Industrial Engineering Newsletter Spring 2022

OPTIMUM

ENGINEERED FOR
WHAT'S NEXT.

CULLEN
COLLEGE OF ENGINEERING
UNIVERSITY of HOUSTON

Letter from the Chair

Dear Colleagues,

I hope that you are well. I am delighted to share with you some of our recent highlights and accomplishments. There are many exciting things going on at the UH Department of Industrial Engineering, including partnerships with technology, medical institutions and more. I hope that you enjoy reading through the following items, and if you wish to collaborate on a project, do not hesitate to let me know.

Warm Regards,

Gino J. Lim, Ph.D.
R. Larry and Gerlene (Gerri) R. Snider Endowed Chair in Industrial Engineering
Cullen College of Engineering
University of Houston

UH IE **BY THE NUMBERS**

ENROLLMENT
(FALL 2021)

120 UNDERGRADUATE SUTDENTS

182 GRADUATE STUDENTS

DEGREES AWARDED
(2020 - 2021)

33 B.S.

60 M.S.

5 PH.D.

DEPARTMENT HIGHLIGHTS

MASTER'S OF ENGINEERING MANAGEMENT EXTENDS
TO FULLY ONLINE OFFERING

UH Extend is a new University of Houston initiative designed for students seeking fully online degree and certificate programs that are both convenient and affordable. Students can take an online 30-credit hour master's in Engineering Management for fall 2022.

Engineering Management (EM) bridges the gap between engineering and technological problem-solving abilities of engineers with administrative skills for leading the day to day operations of today's complex organizations within the current global economy. The scope of EM includes engineering principles, business functions and advanced technologies.

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GINO LIM NAMED DEPARTMENT'S

FIRST FULLY ENDOWED CHAIR

Thanks to a generous gift, the Industrial Engineering Department now boasts its first fully funded endowed chair. Named for its benefactors, the R. Larry and Gerlene (Gerri) R. Snider Endowed Chair in Industrial Engineering came into effect on March 1. **Gino Lim**, Ph.D., is the first individual to hold the distinction.

The Sniders are longtime friends and supporters of the Cullen College. Ever since earning his degree in 1955, Larry and his wife Gerri have been passionate supporters of the University and its students. Over the years they have funded multiple scholarships at the Cullen College, including one for Native Americans, in honor of Larry's membership in the Cherokee Nation, and two scholarships for women in honor of their daughters Melody Kathryn and Rebecca Lee. In 2015, the Sniders established a $6.8 million testamentary charitable gift annuity supporting the future success of the UH Cullen College of Engineering. This latest $1 million gift is in further support of that endeavor.

Lim has been the chairman of Industrial Engineering at the Cullen College since 2011, and has guided the department to many successes, including a Top 50 national ranking in 2020. In addition to his executive leadership at the Cullen College, Dr. Lim also contributes impactful research to the community, regularly partnering with acclaimed institutions such as the Texas Department of Transportation and MD Anderson Cancer Center.

FACULTY, STUDENT VOLUNTEERS KEY TO ST. ELMO BRADY EFFORT

For Industrial Engineering assistant professor **Taewoo Lee** and doctoral student **Poria Dorali**, each one came to the decision to volunteer with the St. Elmo Brady STEM Academy in different ways.

Lee finished his doctorate in Operations Research at the University of Toronto in 2015 and moved to the United States, taking a position at Rice. Since he learned about the pressing issues in the healthcare system, especially related to disparity in access to care, his research has been focused on how to use mathematical models to redesign healthcare delivery systems to improve equity and reduce disparity in access to care. At Rice, Lee worked with a non-profit organization to develop software, based on mathematical modeling, to recruit and assign college student tutors to elementary schools in underrepresented areas in Houston. After moving to UH in 2017, Lee connected with **Jerrod Henderson**, a co-founder of the St. Elmo Brady STEM Academy and now an assistant professor in the William A. Brookshire Department of Chemical and Biomolecular Engineering, and **Ricky Greer**, another co-founder of the academy.

Dorali knew Henderson as an undergraduate, and enthusiastically agreed to help when Lee offered the opportunity for his students to work with the academy. Dorali and Lee were both quick to stress that the volunteer effort was wide-ranging, with support from a variety of organizations. Along with Lee, Dorali identified IE graduates **Zahed Shahmoradi**, **Amanda Khem** and **Krystal Ashby**, and undergrad senior **Emilia Diaz**, as a few of the people he's worked closely with the past few years on efforts at the academy.

When asked of his experience, Dorali added, "This is my fourth year here as a Ph.D. student in the industrial engineering department, where I finished my B.S. in Industrial Engineering in 2018. I've been fortunate to take part in what I consider very meaningful research in medical decision-making for vulnerable or under-served patients, particularly in Harris County. In the future I hope I can continue this focus, whether it be as a professor, with the added bonus of teaching students, or even in the healthcare industry, particularly in the public sector."

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SYSTEM DEVELOPED BY IE DRONE PIONEER PROVIDES

CONTINUOUS LIVE MONITORING

To enhance security of the nation's border, a pioneer in drone technology at the University of Houston is proposing a continuous flight of small drones over its perimeter. One small problem: The battery limitation of small drones (they last about 30 minutes) is a major obstacle to continuous flight time.

To address this problem, **Gino Lim**, R. Larry and Gerlene (Gerri) R. Snider Endowed Chair of Industrial Engineering, proposes the use of drones with a built-in wireless electrification line (E-line) battery charging system. Lim pioneered that technology in 2017. Recent findings were reported in the journal *Computers & Industrial Engineering*. The paper's first author is **Navid Ahmadian**, a former doctoral student in Lim's lab.

The E-line system charges the drones during their surveillance, enables a continuous and seamless flight over the border and eliminates the need for battery charging stations. Continuous monitoring sends live information about different locations of the borderline to the designated control centers, helping enhance border security and reducing the necessity of systems operated by people.

In developing their model, the team reviewed a case study of a segment of the U.S.-Mexico borderline spanning 22.8 miles and located between two border crossings within the Cochise County limits in Arizona. Although drones have been the subject of many studies, few studies have focused on the implementation of the drone for continuous border surveillance.

RESEARCH
ROUNDUP

Developing International Networks

Gino Lim, Ph.D., a professor and the R. Larry and Gerlene (Gerri) R. Snider Endowed Chair in Industrial Engineering, is heading a grant titled "Digital System Requirements for Natural Resources Engineering." The grant is meant to establish an interdisciplinary network of academic and industrialists in Norway, Brazil and the United States. The effort began in October 2020 and runs through September 2023. It is sponsored by the University of Oslo in Norway.

Enhancing Safety and Efficiency in The Oil and Gas Industry

Inspired by the film, Deepwater Horizon, **Qianmei (May) Feng**, a UH Cullen College professor of industrial engineering, recently completed a four year grant from the National Science Foundation totaling $627,102 to improve safety and efficiency in the oil and gas sector. Feng and her team worked with Schlumberger, the American Bureau of Shipping (ABS) and General Electric (GE) to explore equipment failures in capital-intensive industries, to come up with better models for maintaining equipment and reducing failures.

Decision-Making Preferences

A new paper from **Taewoo Lee**, an Assistant Professor of the Industrial Engineering Department at the Cullen College of Engineering, examines decision-making preferences using past decision data, using a novel, data-driven inverse optimization method. "Quantile Inverse Optimization: Improving Stability in Inverse Linear Programming" was printed in a recent edition of *Operations Research*, which is published under the umbrella of the Institute for Operations Research and the Management Sciences (INFORMS).

IMPROVING SUPERCONDUCTOR TAPE UNIFORMITY

Ying Lin, Ph.D., an Assistant Professor in the Industrial Engineering Department at the Cullen College of Engineering, has received a grant from the Advanced Manufacturing Institute at the University of Houston to improve the uniformity of long-length high temperature superconductor tapes during superconductor manufacturing process.

Lin collaborates with two UH colleagues on this project – **Qianmei (May) Feng**, Ph.D., Professor in the Industrial Engineering Department; and Wenjiang Fu, Ph.D., Professor of Statistics and Director of the Statistics and Data Science Program at the College of Natural Sciences and Mathematics.

According to Lin, High Temperature Superconductor (HTS) tapes have the potential to provide multiple commercial solutions to a broad spectrum of sectors of the US economy such as energy, defense and medicine. However, it is challenging to achieve uniform performance over long-length HTS tape due to the unstable manufacturing process.

To help achieve the uniformity in-field performance of superconductor manufacturing, Lin and her team will develop novel machine learning techniques to discover the critical process parameters affecting the uniformity of superconductor tapes. They will also provide real time monitoring to better control the manufacturing process, and collaborate with the experts of superconductor manufacturing in AMI and apply their techniques to the AMI's pilot-scale superconductor manufacturing process.

Lin also serves as the director for the Smart Health & INtelligent Engineering Systems (SHINES) Lab at UH. Research interests of the SHINES Lab lie at the interactions of data analytics, quality engineering and healthcare. Feng and her research lab studies quality and reliability problems for complex systems.

DE ALDECOA BUENO HONORED WITH

ENTREPRENEUR/INNOVATOR AWARD

Carlos de Aldecoa Bueno is President and CEO of Cadeco Industries, Eximius Coffee, and Gulf Coast Distillers. Located near downtown in Houston's trending East End, the enterprises are the modern incarnation of a 3rd generation, family-owned group of companies focused exclusively on the food and beverage industry. He was chosen for the UH Engineering Alumni Association's 2021 Entrepreneur/Innovator Award and honored at its annual gala last November.

A proud UH alumnus, de Aldecoa earned his bachelor's of science in industrial engineering from the Cullen College in 1997. He has served as a Board Member of the Greater Houston Partnership, the Houston Hispanic Chamber of Commerce and the East End Development District. De Aldecoa is a member of the Houston chapter of YPO and serves on the Board of Boys and Girls Country, the Houston Zoo, and the Advisory Board of Amegy Bank. He plans to continue serving coffee, sweeteners and spirits to consumers for many generations to come.

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ALUMNI SPOTLIGHT

INDUSTRIAL ENGINEERING

ERICK C. JONES NAMED

DISTINGUISHED ALUMNI

Erick C. Jones, Sr., Ph.D., is a Distinguished Professor and Fellow in industrial engineering who has served in many roles, including engineer, researcher and leader. His wide-ranging career experiences have spanned industry, government and academia. He currently works for the U.S. State Department as a Senior Analyst (Expert) in the Office of the Chief Economist through a science fellowship from the National Academies of Science, Engineering and Medicine. He is working on resilient supply chains foreign policy, which positively impacts the U.S. middle class.

Jones is an alumnus of the University of Houston with both Ph.D. and master's degrees. He is also an alumnus of Texas A&M University, a scholar of the William J. Fulbright and Alfred P. Sloan programs, and a Fellow of the Institute of Industrial and Systems Engineering. Jones is a tenured Professor at the University of Texas at Arlington.

Jones was honored with the Distinguished Engineering Alumni Award by the UH Engineering Alumni Assocation (EAA) for 2021. He was presented with the award at the EAA's annual gala last November.

THE UNDERGRAD

JOURNEY OF EMI DIAZ.

Emilia (Emi) Diaz, an Industrial Engineering senior at the Cullen College of Engineering, has had an exciting journey as an undergrad. After transferring to UH, Diaz knew she wanted to make an impact, and has since held numerous leadership roles, including Junior Chair for the Society of Hispanic and Professional Engineers (SHPE-UH) and most recently president of the UH student chapter of the Institute of Industrial and Systems Engineers (IISE-UH). Her various internship and leadership experiences have taught her a great deal about teamwork, professionalism, and mentorship.

The University of Houston
Cullen College of Engineering

The University of Houston Cullen College of Engineering addresses key challenges in energy, healthcare, infrastructure and the environment by conducting cutting-edge research and graduating hundreds of world-class engineers each year. With research expenditures topping $40 million and increasing each year, we continue to follow our tradition of excellence in spearheading research that has a real, direct impact in the Houston region and beyond.

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