education Institute
- Institute for Advanced Data Analytics
- J.B. Hunt Innovation Center of Excellence

Justin Chimka, Associate Professor of Industrial Engineering, serves as Graduate Coordinator for degree programs in Industrial Engineering. Dr. Greg Parnell serves as Director for the Master of Science in Operations Management and the Master of Science in Engineering Management programs.

More information can be found at <http://industrial-engineering.uark.edu>

## Highlights

Enrollment in the Department's doctoral program increased by more than 45% from 2010 to 2017. Fall 2017 Ph.D. enrollment in Industrial Engineering was second largest in the College of Engineering, and our Department had the greatest number of female doctoral students in the College. Our graduate students have gained national recognition through awards, honors and publications.

A delegation from Erzurum Technical University, Turkey, visited the Fayetteville campus in July, at which time an agreement was signed.

Under the agreement, the universities will work to create programs for exchanging academic, research or other educational materials. The event provided an opportunity for representatives from sponsoring organizations and embassies to become more familiar with the University of Arkansas campus and students.

Doctoral student Mahmut Tutam received special recognition at an appreciation awards event as part of the two-day sponsor visit at a program hosted by the Office of Sponsored Student Programs. Tutam participated by coordinating a formal agreement of cooperation between the University of Arkansas and Erzurum Technical University in Turkey. Tutam will serve as a faculty member at Erzurum University, after he completes his graduate degree in spring 2018.



*Mahmut Tutam*

“During the visit, we were not only warmly welcomed by all the University of Arkansas staff, but also given an opportunity to meet the faculty and visit the well-equipped laboratories,” said Irfan Kaymaz, dean of Erzurum’s College of Engineering and Architecture. “By signing the memorandum of understanding, we hope to build a strong bridge between Erzurum Technical University and the University of Arkansas. This bridge will serve for both students and academics to exchange their knowledge and culture, in order to form a strong bond between these two universities.”



*U of A Chancellor Joseph Steinmetz and Erzurum Technical University president Muammer Yaylali sign a cooperative agreement between the two institutions.*

The Turkish delegation’s visit and the signing of the cooperative agreement was made possible by the cell and molecular biology program, with the support of the Graduate School and International Education’s Office of Sponsored Student Programs and the College of Engineering. In addition to the exchange of academic and research materials, the agreement is aimed at growing the population of sponsored students at the U of A. Erzurum Technical University was founded in 2010 and has grown to an enrollment of more than 3,300 students.

## Other Graduate Achievements

- Yu “Chelsea” Jin received the Gilbreth Memorial Fellowship at the annual conference of the Institute of Industrial and Systems Engineers in Orlando, Florida.
- Cesar Ruiz Torres was one of four finalists for the QCRE Student Paper Competition at IISE. This is significant in that it was his second time being a finalist and he is only in his second year. He also won the Hans Reiche Scholarship at the annual Reliability and Maintainability Symposium (RAMS 2018).
- Industrial Engineering students identified as Distinguished Doctoral Fellows for 2017 and 2018 included Winthrop Harvey and Jose Carlos Hernandez Azucena. Recognized with the honor of Doctoral Academy Fellow was Oliver Kwizera.
- Doctoral student, Phawis Thammason was part of a team lead by Art Chaovaitwongse, Xiao Liu and post-doctoral student Chunyan Duan; recognized for their work to make radiation for lung tumors more effective. They along with researchers from the University of Washington Medical Center were the recipients of the Best in Physics Award in the Joint Imaging-Therapy Track at the 60th Annual Meeting & Exhibition of the American Association of Physicists in Medicine.

# M.S.O.M and M.S.E.M OVERVIEW



The Master of Science in Operations Management graduate degree program continues to thrive. This applied management program for working professionals attracts managers and professionals in various business sectors, industries, military branches of service and government offices. In the 2017-2018 academic year, there were 927 unique students enrolled in the program and a total of 2,458 course enrollments for the year. Ninety percent of those enrollments were online courses. The MSOM program continues to be the University's largest graduate program with 215 students completing their degree in the 2017-18 academic year.

Operations Management coursework emphasizes practical knowledge in areas such as project management, economic decision-making, supply chain management, human behavior analysis, quality management, and operations research, as well as many other areas of importance to today's manager. Program content focuses squarely on the concepts, methods, and tools that are essential to the successful management of work processes, projects, and people in a wide spectrum of organizations. The curriculum has an Industrial Engineering perspective on the science of management, and equips graduates to carry out their managerial responsibilities more efficiently and effectively. Students are able to select from 29 graduate courses to make up the 10 required to complete the degree.

The program is offered at the University of Arkansas's flagship Fayetteville campus, at live Graduate Resident Centers, and via distance learning online. The program is hosted on three active duty

bases including Little Rock Air Force Base at Jacksonville, Arkansas; Naval Support Activity Mid-South at Millington, Tennessee; and the Air Force Special Operations Hurlburt Field base at Fort Walton Beach, Florida. These sites, and the option of online classes allow the program to reach a diverse student population among career fields and undergraduate majors.

The MSOM program offers students flexibility by operating in eight-week terms and having an online option for program courses. This flexibility accommodates students employed full-time by Fortune 500 companies such as Walmart, Sam's Club, Tyson Foods, J.B. Hunt Transport, FedEx, Lockheed-Martin, and Pratt & Whitney. We are also proud to be affiliated with the military and have many current military members and veterans from all branches of service stationed at our host bases and throughout the world.

The curriculum is presented by outstanding faculty members who are drawn from the University's Industrial Engineering Department and from businesses throughout the country. There are three IE faculty members actively involved with four additional IE faculty on standby, two full-time MSOM instructors, and 55 adjunct faculty members who teach in the program. The program recruits business professionals who are academically qualified and have accrued extensive managerial industry experience in the specific subject that they teach.

Admission to the MSOM program requires a student to have a minimum grade-point average of 3.0 either on the last 60 credit hours of attempted baccalaureate coursework, or from all

coursework cumulatively from the first conferred baccalaureate degree from a regionally accredited institution. If a student does not have the minimum GPA required, but has at least a 2.5, an accompanying GRE or GMAT score within the 50th percentile or higher, plus a 4.0 analytical writing score will suffice. For admission consideration, students who are not native speakers of English and who do not have a conferred master's degree from an accredited U.S. college or university must submit a 550 paper-based score or an 80 internet-based score on the Test of English as a Foreign Language (TOEFL). Before taking any graduate classes in the Operations Management program, such students must also demonstrate proficiency on one of the following test of written English: TOEFL IBT (26), ELPT (75) or GRE/GMAT (4.0).

## Program Highlights

A strength of the program is the dedicated instructors and staff members. The program was pleased to award **Mike Wells** the **2018 Faculty of the Year** award at the annual faculty meeting. Mike is an Adjunct Instructor for the MSOM program. Mike teaches hybrid courses at the Hurlburt Field Florida site as well as online courses for the program. He's attentive to his students and great at communicating with university staff. He has previously served on comprehensive exams, and whenever we visit with students in the Florida area, we hear nothing but positive comments about him and his courses.



**Jim Sutton** was awarded the **2018 Rookie of the Year** award at the annual faculty meeting. Teaching for the MSOM program since summer 2017, Jim served as part of an instructor team



*Associate Dean of the Graduate School, Pat Koski,  
Jim Sutton and Emily Nichols.*

that redesigned our Quality Management course in 2017. He teaches Quality Management and Leadership Principles online. We continually receive exceptional feedback about Jim's courses from

students, and his classes have been regarded by students as an exceptional learning environment.

MSOM Advisor, **Mindy Hunthrop**, was selected as the **College of Engineering Employee of the Semester** for Spring and **College of Engineering Employee of the Year**. Additionally, she was the recipient of the **AAIE Outstanding Support Staff Member of the Year** award. Mindy is a valuable employee to the department who exemplifies professionalism and passion. She spearheads the Lunch and Learn Webinar Series which has been widely popular. Each webinar features an esteemed MSOM faculty member and a topic that is significant to prospective students, students and alumni. The series aims to provide further discussion and education for our current students and alumni, while also recruiting new students.



MSOM Associate Director, **Carol Altom**, was awarded the **AAIE Outstanding Administrative Staff Member** of the Year award. Carol has been a member of the department since 2012. Her focus is on student advising, success, graduation, and MSOM and PM certificate admissions. She occasionally teaches the finance class and continually works to improve departmental processes.

**Blake Chapman** joined the program in 2018 to serve in Marketing and Recruitment initiatives. Blake is a graduate of the MSOM program.



Another strength of the program is a core value of continuous improvement. The motto, "we practice what we teach" guides the program goal to always improve. The MSOM program offered the Graduate Certificate in Project Management starting this academic year. The certificate requires three OMGT core classes as well as

one elective and prepares students to take the Project Management Professional (PMP) exam. Students can work towards the MSOM degree and the certificate program simultaneously, with no extra credit hours required. This creates significant value for both current and prospective students.

The Master of Science in Engineering Management program marked its first year with admissions exceeding initial expectations with 22 students. Additionally, the program had two graduates in its first year. The curriculum introduces students to historical and contemporary management theories and provides practical techniques to apply managerial best practices within technical environments. This program is designed for engineers with ABET-accredited bachelor's degrees in engineering who want to move into leadership positions in engineering organizations.

Since 2016 significant changes to the Comprehensive Exam format continue to increase passing rates. Failure rates prior to implementation hovered around 6%, which dropped to 1% in 2017 and 0.5% in 2018.

## Annual Faculty Meeting

The annual Faculty Meeting was held in July 2018. Over 40 faculty members from all over the United States attended the meeting

and several joined in the days preceding to work on course development and to participate in training. Industrial Engineering Department Head, Ed Pohl, started the meeting by welcoming the group to Fayetteville. Provost Jim Coleman, served as Keynote speaker, and Associate Dean of the Graduate School and International Education, Pat Koski, was the dinner speaker.



*Provost Jim Coleman*

During the meeting, instructors learned best practices from one another, engaged in a panel discussion with current MSOM students, and received insightful information and updates regarding department plans and online services such as ProctorU. Instructional Designers with the Global Campus, attended the meeting to be available to instructors to aid in course revamp initiatives. MSOM and MSEM staff members also attended to provide insight from all perspectives.

More information about the Operations Management program can be found here: <http://operations-management.uark.edu>.



*Faculty and staff of MSOM and MSEM gather for the Annual Faculty Meeting, July 2018.*

# GLOBAL STUDIES



Engineering students recently got a first-hand look at the economic aspects of engineering as part of an engineering economic analysis course at the U of A Rome Center.

In addition to typical classroom-based coursework, students took part in a variety of site visits. A tour of the excavation of Rome's newest subway line proved particularly interesting for students. Since the excavation began in 2007, multiple archeological discoveries have been made. The construction has unearthed second-century military barracks, a second-century home of a military commander, and rare wooden artifacts. The historical discoveries have led to additional costs and construction delays.

Before visiting the excavation site, students conducted an analysis of the project's goals, timeline, costs, and anticipated benefits. During the visit, the site's engineers discussed with the students how the initial project plans have had to be adjusted throughout the construction process.

"I wanted students to explore the economic costs and benefits associated with a large, publicly-funded project," said Tish Pohl, clinical assistant professor of industrial engineering and the course's instructor. "During the visit, students saw how the excavation work is being done, the technology used, and how much

care has been taken to ensure no damage is done to surrounding buildings, many of which are ancient."

The engineering students also visited a travertine quarry. While there, they saw the process by which the stone is extracted and transformed for use in the construction of buildings around the world. Additionally, students toured a modern factory that produces bathroom fixtures. The tour gave students an inside look at the engineering processes and economic considerations used in modern manufacturing.

Students in the course benefited from the comprehensive experiences offered at the Rome Center.

*Studying at the Rome Center allowed for a very personal and focused classroom experience. The addition of site visits to supplement the course was a welcome enhancement that I would not have gotten to experience in Fayetteville.*

"Studying at the Rome Center allowed for a very personal and focused classroom experience," said Patrick Dougherty, an industrial engineering sophomore. "The addition of site visits to supplement the course was a welcome enhancement that I would not have gotten to experience in Fayetteville."

Their time in Italy also allowed the students to build strong connections with their peers, which they will continue to strengthen in Arkansas.

"My favorite aspect of my study-abroad experience was becoming close friends with my classmates," Dougherty said. "I'm looking forward to seeing everyone again in Fayetteville."



# WHERE OUR GRADUATES WORK

Applied Predictive Technologies  
 Tata Consultancy Services American Tubing  
 Green Mountain Technology Windstream Communications  
 United States Postal Service SPP Pumps  
 Marshalltown Watco Supply Chain LaCroix Optics  
 Harrison Energy Partners Burns and McDonnell  
 St. Jude Medical American Airlines  
 Wal-Mart John Deere United States Air Force  
 Transplace AT&T General Motors  
 MIT Viridian Phillips 66  
 Dassault Falcon Boeing Tesla Motors  
 Sam's Club FedEx NALCO  
 Unilever DHL Epic  
 Wells Fargo Securities  
 Booz Allen Hamilton Cummins ABF Freight  
 Koch Industries Walt Disney World Habasit America  
 Hallmark Cards Texas Instruments J.B. Hunt  
 Hershey Company Clark Construction Group  
 Amazon University of Texas Logile  
 Whiting Turner Cerner Northrup Grumman  
 Lockheed Martin Dell Somerset Logistics  
 Erzurum Technical University QPS Engineering  
 Butterball  
 Georgia Pacific Emerson Accenture Kennametal Inc.  
 Nestle Purina Petcare University of Arkansas  
 Rockline Industries Twin Eagle Energy Sources  
 Arkansas Electric Cooperative

# LABORATORIES OVERVIEW

The Industrial Engineering Department has three physical computer laboratories for student use. These are the Foust Lab (BELL 4127-4128), Stephens Lab (BELL 4134A) and a general access computer lab shared with Civil Engineering (BELL 4133). All are equipped with the latest hardware, software and specialized programs.

## David D. and Nancy J. Foust Computation Laboratory

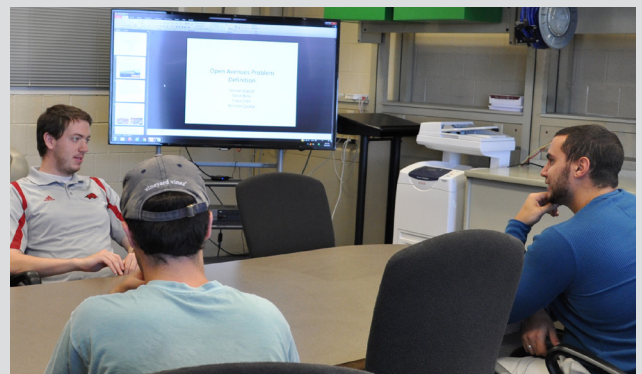


The Foust Computation Laboratory is Industrial Engineering's premier computing and teaching lab, providing general computing access for all students and supports the computing needs associated with course work. Included in the lab are a project area with whiteboards to encourage student discussions. Occupying approximately 2,100 square feet, the computer lab area can accommodate 44 students.

The Industrial Engineering Department is committed to providing the latest in computer technology, software capability, and technical expertise to enhance the educational experience for all students. The Foust Computation Lab is open 24 hours a day throughout the semester to all faculty, staff, and students enrolled in industrial engineering classes.

## Capstone Experience Lab

Used primarily for students in the Industrial Engineering Capstone Experience course, the space is equipped with a conference area, mobile media cart with a 60" television monitor, computer and conference phone. This enables students to meet with industry partners, review draft versions of course milestones, and make presentations of project results.



## Multi-Purpose Teaching Lab

This lab supports two undergraduate courses, Methods & Standards and Ergonomics. The space is used to hold lab meetings for these two courses where students conduct experiments related to cognitive ergonomic concepts, hand tool design, anthropometric measurement, time studies, work sampling, and worksite analysis and design. The space also features a conference area where student teams can meet to discuss research.

## The Bill and Margaret Harrison Family Video Conferencing Facility



The Bill and Margaret Harrison Family Video Conferencing Facility was made possible by a contribution from alumni William and Margaret Harrison of Little Rock.

The paramount feature in the facility is the state-of-the-art software and equipment. The facility is equipped with LifeSize 220 Express, described as the most full-featured video conferencing system available.

The system allows remote video and audio communication between up to eight parties concurrently, and users can share content, control cameras, change layouts, and add participants with ease. It includes an application for smart phones, tablets, and computers and has the ability to record meetings and stream viewing.

## The AT&T Manufacturing Automation Laboratory

The Manufacturing Automation Lab allows students to gain hands-on experience with technologies that boost manufacturers' efficiency and agility. This includes both robotics and additive manufacturing.

The lab hosts two traditional robotic work cells. The vision-equipped Adept Cobra is a 4-axis SCARA geometry that is ideal for high-speed pick-and-place operations. The other work cell features an Adept Viper 6-axis articulated arm mounted on a 2-axis Adept Python Cartesian robot. This is a common arrangement in industry for manufacturing tasks such as robotic welding and machine loading/unloading. The lab also features two collaborative robots: Baxter from Rethink Robotics and a UR10 from Universal Robots. Both are intrinsically safe and possess human-friendly task



specification, allowing humans to enter the work envelope and interact with the robots. With two seven-axis arms, integrated machine vision, and an interactive display, Baxter can handle complex perception and manipulation tasks. The UR10 is a traditional 6-axis articulated arm. Together they represent the next generation of industrial robotics.

The Turtlebot mobile robot from Clearpath Robotics is the lab's fully autonomous robot that gives students experience with the simultaneous localization and mapping (SLAM) technologies used in both industrial mobile robotics and autonomous vehicles.

Additionally, the lab stays particularly active in the

realm of Additive Manufacturing. The Stratasys uPrint is an industrial-grade fused deposition modeling (FDM) 3D printer. Further enhancing exposure to this type of manufacturing is the lab's MakerGear M2 desktop 3D printers, Simplify3D printing software, and Autodesk Inventor CAD software to provide low-cost, hands-on 3D printing experience for students.

## Larry and Gwen Stephens Undergraduate Research Laboratory

The Larry and Gwen Stephens Undergraduate Research Lab provides state-of-the-art facilities including the latest computer hardware and software designed for industrial engineering projects.

The lab provides individual workspace for up to 15 undergraduate students. To be eligible for a space in this lab, a student must be engaged in research with an industrial engineering faculty member.



## ReliaSoft Risk, Reliability, and Maintainability Research Alliance

ReliaSoft Corporation donated software to the University of Arkansas to form and support the ReliaSoft Risk, Reliability, and Maintainability Research Alliance. The software provides engineering students with state of the art tools to help identify potential risks and calculate the severity of disruptions within a manufacturing or transportation environment.

**ReliaSoft**

More information on the Industrial Engineering Labs can be found at: <http://industrial-engineering.uark.edu/Research/Labs/index.php>



## ALUMNI HIGHLIGHTS

More than 200 alumni, family and friends of the College of Engineering gathered April 20 to celebrate the accomplishments of the college's graduates. The Annual Alumni Awards Banquet and Ball brings together alumni from all eight departments within the College of Engineering to recognize alumni who have achieved distinction in their fields since graduating from the University of Arkansas.

Established in 1965, the **Hall of Fame** is the highest honor bestowed by the College of Engineering at the University of Arkansas. The award recognizes prominent graduates and leaders who have made outstanding contributions to the engineering profession and society as a whole. Members of the Hall of Fame have, throughout their careers, made a difference to the engineering profession and demonstrated concern for improving their communities. Their achievements have brought favorable attention to the College of Engineering, the University of Arkansas and the State of Arkansas.

**William "Bill" Keltner**, B.S.I.E. 1959, was inducted into the Hall of Fame posthumously this year. He entered the University of Arkansas in 1955, majoring in Industrial Engineering. During his time at the University, he was active in Sigma Nu and Theta Tau fraternities, and was president of the Arkansas Booster Club. Shortly after graduating, Keltner took a job with Southwestern Bell in Little Rock. He would spend his entire career at Southwestern Bell in various positions. He took time out from his career to serve as a Field Artillery Officer in the U.S. Army, and ultimately retired from Southwestern Bell as a General Manager.



Keltner also found time to give back to the University of Arkansas, serving as president of the Arkansas Academy of Industrial Engineering (AAIE) and on the College of Engineering Dean's Advisory Council. He would later be chosen for the University of Arkansas Hall of Fame and was named a Distinguished Alumni of the College of Engineering. Keltner passed away in 2011.

The College of Engineering **Distinguished Alumni Award** honors the exceptional professional and personal achievements of the University of Arkansas College of Engineering graduates. Recipients have achieved distinction in their fields and have provided outstanding leadership and service to the College of Engineering, and to the organizations and communities to which these distinguished alumni belong.

Receiving recognition from the Master of Science in Operations Management program was **Robert Arvin**, M.S.O.M. 2012, Divisional Vice President - Supply Chain with Walmart, Inc. Bob's career has been dynamic, with 35 years of Fortune 100 experience leading large multi-disciplinary teams in forward and reverse logistics, project management, engineering, transportation, internet fulfillment and distribution center operations.



In his role at Walmart, Arvin is responsible for two national supply chain divisions. The first is the Apparel Network that provides replenishment of apparel, shoes and jewelry to all Wal-Mart Stores & Sam's Clubs in the United States, including fulfillment of online apparel sales for Walmart.com. The second is the Reverse Logistics Network, which includes national return and secondary market programs for Wal-mart stores, Walmart.com, Sam's Clubs and sams.com. His current assignment is development and execution of the reverse logistics strategy for returned goods and distressed inventory from both physical locations and online sales.

Arvin serves on the Dean's Advisory Council for Northeast Oklahoma State University, giving his time and talents to promote operations management principles in academia.

In Northwest Arkansas, he has served as chairman of the board of directors for the Scott Family Amazeum in Bentonville since its inception in 2013, and now supports the Artists Series there, connecting arts entrepreneurs with teenagers. He also serves as board member of The Northwest Arkansas Jazz Society, a non-profit dedicated to preserving, presenting and promoting jazz in all of its forms. He is also a former board member of the I'll Fly Away Foundation, an organization dedicated to getting children involved in music.

The College of Engineering **Distinguished Alumni Award** honors the exceptional professional and personal achievements of the University of Arkansas College of Engineering graduates. Recipients have achieved distinction in their fields and have provided outstanding leadership and service to the College of Engineering, and to the organizations and communities to which these distinguished alumni belong.

The industrial engineering recipient was, **Rita Gail Willcoxon**, B.S.I.E. 1982, Global Engineering Leader for Intelligent Control Systems (retired), General Electric. Rita has had a remarkable career,

starting with the Department of Defense, then extending to the National Aeronautics and Space Administration (NASA) and concluding at one of the largest and most influential business firms in the world, General Electric.



In all of the organizations she represented, Willcoxon excelled, being promoted to positions of higher complexity and tremendous responsibility. At NASA, Willcoxon won multiple awards, and concluded her career by leading the Space Shuttle team at the Kennedy Space Center to complete the final 21 missions of the shuttle program. She was able to complete the program successfully, while also adding an extra flight with the money saved from her budget. In 2011, she received the NASA Distinguished Service Medal for leading the Kennedy Space Center through the successful completion of the Space Shuttle Program.

After her service at NASA, Willcoxon served three years as Global Engineering Leader for the Intelligent Control Systems at General Electric.

After retiring in 2015, Willcoxon is giving back to the community. She is very engaged at the University of Arkansas as a member of the Arkansas Academy of Industrial Engineering, and is also the founder of the Launch STEM Careers program in Brevard County, Florida, which works to inspire girls to pursue careers in science, technology, engineering and math. Presently, there are more than 170 girls enrolled.

The **Early Career Alumni Award** is presented to College of Engineering graduates who are achieving distinction in their fields and show significant promise for professional leadership in state, national and international activities. These individuals have served in their industries for 15 years or less.



Recognized from the Department of Industrial Engineering was, **Jenni Kimpel**, B.S.I.E. 2006, Director of Engineering and Technology, J.B. Hunt Transport Services Inc.

Jenni has worked hard since graduation to progress her career and improve her community. Applying her process improvement skills in many facets of the organization has allowed her to move up and to be recognized as an executive leader in engineering and technology at the Fortune 500 company. As a leader at J.B. Hunt, Kimpel is responsible for developing a strategic vision that will help grow the company's last mile services and is part of a larger team that is positioning J.B. Hunt as a technology company. In addition to a demanding career, Kimpel serves her community by volunteering

in several capacities with the Cystic Fibrosis Foundation, among other organizations. A well-rounded multi-tasker, Kimpel was able to complete her M.B.A. degree from John Brown University while working full time.

## OTHER ACHIEVEMENTS

**Jen Pazour**, alumnus and assistant professor at Rensselaer Polytechnic Institute, received the Logistics & Supply Chain Division Teaching Award at IISE and also won the prestigious Faculty Early Career Development Award (CAREER) from the National Science Foundation (NSF) Division of Civil, Mechanical, and Manufacturing Innovation. She will use the five-year, \$500,000 award to study "Distribution Resource Elasticity: A New Hierarchical Approach for On-Demand Distribution Platforms."



The CAREER Award is given to faculty members near the beginning of their academic careers and is one of the most competitive awards given by the NSF to junior faculty. The award places emphasis on high-quality research as well as novel educational initiatives.

The CAREER award is the latest in a string of accolades that Pazour has garnered in her young career. In 2017, she was awarded the Dr. Hamed K. Eldin Outstanding Early Career IE in Academia Award, which recognizes those who have distinguished themselves through contributions to the welfare of mankind in the field of industrial engineering. She is the recipient of a National Academy of Sciences Gulf Research Program Early-Career Research Fellowship, a Young Investigator Award from the Office of Naval Research, and a Research Start-up Grant from the Material Handling Institute.

**Bryan Hill**, assistant dean for student recruitment and diversity, honors and international programs in the College of Engineering at the University of Arkansas was honored by the U of A Honors College with the Award for Distinguished Leadership.



Hill has more than 15 years of experience in engineering student recruitment, retention, diversity initiatives, and K-12 outreach programs. Since he became assistant dean in 2009, the College of Engineering's undergraduate enrollment has increased 92 percent, female enrollment has increased 157 percent and minority enrollment 152 percent. Overall honors enrollment in engineering has increased by nearly 50 percent since 2009.

Hill also has served as assistant director of the College of Engineering Honors Program since 2009 and is director of UAteach,

a secondary math and science teacher education program. In addition, he was instrumental in starting the Pre-Academic Program for SENACYT Scholars, a five-year program designed to provide low-income, rural Panamanian students a pipeline to college graduation. Hill is principal investigator on STEM educational and outreach grants totaling \$6.6 million.

Hill mentored the inaugural interdisciplinary team of students who submitted the first joint honors thesis in the College of Engineering. He has also embarked on an ambitious curriculum mapping plan to provide engineering students an eight-semester degree plan that includes a semester at a partner institution abroad. In the first year of these efforts, the number of engineering students spending a semester abroad has increased fivefold.

In 2015 Hill was recognized as one of the Top 15 Researchers on the U of A campus. He also received the 2017 Collis R. Geren Award for Excellence in Graduate Education and was a finalist for the Global Engineering Deans Council Airbus Diversity Award in 2014.

**Brian Smith**, assistant professor at Mississippi State University was the inaugural faculty recipient of the 2018 Wesley A. Ammon New Academic Advisor Award at Mississippi State University. The award recognizes both a faculty and staff member who have demonstrated qualities associated with outstanding academic advising of



undergraduate students and who have served as academic advisors for less than five years. The award is named in honor of Ammon who served as director of MSU's University Academic Advising Center.

**Kellie Schneider**, alumna and assistant professor at the University of Dayton was given the Miryam Award at University of Dayton for advancing the potential for women's achievements. The Miryam Award was initiated by Campus Ministry's Center for Social Concern in 1996 as a way to recognize efforts to change the atmosphere and the potential for women's achievements at the University of Dayton.



**Yisha Xiang**, alumna and assistant professor in the Department of Industrial Engineering at Lamar University received a National Science Foundation grant for collaborative research she is conducting with University of Houston Associate Professor and Sunita Agrawai Faculty Fellow, Qianmei Feng.



# LIAISON COMMITTEE

The Arkansas Academy of Industrial Engineering (AAIE) was founded in 1986 to recognize the achievements of University of Arkansas Industrial Engineering graduates and to provide continuing guidance and support to the Department of Industrial Engineering. The Academy also provides its members with the opportunity to nurture the organization that played an important role in their professional growth and development. Academy members provide tremendous financial resources that endow many scholarships for the Industrial Engineering students.

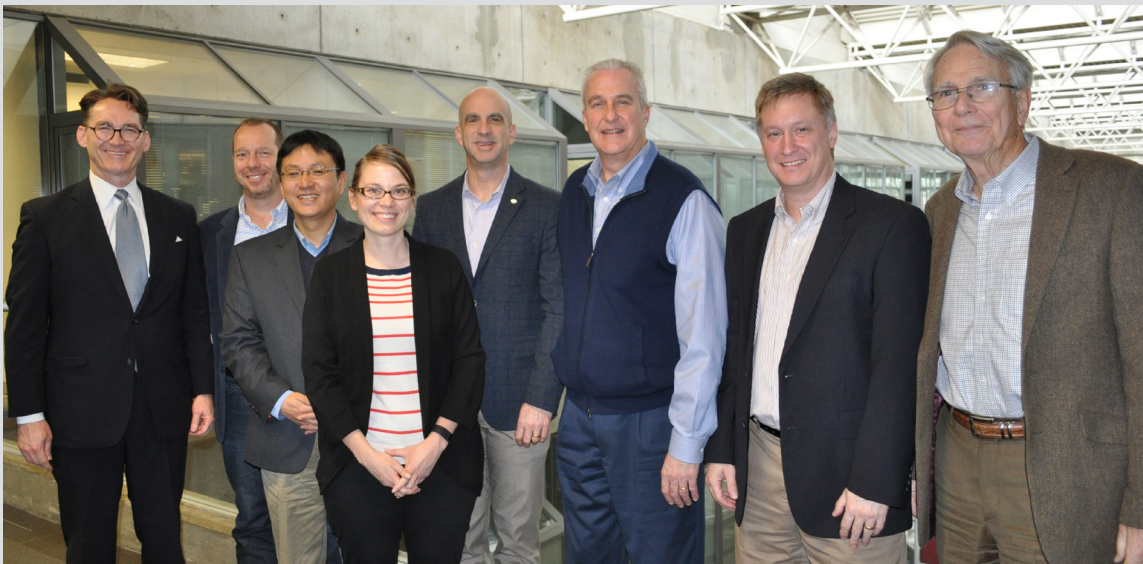


The AAIE organizes a Liaison Committee that serves as our advisory board and meets annually to evaluate the department. The committee is comprised of accomplished professionals from academia, business, and industry who bring both an applied perspective and an independent assessment to the Industrial Engineering program at the University of Arkansas.

It is the opinion of this year's Liaison Committee that overall, the Industrial Engineering Department continues to be extremely successful in delivering its mission. Across the board, student, faculty, and staff successes over the past year are a testament to this. Departmental leadership remains strong and committed to continuous improvement.

The members of the 2018 Liaison Committee are:

- G. Kent Burnett, Senior Vice President of IT at Dillard's, retired.
- Vance Clement, Chief Executive Officer at Lineus Medical. Vance is also the current President of the Arkansas Academy of Industrial Engineering.
- Ken Gaines, President and CEO of The Steco Corporation, in Little Rock, Arkansas.
- David Humphrey, Vice President of Investor Relations for ArcBest in Fort Smith, Arkansas.
- Bill Klimack, Chevron Decision Analysis Functional Manager.
- Jenn Pazour, Assistant Professor of Industrial and Systems Engineering at Rensselaer Polytechnic Institute (RPI).
- Edwin Romeijn, H. Milton and Carolyn J. Stewart School Chair at the Stewart School of Industrial & Systems Engineering at Georgia Tech.
- Ami Spivey, Senior Vice President, Next Generation Supply Chain at Walmart, retired.
- Young-Jun Son, Professor and Department Head of Systems and Industrial Engineering at University of Arizona.
- Tarek Taha, Sr. Director Engineering & Technology with J.B. Hunt.



*Left to right: Vance Clement, Edwin Romeijn, Young-Jun Son, Jenn Pazour, Tarek Taha, David Humphrey, Ken Gaines, and G. Kent Burnett. Not pictured, Ami Spivey and Bill Klimack.*



# OUR FACULTY



**C. Richard Cassady, Ph.D.**  
Professor

Dr. Cassady serves as Director of Freshman Engineering and Director of the Honors Program for the College of Engineering. For the Department of Industrial Engineering, Dr. Cassady teaches the introductory industrial engineering course and coordinates the capstone experience. He also teaches courses probability and stochastic processes. Dr. Cassady serves as Co-Director of FIRST LEGO League for the state of Arkansas. He is a Fellow of the Institute of Industrial and Systems Engineers and the Society of Reliability Engineers. He joined the faculty in 2000.

Education:  
Ph.D. Industrial and Systems Engineering (Virginia Tech)  
M.S. Industrial and Systems Engineering (Virginia Tech)  
B.S. Industrial and Systems Engineering (Virginia Tech)

**W. Art Chaovalitwongse, Ph.D.**  
Professor, and 21st Century Research Leadership Chair

Dr. Chaovalitwongse's research group conducts extensive Analytics research, ranging from basic computational science/statistics, applied mathematical modeling, and translational research at the interface of engineering, medicine, and other emerging disciplines. He joined the faculty in 2016.

Education:  
Ph.D. Industrial Engineering & Systems Engineering (University of Florida)  
M.S. Industrial Engineering & Systems Engineering (University of Florida)  
B.E. in Telecommunication Engineering (King Mongkut Institute of Technology)



**Justin R. Chimka, Ph.D.**  
Associate Professor

Dr. Chimka is director of graduate programs in industrial engineering. His research interests include statistical modeling, monitoring, and detection. He teaches courses in applied statistics, production, and operations analysis. Dr. Chimka joined the faculty in 2002.

Education:  
Ph.D. Industrial Engineering (University of Pittsburgh)  
M.S. Industrial Engineering (University of Pittsburgh)  
B.S. Industrial Engineering (University of Pittsburgh)

**John R. English, Ph.D., PE**  
Professor, Dean, and Irma F. and Raymond F. Giffels Endowed Chair in Engineering

Dr. John English's research focuses on quality and reliability engineering. He has published numerous articles and book chapters in the field of logistics and material handling. His awards include the Halliburton Research Award, the Dr. Theo Williamson Award from *Integrated Manufacturing Systems* and the Continuing Professional Development Best Paper Award from the American Society for Engineering Education. He is a fellow of the Institute of Industrial and Systems Engineers. Dr. English returned to the college in 2013.

Education:  
Ph.D. Industrial Engineering and Management (Oklahoma State University)  
M.S. Operations Research (University of Arkansas)  
B.S. Electrical Engineering (University of Arkansas)





### **Carol S. Gattis, Ph.D.**

**Adjunct Associate Professor, and Associate Dean Emeritus of the Honors College**

Dr. Gattis remains involved in several areas: undergraduate research, international education, service learning, K-12 math and science education, student recruitment and retention, and diversity. She currently serves as the Associate Dean Emeritus of the Honors College. Dr. Gattis joined the faculty in 1991.

Education:

Ph.D. Engineering (University of Arkansas)  
M.S. Electrical Engineering (University of Arkansas)  
B.S. Electrical Engineering (University of Arkansas)

Dr. Liu's research focuses on engineering probability and statistics, spatio-temporal modeling, big data analytics, and various engineering-knowledge-based data-driven methodologies in broad areas such as quality and reliability, manufacturing yield prediction, preventive maintenance, urban air quality modeling, and extreme weather events prediction. He joined the faculty in 2017.

### **Xiao Liu, Ph.D.**

**Assistant Professor**



Education:

Ph.D. Industrial Engineering (National University of Singapore)  
B.Eng. Mechanical Engineering (Harbin Institute of Technology)



### **Haitao Liao, Ph.D.**

**Professor, James M. Hefley and Marie G. Hefley Professor in Logistics and Entrepreneurship**

Dr. Liao's research interests include reliability models, maintenance and service logistics, prognostics, data analytics, design of experiments, and probabilistic risk assessment. In his research, he focuses on the use of theory of probability, statistics, operations research, signal processing tools in reliability estimation and improvement of highly reliable products, and optimization of service and operation of engineering systems. He joined the faculty in 2015.

Education:

Ph.D. Industrial and Systems Engineering (Rutgers University)  
M.S. Industrial and Systems Engineering (Rutgers University)  
M.S. Statistics (Rutgers University)  
B.S. Electrical Engineering (Beijing Institute of Technology)

### **Ashlea Bennett Milburn, Ph.D.**

**Associate Professor and John L. Imhoff Chair in Industrial Engineering 2017-2018**

Dr. Milburn's research interests include applying operations research tools and techniques to problems encountered in healthcare, humanitarian and transportation systems. She is especially motivated by the modeling and analysis of challenges associated with disaster relief and the delivery of home healthcare. Dr. Milburn teaches courses in probability and statistics, healthcare systems, and transportation logistics. She joined the faculty in 2010.

Education:

Ph.D. Industrial and Systems Engineering (Georgia Tech)  
M.S. Industrial and Systems Engineering (Virginia Tech)  
B.S. Industrial Engineering (University of Arkansas)



### **Heather Nachtmann, Ph.D.**

**Professor, and Associate Dean of Research, College of Engineering**

Dr. Nachtmann serves as the Director of the Maritime Transportation Research and Education Center and the Mack-Blackwell Transportation Center. Her current research program focuses on economic and decision analysis of transportation systems focusing on inland waterways. She has taught courses in engineering economy, cost analysis, and decision modeling. She joined the faculty in 2000.

Education:

Ph.D. Industrial Engineering (University of Pittsburgh)  
M.S. Industrial Engineering (University of Pittsburgh)  
B.S. Industrial Engineering (University of Pittsburgh)



**Kim LaScola Needy, Ph.D., PE, CFPIM, PEM**  
**Professor & Dean, Graduate School and International Education**

Dr. Needy's research interests include engineering management, engineering economic analysis, sustainable engineering, and integrated resource management. She has taught courses in project management and industrial engineering design. Dr. Needy joined the faculty in 2008.

**Education:**

Ph.D. Industrial Engineering (Wichita State University)  
 M.S. Industrial Engineering (University of Pittsburgh)  
 B.S. Industrial Engineering (University of Pittsburgh)

**Sarah Nurre, Ph.D.**  
**Assistant Professor**

Dr. Nurre's current research interests are in applying network optimization, scheduling, integer programming, and optimization algorithms to relevant applications such as infrastructure restoration, multi-layer interdependent network protection, vehicle routing for the military and public sector, and the integration of electric vehicles with a smart grid. She joined the faculty in 2015.



**Education:**

Ph.D. Decision Sciences and Engineering Systems (Rensselaer Polytechnic Institute)  
 M.E. Industrial and Management Engineering (Rensselaer Polytechnic Institute)  
 B.S. Mathematics (Rensselaer Polytechnic Institute)



**Gregory S. Parnell, Ph.D.**  
**Research Professor of Industrial Engineering and Director of the M.S. in Operations Management and M.S. in Engineering Management Programs**

Dr. Parnell's research interests include decision analysis, systems engineering and resource allocation in the areas of defense, national security, homeland security, and R&D planning. He teaches courses in decision models, systems engineering, project management, operations management, and industrial engineering design. He joined the faculty in 2013.

**Education:**

Ph.D. Engineering-Economic Systems (Stanford University)  
 M.S. Systems Management (University of Southern California)  
 M.E. Industrial & Systems Engineering (University of Florida)  
 B.S. Aerospace Engineering (State University of New York at Buffalo)

**Harry A. Pierson, Ph.D.**  
**Assistant Professor**

Dr. Pierson's research interests include collaborative robotics and agile automation. Applications include distribution center operations and low-volume, high-mix manufacturing environments. Additionally, he conducts research in additive manufacturing (commonly referred to as 3D printing). Dr. Pierson teaches courses in applied robotics and manufacturing processes. He joined the faculty in 2014.



**Education:**

Ph.D. Industrial and Systems Engineering (The Ohio State University)  
 M.S. Engineering Management - Manufacturing Engineering (University of Missouri-Rolla)  
 B.S. Mechanical Engineering (University of Missouri-Rolla)



### **Edward A. Pohl, Ph.D.**

#### **Professor, Department Head & 21st Century Professor of Industrial Engineering**

Dr. Pohl's research interests include reliability and risk analysis, large-scale systems engineering and analysis, probabilistic design, engineering optimization, and supply chain analytics. He teaches courses in quality control, engineering statistics, non-linear programming, heuristics, risk modeling, systems engineering, project management, global engineering, and innovation. Dr. Pohl joined the faculty in 2004.

#### Education:

Ph.D. Systems and Industrial Engineering (University of Arizona)  
 M.S. Reliability Engineering (University of Arizona)  
 M.S. Engineering Management (University of Dayton)  
 M.S. Systems Engineering (Air Force Institute of Technology)  
 B.S. Electrical Engineering (Boston University)

### **Letitia M. Pohl Ph.D.**

#### **Clinical Assistant Professor**

Dr. Pohl serves as the undergraduate academic advisor. Her interests include facility logistics, transportation security, and engineering education. Dr. Pohl teaches courses in engineering economic analysis, operations management, and human factors/ergonomics. She joined the faculty in 2012.



#### Education:

Ph.D. Industrial Engineering (University of Arkansas)  
 M.S. Systems Engineering (Air Force Institute of Technology)  
 B.S. Mechanical Engineering (Tulane University)



### **Chase Rainwater, Ph.D.**

#### **Associate Professor**

Dr. Rainwater's research interests lie in the areas of large-scale optimization, integer programming, and supply chain logistics. In addition, he conducts research in areas of healthcare planning, homeland security, and reliability. Dr. Rainwater teaches courses in probability and statistics, optimization, and decision support systems. He joined the faculty in 2009.

#### Education:

Ph.D. Industrial and Systems Engineering (University of Florida)  
 B.S. Industrial Engineering (University of Arkansas)

### **Ronald L. Rardin, Ph.D.**

#### **Distinguished Professor Emeritus**

Dr. Rardin officially retired in 2013, but remains active teaching for our distance education programs. His research and teaching interests center on large-scale optimization modeling and algorithms, including their application in healthcare delivery, transportation and logistics, and energy planning.



#### Education:

Ph.D. Industrial and Systems Engineering (Georgia Institute of Technology)  
 M.P.A. Municipal Administration (University of Kansas)  
 B.A. Mathematics/Political Science (University of Kansas)



**Manuel D. Rossetti, Ph.D., PE**  
**Professor, and Associate Department Head**

Dr. Rossetti's research is focused on the design, analysis and optimization of transportation, inventory, healthcare and manufacturing systems, using stochastic modeling, computer simulation, information systems, and heuristic modeling techniques. He teaches courses in the areas of probability modeling, discrete event simulation, object-oriented and database systems, transportation/logistics modeling, and inventory modeling. He serves as the Director of the Center for Excellence in Logistics and Distribution (CELDi) Dr. Rossetti joined the faculty in 1999.

**Education:**

Ph.D. Industrial and Systems Engineering (The Ohio State University)

M.S. Industrial and Systems Engineering (The Ohio State University)

B.S. Industrial Engineering (University of Cincinnati)

**Kelly Sullivan, Ph.D.**  
**Assistant Professor**

Dr. Sullivan's research focuses on developing and applying operations research methodology to design systems that are resilient against disruption. His primary research interests lie in the areas of integer programming, network optimization, and reliability. Dr. Sullivan teaches courses in probability and statistics, operations research, and network optimization. He joined the faculty in 2012.



**Education:**

Ph.D. Industrial and Systems Engineering (University of Florida)

M.S. Industrial Engineering (University of Arkansas)

B.S. Industrial Engineering (University of Arkansas)



**John A. White, Ph.D., PE**  
**Distinguished Professor & Chancellor Emeritus**

After serving for eleven years as Chancellor of the University of Arkansas, Dr. White joined the faculty of the Department of Industrial Engineering full-time in 2009. A distinguished alumnus of the department, Dr. White teaches engineering economics, facility logistics, leadership principles and practices, and queueing systems. He directs graduate student research in modeling distribution center facilities and their operations.

**Education:**

Ph.D. (The Ohio State University)

M.S. Industrial Systems Engineering (Virginia Tech)

B.S. Industrial Engineering (University of Arkansas)

*Dr. White also holds honorary doctorates from the Katholieke Universiteit of Leuven in Belgium and George Washington University.*

**Shengfan Zhang, Ph.D.**  
**Assistant Professor**

Dr. Zhang's research interests are mathematical modeling of stochastic systems with an emphasis on statistical and decision analysis as applied to healthcare, manufacturing, and service environments. One of her research goals is to develop methods for addressing the complexity of breast cancer modeling in diverse populations in order to create more personalized screening and treatment strategies. Dr. Zhang teaches courses in advanced stochastic processes, decision modeling in healthcare, and quality engineering and management. She joined the faculty in 2011.



**Education:**

Ph.D. Industrial Engineering (North Carolina State University)

M.I.E. Industrial Engineering (North Carolina State University)

B.M. Management Science (Fudan University)

# WAYS TO PARTNER WITH US

The Industrial Engineering Department at the University of Arkansas works with a wide network of collaborators. Listed below are some of the ways we are working together with the professional community for mutual benefits. We are always eager to explore new and creative ways to team up with you, our alumni, and industry friends.



## INDUSTRY RESEARCH OPPORTUNITIES

IE's faculty and students work with corporations, governmental agencies and other organizations to perform in-context research that provides new knowledge, tools and insights. Your research funding supports faculty and student time associated with the project, provides valuable experience for students that prepares them to directly contribute to your organization, and leverages the expertise and resources associated with a major research institution. Our focus is on ensuring that your research funding results in a measurable return on investment to your organization. For more information, contact Dr. Ed Pohl: [epohl@uark.edu](mailto:epohl@uark.edu)

## PROJECT OPPORTUNITIES

The Capstone Experience Course, provides unique opportunities for companies to partner with students to solve real-world issues companies face. The student teams work closely with the company to identify projects of interest, then work together to identify objectives and ways to achieve desired outcomes. To partner with us, please contact Dr. Ed Pohl at [epohl@uark.edu](mailto:epohl@uark.edu)

## MOCK INTERVIEWS

Through the Mock Interview program, sponsored by the Arkansas Academy of Industrial Engineering (AAIE), students are able to interview with actual employers to hone their interviewing skills. Interviewers come from companies that regularly recruit industrial engineers as well as AAIE members. The goal is to help prepare students so they are ready to present themselves in the best possible way at career fairs and job interviews. Contact: [aaie@uark.edu](mailto:aaie@uark.edu)

## MENTORING CIRCLES

Through the Mentoring Program, IE students are provided with networking opportunities and access to industry professionals with whom they can discuss career opportunities, job expectations, and skills and strategies for professional success. Industry mentors are provided the opportunity to share their passion for their profession and help develop the next generation of leaders, while building their own coaching, communication and leadership skills. Contact: [aaie@uark.edu](mailto:aaie@uark.edu)

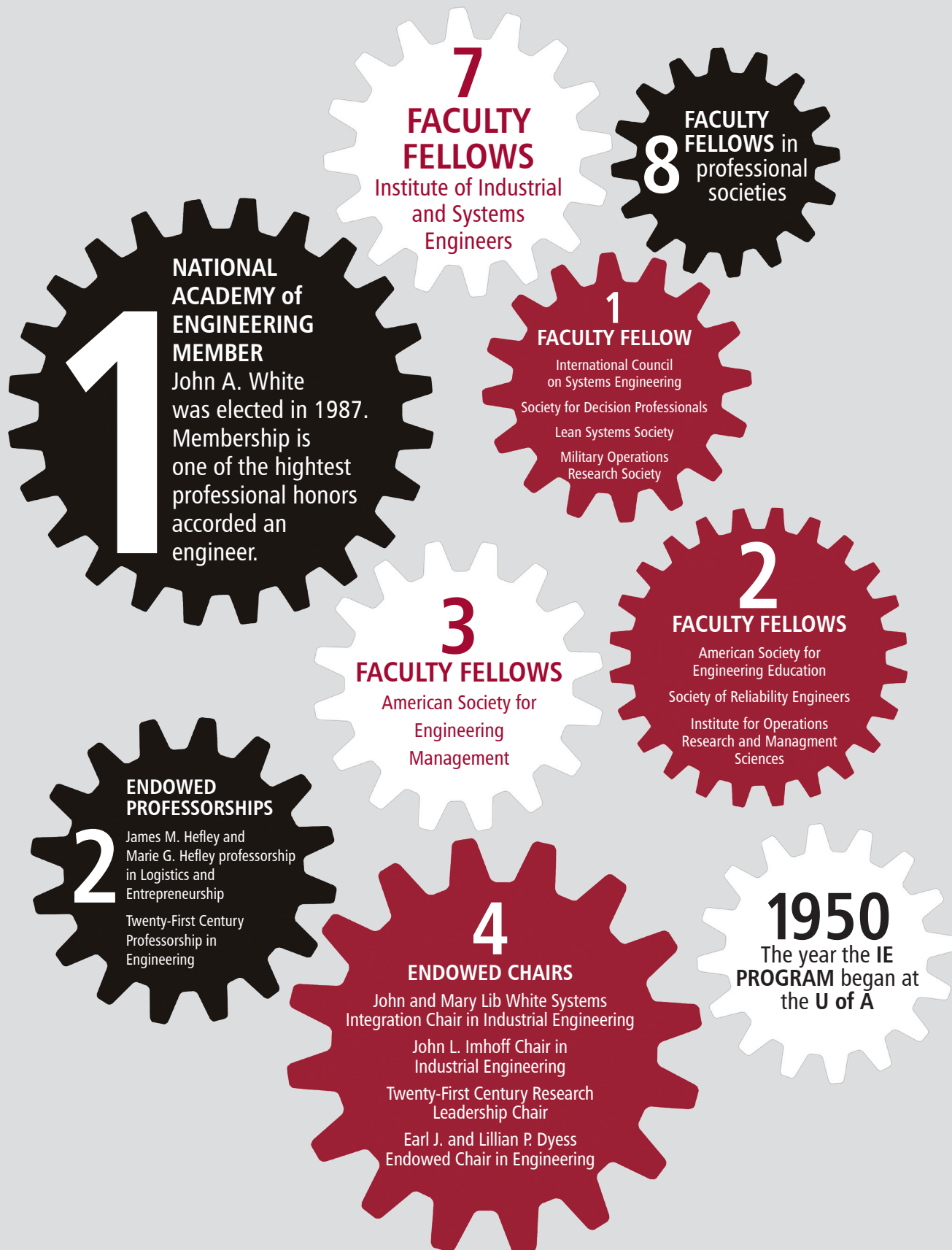
## COOPERATIVE EDUCATION AND INTERNSHIPS

Through cooperative education and internships, employers receive the benefit of working with some of the top students in our program. The students gain hands-on experience in the workforce and are able to use their newly acquired skills. Employers also find potential new employees by developing their relationship with the students. Contact: Kelsey Lavigne at [klavigne@uark.edu](mailto:klavigne@uark.edu)

## GUEST SPEAKERS

The Industrial Engineering Faculty cannot be available for every single class during a semester. They, like all of us, have conferences to attend as well as family matters that take precedence over work at times. There are also times during a school year that bringing in a guest lecturer can add some variety in substance to a course as well as provide real world experiences that the faculty member may or may not be able to provide. For more information, contact Dr. Ed Pohl: [epohl@uark.edu](mailto:epohl@uark.edu)

# I.E. BY THE NUMBERS



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Shengfan Zhang.....	shengfan@uark.edu .....	(479) 575-3571





## WAYS TO GIVE BACK TO INDUSTRIAL ENGINEERING

**W**ould you like to help the Department continue to provide world-class industrial engineering education and relevant, cutting-edge research? Below are some options to do just that!

**Annual Giving:** Annual gifts to IE are generally unrestricted to help meet the greatest current needs of the department.

**Endowments:** Endowments are created to provide support into perpetuity. Examples of endowments in IE are scholarships, fellowships, and faculty chairs.

**Planned Giving:** Planned gifts can be as simple as a bequest (included in your estate plans). Other options include trust vehicles and annuities, which have potential to provide an income stream and significant tax benefits.

**Are you ready to help today?**

Go to [onlinegiving.uark.edu](https://onlinegiving.uark.edu) and enter account number: 30003454

*Thank you!*

For questions concerning giving, please contact:

EMILY WOOD • DIRECTOR OF DEVELOPMENT • [EEWOOD@UARK.EDU](mailto:EEWOOD@UARK.EDU) • 479-575-3075