

Mechanical Engineering
Newsletter Fall 2022

MOMENTUM

ENGINEERED FOR
WHAT'S NEXT.



Cullen College of Engineering
UNIVERSITY OF HOUSTON

Letter from the Chair



Dear Colleagues,

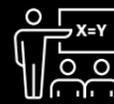
Greetings! I hope you are well. I am delighted to share some of the highlights and accomplishments of the UH Mechanical Engineering department's esteemed faculty and industrious students. There are many exciting developments in progress in our department, and I invite you to come visit us in person when you can. When we collaborate, we have the potential to make great strides in innovation.

Warm Regards,

Pradeep Sharma, Ph.D

Hugh Roy and Lillie Cranz Cullen Professor and Chair
Mechanical Engineering
Cullen College of Engineering
University of Houston

UH ME **BY THE NUMBERS**



FACULTY (SPRING 2022)

- 4** NATIONAL ACADEMY OF ENGINEERING MEMBERS
- 2** NATIONAL ACADEMY OF INVENTORS FELLOWS
- 1** NATIONAL ACADEMY OF INVENTORS SENIOR MEMBER



ENROLLMENT (SPRING 2022)

- 958** UNDERGRADUATE STUDENTS
- 199** GRADUATE STUDENTS



LEARN MORE ABOUT ME PROGRAMS:
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DEGREES AWARDED
(SPRING 2022)



246 B.S.



42 M.S.



13 PH.D.



UH MECHANICAL ENGINEERING GRADUATE PROGRAM RATING IMPROVES IN U.S. NEWS & WORLD REPORT RANKINGS



The Mechanical Engineering graduate level program at the University of Houston's Cullen College of Engineering improved significantly for 2023, according to the latest rankings edition of U.S. News & World Report. Mechanical Engineering jumped 14 spots, improving to No. 69 overall.

Overall, the Cullen College of Engineering was rated as the No. 71 graduate school in the nation. As of Fall 2021, the Cullen College of Engineering had about 2,955 undergraduate students enrolled, as well as 732 students pursuing Masters' degrees, and 535 doctoral students. The Masters' student enrollment represents a gain of more than 200 students, year-to-year.

Degrees are offered in biomedical, chemical, civil, computer, electrical, environmental, geosensing systems, industrial, mechanical and petroleum engineering. The college also offers interdisciplinary graduate programs in subsea, aerospace, space architecture, materials and computer and systems engineering.

The University of Houston is a Carnegie-designated Tier One public research university recognized by The Princeton Review as one of the nation's best colleges for undergraduate education. UH serves the globally competitive Houston and Gulf Coast Region by providing world-class faculty, project-based learning, high impact research and strategic industry partnerships. Located in the nation's fourth-largest city, UH serves more than 47,000 students in the most ethnically and culturally diverse region in the country.

For the full list of rankings from U.S. News and World Report, please visit:
<https://www.usnews.com/best-graduate-schools> ⚙️

UH MECHANICAL ENGINEERING WELCOMES

NEW FACULTY MEMBERS FOR FALL 2022

ALEXANDRA LANDON



Alexandra Landon joined the department as a professor of practice; a first of its kind at the Cullen College of Engineering. Landon earned her B.S. in Mechanical Engineering from Princeton University in 2012, and a master's degree with high distinction in Business Administration from the Harvard Business School in 2018.

BEN XU



Ben Xu has come to UH after being employed as an Assistant Professor at Mississippi State University and the University of Texas-Rio Grande Valley. His research projects have drawn funding from U.S. Department of Energy and NASA. Xu will join the college in 2023. ⚙️

THEOCHARIS BAXEVANIS



Theocharis Baxevanis has been promoted from Assistant Professor to Associate Professor. He earned his doctorate from Aristotle University of Thessaloniki in Greece, and joined UH in 2016.

SHAILENDRA JOSHI



Shailendra Joshi has been promoted from Bill D. Cook Assistant Professor to Bill D. Cook Associate Professor. He joined the college in 2018 after previously teaching at the National University of Singapore. He earned his doctorate from the Indian Institute of Technology Bombay.

HOLLEY LOVE



Holley Love has been promoted from Instructional Assistant Professor to Instructional Associate Professor. She joined the faculty of the college in 2016, following work at the Texas Heart Institute. She earned her doctorate at the University of Houston. ⚙️



Chancellor Khator and Director Wyche with other NASA and UH System officials after the partnership signing.

UH SYSTEM PARTNERS WITH NASA TO HELP **'ADVANCE HUMAN SPACEFLIGHT'**

The University of Houston System and NASA's Johnson Space Center (JSC) are expanding a longtime partnership to work collaboratively on joint research, technology development, technology transfer, training and educational and outreach initiatives.

As NASA endeavors to travel deeper into space, these efforts will be carried out through the undergraduate, graduate, and joint research programs at the four UH System universities: University of Houston, University of Houston-Downtown, University of Houston-Clear Lake and University of Houston-Victoria.

Areas of interest for this partnership encompass science, engineering, technology and business disciplines that are vital for human and robotic spaceflight missions, aerial and ground-based research, including data analytics, cybersecurity and other emerging technologies – all areas facing critical workforce shortages. Entrepreneurship students at UH, for example, are currently working to commercialize various NASA technologies. ⚙️

‘SUPER COOL CONDUCTOR’

ADVANCES IN PRESTIGIOUS DOE COMPETITION

As the world embarks upon the energy transition, improved electrification will be key to powering an efficient low carbon global economy. The development of superconductors, materials that can revolutionize the way electricity is generated, transmitted, stored and efficiently used for technologies fundamental to modern life at scale and low cost, will be central to this transition.

The University of Houston is contributing to the energy transition through its research efforts on superconductors.

The Super Cool Conductor from **UH’s Selva Research Group** was recently one of ten competitors to win the first stage of the U.S. Department of Energy’s prestigious Conductivity-enhanced materials for Affordable, Breakthrough Leapfrog Electric and thermal applications or CABLE Prize. The three-stage competition will award up to \$4.5-million to spur development of new materials that enhance conductivity.



Each winning team earned a \$25,000 cash prize and a stipend for third-party conductivity testing in the second stage of the competition. ⚙️

SOLAR HARVESTING SYSTEM

HAS POTENTIAL TO GENERATE POWER 24/7

A University of Houston professor is continuing the historic quest of harnessing the power of the sun, reporting on a new type of solar energy harvesting system that breaks the efficiency record of all existing technologies. And no less important, it clears the way to use solar power 24/7.

“With our architecture, the solar energy harvesting efficiency can be improved to the thermodynamic limit,” reports **Bo Zhao**, Kalsi Assistant Professor of Mechanical Engineering and his doctoral student **Sina Jafari Ghalekohneh** in the journal *Physical Review Applied*. The thermodynamic limit is the absolute maximum theoretically possible conversion efficiency of sunlight into electricity.

Finding more efficient ways to harness solar energy is critical to transitioning to a carbon-free electric grid. According to a recent study by the U.S. Department of Energy Solar Energy Technologies Office and the National Renewable Energy Laboratory, solar could account for as much as 40% of the



nation’s electricity supply by 2035 and 45% by 2050, pending aggressive cost reductions, supportive policies and large-scale electrification. ⚙️

YASHASHREE KULKARNI ELECTED AS AMERICAN SOCIETY OF MECHANICAL ENGINEERS FELLOW



Yashashree Kulkarni, Bill D. Cook Professor of Mechanical Engineering, has been elected to the Fellow grade of membership for the American Society of Mechanical Engineers (ASME). Only about 3,000 members of ASME are Fellows, out of a total membership of about 75,000.

ASME confers the Fellow grade of membership on worthy candidates to “recognize outstanding engineering achievements and contributions to the engineering profession and to ASME”. An ASME Member has to have 10 or more years of active practice, at least 10 years of active corporate membership in ASME, and be nominated by at least two ASME members or fellows.

“Being recognized by the scientific community is indeed an incredible honor and I am humbled by it”, said Kulkarni. “Of course, this would not have been possible without the support of my amazing students, colleagues, and collaborators.” Kulkarni is currently the Bill D. Cook Professor of Mechanical Engineering. She joined the Cullen College of Engineering in 2009. In 2019, she was appointed as the Director of Research Computing for the Cullen College of Engineering. Prior to joining the University of Houston, she was a post-doctoral scholar at University of California at San Diego. She earned her Bachelors’ degree from Indian Institute of Technology in Bombay, India and her PhD in Applied Mechanics from California Institute of Technology.

Kulkarni currently serves as an Associate Editor for the ASME Journal of Applied Mechanics. She was the recipient of the ASME’s Sia Nemat-Nasser Early Career Award in 2017. ⚙️

PRADEEP SHARMA TABBED FOR THE NEW EDITOR-IN-CHIEF OF ASME JOURNAL OF APPLIED MECHANICS



The American Society of Mechanics Engineers (ASME) announced that Professor **Pradeep Sharma** has taken over as the 8th editor-in-chief of one of its flagship journals, *Journal of Applied Mechanics*. The journal, as part of its *raison d’être*, “serves as a vehicle for the communication of original research results of permanent interest in all branches of mechanics.”

The journal was established in 1933 and is not only one of the oldest ASME journals but also one of the first journals dedicated to the broad field of mechanics thus playing a pivotal role in shaping this research field. Subject matter ranges from biomechanics, mechanical and fracture behavior of solids, thermodynamics and waves to nanomechanics, among others.

“I am honored to have this opportunity to serve my community. Some of the most pioneering work in the field of mechanics has appeared in *Journal of Applied Mechanics*”, said Sharma. “I am excited about implementing several new ideas to enable this journal to become the first choice for the next-generation scientists working in the area of mechanics.”

Pradeep Sharma is the Hugh Roy and Lillie Cranz Cullen Distinguished University Professor and Chair of the Department of Mechanical Engineering at the Cullen College of Engineering. Sharma’s research focuses in the areas of solid mechanics, theoretical and computational materials science and biophysics. Sharma is the recipient of numerous awards such as the Guggenheim Fellowship, Charles Russ Richards medal from the ASME, and the James R. Rice medal from the Society of Engineering Science. He is also a member of the National Academy of Engineering. ⚙️



Mina Moradnia

CRYSTAL GROWTH & DESIGN PICKS RYOU RESEARCH GROUP WORK FOR COVER

A paper from the research group of **Jae-Hyun Ryou**, Associate Professor of Mechanical Engineering, was chosen for the cover of *Crystal Growth & Design* earlier this year.

“Thermodynamic Analysis of Hybrid Chemical Vapor Deposition of Transition-Metal-Alloyed Group-III-Nitride ScAlN Piezoelectric Semiconductor Films” was published in the journal earlier this year, with one of five cover options focusing on the work of Ryou’s group.

Listed authors for the research include Ryou, doctoral students **Mina Moradnia**, the paper’s lead author, and **Nam-In Kim**, postdoctoral research **Sara Pouladi**, and Master’s student **Onosetale Aigbe**. **Jie Chen**, a doctoral graduate of Ryou’s, also contributed to the research and is now at Applied Optoelectronics, Inc.

Ryou identified Moradnia as doing strong work on this paper, and in 2021, she likewise was one of the primary authors for research on semiconductor improvement. She expects to complete her doctorate in Fall 2022. She is still open to a variety of career options going forward, although she’d like to continue in a research role. ⚙️

CULLEN

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 worldclass 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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