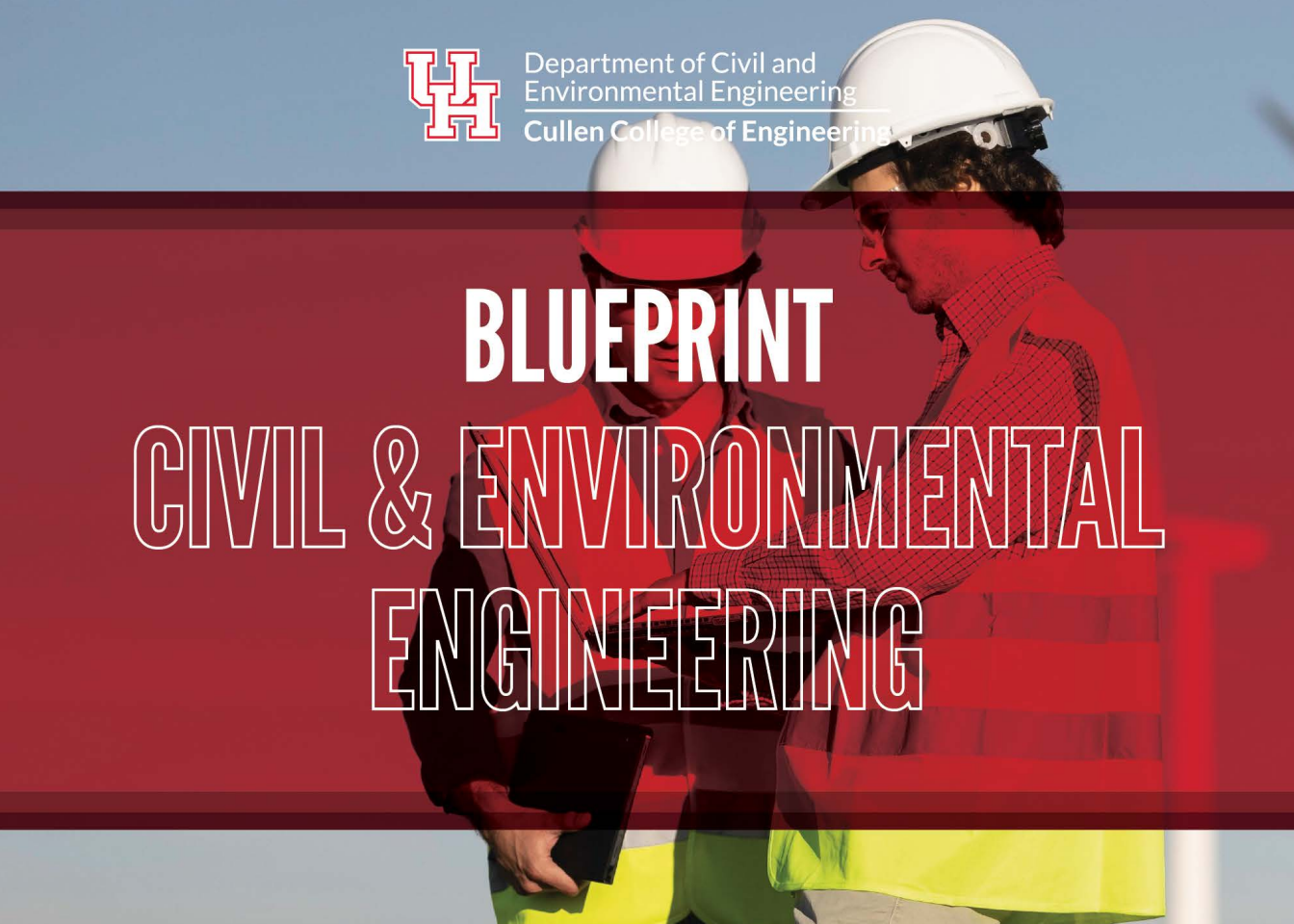




Department of Civil and
Environmental Engineering
Cullen College of Engineering

A background image showing two male engineers wearing white hard hats and high-visibility yellow safety vests. They are standing on a construction site, looking at a tablet held by the engineer on the left. The image is overlaid with a semi-transparent red band across the middle.

BLUEPRINT CIVIL & ENVIRONMENTAL ENGINEERING

LU GAO USES ARTIFICIAL INTELLIGENCE TO MAKE ROADS SAFER

Study Helps Identify Roadway Segments Where Pavement or Roadway Conditions May Be Linked to Higher Crash Risk

A University of Houston professor of civil and environmental engineering is using artificial intelligence to make roads safer by connecting information that is usually analyzed separately. In a study funded by the Texas Department of Transportation, **Lu Gao** used AI to analyze large-scale roadway condition data, including pavement structure, surface condition, roadway geometry and crash records, especially police crash narratives.

By bringing data sources together, the study helps identify roadway segments where pavement or roadway conditions may be linked to higher crash risk.

“A case study using over 24,000 police crash narratives linked to a pavement management dataset of approximately 180,000 data records demonstrates strong associations between friction/texture measures and wet-pavement crash mechanisms,” said Gao, whose research results are published in the journal *Accident Analysis and Prevention*.

“These results can help transportation agencies select candidate pavement-safety projects by identifying pavement conditions associated with elevated crash risk and prioritizing targeted, cost-effective countermeasures,” he added.

The goal of the research is to help transportation agencies better determine which road segments are most in need of maintenance or safety improvements, so limited resources can be directed to places where they may have the greatest impact on improving pavement conditions and reducing crash risk.. ⚙️



IM RAHIMI MAPS OUT STRATEGY TO USE OCEAN TECHNOLOGY TO TRAP CARBON DIOXIDE

Professor **Mim Rahimi** and Ph.D. graduate **Abdelrahman Refaie** are exploring the logistics and deployment of a promising carbon-removal technology known as electrochemical marine carbon dioxide removal (e-mCDR). The approach enhances seawater's ability to absorb and store carbon dioxide from the atmosphere, offering a potential pathway for large-scale climate mitigation.

The motion of the ocean may be the key to removing carbon dioxide from the atmosphere, so University of Houston researchers set out to determine which U.S. coastlines are best suited for the process in a new study.

Spoiler alert: The Gulf Coast may be the top contender, which could boost coastal economies through jobs tied to building and maintaining a new carbon removal system that uses seawater.

The study, published in *Nature's Communications Sustainability* journal and led by UH Cullen College of Engineering Professor Mim Rahimi, aimed to develop a plan of implementation of this new technology.

"The question we had wasn't technical, rather it was logistical in regard to implementation down the road," Rahimi said. "This would be a roadmap if a company or the government wants to utilize this technology."

The technology is called electrochemical marine carbon dioxide removal (e-mCDR), which treats seawater in a way that increases the ocean's ability to absorb and store carbon dioxide from the air.

As it stands, oceans already absorb approximately 30% of human-produced carbon dioxide emissions each year, according to the study, which makes them an attractive resource for carbon removal efforts. ⚙️



Mim Rahimi
Professor, Civil and Environmental Engineering



Abdelrahman Refaie
Ph.D. Graduate, Civil and Environmental Engineering

DIMITRIOS KALLIONTZIS RECEIVES \$500K IN GORI INITIATIVE TO REPURPOSE OFFSHORE INFRASTRUCTURE

The Department of Civil and Environmental Engineering's Assistant Professor **Dimitrios Kalliontzis** has received a \$500,000 share of \$20 million awarded by the National Academies of Science, Engineering and Medicine (NASEM) to the Gulf Offshore Research Institute (GORI)'s Repurposing Petroleum Infrastructure for Sustainable Energy, Food, and Critical Minerals project.

Funding was awarded to two teams out of ten finalist and 164 original applicant teams through the Gulf Futures Challenge — a \$50 million initiative.

“The main goal of this project is to find a solution to an ongoing problem in the Gulf Coast region related to existing offshore platforms and other Gulf assets at or nearing their end of operational life: many of these platforms once used by the oil and gas industry are now at a point where they need to be repurposed or decommissioned, and decommissioning is a very costly procedure – most platform owners would prefer to avoid it,” Kalliontzis said.

“These assets in the offshore region can be repurposed instead of decommissioned, and they can be retrofitted, repaired and continue their operational life in the Gulf of America under new transformative applications,” he added. “This has far-reaching economic implications, both because it creates new jobs and because it catalyzes a new energy transition-based economic environment with new opportunities for the communities involved.” ⚙️

Dimitrios Kalliontzis

*Assistant Professor,
Civil and Environmental Engineering*



CULLEN RESEARCHERS USE AI TO UNLOCK DECADES OF HIDDEN FLOOD RISK DATA

Engineers Reveal How Houston's Flood Risk Has Shifted Over Time

Engineers at the University of Houston have unlocked decades of hidden flood risk data, using artificial intelligence to transform paper flood maps into digital tools that reveal how flooding has evolved — and where future risks are rising.

The team developed an AI-driven framework that extracts and georeferences historical Flood Insurance Rate Maps (FIRMs), converting paper records into high-accuracy digital datasets. The approach allows researchers, planners and policymakers to track how flood risk has shifted over time and make more informed decisions about development, infrastructure and disaster preparedness.

“The resulting dataset of longitudinal flood evolution can now be used to understand how geophysical drivers exacerbated flooding,” said **Francisco Haces-Garcia**, former UH doctoral student and lead author of the paper published in *Journal of Hydrology: Regional Studies*. “When combined with other variables (e.g., population

growth data, critical lifeline services), it would be possible to envision strategies to reduce vulnerabilities and enhance recoveries from floods.

With Houston among the most flood-prone metro areas in the United States, the ability to analyze long-term flood trends offers a powerful new tool for understanding risk in a rapidly growing region.

Using data from the 1970s through 2025, the team tested its system with three case studies on sites within the Houston area: Meyerland, Fifth Ward/Kashmere Gardens, and Cypress (near Bridgeland). They found that flood risk varies significantly across locations—highlighting the value of the newly unlocked data.

Together, the case studies reveal a region where flood risk is not uniform — and in some areas, still growing. ⚙️



UH ENGINEERS ISSUE HOT TAKE ON COLD-STEEL: FINDING HIDDEN DAMAGE REQUIRES RADAR, AI

A University of Houston engineer has developed a method to detect possible damage in concealed cold-formed steel construction framing materials hidden behind walls, without having to tear the walls open. The new technology uses ground-penetrating radar and artificial intelligence to automatically detect possible damage in materials like studs and joists made of the lightweight steel found in 30% to 35% of nonresidential buildings in the United States.

Over the past decade, as advancements in developing cold-formed steel surged, its use in the construction industry has soared. In comparison to hot rolled steel, cold-formed steel is more affordable and offers environmental benefits. But traditional inspection of concealed cold-steel materials is inefficient, requiring partial or complete removal of cladding and drywall, making the process labor-intensive and costly.

“To address these limitations, we introduce a new framework that combines a quick radar scan with AI

that reads the radar images and points to where the steel is, where damage is likely and the severity and type of damage,” said **Vedhus Hoskere**, Kaspar J. Willam Assistant Professor of Civil and Environmental Engineering.

“That lets inspectors verify only the flagged spots instead of opening up everything — saving time, money and disruption, and helping maintenance or post-disaster assessments scale.”

Hoskere published his new method in *Journal of Computing in Civil Engineering*. It includes development of his new AI tool called InternImage.

Hoskere’s invention also includes a specialized dataset of radar images of cold-formed steel behind common wall coverings, spanning different layouts and damage types and a new training trick for the AI (GPR-CutMix) that helps the model handle real-world variation, like different stud spacing and messy field conditions. ⚙️



SELVA, EIGHT OTHERS FROM CULLEN HONORED WITH UH AWARDS

Venkat “Selva” Selvamanickam, M.D. Anderson Chair Professor of Mechanical & Aerospace Engineering, is this year’s recipient of the Esther Farfel Award, the highest honor given by the University of Houston to its faculty members.

Selva also earned the Excellence in Innovation Award, a new category of recognition this year. It has been an incredible year for Selva, who was also named to the National Academy of Engineering in February.

“Please join me in congratulating this year’s award recipients,” said **Diane Z. Chase**, Senior Vice President for Academic Affairs and Provost. “They are examples of the outstanding faculty who are making an impact through service, teaching, and research.”

The other winners from the Cullen College of Engineering are:

Excellence in Research: Assistant Professor:

Pieremanuele Canepa, Electrical & Computer Engineering

Excellence in Research: Assistant Professor:

Abdul Latif Khan, Engineering Technology

Excellence in Research: Associate Professor:

Venkatesh Balan, Engineering Technology

Excellence in Research: Professor:

Yashashree Kulkarni, Mechanical & Aerospace Engineering

Moore Professorship:

Sergey Shevkoplyas, Biomedical Engineering

Outstanding Graduate Teaching Assistant Award:

Zahra Rouzitalab, Civil & Environmental Engineering

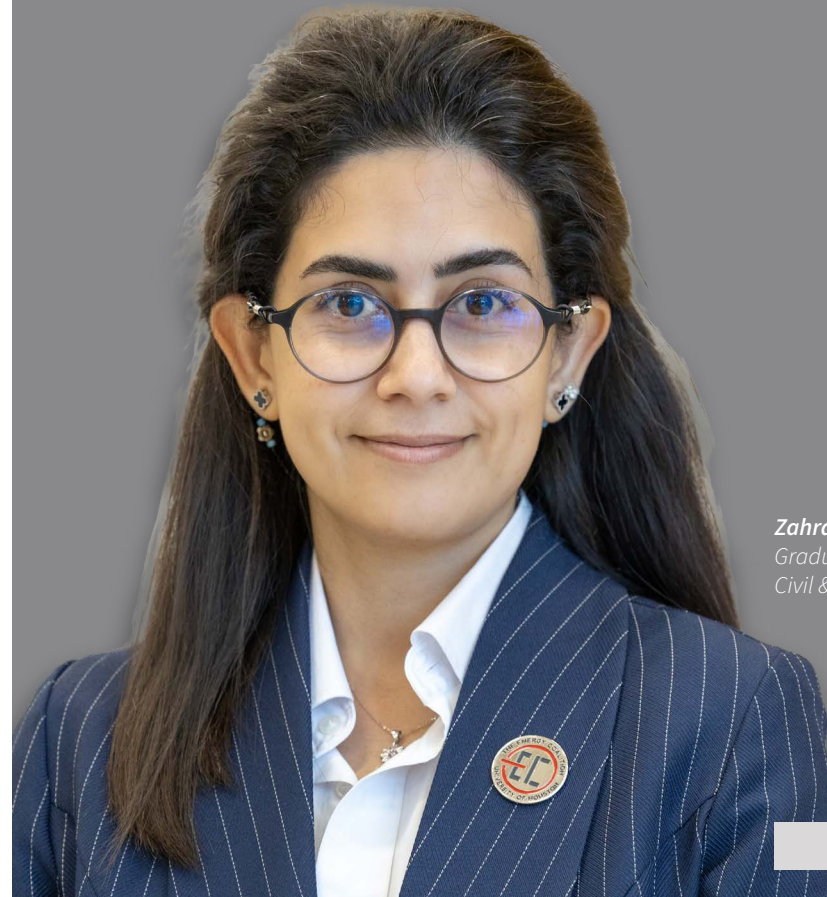
Rising Innovator Award:

Marzia Cescon, Assistant Professor, Mechanical and Aerospace Engineering

Undergraduate Research Mentor Award:

Chandra Mohan, Professor, Biomedical Engineering

A ceremony for the award recipients is being planned for Fall 2026. ⚙️



Zahra Rouzitalab

*Graduate Teaching Assistant,
Civil & Environmental Engineering*

DEPARTMENT HIGHLIGHTS

MIM RAHIMI COUNSELS MEMBERS OF CONGRESS ON OCEAN-BASED CARBON DIOXIDE REMOVAL

The Department of Civil and Environmental Engineering's Kaspar J. Willam Assistant Professor **Mim Rahimi** recently represented the University of Houston's Cullen College of Engineering while connecting with US policymakers at Carbon to Sea's 2026 Hill Day to discuss ocean-based carbon dioxide removal (oCDR) research and developments.

These meetings with Republican and Democratic Members of Congress and their staffs provided key opportunities for federal support in this emerging field, including through increasing bipartisan support for oCDR solutions.

The Carbon to Sea initiative cultivates and maintains connections with experts in the field who research relevant technological developments. Rahimi was contacted to serve as a subject matter expert in the field for this year's event.

"In general, my training is in electrochemistry and, specifically, on electrochemical separation, including CDR," said Rahimi. "Different offices recognize the need to reduce CO2 emissions, and there is growing awareness that the ocean could play an important role in that conversation. It can complement both point-source emission reduction efforts and direct air capture." ⚙️



Mim Rahimi

Professor, Civil and Environmental Engineering

STUDENT SUCCESS

CM STUDENTS RECEIVE OVER \$90,000 FROM INDUSTRY ADVISORY BOARD

\$92,000 in scholarship funding was awarded to 50 construction management (CM) students for 2025–2026 by the Construction Management Industry Advisory Board (CMIAB), as announced at the Board's Spring 2026 meeting earlier this month.

Established in 2008, the Board has worked closely with the construction management program to strengthen student recruitment and success as well as efforts pertaining to curriculum development and research initiatives.

"The board has played a pivotal role in establishing and growing scholarship endowments that directly support our students," said professor and CM Program Chair **Ahmed Senouci**.

"We would like to express our sincere appreciation to the members of the CMIAB for their continued commitment to our students and our program," he continued.

"Thanks to the generosity and dedication of the CMIAB, as well as the valued contributions of CM alumni and industry partners, the number of scholarship endowments has grown steadily to 15 different funds." ⚙️



PH.D. CANDIDATE ADEBIYI EARNS SCIPE CHISHIKI AI FELLOWSHIP

An attractive research environment was the selling point for the University of Houston for **Taiwo Adebisi**, but the doctoral student has excelled in his own ways at the Cullen College of Engineering as well.

His work has been recognized after he was selected for the Strengthening the Cyberinfrastructure Professionals Ecosystem (SCIPE) Chishiki AI in Civil Engineering Graduate Fellowship. The program provides a significant stipend, and only five students were chosen from a national field of applicants.

“Winning a national fellowship like this was deeply encouraging, and my most immediate feeling was gratitude,” he said. “I felt grateful for the privilege of doing meaningful research in the Uncertainty Quantification Lab at the University of Houston (UQ@UH), grateful for the people who have believed in me and continued to push me toward competitive opportunities, and grateful to God for the journey. For me, this fellowship felt like a strong validation of work that has taken years to build, but also a reminder that the work is still growing.”

Adebisi pointed to his advisor, assistant professor **Ruda Zhang** in the Civil and Environmental Engineering Department, as important in his decision to come to Cullen and in his development as a researcher.

“When I learned about Dr. Zhang’s work, it immediately felt connected to the future of engineering,” he said. “I accepted my Ph.D. offer before ChatGPT was released, but even then, I felt strongly that probabilistic machine learning, uncertainty quantification and optimization would become essential for trustworthy automation in science and engineering. Since then, the rapid growth of AI has only made that research direction feel even more important.”

He also noted that the Houston metro area and the College provided a “strong engineering environment,” thanks to the city’s deep connections to energy, infrastructure and industry. ⚙️



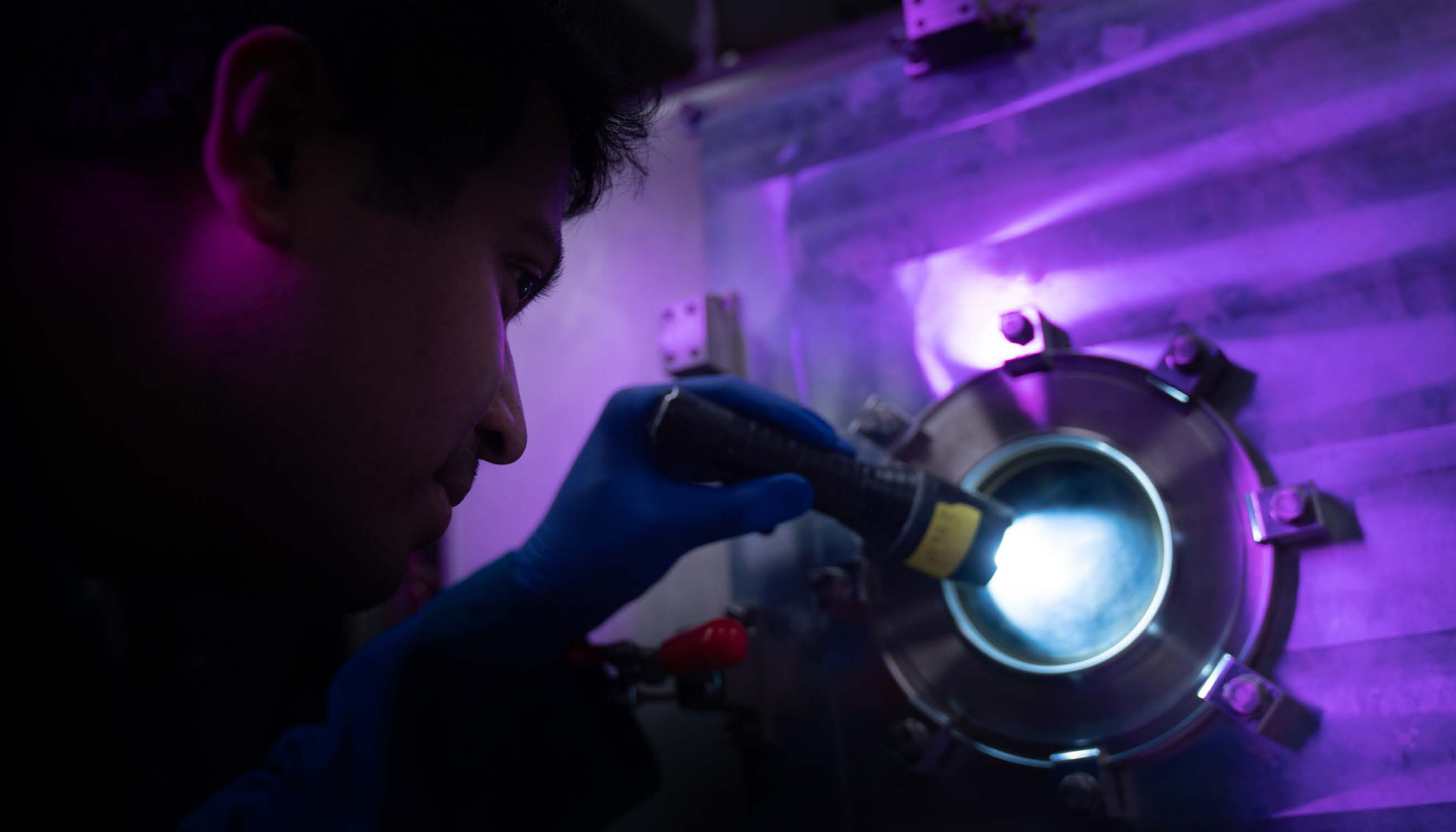
Ruda Zhang
Professor,
Civil and Environmental Engineering

Taiwo Adebisi
Doctoral Student,
Civil and Environmental Engineering

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 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.





Cullen College of Engineering

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