ISE Viewbook 2021

Department of Industrial and Enterprise Systems Engineering

The Grainger College of Engineering

ISE Class of 2021
We salute you!

[Image of a graduate in cap and gown]
Throughout you will find photos of 2021 graduates.

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COVER: Anka Rashed, BSSED 2021
MAJOR: Systems Engineering and Design
SECONDARY FIELD OPTION: Autonomous Systems and Robotics
While at ISE, Anka worked on a senior engineering project with Professor Girish Krishnman to perfect the gripper on a fruit-harvesting robot. Anka says, “I would definitely recommend ISE to someone else doing robotics, especially if they wanted an overall understanding of robotics as opposed to specializing in either the mechanical or electrical portions.” Read more about student researchers inside.
This issue is dedicated to graduating seniors and graduate students, and all who sacrificed their time or comfort on campus to slow the spread of COVID-19.

ISE Class of 2021, CONGRATULATIONS!
CLASS OF 2021 BEFORE...
...AND AFTER!
**ISE STUDENT NEWS**

**ISE UNDERGRADS* PUBLISH!**

UNDERGRADUATE RESEARCHERS ARE ADVANCING THE SCIENCE AND PRESENTING THEIR WORK IN PROFESSIONAL VENUES.

When John Morgan was entering his junior year at the University of Illinois, he wasn’t sure what kind of job he would aim for after graduation. But that all changed in the fall of 2019 when he had his first taste of undergraduate research, processing data for ISE professor Abigail Wooldridge.

Today, as new ISE graduate, Morgan is beginning a career in data analytics, thanks to the work he did with Wooldridge through the U of I’s Research Experience for Undergraduates (REU) program. Recent ISE graduate Sanghyun Shin tells a similar story, singing the praises of his undergraduate research experience, in which he analyzed data for ISE professor Lavanya Marla.

Shin’s work in Marla’s lab tackled aviation disruptions, while Morgan contributed to Wooldridge research on the use of a new app to train health workers.

These research projects not only trained undergraduates to analyze data; they also produced award-winning papers.

At ISE, the idea of hands-on education continued to flourish throughout the pandemic. These pages pay tribute to only a few of our student researchers.

Sophie Benmore, sophomore
MAJOR: Systems Engineering and Design
INTERN: Materials Development, Inc.

PUBLICATIONS:


“My first year of ISE was a rollercoaster. Working online was a lot more difficult than I expected, and I am very excited for in-person school. I particularly liked my SE101 class, though.”

*AND, OF COURSE, GRADUATE STUDENTS!*
**Full House: A Winning Hand**

**Wooldridge’s Lab Welcomes Undergraduates Into High-Level Research**

**BY DOUG PETERSON**

“With both graduate students and undergrads, I have a full house in my lab—such a full house,” says ISE Professor Abigail Wooldridge.

When Wooldridge joined ISE in 2018, she immediately began to involve undergraduates in her research. Since then, she has worked with anywhere from three to four undergraduates at a time, making her lab a busy, bustling place.

“It’s a balancing act,” Wooldridge says. She doesn’t want her lab to get too crowded because she wants to be able to pair each undergraduate with a graduate student. The undergrads in her lab work on all types of cutting-edge research on human factors, such as evaluating a virtual-reality app for training health workers, assessing the new mobile laboratory for COVID-19 testing, and analyzing what happens when trauma patients are moved from the operating room to the intensive care unit.

“I’m not a professor only because I love research,” Wooldridge says. “I also really enjoy teaching, and this work is another way I get to teach undergrads.”

One of her research projects brought in three undergraduates to evaluate a new app that trains health workers on the use of “code carts.” A code cart, or crash cart as it is sometimes called, looks like an ordinary wheeled cabinet with rows of drawers. But when it was introduced in the United States in the 1960s, this unassuming cart revolutionized the way emergencies were handled. The cart organized, in one portable unit, the essential equipment that medical personnel need in an emergency.

Now, Wooldridge and the Jump Simulation Center in Peoria, Illinois, are revolutionizing the way nurses and doctors are trained in using a pediatric code cart. The Jump Simulation Center developed a training app, which uses a virtual reality code cart to teach health workers where to find supplies in the cart. Wooldridge’s team has been testing the effectiveness of the app, and the initial results are promising. The three undergraduates, Anthony Composto and John Morgan in ISE and Ashley Mitchell in Bioengineering, did extensive data analysis on the app. What’s more, Morgan was the primary author of one of the team’s papers, which won first place in the student paper competition for the Health Care Technical Group at the annual meeting of the Human Factors and Ergonomics Society in October.

“As the first author, John wrote the bulk of the paper,” Wooldridge says. “It’s very unusual for a paper to be led by an undergraduate. And undergraduates
ISE student Sidhanth Asur took 3rd place at the ISE North-Central Region Undergraduate Student Technical Paper Competition. Sidhanth is a sophomore in Systems Engineering and Design. His SFO is Autonomous Systems and Robotics. The winning paper is Hyperspectral Camera Development and Evaluation for Improved Terrain Characterization. The hyperspectral sensor is a revolutionary device that allows for detailed data collection, especially in terrain characterization databases. However, these sensors are commercially available for more than $20,000 which far exceeds many research groups’ funding. This project was meant to recreate a hyperspectral sensor camera, for low cost. The research was sponsored by the Research Experience for Undergraduates (REU) program at ISE. Professor Bob Norris served as Asur’s advisor.

almost never win that competition.”

Morgan says the code-cart project was the first time he had ever written an academic research paper, and he says it taught him how to do technical writing and communicate statistical results. The project also helped him to learn R statistical software, with guidance from one of the graduate students on the team, Jyotika Roychowdhury. He says Wooldridge’s lab was a “great environment” as he processed data on the usability of the new code-cart training app.

A fully stocked code cart is not often available for training purposes, so the app solves this problem, Morgan explains. When you aim your phone’s camera at an empty space, the app will project a virtual code cart in that spot. Health workers can then use the app to open drawers in the virtual code cart and click on various items to see what they do. They can even time themselves in a search for supplies or go through specific scenarios in which they need to locate materials.

For this project, the research team concentrated on training health workers to locate 10 items in a pediatric code cart, such as an IV catheter, needle decompression kit, and oxygen mask for a child.

The new app was tested with nurses, nurse educators, and attending physicians, who then answered 53 questions, including items on the System Usability Scale (SUS), developed by usability specialist John Brooke in 1995. Morgan used this survey information to calculate a SUS score of 82.5, which he says was pretty good for a new app in its initial testing phase.

Composto and Mitchell, meanwhile, worked on data collected by Tobii Pro eye-tracking glasses. Before and after using the app, health workers wore the eye-tracking glasses while using the real code cart to search for the 10 items. By gathering data from the glasses, researchers examined eye “fixations,” which is when users focus on a particular location. After health workers used the training app, the number of fixations went down while duration increased when using the real code cart, a potential indicator of improved expertise.

Many of the undergraduates in Wooldridge’s lab came to her as part of the U of I’s Research Experience for Undergraduates (REU) program. “When I work with an undergraduate, I try to assess their career goals and what skills they want to develop,” she says. “Then I try to find a spot in a project that will teach them the new things that will set them apart when they’re pursing the career they want. But I’m also secretly hoping they’ll fall in love with research and will want to go on to complete a graduate degree.”

Wooldridge’s first undergraduate researcher was ISE student RuthAnn Haefli, who coded data about health care transitions, such as the transfer of patients from the operating room to the intensive care unit—a crucial handoff in which accurate, timely communication is vital among the nurses and doctors. So far, the research team has run seven simulations, in which physicians and nurses simulate the transition of a pediatric trauma patient to a high-fidelity simulation space that looks exactly like an intensive care unit. Then they surveyed the physicians and nurses on how well the handoff went—what worked, what didn’t, and what could have been improved.

Out of this research, Haefli contributed to an award-winning paper, for which Wooldridge led the writing. It won a best paper award at the International
Conference on Quantitative Ethnography in 2019.

“RuthAnn did such a phenomenal job that I became even more enthused about involving undergraduate students in my research group,” Wooldridge says.

After Haefli graduated, another ISE student, Maya Burgard, stepped in to continue analyzing qualitative data from the health care handoffs, and she also helped Wooldridge do some secondary data coding.

Not all of the undergrads in her lab are from engineering, however. Madison Kaufman, an undergrad from the College of Applied Health Sciences, worked with Wooldridge during the summer and fall of 2019, conducting a literature review looking at human factors and health inequity—differences in access to health care or health care outcomes due to race, ethnicity, gender, socioeconomic status, or even whether a patient lives in a rural or urban area. In addition, Ariel Alexander, a chemistry undergrad, analyzed survey data that Wooldridge had gathered from human factors professionals. This survey focused on their thoughts about using human factors research to address issues related to diversity and social justice. One such example is designing technology to make it accessible to those who are blind or have low vision. Wooldridge also conducted a focus group with the same human factors professionals on diversity and social justice. The focus group data was analyzed by yet another ISE undergrad, Mia Spiwak.

Some of the undergrads get involved with multiple projects, Wooldridge notes. Ashley Mitchell, the Bioengineering undergrad, has also been helping with the failure modes and effects analysis of Wooldridge’s MobileSHIELD project. MobileSHIELD is a mobile testing laboratory that can do Covid-19 testing from a tractor-trailer driven all around the state.

“When we design a new process or evaluate an existing process, we like to think about what can go wrong, how likely it is to go wrong, and what happens if it goes wrong,” Wooldridge says. “Failure modes analysis is one of the techniques we use to do that.”

John Morgan also had a chance to get involved in a second project—the research on health care handoffs. According to Wooldridge, he did some high-level data analysis for this work.

“I remember that when John approached me to do research, he was a little shy,” she says. “But over the course of the last 18 months, he’s really developed—and not just in technical skills. Now he can go out and talk to people who are PhDs or physicians and get them excited about the work he has done. When I see students connect with the research, when I see students blossom, that’s really exciting. I love seeing the light bulbs go off.”

Morgan says his undergraduate research experience has helped point him in the direction of data processing. He just graduated at the end of 2020 and has landed a job doing price analysis for W.W. Grainger, Inc., a Fortune 500 industrial supply company.

As Wooldridge puts it, “I like to think that the fact that John has done some very advanced statistical

“I would definitely recommend undergraduate research to other students. This work helped me mold my career path. If I had known about the REU program before, I would have tried to do undergraduate research every single semester. I honestly think it was one of my best experiences in college.”
Holding Patterns

ISE Researchers Look for Patterns in Aviation Disruptions

By Doug Peterson

You know it’s been a tough winter when Las Vegas gets more than three and a half inches of snow in a single day. December of 2008 was rough all over the country, with more than 2,000 daily snowfall records being shattered. Illinois was slammed by seven winter storms that month, while Green Bay, Wisconsin, set a December record of 45.6 inches of snow.

Snow coverage on the ground neared record levels in 2008, but the weather also wreaked havoc in the air as plane delays cascaded throughout the aviation system. ISE professor Lavanya Marla is looking at patterns in aviation disruptions from 2008 to 2017 using a unique graph signal processing model. But what also makes her work unique is that she brought in undergraduates to analyze data through the University of Illinois Research Experience for Undergraduates (REU) program.

Marla says she has been involving undergraduates in her research for the past four years; in the aviation research, she drew on the work of three undergrads—two of them from ISE, Sanghyun Shin and Darsh Jalan. They were joined by computer science major Aritro Nandi.

“The project was great,” says Shin, a 2020 Industrial Engineering graduate who worked on the research in the fall of 2019. “Our job was to come up with our own code to process data and calculate variables that the research team could use to do their math work.”

According to Marla, the aviation project first got off the ground when she was approached by an MIT graduate student who happened to be from Champaign. This MIT student was looking at data on aviation disruptions at a “very aggregate level”—day-by-day delays in the system. When Marla and the Illinois team joined the effort, they “zoned in more,” she says, diving deeper into hour-by-hour data.

Aviation disruptions can be caused by equipment breakdowns, such as the computer outage at Delta Air Lines’ Atlanta headquarters in August of 2016. They can also be caused by incidents such as a Chicago control-center fire in September of 2014. But Marla says they focused on the most common aviation disruption of all—weather. They studied “disruption-recovery trajectories,” or DRTs, over a span of 10 years, hour-by-hour, at 30 of the most highly trafficked airports in the United States—a massive amount of data.

“It takes some time to look at the initial raw data, process it, and get it into a form in which you can start to see patterns,” Marla says. “But the undergrads understood how to look at a large system and figure out what was happening. It takes some time, and it means getting their hands dirty with the data.”

The research team grouped the DRTs into several categories, including brief disruptions that may last only a few hours, day-long disruptions, and multi-day disruptions that can spread chaos through a highly interconnected aviation system. They found that the average length of time from the beginning of a disruption to a return to normalcy was 5.3 hours.

“Disruptions can be large enough that the capacity of an airport can drop 20 or 50 percent,” Marla says. “In rare cases, they can even shut down an airport. When many factors, like high-traffic airports and tight aircraft or crew connections, come together in a perfect storm, disruptions cascade across the interconnected system, spreading delays from one airport to the next.”

The combined MIT/Illinois research team went on to win a best paper award, taking top honors in the systems performance track at the International Conference on Research in Air Transportation in September.

But according to Marla, this is only the team’s first foundational step—characterizing the dynamics of disruption and recovery. Eventually, she says, they want this methodology to help authorities in the Federal Aviation Administration know when a disruption will recover on its own and when (and where) the FAA needs to take special measures to control the disruption and keep its costs low.

Right now, those decisions are made based on extensive human experience,” she says. “We would like to formalize what’s happening and provide data-driven decision-support tools.”

The three undergraduates on her team “showed very good teamwork,” Marla points out. “They gave me regular updates on what was happening, and given the one-semester timespan, I thought they were really efficient in getting things done.”

Shin coordinated the team of undergraduates, setting up regular meetings. He says this research...
experience was a “major stepping stone” and even led to an internship last summer at Samsung.

“It also gave me confidence in the field,” he adds. “This kind of experience is good whether you’re applying for grad school or looking for jobs.”

After graduating in Industrial Engineering last May, Shin returned to his home in Suwon, South Korea, where he is pursuing his master’s degree at Illinois remotely.

“One of the reasons I chose industrial engineering is because it offers so many options,” he says. “I’m still exploring those options, but I would like to go into data processing—and my undergraduate research had a huge impact in choosing that field.”
Angela Chan (BSSED 2021) has just completed her degree in Systems Engineering and Design and is returning to ISE in the fall to earn an MS in Systems and Entrepreneurial Engineering. She is presenting her paper, “Engagement in Practice: Social Performance and Harm in Civic Hackathons” at the Annual American Society for Engineering Education Conference this July. She worked on this paper with ISE Professor Molly Goldstein, as part of a Fall 2021 REU. Angela served as director of Social Hack 2021, an event hosted by Design for America, a 501(c)3 non-profit and student led organization. As an undergrad, Angela’s team won second in the global Map the System competition, a project of with the Skoll Centre for Social Entrepreneurship at the Said Business School, University of Oxford.
Monitoring the progression of multiple sclerosis-related gait issues can be challenging in adults over 50 years old, requiring a clinician to differentiate between problems related to MS and other age-related issues. To address this problem, researchers are integrating gait data and machine learning to advance the tools used to monitor and predict disease progression.

A new study of this approach led by ISE graduate student Rachneet Kaur, Kinesiology and Community Health Professor Manuel Hernandez and ISE and Mathematics professor Richard Sowers is published in the journal *Institute of Electrical and Electronics Engineers Transactions on Biomedical Engineering*.

Multiple sclerosis can present itself in many ways in the approximately 2 million people that it affects globally, and walking problems are a common symptom. About half of the patients need walking assistance within 15 years of onset, the study reports.

“We wanted to get a sense of the interactions between aging and concurrent MS disease-related changes, and whether we can also differentiate between the two in older adults with MS,” Hernandez said. “Machine-learning techniques seem to work particularly well at spotting complex hidden changes in performance. We hypothesized that these analysis techniques might also be useful in predicting sudden gait changes in persons with MS.”

Using an instrumented treadmill, the team collected gait data—normalized for body size and demographics—from 20 adults with MS and 20 age-, weight-, height- and gender-matched older adults without MS. The participants walked at a comfortable pace for up to 75 seconds while specialized software captured gait events, corresponding ground reaction forces and center-of-pressure positions during each walk. The team extracted each participant’s characteristic spatial, temporal and kinetic features in their strides to examine variations in gait during each trial.

Changes in various gait features, including a data feature called the butterfly diagram, helped the team detect differences in gait patterns between participants. The diagram gains its name from the butterfly-shaped curve created from the repeated center-of-pressure trajectory for multiple continuous strides during a subject’s walk and is associated with critical neurological functions, the study reports.

“We study the effectiveness of a gait dynamics-based machine-learning framework to classify strides of older persons with MS from healthy controls to generalize across different walking tasks and over new subjects,” Kaur said. “This proposed methodology is an advancement toward developing an assessment marker for medical professionals to predict older people with MS who are likely to have a worsening of symptoms in the near term.

Future studies can provide more thorough examinations to manage the study’s small cohort size, Sowers said.

“Biomechanical systems, such as walking, are poorly modeled systems, making it difficult to spot problems in a clinical setting,” Sowers said. “In this study, we are trying to extract conclusions from data sets that include many measurements of each individual, but a small number of individuals. The results of this study make significant headway in the area of clinical machine learning-based disease-prediction strategies.”

Hernandez also is affiliated with the Beckman Institute of Advanced Science and Technology and the the Carle Illinois College of Medicine.
Eugenia Maldonado is a senior in ISE. She chose that discipline because it allowed her to look into different areas she wanted to explore. “I wasn’t really sure what I wanted to do at the beginning,” she explains. “And so I was just like, ‘I’m just going to try different things and find my passion and then go into that with a concentration.’ And so that’s what systems allowed me to do.” ISE’s secondary field option lets students explore an area more in depth, so she chose data science.

Maldonado shares why she came to Illinois: “I knew that it was such a big university, and I have so many different passions that I wanted to kind of explore. I do music; I play the cello, and I knew the school of music was very good, too. So it kind of gave me that balance.” While she’s not minoring in music, she performs with a musical group: the Noten Quartet.

One of the challenges Maldonado encountered early on after coming to Illinois was over-extending herself. “I was really eager to get involved in the community,” she admits. “And so I took on too many things at once for a while, and because I was passionate about so many things, I think it became really overwhelming at times, and I had to choose.” Although she knew she had the ability to choose what she wanted to do, she acknowledges, “I thought I had to do everything at the same time.” But, at the end of her sophomore year, she said to herself, “I have a whole lifetime to explore that!” telling herself, “I need to simplify my life a little bit!” So, she started focusing more on the things that gave her joy instead of tasks and being involved in so many clubs and so many different things. “So, I think that was the biggest challenge.”

One thing Maldonado has learned at Illinois was actually about herself. “I think I have come to understand that I have many facets to myself instead of just being an engineer.” That epiphany has allowed her to integrate “so many aspects of myself and know that I can be all of them at the same time instead of just being solely focused on one thing. So that was music for me.” She goes on to explain, “I’m very technical on one side, so I love programming; I love logic and all of these things. And then I also love my artistic, creative side.” The life lesson she’s learned and passes on is: “You don’t have to choose. You can be all of that at the same time.”

Actually somewhat unrelated to engineering, Maldonado’s dream job is to reframe the education system. “I think we’ve come to a point where we need to rethink a lot of the things that have been passed down,” she acknowledges. “Because we’re this new generation, and we come with new ideas. I think we have that responsibility to speak about what we want to do in the future, and going forward, I want to be
Maldonado will be working for Abbott laboratories in Germany when she graduates. While her first rotation is in Germany, she’s going to be working at least the first half here in Chicago. “Then, hopefully, they’ll let me go to Germany and experience that culture.” She’ll be working in the IT professional development program.

Her advice for incoming freshmen to Illinois is to be trail blazers: “There’s not one path. You have to create your own path—follow your inner guidance system, and don’t try to copy what everyone else has been doing. Don’t travel the traveled path. Don’t be afraid to go into the unknown and explore, because that’s where magic happens—the paths that have not been traveled. So don’t be afraid.”

Kinga Wrobel

Kinga Wrobel was born in a rural village near Elk, Poland. Even as a little girl, her curiosity always kept her yearning to learn new things and one day discover more of the unknown. Her interest in creating and inventing new things led her to the Uof I where she is majoring in Systems Engineering and Design. She is the first female engineer in her family, and the first to be pursuing a career in the aerospace industry.

Kinga has previously worked on several mechanical design and engineering projects in the Eco Illini Supermileage Club, where she worked with the team to design components and construction of the chassis for a maximally efficient gasoline engine prototype car. She also worked on designing custom automation assemblies for high-precision CNC machines, and developed a custom laser engraving system at Sunlight-Tech during the summer of her freshman year of college. These experiences influenced her to pursue undergraduate research with the Engineering Systems Design Lab at UIUC, where she developed a One-Dimensional Testbed for Attitude Control Studies. She successfully published and presented her work at the International Mechanical Engineering Congress and Exposition (IMECE) in Fall 2020. Through the ESDL and her research project, she became heavily involved in the aerospace industry, and fell in love with space exploration. She became determined to use her skills to create new technology for deeper space exploration.

Her passion in space exploration led her to a Systems Engineering Internship at NASA Headquarters during the Fall 2020 and Spring 2021 sessions where she is developing a NASA Systems Engineering Processes tutorial that will aide future NASA interns and staff. She is conducting interviews with seasoned NASA engineers and scientists involved with Parker Solar Probe to gain detailed insight into the NASA Systems Engineering Process. By analyzing Parker’s trade studies, instrument development and integration, Lifecycle Reviews, etc. she is learning what it takes to be a successful Systems Engineer.

During her free time, Kinga loves to craft and paint as well as travel, play soccer, unicycle, and jump out of perfectly good airplanes.

As a Brooke Owens Fellow, Kinga will be interning with Lockheed Martin in the Advanced Programs Division. She is excited to feed her curiosity and contribute to the discovery of the unknown.

Chaitanya Gulati, senior in Systems Engineering and Design, with a minor in Electrical Engineering, was listed in Chicago Inno’s “25 Under 25: 25 rising Chicago entrepreneurs and technologists 25 and younger”.

Gluati is Founder and CEO of NASADYA. Founded in 2018, NASADYA is working to create sustainable energy systems for the future. The company addresses waste issues in energy grids by converting excess energy into hydrogen and oxygen. Gulati is pursuing a dual degree in Systems Engineering and Design, and Innovation Leadership and Engineering Entrepreneurship. He and his startup were selected to be in U of I’s iVenture Accelerator, as well as the 2020 cohort of Future Founders, a local accelerator program for young entrepreneurs.
Samantha Simonetti, BSSED 2021
MAJOR: Systems Engineering and Design
SECONDARY FIELD OPTION: Economics and Finance
ACTIVITIES AND SOCIETIES: Engineering Student Alumni Ambassadors (Vice President, Treasurer, Director of Marketing, Engineering Council Representative), Institute of Industrial and Systems Engineers, Society of Women Engineers, Engineering Council, Volleyball (Intramural), Soccer (Intramural), Delta Zeta
TITLE: Supply Chain Associate at PepsiCo, Chicago
MESSAGE FOR NEW STUDENTS:
“You were accepted into this college for a reason. You got this! Work hard, but don’t forget to have fun!”
Many thanks to the Donors, Alumni, and Faculty for your unwavering support of the Department of Industrial and Enterprise Systems Engineering.
**EXCELLENCE IN TEACHING**

**Teaching Awards**

**The Sharp Outstanding Teaching Award in Industrial Engineering**  
Doug King

**ISE Department Head’s Teaching Award**  
Joe Barich

**Grainger College of Engineering Outstanding Advisor Award**  
Molly Goldstein

**Teachers (and Classes) Ranked Excellent by Students**

**Fall 2020**

**Industrial Engineering**

- Liming Feng  
  IE 522
- R.S. Sreenivas  
  IE 531
- Chrysafis Vogiatzis  
  IE 300, 532
- Abigail Wooldridge  
  IE 598

Carolina Carvalho Manhaes Leite  
TA IE 400  
Juan Xu  
TA IE 523

**Systems Engineering**

- Joe Barich  
  SE 400  
  Parth Bansal  
  TA SE 101  
  * Kangcheng Lin  
  TA SE 101  
  * Seyoung Park  
  TA SE 320

**Spring 2021**

**Industrial Engineering**

- Liming Feng  
  IE 525  
  Jugal Garg  
  IE 598
  *Chrysafis Vogiatzis  
  IE 300, 398

**Systems Engineering**

- * Joe Barich  
  SE 400  
  Carolyn Beck  
  SE 424

* = Marked as top tier of outstanding rankings by students
How to make the most of your undergraduate education and the rest of your life: ICC Chairman Carrie Zalewski (BSGE 2001)

Illinois Commerce Commission (ICC) Chairman Carrie Zalewski attributes the dawning of her interest in STEM, as a young person, to inspirations provided by two men: her brother James Solberg, and Albert Einstein. Although Albert Einstein is the more famous, it was ultimately her brother James who kindled her interest in engineering and preceded her to the University of Illinois’ College of Engineering. Four years older than her, he went to the U of I to be a Mechanical Engineering major. But it was ISE Professor and Associate Head of Undergraduate Programs Michael H. Pleck who mentored her as an undergraduate, assuring her that, as a pre-law student with a passion for environmental issues, General Engineering (now Systems Engineering and Design) was the perfect major for her.

She says she loved her engineering education for two reasons. First, the “holistic approach” of systems engineering “focused on problem solving, in a very creative and innovative way, thinking through various ways to get to a solution.” Second, she enjoyed the collaboration in the College of Engineering.

And, citing “grit,” she persevered through not only the difficult engineering major but a secondary field option in African Studies, which saw her spending six months abroad in South Africa. “Another amazing thing about U of I,” she notes, is that she was able to take a class in the Zulu language, spoken only in southern Africa. She was also a member of a women’s engineering sorority, Alpha Omega Epsilon. She managed to squeeze in an internship with the Illinois Department of Transportation (IDOT), where she would later find one of her first jobs in the legal profession.

From the U of I she went on to demonstrate the grit necessary to finish her degree at Chicago Kent—College of Law. From law school she went on to serve the state at the Illinois Department of Transportation working on environmental compliance issues. She recommends government work for young attorneys because, among other reasons, “young lawyers working at the government get to do good work, making an impact, solve important, challenging problems, all while being afforded more autonomy representing the state than often afforded to new attorneys in private practice.”

From IDOT she was appointed to the Illinois Pollution Control Board (IPCB) where she was a board member for nine years working on environmental regulation. One of the highlights of her work at the Board was setting water quality standards for the Chicago area water system, which ensured better water quality and greater use of the river that runs through downtown Chicago and the recently redeveloped River Walk.

Excited by Governor Pritzker’s call to decarbonize Illinois, she applied to and was appointed to the ICC. The Illinois Commerce Commission has about 200
employees, and, among its many activities, is tasked with balancing the interests of consumers and utilities to ensure adequate, efficient, reliable, safe and least-cost public utility services. Comparing her time at ICC to her time with the IPCB, she advises young people interested in sustainability and decarbonization to consider working in energy.

“If you want to work in the sustainability field and are passionate about solving climate change, the ICC is a great place to understand the inner workings of energy markets and the Illinois law incentivizing renewable energy coming online.”

When asked how her engineering training in complex systems helps her work at the ICC, she says her engineering degree gave her “the confidence and the ability to learn, understand and synthesize challenging topics, in order to work towards a well thought-out solution”, noting “problem solving is perhaps the most useful thing you could learn from any institution.”

The challenge-hungry Chairman Zalewski also volunteers on the Illinois Sustainable Technology Center (ISTC) Advisory Board, which is part of UIUC’s Prairie Research Institute.

She is cognizant that women are still under-represented in the engineering field, something that was prevalent when she was a student. She recalls an electrical engineering class in which she was one of two females out of 90 students. A secondary passion is trying to solve this problem. While in law school, she volunteered as a tutor for students from underserved communities through the Tutoring Chicago Program (previously the Cabrini Green Tutoring Program) and after law school served on the Chicago Youth Centers Auxiliary Board, which raised funds for after-school support and resources for underserved communities such as STEM opportunities. She is dedicated to providing young women and other underrepresented students the same spark provided by her brother and Einstein.

We congratulate her on her many successes!

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>>>Find out what your classmates are up to: https://ise.illinois.edu/alumni/album

>>>Contribute to the alumni album: https://go.ise.illinois.edu/ISEAlumniAlbum

>>>Check out what recent graduates are up to: https://ise.illinois.edu/alumni/yearbook
SENIOR ENGINEERING PROJECTS

FALL 2020

**Agri-Fab, Inc**  
**Mow-N-Vac Blower Vane Redesign for Functional Improvement** - Phase II  
Tom Titone, Advisor  
Jake Butera  
Timothy Deckard  
Eriq Lucero  
Nicholas Sandora  
*WINNER: BERNT O. LARSON PROJECT DESIGN AWARD, FIRST PLACE*

**Crandall Stats and Sensors**  
**Electro-pneumatic Thermostat Design Development**  
Scott A. Burns, Advisor  
Jack Berglund  
Ted Loewenthal  
Omero Nieto  
*WINNER: BERNT O. LARSON PROJECT DESIGN AWARD, SECOND PLACE*

**Hauser Hard Chrome, Inc**  
**Value Stream Mapping for Lean Analysis and Cost Tracking** - Phase II  
Liming Feng, Advisor  
Jane Li  
Samantha Simonetti  
Conrad Tkacz  
Alexander Yu

**ISE Internal**  
**Clearpath Jackal Vehicle System Identification**  
Robert Norris, Advisor  
Tiancheng Cheng  
Alex Darragh  
William Jones  
Matthew Obradovic

**ISE Internal**  
**MAPS (Maintenance and Proximity Sensing) App Development**  
Alexandra Chronopoulou, Advisor  
Melissa Doyiakos  
Rishabh Pandey  
Siddharth Salklan

**ISE Internal**  
**Robotic Gripper Analysis and Redesign**  
Girish Krishnan, Advisor  
Sabin Gianelloni  
Shaneelah Rashid  
Lucas Semitka

**ISE Internal**  
**Simulated Ultrasound Imaging for a Soft Active Heart Simulator**  
Girish Krishnan, Advisor  
Nina Ayad  
Spencer Binning  
Alexandra Kaste

**ISE Internal**  
**Simulation and Analysis of Networked Disease Dynamics**  
Carolyn Beck, Advisor  
Jason Chang  
Marwan Elgendy  
Jiaqing Mao

**North American Lighting**  
**Robotic Pick and Place Vision System Analysis and Application** - Phase II  
Harrison Kim, Advisor  
Jack Bollito  
Scott Manhart  
Monika Syptek  
Kevin Wu

**Nextstep Commercial Products**  
**Algorithm Development for Dynamic Warehouse SKU Location Optimization**  
Wayne J. Davis, Advisor  
Andrew Barvinek  
Qingyu Guo  
Yuanqing Guo  
Jack Sitta

**Polyform Products Company**  
**Clay Conditioning Machine Redesign - Phase II**  
Molly Goldstein, Advisor  
Diego Arriaga Salinas  
Umer Bandukda  
Jimmy Sommer

**Polyform Products Company**  
**Predictive Test Analysis for Clay Quality - Phase II**  
Harry S. Wildblood, Advisor  
John Morgan  
Caitlyn Person  
Justin Sowinski

**United - Corporate Support Center**  
**Analysis of Flight Scheduling Effectiveness** - Phase II  
Lavanya Marla, Advisor  
Ketaki Barapatrey  
Juan Cepeda  
Peter Grahl  
Matthew Samuel

**Vanfab, Inc**  
**Steel Reel Business Opportunity Analysis**  
Henrique L. M. dos Reis, Advisor  
Jacob Aron  
Vincent Chee  
Justin Moises Habana  
Jake Wolff

SPRING 2021

**4B Components Ltd.**  
**Reducing Aerodynamic Drag in Bucket Elevators**  
Tom Titone, Advisor  
Vincent Hu  
Jerry Liu  
Raj Patel  
Francesca Santos

**Agri-Fab, Inc.**  
**Semi-Autonomous Validation Test Equipment Design**  
Robert Norris, Advisor  
Angela Chan  
Kishan Desai  
Nikhil Kumar  
Eugenia Maldonado Alvarado

**Color Communications, LLC**  
**Color Sample Chip Transfer Press Redesign**  
Molly Goldstein, Advisor  
Estelle Marissa Chavez  
Becky Donnelly  
Yuzhou Du  
Joshua Zhou

**Crandall Stats and Sensors**  
**Electro-pneumatic Thermostat Design Development - Phase II**  
Scott A. Burns, Advisor  
Yifan Chen  
Chen Ge  
Nicholas Gustafson  
Thomas Kaufmann  
Haolin Zhang
<table>
<thead>
<tr>
<th>Division of Animal Resources</th>
<th>DAR Animal Facilities Operational Analysis for Improved Efficiency</th>
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<tbody>
<tr>
<td>Dan Thompson, Advisor</td>
<td>Nick Fontana</td>
</tr>
<tr>
<td>Gautam Kalluri</td>
<td>Matt Linden</td>
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<tr>
<td>Harsh Singh</td>
<td>Gabrielle Wind</td>
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<thead>
<tr>
<th>Derby Industries, LLC</th>
<th>Robotic Pick and Place Application and Layout Optimization</th>
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<tbody>
<tr>
<td>Aleksandr Stolyar, Advisor</td>
<td>Zachary Kanjirath</td>
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<tr>
<td>Rahul Mahesh</td>
<td>David Okrzesik</td>
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<td>Icabel Rodriguez</td>
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<thead>
<tr>
<th>Forster Products</th>
<th>Bullet Seating for Measurement and Process Refinement</th>
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<tr>
<td>Henrique L. M. dos Reis, Advisor</td>
<td>Michael Elzanati</td>
</tr>
<tr>
<td>Nishant Modi</td>
<td>Samuel Zelman</td>
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<thead>
<tr>
<th>Hausner Hard Chrome, Inc.</th>
<th>Value Stream Mapping and Tracking of Key Operations into ERP System</th>
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<tbody>
<tr>
<td>Harry S. Wildblood, Advisor</td>
<td>Jared Espinosa</td>
</tr>
<tr>
<td>Ellie Guido</td>
<td>Nathan Hinnen</td>
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<td>Justin Powell</td>
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<tr>
<th>Imagination Products Corp.</th>
<th>(FlexiSnake) Vac Snake Application &amp; Design</th>
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<tbody>
<tr>
<td>Yumeng Li, Advisor</td>
<td>Rosemarie Garza</td>
</tr>
<tr>
<td>Fred Hwang</td>
<td>Benjamin Mark</td>
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<tr>
<td>Rachel Wortman</td>
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<thead>
<tr>
<th>Jtec Industries, Inc.</th>
<th>Robotic Vision System</th>
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<tbody>
<tr>
<td>Rasoul Etesami, Advisor</td>
<td>Taeyu Cai</td>
</tr>
<tr>
<td>Ziyang Liu</td>
<td>Jinglan Shi</td>
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<tr>
<td>Wenpeng Wang</td>
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<thead>
<tr>
<th>Kemp Mfg. Co.</th>
<th>ERP Quality Data Retrieval and Reporting Improvement</th>
</tr>
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<tbody>
<tr>
<td>Qiong Wang, Advisor</td>
<td>Alexander Enrico</td>
</tr>
<tr>
<td>Maxim Jayes</td>
<td>Benjamin Kofman</td>
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<td>Tyler Zhang</td>
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<tr>
<th>Kwik-Wall Company</th>
<th>Flow &amp; VSM &amp; Productivity Increase for New Facility</th>
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<tbody>
<tr>
<td>Jugal Garg, Advisor</td>
<td>Jon Doss</td>
</tr>
<tr>
<td>Minjae Kim</td>
<td>Xiang Li</td>
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<tr>
<td>Shen Liu</td>
<td>Honghui Xie</td>
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<tr>
<th>Laystrom Manufacturing</th>
<th>CNC Laser Sheetmetal Part Separation Efficiency Improvement</th>
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<tbody>
<tr>
<td>Ruoyu Sun, Advisor</td>
<td>Chris Abarro</td>
</tr>
<tr>
<td>Nirvaan Garg</td>
<td>Grayson Will</td>
</tr>
<tr>
<td>Yue Yang</td>
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<thead>
<tr>
<th>Morton Buildings, Inc.</th>
<th>Dutch Door Frame Unit Manufacturing Process Development</th>
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<tbody>
<tr>
<td>Wayne J. Davis, Advisor</td>
<td>Vishrut Khaitan</td>
</tr>
<tr>
<td>Colin O’Reilly</td>
<td>John Snyder</td>
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<td>Yumeng Wang</td>
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<tr>
<th>North American Lighting</th>
<th>Space Utilization for Efficient WIP Storage and Retrieval</th>
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<tr>
<td>Scott A. Burns, Advisor</td>
<td>Lucas Kinsey</td>
</tr>
<tr>
<td>Teresa Riles</td>
<td>Zidan Xiao</td>
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<tr>
<th>Northrop Grumman</th>
<th>Aircraft Survivability Test Data Integration for Enhanced Visualization</th>
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<tr>
<td>Rakesh Nagi, Advisor</td>
<td>Blake Lesser</td>
</tr>
<tr>
<td>Chaitanya Maroju</td>
<td>Alexander Pieri</td>
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<tr>
<td>Hyunjoon Rhee</td>
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<thead>
<tr>
<th>Plastipak Packaging Inc.</th>
<th>Automated Material Handling AGV Analysis and Implementation</th>
</tr>
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<tbody>
<tr>
<td>Lavanya Marla, Advisor</td>
<td>Christian Forster</td>
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<tr>
<td>Molly Maloney</td>
<td>Jaquelin Salcedo</td>
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<tr>
<th>PPC Flexible Packaging</th>
<th>Medical Packaging Production Troubleshooting and Productivity Improvement with Pick- and Place Technology</th>
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<tbody>
<tr>
<td>Karthekeyan Chandrasekaran, Advisor</td>
<td>Aaryaman Baid</td>
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<td>Harrison Oliff</td>
<td>Minxing Sun</td>
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<td>Satvika Veeravalli</td>
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<tr>
<th>Precision Products, Inc.</th>
<th>Collapsible Spreader Design</th>
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<tbody>
<tr>
<td>Pingfeng Wang, Advisor</td>
<td>Yongseok Kim</td>
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<td>Robbie Torchalski</td>
<td>Bohua Zhang</td>
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<tr>
<th>Psychosemic</th>
<th>Optimization of Manufacturing Efficiency and Scalability for the Bionic Ability Hand</th>
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<tbody>
<tr>
<td>Dusan M. Stipanovic, Advisor</td>
<td>Anna Steinbrenner</td>
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<td>Siwen Wang</td>
<td>Saad Yenepoya</td>
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<tr>
<th>R &amp; R Bindery Service, Inc.</th>
<th>Book Block Layout and Material Handling Optimization</th>
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<tr>
<td>Abigail Woolridge, Advisor</td>
<td>Evelyn Hughes</td>
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<td>Anvi Sarbhai</td>
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<th>TEC</th>
<th>Analysis of the Three-Hub Model for Distribution System</th>
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<tr>
<td>Xin Chen, Advisor</td>
<td>Daniel Dirienzo</td>
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<td>Parth Patel</td>
<td>Connor Steel</td>
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<th>Wahl Clipper Corporation</th>
<th>Oscillating Motor Controller and Prototyping</th>
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<tr>
<td>Jeff Shamma, Advisor</td>
<td>Mariana Conde</td>
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<tr>
<td>Ethan Hoggard</td>
<td>Adam McCarthy</td>
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</table>

**WINNER: BERNT O. LARSON PROJECT DESIGN AWARD, FIRST PLACE**
NEW ISE ALUMNI

BACHELOR’S DEGREES

AUGUST 2020 GRADUATES

Industrial Engineering
Abidi, Syed S
Ahn, Kisun
Demirok, Yasemin Burcu
Ng, Connor Chung

Systems Engineering and Design
Ferguson, Kenneth Lee
Wang, Ruolei

DECEMBER 2020 GRADUATES

Industrial Engineering
Chee, Vincent Jeffrey
Couston, Paul Thomas
Dash, Ritesh
Faydasicok, Hasan Batuhan
Li, Tiantong
Morgan, John Edward
Sowinski, Justin T
Wang, Can

Systems Engineering and Design
Addo, Sir-Simons N
Bowbin, William Patrick
Cheng, Tiancheng
Darragh, Alexander William Peter
Elgendy, Marwan M
Gao, Qingyuan
Gianelloni, Sabin Alexander
Jones, William Casey
Li, Jane
Lundstrum, Lucas Reinhart
Pulido, Bella Yolanda
Semitka, Lucas Alexander
Sitta, Jack Miles
Sommer, James Patrick
Spytek, Monika R

SPRING 2021 GRADUATES

Industrial Engineering
Abarro, Christian Anthony Ocampo
Alladi, Sarang
Aron, Jacob C
Ayar, Nina V
Baid, Aaryaman
Barapatre, Ketaki Charudatta
Barvinek, Andrew R
Bollito, Jack Anthony
Desai, Kishan Raheesh
Dirienzo, Daniel Edward
Donnelly, Rebecca Marie
Doss, Jonathan Michael
Ezmati, Michael Saad
Enrico, Alexander
Espinoza, Jared M
Fontana, Nicholas Joseph
Forster, Christian O
Garg, Nirvaan
Ge, Chen
Grah, Peter Josiah
Guido, Elizabeth Evelyn
Guo, Yuanqing
Gupta, Arnab
Hinnen, Nathan Isaac
Hughes, Evelyn A
Inccapeo, Paul Edward
Kalluri, Gautam Sai Dutt
Kanjirath, Zachary Stephan
Khaitan, Vishrut
Kim, Yongseok
Kinsey, Lucas Anthony
Lesser, Blake Elliot
Li, Xiang
Li, YiJie
Mao, Jiaqing
Maroju, Chattanya Soma
Modi, Nishant S
Okreslik, David Thaddeus
Olliff, Harrison George
O’Reilly, Colin Joseph

Pandey, Rishabh
Patel, Parth Alpesh
Patel, Raj Y
Person, Caitlyn Marie
Powell, Justin James
Rahul Mahesh, -
Ramos, Elizabeth Therese
Rhee, Hyunjoon
Riles, Teresa C
Rodriguez, Icabel
Sarbhai, Anvi
Shi, Jinglan
Singh, Harshvardhan
Smith, Madison Anne
Snyder, John Thomas
Spiwak, Mia Alexandra
Steinbrenner, Anna Lisa
Tkacz, Conrad Derek
Wang, Yumeng
Wortman, Rachel Lynne
Wu, Kevin Wayne
Yang, Yue
Yenepoya, Moideen Saad
Zhang, Bohua
Zhang, Dingying
Zhang, Youlan
Zhao, Yuanbo
Zhou, Joshua

Bandukda, Umer
Berglind, Jack P
Binning, Spencer
Butera, Jacob Vincent
Cai, Taoyu
Cepeda, Juan Ignacio, Jr
Chan, Angela Lilly
Chang, Jason Jing-Shen
Chavez, Estelle Marissa Curimao
Conde, Mariana
Deckard, Timothy Paul
Doyiakos, Melissa Maria
MASTER’S DEGREES

AUG 2020 GRADUATES

Master of Science in Industrial Engineering
Balasubramanian, Sharan
Bibaksereskeh, Seyedali
Chen, Xin
Ruan, Yufei

DEC 2020 GRADUATES

Master of Science in Industrial Engineering
Chen, Shulu
Chen, Yuhao
Liang, Yuhun
Sun, Chang
Susanto, Yohanes
Yan, Shen
Yang, Junchi
Zhu, Qizhi
Zuo, Luo

May 2021 Graduates

Master of Science of Systems Engineering and Design
Fu, Tianshi

DOCTORAL DEGREES

AUG 2020 GRADUATES

Doctor of Philosophy in Industrial Engineering
Zhang, Wenda
Dissertation: Cyclic best first search in branch-and-bound algorithms

DEC 2020 GRADUATES

Doctor of Philosophy in Systems Engineering and Design
Raman, Arun
Dissertation: On the decidability of problems in liveness of controlled Discrete Event Systems modeled by Petri Nets

MAY 2021 GRADUATES

Doctor of Philosophy in Industrial Engineering
Ghayoori, Arash
Dissertation: Budget allocation and optimal use of resources in four different contexts: Data centers, viral marketing, recommendation systems, and the fight with the HIV epidemic

Li, Menglong
Dissertation: M1-convexity, S-convexity, and their applications in operations

Doctor of Philosophy in Systems Engineering and Design
Courtney, Logan Matthew
Dissertation: Learning from videos with deep convolutional LSTM networks

Li, Yao
Dissertation: EEG-based brain-computer interface for human-robot collaboration

Patterson, Albert Edward, V
Dissertation: Meso-Scale FDM Material Layout Design Strategies Under Manufacturability Constraints and Fracture Conditions

Peddada, Satya Ravi Teja
Dissertation: A Two-stage Design Framework for Optimal Spatial Packaging of Interconnected Fluid-Thermal Systems
CALLING ALL ALUMNI!

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The year 2021 marked the 100th anniversary of the Department of General Engineering, the department that became ISE. This year is also the 100th birthday of the Transportation Building, whose northern portion was completed in 1921. General Engineering would grow to fill the building, and merge with Industrial Engineering to form ISE. In those 100 years, we have made innumerable breakthroughs in research and graduated thousands of students. We thank you for being a part of our storied history. Your support makes our next century even brighter than our first.

The number of postal mail addresses we have for you outnumbers the email addresses we have for you at about 2-to-1.

Please consider visiting this web form to update your contact info, and pass along news of where your degree has taken you.

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For More Information
Contact Katy Swanson at (217) 300-3651 or email kswnsn@illinois.edu

ise.illinois.edu