

# IMSENNews

2021-2022

Developing a flight simulator  
to evaluate innovative technologies in aviation



# Letter From the Chair

Dear Friends and Alumni,

It's been yet another busy school year here at Iowa State University, but we've made it through. The COVID-19 pandemic appears to be winding down and it's been encouraging that we've been able to return to more-or-less normal operations here on campus. Perhaps our biggest news from the previous school year is that plans have been announced for a new industrial engineering building. Many thanks to alums Turk and Joyce Therkildsen for their financial support, and much credit to IMSE's Gül E. Kremer for her accomplishments in coordinating the project. We wish Dr. Kremer all the best in her new position as Dean of the University of Dayton School of Engineering, beginning in August.

After nine months in the interim role, I was greatly honored to be selected as the department's next chair. I'm privileged to be able to serve in this role and lead the department into the future. I know that we have many challenges and opportunities moving forward and I'm confident we'll be able to successfully navigate them. I'd like to recognize the support that the department's faculty and staff provide to our students, because our day-to-day operations just wouldn't happen without everyone doing their part.

The following pages also include stories about the accomplishments of our students and alumni as well as some great research projects and other initiatives led by our faculty. Of particular interest is that our Dr. Michael Dorneich, a specialist in Human Factors and Ergonomics research, has been promoted to full professor. You can read more about Dr. Dorneich and his research inside this magazine.

Our department's accomplishments would not be possible without the support from our students (and their families), faculty, staff, alumni, donors and other stakeholders. I hope you enjoy this magazine and are able to see the impact our department is having not only on campus, but across Iowa and beyond.

Go Cyclones!



Sarah Ryan

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

## Cover Photo Caption

A scene from the Adaptive Cognitive Systems Laboratory (ACSL) of Dr. Michael Dorneich. In this scene, two students operate the configurable, fixed-based flight simulator that can replicate the cockpit of multiple airplanes. This enables researchers to identify human factors and pilot performance considerations associated with specific new aviation technologies. ACSL focuses on cognitive engineering research issues in the design of joint human-technology systems that support human activity in complex domains. Dr. Dorneich was recently promoted to full professor  
*...read more about Dr. Dorneich and his research on page 19*

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# Sarah Ryan named chair of the Iowa State University Department of Industrial and Manufacturing Systems Engineering

**Sarah Ryan** has been named the C.G. “Turk” and Joyce A. Therkildsen Department Chair of Industrial and Manufacturing Systems Engineering at Iowa State University. Ryan served as the recent interim department chair and her permanent appointment took effect in March.

Ryan is an accomplished scholar, teacher and decision-maker who will bring great energy to this position. She will continue to advance the department with her vision, leadership and creativity. “Sarah is passionate about providing students the highest quality education,” said **W. Samuel Easterling**, dean of the College of Engineering. “Working closely with faculty and staff, Sarah plays a vital role in developing our future engineering leaders who will make an impact in their communities around the world.”

Ryan has a combination of both academic and industrial experience. While pursuing her doctorate degree she was an intern for General Motors Research Laboratories where she developed new product program investment strategies. She also consulted for Homart Development Company (a subsidiary of Sears Roebuck and Company) and worked in the Eastman Chemical Company’s management engineering services group. Her first tenure-track faculty appointment was at the University of Pittsburgh. She then spent four years at the University of Nebraska-Lincoln prior to joining the Iowa State faculty in 1999. She also served as a visiting associate professor at the University of Auckland in New Zealand.

In addition to serving as the IMSE interim chair two different times, Ryan was also the department’s associate chair of research and director of graduate education. She currently directs the DataFEWSion Graduate Traineeship at Iowa State – a program focused on research at the nexus of food, energy and water systems.



Ryan

Ryan’s research examines the planning and operation of manufacturing, energy, and service systems under uncertainty. Currently, she is focusing on supply chain design for distributed manufacturing and renewable energy integration. Methodological issues under study by her research group include the assessment of input reliability and solution quality in stochastic programming models for optimization under uncertainty. Ryan has received a number of prestigious honors during her career including an NSF CAREER Award and the Wellington Award from the Institute of Industrial and Systems Engineers (IISE). She holds the rank of Fellow in IISE and has also been elected to Sigma Xi, the Scientific Research Honor Society. She previously served as editor-in-chief of *The Engineering Economist* journal.

“I am excited about this new opportunity to serve as the permanent department chair,” Ryan said. “I’m looking forward to sharing my vision and contributing to the excellent reputation of the college. My leadership experiences in the department, interdisciplinary research projects and industrial engineering scholarship will help support the department moving forward.”

Ryan received her bachelor’s degree in systems engineering from The University of Virginia, and her master’s and doctorate in industrial and operations engineering from The University of Michigan. Her teaching at Iowa State has focused on engineering economic analysis, stochastic modeling and optimization under uncertainty.

The Iowa State IMSE department was officially established in 1929 and has been a leader in providing students with a classical industrial engineering foundation, while also engaging in discovery and outreach to prepare them for the careers of tomorrow.



# Building for the Future

## New Industrial Engineering Facility Made Possible Because of Generous Support from C.G. “Turk” and Joyce A. McEwen Therkildsen

The history of industrial engineering at Iowa State dates back to 1919 with courses on time studies, industrial organization, factory planning and scientific management. This early curriculum led to the establishment of the Department of General Engineering in 1929. In the 1946-47 academic year, the department started offering industrial engineering as an option. In 1956, the Department of General Engineering was renamed the Department of Industrial Engineering. In 1989, the Industrial Engineering faculty requested that the department's name be changed to Department of Industrial and Manufacturing Systems Engineering. This name change, and the increased “emphasis on manufacturing recognized the growing importance of a strong engineering base for America's manufacturing industries.”

Today, this department is a top-ranked program enrolling more than 500 undergraduate and graduate students and is a premier destination for education and research in all major subfields of industrial engineering: advanced manufacturing, operations research and analytics, and human factors engineering.

The department is about to take a historic step forward in its ability to educate professionals ready to pursue creative solutions to today's challenges and move our economy forward.

Thanks to a \$42 million gift commitment from **C.G. “Turk” and Joyce A. McEwen Therkildsen**, the department will have a new facility that will serve as its home and provide technically enhanced research laboratory and learning spaces where industrial engineering students can gain the knowledge to design tomorrow's innovative, nimble and intelligent processes needed now more than ever across all industrial sectors.

“In a field that is ever evolving and advancing, the department has remained focused on providing the highest standards of excellence in teaching, research, service and professional



*C.G. “Turk” and Joyce A. McEwen Therkildsen*

practice,” said **Gül E. Kremer**, who recently transitioned from her role as the inaugural C.G. “Turk” and Joyce A. Therkildsen Department Chair in Industrial and Manufacturing Systems Engineering. “Turk and Joyce value this focus, and their support to the department has increased over time. I met Turk and Joyce five years ago, and our interactions since then impacted the way I led IMSE. We share a commitment to excellence, the courage to think big, and a desire to preserve old-fashioned values such as hard work and loyalty. This transformational gift makes me excited to see its impact on future generations

of Cyclone Industrial Engineers and how they in turn will impact the profession and the world.” In her new role, Kremer serves as the senior director of presidential projects in addition to her position as Wilkinson Professor in Interdisciplinary Engineering. Kremer worked closely with Turk and Joyce in her time as chair, and she will now take the lead role in overseeing this project.

*General Engineering (a predecessor to Industrial Engineering) Professor Forest C. Dana works with a student in a drafting class around 1934. Photo courtesy of Iowa State University Special Collections and University Archives.*



As it is currently envisioned, the estimated \$54 million building project will offer more than 77,000 square feet of space located southwest of Howe Hall on the Iowa State campus and will be designed to complement the current aesthetics of the university's engineering corridor.

"Iowa State alumni know that our educational excellence creates a solid foundation for future achievements," said Iowa State University President **Wendy Wintersteen**. "This transformational investment by two extraordinary alums, Turk and Joyce Therkildsen, helps to solidify Iowa State University's prominence in engineering and to prepare our students for success in an increasingly complex, technology-driven world. We are grateful for their generosity."

The building will be named "Therkildsen Industrial Engineering" in honor of the Therkildsens.

"It's not every day a college is so fortunate to have an amazing project like this come to life due to the generosity of such passionate donors," said **W. Samuel Easterling**, the James L. and Katherine S. Melsa Dean of Engineering. "This facility will be transformative and elevate the prestige of our entire college even further. This investment in our students will provide learning opportunities to inspire and create innovation for our future engineering leaders who will make a difference in their communities and around the world. We all greatly appreciate the Therkildsens' leadership and commitment."

The building will enrich the department's ability to provide hands-on, experiential learning to undergraduate and graduate students through advanced teaching and research laboratories available nowhere else on the Iowa State campus. This includes:

- An advanced manufacturing laboratory to train engineers for the Industry 4.0 era
- A human factors and ergonomics teaching and research laboratory
- Data intensive engineering analysis and visualization laboratory for teaching and research

"Investment in these laboratories would be noteworthy for the industrial engineering community and for all our industrial stakeholders," Kremer said. "With a building that provides space for these and other similar innovative efforts, the department will be poised to further expand its industry interactions in Iowa and beyond. This building will allow



*IE Chair Joseph Walkup teaches a plant design class in the 1950s. Photo courtesy of Iowa State University Special Collections and University Archives.*

us to generate new knowledge contributing to the economic prosperity of our state and to the advancement of society."

The building will also feature flexible space and an inclusive, collaborative environment that integrates teaching, learning, research and innovation and can be adapted to the evolving needs of the university environment and the industries the department serves.

The Therkildsens' committed lead gift is part of their enduring relationship with Iowa State. Members of the class of 1959, C.G. "Turk" Therkildsen is an industrial engineering alumnus, and Joyce A. McEwen Therkildsen graduated with majors in zoology and physical education.

"We feel strongly about investing in the future of industrial engineering at Iowa State. Joyce and I continue to be impressed with the quality of an Iowa State industrial engineering education, and the visionary leadership demonstrated by the department and university," said C.G. "Turk" Therkildsen, who is the semi-retired CEO and Chairman of Industrial Hard Chrome based in Geneva, Illinois. "Providing a state-of-the-art facility is one of the best ways to ensure the department is able to evolve and expand as the professional field advances."

*The Therkildsens made their gift commitment through the Iowa State University Foundation. The foundation is a private, nonprofit organization committed to securing and managing gifts that benefit Iowa State University. For more info Visit, [foundation.iastate.edu/](http://foundation.iastate.edu/)*





# The Power of Love, Education and an Entrepreneurial Spirit

It's a moment in life you don't forget.

**C.G. Therkildsen** was at the Iowa State library the fall of 1956 at his Sig Ep fraternity study table when he noticed a beautiful co-ed sitting across the aisle at the Delta Delta Delta sorority study table.

It was **Joyce McEwen**, and "Turk," as his friends call him, had just set eyes on the love of his life. Their first date was a Coca-Cola date at the Memorial Union.

As a student from Harlan, Iowa, Turk was an aspiring football player who came to Iowa State with the assistance of a football scholarship.

But his dreams of becoming a Division I player evaporated his sophomore year. "I discovered that my wheels were not Division I speed."

He also discovered the electrical engineering curriculum didn't match his desire for a much broader engineering foundation. So, he changed his major and enrolled in industrial engineering.

Joyce, who came to Iowa State from her hometown of Zion, Illinois, also changed majors. She first pursued pre-veterinary medicine courses, and later switched to a double major in zoology and physical education. During her junior year she greatly enjoyed being an Iowa State cheerleader for ISU sports.

Aside from their studies, Turk and Joyce were both involved in Greek life, with Turk pledging Sigma Phi Epsilon and Joyce pledging Delta Delta Delta. Greek life included grade point pressure, intra-personal development, frequent social events, formal dining etiquette and lifelong friendships. Joyce and Turk were married on August 31, 1957, and later lived in historic Pammel Court, which was a wonderfully memorable experience and a short walk to class.

Not only did the two find love at Iowa State, they discovered the true power of education and hard work.

"Iowa State shaped our work ethic," Turk said. "It was known as a tough university. We learned integrity, character, tenacity and drive that have served us ever since. We are indebted to many – our coaches and many educators and professors."



*Joyce A. McEwen  
Therkildsen*



*C.G. "Turk"  
Therkildsen*

Turk applied these lessons to his core course work and electives in advanced Air Force ROTC earning a private pilot certificate on May 26, 1959. Joyce was his first passenger and it was her first flight. Prior to graduation, the Air Force requested an increase to Turk's three-year service contract to five years, which he declined. Years later he acquired the coveted Airline Transport Pilot rating in a Citation jet and the Citation single pilot rating. He retired after 48 years of flying with over 4,000 hours of flight time and Joyce nearly 2,000 hours as his co-pilot.

After graduating, the couple moved to Zion, Illinois, and their second daughter was born. Turk started in Plant Layout at Johnson Motors Division of Outboard Marine in Waukegan, Illinois. Four years later he entered Northwestern University's MBA program. "My capacity to graduate from Northwestern was enabled by my Iowa State work ethic," said Turk, who, by the end of the program, had commuted the equivalent of the world's circumference by train to attend classes in Chicago, while also working full time in Waukegan. Turk completed the graduate business program early because the university granted him credit for courses he had taken at Iowa State.

Joyce also attended graduate school at Northwestern, receiving a Master of Arts degree just a year after Turk received his MBA. She had been a junior high teacher in Zion, and later a high school teacher and coach in Waukegan, before taking a teaching and coaching position in Arlington Heights, Illinois. She has since retired from teaching.

In 1968 Turk became Plant Manager at Parker-Hannifin, and in 1974 joined Industrial Hard Chrome now based in Geneva, Illinois, as a shareholder and General Manager. He and Joyce purchased the company on October 25, 1985. Turk remains as CEO and Chairman of the Board and Joyce is Corporate Secretary.

Among his many honors, Turk received the Joseph K. Walkup Prominence in Engineering Award in 2019 from Iowa State's Department of Industrial and Manufacturing Systems Engineering. This prestigious award recognizes outstanding achievements of Iowa State alumni and friends in the industrial engineering profession.

Both he and Joyce say they owe much of their success to their foundation at Iowa State, and that is why they have chosen to give back to the Department of Industrial and Manufacturing Systems Engineering over the years.

**WATCH:**

[imse.iastate.edu/therkildsen-story-video/](https://imse.iastate.edu/therkildsen-story-video/)

"The department provided me with an education that's had a profound impact on my life and career," Turk said.

They established the C.G. "Turk" and Joyce A. Therkildsen Department Chair in Industrial and Manufacturing Systems Engineering in 2016 and the C.G. "Turk" and Joyce A. Therkildsen Professorship in Industrial and Manufacturing Systems Engineering in 2018.

In addition to their support of students, faculty and programs at Iowa State, the couple help foster a connection between Iowa State and students from Harlan, Iowa, who want to attend the university.

Most recently, they have committed the lead gift of \$42 million to the proposed new Department of Industrial and Manufacturing Systems Engineering facility.

"In real estate it's often said the three most important factors are location, location, location," said Turk. "Joyce and I see the three most important factors in life as education, education, education."

***"The department provided me with an education that's had a profound impact on my life and career."***

***~C.G. "Turk" Therkildsen***



**C.G. "Turk" and Joyce Therkildsen met at Iowa State University as students in 1956.**

**For regular updates about the building project, visit:**

***[engineering.iastate.edu/therkildsen-building/](http://engineering.iastate.edu/therkildsen-building/)***

## **Peters receives industry award for metalcasting research**

**Frank Peters**, C. G. "Turk" and Joyce A. Therkildsen Professor, ended 2021 on a strong note by winning a prestigious industry award for his research in metalcasting.

Peters, who also serves as the director of Iowa State University's Study Abroad Center as well as an associate professor in industrial and manufacturing systems engineering (IMSE), is the 2021 recipient of the Thomas E. Barlow Award of Honor from the Steel Founders' Society of America (SFSA). Peters was recognized with this honor during the 2021 National T&O Conference which took place in Chicago, marking the 30th T&O Conference that Peters has attended. The Barlow Award is one of SFSA's three top honors and aims to recognize individuals who have gone above and beyond the call to support the steel casting industry but are not eligible (an employee of a member company) for SFSA's other awards.

"This recognition is especially meaningful as it demonstrates that our research to improve the competitiveness of metalcasting operations is valued by industry," Peters said.

As part of this award, a scholarship in Peters' name will be set up at Penn State University's Behrend campus in Erie, Pa. Peters, who is originally from the Erie area, spent two years at Behrend as an undergraduate prior to transferring to Penn State's University Park campus where he completed his B.S. in industrial and manufacturing engineering. He went on to also complete his M.S. and Ph.D. in the same field from Penn State. It was during his graduate studies that he began research with the metalcasting industry.

Peters joined the IMSE faculty at Iowa State in 1996. He teaches classes in manufacturing processes and systems, and the central theme of his research has been manufacturing system improvements and reducing measurement error.



*Frank Peters (right), C. G. "Turk" and Joyce A. Therkildsen Professor, poses with Max Holman, President of the Steel Founders' Society of America.*

# Ashley Sackpraseuth:

## Fall 2022 College of Engineering Student Marshal

**Hometown:** Des Moines, Iowa

**Clubs and activities:** Iowa State University Cyclone Football 'Varsity' Marching Band, IMSE student ambassador, undergraduate research assistant, undergraduate teaching assistant, Engineering Global Friends, Cultural Ambassador Program, Tau Beta Sigma, Alpha Pi Mu, Tau Beta Pi

**Awards and honors:** Stanford Center for Asian Health Research and Education Scholar, George Washington Carver scholar, Cyclone Marching Band Jayne Larson Award, Outstanding Achievement in Third Year Chinese, Overall Best Graduate Research Project, College of Engineering Dean's List

**What would you consider your greatest accomplishment at ISU?**

I've done a lot of cool things during my time at Iowa State, but my greatest accomplishment has been starting the Cyclone Marching Band Diversity, Equity, and Inclusion scholarship. The scholarship fund was created to provide future members the opportunity to be a part of the organization that shaped me into the leader I am today. The scholarship will provide housing and food support and will be funded by the proceeds from an annual 5K launching this spring.

**Who was your most influential mentor while at Iowa State and why?**

My most influential mentor at Iowa State has been **Leslie Potter**, teaching professor of industrial and manufacturing systems engineering. I could write an entire essay about Leslie, but thankfully she taught me efficient and concise communication practices (another thing I have to thank her for). In a few words, any student who has had Leslie can attest that she goes above and beyond to support her students. Her passion for connecting with students and helping them reach their career goals is unmatched.



**What are your plans for after graduation?**

I will be starting my career as a process improvement engineer at UnityPoint Health – Des Moines. I will serve as a member of the Health Equity Committee and Young Advisory Council. In addition, I will be traveling to Orlando, Florida, in January to present about health equity at the 2022 Healthcare Systems Process Improvement Conference.

**What's the mark you're looking to leave on the world as an engineer?**

My life philosophy is to leave things better than I found them. Through my research experiences and internships, I found my calling using engineering in the healthcare industry. I

find working to help people so meaningful because every person has a story to tell, and sharing it has the potential to change the world. My knowledge of efficiency and flow will help me to multiply the number of lives saved in hospitals – the lives of future history makers. By continuing their stories, the world continues to evolve into a place better than the one we found it as.

**What's unique about the Cyclone Engineering student experience?**

What's unique and awesome about the ISU engineering experience is that it took me to places I never thought were possible. I was able to veer off the traditional engineering path and follow my passions to create my own adventure: study halfway across the world, do research at my dream school, and find my dream job. I'm extremely grateful for the endless support I've received at Iowa State and the opportunities I've been given to grow as a leader.



# Landon Getting:

## Spring 2022 College of Engineering Outstanding Graduating Senior for Industrial Engineering

**Hometown:** Fort Dodge,  
Iowa (Go Dodgers!)

**Clubs and activities:** Institute of Industrial & Systems Engineers (IISE), Rapid Manufacturing Club, Alpha Pi Mu, Tau Beta Pi, Peer Mentor for the Industrial Engineers Are Leaders (IDEAL) Learning Community, Peer Mentor for the First-Year Honors Program, Iowa Statesmen Choir, undergraduate research assistant, undergraduate teaching assistant

**Valuable hands-on learning experiences:** Working as an undergraduate research assistant taught me to think differently and introduced me to new skills outside my regular classes. I

am so grateful to learn from such a talented and fun research team, even if they later crushed me in intramural sports.

**Influential mentor:** I can vividly recall nervously walking into **Frank Peters'** office during my first year to discuss potential research projects. A few semesters later, I realize that our conversation must have gone well because he ended up hiring me as an undergraduate research assistant, an undergraduate teaching assistant, and recently as a graduate research assistant.

Dr. Peters, associate professor of industrial and manufacturing systems engineering, has been an inspiring role model, research mentor, and professor for me throughout my undergrad. His mentorship has truly been life-changing – not to mention his legendary BBQ.

**Greatest accomplishment:** Helping new students during their transition to Iowa State. I struggled during the initial weeks of my first semester, and I am so thankful for amazing peer mentors who provided reassurance and answered my many questions.

Through the Industrial Engineering and Honors learning communities, I had the opportunity to mentor over 40 students and make an impact that will last beyond my time at Iowa State.



**Plans for after graduation:** I will be heading to Austin, Texas, this summer to intern at Tesla! I will be joining the Production Control team at the Gigafactory as a Process Engineering Intern. After the internship, I will return to Iowa State to continue research and complete my master's degree in industrial engineering.

**Leaving my mark on the world:** I believe our class of engineers has the talent and responsibility to create a better world for future generations. As a student in industrial engineering, I have learned how we can design efficient systems to better conserve our resources. While working on sustainable solutions, I hope to inspire other engineers to strive for their goals and improve the lives of people in their communities.

**Engineering like a Cyclone Engineer:** Cyclone Engineers have the opportunity to innovate through challenging projects and meeting amazing people.

There are so many engineering student organizations, research groups, and class projects that provide a diverse range of experiences to match your interests. By graduation, Cyclone Engineers have the knowledge and collaboration skills to make the world a little more awesome.

# Cyclone engineers take to the sky for advanced manufacturing research



*From left: Pavithra Premaratne, Fei Liu, Li Yu, Shan Jiang, Matthew Marander, Hantang Qin, Liangkui Jiang, Juan Ren, Tyler Kirscht, Charchit Shukla, Yanhua Huang and Xuepeng Jiang.*

A team of Iowa State University College of Engineering researchers recently experienced something that few ever will: a zero-gravity environment.

The research team, led by **Hantang Qin**, assistant professor in industrial and manufacturing systems engineering (IMSE), and **Shan Jiang**, assistant professor in materials science and engineering (MSE) who has a courtesy appointment in IMSE, set out to test the novel 3D printing process they developed in a zero-gravity environment. They developed this process in recent years inside Qin's Flexible Electronics and Additive Printing Laboratory on the Iowa State University campus leading up to the zero-gravity test flight, which took place at the Fort Lauderdale International Airport, Zero Gravity Corporation's (Zero-G) research operations base, in Fort Lauderdale, Fla. in December. The team has dubbed their effort **NINJAS – No-Gravity INk Jet Printing for Aeronautics and Space**.

"The main goal of our experiment was to print a conductive circuit pattern in microgravity," said Qin. "We tested multiple types of ink with different material properties, such as density, surface tension and permittivity, while pinpointing the optimal operating conditions, including voltage, pulse frequency and nozzle orientation."

With the help of NASA's Flight Opportunities program, the team has developed brand new ways to synthesize silver and barium titanate inks (patent pending) and successfully print those inks to a glass substrate during the test flight. These particular inks are desirable for their applications in printing electronic devices, including general circuitry, capacitors and humidity sensors, according to Qin and Jiang. The team hopes that the findings from this research might improve the manufacturing of flexible sensors, soft robotics, circuit boards, semiconductors and other micro-scale electronic devices on earth as well as in space.

Qin is the project's Principal Investigator (PI) and he is supported by Co-PIs Shan Jiang; Juan Ren, associate professor in mechanical engineering; and Pavithra Premaratne, an Iowa State University aerospace engineering alumnus who currently serves as an assistant professor of physics and engineering at Central College in Pella, Iowa. The mechanical and industrial engineering team handled the development of the in-space printer, while the materials engineering team developed the inks used for testing.

"My students helped in the design and assembly of the new inkjet printer, hardware-wise," said Ren. "Also, we designed the software of the printer, including signal routing, stage motion control and user interface."

Qin said vibrations from the aircraft transferring to the 3D printer onboard was one of the biggest challenges the team faced. Vibrations from the aircraft engine coupled with the turbulence caused disruptions to the nozzle of the 3D printer while in operation. The team attempted to recreate these vibrations in the months leading up to the test flight by operating the printer while driving a car around Ames. Qin said the team was able to overcome the obstacles that the vibrations presented during the test flight by adjusting factors such as the voltage of the electric field and distance from the printer nozzle to the glass substrate. Adjusting the pulse frequency also alleviated some of the vibration-induced issues.

Adapting to the physical sensation of a zero-gravity environment was another challenge the researchers faced. Qin said motion sickness medicine helped them to deal with the nausea caused by the zero-gravity environment and he compared the sensation to "operating a printer while literally jumping off a 30,000-foot building." Matthew Marander, a Ph.D. student in MSE, said the sensation was like being in a pool, but with less to push against.

*continued on page 11...*





"The zero-gravity environment wasn't even that difficult to adjust to the feeling of," said Marander. "What I felt was more difficult to deal with was the feeling of rapid transition between hyper-gravity, the normal gravity and zero-gravity. Switching between all of them so quickly can feel a little bit disorienting."

Qin said he was grateful to have a diverse, interdisciplinary team of researchers for the project, which he feels has helped to contribute to its success so far.

"Diversity triggers innovation and competitiveness, which benefits all individuals involved in the learning process," said Qin. "Learning with people from a variety of backgrounds elevates collaboration, encourages hard work and builds an energetic setting for new ideas."

This work builds upon past research Jiang and his Soft Matter and Nano Engineering Lab have conducted in the area of nanoparticle synthesis and material formulation, and it also

advances past work Jiang and Qin have done through the NASA Iowa Space Grant Consortium and the Iowa NASA EPSCoR Research Building Seed Grant program. Qin and the team are grateful for the support they received from Tomas Gonzalez-Torres and Kelsey Mueller with Iowa NASA EPSCoR as well as from Zero Gravity Corporation, NASA's Space Technology Mission Directorate Flight Opportunities program and the NASA Marshall Space Flight Center.

The team returned to Florida in May 2022 for another test flight.

"We want to help NASA develop a platform that can greatly expand the materials and devices they can make in space," Jiang said.

Additionally, they hope to develop a nozzle head to be used for NASA's International Space Station printer before 2024.

"In the future, we aim to improve the structural integrity of the setup and test different ink combinations to improve the print quality and functionality," Qin said.



# IE's Tokadlı named Fall 2021 Graduate College student marshal

For the second semester in a row, a College of Engineering student has been selected as the Graduate College's student marshal and during the Fall 2021 semester that honor went to **Güliz Tokadlı**, a Ph.D. candidate in industrial engineering and human-computer interaction.

"I felt proud of my work," said Tokadlı. "The news that I was receiving this honor brought me joy because the Graduate College was recognizing my hard work,"

Tokadlı's graduate school experience differs from most doctoral students in that she is working full-time while pursuing her Ph.D. In September 2021, she started working as the human factors lead at Locomotion, a company developing human-guided autonomous trucking technology. Prior to that, while still a Ph.D. student, she worked as a user/operator experience researcher at Uber's Advanced Technology Group, Uber's self-driving division.

In her work, she applies the skills and knowledge she has developed through both the curriculum and her graduate research, which focuses on human-autonomy teaming development and characteristics, specifically in commercial flight operations and long-distance human space missions. Several of her projects, which have been overseen by her advisor, **Michael Dorneich**, professor in industrial and manufacturing systems engineering, have been funded by the Federal Aviation Administration's Partnership to Enhance General Aviation Safety, Accessibility and Sustainability as well as Collins Aerospace.

"By being exposed to a variety of projects, I was able to develop experience and background in sensor technologies for flight vision systems and human-autonomy teaming," Tokadlı said.

Her dissertation research relies heavily on human-in-the-loop experiments and modeling data using various human factors methods, such as work domain analysis and decision-action diagrams. She said Dorneich's IE 672: Human Factors in Automation Design course has been perhaps her most impactful class as a graduate student at Iowa State.

## How she got here

Tokadlı attributes her interest in the STEM field to her father, Eser Tokadlı, a parachutepilot and aerospace enthusiast back in her home country of Turkey. While she initially wanted to join the Turkish Air Force, she discovered her passion for astronautical engineering as an undergraduate at Istanbul Technical University.

She was part of an undergraduate research project that examined human factors in the flight deck.

After graduating with her B.S. in astronautical engineering, she pursued her M.S. in aerospace engineering, with a focus on cognitive systems engineering, from Georgia Tech. As a master's student she expanded upon the research she did as an undergraduate. Her advisor, Karen Feigh, was familiar with Dorneich's research at Iowa State, so she encouraged Tokadlı to consider studying

under him for her doctoral degree. Tokadlı connected with Dorneich and he brought her into his lab in January 2016.

"After living in the south, the Iowa winter hit me hard but I was surrounded with really nice people who gave me a warm welcome which helped me to adapt quickly," she said.

When the weather is nice, Tokadlı enjoys spending time outdoors, particularly playing tennis and going hiking. An Alaskan Malamute puppy, Palamut, joined her family in 2020 and has quickly become a "hiking buddy."

"Hiking with Palamut is not only fun but it gives me an opportunity to truly appreciate the beauty of the natural world," Tokadlı said, adding she has also recently developed an interest in mixology.

## Reflecting on her time at Iowa State University

As her time at Iowa State University winded down, she fondly remembered the "coffee breaks" with her colleagues and friends on campus.

"Whenever I felt overwhelmed or stuck in some point of research or my friends felt the same way, 'coffee break' was our code to distract ourselves or walk around the campus. It was a nice way of handling moments of stress," Tokadlı said.

For any other young, aspiring engineers from Turkey, or anywhere else in the world for that matter, Tokadlı encourages them to consider Iowa State University.

"Iowa State offers an environment for collaboration," she said. "As a grad student, you will be able to work on projects with people from different disciplines that supports professional growth."





# New program combines IE with navy engineering analytics

Faculty in the Department of Industrial and Manufacturing Systems Engineering (IMSE) are developing a new program to provide students with the knowledge and skills to pursue careers in the U.S. Navy and adjacent paths.

A group of IMSE researchers recently received a \$520,000 grant from the Office of Naval Research's STEM Education and Workforce Program to establish the Navy Engineering Analytics Program (NEAP), which they intend to eventually become a minor program administered through the IMSE department. NEAP is a unique education and training program that exposes talented undergraduate students at Iowa State University to technical coursework applicable to the Navy. The program will also provide opportunities for the students to work directly with professionals who are solving challenging Navy problems.

"NEAP will help students develop analytical skills with naval applications and relevance by offering courses in crisis decision making and mitigation, modeling simulation and forecasting, design and evaluation in human-computer interaction, and a capstone course with projects relevant to the Department of Defense," said **Cameron MacKenzie**, assistant professor in IMSE who is also serving as the project's principal investigator (PI).

Courses through this program will teach analytic skills applicable to a wide range of areas while incorporating Navy applications, problems and case studies. The program aims to prepare students for internships with Navy-related entities such as the Office of Naval Research, the Naval Postgraduate School and the Naval Air Systems Command as well as with Department of Defense-related (DoD) companies such as Collins Aerospace, Boeing Defense Systems and Northrup Grumman.

The program will build upon the IMSE foundation in areas like operations research, human factors and systems engineering. Students will develop skills in decision making, risk mitigation, designing and evaluating human-computer interaction (HCI) systems, modeling and forecasting with uncertainty and data science.

"These skills are applicable to many different industries but the program will focus on how to apply these skills specifically to tackle Navy and defense problems," MacKenzie said.

MacKenzie will be supported by a team of co-PIs, all of whom are on the IMSE faculty, who will each teach different courses and modules. **Michael Helwig** and **Brendan Devine** both have military experience and understand how this knowledge is applied in real-world situations. **Michael Dorneich** is an expert in HCI and teaches a course on designing and evaluating HCI systems.



Cameron MacKenzie



Brendan Devine



Michael Dorneich



Michael Helwig



Qing Li



Sarah Ryan

**Qing Li** and **Sarah Ryan** are experts in mathematical models, statistics and dealing with uncertainty in data. MacKenzie will focus on decision analysis and risk management.

"My goal is to give students exposure to analysis methods, specialized organizations, and complex systems that they may not otherwise have access to with traditional internships. This is a world-class networking opportunity as well as a multi-faceted introduction to the intersection of government, military, academia and corporate players," Devine said.

Devine, who served in the U.S. Air Force, said that having DoD experience will be beneficial when teaching the students about the practical application of the skills and knowledge they develop through the program.

"Many DoD employers put new hires in test and evaluation positions for a first assignment," he said. "It leverages the enthusiasm of a younger, more junior engineer while exposing them to the functionalities of the system they will be working on. It's truly a choice job; you get to play with a new system before anyone else and therefore you will be the default subject matter expert. Then, a lot of attention and opportunities will come your way."

NEAP is open to any undergraduate student at ISU, and particular emphasis will be placed on recruiting female undergraduate students and veterans. The program is mainly aimed at engineering and business students, and program organizers hope that scholarships will eventually be available for select students. They plan to offer the first course for the program in Fall 2022. Devine thinks that this program can fill a void that is currently vacant.

"I believe there's a real need for this type of course in engineering," said Devine. "Not all engineering roles in society revolve around production, design or mathematical models. Some are more of an operational role that doesn't tie to a specific discipline, but engineers can play a critical role in the planning and execution of large-scale policy."

# IE friends now work for competing companies

A pair of industrial engineering students who befriended each other at Iowa State University have now gone their separate ways as they've gone to work for competing window manufacturers after graduation.

**Mackenzie Bochart** and **Kasey Sutton** first met their freshman year. They lived a couple doors down from one another in Friley Hall and took LD ST 270: Campus Leadership Development together. They eventually both pledged to Alpha Sigma Kappa, a social sorority for women in technical fields, and considering they were both pursuing majors in IE, they became study buddies and even friends outside of the classroom.

Though each woman had a different path for getting to Iowa State, they both shared a passion for STEM before they even arrived on campus. Bochart grew up in Washington, Ill. and developed an interest in engineering after having the opportunity to shadow female engineers at Caterpillar. Sutton, meanwhile, grew up in Wayland, Iowa and really enjoyed her high school calculus, chemistry and physics classes, which were taught by an Iowa State University chemical engineering alumnus.

Bochart and Sutton were both attracted to Iowa State because of its strong reputation for engineering. Bochart initially declared a major in mechanical engineering before an internship experience led her to rethink her career goals.

"I had an internship with Sukup Manufacturing Company as a quality engineering intern where I performed continuous improvement projects. I fell in love with the ability to improve a manufacturing process and saw a home for myself in IE," Bochart said.

Sutton, meanwhile, just felt that IE better aligned with her strengths and aspirations.

"I picked IE as my major because I love people – IE is often referred to as social engineering – and I enjoy organizing," said Sutton. "IE is heavily focused on the operator and how things flow together or need to be laid out."

Both Bochart and Sutton said I E 222: Design & Analysis Methods for System Improvements was helpful in providing them with terminology and other baseline knowledge that they have applied to higher level courses and even to co-ops and internships. Sutton also said that her I E 271: Applied Ergonomics and Work Design course with **Gary Mirka**, John Ryder Professor, has been especially valuable.



"That class focused on the physical health and limitations of operators and I spent my entire co-op with Pella focusing on the mental limitations of operators," said Sutton. "It was interesting to dive deeper into what an operator experiences."

Bochart said she's taken a lot from I E 441: Industrial Engineering Design, or senior capstone, with **Dave Sly**, teaching professor.

"Senior capstone has allowed me to think like an industrial engineer, and Dr. Sly has been pushing me to my limits, which has allowed me to do more than I ever thought I was capable of doing," Bochart said.

The two have also built a close bond with **Mike Helwig**, associate teaching professor, and

consider him to be a mentor. Bochart said she appreciates that Helwig is constantly challenging her to find ways to improve, while Sutton said she likes how inviting he is and always got even the shyest students to come out of their shells. The two also like to remind Helwig that they are undefeated in bags/cornhole (the popular lawn/tailgating game) against him. Helwig jokingly disputes the claim.

The two women said the final weeks of the Fall 2021 semester were bittersweet as they were both excited to graduate and take the next step in their lives, but they were sad knowing that after college they will not see each other every day. Bochart completed her B.S. in IE in December 2021 and moved to Dubuque, Iowa to work as an associate engineer in the manufacturing engineering department with Anderson Corporation.

"I will miss being around my sisters in Alpha Sigma Kappa the most. I have created a tight bond with many of them and will miss being close enough to go to events consistently. I do plan on coming back to Ames every so often to visit my sorority sisters," Bochart said.

Sutton graduated in May 2022 and afterward moved to Pella, Iowa where she will work as a process engineer for Pella Corporation. For Sutton, this will be a bit of a homecoming since she previously interned at Pella and is familiar with the team she will join, but she said she will still hold her memories from Iowa State close to her heart.

"I'm really going to miss the community and all of my friends," she said. "I am also going to miss all of the social opportunities I get as an ISU student. I love homecoming and Greek week a lot. Even though it is probably the busiest week of the semester every time, it is so fulfilling to be part of."



# IE background sets up alum for a career in international communications

When deciding on a college major, **Grant Barton** wanted to find something that allowed him to balance his mathematical abilities with his passion for the arts. He found just that when he decided to pursue industrial engineering (IE).

Barton grew up in Cedar Rapids, Iowa and he enjoyed his math classes just as much as the courses he took in art and music. After performing in the Opus Honor Choir at Stephens Auditorium in 2011, Barton decided Iowa State University was the place for him.

"I fell in love with Iowa State's campus," said Barton. "It was autumn. It was gorgeous. My 14-year-old self was loving it."

Barton knew he wanted to be part of the Cyclone Marching Band in college. He spent three years in the clarinet section before becoming the band's photographer. It was through the band that he met, Rebecca Flicher, who influenced him to declare a major in IE. Flicher, who served as tour guide for prospective engineering students, described IE as "the people engineers" which appealed to Barton, who was a recipient of a Bright Foundation scholarship.

"Finally, I had found a major that combined my mathematical brain with my interpersonal skills," he said.

I E 222: Design & Analysis Methods for System Improvements with teaching professor **Leslie Potter** was one of the most impactful IE courses he took as a student. He said he appreciated Potter's ability to relate engineering concepts to everyday life across different scales. In addition, the course got him to think critically about the different ways he could apply IE concepts and methods in the areas that interested him, such as the performing arts. He applied aspects of process improvement and efficiency when he established a Kanban paper filing system through his work with ISU's Graduate College. As a student he also gave tours for The Engineering Ambassador and Mentor Program (TEAM) and worked with **Mike Helwig**, associate teaching professor in IE, to develop lecture presentations that would be accessible to all students regardless of ability.

Outside of his engineering work, Barton was also active in campus musical activities. He played in the marching and symphonic ensembles and was a member of the band service fraternity, Kappa Kappa Psi, ascending to the rank of president his senior year.

Barton completed his B.S. in IE in 2019 and returned to Cedar Rapids where he coached musical theatre at his high school alma mater, Cedar Rapids Kennedy, while applying for jobs. He founded his own photography company, Grant Barton Photography, in 2018 which he continues to operate today. He was eventually hired as



an elections office coordinator for Linn County, which allowed him to apply some of the knowledge he learned in the IE curriculum, such as utilizing value stream maps.

"I was mapping out the flow of product, in our case, the product was an election worker, and how the worker moved through the recruitment and training process, which was one of my key job functions," he said.

After about a year of working in county government, Barton experienced what he called a "mid-pandemic-quarter-life-crisis moment" and decided to pursue a graduate degree so he could find a career that more closely aligned with his passions. He was admitted into four graduate programs in the London area and ultimately decided to enroll in the international communication and development masters program at City, University of London.

"International communications and development has just as much to do with content creation as it does the distribution and purpose behind the content. Again, those organizational and project management skills that I developed through the IE curriculum at Iowa State are huge here," he said.

Barton plans to complete his degree in September 2022 and he said he hopes to find a job in London after graduation. Though he now lives on the other side of the pond, Barton fondly remembers his time in Ames. He said it's the simple things that he misses most, such as living close to his friends and just walking around the campus, especially in the fall since that was when he first fell in love with the place that he now proudly calls his alma mater.

# Engineering Innovation: Making parents' lives easier

A pair of industrial engineering alums have developed a product that will bring convenience and ease to parents and other caretakers when changing diapers on-the-go.

**Cameron Lynch** and **Danilo Manfre**, both of whom hold a B.S. in industrial engineering (IE) from Iowa State University, are the co-founders of Fin & Viola, a consumer-packaged goods company with an emphasis on “baby and mom” products. They currently have five different products for sale and a list of prototypes to develop in the future. Fin & Viola products are currently available through their website and the ISU Bookstore.

“Our products are designed to make your life easier,” said Manfre.

Their flagship product is the DubbleRoo™, which they say “provides peace of mind to every parent or caregiver who needs to change a diaper on-the-go.” Their product provides both a clean, durable surface on which to change baby’s diaper as well as a built-in pouch for storing a soiled diaper, without fear of leaks or odor, until it can be properly disposed.

The idea for their company first came about in Spring 2020 when they were part of the Entrepreneurial Product Development Club. Because of the strong relationship they had with the university, the duo decided to base their company in Ames with their office currently located in Iowa State University’s Research Park. The name for their company was inspired by one of their co-founders, who made up the characters of Fin and Viola, and would tell their imaginary stories when out on bike rides with his two young daughters.

“Fin & Viola means imagination, creativity and the idea that kids can grow to be anything they want,” Manfre said. “The dream behind Fin & Viola is to add value to the experience of being a parent. We want to create a brand that people turn to not only to buy products, but also for resources to make their experiences as parents easier and better.”

Their website features a series of blogs designed to provide information on various topics related to being a parent and interacting with babies.



*Cameron Lynch (left) and Danilo Manfre pose with their flagship product, the DubbleRoo™.*

The duo, who both said the beautiful campus is part of what attracted them to Iowa State, often take IE concepts and methods – such as project management, cost analysis, process improvement, quality control and rapid prototyping – and apply them to their business. Aside from this technical knowledge, the duo also emphasizes the importance of soft skills, such as developing good relations with suppliers and an ability to collaborate with individuals from diverse backgrounds.

Both Lynch and Manfre said they did not come to Iowa State with the intent of becoming entrepreneurs, but instead stumbled upon it through their coursework and other activities. Because of this, they encourage others with unique ideas to pursue their business dreams.

“Just know that whatever you do first may be wrong. And that is OK. What matters is doing it, failing, learning from it and doing it again. Understand that it won’t happen overnight and that if you don’t put hard work, consistency and discipline into it, it will not happen,” Manfre said.

Manfre also expressed the importance of not getting so consumed by your company that you forget to have a personal life. He said things like getting adequate sleep, eating healthy, exercising, and making time for your family, friends and hobbies will improve your work performance and will help to prevent burnout.

Lynch stressed the importance of good communication skills with every aspect of a business. He also encourages new entrepreneurs to continue to develop both professionally and personally by reading.

“Whether it be textbooks, books to learn from, or books to enjoy, just start reading,” he said. “I recommend the book *The Go-Giver* by Bob Burg and John Mann for anyone who wants to learn about what it means to give more than they take.”

While IEs are constantly focused on process improvement, Manfre also stressed the importance of the process when managing a company and developing products.

“Just enjoy the process, don’t stress too much about the finish line. Being exposed to an entrepreneurial environment provides huge growth, both professional and personal. Appreciate the journey,” he said.

# Finding a little slice of her Iranian homeland in Ames

Even though she now lives halfway across the world, one industrial engineering (IE) graduate student has found a little slice of her Iranian home here in Ames.

In addition to being a Ph.D. student in IE, **Motina Kashanian** also serves as treasurer of Iowa State University's Iranian Students' and Scholars' Association (ISSA). ISSA aims to bring together students from Iran and from Iranian families, or anyone else in the Ames area who has an interest in Persian culture and language. The group hosts regular meetings and special events to celebrate the history and culture of Iran.

Kashanian recently served as the master of ceremonies during the group's annual Norooz event, which marks the Persian New Year and the beginning of spring. Though the official Norooz holiday landed on the morning of March 20, the group hosted their event on March 22 at Cornerstone Church in Ames.

"We planned several fun activities for the around 160 participants, which included traditional Iranian food, a live musical performance, three different types of Persian dance performances, a trivia game and more," said Kashanian. "Together we made some wonderful memories and wished each other an amazing year ahead."

Kashanian grew up in Tehran, the capital of Iran. She always had an interest in "discovering how things work" and studied IE as an undergraduate at Amirkabir University of Technology – Tehran Polytechnic in Iran's capital city.

"This experience opened my eyes to the excitement and wider benefit of mathematical programming and the art of translating problems from an application area into tractable mathematical formulations," she said.

After completing her B.S., she went across town and pursued her M.S. in IE from the Iran University of Science and Technology where she specialized in macroeconomic systems and renewable energy. Through her research she developed a robust sourcing plan for a sustainable biomass portfolio using multi-stage stochastic programming.

She knew she wanted to dive even deeper into this field after completing her M.S., so she applied to and was admitted into Iowa State University's Ph.D. program in IE. She was attracted to what she saw as a "great educational environment" at Iowa State, which included strong faculty who conducted research in her field as well as opportunities for both networking and the ability to gain real-world experience by working with external companies.

Kashanian works in the lab of **Sarah Ryan**, a professor of IE who was recently named the C.G. "Turk" and Joyce A. Therkildsen Department Chair. They are currently working on a NSF-funded project that examines the supply chain design of particular types of chemicals from biomass using mathematical modeling and optimization under uncertainty. Kashanian is also a trainee with the DataFEWision program, which is overseen by Ryan.

To unwind after a busy day, Kashanian said she likes to work out at the campus recreation facilities to maintain both her physical and mental health. She also enjoys music, movies and sports, and recently started taking online singing lessons.

Having come from the big city of Tehran, with a population of more than eight million people, she said she's grown to appreciate the tranquility of Ames. She has found the public transportation makes it easy to get around town and appreciates that the people are "nice, warm and welcoming." She admits that adapting to the cold, snowy winter has been one of the biggest challenges she has faced since living in Ames.

"In the last days of September, that famous Game of Thrones quote kept running through my head: Winter is coming," she said with a laugh. "However, the spring has now come. I am looking forward to longer and warmer days."

Kashanian plans to complete her Ph.D. in 2025. She hopes to pursue a career in academia after graduating. In addition to advancing research and teaching in the field of operations research and artificial intelligence, she hopes to also serve as a supportive role model to encourage other young women to pursue studies in STEM.

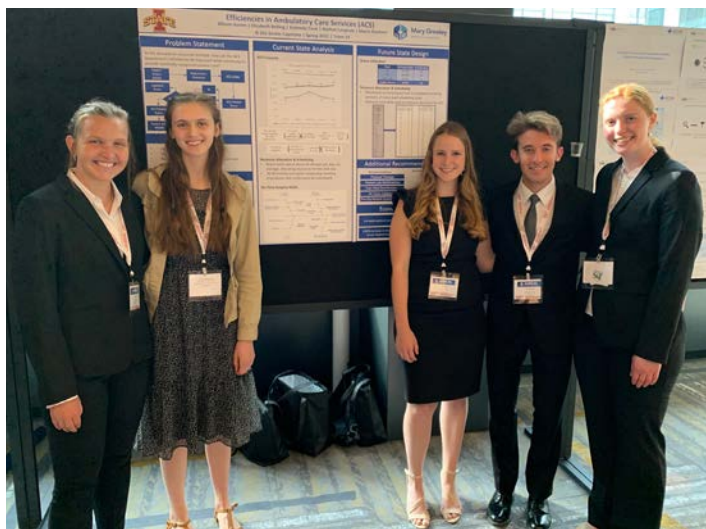
"I want to do my part to pave the way for female scientists and engineers. I hope that I can advance gender equality and use industrial and systems engineering techniques to make the world a better place to live," she said.



*Kashanian poses with Dr. Ryan beside a HaftSeen arrangement, a traditional Persian decoration for Norooz.*



# IISE Annual Conference | May 21-24 | Seattle, Wash.



*Congrats to our IMSE undergraduate student team of Allison Austin, Elizabeth Belling, Kennedy Cook, Nathan Langholz and Maria Seymour who advanced to the semifinals of the national Capstone Senior Design Project student poster competition. They were on hand in Seattle to present their research to conference attendees.*



*Hantang Qin (left) and Qing Li tout their Cyclone pride with this flag at the IISE Annual Conference.*



*Val Boelman (right), a member of IMSE's Industrial Advisory Council, stopped by to learn more about the Capstone Senior Design Project sponsored by Mary Greeley Medical Center.*



*Cameron MacKenzie (second from right) was part of a panel discussion focused on engineering economics during the IISE Annual Conference. MacKenzie is an assistant professor of IMSE at Iowa State.*

## Other highlights from the IISE Annual Conference

**Sarah Ryan**, delivered the annual Wellington Award lecture sponsored by the Engineering Economy Division at IISE 2022

**Hantang Qin**, received a Certificate of Appreciation for organizing the "Advanced Manufacturing of Flexible Electronics and Nondestructive Testing for Quality Assurance" workshop supported by the Manufacturing & Design Division at IISE 2022

## Dorneich promoted



The Board of Regents has approved **Michael Dorneich's** promotion to full professor, which takes effect July 1.

Dorneich joined the IMSE faculty at Iowa State in 2012. In addition to serving on the IMSE faculty, he serves on faculty for the Human-Computer Interaction graduate program as well as a faculty

affiliate for Iowa State's Virtual Reality Applications Center (VRAC). He also holds a courtesy appointment in aerospace engineering.

Dorneich's research interests focus on creating joint human-machine systems that enable people to be effective in the complex and often stressful environments found in aviation, military, robotic and space applications. He specializes in adaptive systems which can provide assistance tailored to the user's current cognitive state, situation and environment.

He has taught courses in Statistical Quality Assurance, Design and Evaluation of Human-Computer Interaction, Human Factors in Product Design, Human Factors in Automation Design, Human-Autonomy Teaming, and the Conduct of Research.

Dorneich holds a B.S. and M.S. in electrical engineering and a Ph.D. in industrial engineering, all from the University of Illinois at Urbana-Champaign.

## Herb Harmison (1933-2022)



Longtime industrial engineering faculty member **Herbert "Herb" Harmison** passed away on March 5, 2022 at the age of 88.

Harmison was born on July 15, 1933 in Dubuque, Iowa. He graduated from the Culver Military Academy in 1951 and joined the U.S. Army (and later the Iowa National Guard) eventually achieving the rank of Brigadier General after being stationed in Colorado and Germany. He returned to Iowa after his service and was a member of the Cyclone basketball squad his freshman year at Iowa State. He graduated with his B.S. in mechanical engineering (ME) in 1962, then went on to work for the Berkely Company (a manufacturer of fishing equipment) in Spirit Lake, Iowa, which happened to be founded by Berkely Bedell, who also studied ME at ISU and went on to serve in the U.S. House of Representatives. Harmison joined the faculty of the industrial engineering department at Iowa State after completing his M.S. in ME in 1968. He rose to the rank of associate professor during his career in the department, and eventually became the Head Placement Director for Iowa State's College of Engineering, helping students to secure employment after graduation. Additionally, he served as a faculty advisor for Iowa State's chapters of the Society of Black Engineers and the Society of Women Engineers.

Harmison married Esther Hunter in 1955, and the couple enjoyed a 62-year marriage before Esther passed away in 2017. The couple had four children all of whom followed in their father's footsteps in different ways. Daughter Kathy became a professional musician and teacher, inspired by her father who had a deep passion for music and education; son Chuck played basketball for the Cyclones (1977-80) and went on to play professionally in Australia; and sons Dave and Mark both pursued careers in engineering.

## Potter co-authors textbook for technical writing

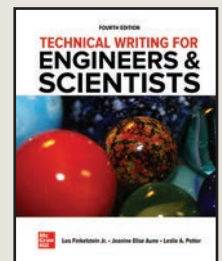
**Leslie Potter**, teaching professor in IMSE, is the co-author of the 4th edition of *Technical Writing for Engineers & Scientists* published this year by McGraw Hill.

Potter, along with Jeanine Elise Aune, a teaching professor in the English department at Iowa State (who happens to be the wife of **Siggi Olafsson**, an associate professor in IMSE) maintained the original vision of Dr. Leo Finkelstein's well-regarded textbook, which has helped students learn to succinctly explain the content and structure of concepts and understand genres common to communication in engineering and science disciplines since it was originally published in 1999.

The book covers all the ins and outs of technical writing theory, concepts, strategies and genres found in writing classes. It

provides a useful resource for instructors looking to incorporate writing assignments into their already-packed classes, or for students looking for the nitty-gritty details about what they need to do to get the writing project done in their engineering and science classes.

The 4th edition is organized around three major sections: the first one discusses fundamental material, the second describes how to write the most common technical documents, and the third provides useful information that does not fit neatly in the first two sections.





# The Year in Photos



*Graduating industrial engineering students pose together during the Fall 2021 IMSE Pre-Commencement Reception hosted on Dec. 18, 2021 in Troxel Hall.*



*The IMSE academic advisors tried their hand at welding. Here Devna Popejoy-Sheriff (right) receives instruction from Aaron Jordan, laboratory supervisor, as she practices welding.*

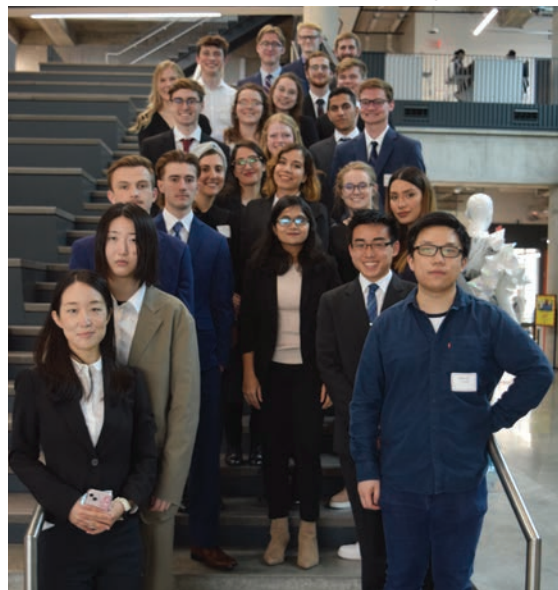


*Department retirees Kevin Brownfield, Roger Berger and Doug Gemmill made it back to campus for the IMSE Sweets and Treats Open House on Dec. 14, 2021.*

*You had me at "free pizza!" IMSE students line up down the hall for the Welcome Back Pizza Lunch event on Jan. 26, 2022.*



*IMSE students pose during the department's Research Symposium at the Student Innovation Center on April 28, 2022.*





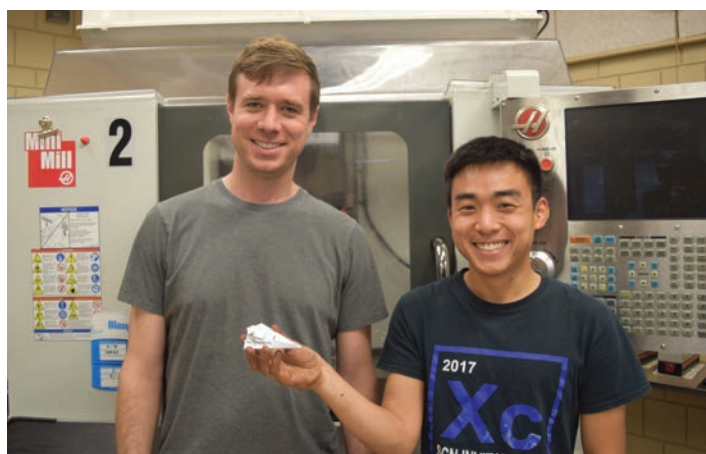
# The Year in Photos



*Graduating industrial engineering students pose together during the Spring 2022 IMSE Pre-Commencement Reception hosted on May 14 in Troxel Hall. We're glad Cy was able to join us for the celebration!*



*Members of IMSE's Industrial Advisory Council pose during their annual meeting on April 28-29, 2022.*



*Eric Weflen (left) and Joseph Kim pose with a Star Destroyer (from Star Wars) they made in I E 449/549 Computer Aided Design and Manufacturing*

*A group of students from I E 348: Solidification Processes pose with the metal basket they designed and fabricated, using CAD and a two-foot square piece of steel.*





# Awards and Honors

## 2022 Research Symposium Winners

### Undergraduate Students

#### **Best Poster Award First Prize**

##### **Luke Vathing**

Faculty Mentor: Gary Mirka

Graduate Student Mentor: Sang Hyeon Kang

"HeroWear Exosuit"

#### **Best Poster Award Second Prize**

##### **Aron Mitchell, Colton Richardson, Grace Peterson, & Katie Wyatt**

Faculty Mentor: Frank Peters

Graduate Student Mentor: Sharon Lau

"Reducing Measurement Error in Wet Magnetic Particle Inspection in Steel Castings"

#### **Best Poster Award Third Prize**

##### **Olivia Poppen & Madison Bemis**

Faculty Mentor: Stephen Gilbert

Graduate Student Mentor: Kathryn Liefgrig

"Ergonomic Assessment Via Virtual Reality: Is it Possible?"

#### **People's Choice Award**

##### **Allison Hubbell**

Faculty Mentor: Cameron MacKenzie

"Investigating the Economic Consequences of the August 2020 Midwest Derecho"

### Graduate Students

#### **Best Poster Award First Prize**

##### **Parvin Mohammadiarvejeh**

Major Professor: Guiping Hu

"Bioenergetic and Vascular Predictors of Potential Super-Ager and Cognitive Decline Trajectories - A UK Biobank Classification Study"

#### **Best Poster Award Second Prize**

##### **Ghazal Shah Abadi**

Major Professor: Sarah M. Ryan

"Reliability Assessment of Scenarios for CVaR Minimization in Two-Stage Stochastic Programs"

#### **Best Poster Award Third Prize**

##### **Gazi Nazia Nur**

Major Professor: K. Jo Min

"How to Value an Option to Add a Generator Under Uncertainties"

#### **People's Choice Award**

##### **Yiqun Jiang, Shaodong Wang, & Wenli Zhang**

Major Professor: Qing Li

"ICU Outcome Prediction Using Real-Time Signals with Wavelet Transform-Based Convolutional Neural Network"

## Faculty and Staff

### **Danial Davarnia**

#### **Assistant Professor**

Finalist for Best Paper Award in the Energy System Division at 2021 IISE Annual Conference

### **Kate Garretson**

#### **Administrative Assistant**

Omurtag Staff Excellence Award

### **Qing Li**

#### **Assistant Professor**

Best Paper Award in the Manufacturing & Design Division at 2021 IISE Annual Conference

### **Frank Peters**

#### **C. G. "Turk" and Joyce A. Therikildsen Professor**

Thomas E. Barlow Award of Honor from Steel Founders Society of America; 25 Year Club award for 25 years of service to ISU

### **Leslie Potter**

#### **Teaching Professor**

Don Grant Faculty Award for Excellence in Undergraduate Education

### **Hantang Qin**

#### **Assistant Professor**

Awarded Patent 17301695 for "Cellulose derivative based biodegradable support structures for 3D printing"; Best Poster Award from the American Society of Mechanical Engineers – Manufacturing Science & Engineering Conference; Best Paper Award in the Manufacturing & Design Division at 2021 IISE Annual Conference; Miller Faculty Fellowship from ISU Center for Excellence in Learning and Teaching

### **Mike Renze**

#### **Systems Support Specialist**

Excellence in Instructional Support Award (part of COVID-19 Exceptional Effort Awards Program) from ISU

### **Sarah Ryan**

#### **C. G. "Turk" and Joyce A. Therikildsen Department Chair, Professor**

Wellington Award from IISE; Initiated into Sigma Xi Scientific Research Honorary Society

### **Lizhi Wang**

#### **Professor**

Outstanding Paper in Crop Breeding and Genetics Award from the Crop Science Society of America

# Awards and Honors

## Students

### **Luke Becker**

Student Innovation Fund from the Innovation Fellows Program

### **Nicholas Chockalingam**

Rising Multicultural Engineer from LEAD: Leadership through Engineering Academic Diversity

### **Mohammad Fili**

Teaching Excellence Award from ISU Graduate College (Fall 2021)

### **Landon Getting**

Dwight D. Gardner Scholarship from the Institute of Industrial & Systems Engineers (IISE); Named IISE Technical Paper Competition North Central Regional Champion from IISE

### **Dedley Nelson Gorayeb Filho**

Fresh Global Scholars Achievement Award from ISU International Students and Scholars Office

### **Liangkui Jiang**

Future Faculty Fellow from IISE Technical Operations Board and the Council of Industrial Engineering Academic Department Heads; Best Student Poster Award from the Manufacturing Science & Engineering Conference; Best Paper Award in the Manufacturing & Design Division at 2021 IISE Annual Conference; George E. Lamp Graduate Scholarship from IMSE

### **Xuepeng Jiang**

Best Paper Award in the Manufacturing & Design Division at 2021 IISE Annual Conference; Teaching Excellence Award from ISU Graduate College (Spring 2022)

### **Saeed Khaki**

Third Place in Machine Learning Competition at Third International Workshop on Machine Learning for Cyber Agricultural Systems

### **Zahra Khalilzadeh**

Third Place in Machine Learning Competition at Third International Workshop on Machine Learning for Cyber Agricultural Systems; 2021 Women in Operations Research Bayer Scholarship from the INFORMS Analytics Society

### **Joseph Kim**

HPMTG Best Student Paper Award from the Human Factors and Ergonomics Society

### **Xue Lei**

Research Excellence Award from ISU Graduate College (Spring 2022)

### **Paiton Pumroy**

Multicultural Vision Program Scholarship from Iowa State University

### **Hosseinali Salemi**

Finalist for Best Paper Award in the Energy System Division at 2021 IISE Annual Conference

### **Saiara Samira Sajid**

Third Place at the Syngenta Corp Challenge in Analytics

### **Weijun Shen**

Best Paper Award in the Manufacturing & Design Division at 2021 IISE Annual Conference

### **Alisha Smith Reinhart**

Finalist for Best Student Research Award from the Institute of Electrical and Electronics Engineers/ American Institute of Aeronautics and Astronautics Digital Avionics Systems Conference

### **Jacklin Stonewall**

Outstanding Academic Title from Choice Publishing

### **Güliz Tokadlı**

Best of Session Award from the Institute of Electrical and Electronics Engineers/ American Institute of Aeronautics and Astronautics Digital Avionics Systems Conference; Student Marshal for ISU Graduate College

### **Eric Weflen**

Future Faculty Fellow from IISE Technical Operations Board and the Council of Industrial Engineering Academic Department Heads; John Pappajohn Entrepreneur Scholarship Award from ISU Pappajohn Center for Entrepreneurship

### **Ani Yam**

Student Legacy Award from ISU Office of Admissions; Cardinal Key Honors Society Inductee

### **Fatemeh Amini, Luning Bi, Chih-Yuan Chu**

Research Excellence Award from ISU Graduate College (Fall 2021)

### **Kylie Mathison, Taylor Butler, Lauren Robbins, Landon Getting**

4th place in Simio Student Simulation Competition

### **Noah Krichau, Shelby Dahl, Melia Finn**

Honorable Mention in Simio Student Simulation Competition

### **Fatemeh Amini, Reyhaneh Bijari, Chih-Yuan Chu, Ramin**

### **Giahi, Zhuoyi Zhao**

INFORMS 2021 Student Chapter Annual Award as a Cum Laude chapter



# IOWA STATE UNIVERSITY

## Department of Industrial and Manufacturing Systems Engineering

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