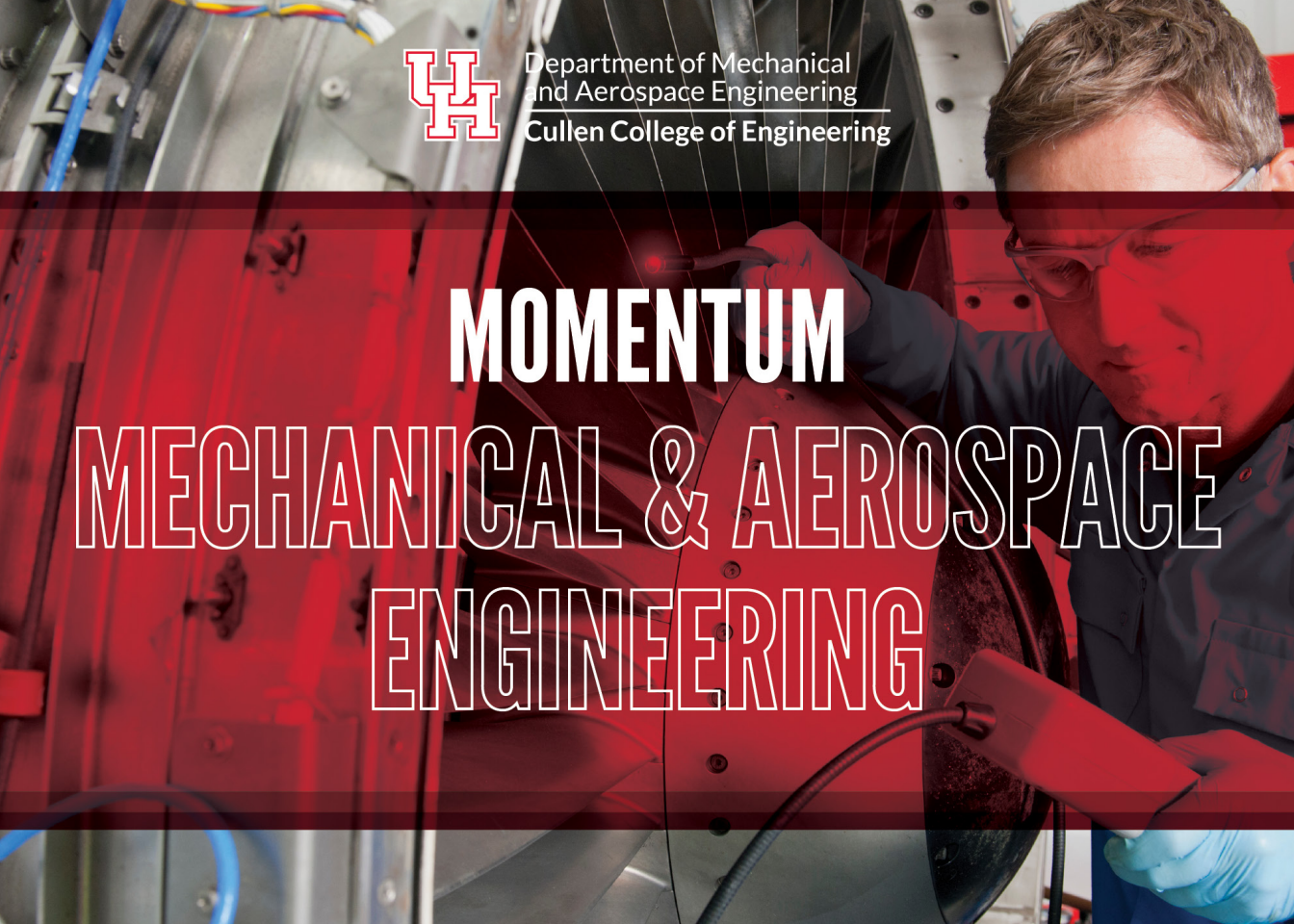


Department of Mechanical and Aerospace Engineering
Cullen College of Engineering

MOMENTUM

MECHANICAL & AEROSPACE ENGINEERING

PROFESSOR ELECTED TO NATIONAL ACADEMY OF ENGINEERING

Venkat Selvamanickam Recognized for Transformative Breakthroughs in Superconductivity

University of Houston engineering professor Venkat Selvamanickam has been elected to the National Academy of Engineering, one of the highest professional honors awarded to engineers worldwide.

Selvamanickam is the M.D. Anderson Chair Professor of Mechanical & Aerospace Engineering and director of the Advanced Manufacturing Institute at the UH Cullen College of Engineering. He was recognized for his cutting-edge contributions to industrial-scale advanced manufacturing processes for high-temperature superconductor wires for electric power applications and their commercialization.

A globally recognized innovator in superconductivity, Selvamanickam, who earned his M.S. and Ph.D. in engineering at UH, has spent decades developing and commercializing high-temperature superconducting technologies that have transformed the energy industry. His work has helped modernize electric grids, strengthen energy resilience and accelerate the development of next-generation energy systems.

At UH, Selvamanickam has built one of the nation's premier academic programs in advanced superconducting manufacturing, securing major federal and industry partnerships to accelerate domestic production of next-generation superconductors and strengthen U.S. competitiveness in critical energy technologies. Last fall, he was awarded $8 million in federal funding to advance superconducting magnet research for compact fusion reactors — work aimed at keeping the nation at the forefront of fusion innovation.

"Year after year, Professor Selvamanickam pushes the boundaries of engineering, producing breakthrough innovations to drive society forward," said UH President Renu Khator. "From medical treatments to motors, his 40-year career advancing superconductor technology has significantly impacted quality of life and economic development. He personifies UH's mission to transform lives and communities and is richly deserving of this honor."

Venkat Selvamanickam
M.D. Anderson Chair Professor

ENGINEERS STRETCHING THE WAY WE SHAPE, ARRANGE MATERIALS

One day, not long ago, **Maksud Rahman** found himself unable to get an image out of his head: his son folding a sheet of paper this way and that, practicing the ancient art form of origami.

Rahman is an assistant professor of mechanical and aerospace engineering at the University of Houston, so he's something of a materials expert. He spends a lot of time thinking about how to make materials like ceramics more "damage-tolerant," so when he thought about his son's origami hobby, he got an idea.

"Can we make origami using ceramic?" he wondered.

If he succeeded in making inherently brittle ceramic materials lighter and foldable, such materials could be used for medical prosthetics and new components in the aerospace industry.

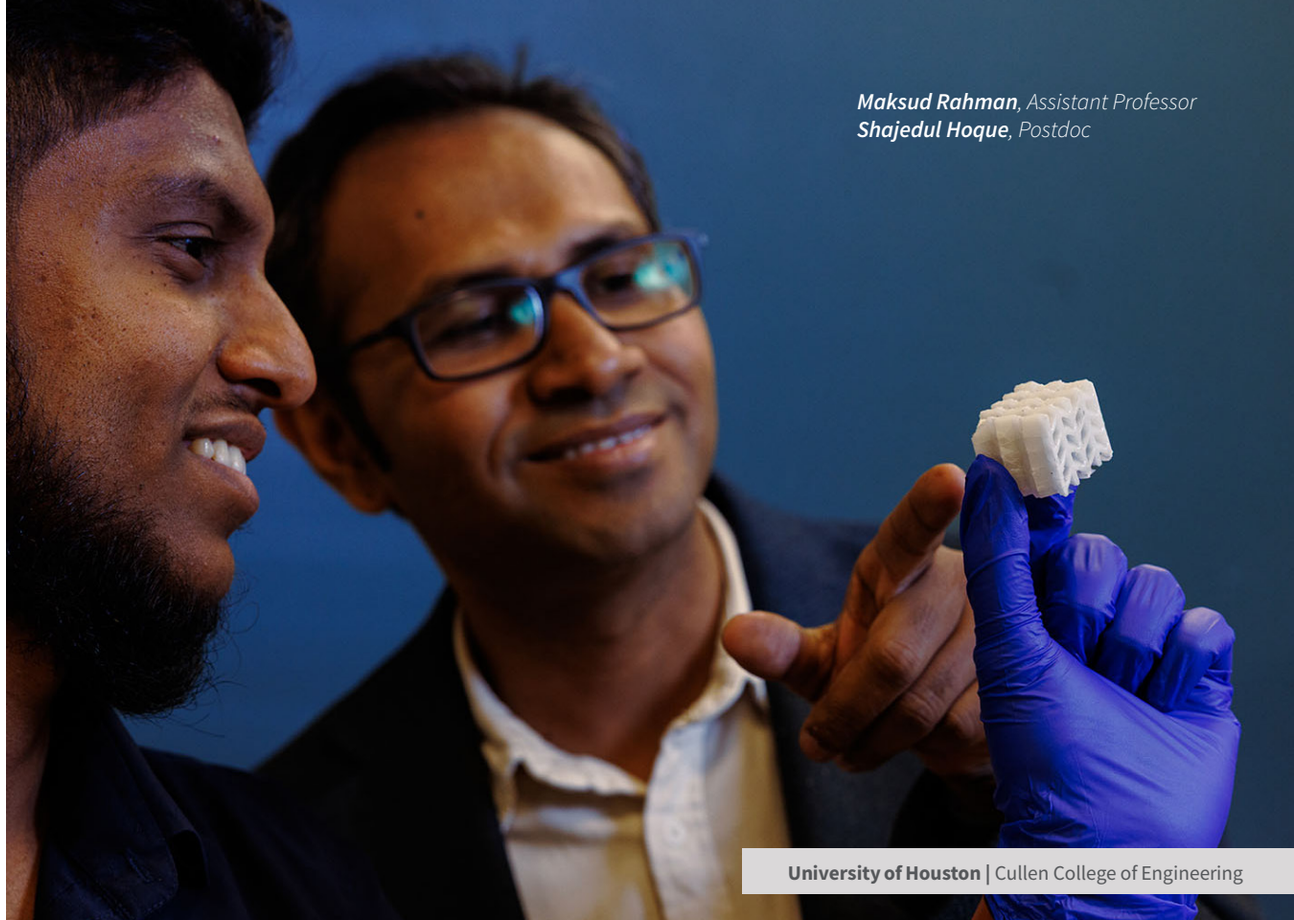
"I always tell my students, 'It's called research because you'll search again and again,'" he says. You may fall short of your goal, but that just means you're getting closer.

Around the same time, **Tian "Tim" Chen**, a professor of mechanical and aerospace engineering at UH, was also working with a soft material: fabric. With a lab that uses both industrial knitting machines and 3D printing to explore material behavior, Chen is exploring new applications in the worlds of tech and robotics.

"Problems we haven't traditionally thought of as mechanical are becoming mechanical," Chen says.

Both Chen and Rahman are stretching materials science in new directions — and delivering major innovations in the process.

There are two main ways to do research, Rahman explains. One way is to build upon work someone else has begun. The other way is to develop something new, something no one else has tried before. This is called "zero to one" research — and it's what Rahman was doing with his origami-centric approach to ceramics.



***Maksud Rahman**, Assistant Professor*
***Shajedul Hoque**, Postdoc*

CHEN, SONG AWARDED $500,000 FOR REMOTE SUBSEA INSPECTION PROPOSAL

Bill D. Cook Associate Professor of Mechanical & Aerospace Engineering **Zheng Chen**, Principal Investigator, and Moores Professor of Mechanical & Aerospace Engineering **Gangbing Song**, co-PI, have received a combined $500,000 grant for their Ocean Energy Safety Institute (OESI) proposal, Integration of Percussion with Robotics for Offshore Bolted Structure Inspection. It is one of 14 OESI-funded project proposals out of 91 submissions geared toward innovation and technology development to improve the safety and environmental stability of offshore energy development.

“For decades, there have been many offshore pipelines deployed in the Gulf of America, and their bolt structures need constant monitoring for tightness,” said Chen. “If the bolts lose their tightness, leaks from the pipeline can cause environmental issues along the coastal area. I am working with Dr. Song, who is working on smart-touch inspection using smart-touch sensors to inspect bolt structure failure, to deploy sensors to the bolt structures with remotely operated robotic vehicles.”

The sheer length of pipeline currently in operation means that there are greater chances for failure at any given moment, and timely subsea inspections are necessary to prevent leaks and spills.

“Instead of using a smart-touch sensor, we use a percussion tool to tap the bolt structure. By listening to the sound, we can detect if this bolt has lost its tightness with the use of machine learning algorithms,” Chen said.

Zheng Chen
Bill D. Cook Professor

Gangbing Song
Principal Investigator, and Moores Professor

ARDEBILI RECEIVES EMMY NOETHER MEDAL FROM SOCIETY OF ENGINEERING SCIENCE

Haleh Ardebili has received the Emmy Noether Medal from the Society of Engineering Science (SES) for her "pioneering contributions to the development of solid electrolytes for stretchable batteries and the promotion of science to the general public."

"The SES Emmy Noether medal celebrates [excellence] in engineering and recognizes Noether's fundamental contributions to the development of conservation laws which are foundational to the field of engineering sciences," said former SES president and Bill D. Cook Professor of Mechanical & Aerospace Engineering **Yashashree Kulkarni**.

Emmy Noether was a 20th century German mathematician and an instrumental theorist in the foundations of modern abstract algebra, and Noether's Theorem fundamentally transformed physics' understanding of the universe. She was featured by John Lienhard in an early episode (#226) of The Engines of Our Ingenuity in the late 1980s; the show still continues today under an expanded team of presenters and writers, which includes Ardebili herself.

"I'm very honored," said Ardebili of her recognition with this award. "It's really a privilege to be selected for this inaugural award. I appreciate that my work has been recognized both on the material science side, in my research on stretching polymers and their applications to stretchable batteries, as well as the educational side, interfacing with the general public through the Engines [of Our Ingenuity] radio program. It's a privilege to be in the position to provide brief, accessible discussions related to science and technology to the greater public, both in Houston and beyond."

Ardebili's research into stretchable polymers is dual purpose: it enables the development of more sophisticated deformable batteries, which can be integrated into items such as textiles with integrated electronics like biosensors and communications technology, but it also advances overall scientific research and understanding of stretchable polymers and ion conductivity.

Haleh Ardebili
Kamel Salama Endowed Professor and,
Assistant Vice President of Entrepreneurship and Startup Ecosystem

ASME-UH WINS SECOND STUDENT SECTION AWARD IN PURSUIT OF ENGINEERING EXCELLENCE

The American Society of Mechanical Engineers (ASME) at the University of Houston, a professional student organization that aims to lead engineering students to success in all aspects of the engineering disciplines, with conscious intent to promote diversity, equity, and inclusion in programs, events, member outreach, learning and development opportunities and scholarships, has received the ASME Student Section Achievement Award for two academic years (2023–2024 and 2024–2025) in a row.

2024–2025 ASME-UH president **Bryan Haro**, who has since graduated from the Cullen College of Engineering and now works as a mechanical engineer — "putting my degree to good use," he says — considered carrying on 2023–2024 president Kevin Jandal's legacy through another win to be a priority in his own presidency.

"It took the whole team — roughly 22 officers — because each and every student put their whole heart into it. Most of us were engineering students, and one of the things [engineering students] have very little of is spare time. We're always studying, always doing something else that occupies us — applying for jobs, internships, whatnot — but at the end of the day, we all came together and showed up to fully excel at this organization," Haro said. "That award isn't my award."

One of the organization's most significant contributions, according to Haro, is the opportunities it creates for students.

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39 ABS SCHOLARSHIP RECIPIENTS RECOGNIZED AT MAE CELEBRATION EVENT

The Department of Mechanical Engineering at the Cullen College of Engineering recognized at an Oct. 16 event 39 students that qualified this year as American Bureau of Shipping (ABS) Academic Excellence Scholarship recipients.

The following MAE students were recognized with a 2025 ABS Academic Excellence Scholarship:

- Oludolapo Arogun
- Nuhan Azad
- Sara Bedolla
- Andres Belloso
- Miguel Blanco
- Grace Brown
- Stephanie Castillo
- Sophia Chen
- Marco Cid
- Cole Comer
- Abiral Dangol
- Van Hieu Dang
- Arvi Dhaliwal
- Hana El-Toukhy
- Olivia Farmer
- Nathan Hernandez
- Xiaoying Huang
- Sean Laguna
- Ricardo Leyba
- Evelyn Marshall
- Baha Aldeen Manasra
- Noelia Medina
- Prince Miranda
- Bryce Monk
- Johnathan Morales
- Isabela Morales
- Ryan Nguyen
- Chidiebere Nwagboso
- Dennis Francisco Nunez Williams
- Anthony Oranday
- Omotolase Osisanlu
- Paola Perdomo
- Jayz'n Robinson
- Mia Rodriguez
- Paul Sabong
- Andres Salazar
- Ivan Toledo
- Fernanda Valdivia Sota
- Hanna Vu

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RESEARCH ADVANCEMENT

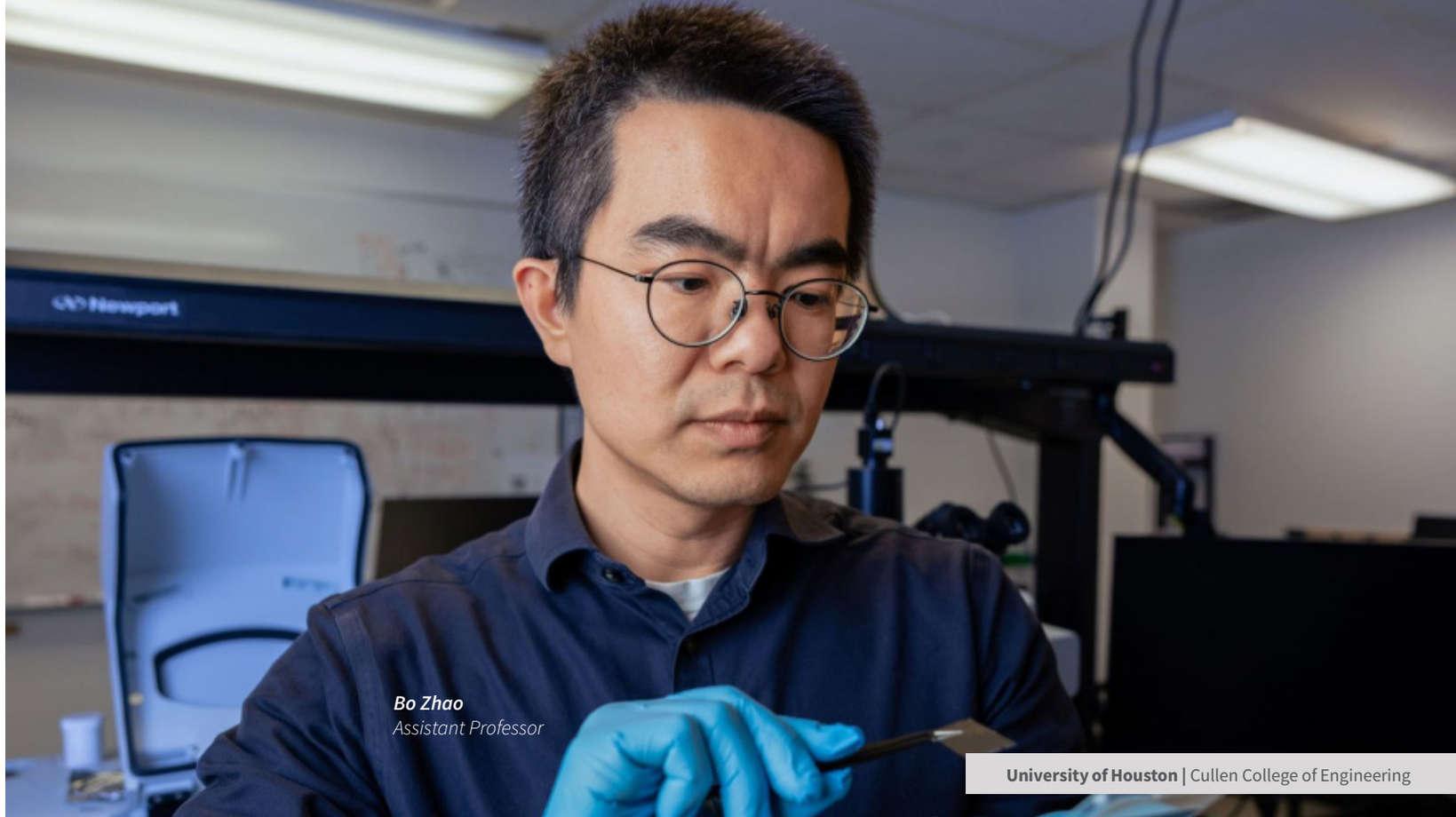
RESEARCHERS LEAD BY MAE'S ZHAO BRING THE HEAT

- UH researchers developed a way to make heat flow in only one direction, giving engineers new control over how devices manage temperature.
- The technology works like an electronic diode for heat, helping prevent overheating and potentially extending battery life in phones, electric vehicles and satellites.
- The approach could lead to cooler, safer and more reliable electronics, especially in extreme environments like space.

New technology from University of Houston researchers could improve the way devices manage heat, thanks to a technique that allows heat to flow in only one direction.

The innovation is known as thermal rectification, and was developed by **Bo Zhao**, an award-winning and internationally recognized engineering professor at the Cullen College of Engineering, and his doctoral student **Sina Jafari Ghalekohneh**. The work is published in Physical Review Research.

This new technology gives engineers a new way to control radiative heat with the same precision that electronic diodes control electrical currents, which means longer-lasting batteries for cell phones, electric vehicles and even satellites. It also has the potential to change our approach to AI data centers.



Bo Zhao
Assistant Professor

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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