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22-23 Eleven Inducted into IMSE Hall of Fame
Greetings from IMSE at Mizzou! We’ve had a productive year as our researchers, students and alumni continued to find new ways to improve the world. IMSE faculty this past year conducted research in critical areas. Specifically, Dr. Jung Hyup Kim received an $850,000 award from the National Science Foundation (NSF) for research on the use of real-time tracking sensor and eye-tracing technology for integrating metacognition and augmented reality. Additionally, we received more than $600,000 from the U.S. Department of Education (GAANN) to offer an Industrial Engineering Graduate Scholars Program. Furthermore, Dr. Sharan Srinivas, is wrapping up the NSF I-Corps program for scalable cloud-based route optimization software for efficient aerial and road logistics.

Our research this past year has been published in journals such as Transportation Research Part E, Computers & Operations Research, Multimodal Transportation, Big Data Research, Healthcare Analytics, and the Journal of Clinical Oncology. Faculty have presented at conferences including the International Conference on Human-Computer Interactions, and IEEE International Conference on Healthcare Informatics.

We were excited to host the Center for Excellence in Logistics and Distribution (CELDi) Symposium in the spring, bringing to Mizzou leaders from industry and academia. CELDi is a graduated National Science Foundation I/UCRC comprised of six major research universities and a wide range of member organizations.

Students presented at the IISE South Central Regional Conference and attended the IISE Annual Conference in Seattle and INFORMS in Indianapolis. And many of our students gained real-world experience at internships at companies such as 3M and ThermAvant.

Congratulations to Doug DeMaire, BS IE ’68, MS IE ’69, for receiving a 2022 Missouri Honor Award and to Bob Thumser, BS IE ’82, MS IE ’90, for receiving the James E. “Bud” Moulder Award. And congratulations to the 11 alumni who were inducted into the IMSE Hall of Fame.

We’re proud of the work we’re doing in IMSE at Mizzou and look forward to exciting developments ahead. Go Tigers!

James Noble
Chair, Industrial and Manufacturing Systems Engineering
Industry leaders, faculty from several universities and industrial engineering students discussed supply chain issues, presented research and learned about ways they can help one another during a research event at Mizzou this past spring.

The annual Center for Excellence in Logistics and Distribution (CELDi) Research Symposium brought about 45 attendees — including representatives from The Boeing Co., Anheuser Busch, Emerson Electric, Leggett & Platt and Kansas City Southern Railroad — to Mizzou. CELDi is a graduated National Science Foundation I/UCRC comprised of six major research universities and a wide range of member organizations.

The conference gave companies the opportunity to learn more about faculty and student work, and how they might benefit from that research, said Jim Noble, chair of industrial and manufacturing systems engineering.

“They were excited to see the different areas we’re working on and what our capabilities are,” he said. “It was an opportunity to make connections, learn about resources and see the raw talent we have to address logistics and supply chain problems. That was the goal, and I felt we achieved that.”

Keynote speakers Mike Williams, director of logistics for North America, Emerson Electric, and Scott Collignon, senior vice president of aftermarket supply chain operations at Lippert, focused on current supply chain challenges during their remarks.

An industry panel allowed attendees to delve deeper into specific issues both from a supplier and consumer perspective. Panelists included Jay Witherspoon, director of logistics for Leggett & Platt, Kurt Ehlers (BS IE ’13, MS IE ’15), who leads implementation of a new planning tool at Anheuser Busch, Nicolas Klein (BS IE ’09, MS IE ’14), assistant vice president of network operations at Kansas City Southern Railroad, and Randolph Bradly, a technical fellow at The Boeing Company.

“It was a great discussion of the analytic needs companies have, what’s being implemented and where new approaches are needed,” Noble said.
Eight academic teams presented research posters on topics ranging from developing a disaster resource portfolio, hybrid truck/drone/robot routing for parcel deliveries, and optimized procurement dashboards.

PhD student Zeynab Oveysi took first place in the poster competition for her work around optimizing inventory for research and development operations, work she conducted alongside Assistant Professor Suchithra Rajendran.

Mizzou’s Erik Starrenburg won the CELDi Outstanding Undergraduate Student Achievement Award, and Garrett Robinson took honorable mention in the outstanding graduate student achievement category.

“Companies are seeing first-hand the supply chain talent pipeline,” said Noble, who noted that two Boeing representatives in attendance last week were alumni of CELDi’s academic members, including Mizzou. “They’re hiring the best and the brightest.”
Despite their catchy commercials, insurance companies have a public relations problem. Numerous studies have shown that general perceptions of the industry are negative. Now, a team of Mizzou researchers have used their industrial engineering expertise to find out why.

In a first-of-its-kind study, Suchi Rajendran and Sharan Srinivas, assistant professors in industrial and manufacturing systems engineering, along with senior Emily Pagel, mined publicly available data to determine some of the root causes of public dissatisfaction.

“We were motivated to study this specific sector because it has not received as much attention as health care, manufacturing or other industries,” said Srinivas, who has a joint appointment in the Trulaske School of Business. “Insurance companies contribute about $600 billion to the U.S. gross domestic product and employ over 2.5 million people, but the overall perception of clients and workers in this domain is poor.”

The research team combed through online reviews and social media posts to determine specific complaints against the top four insurance companies in the country. While online reviews, in general, tend to skew negative, the researchers looked for specific themes and service quality aspects discussed in the reviews. They determined that customers are mainly unhappy about the assistance they receive, payment and claims processes, a lack of discounts and poor communication.

“From there, we were able to identify the underlying reasons for customer satisfaction and dissatisfaction pertaining to each aspect,” Rajendran said. “For instance, some root causes of dissatisfaction around client assistance were unreturned phone calls, long wait times and delayed inspections.”

Simple solutions such as implementing call-back systems or improving payment options could help boost public perceptions, she said.

Another factor impacting public perception is how satisfied and motivated employees are. The researchers found that long work hours, complicated training and low salaries have a negative impact on the insurance workforce, which sees a roughly 13% turnover rate each year.

Incentivizing employees with perks such as recreational services or mentorship programs could boost morale and translate into improved employee satisfaction, researchers found.

In the study, published in the January issue of Benchmarking: An International Journal, the team provided a SWOT analysis for the top four insurance companies. The analysis outlines strengths, weaknesses, opportunities and threats for each company.

“If companies were to adopt this as a decision support tool, they’ll not only understand the voice of customers and employees but will also be able to see what their competitors are doing well and how they can distinguish themselves from their peers,” Rajendran said. “We’ve provided some practical implications and recommendations for insurance companies on how to overcome the problems they are facing.”
A Mizzou Engineering team has devised a new way to determine how many times you can recharge a lithium-ion battery before it needs to be replaced.

Lithium-ion batteries are common in electronics such as laptops, and they’re a key component to getting electric vehicles on the roads. They can be recharged hundreds of times, but at some point, they’ll run out of charging cycles. That could be bad news if, say, you’re traveling, and your electric vehicle can no longer be recharged.

“Lithium-ion battery capacity decreases whenever we use it, and at some point in time, we’re going to have to replace it with a new one,” said Kangwon Seo, assistant professor of industrial and manufacturing systems engineering. “If we can find out when it will essentially fail, then we can better prepare.”

Traditional methods to determine how long lithium-ion batteries last have relied on historical degradation data and theoretical assumptions. But that doesn’t take into account factors such as temperature and voltage.

“When we start running our laptop on battery, the temperature rises,” said MD Shoriat Ullah, MS IE ’20, who worked on this research as part of his master’s program. “If you start streaming videos on your phone, the temperature rises, and the battery will die faster. In the past, most studies haven’t considered those other parameters.”

And the few studies that have looked into those factors relied only on averages.

The novelty of Seo and Ullah’s work is that they applied a functional principal component analysis to assess the range of factors such as fluctuating temperatures and voltage.

“The most important feature is the functional data analysis,” Seo said. “We wanted to reflect the shape of the function, not just the mean value. In this research, we really wanted to suggest that we need to consider the shape, not just the mean, for more accurate prediction.”

Seo and Ullah outlined their method in the journal of Applied Sciences.
Scientists have known for years that a person’s risk of cardiovascular disease (CVD) can be lowered with lifestyle changes such as modifying diet, exercise, alcohol and tobacco use. Now IMSE Assistant Professor Sharan Srinivas and collaborator Anand Chockalingam demonstrate in a new study that a long-term association also exists between an adolescent’s psychological well-being and their risk of CVD as an adult.

Specifically, Chockalingam, a professor of clinical medicine, and Srinivas have found that people who are more optimistic or positive when they are adolescents can lower their chances of being in the high-risk category for CVD as an adult.

Chockalingam believes this study emphasizes the value of optimism in an adolescent’s life.

“Adolescents are simultaneously understanding the world as well as their own inner nature and mindset,” Chockalingam said. “Therefore, parents and other caregivers have a substantial role in the lifetime resilience and outlook of children. The biggest legacy that anyone can pass on for subsequent generations is optimism.”

The team analyzed data from study participants involved with the National Longitudinal Study of Adolescent to Adult Health. Chockalingam said the database served as a rich source of information for their study.

Srinivas believes this study could help clinicians develop a personalized approach to lower someone’s CVD risk by integrating problem-solving techniques currently used by industrial engineers that place an emphasis on prevention and early detection.

“There are several step-by-step techniques established by industrial engineers that help with early detection of problems in the manufacturing and service industries,” said Srinivas, who has a joint appointment in the Trulaske College of Business.

“This is an opportunity to adapt some of these techniques to enable health care practitioners to monitor the well-being of an adolescent over time, because that’s the formative stage where your outlook on life is established, and it doesn’t change much after that.”

In the future, Srinivas would like to explore the use of other industrial engineering and data analytics techniques, such as machine learning.

“We want to use these techniques to help predict the long-term risk for CVD among adolescents, and uncover the impact that underlying factors can have on a person’s chance to develop CVD, including the influence of a person’s well-being,” Srinivas said.

“Adolescent psychological well-being and adulthood cardiovascular disease risk: longitudinal association and implications for care quality management,” was published in Benchmarking: An International Journal. Kavin Anand, an undergraduate student at Stanford University, also contributed to this work.
Augmented reality (AR) has the potential to bring coursework to life. Imagine, for instance, learning about supply chains by seeing the various components of an operation laid out in front of you, from the manufacturing plant to the delivery site.

Jung Hyup Kim, an associate professor of industrial engineering, is exploring how best to incorporate AR technology into engineering curriculum. He’s the Principal Investigator on a National Science Foundation grant that is allowing him to design and test AR lessons in a new lab in Lafferre Hall.

Specifically, Kim is researching the use of real-time tracking and eye-tracking technologies for integrating AR into undergraduate engineering labs.

AR technology has not yet been widely adopted in education, in part because it has technical challenges. Previous studies have shown that students lose attention or aren’t comfortable with complex augmented materials. Oftentimes, the digital components don’t show up at the right place, or they don’t display correctly. In an educational setting, those types of flaws can cause distractions and confusion.

Last year, Kim conducted a pilot study of AR to address those technical challenges. He found that using a location tracking device helped better align augmented content with the physical environment.

In the new lab, the first objective is to integrate real-time 3D motion and location tracking systems to improve student engagement. The GPS-based system would have the ability to determine where a student is and respond based on the student’s posture. This will ensure students see appropriate images in the right spots so they can understand the context of the digital assets.

Another objective, Kim said, is to track eye movements and metacognition to determine whether a student is actually paying attention and grasping the concepts.

“We’re developing mechanisms to analyze eye tracking images while students are watching AR models and images,” Kim said. “Based on eye gaze movement and where they are looking, we will know whether they are paying attention or not. If they are not paying attention or it looks like a student isn’t learning, we’ll have to reengage or do something to help them learn the content.”

The third objective of the lab is to launch an exploratory study testing AR learning application in an engineering lab based on feedback and performance. In Kim’s new lab, students will have a series of stations with different AR experiences. They will stand at a certain spot to complete a module before proceeding to the next.
A Mizzou Engineering team has devised a model that could help reduce the risk of exposure to viruses such as COVID while still operating public transportation.

Mohamed Salama, a PhD candidate in industrial and manufacturing systems, specifically studied a transit model known as skip-stop. Used in select cities to reduce travel time, Salama helped examined how it could protect health, as well.

During a pandemic, people are supposed to maintain physical distance, however that’s not consistent with the idea of mass transit. However, time is also a factor. The Centers for Disease Control defines a close contact as being within six feet of an infected person for more than 15 minutes.

The skip-stop model designates certain buses to specific stops. For instance, instead of a bus making every stop along its route, Bus A might pick up and drop off at every other bus stop, while Bus B makes the alternating stops. Some bus stops would be designated for buses A and B to allow for transfers.

“Enhancing mass transit passenger safety during a pandemic via in-vehicle time minimization” was published in the journal Computers & Operations Research.
From graduating workforce-ready engineers to partnering on research and development, Mizzou Engineering has a lot to offer mid-Missouri manufacturers. That was the main take-away from an MU Manufacturer Connection Event the College hosted this past spring.

The event brought about 40 manufacturing and economic development leaders to campus to hear updates from the College and to tour engineering facilities. MU Extension organized the event to help business leaders connect to resources across the four UM System campuses.

Professor Jim Noble, chair of the Department of Industrial and Manufacturing Systems Engineering (IMSE), said he hopes visitors left with some ways in which they might partner with Mizzou Engineering.

“We can provide assistance in every aspect of their organization, from materials, product design, processes design to operations analysis and supply chain logistics,” he said. “I think some of the employers were very excited about knowing there are qualified students in the talent pipeline, and I think the event awakened them to the amazing resources available in their backyard.”

The IMSE department also has faculty who can provide expertise in applied operations, data analysis, transportation logistics, healthcare systems and human-computer interaction.

“We are here to do the research for you,” Mizzou Engineering Dean Noah Manring told attendees during a welcome session. “We can take on those high-risk ideas and do preliminary testing for new product development. We’re always here to do that, and we have ways to contract with you to do that.”

Another resource at Mizzou Engineering is the Midwest Industrial Assessment Center (IAC), which provides manufacturers with free energy assessments. The IAC aims to help companies cut down on energy consumption, carbon dioxide emissions and realize significant cost savings, Director Sanjeev Khanna told attendees. The IAC is funded by the US Department of Energy, which provides training for IAC student interns to conduct the energy assessments. To date, that work has resulted in more than $102 million in energy cost savings. More than 300 manufacturing plants in Missouri and Kansas have availed IAC energy assessments, with more than 80 students graduating from the program.

Following presentations at the MU Manufacturer Connection Event, attendees took a tour of engineering labs and facilities, including the 3D Printing Research & Experiences Lab and the new MU Materials Science & Engineering Institute. They also heard plans for a new manufacturing and teaching lab at Mizzou expected to showcase manufacturing engineering to future generations.

Manufacturers Gather at Mizzou to Learn About Engineering Resources
More than 180 Missourians are now sharpening their digital skills thanks to a new initiative at the University of Missouri. Mizzou Engineering has partnered with MU Extension to create a Digital Transformation Consortium, a group comprised of academic and industry leaders who have developed online courses around today’s technology.

“The goal was to create a consortium that includes training so that working Missourians can go into digital or analytical domains,” said Sharan Srinivas, an assistant professor of industrial and manufacturing systems engineering. “The courses allow people to reskill and pivot for different types of opportunities.”

Srinivas teaches Business Analytics, one of three courses currently being offered. In that class, students are learning to turn large, cumbersome data files into meaningful statistics using tools such as Excel and R software. Other courses are Introduction to Coding and Programming and Introduction to Geographical Information Systems and Geostatistical Analytics, which explores location-based big data.

Each self-paced course requires about 50-60 hours over a six-week span. Individuals who complete each course will receive a certificate, and those who complete all three classes will receive an MU Extension continuing education certificate in digital transformation.

“Research tells us that significant portions of the American workforce have limited or no digital skills,” said Rob Russell, MU Extension director of labor and workforce development. “Ensuring that workers have the necessary skills to compete in the 21st century has to be a priority to businesses in Missouri if they want to succeed.”

Companies can join the consortium to help with the development of future classes, Srinivas said.

“The plan is to add more courses and have more industries in the Midwest to get involved,” he said. “They can become a member of the consortium and guide us on workforce needs to develop courses tailored to specific industries.”

Funding for this initiative comes from a Governor’s Emergency Education Relief Fund grant through the Missouri Department of Higher Education and Workforce Development.
IMSE Chair Jim Noble says he was “totally surprised” when University of Missouri President Mun Choi and campus leaders interrupted his class last spring to present a William T. Kemper Fellowship for Teaching Excellence.

Those who know him aren’t surprised at all. Students routinely praise him for being enthusiastic, caring and knowledgeable; “one of the best professors on campus,” as one student said. Colleagues say he exemplifies the best qualities of an instructor-researcher.

“One of the things I find most satisfying about getting the Kemper is that it acknowledges my true motivation for why I’m here, and that’s to serve the students and to put them on a trajectory to contribute to society in meaningful ways,” Noble said. “That’s why I’m a professor.”

Over the course of his 30-year career at Mizzou Engineering, Noble has earned a reputation for being an inspiring educator passionate about preparing the next generation of industrial engineers. Outside of the classroom, he conducts research and works with industry, all with students in mind. He serves as director of undergraduate studies and interim director of graduate studies to provide additional mentorship and support.

In the IMSE Department, Noble has taught production system design, material flow and logistics systems, and capstone design. He helped design Engineering 1000, a College-wide introductory course that helps students decide which areas of engineering they wish to pursue. Noble also connects students with successful IMSE alumni, providing networking opportunities that help lead to internships, co-ops and careers in the industry.

Noble says he enjoys taking time to provide those extra layers of support, which he says is a cornerstone of industrial engineering education at Mizzou.

“One of the things we’ve always said within our department is that we want to be known for excellent teaching,” he said.

IMSE Welcomes New Faculty Member

Yi Wang is an assistant professor of industrial and manufacturing systems engineering. His primary research interests include advanced micro/nano manufacturing technology, brain-machine interface development, biomedical sensors and devices development, ultrasonic-assisted machining, and computer-aided design and manufacturing. Wang has a PhD from North Carolina State University and a master’s and bachelor’s from Tianjin University in China.
Members of the Mizzou Institute of Industrial and Systems Engineers (IISE) student organization connected with other industrial engineering students and professionals at the 2022 IISE South Central Regional Conference. “It was great to be able to talk to industrial engineering students from other universities,” Grayson Burns, president of Mizzou IISE, said. “We were able to see, hear and learn different perspectives about and potential applications of industrial engineering.”

The conference, held on the campus of Oklahoma State University in Stillwater, Oklahoma, brought Mizzou students together with students from six other educational institutions: Kansas State University; Oklahoma State University; Texas A&M University; the University of Oklahoma; the University of Texas at Arlington and Wichita State University.

Junior Reegan Spicer participated in a research presentation competition held as part of the conference’s schedule of events. “I wanted to present the research I conducted the previous semester, plus learn what other research was being done by students and learn from them,” Spicer said, “I also wanted to make connections with other students from other schools.”

Additional activities during the conference included visiting two companies and seeing how they utilize industrial engineering in their operations, and learning about leadership versus management from Brenda Shumate, general manager of operations (mid-continent) for DCM Midstream.

“I honestly can’t pick a favorite activity,” junior Dustin Meier said. “From the plant tours, the banquet, to meeting and spending time with people – it was a great, beneficial and fun experience!”

All three students are already looking forward to next year’s regional conference, as the Mizzou chapter is planning to host the event. “We are excited to host next year’s IISE South Central Regional Conference,” Burns said, “This year’s conference set the bar high, but we will have a lot of support in planning it.”

“We were able to see, hear and learn different perspectives about and potential applications of industrial engineering.”

Grayson Burns
President of Mizzou IISE
Limitless in Seattle

A Mizzou Engineering alumni group sponsored senior Reegan Spicer’s trip to Seattle this past spring, where she networked with industrial engineers from around the world during the Institute of Industrial & Systems Engineers (IISE) Annual Conference.

“I thought the conference would be a great way to experience something new, and to expand my network and knowledge,” she said. “There were people from everywhere, and I was able to meet people I wasn’t expecting to meet.”

Spicer had the opportunity to attend three days of the conference after her team placed first in an undergraduate research competition within the Department of Industrial and Manufacturing Systems Engineering (IMSE). By winning the competition, the IMSE Hall of Fame provided funds to fully pay her travel expenses as part of the first-place prize package.

Domingues Wins Hesburgh Scholarship

IMSE student Carlos Aleixo de Lima Domingues received a University of Missouri Hesburgh Scholarship, an award given for academic achievement every spring. The scholarship is presented to only one Mizzou student in each undergraduate class at a special event held last month.

“I’m very, very happy to receive this award, getting to go to the presentation and interacting with everyone there,” he said. “This is a special prize for me, and I am really honored to receive it.”

Domingues, a sophomore from Porto Alegre, Brazil, likes mathematics, calculus and physics. He chose to pursue industrial engineering because he could use his skills in those areas while enjoying the career opportunities available in the field.

“There are so many options; you can specialize in many areas (in industrial engineering),” he said. “Flexibility in the field helps me with my goals, as I want to own my own business one day and be able to help people.”

Domingues eventually wants to get involved with Engineers Without Borders and apply his industrial engineering knowledge to improve people’s lives in any way he can. He credits his time at Mizzou, in part, for wanting to make a positive impact on the world.

“My experience at Mizzou has been wonderful and character-shifting, helping me grow so much,” he said. “I’m really satisfied and motivated to keep going down this path of achieving academic excellence and helping people.”

The scholarship is funded by the TIAA-CREF Hesburgh Endowment Fund through MU’s General Education Program.
Seniors in the Department of Industrial and Manufacturing Systems Engineering at Mizzou conclude their coursework with a capstone project. Through these capstone projects, they apply what they’ve learned in their classes to a manufacturing, health care or logistics problem provided by real-world companies. Students meet and work with their assigned companies to come up with answers to improve efficiency, quality, cost effectiveness and safety.

Below are the IMSE capstone projects from the Fall 2021 semester.

**Optimal Project Scheduling**
**Team Members:** Zachary Beeson, Lauren Clay  
**Company Sponsor:** Ameren  
**Objective:** Build an optimal scheduling tool that minimizes labor cost when forecasting future transmission line construction projects resulting in a year-round ‘levelized’ contractor workforce.

**Optimal 911 Call Operations**
**Team Members:** TJ Burke, Andrew Deadwyler, Kaylin Twenter  
**Company Sponsor:** Boone County Joint Communications  
**Objective:** Minimize the current error between the demand of incoming calls and the ability of the workers to respond to calls of MSE=66.45 by strategically scheduling workers to provide coverage to the change in hourly demand of calls over the course of a day of the week.

**Implementing Automation to Reduce Resource Waste**
**Team Members:** Braden Keller, Lindsey Sommerfeldt, Kendall Swanson  
**Company Sponsor:** Environmental Dynamics Intl  
**Objective:** Implement automation across the facility to reduce non-value-added operator time by 20 hours per week and increase machine production by 50 membranes per day.

**Reducing Paper Waste**
**Team Members:** Nate Howard, Lauren Hyde, Gary Plaster  
**Company Sponsor:** Mizzou Print Services  
**Objective:** Modify Make/Ready to accurately reflect 4-color printing processes and reduce paper waste.

**Increasing Research Trial Enrollment**
**Team Members:** Alex Haeke, Chris Rogers, Chris Scheiner  
**Company Sponsor:** MU Hospital  
**Objective:** Increase the percentage of enrolled patients to 15% by decreasing waste in the screening process and implementing an optimized queuing model for the enrollment process.
SPRING 2022

Below are the IMSE capstone projects from the Spring 2022 semester.

Optimization of Emergency Room Inventory System
Team Members: Chris Goldston, Isa Elwell, Ryan Charles
Company Sponsor: MU Hospital
Objective: Restructure the emergency department periodic automatic replenishment room by utilizing 6S Audit, Simulation and satisfaction surveys to enhance the room’s efficiency and time spent locating supplies.

Cell-Employee Preventive Maintenance Notification
Team Members: Will Mihm, Danielle Flieg, Drew Boswell
Company Sponsor: Schneider Electric
Objective: Reduce downtime and rework in PPL line caused by missed calibration by setting up a preventative maintenance cell-employee notification system.

Production System Simulation to Improve Yield
Team Members: Grace Floyd, Sam Furrer, Erik Starrenburg, D’mitri Winkeler
Company Sponsor: Quaker Oats / PepsiCo
Objective: Determine the number of poppers running to optimize the tradeoff between decreasing waste and system throughput.

Production System Ergonomic Analysis and Redesign
Team Members: Brenden Cochran, Noah Novak, Dylan Johnson
Company Sponsor: American Air Filter
Objective: Reduce the ergonomic stress index to 0, reduce the non-value-added time of the filter production and increase product production rate by 20%.
Internships give students a chance to apply their learning to hands-on projects.

Grayson Burns spent the summer as an intern with 3M.

Tell us about your internship at 3M. What’s your role and primary responsibility?

I am a Student Engineer, employed by Pride One, working on the Littmann Stethoscope product line at the 3M plant in Columbia, Missouri. My primary responsibilities consist of completing the engineering projects I have been assigned to lead. This year, I have tackled three main projects involving robotic automation, the reengineering of a fixture design and conducting a Kaizen event. Beyond my projects, I serve as a support role for the entire stethoscopes engineering team.

What’s a typical day like?

Apart from daily meetings, there is no such thing as a typical day for my role. I am constantly bouncing around between projects, which has brought a wide range of experiences and teachings. This variability makes the days fly by as I get to expand the boundaries of my engineering skills.

How did Mizzou Engineering Career Services assist you with securing or preparing for this internship?

I made my first impression on 3M at the Mizzou Engineering Fall Career Fair put on by Career Services. This was a key interaction in receiving this incredible internship opportunity.

What have you enjoyed most working at 3M so far?

It is hard to narrow down such a positive experience to one key element. One aspect that has a significant impact on me is the trust that 3M places in their employees’ abilities. Despite being new to the engineering profession, I have been given projects that have pushed me and used my full range of skills.

What have you learned from your internship experience?

I have learned what real-life applications of the engineering techniques I’ve learned in class look like. Learning from examples in a book is a good introduction to topics but hands-on application has given me a true understanding of how and why we do certain things.
Internships give students a glimpse into what working a full-time job will be like post-graduation.

Jim Vespa, a junior in industrial engineering, conducted an internship with ThermAvant.

We reached out to ask him a few questions about the experience.

Tell us about your internship at ThermAvant. What’s your role and primary responsibility?

As a startup company, ThermAvant is looking to ramp up their production in the near future. I was brought in as an industrial engineering intern to help out with (1) the typical challenges faced by a startup company, (2) executing a re-layout of the facility and (3) making sure all new technicians can easily learn their station’s details.

What’s a typical day like?

There really is no one “typical day” that I’ve had. While working here I’ve had multiple responsibilities. We had frequent meetings to review the latest draft of a warehouse layout and how the process flow of parts would work. It was difficult since we have many large machines, are actively ordering more machines and only have so much room in our warehouse to work with. I have to find and purchase the most ideal workstations online by comparing price, size, lead time, quality and features of all the workstations currently available.

How did Mizzou Engineering prepare you for this internship?

The Mizzou Department of Engineering taught me how to think from a systems perspective ever since I took my first industrial engineering class. I was able to compare the workstations well due to assistance from Professor Shahvari and his engineering economics class. I knew how to create the SOPs and the sequences of events for the time studies well because of Professor Wu and his Fundamentals of System Designs class. Also, the rigorous coursework in general at Mizzou Engineering molds you into a more focused student just to pass your classes, which in turn brings this strong work ethic into the workplace.

How did Mizzou Engineering Career Services assist you with securing or preparing for this internship?

Mizzou Engineering Career Services really helped me refine my resume. It is challenging to land an engineering internship just after your sophomore year since some of the more advanced coursework doesn’t start until junior year. The career services department’s advice as to what to highlight in my resume as well as assisting in the presentation was a game changer.

What have you learned from your internship experience?

Through these six months of interning, I have learned the significance of teamwork, organization and consistency. I feel like these are the three major keys that will make or break a company. We have a truly great team full of genuine, smart people that I feel proud to be associated with. I am very excited for the future. I feel big things are ahead for both this company and my personal career.

Jim Vespa
DeMaire Receives Missouri Honor Award

Doug DeMaire, BS IE ’68, MS IE ’69 has received the 2022 Missouri Honor Award recognizing his outstanding contributions to the College of Engineering and the engineering profession. The award is the highest accolade bestowed on an engineering graduate.

DeMaire has supported the Department of Industrial and Manufacturing Systems Engineering over the years, earning him a spot in the IMSE Hall of Fame in 2014. Specifically, he has sought opportunities to enable Missouri students to attend Mizzou and pursue an engineering degree, such as the one that provided the foundation for his career success, his nominator wrote.

The DeMaires established the J. Douglas and Barbara N. DeMaire Scholarship, which supports IMSE students from Missouri, with preference given to those from Barton County, where DeMaire grew up.

“Mizzou provided a solid engineering education,” he said. “We had a good time at MU, but more importantly, it prepared both of us to go out and have successful careers. We find great satisfaction in knowing this scholarship is helping the College of Engineering continue to produce excellent engineers and leaders for tomorrow.”

After earning his master’s degree, DeMaire went to work for Olin Brass in the St. Louis area. The company manufactures and distributes copper and copper-alloy sheet, strip, plate, foil and fabricated components. Over the next 26 years, he rose in the ranks from a special projects industrial engineer to a position as Manager of Industrial Engineering. He then established a market research department and later became the Director of Marketing before taking the role of Business Planning and Management Systems. Working with the Olin Brass team, he and colleagues successfully expanded the business from $300 million in sales to just over $1 billion in five years.

DeMaire’s last role for the company was serving as Vice President of Strategic Planning and Business Development for Olin Corporation. One result of this work was the spinoff of Olin’s Defense Business into a new public company, Primex Technologies, Inc. DeMaire joined the new company, serving as Executive Vice President and then President of Primex Technologies, Inc. He successfully ran the company until it was acquired by General Dynamics, at which time he retired.

During his career, DeMaire provided mentorship and guidance to numerous younger industrial engineers. “He was generous with his advice and recommendations, while at the same time giving us room to let us each grow individually,” one of his supporters wrote for his nomination.

After retirement, DeMaire established his own management consulting practice and worked with a variety of clients over the next 15 years until his second retirement.

The DeMaires reside in St. Petersburg, Florida, where he’s played banjo in several bluegrass bands and Barbara is an accomplished figurative sculptor.
Bob Thumser, BS IE ’82, MS IE ’90, has received the 2022 James E. “Bud” Moulder Distinguished Alumni Award recognizing his longstanding service to the College of Engineering and the Department of Industrial and Manufacturing Systems Engineering.

“I’m greatly honored to accept this award,” he said. “I’m thankful and glad to know I have been an asset to the department over the years.”

Thumser’s contributions have been vast. He was a founding member of the IMSE Industrial Advisory Board when it was revitalized in 1998, and he has consistently attended meetings every semester over the past 23 years. He’s evaluated Capstone Design Team projects, helped ensure curriculum is up-to-date and has been involved in multiple strategic planning initiatives for the department. Thumser has also provided industry insight for ABET accreditation.

In 2011, Thumser was inducted into the IMSE Hall of Fame. He has been on the Hall of Fame Board of Directors since 2015, serving as president in 2020.

“Bob is a true Mizzou Tiger who has generously given back to support the success of the IMSE department and our students,” his nominator said.

What’s kept him active with Mizzou Engineering for more than two decades? Thumser said it’s stems from his appreciation for his education.

“I think Mizzou’s strongpoint is that it gives you a strong core engineering foundation,” he said. “They give you valuable tools you can use to solve problems.”

Thumser also expressed gratitude for the professors who helped guide his path. Specifically, Dr. Owen Miller connected him with Goodwill Industries in St. Louis for a summer job establishing a performance measurement system for their Sheltered Workshops program, an experience for which Thumser said he’s always been grateful. And Dr. Mike Leonard encouraged him to pursue graduate school, something he hadn’t previously considered.

His master’s degree helped Thumser secure a position at McDonnell Douglass, where he served in a number of roles including team manager, group manager and principal specialist. He later managed groups at The Boeing Company and became an employee of GKN Aerospace following the Boeing sale of their fabrication center. Thumser is now retired following a 37-year career in the aerospace industry.

His industry expertise has especially helped IMSE students interested in career options. Thumser encourages other alumni to consider supporting the next generation, as well.

“One of the ways they can participate is just by sharing their stories and sharing with students what they do,” he said. “Students appreciate being able to hear about those real-life problems and how you solve them. I’ve just really enjoyed going back and helping out. I’m thankful for the opportunity to give back.”
Eleven Inducted into IMSE Hall of Fame

The Department of Industrial and Manufacturing Systems Engineering (IMSE) honored 11 new inductees on Oct. 21 at a ceremony honoring their outstanding contributions to the field of industrial engineering.

Established in 2008, the IMSE Hall of Fame honors extraordinary IMSE graduates for their outstanding achievements, excellence and leadership, as well as their contributions to the department.

Nicole Birdwell is a consultant at the executive level for companies in various growth stages and provides fractional roles and board service. Previously, she served as Chief Operating Officer for Ndustrial, a software and services company.

Brad Boswell belongs to the fourth generation of a barrel-making family with over 110 years’ experience in the cooperage industry. Family-owned Independent Stave Company was founded by his great-grandfather in 1912. Today, Boswell is the CEO and President of Independent Stave Company. He was appointed President in 1999 and subsequently CEO in 2017.

Brian Carter is the Senior Vice President of Operations & Distribution for Scholastic Inc., where he manages a large portion of the company’s supply chain, consisting of warehousing, order fulfillment, and transportation activities across 41 distribution centers throughout the U.S. with up to 1,800 employees.

Dr. F. Frank Chen is the Lutcher Brown Distinguished Chair in Advanced Manufacturing at the University of Texas at San Antonio (UTSA), where he founded the Center for Advanced Manufacturing and Lean Systems and served as the center director (2007-2015).

Tamara Harris recently joined UnitedHealth Group as an Associate Director – Government Operations Quality. Harris started her career with McDonnell Douglas as an Industrial Engineer and eventually left aerospace and joined automotive manufacturing at General Motors. Spending most of her career with General Motors, while raising a family, she forged a career of balance and growth.

Tyra Holmes is Senior Director for the Government Training Engineering organization within the Boeing Global Services (BGS). The team develops and sustains affordable, high fidelity families of training and simulation solutions for government customers at numerous global learning centers. Prior to this assignment, Holmes held the position of Director, F-15 Mission Systems, Boeing Defense Systems. In that role, she led the organization.

Omar A. Henaidy founded Taj Holding Group, a business hub for talented entrepreneurs and international investors. In 2018, Taj Holding announced its most significant acquisition - Beside Group, a fashion retail Group that distributes eight global brands across six countries.
countries in the Middle East. Henaidy oversees Beside Group expansion as its Executive Chairman. As of 2022, Taj Holding Group has a controlling interest in more than 25 businesses across five main verticals: Engineering, Retail, Manufacturing, Real Estate, and Healthcare, employing thousands of professionals across the Middle East.

Mark Hense is the President and Chief Executive Officer (CEO) for TTG Inc. with company overall operations located in Higginsville, Missouri. TTG develops and manufactures ePTFE membrane films used in various industries throughout the world, from advanced textile media development in Industrial Air Filtration, Micro Venting, Performance Apparel, Medical Device, Fuel Cell, EV Battery Venting and other applications. Mark’s responsibilities span all facets of the company’s management from Sales & Administration to Product Development to Manufacturing & Distribution. He also serves as Chairman on TTG’s Board of Directors.

Karen (Detweiler) Johnson is Director of Operational Efficiency for McKinstry. She works with energy and internal consulting teams to improve processes and efficiency in the delivery of projects that focus on decarbonizing buildings to strive for a zero-carbon future. Prior, she served as Director of Process Improvement introducing Lean Six Sigma to the largest school district in Colorado, Denver Public Schools.

Joyce Knehans Swanke is retiring from Nextworld, (a startup ERP software company) after being recruited to the team six years ago. She has recently been selected for Deloitte’s “Board Ready Women Program.” For more than 10 years, Swanke worked directly in manufacturing companies.

Brett Uldrich is Director, IBM Technology Sales for the U.S. Southeast Region, a 14-state footprint serving more than 25,000 clients. In this role, he has leadership responsibility for IBM’s go-to-market including sales, technical sales, client engineering, and customer success across the IBM Technology portfolio — including Software, Systems, Public Cloud, and Services. He has accountability for revenue, profit, and client satisfaction (NPS scores) for all routes.

Also this year, the IMSE department debuted new annual awards aimed to recognize early-career alumni who have demonstrated an amazing early career trajectory, outstanding IMSE faculty and outstanding IMSE instructors/staff.

The inaugural recipients are:

- **Junior Career Award:** Nicolas Klein, BS IE ’09, MS IE ’14, Assistant Vice President Operations Technology, Analytics and Resource Planning and Business Transformation Director at Kansas City Southern Rail
- **Outstanding IMSE Instructor/Staff:** Assistant Teaching Professor Omid Shahvari
- **Outstanding IMSE Faculty:** Assistant Professor Sharan Srinivas