

INDUSTRIAL ENGINEERING 2018-2019



UNIVERSITY OF
ARKANSAS

College of Engineering
Industrial Engineering

On the cover

Clock Tower Old Main Sunrise

This image shows the south side of the south tower of the University of Arkansas, Old Main building at sunrise.

In the lifetime of Old Main there had never been a clock in the south tower, which was built to house a timepiece. The billion dollar Campaign for the Twenty-first Century raised funds to complete the architectural goal of installing a clock.

“On a very cold late October morning in 2005, the newly-installed bronze clock face was still shiny from the polish applied by Balzer Family Clock Works of Freeport, Maine. The shine would very soon disappear due to humidity. (Oxidation turns bronze brown.)

I knew this was a once-in-a-lifetime opportunity for the clock, guaranteed for 300 years, to be photographed in this pristine condition. Nearing completion of the exterior renovation of Old Main, the contractor had removed nearly all the scaffolding. I talked the contractor into leaving a single piece extended, so as to obtain my perfect angle. I arrived well before dawn, and from the rooftop, I climbed out onto the scaffolding in the darkness. I straddled the plank and positioned myself to await the sunrise. As I waited during this windy morning, my body

temperature began to drop. At one point I was shaking so hard I feared I might shake myself off of the scaffolding.

As the sun began to rise, I forgot about the cold. I focused and made adjustments carefully with my camera. I photographed a series of exposures during the sunrise. I knew I had less than a minute to capture the image, and there would be no do-overs.

As I climbed off of the scaffolding numb and still shaking from the cold I knew I had just witnessed and photographed the experience of a lifetime.”



Russell Cothren, Photographer
University Relations

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UNIVERSITY OF
ARKANSAS

College of Engineering
Industrial Engineering

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

FROM THE DEPARTMENT HEAD

As we start the 2019-2020 academic year, we welcome you to join us as we review the previous year. Throughout this report, we enthusiastically highlight the significant accomplishments and outstanding achievements of our students, faculty, alumni, and staff.

The theme of the last few annual reports has been “growth” and I am happy to report continued growth at the University of Arkansas and specifically, in the Industrial Engineering department. The enrollment at the UofA is expected to stay level at just over 27,000 students total. Industrial Engineering is home to over 220 undergraduates and over 70 graduate students, plus over 750 students combined between our Operations Management program, our new Engineering Management program, and our new Project Management graduate certificate. As enrollment numbers plateau, we are given a chance to focus on growth in other areas, such as our study abroad program, new emphasis areas, our faculty team, scholarship awards, research efforts, and more.

It goes without saying that we have an extremely talented faculty and staff team. This year, we were fortunate to celebrate many victories and accolades. To name a few, Dr. Kim Needy earned the Albert G. Holzman Distinguished Educator Award and the Engineering Economy Wellington Award from the Institute of Industrial and Systems Engineers (IISE). Dr. Needy also earned the Merl Baker Award in recognition of exemplary service to the engineering management division from the American Society for Engineering Education (ASEE). Dr. Tish Pohl also had an outstanding year, earning the Engineering Economy Division Teaching Award at IISE and the Industrial Engineering Division Distinguished Service Award at ASEE. Dr. Haitao Liao was recognized for his scholarship and service by being named a Fellow by IISE. Dr. Richard Cassady was honored by the University of Arkansas Honors College with the Distinguished Leadership Award for his support of students. Dr. Cassady was also promoted to University Professor this year, a special honor given only to those who have shown exemplary service in a spirit of collegiality to the University of Arkansas and a combination of service in their profession and to the public through their professional activities. Dr. Kelly Sullivan and Dr. Shengfan Zhang were promoted to Associate Professor with tenure. Including our newest faculty members, this brings our tenured faculty number up to 12. Mrs. Ashley Reeves, Assistant to the Department Head, was honored at the College of Engineering spring meeting with the Staff Member of the Year award.

I am excited to welcome our newest faculty members to their new home on the hill. Sandra and Burak Eksioglu joined our faculty as Professors. They come to us from Clemson University, and they will bring a wealth of knowledge, leadership, and experience to our department. Sandra’s

research interests include operations research, network optimization, and algorithmic development. She uses these tools to develop models and solution algorithms for solving large-scale problems that arise in the areas of transportation, logistics, and supply chain. Burak’s research is focused on the area of optimization with applications in transportation, logistics, production management, supply chain management, and healthcare.



We welcome them and their three sons into the IE family with open arms!

Our distinguished alumni group, the Arkansas Academy of Industrial Engineers (AAIE), celebrated being able to award over \$100,000 in student scholarships this year. This record amount of scholarship money went to both undergraduate and graduate students in the IE Department. I am constantly amazed by the support and generosity of AAIE. I know our students will agree, we are very lucky to have such a wonderful alumni base!

The amount of students studying abroad is also growing. During the 2018-2019 school year, 15 Industrial Engineering students studied abroad in 9 different countries. Thanks again to AAIE for working to grow the amount of scholarship dollars available to students for global studies! Students were able to capitalize on the opportunity to study topics from the perspective of another culture, while also broadening their horizons and improving valuable skills such as independence and adaptability. What an amazing opportunity!

Throughout this report, you will learn about current research initiatives, grants and publications statistics, and other highlights from this previous year. I hope you enjoy! Please feel free to contact us or stop by for a visit soon!

Sincerely,

A handwritten signature in black ink, appearing to read "Edward A. Pohl".

Edward A. Pohl, Ph.D.

Department Head and 21st Century Professor of Industrial Engineering

ANNOUNCING RETIREMENT

After 56 years and thousands of students, John White retires.

John White, Jr. was a terrible encyclopedia salesman.

It was the summer of 1958 and the man who would go on to become head of the engineering directorate at the National Science Foundation, dean of engineering at Georgia Tech and chancellor of the University of Arkansas, was just looking for some air conditioning.

At 19 years old, White and his fellow salesmen had been dropped off in a Little Rock neighborhood to haul boxes of the reference books door-to-door, and he was terrible at it.

“I was the world’s worst seller of encyclopedias,” White said. “I concluded sales was not in my competency list.” He quit after two days.

As it turns out, selling was what White spent most of his career doing.

He didn’t wind up selling books, or any commodity, really — White was in the business of selling ideas.

After graduating from the University of Arkansas in 1962 with a bachelor’s degree in industrial engineering, White took a job at Tennessee Eastman Company, where he intended to stay his entire career.

On Feb. 23, 1963, White’s boss, Buck Newsome, went on a fishing trip with Herb Manning, head of the industrial engineering department at Virginia Tech, known as Virginia Polytechnic Institute at the time. Manning had two openings on his faculty, because two professors had been mobilized through the National Guard to deploy to Berlin, and he wondered whether Newsome knew anyone who might step in.

Newsome did, but White had a small problem: he and Mary Elizabeth Quarles were engaged to be married later that year. He asked Mary Lib what she thought.

“She said, ‘Well, I guess you’ll just have to commute.’” That decision set White on a path that would take him to some of the highest ranks in academia, industry and the federal government.

He took the job on the condition the school would allow him to pursue a master’s degree in industrial engineering at the same time.

White still remembers his first day in the classroom. It was the day he realized he was put on Earth to be an educator.

“Naturally, I was very nervous,” White said. “I had never taught before. Here I was just a year and a half into my industry work. Some of my students were older than I was. I just remember walking into the room, standing in front of the class and thinking ‘Oh my goodness. Here I am.

This is what I was put here to do.’”

There were challenges, but White found success. He credits his classroom success to something that eluded him when he was selling encyclopedias: passion.

“Back then, I realized I needed to sell myself to these students,” he said.

“They needed to have confidence in me that I one, knew my subject, and two, cared about them. I always tried to do it with a lot of passion, a lot of enthusiasm, a lot of excitement about having the opportunity to be with them.”

Over the course of his 56-year career, White, who never thought he would sell anything, sold his passion and his expertise to more than 4,000 students. His work touched the lives of tens of thousands more through his leadership.



White completed his master’s degree and pursued a doctorate at The Ohio State University. He graduated and joined the faculty of Virginia Tech where he earned tenure after a year and a half. He taught five more years before joining the faculty at the Georgia Institute of Technology, where he was a faculty member for more than 22 years, ultimately serving as dean of engineering.

He took a brief detour from his teaching path when in 1988 he was tapped to serve as assistant director for engineering at the National Science Foundation, a post he held for three years.

During that time, White focused on something that would be a hallmark of his leadership tenure: expanding opportunities for women and underrepresented minorities to enter the field of engineering.

It wasn’t always a popular pursuit. White received national criticism and was accused of using his post to conduct “social engineering.” Engineering leaders from a variety of corners tried to convince him that women

simply were not meant to be engineers; they simply did not have the capacity to succeed in math and science. He didn't let those people slow him down.

"Just because people were criticizing me and resisting my efforts didn't make me question whether I should be doing it," he said. White knew he had the support of NSF Director Eric Block and he pressed on.

He ultimately earned the NSF's Distinguished Service Medal for his impact in growing the ranks of women and underrepresented groups in engineering. He was also honored for his progress in building interdisciplinary collaboration among the fields of engineering education.

In 1997, the call, or rather, calls came. The University of Arkansas needed a new chancellor, and they wanted to talk to White about it.

White was Dean of Engineering at Georgia Tech. It was an excellent job. He had a wonderful faculty. He was surrounded by outstanding students. He was on his way to making MIT the Georgia Tech of the north, and not the other way around.

White politely told Alan Sugg, president of the University of Arkansas system thank you, but he wasn't interested. White had been at Georgia Tech more than two decades, ascending through the faculty ranks to lead the internationally-renowned program. Sugg persisted, and White rebuffed.

Finally, Sugg called for the last time. The search committee was meeting in a few days, and they wanted to know why White wouldn't even apply to lead his alma mater.

Finally, White agreed to at least discuss the prospect with Mary Lib. He had great reasons to stay at Georgia Tech. The program was successful there, faculty, staff and students were growing and diversifying.

Then came the phrase that began a chain of events that would reshape the University of Arkansas.

Mary Lib said "If you don't do it, I'm afraid someday you'll regret it."

White paused, and he still pauses when telling the story.

"I said, 'Fine. I'll go print off my resume and send it to them.'"

The search committee met Monday, and by Tuesday the *Atlanta Journal-Constitution* ran a story that John White was a finalist for the University of Arkansas chancellor job.



I knew if I could teach it would be the best three hours of my week. And if I could have those three hours, I might be able to handle everything else.

White interviewed two weeks later, and told the search committee what he had told Alan Sugg all along: He had no interest in the job.

"I told them 'I will not have interest in the job until I'm convinced there is a commitment to make the University of Arkansas as competitive in its academic fields as it is on its athletic fields.'"

He then pulled out an index card listing the 19 schools with fewer resources per student than Arkansas and read it to the committee.

After the interview, White boarded his flight back to Atlanta figuring that was the end of that. It was not.

Sugg offered White the job, and he accepted on two conditions. The first — White wanted to continue to teach while serving as chancellor. It was partially to let faculty know he was dedicated to undergraduate education. It was mostly because he wanted to stay in touch with modern students. Plus, there was the fringe benefit.

"I knew if I could teach it would be the best three hours of my week," White said. "And if I could have those three hours, I might be able to handle everything else."

White's second condition was that six families make a commitment to support his quest to make Arkansas academics as nationally competitive as its athletics reputation. The Walton, Tyson, Dillard, Stephen, Ford and Murphy families all agreed, and White set about his mission to transform the University of Arkansas.

Under his leadership, the University raised \$1 billion during the Campaign for the 21st Century. The centerpiece of the campaign was the largest single gift to a public university in the history of American philanthropy: the \$300 million gift from the Walton Family Charitable Support Foundation. That gift alone enabled the university to establish an entirely new Honors College, create an endowment for University Libraries and establish endowed fellowships across the campus.

The university grew and improved by almost every metric. Scores on the ACT, the grade point averages of incoming freshman, freshman enrollment and retention rates, and six-year graduation rates all increased dramatically. The number of National Merit scholars nearly doubled, from 90 to 171. Research expenditures increased from \$73.7 million to \$113.8 million, and the university endowment grew more than six-fold, from \$119 million in 1997, to nearly \$900 million upon his retirement.

White left the chancellor's office in 2008 and returned to his first love (after Mary Lib): the classroom, teaching industrial engineering.

White retired in May 2019 after 11 years as a Distinguished Professor of Industrial Engineering, but even though his full-time faculty work may be over, his mission to teach is not.

White continued advising doctoral students through the summer of 2019 and has been contacted by his publisher to revise one of the textbooks he authored along the way. He Skypes every week with a former graduate student who now lives in Turkey.

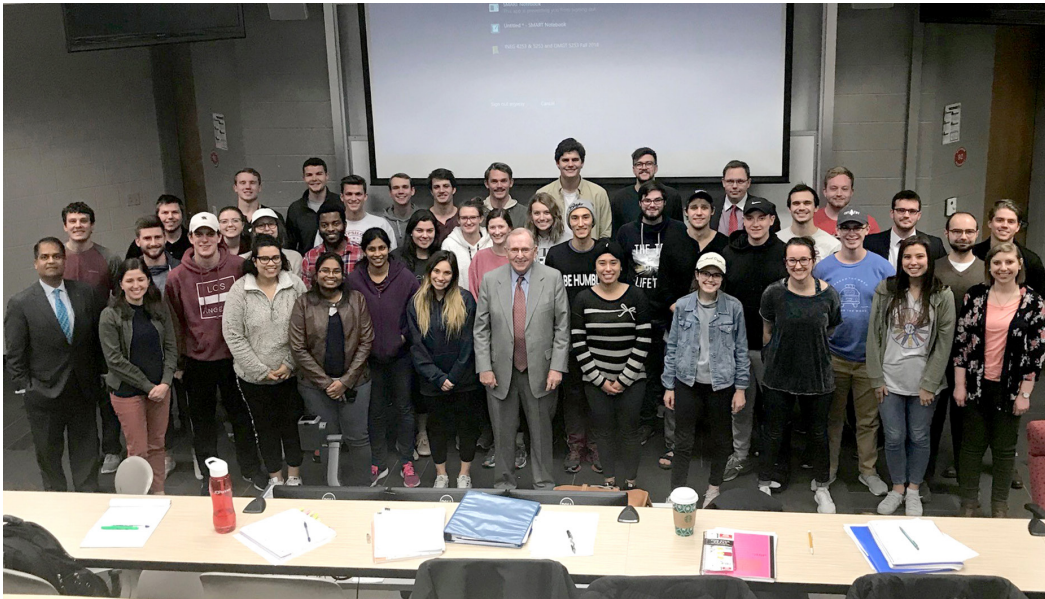
So what's White's secret to success? There's a metaphor he uses when students ask him how to be successful in life, and they ask him often.

Everyone juggles multiple balls. It's hard to keep them in the air, especially when new ones are constantly tossed in. The path to success is in realizing this: Some of those balls are rubber, and some are crystal.

Your relationships, your health — these are the balls you shouldn't drop.

"The big things in life have nothing to do with the courses you're taking," White said. "I tell students 'Don't jeopardize your health by not taking care of yourself. Don't overdo it. Get good sleep, eat well, exercise. Stay in touch with the people you care about; it's far better to give roses to the living than to send them to funerals. You need to let the people you care about know you love them — don't just assume they know.'"

Written and contributed by Nick DeMoss
Director of Communications
College of Engineering



John White with his last official class.

FEATURED RESEARCH ENDEAVORS

Can an Industrial Engineer Be a Player in Data Analytics?

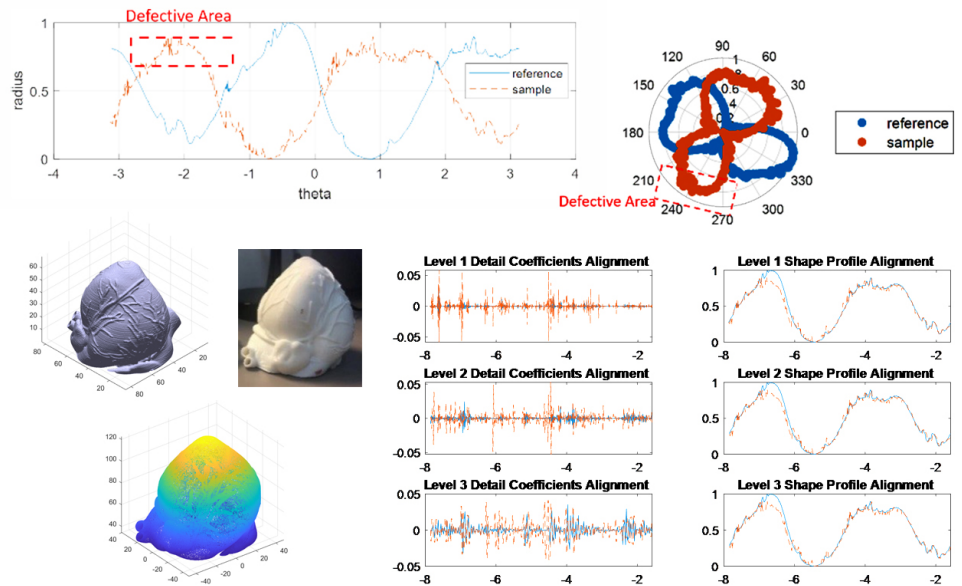
HAITAO LIAO



Researchers and practitioners use data to support a decision-making process. To this end, the right data relevant to the problems of interest need to be collected and analyzed in an effective and efficient way. As industrial engineers, we strive to make products, processes and service meet or go beyond expectations using the valuable information acquired from different sources of data.

an automated in-plane alignment and error quantification framework to distinguish the fabrication, measurement and alignment errors in an AM part. The multi-resolution framework uses wavelet decomposition to automatically align two-dimensional point clouds and then to differentiate errors from different sources based on a

It is often expected that a product, as small as a cutting tool or as massive as a 10 megawatt wind turbine, can operate reliably and be maintained in a timely fashion. However, product reliability and service logistics usually do not reconcile due to various uncertainties. As a result, decisions on maintenance and procurement of service parts are made either too late or too early. In Professor Haitao Liao's Reliability and Intelligent Systems Engineering (RISE) Laboratory, research efforts are being taken to create holistic tools that will enable accurate reliability estimation, proactive control of product reliability and operational adjustments to adaptively coordinate product reliability and service logistics. The team is currently developing a collection of generic models and tools for analyzing accelerated life or degradation testing data involving complex covariates. Their recent work on the use of



Multi-resolution framework for automated in-plane alignment and error quantification

Materials & Components

- ✓ Accelerate life test
- ✓ Accelerated degradation test
- ✓ Reliability growth test
- ✓ Reliability demonstration test
- ✓ Reliability prediction
- ✓ Optimal design of test plans

Systems & Products

- ✓ HALT/HASS
- ✓ Sys. reliability optimization
- ✓ Diagnostics & prognostics
- ✓ Condition-based maintenance
- ✓ Smart life extension

Fleet

- ✓ Service demand pred.
- ✓ Warranty planning
- ✓ Spare part control
- ✓ Gross profit estimation

design-of-experiment approach. In addition, a two-stage optimization model is proposed to find the best configuration of the multi-resolution framework. One of the key contributions of the proposed framework is that it can evaluate the performance and consistency of alignment results under different levels of details. So far, a sample part with different featured

phase-type distributions for modeling accelerated life testing data and on degradation-based reliability growth modeling received several best paper awards.

Liao is currently working with Assistant Professor, Harry Pierson, on data analytics in additive manufacturing (AM). In AM, the in-situ layer-wise inspection of geometric accuracy is essential. The team has proposed

layers, including a simple free-form layer, a defective layer, and a layer with internal features, has been used to illustrate the effectiveness and efficiency of the proposed framework. It is expected that the proposed framework can be integrated into an online inspection and monitoring system in AM to generate alarms when non-conformities are observed in the current working layer.

Next-Generation Data Analytics for Large-Scale Recurrent Event Processes

XIAO LIU



Advances in Big Data have led to an explosive growth of **large-scale recurrent event data** arising from interdisciplinary domains:

- In *reliability engineering and asset management*, it is critical to model and predict the failure events experienced by engineering systems or civil infrastructures under dynamic operating-environmental conditions.
- In *disasters and extreme weather forecasts*, of interest is the modeling or prediction of floods, wildfires, extreme rainfalls, wind gusts, ice storms at some critical geolocations over time.
- In *healthcare*, of interest is when certain chronic medical events will recur for individual patients given patients' attributes and other dynamic risk factors.
- In *cyber security*, of interest is the prediction or control of fraudulent activities and cyber-attack events on an online platform under a complex and highly dynamic internet environment.
- In *transportation safety*, of interest is why and when traffic accidents frequently occur on certain highway sections under certain traffic, visibility, and weather conditions.
- In *online retail business*, retailers, such as Walmart, would like to know why and when customers place their orders on some online shopping platforms.

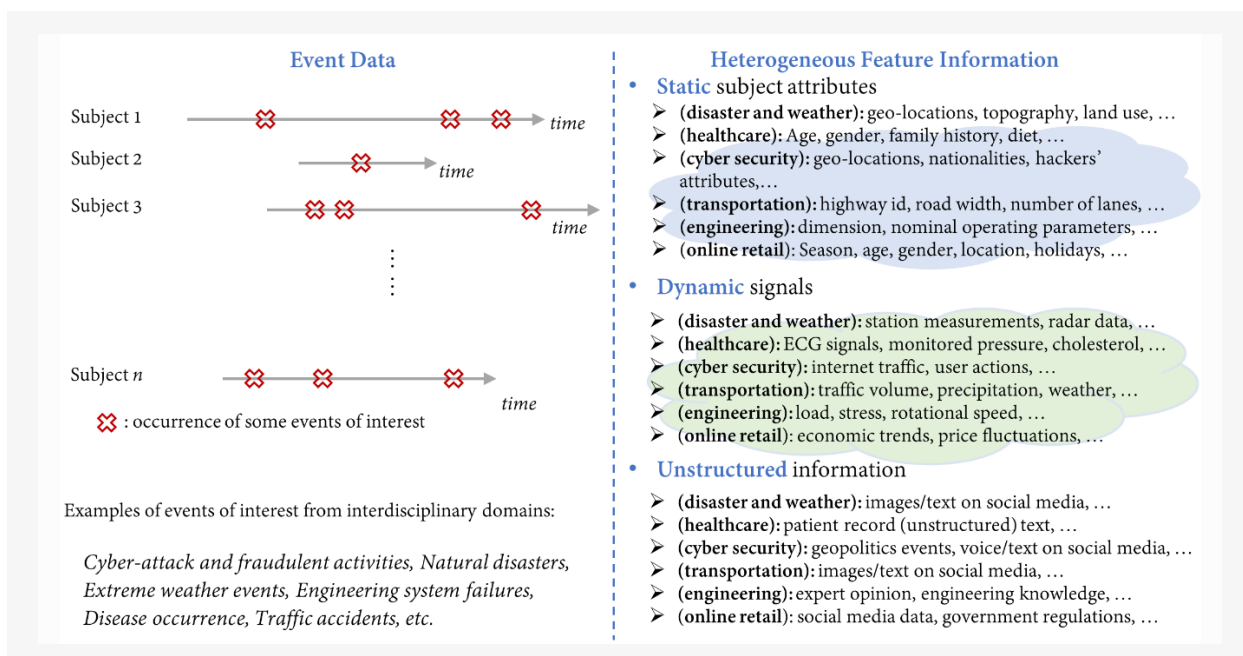
This type of Big Data has two defining characteristics: (i) the data

contains the occurrence times of some critical events from a large population of heterogeneous individuals, and (ii) for each individual, there exists important feature information, which characterizes the unique attributes and dynamic conditions experienced by an individual.

Liu's research seeks to answer a fundamental question, "can we harness such Big Data and develop novel data analytics methodologies to capture the complex interactions between event processes and individual features?"

Successfully addressing this challenge enables us to understand why critical events happened in the past, when events of interest will recur in the future, and how one can optimize the event processes through proactive interventions.

In particular, this research addresses four major obstacles in advancing the data revolution in event analytics: (i) (Heterogeneous individuals with diverse features). In the Big Data environment where the event data arise from a large population of individuals, sub-populations always exist which violates many basic assumptions in the classical theory of statistics; (ii) (Model Specification). With high-dimensional heterogeneous feature information, it becomes literally impossible to force parametric assumptions that adequately describe the complex dependence structure between event processes and feature information; (iii) (Interpretability). In the age of Big Data, many features are redundant either from the statistical modeling or domain knowledge perspectives. Efficient variable



selection becomes the most sought-after capability as data-driven models are getting more complex but seemingly less interpretable; and (iv) (Computation). It is a common practice in industry today to store massive data on distributed Big Data platform, which requires the next-gen data-analytics algorithms to be parallelized on distributed data storage — an extremely critical issue, but it is often ignored in traditional statistical data analysis.

Liu’s research extensively explores the novel idea of integrating modern additive regression trees and classical statistical methods for recurrent event data. The goal is to develop two algorithms called RF-R (Random Forests for Recurrent Event Analytics) and Boost-R (Boosting for Recurrent Event Analytics) which respectively integrate the popular RF and Boosting trees with the classical statistical methods for recurrence data. Statistical

properties, scalability and implementation of the developed algorithms on modern Big Data platform are systematically investigated.

Preliminary research outcomes will soon appear on *Technometrics* — a quarterly journal by the American Society for Quality and the American Statistical Association (Liu, X., and Pan, R. (2019), “Analysis of Large Heterogeneous Repairable System Reliability Data with Static System Attributes and Dynamic Sensor Measurement in Big Data Environment”).

Since its inception in 1959, *Technometrics* has been recognized as the leading journal contributing to the development of statistical methods in the physical, chemical, and engineering sciences. Due to the interdisciplinary nature of Liu’s research, the success of this project will create tremendous cross-discipline research impact and collaboration opportunities.

Simulation of Bulk Petroleum Supply Chains for Disruption Planning

MANUEL ROSSETTI



The Defense Logistics Agency (DLA) Energy Division is responsible for supplying fuel to all US military bases worldwide.

Operating such a supply chain involves sourcing different fuel products from suppliers, transporting them through their own network of fuel terminals using varying modes of transport, handling fuel at each terminal in the network, and finally delivering the fuel to the customer locations on time.

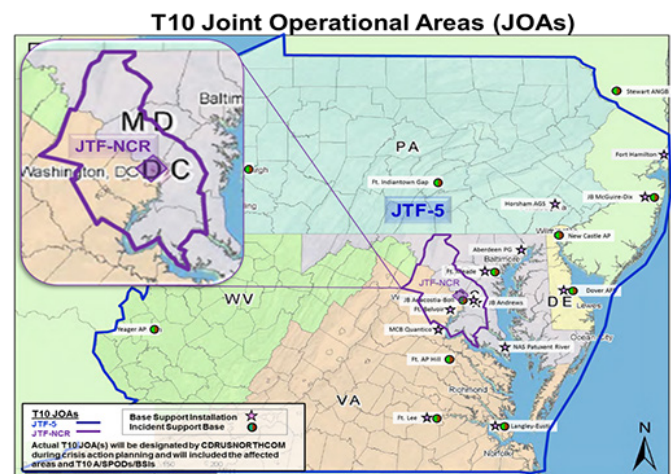
Because of the complex interactions between the various system components the planning and execution of this supply chain is extremely challenging. A major challenge in this process is respecting storage and capacity limitations throughout the supply chain. In addition, short and long-term acquisition options must be evaluated to ensure high availability of supply. These challenges are made even more complex because of the uncertainty of supply due to disruptions (e.g. geopolitical actions, weather, military actions, equipment/refinery shut downs, etc.) and due to the uncertainty of demand.

Rossetti’s research involves the development of simulation software that can 1) quickly analyze the demand and supply requirements in order to identify exceptions related to disruption events, and 2) analyze the detailed capacity and transportation risks associated with disruption events.

An example of a disruption event is Hurricane Harvey, which made landfall in the Houston, Texas area in the summer of 2017. Hurricane Harvey caused serious disruptions within the Houston area that had a rippling effect elsewhere in the U.S., because Houston is a key location for fuel refinery operations.

The simulation modeling capabilities were illustrated through the analysis of a 43-node supply chain involving DLA Energy’s bulk

petroleum supply chain as impacted by a category 4 hurricane affecting the east coast of the continental United States.



Category 4 Hurricane Hits Washington D.C. Area

Through the development of specialized metrics and data analytics techniques, the simulation was able to identify locations that are weak points within the network and to test the effectiveness of various disruption mitigation strategies, such as the pre-positioning of fuel supplies. The results enable DLA Energy to control the risks associated with supply chain disruption and to assist with long-term logistics support analysis associated with their world-wide supply network.

Poultry Excellence in China Findings Presented in Guangzhou

CHASE RAINWATER



The Poultry Excellence in China collaboration, supported by a \$2.3 million grant from the Walmart Foundation in conjunction with the Walmart Food Safety Collaboration Center, celebrated the completion of research in June 2019.

At the semi-annual meeting in Guangzhou, researchers from the University of Arkansas, South China Agricultural University, China Agricultural University, Zhejiang University, and Zhejiang Academy of Agricultural Sciences presented research findings to an esteemed advisory board composed of food safety experts from around China.

Performance of new mobile salmonella sensors, static and dynamic risk models for the poultry supply chain, and visualization of supply chain performance metrics were introduced by members of the research team. These products serve to monitor and develop control strategies to better mitigate causes of contamination in Chinese poultry supply chains.

The international team of academic, industrial and government experts from the both the United States and China were recognized by President Liu Yahong of the South China Agricultural University as a model for what is needed in international research collaboration to solve issues

impacting millions of people. The issue of Salmonella is of particular importance to China, the world's second largest producer and consumer of poultry, making food safety in this area of the world a high priority for government, industry, and consumers.

The Department of Industrial Engineering research team, led by Chase Rainwater, Ed Pohl and graduate student Winthrop Harvey contributed to this effort by offering risk assessment approaches toward assessing Salmonella in China from “farm to fork” and offering a machine learning-based framework for dynamic risk assessment that makes use of real-time biosensor information.

The research team has submitted a research proposal in expectation of receiving support for two more years of investigation in China.

The research is part of the ongoing ReliaSoft Risk, Reliability, and Maintainability Research Alliance, funded by ReliaSoft.



INTRODUCING NEW FACULTY MEMBERS

Sandra D. Eksioglu joined the Department of Industrial Engineering in August 2019, and holds the James M. and Marie G. Hefley Professorship in Logistics and Entrepreneurship. She received her Ph.D. in Industrial and Systems Engineering from the University of Florida. Prior to joining the University of Arkansas, she served as a faculty member at Mississippi State and Clemson Universities.



Sandra's expertise lies in the areas of operations research, network optimization, and algorithmic development. She uses these tools to develop models and solution algorithms for solving large-scale problems that arise in the areas of transportation, logistics, and supply chain. Her research has been sponsored by the National Science Foundation (NSF), the Department of Energy, the Department of Transportation, and the Department of Homeland Security. She is currently serving in the editorial board of *Optimization Letters*, *Journal of Energy Systems*, and *Journal of Cleaner Production*.

Sandra was a recipient of the Institute for Operations Research and the Management Sciences (INFORMS) Moving Spirit Award for Chapters in 2010, National Science Foundation CAREER Award in 2011, and the American Society for Engineering Education (ASEE)-Southeast Mid-Career Teaching Award in 2015. She was the winner of the Best Application Paper in IISE Transactions Focus Issue on Scheduling and Logistics in 2018 & 2019. She currently serves as Chair of the Women in Engineering Division of ASEE; she was the Chair of Railway Application Section of the INFORMS, and the President of Operations Research Division of IISE.

Burak Eksioglu also joined the Department of Industrial Engineering as a Professor in August 2019. He received his Ph.D. in Industrial and Systems Engineering from the University of Florida, a master's degree in Engineering Business Management from the University of Warwick in the UK, and a bachelor's degree in Industrial Engineering from Bogazici University in Turkey. His research program is focused on the area of optimization with applications in transportation, logistics, production management, supply chain management, and healthcare.



Burak's research has been sponsored by the U.S. Department of Transportation, the U.S. Department of Homeland Security (DHS), NASA, the Mississippi Department of Transportation (MDOT), and industry. He currently serves as Associate Editor of IISE Transactions. He has served as the president of the Operations Research and the Logistics and Supply Chain Divisions of the Institute of Industrial and Systems Engineers (IISE). He also served as the director of a Tier 1 University Transportation Center.

Burak has received numerous teaching and research awards such as the Best Application Paper Award from IISE Transactions, Bagley College of Engineering Faculty Research Award, and Excellence in the Teaching of Operations Research from IISE. He is a member of Tau Beta Pi, INFORMS, IISE, ASEE, and POMS.

FACULTY ACHIEVEMENTS & SERVICE

C. Richard Cassady, Professor and Director of the First-Year Engineering Program was recognized by the Honors College at the University of Arkansas, with their Distinguished Leadership Award. The Office of Nationally Competitive Awards also recognized Cassady with the Faculty Gold Medal for his significant support of students as they applied for national and international opportunities.



Cassady serves as a mentor for the local FIRST Robotics Team, Root Negative One 9879 along with fellow faculty member Chase Rainwater. The team was the recipient of the Aspire Award at the 2018-2019 FIRST Tech Challenge World Championship in Houston, Texas. After the competition, the team received notification they had been selected to represent the United States at the FIRST Global Challenge in Dubai. The event recognized as the “Robotics Olympics” will have more than 180 countries sending a team to the event.



Professor and holder of the holder of the 21st Century Research Leadership Chair in Industrial Engineering, **W. Art. Chaovalitwongse**, was the recipient of the Outstanding Researcher Award, for Department of Industrial Engineering in May of 2018. Additionally, he was a finalist for the Association of Southeast Asian

Nations (ASEAN) ASPIRE Award, nominated by the Ministry of Science and Technology of Thailand.

The Institute of Industrial and Systems Engineers (IISE) has awarded **Haitao Liao** the title of Fellow. Liao is a professor of industrial engineering and the John and Mary Lib White Endowed Systems Integration Chair. The award was presented at the IISE international conference in Orlando, May 2019.



Assistant Professor, **Xiao Liu**, along with his former colleagues from the IBM Thomas J. Watson Research Center; Kyongmin Yeo and Youngdeok Hwang were the recipients of the 2018 Statistics in Physical and Engineering Sciences Award from the American Statistical Association.

Ashlea Bennett Milburn, Associate Professor of industrial engineering, earned the Dean’s Award of Excellence in Rising Teaching. Milburn was recognized for her outstanding teaching evaluation scores and positive feedback from her students. Milburn teaches one of the most difficult courses in the industrial engineering curriculum and still has some of the highest evaluation scores in the department. Students praised her dynamic teaching, engaging in-class conversations and ability to connect course material to real-world applications.



Kim LaScola Needy, dean of the Graduate School and International Education and professor of industrial engineering, was honored twice for her contributions to the profession of industrial engineering at the annual Institute for Industrial and Systems Engineering international conference.

She earned both the Albert G. Holzman Distinguished Educator Award and the Engineering Economy Wellington Award, both from the Institute of Industrial and Systems Engineers. In addition to these awards she was the recipient of the American Society for Engineering Education 2019 Merl Baker Award presented in recognition of exemplary service to the Engineering Management Division.

In October 2018, **Heather Nachtmann**, Associate Dean for Research, Professor, and Director of MarTREC, was appointed to the Earl J. and Lillian P. Dyess Endowed Chair in Engineering.



The Institute for Operations Research and the Management Sciences (INFORMS), selected **Sarah Nurre** and **Shengfan Zhang** for the Moving Spirit Award 2018. The award recognizes volunteers who have made outstanding and sustained contributions to their fora.

Harry Pierson, Assistant Professor, will participate in the summer 2019 Air Force Research Lab Summer Faculty Fellowship Program at the Materials & Manufacturing Directorate of the Air Force Research Lab



at Wright-Patterson Air Force Base near Dayton, Ohio. This is Pierson's second time to receive this honor.

Pierson was also the recipient of a grant through the Defense University Research Instrumentation Program (URIP) from the Department of Defense. This will allow him to deepen his research into the collaboration between humans and robots to perform complex tasks.

Professor and Department Head, **Ed Pohl**, received the title of Fellow from the American Society for Engineering Management (ASEM). The award was presented at the society's 2018 International Annual Conference in Coeur d'Alene, Idaho.



Letitia Pohl, Teaching Assistant Professor, received the Engineering Economy Division Teaching Award from the Institute of Industrial and Systems Engineering. Pohl is the undergraduate advisor for the Industrial Engineering Department. In this role, she advises over 200 students on a regular basis each semester in addition to teaching five courses throughout the academic year. The award recognizes and promotes the outstanding teaching of Engineering Economy. Pohl has been recognized previously as a Fellow of the University of Arkansas Teaching Academy.

Associate Professor, **Kelly Sullivan** has been selected as the 2019-2020 recipient of the John L. Imhoff Chair in Industrial Engineering. This title, established in 1983, honors the memory of John L. Imhoff, founding head of the University of Arkansas, Department of Industrial Engineering.



Professional Service

Cassady, C. R.

Editor, *International Journal of Six Sigma & Competitive Advantage*, 2018
Editorial Board Member, *Stochastics & Quality Control*, 2018

Chaovalitwongse, W. Art

Annals of Operations Research, 2012 — present
Area Editor, *IIEE Transactions on Healthcare Systems Engineering*, 2017 — present
Associate Editor, *Brain Informatics*, 2014 — present
Associate Editor, *IEEE Transactions on Human - Machine Systems*, 2013 — 2018
Associate Editor, *Journal of Combinatorial Optimization*, 2005 — present
Associate Editor, *Journal of Global Optimization*, 2010 — present
Associate Editor, *Optimization Letters*, 2006 — present
Editorial Board Member, *Journal of Radiology & Radiation Therapy*, 2013 — present

Editorial Board Member, *Journal of Supply Chain and Operations Management*, 2013 — present

Editorial Board Member, *Suranaree Journal of Social Science*, 2014 — present

President, Omega Rho International Honor Society, the Honor Society of INFORMS, 2018 — 2020

Member, Program Committee for the Fifth International Conference on Machine Learning, Optimization, and Data Science (LOD 2019), Tuscany, Italy September 10-13, 2019

Member, Program Committee for the 2018 International Conference on Brain Informatics (BI 2018), Arlington, TX, December 7-9, 2018

Member, Program Committee for the 2018 ACM International Conference on Knowledge Discovery and Data Mining (KDD 2018), London, England, August 19-23, 2018

Member, Program Committee for the Fourth International Conference on Machine Learning, Optimization, and Data Science (LOD 2018), Volterra, Tuscany, Italy, Sep 13-16, 2018

English, John R.

Senior Level Member, Institute of Electrical and Electronics Engineers
Member, Institute of Industrial and Systems Engineers, Honors and Awards Committee

Member, Institute of Industrial and Systems Engineers, Mock P & AT Review Committee, New Faculty Colloquium

Liao, Haitao

Special Issue, Co-Editor, *Journal of Quality Technology - Big Data Applications in Reliability*, 2016 — 2018

Associate Editor, *Journal of Quality Technology*, 2016 — 2018

Associate Editor, *IIEE Transactions on Quality and Reliability Engineering*, 2017 — present

Associate Editor, *Journal of Quality Technology*, 2016 — 2018

Reviewer, Ph.D. Research Proposals Scholarship for Doctoral Symposium at the PHM Society Conference, 07/2018

External Proposal Reviewer, Department of Energy — Nuclear Engineering University Program, 11/2018

Organizer, INFORMS QSR Best Refereed Paper Award, INFORMS, Phoenix, AZ, 2018

Invited Guest for INFORMS QSR Student Introduction and Interaction Session and Judge for Best Poster Competition, INFORMS, Phoenix, AZ, 2018

Liu, Xiao

Council Member, Quality, Statistics and Reliability (QSR) Section, INFORMS, 2018-2020

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

Co-Editor, Special Issue, *Quality Engineering*, Issue 3, 2020

Institute of Industrial and Systems Engineering (IISE) Webinar, November 2018

Conference Organizing Co-Chair (Invited/Special Cluster/Section) 2019 INFORMS Conference on Service Science -June 27-29, Nanjing, China

Program Committee — The 3rd IEEE International Workshop on Big Spatial Data in conjunction with 2018 IEEE International Conference on Big Data, Dec. 10-13, 2018 — Seattle, WA

Conference Sub-Committee — INFORMS 2018, Quality, Statistics and Reliability section, November 2018 — Phoenix, AZ

Committee Member — Judge, *IIEE Transactions Quality and Reliability Engineering*, Best Paper Award Committee, 2018 — present

Reviewer, QSR, Best Student Paper Competition, INFORMS 2018

Milburn, Ashlea Bennett

Reviewer, *Annals of Operations Research*, 2018 — present
 Reviewer, *European Journal of Operational Research*, 2018 — present
 Reviewer, *INFORMS Transactions on Education*, 2018 — present
 Reviewer, *Networks*, 2018 — present
 Reviewer, *Transportation Science*, 2018 — present
 Associate Editor, *INFORMS Transactions on Education*, 2018
 Treasurer, Health Systems Engineering Alliance, 2016 — 2018
 Board Member, *INFORMS Transactions on Education*, 2018

Nachtmann, Heather

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

Needy, Kim LaScola

Book Editor, *The Engineering Economist*, 2004 — present
 Associate Editor, *Engineering Management Journal*, 2002 — present
 Governing Board of the Body of Knowledge, Institute of Industrial and Systems Engineers, 2016 — 2019
 Institute of Industrial and Systems Engineers, Task Force to develop a Diversity and Inclusion policy, 2018 — 2019
 Graduate Record Examination, Diversity, Equity and Inclusion Committee, 2017 — 2020
 Conference of Southern Graduate Schools, Executive Committee, 2016 — 2018
 Conference of Southern Graduate Schools, Presidential Rotation, 2018 — 2021
 Council of Graduate Schools, Committee on Research and Information Services, 2019
 Council of Graduate Schools, Math, Physical Sciences and Engineering Dissertation Award Committee, 2018 — 2019
 Board of Directors for the United Way of Northwest Arkansas, 2019 — 2021

Nurre, Sarah

Past President, Women in Operations Research and Management Science (WORMS), 2018
 Fora Representative, *INFORMS Subdivisions Council*, 2018 — present
 Member, *INFORMS Professional Recognition Committee*, 2018 — present
 Member, *INFORMS Chapters/Fora Committee* — Jan 2018 — present
 Track Chair, IISE Security Engineering, 2018 — present
 Session Chair, ISERC 2018 — Security Engineering — 2018
 Track Chair, ISERC 2019 — Security Engineering — 2018 — present

Parnell, Greg

Area Editor, *INCOSE Systems Engineering Body of Knowledge*, 2016 — present
 Vice Chair, *INCOSE Fellows Committee*, 2018
 Editor-in-Chief Search Committee, *Decision Analysis Journal*, 2018
 International Council on Systems Engineering (INCOSE), Fellows Selection Committee, 2016 — 2019
 Chair, Transportation Research Board/National Academy of Engineering

study on the safety and risks associated with offshore oil and gas operations, 2018 — 2019

Pohl, Ed

Co-Editor, *Engineering Management Journal*
 Editorial Board, *The Journal of Military Operations Research*
 Editorial Board, *Systems*
 Editorial Board, *IEEE Transactions on Engineering Management*
 Associate Editor, *IEEE Transactions on Reliability*
 Associate Editor, *Journal of Risk and Reliability*
 Associate Editor, *Quality Technology & Quantitative Management*
 INFORMS Meetings Committee
 Selects Committee, *INFORMS Business Analytics Conference*
 IISE Representative, RAMS Board of Directors
 President, Society of Reliability Engineers
 ASEM Scholarship Committee
 ASEE National Engineering Economy Teaching Excellence Award Committee
 ASEE John L. Imhoff Awards Committee

Pohl, Letitia

Past Division and Awards Chair — I.E. Division, American Society of Engineering Education (ASEE), 2017 — 2018

Rainwater, Chase

Program Chair, Institute of Industrial and Systems Engineers, Annual Conference, 2018
 President, Operations Research Division, Institute of Industrial and Systems Engineers (IISE), 2018
 Program Chair, Industrial and Systems Engineering Research Conference (ISERC), 2018
 Member, Professional Recognition Committee, Institute for Operations Research and the Management Sciences, 2018

Rossetti, Manuel

Associate Editor, *International Journal of Modeling and Simulation*, 2000 — present
 Advisory Board, *Journal of Defense Analytics and Logistics*, 2016 — present

Sullivan, Kelly

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

White, John A.

Member, National Engineering Economy Teaching Excellence Award Committee, American Society for Engineering Education (ASEE), 2015 — 2018
 Member, Northwest Arkansas Council, 1997 — present
 Member, Board of Advisors, World Trade Center Arkansas, 2007 — present

Zhang, Shengfan

Senior Vice President of Programs, *INFORMS Section on Public Sector Operations Research*, 2018

NEW LEADERSHIP PODCAST



Four university of Arkansas faculty members have teamed up to create a new podcast to give listeners a chance to learn from top leaders in a variety of fields.

Called LeadershipWWEB, the podcast features interviews with executives including University of Arkansas Chancellor Emeritus John White; John Reap, retired president and CEO of Town North Bank N.A. in Dallas; and Kim Needy, dean of the Graduate School and International Education at the University of Arkansas. Future episodes will feature top executives from businesses in Arkansas and beyond.

John White, chancellor emeritus of the University of Arkansas; Matt Waller, dean of the Sam M. Walton College of Business; John English, dean of the College of Engineering; and Andrew Braham, associate professor of civil engineering, are behind the effort.

The podcast is designed to help listeners build or improve their leadership toolkit by providing a variety of perspectives. While the content is useful for listeners at all levels, Braham said undergraduate students are the target audience.

“There’s a lot of noise coming at them that I believe doesn’t represent good leadership values,” Braham said. “I don’t see anything out there trying to balance that out.”

Braham said leadership is a difficult subject to teach because it manifests in so many different ways.

“You can’t just give someone a book on leadership and expect them to become a leader,” Braham said. “We want to create an opportunity to hear directly from successful leaders, to expose them to what leadership looks like in the real world.”

Braham said the idea for the format came from a course about leadership taught by John White, chancellor emeritus and distinguished professor of industrial engineering.

White’s “Leadership Principles and Practices” course featured in-class interviews with executives from a variety of fields, which Braham said was an effective way to find out how leaders think.

The podcast focuses on “values-based leadership,” and each guest is asked to identify their top leadership values and discuss how they drive decision-making.

“We chose a values-based approach because we felt values are not only very personal, but are also very apparent to people you interact with,” Braham said. “They’re something that can be used as an anchor to make decisions both personally and professionally.”

Waller said the episode featuring Steinmetz is an excellent look into gaining organizational alignment.

“Chancellor Steinmetz led the creation of our eight guiding priorities in a way that incorporated the entire campus,” he said. “These priorities can be used by units on campus to order their strategic initiatives in a way that is aligned. Gaining alignment is a salient function of leadership.”

For English, the podcast has already been valuable for him personally.

“I have learned so much from these leaders,” he said. “As listeners process what they hear, they are going to be inspired by what makes these extraordinary people tick.”

LeadershipWWEB publishes two times per month and is available on iTunes. You can also follow on Instagram or LinkedIn, simply search LeadershipWWEB.

CURRENT GRANTS

As it relates to scholarly activity, the department productivity included submission of 34 proposals and 11 grant awards with a cumulative total of more than \$1.8M. Total research expenditures exceeded \$2.8M. During 2018-2019, the following research grants were active. The principal investigator is listed in **bold**.

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

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

Chimka, Justin, US Department of Transportation, \$132,848, “Climate Impacts on Lock Use and Performance,” 2016-2018

Hernandez, Sarah and **Justin Chimka**, Arkansas State Police, \$62,198, “Seat Belt, Motorcycle Helmet, & Child Restraint Survey,” 2018-2019

Chimka, Justin, US Department of Transportation, \$113,358, “Learning from USACE Open Data for Locks,” 2018-2020

Hernandez, Sarah and **Justin Chimka**, Arkansas State Police, \$79,340, “Seat Belt, Motorcycle Helmet, & Child Restraint Survey,” 2019-2020

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 Department of Higher Education, \$4,000, “SURF Award: Optimal emergency response shelter placement,” 2019

Nachtmann, Heather and Kevin Hall, U.S. Department of Transportation, \$7,000,000, “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

Nachtmann, Heather and Justin Chimka, US Department of Transportation, \$215,655, “Modeling Dynamic Behavior of Navigable Inland Waterways,” 2018-2020

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,” 2013-2019

Needy, Kim, IN/Council of Graduate Schools, \$96,000, “Understanding PhD Career Pathways for Humanities and STEM program,” 2017-2020

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 Department of Transportation, \$250,396, “Prioritizing Solutions for Truck Parking,” 2018-2019

Nurre, Sarah and Sarah Hernandez, Arkansas Department of Transportation, \$39,815, “Evaluation of WIM Auto-Calibration Practices and Parameters,” 2018-2019

Nurre, Sarah, Kelly Sullivan, and Ben Runkle, US Department of Transportation, \$220,461, “Informing Post-Disaster Restoration Through Modeling Interdependent Agriculture,” 2018-2020

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

Parnell, Gregory and Edward Pohl, US Department of Transportation, \$85,695, “Trade-Off Analytics for Infrastructure Preservation,” 2018-2019

Pierson, Harry, Department of Defense, \$274,100, “The Test Bed for Research in Collaborative Robotics,” 2019-2020

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

Pohl, Ed, Haitao Liao, and Kelly Sullivan, US AFIT, \$156,333, “Science of Test Research Consortium,” 2018-2019

Reeves, Carol, **Ed Pohl**, Bob Beitle, and Cynthia Sides, National Science Foundation, \$99,863, “I-Corps Comm STEP,” 2017-2022

Rainwater, Chase, and Ed Pohl, Walmart Foundation, \$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, Justin Chimka, Sarah Nurre, Xintao Wu, J.B Hunt Transportation Inc., \$2,750,000, “J.B. Hunt Center of Excellence,” 2017-2022

Rainwater, Chase, and Jackson Cothren, US DOE, \$534,769, “Autonomous and Rigorous Photogrammetric Localization,” 2016-2018

Rainwater, Chase, and Sarah Nurre, Chevron Corporation, \$15,000, “Introduction to Operations Research and Management Science,” 2018

Rainwater, Chase, Art Chaovaitwongse, and Jackson Cothren, National Science Foundation, \$98,703, “Artificial Intelligence in Air Force Acquisition, 2018-2019

Rossetti, Manuel, Defense Logistics Agency, \$60,000, “CELDi Membership Renewal 2017,” 2018-2019

Rossetti, Manuel, Defense Logistics Agency, \$60,000, “CELDi

Membership Renewal 2018,” 2018-2019

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

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- TT: Fast Multi Echelon Optimization via Grouping,” 2017-2018

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

Sullivan, Kelly, National Science Foundation, \$500,000, “CAREER: Survivable, Maintainable, and Adaptable Sensor Networks

Catanzaro, Donald, and **Shengfan Zhang**, US Department of Defense, \$156,932, “Identifying Individuals at Risk of Progression to active Tuberculosis,” 2018-2019

Catanzaro, Donald, and **Shengfan Zhang**, National Institutes of Health, \$223,811, “Identifying Individuals at Risk of Progression to active Tuberculosis,” 2018-2020

PUBLICATIONS

In 2018-2019 the faculty of the Department of Industrial Engineering at the University of Arkansas contributed one book, three book chapters, 27 refereed journal articles, and 20 other refereed publications and proceedings. The faculty authors are indicated in **bold** face type.

Books

Kong, N., and **S. Zhang**. *Decision Analytics and Optimization in Disease Prevention and Treatment*. John Wiley & Sons, New York, 2018.

Book Chapters

Small, C., **G. Parnell**, **E.A. Pohl**, S. Goerger, S., C. Cottam, E. Specking, Z. Wade, "Engineering Resilience for Complex Systems." In *Disciplinary Convergence in Systems Engineering Research*, edited by A. Madni, B. Boehm, R. Ghanem, D. Erwin, M. Wheaton, pp. 3-15. Springer, 2018.

Mahboubeh, M., **S. Zhang**, "Cost-effectiveness Analysis of Breast Cancer Mammography Screening Policies Considering Heterogeneity in Women's Adherence." In *Decision Analytics and Optimization in Disease Prevention and Treatment*, edited by N. Kong, and S. Zhang, Chapter 10: pp. 223-240. New York: John Wiley & Sons, 2018.

Talafuse, T., **E.A. Pohl**, "Grey Systems in Reliability." In *Wiley StatsRef-Statistics Reference Online*, <https://doi.org/10.1002/9781118445112.stat08061>, 2018.

Refereed Journal Articles

Tansitpong, P., and **W. Chaovalitwongse**, "An Investigation of Differentiated Prescription Decision on Profitability: A Case Study from Thailand." *International Journal of Healthcare Management*, Vol. 11, No. 1 (2018): 44-51

Wootton, L., M. Nyflot, **W. Chaovalitwongse**, and E. Ford, "Error detection in IMRT quality assurance using radiomic analysis of gamma distributions." *International Journal of Radiation Oncology, Biology, Physics*, Vol. 102, No. 1 (2018): 219-228

M. Anzanello, **W. Chaovalitwongse**, A. Kahmann, M. Ferrao, K. De Cassia Mariotti, M. Marcelo, R. Scorsatto Ortiz, and F. Fogliatto, "Interval Importance Index to Select Relevant ATR-FTIR Wavenumber Intervals for Counterfeit Drug Classification." *Journal of Pharmaceutical and Biomedical Analysis*, Vol. 158 (2018): 494-503

Yuan, M., K. Deng, **W. Chaovalitwongse**, and H. Yu, "Research on Technologies and Application of Data Mining for Cloud Manufacturing Resource Services." *International Journal of Advanced Manufacturing Technology*, Vol. 99, No. 5-8 (2018): 1061-1075

Seref, O., Y.J. Fan*, E. Borenstein, and **W. Chaovalitwongse**, "Information-Theoretic Feature Selection with Discrete k-Median Clustering." *Annals of Operations Research*, Vol. 263, No. 1-2 (2018): 93-118

Li, X., W. Chen, F. Sun, **H. Liao**, R. Kang, and R. Li, "Bayesian Accelerated Acceptance Sampling Plans for a Lognormal Lifetime Distribution under Type-I Censoring." *Reliability Engineering & System Safety*, Vol. 181 (2018): 78-86

Xie, W., **H. Liao**, and B. Niu, "Optimal Material Ordering Policy and Allocation Rule for a Company Making Multiple Products." *Applied Mathematical Modeling*, Vol. 55 (2018): 637-651

Zhang, Y., L. Wang, S. Wang, P. Wang, **H. Liao**, and Y. Peng, "Auxiliary Power Unit Failure Prediction using Quantified Generalized Renewal Process." *Microelectronics Reliability*, Vol. 84, (2018): 215-225

Liu, D, Y. Song, Y., L. Li, **H. Liao**, and Y. Peng, "On-line life cycle health assessment for lithium-ion battery in electric vehicles." *Journal of Cleaner Production*, Vol. 199 (2018): 1050-1065

Ruiz, C., **H. Liao**, **E.A. Pohl**, and **K.M. Sullivan**, "A Bayesian Framework for Accelerated Reliability Growth Testing with Multiple Sources of Uncertainty." *Quality and Reliability Engineering International*, Vol. 1 (2018): Online

Kirac, E., **A.B. Milburn**, "A general framework for assessing the value of social data for disaster response logistics planning." *European Journal of Operational Research*, Vol. 269, No. 2 (2018): 486-500

Li, B., I. Hernandez, **A.B. Milburn**, J. Ramirez-Marquez, "Integrating uncertain user-generated data when locating facilities for disaster response commodity distribution." *Socio-Economic Planning Sciences*, Vol. 62 (2018) 84-103

Nurre, S.G., and T.C. Sharkey, "Online Scheduling Problems with Flexible Release Dates: Applications to infrastructure restoration." *Computers and Operations Research*, Vol. 92 (2018): 1-16

Widrick, R.S., **S.G. Nurre**, and M.J. Robbins, "Optimal Policies for the Management of an Electric Vehicle Battery Swap Station." *Transportation Science*, Vol. 52, No. 1 (2018): 59-79

De Icaza, R. R., and **G. Parnell**, "Container Port Selection in West Africa: A Multi-Criteria Decision Analysis." *Engineering Management Research*, Vol. 7 (2018): 68-87

Specking, E., C. Whitcomb, **G. Parnell**, S. Goerger, **E.A. Pohl**, and N. Kundeti, "Literature Review: Exploring the Role of Set-Based Design in Trade-off Analytics." *Naval Engineers Journal*, Vol. 130 (2018) 51-62

Buchanan, R.K., S.R. Goerger, C.H. Rinaudo, **G. Parnell**, A. Ross, and V. Sittlerle, "Resilience in Engineered Resilient Systems." *The Journal of Defense Modeling and Simulation: Applications, Methodology, Technology* (2018): Online

Specking, E., **G. Parnell**, **E. A. Pohl**, and R. Buchanan, "Early Design Space Exploration with Model-Based System Engineering and Set-Based Design." *Systems*, Vol. 6, No. 4 (2018): *Online*

Chivukula, B., and **H.A. Pierson**, "Process-Property Relationships for Fused Filament Fabrication on Preexisting Polymer Substrates." American Society of Mechanical Engineers, *Journal of Manufacturing Science and Engineering*, Vol. 140 (2018): 1-6

Brown, S.L., and **H.A. Pierson**, "A Collaborative Framework for Robotic Task Specification." *Procedia Manufacturing*, Vol. 70 (2018): 270-277

Pierson, H.A., & S. Brown, "A Process for Digital Design Integrity for Additive Manufacturing." *International Journal of Rapid Manufacturing*, Vol. 7 (2018): 43-58

Talafuse, T., and **E.A. Pohl**, "Small Sample Discrete Reliability Growth Modeling Using a Grey System Model." *Grey Systems: Theory and Application*, Vol. 8, No. 3 (2018): 246-271

Baycik, O., T. Sharkey, and **C. Rainwater**, "Interdicting Layered Physical and Information Flow Networks." Institute of Industrial and Systems Engineering, *Transactions*, Vol. 8, No. 1 (2018): 2-20

Ahadi, K., **K.M. Sullivan**, and K.N. Mitchell, "Budgeting Maintenance Dredging Projects to Improve the Inland Waterway Network Performance." *Transportation Research Part E: Logistics and Transportation Review*, Vol. 119 (2018): 63-87

Margolis, J., **K.M. Sullivan**, S.J. Mason, and M. Magagnotti, "A Multi-Objective Optimization Model for Designing Resilient Supply Chain Networks." *International Journal of Production Economics*, Vol. 204 (2018): 174-185

Wang, F., **S. Zhang**, and L.M. Henderson, "Adaptive Decision-Making of Breast Cancer Mammography Screening: A Heuristic-Based Regression Model." *Omega*, Vol. 76 (2018): 70-84

Madadi, M., M. Heydari, **S. Zhang**, **E.A. Pohl**, C. Rainwater, D.L. Williams, "Analyzing Over Diagnosis Risk and Cost in Cancer Screening: A Case of Screening Mammography for Breast Cancer." Institute of Industrial and Systems Engineering, *Transactions on Healthcare Systems Engineering*, Vol. 8, No. 1 (2018): 2-20

Refereed Conference Proceedings

Schneider, K. and **C.R. Cassady**, "An Introduction to Probabilistic Methods in Reliability and Maintainability." *Proceedings of the 2018 Reliability and Maintainability Symposium*, Reno, Nevada, January 2018.

Thammasorn, P., W. Wu, L.A. Pierce, S.N. Pipavath, P.D. Lampe, A.M. Houghton, **W. Chaovalitwongse**, P.E. Kinahan, "Deep-learning derived features for lung nodule classification with limited data sets." *Proceedings of the International Society for Optics and Photonics*, Medical Imaging (oral presentation), Houston, Texas, February 2018.

Mahanan, W., J. Natwichai, and **W. Chaovalitwongse**, "Characterizations of Local Recoding Method on k-Anonymity." *Proceedings of the International Conference on Network-Based Information Systems*, Slovakia, September 2018.

Hippe, D., **W. Chaovalitwongse**, C. Duan, P. Thammasorn, **X. Liu**, R.S. Miyaoka, H. Vesselle, P.E. Kinahan, R. Rengan, J. Zeng, and S.B. Bowen, "Variogram-weighted Generalized Least Squares Regression to Predict Spatially Variant Tumor Voxel Response on Longitudinal FDGPET/CT Imaging of FLARE-RT Protocol Patients." (**Best in Physics Award in the Joint Imaging Therapy track**), *Proceedings of the Sixtieth Annual Meeting of the American Association of Physicists in Medicine - Medical Physics*, Vol. 45 No. 6: E581, Nashville, Tennessee, July 29-August 2, 2018

Li, X., **W. Chaovalitwongse**, G. Curran, J.M. Tilford, H. Felix, and B.C. Martin, "Using Machine Learning to Predict Opioid Overdoses Among Prescription Opioid Users." *Proceedings of the Annual Meeting of the International Society for Pharmacoeconomics and Outcomes Research - Value in Health*, Vol. 21, No. 1: S245, Baltimore, Maryland, May 2018

Duan, C., **W. Chaovalitwongse**, K. Puk, P. Thammasorn, S. Wang, D. Hippe, L.A. Pierce, and **X. Liu**, "Machine Learning of Tumor Cluster DosiRadiomics to Predict Regional Changes on Early-Response FDG." *Proceedings of the Sixtieth Annual Meeting of the American Association of Physicists in Medicine*, Nashville, Tennessee, July 29-August 2, 2018

Ruiz, C., **H. Liao**, **E.A. Pohl**, and **K.M. Sullivan**, "Bayesian Accelerated Reliability Growth of Complex Systems." *Proceedings of the 64th Annual Reliability and Maintainability Symposium*, Reno, Nevada, January 2018

Ruiz, C., **H. Liao**, and **E.A. Pohl**, "Reliability Demonstration Tests Considering Performance Degradation with Measurement Error." *Proceedings of the 10th IMA International Conference on Modeling in Industrial Maintenance and Reliability*, Manchester, United Kingdom, June 2018

Gu, W., N. Fan, and **H. Liao**, "Fitting Coxian Phase Type Distributions with Covariates to the Length of Stay of Geriatric Patients by Parametric Methods." *Proceedings of the 13th Inform Data Mining and Decision Analytics Workshop*, Phoenix, Arizona, November 2018

Mullin, E., and **A.B. Milburn**, "Disaster response routing with social data in stylized demand scenarios." *Proceedings of the Institute of Industrial and Systems Engineering Annual Meeting*, Orlando, Florida, May 2018

Kwizera, O. and **S.G. Nurre**, "Using Drones for Delivery: A Two-Level Integrated Inventory Problem with Battery Degradation and Swap Stations." *Proceedings of the Industrial and Systems Engineering Research Conference*, Orlando, Florida, May 2018

Wade, Z., **G. Parnell**, S. Goerger, **E.A. Pohl**, and E. Specking, "Designing Engineered Resilient Systems Using Set-Based Design." *Proceedings of the 16th Annual Conference on Systems Engineering Research*, Charlottesville, Virginia, May 2018

Ferris, T., E. Jackson, E., Specking, **G. Parnell**, and **E.A. Pohl**, "The Fundamental Nature of Resilience of Engineered Systems." *Proceedings of the 28th International Council on Systems Engineering Annual Symposium*, Washington, DC, July 2018

Small, C., R. Buchanan, M. Cilli, **G. Parnell, E.A. Pohl**, and Z. Wade, "A UAV Case Study with Set-based Design." *Proceedings of the 28th International Council on Systems Engineering Annual Symposium*, Washington, DC, July 2018

Specking, E., **G. Parnell, E.A. Pohl**, and R. Buchanan, "A Foundation for System Set-Based Design Trade-off Analytics." *Proceedings of the American Society for Engineering Management International Annual Conference*, Coeur d'Alene, Idaho, October 2018

Woods, A., and **H.A. Pierson**, "Developing an ergonomic model and automation justification for industrial spraying operations: A case study." *Proceedings of the Institute of Industrial and Systems Engineers Annual Conference*, Orlando, Florida, May 2018

Parsa, P., and **M.D. Rossetti**, "A multi-functional metric for monitoring inventory and transportation efficiency in collaborative supply chains." *Proceedings of the Institute of Industrial and Systems Engineers Annual Conference*, Orlando, Florida, May 2018

Rossetti, M.D., and J. Bright, "Bulk Petroleum Supply Chain Simulation Modeling." *Proceedings of the 2018 Winter Simulation Conference*, Gothenburg, Sweden, December 2018

Weishaar, C., **M.D. Rossetti**, K. Needy, E. Specking, T. Dodson, "Effectiveness of GRE Workshops to Increase Awareness." *Proceedings of the American Society for Engineering Education Annual Conference*, Salt Lake City, Utah, June 2018

Janer, M.L. and **M.D. Rossetti**, "Simulation Modeling of a Prototype Designed to Address the Congestion of Passengers and Items at the Composure Area of Security Checkpoints." *Proceedings of the Transportation Research Board Annual Meeting*, Washington DC, January 2018



Industrial Engineering faculty and students earned more than a dozen awards at the 2019 Annual Conference of the Institute of Industrial and Systems Engineers in Orlando, Florida.

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:

- Successfully apply core industrial engineering knowledge and skills for industrial or public sector organizations,
- Successfully pursue advanced professional degrees, graduate studies in industrial engineering, professional training, or engineering certification, and
- 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 11% 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/>

Student, Industry Collaboration Highlight Industrial Engineering Capstone Symposium

During the 2018-19 academic year, 65 industrial engineering students participated in the industrial engineering senior capstone experience as part of 13 teams of four or five students. Every student pursuing the Bachelor of Science in Industrial Engineering at the University of Arkansas is required to complete the two-semester course sequence. Richard Cassady, professor of industrial engineering, coordinates the Industrial Engineering Capstone Experience courses.

The teams are matched with an industrial partner, led by a student project manager and advised by a member of the industrial engineering faculty. In the fall semester, teams begin by conducting background research on their industry partner and the issues of interest to that partner.

Students develop a detailed understanding of the process or system of interest and obtain the data necessary to conduct preliminary analysis into the issues faced by the industry. Based on their preliminary analysis, they define objectives for their spring semester work, the performance measures they will use to measure their success in achieving the objectives, and the deliverables they will provide their partner at the end of the year.

In the spring semester, teams apply their industrial engineering skills to achieve their project objectives. Through their defined performance measures, they assess their success in achieving their objectives and create their project deliverables. They also document information necessary for their industry partner to use their deliverables.

The experience concludes with a symposium, during which teams communicate their research in an exhibit and poster session. Teams also deliver detailed, 35-minute presentations.

Best Overall Project



Increasing Plant Productivity by Improving the Current Scheduling Process

Team Members: Dasher Smith, Project Manager; Andrew Burroughs, Elisa Daniel, Oscar Guzman, and Joe Thongsavath

Faculty Advisor: Tish Pohl

The purpose of our project is to help Tyson Foods improve production opportunities in their Shelbyville, Tennessee chicken tray packing plant.

The team's decision support tool takes a sequential optimization approach in which they allocated orders using a variation of a bin packing heuristic and then sequence the orders by grouping like tray sizes together to reduce changeover time.

The tool creates a schedule and outputs three key performance measures: total changeover time, total changeover cost, and machine utilization used to assess productivity and efficiency improvement.

Outstanding Achievement in Data Analysis



Increase Profitability by Predicting Customer Operating Ratios using Machine Learning

Team Members: Morgan Hartsell, Project Manager; Nikki Hayes, Jack Porter, Tad Dixon, and Parker King

Faculty Advisor: Karl Schubert

ArcBest customers are offered an initial price from the pricing analyst department based on the provided information about the customers' freight.

This project involved data analysis of past shipments in order to provide a data-based tool for pricing analysts to use as a pricing aid.

The pricing analysts will be able to use the model by inputting specific freight factor values to then get a "Predicted FAOR." The new systematic method and data-based approach will aid them in determining initial prices, leading to an increase in profitability for ArcBest.

Outstanding Achievement in Modeling



Reducing Internal Fuel Cost by Improving Operational Procedures

Team Members: Christian Faubel, Project Manager; Carter McDonald, Jasmine Richard, Steven Litwiller, and Alicia McComb

Faculty Advisor: John English

The Internal Logistics Team at GerdaU's Fort Smith mill facilitates the movement of steel bundles throughout the Fort Smith facility from when they are first cast until they are ready for customer delivery.

This project has been approached as a facility layout problem because the stockyards are in essence acting as outdoor warehouses between movements. This allows the yards to be defined in terms of rectilinear distances and, therefore, mathematically analyzed. The best stockyard layout developed sets criteria on the placement of bundles based on a bundle's due date, which helps standardize the movement of forklifts within the stockyards.

Outstanding Achievement in Decision Support



Streamlining the Parcel Rating Process using Customer Data Automation

Team Members: Alec Hewitt, Project Manager; Vincent Chang, Ruby George, Mikki Harrell, and Blake Yates

Faculty Advisor: Chase Rainwater

This project serves to provide Green Mountain Technology's Strategic Solutions Department with the ability to quickly and accurately estimate the parcel shipping costs across millions of shipments.

To accomplish this, the team created a decision support tool capable of automatically calculating shipping costs from customer data files. The processing of these files is complicated due to the complexities of each customer's data files, resulting in Engineers having to process files individually with a time-intensive data investigation process. With this solution and a supporting optimization model, the Engineers will be able to quickly and consistently generate recommendations.

Other Capstone Awards

- Impact Award: Matt Millis, Project Manager; Jake Harrison, Parker Galligan, Josh Jensen, and Cory Stewart for their project, Improving Staffing and Resource Allocation through Forecasting of Emergency Department Patient Volumes and Admission Rates - Parkland Health & Hospital System. Faculty Advisor: Shengfan Zhang.
- Outstanding Project Managers: Nicole Frear, Kaitlin Smithy, and Luke Turner.
- Outstanding Team Members: Dustin Adcock, Tad Dixon, and Kenny Phipps.
- Outstanding Faculty Advisors: Assistant Professor, Kelly Sullivan; Associate Professor, Chase Rainwater, and Professor, Karl Schubert.
- Outstanding Industry Partners: Kirby Clark, ArcBest; Clint Johnson, Gerdau, and Alex Wong, J.B. Hunt.

The following additional projects were also presented at the 2019 Capstone Experience Symposium:

- Improving Outpatient Flow and Experiences by Implementing Simulation Techniques to Improve Resource Utilization. Industry partner: Central Arkansas Veteran's Health Care System. Team members: Kevin Diaz, Project Manager; Andrew Clark, Lauren Curran, and Joy Jenkins. Faculty Advisor: Greg Parnell.
- Supporting Product Innovation by Categorizing Products, Analyzing Flavor Profiles, and Defining Historical Trends. Industry partner: The Hershey Company. Team members: Nicole Frear, Project Manager; Jalal Almuhanha, Abdul Almusaiter, Ashley Johnson, and Kenny Phipps. Faculty Advisor: Art Chaovalitwongse.
- Identifying Post Seasonal Missed Sales Opportunities using Automated Data Analysis. Industry Partner: The Hershey Company. Team members: Bria Garcia, Project Manager; Brooke Larkin, Ty Martindale, Hector Ramos, and Alejandro Torrico. Faculty Advisor: Ed Pohl.
- Automating Product Selection and Removal Process for Cross Dock Operation via Decision Support Tool. Industry Partner: Medtronic PLC. Team members: Nate Hemby, Project Manager; Kyle Adams, Tylon Jackson, Damon Pettis, and Ben Thornton. Faculty Advisor: Manuel Rossetti.
- Improving Capital Investment Decisions by Increasing the Fidelity of Return on Capital Employed. Industry Partner: ABF Freight®. Team members: Kyle Kraichely, Project Manager; Austin Knabe, Sydney Motes, Theo Munoz, and Josselyn Terrazas. Faculty Advisor: Haitao Liao.
- Improving Load Planning by Modeling Variability in Driver Activity Time. Industry partner: J.B. Hunt Transport, Inc. (Intermodal Division). Team members: Emily Matlock, Project Manager; Majed Alahmadi, McKenzie Barnes, Hunter Chastain, and Sam Jeffcoat. Faculty Advisor: Kelly Sullivan.
- Improving the New Business Opportunity Process Using a Decision Support Tool and Optimization Model. Industry partner: J.B. Hunt

Transport, Inc. Team members: Kaitlin Smithey, Project Manager; Coleman Crouch, Jaylan Matthews, Tara Minmier, and Reid Skinner. Faculty Advisor: Ashlea Bennett Milburn.

- Improving Forecasting Accuracy of Intermodal Pickup Demand by Integrating Statistical Forecasting Methods. Industry partner: J.B. Hunt Transport, Inc. Team members: Luke Turner, Project Manager; Dustin Adcock, Payton Moore, Olivia Ohlstein, and James Waller. Faculty Advisor: Justin Chimka.

Undergraduate Highlights

The College of Engineering honored top students at an annual awards ceremony on April 30, 2019. Senior Industrial Engineering student Morgan Hartsell was recognized as the Outstanding Senior in the department.



In addition to being a full-time student, Morgan is also a pole vaulter on the women's track and field team and member of two national honor societies: Tau Beta Pi and Alpha Pi Mu.

She is researching the truck parking problem throughout the State of Arkansas in hopes of supplying truck drivers with adequate information to be able to abide by driving regulations and legal parking destinations. In summer 2017 and 2018 she worked as an engineering intern with J.B. Hunt.



Senior Nicole Hayes is the recipient of the 2018-19 S. Balachandran Service Scholarship, one of five scholarships awarded nationally each year by Alpha Pi Mu, the industrial engineering honor society.

A committed Alpha Pi Mu member, Hayes served as social chair and worked to organize many of the events for the local chapter and sees this as a community building effort for the Industrial Engineering Department.

Hayes is working on honors research with Shengfan Zhang, studying ways to use machine learning and artificial intelligence for mental health. Minorng in Spanish has led to study abroad opportunities in Madrid, Spain. After graduation, she will be working with Wright Medical in Memphis, Tennessee, as an Operations Lead-R Associate.

The S. Balachandran Service Scholarship was established in 2016 to recognize outstanding service to Alpha Pi Mu.

Senior Matthew Mills was the recipient of the Industrial Engineering Undergraduate Research Award. Each year, one undergraduate student is recognized for their valuable contributions to departmental research efforts. Faculty nominate students describing the research contributions, and the recipient is determined by faculty vote.



Matthew has been conducting research to analyze the potential impact of energy storage on the vulnerability of the electric grid. He received a SURF Award in 2018 to support this research, and he will present his findings at the 2019 Industrial and Systems Engineering Annual Meeting in Orlando, Florida. In addition to demonstrating impressive technical skills in his own research, he provided invaluable mentorship to our junior class of honors students by reviewing and analyzing their SURF proposals. Matthew is advised by assistant professor Kelly Sullivan.



Wesley Nimmo is the recipient of the 2019-2020 Myrtle & Earl Walker Scholarship from the Society of Manufacturing Engineers Education Foundation.

Nimmo is completing an internship with J.B. Hunt Transport Services, Inc. His team is converting reporting into Power BI, a data visualization application, which will centralize and automate data reporting. Wesley said he has found many of his classes have real applications in the work he is doing and he enjoys using what he has learned in the classroom to create real-world solutions.

Assistant professor, Harry Pierson, a 21-year SME member, promotes the SME scholarship program within the department. "SME scholarships are prestigious, nationally competitive awards, and I'm very proud that our students are consistently competitive," he said.

Industrial engineering students have earned SME Foundation awards for four consecutive years:

- 2016: Arturo Nunez
- 2017: Allison Morast
- 2018: Erin Mullin
- 2019: Wesley Nimmo

Senior, Alejandro Torrico received the Outstanding Performance Award from the Arkansas AI-Campus. The Arkansas AI-Campus is a unique statewide training program, existing outside of the traditional academic environment. The interactive training program allows students to work closely with top global and national experts in machine learning, artificial intelligence and deep learning.



Experts who hold top records in international competitions, such as Data Science Bowl (DSB) and DREAM Challenges, serve as volunteer coaches for the Arkansas AI-Campus program, providing frontier knowledge, technology, and overseeing the hands-on projects.

The full experience consists of two four-month phases, and brings together qualified students, including senior undergraduates and graduate students from diverse academic programs and disciplines from various Arkansas institutions.



The Arkansas Alumni Association selected Kaitlin Smithy as a Senior of Significance for 2019. She served as the president for Alpha Pi Mu and the vice president for the Society of Women Engineers.

Kaitlin has also worked as an undergraduate research assistant studying the benefits of global standards within healthcare organizations alongside Medtronic. She was able to present this research at both the CELDi (Center for Excellence in Logistics and Distribution) Conference and the 2018 National IISE Annual Conference in Orlando, Florida.

After graduation, Kaitlin plans to relocate to Houston, Texas, where she has accepted a role with Halliburton in their ELMT (Engineering Leadership in Manufacturing and Technology) program.

Award Winning Videographers

A team of Industrial Engineering students earned first place in a national video competition hosted by the Institute of Industrial and Systems Engineers.

The winning entry from last year helped inspire the team to take the top prize in the 2019 IISE Industry Advisory Board (IAB) YouTube Video Contest sponsored by Tompkins International. Organizers challenged student groups to create a video promoting the field of industrial and systems engineering to high school students, teachers and college counselors, with the goal of encouraging future students to pursue the profession.

The team, composed of Nathan Hemby, Olivia Ohlstein and Parker Galligan, beat out 10 teams from across the country to take the top spot with their video "What will you be with IE?" Along with first-place recognition, the team won a \$1,000 grant. They were recognized at the IISE Annual Conference in Orlando, Florida, in May.



Parker Galligan, Olivia Ohlstein and Nathan Hemby

View the Award Winning Video on YouTube Here:
<http://y2u.be/BSDGNcCxrK>



Other Undergraduate Achievements

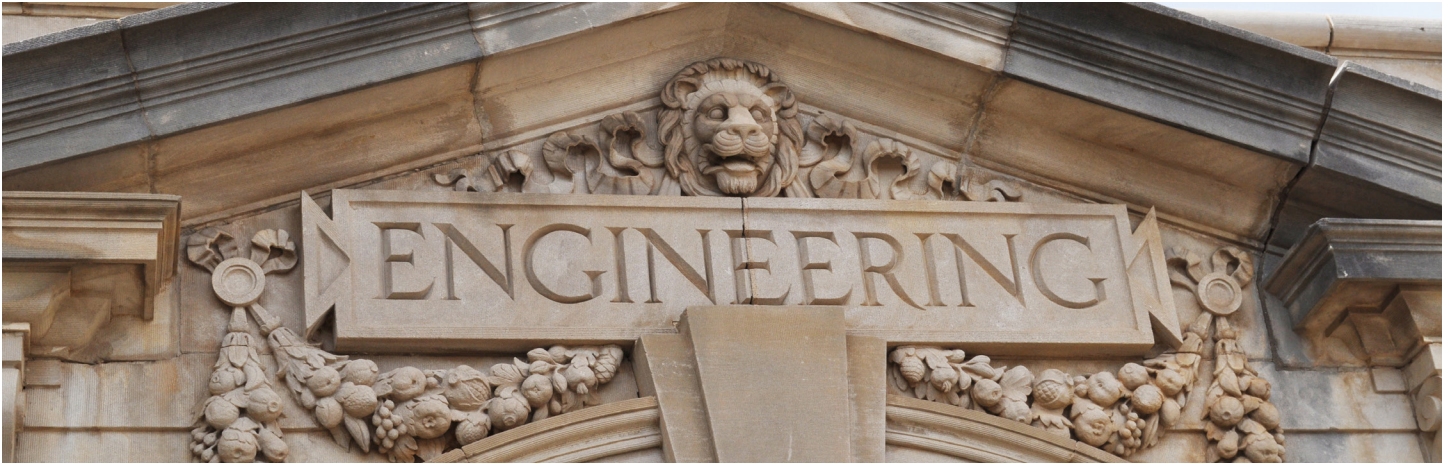
- Brandon Satterwhite was the recipient of a State Undergraduate Research Fellowship (SURF). The SURF program began in 1993 through funding from the National Science Foundation. This program encourages undergraduate students to become involved in research in their respective area of expertise. SURF requires the student be either a sophomore, junior or senior and paired with a research faculty mentor within the same area of research being conducted.
- Conner Waybright received the A.O. Putnam Memorial Scholarship from the Institute of Industrial and Systems Engineers.
- Clay Ferguson, Karlton Haney and Amie Westerman received the Dwight D. Gardner Scholarship from the Institute of Industrial and Systems Engineers.
- Alexander Hendrickson and Wesley Nimmo were the recipients of the Harold & Inge Marcus Scholarship from the Institute of Industrial and Systems Engineers.
- Madeline Suellentrop received the Henry & Elisabeth Kroeze Memorial Scholarship from the Institute of Industrial and Systems Engineers.
- Patrick Dougherty was awarded the Marvin Mundel Memorial Scholarship by the Institute of Industrial and Systems Engineers.
- Industrial engineering students received more than \$170,000 in scholarships during the annual industrial Engineering Student Awards Banquet. Students, parents, staff, faculty, alumni and corporate partners were on hand to celebrate 56 students who earned scholarships.

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 2018-2019, four undergraduate students completed the Honors College experience in our department:

Student	Thesis Title	Advisor
Morgan Hartsell	Characterizing Truck Parking Shortages in Arkansas: A Data Analytical Approach	Sarah Nurre
Joy Jenkins	Data Visualization of Treatment Outcomes for Tuberculosis Patients	Shengfan Zhang
Matthew Millis	Vulnerability Analysis of Modern Electric Grids: A Mathematical Optimization Approach	Chase Rainwater
Luke Turner	Simulating Alternative Tuberculosis Diagnosis Methods in Underdeveloped Countries	Manuel Rossetti

GRADUATE OVERVIEW



Graduate 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 also offers online the 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

Haitao Liao, Professor John and Mary Lib White Endowed Systems Integration Chair, serves as Graduate Coordinator for 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: industrial-engineering.uark.edu

Graduate Spotlight

Enrollment in the Department's doctoral program increased by 29% from 2010 to 2018. In fall 2018, female students represented 27% of our graduate student population. Of those, 61% were seeking a doctoral degree.

In the following narrative you can see that our graduate students have gained national recognition through awards, honors and publications.

Doctoral candidate, Ms. Samira Karimi and faculty mentors, Haitao Liao and Ed Pohl received the 2019 Stan Ofsthun Best Student Paper Award from Society of Reliability Engineers (SRE) at this year's Reliability, Availability and Maintainability Symposium (RAMS) in Orlando. Their paper was titled "A Robust Approach for Estimating Field Reliability Using Aggregate Failure Time Data."



Doctoral student and active duty Army officer Nick Shallcross is the recipient of the Omar N. Bradley Research Fellowship. The fellowship is given to support an active duty military officer to pursue research in mathematical sciences.



Selection for the fellowship is made without regard to rank, branch, or affiliation and is granted to officers who are actively engaged in research or have the best-developed plans for providing significant contributions to Army and defense-related problems.

Working with his adviser, research professor Greg Parnell, Shallcross presented his research at the 87th Military Operations Research Society Symposium in Colorado Springs in June 2019.

Cesar Ruiz and professors Haitao Liao and Ed Pohl, along with Fuqiang Sun of Beihang University were the recipients of a best paper award for their paper “Reliability Estimation from Multiple Degradation Processes with Dependent Random Effects,” at the 2019 International Conference on Mathematical Modeling in Reliability (MMR).



In this paper, a new mathematical model for analyzing data widely seen in the areas of microelectronics and advanced manufacturing. The proposed approach provides experts with a new statistical tool for component reliability prediction involving dependent degradation processes. The paper will be published in the *Proceedings of The 11th International Conference on Mathematical Methods in Reliability*, Hong Kong, June, 2019.

Chelsea Jin was the recipient of the Industrial Engineering Graduate Research Award. The award recognizes the graduate student who made the most valuable contributions to departmental research efforts. Faculty members nominate students and the final decision is made by faculty vote. She was also the recipient of the Gilbreth Memorial Scholarship from the Institute of Industrial and Systems Engineers.



Chelsea has been conducting research in the area of additive manufacturing. For example, she has developed a method that applies artificial intelligence to identify defects in objects created by additive manufacturing. In calendar year 2018, she submitted a journal paper

for peer review, presented at two conferences, had three presentations accepted for upcoming conferences, and organized and chaired a session for the IISE Annual Conference.

Melissa Quinton was recognized as the Industrial Engineering Outstanding Graduate Student. The award identifies the most outstanding IE graduate student who is graduating in calendar 2019. Faculty identify students who excel in academic performance, leadership, service, collegiality, ethics, and dedication. The winner is then selected from among the nominees by faculty vote.



In just two short years, Melissa has served as a research assistant on an industry-funded project, held a Logistics Engineer Internship with J.B. Hunt, and filled a critical teaching role. As the graduate teaching assistant for our senior capstone experience, she met regularly with 13 capstone teams to provide technical advice and administrative support. Last year, she received the Steven L. Tidwell Memorial Scholarship and she presented her research poster at the 2018 INFORMS Annual Meeting in Phoenix. After completing her M.S. degree in May 2019, she will join Walmart as a Data Analyst.

Other Graduate Achievements

- Doctoral student, Oliver Kwizera received the John S.W. Fargher Jr. Scholarship from the Institute of Industrial and Systems Engineers. The scholarship is available to full-time graduate students enrolled in any school in the United States provided, the school has an accredited program by an agency recognized by IISE in industrial engineering or engineering management. This award is intended to recognize academic excellence and noteworthy contribution to the development of the industrial engineering profession.
- Carlos Mendez was given the Outstanding Teaching Assistant award from the Undergraduate Students of Industrial Engineering.
- Andrew Alseth, Winthrop Harvey, Jose Hernandez Azucena, and Macy Tush were recognized as 2018-2019 Industrial Engineering Scholars by the Department of Industrial Engineering Faculty.

MSOM and MSEM 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 bodies. In the 2018-2019 academic year, there were 834 unique students enrolled in the program and a total of 2381 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 195 students completing their degree in the 2018-2019 academic year.

Operations Management coursework emphasizes practical knowledge in areas such as project management, decision making, supply chain management, quality management, and 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 principals of management, and equips graduates to carry out their managerial responsibilities more effectively. Students are able to select from 32 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 online learning. It is also hosted on two active duty bases, Naval Support Activity Mid-South at Millington, Tennessee; and Hurlburt Field Air Force Base at Fort Walton Beach, Florida. This year marked the closing of the Little Rock Air Force Base location at Jacksonville, Arkansas, due to declining enrollment. The program relocated live instruction facilities to the Walton College of Business Executive Education Center in Downtown Little Rock. This move brings viability to serving students in the Little Rock region, by bringing instruction closer to where students live and attracting a wider range of students.

By operating in eight-week terms and having an online option for program courses, the flexibility of the program 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 proud of our military affiliation and have many current military members and veterans as students 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. We have two full-time MSOM instructors, and 55 adjunct faculty members who teach in the program. As instructors, 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 from the first conferred baccalaureate degree from a regionally accredited institution. The program now encourages students who have a GPA between 2.5 and 3.0 to enter one of the accompanying graduate certificates in order to gain admission if they complete coursework with a 3.5 GPA. This is a popular option that is helping more students matriculate into the program.

Program Highlights

One strength of the program is the dedicated instructors and staff members. We were pleased to award Leonard Nethercutt the 2019 Faculty of the Year award at the annual faculty meeting. Leonard is a full-time instructor and began teaching for the program in 1997 as an adjunct instructor.



Dave Peterson was awarded the 2019 Rookie of the Year Award at the annual faculty meeting.

Dave is always responsive, thorough, and caring when working with students. He is quick to volunteer to help, and contributed to the development of our Lean Six Sigma course in his first year with the program. His passion for teaching and helping students, combined with his industry experience, make him a true asset to our team.

Mindy Hunthorp was promoted to Assistant Director for Faculty Development in the Operations Management and Engineering Management Programs. Mindy started with the program in 2015 as an Academic Advisor. Her tireless contributions to ensuring academic success, and spearheading new initiatives such as the Lunch & Learn Webinar Series, and the MSOM Scholarship Golf Tournament, make her an obvious choice to lead faculty development.



Rachel Tracy joined College of Engineering's online graduate distance education programs in September of 2018 as Course and Faculty Support Specialist working closely with the MSE, MSEM, and MSOM programs. Rachel is a graduate of the Industrial Engineering Department, receiving her BSIE in summer 2004 and a MS in Instructional Technology and Design from UCA in 2015.



For the past 10 years, Rachel has worked in K – 20 education, most recently at Duke University's Pratt School of Engineering in K-12 education and outreach where she worked with the NC Department of Education to implement pre-engineering programs in K-12 schools, facilitated training programs, and was a Co-PI for a Boeing grant that allowed undergraduate engineering students to demonstrate STEM lesson plans related to the Engineering Grand Challenges in K-12 schools. She and her husband Matt are excited to be back in Northwest Arkansas with their 2 dogs.

Another strength of the program is a core value of continuous improvement. The motto, "we practice what we teach" guides the program. With this goal in mind, the program introduced graduate certificates in Lean Six Sigma and Homeland Security starting in the 2019-2020 Academic Year. The Lean Six Sigma Graduate Certificate has four required courses and prepares the student to take the IASSC Green Belt Certification Exam. The Homeland Security Graduate Certificate consists of three required courses and one elective and prepares the student to take the ASIS Certified Protection Professional (CPP) exam.

Students can work towards the MSOM degree and the certificate program simultaneously, with no extra credit hours required.

The Master of Science in Engineering Management marks its second year with admissions continuing to exceed initial expectations with 43 students. Additionally, the program has 2 graduates in its second 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 their organizations.

Annual Faculty Meeting

The annual Faculty Meeting was held in July 2019. Over 45 faculty members from all over the United States attended the meeting and several joined the day 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. College of Engineering Dean, John English served as Keynote speaker.

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



College of Engineering Dean, John English, gives keynote at the 2019 MSOM and MSEM Faculty Meeting.

GLOBAL STUDIES



Students majoring in Industrial Engineering who are interested in study abroad experiences are eligible to apply to the John L. Imhoff Global Studies Endowment for scholarships. These scholarships are designed to help defray the expenses for industrial engineering students while engaged in for-credit overseas study and/or overseas work experience defined as internships and cooperative work programs.

An engineering educator for more than 50 years, John L. Imhoff thrived on the global impact potential of the industrial engineering discipline. His vision encompassed the undergraduate, graduate, and teaching levels.



He believed that global sharing through educational channels would lead to greater cooperation and understanding. He was very committed to students within the classroom and was passionate about professional student organizations as well as faculty involvement within those organizations.

He encouraged students to travel abroad on work/study programs and to take summer jobs abroad; and he encouraged faculty to bring in speakers who had worked abroad to share their experiences.

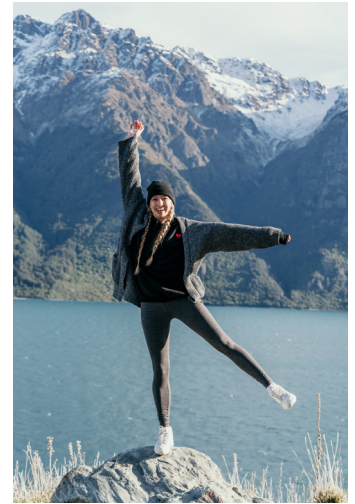
This same commitment drives the department to encourage undergraduate students to pursue global studies today.

Over the past year, we have had 15 students study abroad in nine different countries. Most of the students keep a travel blog and share their experiences with us as they learned and toured.

Junior, Christine Rheinberger, spent the spring 2019 semester studying and absorbing the culture of Australia at the University of Newcastle. Newcastle is a coastal city two hours north of Sydney. Of course, that included the beautiful Australian beaches, hiking, and sightseeing. She shared, “While I did enjoy the Aussie lifestyle, school was the main focus of my trip to Australia, so I have new and better techniques for staying focused and finishing my work efficiently.”



Donna Quedens also spent spring 2019 in Australia. She had this to say about her experience, “During my time in Australia, I traveled to New Zealand, marking off one of my bucket list items! I also got to see Milford Sound and hike a glacier. More importantly, I learned new techniques in studying and absorbing new material. Studying abroad has helped me explore my individuality while becoming a more confident young woman in STEM.”



Matthew Walters, traveled to Gent, Belgium where he attended The University of Gent. While in Belgium, Matthew had the opportunity to attend fascinating lectures about sustainability in Europe and visit many food production facilities throughout Belgium. He shares, “It was cool getting to witness what I have learned thus far, as an industrial engineering student, within an actual industry such as the food industry.” “Some of my favorite experiences from the trip included sightseeing around Belgium, hanging out with my friends that I met there, and visiting with the locals. I learned a great deal about the importance of sustainability in the industry, and I hope to take what I’ve learned and apply it to my future studies and career as an engineer.”

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
Tyson Foods
Harrison Energy Partners Burns and McDonnell
St. Jude Medical American Airlines Phillips 66
Wal-Mart MIT John Deere United States Air Force
Cerner Transplace AT&T General Motors
Dassault Falcon Tesla Motors Viridian
Rensselaer Polytechnic Institute Sam's Club FedEx
Booz Allen Hamilton Boeing DHL Epic NALCO
Wells Fargo Securities Hershey Company
Habasit America ABF Freight Walt Disney World
Halliburton Unilever Cummins
Koch Industries Parkland Health & Hospital System
Hallmark Cards Texas Instruments J.B. Hunt
Amazon University of Texas Clark Construction Group
Whiting Turner Logile Northrup Grumman
Lockheed Martin Dell Somerset Logistics
Erzurum Technical University QPS Engineering
Butterball Cognizant
Georgia Pacific Emerson Accenture Kennametal Inc.
Nestlé Purina Petcare University of Arkansas
Rockline Industries
University of New Haven Twin Eagle Energy Sources
Arkansas Electric Cooperative
Baptist Health Physician Partners University of Tennessee

ALUMNI HIGHLIGHTS

Lee Lane, Distinguished Alumna Recognized

A 1976 graduate of the Department of Industrial Engineering, was recognized during halftime at the Homecoming football game on Saturday, October 20, 2018.



Lee Lane holds three degrees from the University of Arkansas, a B.S. in Chemistry, a M.S. in Operations Research and a Ph.D. in Engineering. She was also the first female to receive a doctoral degree from the College of Engineering.

Lee returned to the U of A after a 10 year absence. During those 10 years, She worked for Dow Chemical as their first female research physical chemist in Midland, Michigan. Later, as a single mother of two, Lee was accepted into the Industrial Engineering graduate program. In just three and a half years, Lee was able to complete both a Master's of Science in Operations Research and a Doctorate in Engineering.

She launched a successful career in the aerospace industry at Northrop Electronics and General Dynamics, climbing the corporate ladder and shattering the proverbial glass ceiling faced by women in that industry. The aerospace industry was on the cutting edge of technology and was where she wanted to be. Her timing was perfect, she worked on the Trident Submarine, M-1 Abrams Tank, F-16 Fighter, B-1 Bomber, B-2 Stealth Bomber, Phalanx Gun, Stinger Missile, Artificial Intelligence and other amazing programs.

As her management responsibilities increased, she served as a role model, and utilized her position to identify and encourage other competent technically trained women to join the aerospace industry and personally helped to mentor their careers.

Lane also spent a brief part of her career as a professor at San Diego State University teaching systems analysis, programming and statistics where she fulfilled the important mission of educating other engineers.

We are very proud of Lee as one of the Department of Industrial Engineering successful alumni and are happy to congratulate her on this very prestigious recognition!



Four Distinguished Alumni Recognized by the College of Engineering



The Annual Alumni Awards Banquet brings together alumni from all eight departments within the College of Engineering to recognize graduates who have achieved distinction in their fields since graduating from the University of Arkansas.

In addition to the Hall of Fame award, two other award designations are recognized at the banquet, the Early Career Alumni Award and the Distinguished Alumni Award.

The Early Career Alumni Award is given 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.

The 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.

There were actually four recipients of these two awards from the Industrial Engineering Department. Two from the Industrial Engineering Program and two from the online distance program within industrial engineering, the Master of Science in Operations Management program.

Early Career Award Winner

Willie Montgomery III, BSIE 2004, MSIE 2009

Senior Director, Data Science and Advanced Analytics
Walmart — Bentonville, AR

Willie Montgomery, III has achieved rapid and impressive career advancement by being promoted by several position levels on four occasions in a five-year period. He is a data scientist presently in a

leadership position in a Fortune 100 company. In summer 2019, Willie graduated from the Presidential Leadership Scholars program. The program brings together a diverse group of leaders from different fields who inspire each other and have a common purpose and goal in life to make the world a better place.



Montgomery commented, “I am so honored to join the 2019 Class of Scholars as we continue to work on multiple projects with the aim of making a difference in the world. Over the past six months, we learned about leadership from a Presidential lens, built relationships with some of the brightest and most influential leaders in the country and generated ideas to help solve many problems that the world is facing today.”



Distinguished Alumni Award

Bob Etien, BSIE 1966

World-Wide Manager, Total Cycle Time Motors Business
General Electric Co. (Retired)



Robert A. Etien, Jr. is a dedicated supporter of the University, College of Engineering and Department of Industrial Engineering. He has been instrumental in enhancing the Arkansas Academy of Industrial Engineering scholarship program for many years, including his successful initiative to exceed \$2 million in endowed funds. Most recently, he championed the establishment of a new endowment to help support recruitment and retention of graduate students.

From our Master of Science in Operations Management distance education program, we also had two alumni recognized.

Early Career Award Winner

Alfonso Camerlingo, MSOM 2014

Director, Global Supply Chain
Walmart — Bentonville, AR



Alfonso Camerlingo has been with Walmart for more than 10 years and has served as the Director of Global Supply Chain for three years. He has also held various positions in Merchandising, Private Brands Planning and Analytics, Merchandise Finance, and Global Sourcing Finance for the company, and is responsible for Walmart’s logistics and warehouse operations for the import dry packaged food, global logistics strategy and systems. In all,

he has more than 23 years of experience in Corporate Finance, Strategic Planning, Merchandising, Procurement and Supply Chain.

Distinguished Alumni Award

Michael W. Blinzler, MSOM 2010

Chief Information Officer
Leggett & Platt — Pierce City, MO



Michael Blinzler is the Chief Information Officer at Leggett & Platt which is a 22,500-employee diversified global manufacturer of engineered products found in most homes and automobiles. Michael began working for Leggett & Platt, Incorporated in 1986. He advanced through various positions of increasing responsibility and was named Vice President - Information Technology in 2004 and Vice President - Chief Information Officer in 2017.



Left to right: John True, B.S.I.E.'03; Karen Standley, Honorary; Mandy Robinson, B.S.I.E.'04; Ashlea Bennett Milburn, B.S.I.E.'99; Cynthia Westcott, B.S.I.E.'03; Erica Taylor-Kelley, B.S.I.E.'04; and Jason Honeycutt, B.S.I.E.'04, M.S.I.E.'06.

Arkansas Academy of Industrial Engineering Banquet and Induction Ceremony

In April 2019, The Arkansas Academy of Industrial Engineering inducted seven new members to their ranks. The members inducted were recognized as distinguished graduates of the Industrial Engineering Department and for their sustained and outstanding contributions to the industrial engineering profession.

Doctoral Alumni Recognized by Society of Reliability Engineers

Yisha Xiang received the Doug Ogden Best Paper Award at this year’s Reliability, Availability and Maintainability Symposium (RAMS) in Orlando. Xiang and her research team Yue Shi and Tongdan Jin received the award for their paper “Structured Maintenance Policies for Deteriorating Transportation Infrastructures.”



Yisha is a 2009 graduate of the Department of Industrial Engineering and a faculty member at Texas Tech University.

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 2019 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.
- Jonathon Fite, Managing Partner, KMF Investments.
- David Humphrey, Vice President of Investor Relations for ArcBest in Fort Smith, Arkansas.
- Bill Klimack, Chevron Decision Analysis Functional Manager.
- Jenn Pazour, Associate 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.
- Tarek Taha, Sr. Director Engineering & Technology with J.B. Hunt.
- Eileen Van Aken, Professor and Department Head of the Grado Department of Industrial and Systems Engineering at Virginia Tech.



*Left to right Back: Ami Spivey, Vance Clement, Tarek Taha, David Humphrey
Front: Eileen Van Aken, Jenn Pazour, Bill Klimack and Edwin Romeijn.
Not pictured, G. Kent Burnett and Jonathon Fite.*

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

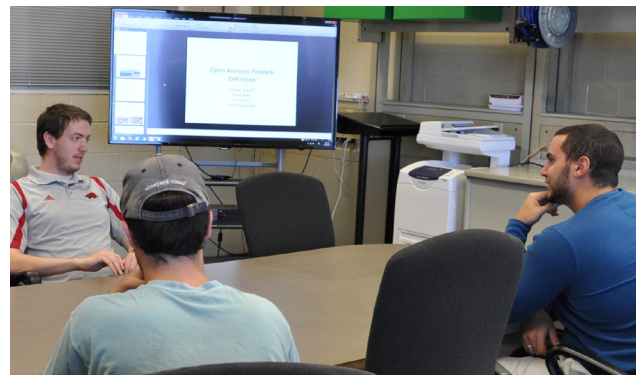


The Foust Computation Laboratory is Industrial Engineering's premier computing and teaching lab, providing general computing access for all students and supports the computing needs associated with course work. Included in the lab are a project area with whiteboards to encourage student discussions.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

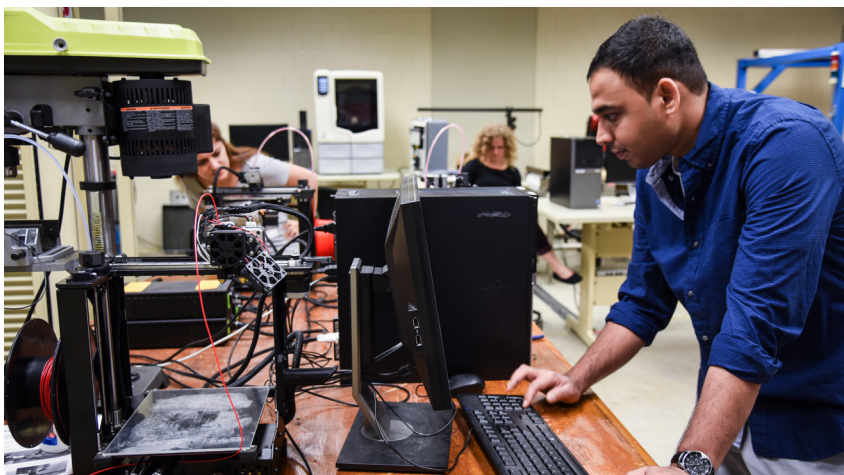
The lab also features two collaborative robots: Baxter from Rethink Robotics and a UR10 from Universal Robots. Both are intrinsically safe and possess human-friendly task specification, allowing humans to enter the work envelope and interact with the robots. With two seven-axis arms, integrated machine 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: industrial-engineering.uark.edu/Research/Labs/



OUR FACULTY



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M.S.I.S.E (Virginia Tech)
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M.E.I.S.E. (University of Florida)
B.S. (University of New York at Buffalo)



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B.S.M.E. (University of Missouri, Rolla)



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M.S.S.E. (Air Force Institute of Technology)
M.S.E.M. (University of Dayton)
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M.P.A. (University of Kansas)
B.A. (University of Kansas)



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B.S.I.E. (University of Cincinnati)



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M.S.I.E. (University of Arkansas)
B.S.I.E. (University of Arkansas)



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M.S.I.E. (Virginia Polytech Institute and State University)
B.S.I.E. (University of Arkansas)



Shengfan Zhang, Ph.D.
Associate Professor

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M.I.E. (North Carolina State University)
B.M. (Fudan University, Shanghai)

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
Haitao Liao
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

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

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

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

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

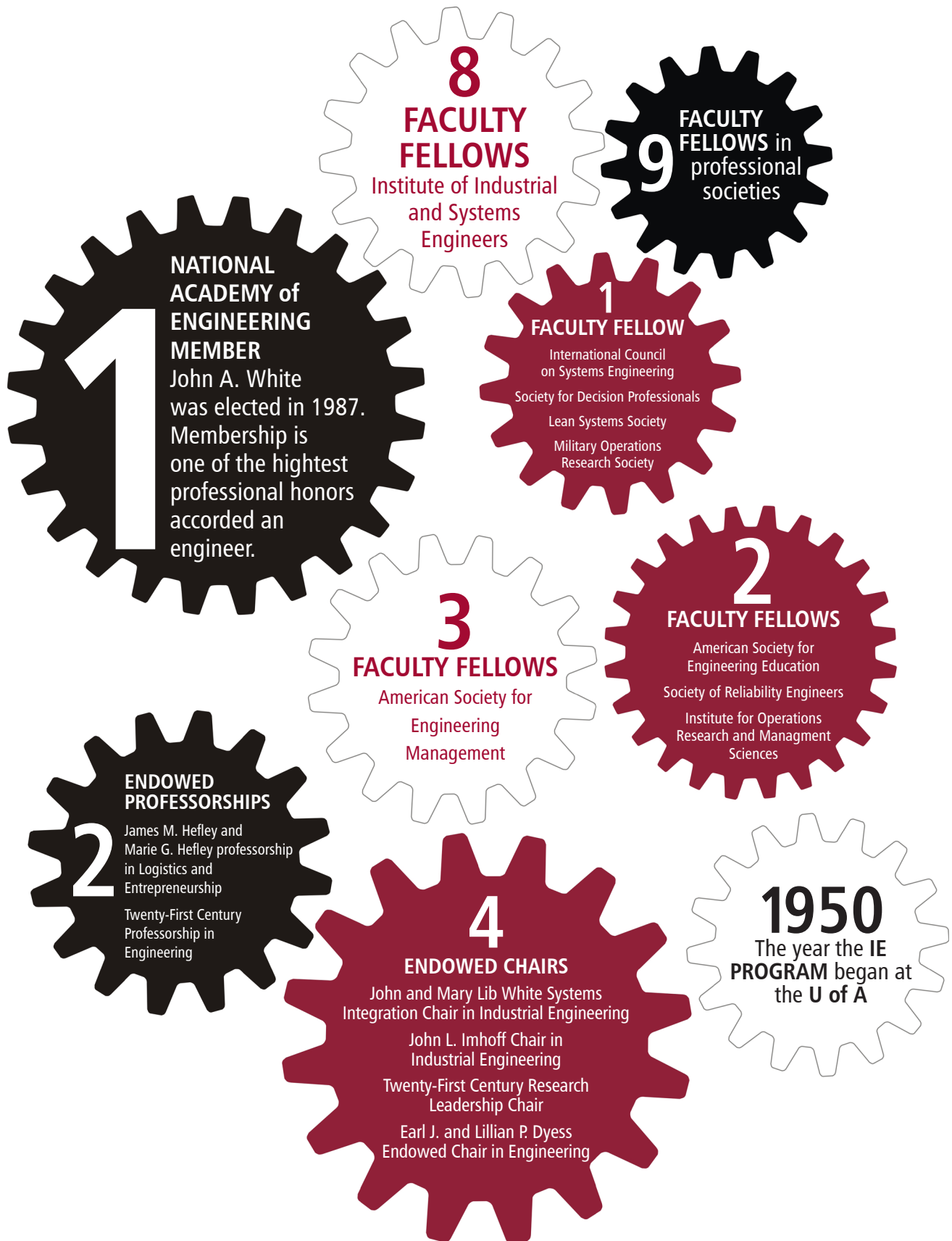
COOPERATIVE EDUCATION AND INTERNSHIPS

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

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

I.E. BY THE NUMBERS



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College of Engineering
Industrial Engineering



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WAYS TO GIVE BACK TO INDUSTRIAL ENGINEERING

Would 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 and enter account number: 30003454

Thank you!

For questions concerning giving, please contact:

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