

Civil and Environmental Engineering  
Newsletter Fall 2023

# BLUEPRINT

ENGINEERED FOR  
**WHAT'S NEXT.**



Cullen College of Engineering  
UNIVERSITY OF HOUSTON

# Letter from the Chair



Dear Colleagues,

Greetings from the UH Civil and Environmental Engineering Department! The last six months have been a very busy time for our department. I invite you to explore the following stories which represent a small sampling of the exciting work being done by our faculty and students. If you see opportunities for collaboration, do not hesitate to reach out, and I invite you come and visit whenever you have a chance.

Warm Regards,

**Roberto Ballarini, Ph.D., P.E.**

Thomas and Laura Hsu Professor and Department Chair  
Civil and Environmental Engineering  
Cullen College of Engineering  
University of Houston

## UH CEE **BY THE NUMBERS**



**FACULTY** (FALL 2023)

**1** NATIONAL ACADEMY OF  
ENGINEERING MEMBER



**NATIONAL ACADEMY  
OF ENGINEERING**



**ENROLLMENT** (FALL 2023)

**465** UNDERGRADUATE  
STUDENTS

**139** GRADUATE  
STUDENTS



**DEGREES  
AWARDED**  
(FY 2023)



**75** B.S.



**42** M.S.



**4** PH.D.

NATIONAL RECOGNITION



*Pictured: Konrad Krakowiak and student.*

CIVIL AND ENVIRONMENTAL ENGINEERING

## UH CEE PROFESSOR EARNS NSF CAREER AWARD

FOR “STEREOCHEMICAL BIOMIMICRY FOR SUSTAINABILITY” PROPOSAL

**Konrad Krakowiak**, assistant professor in the Civil and Environmental Engineering Department at the University of Houston’s Cullen College of Engineering, is quick to defer when he’s offered praise for his research. For him, any success he might have is due to the students he has working with him, and the critical thought process foundation he got from his academic mentors.

His latest “great achievement,” as he considers it, is earning a National Science Foundation CAREER award for his proposal, “Stereochemical Biomimicry for Sustainability.” The \$698,187 in funding is the second significant NSF grant for Krakowiak, after earning \$203,151 for similar research in 2018.

The main focus of Krakowiak’s research group is implementing practical modifications for construction materials by examining and improving them on the molecular scale. Globally, estimates on the amount of concrete used each year vary from 4 billion tons on the low end, to as high as 30 billion tons.

“What we are aiming at is basically, how to make a concrete material more durable, how to extend its lifespan, how to prevent any type of mechanics that will degrade the concrete in real time structures,” he said.

“We don’t do it by simple mixing and checking various combination of the ingredients, but by looking at the fundamental physics and chemistry principles, and how to design the concrete at the nano-level, and then assemble the micro-structure such that the best properties will be achieved.

Krakowiak added that several other factors combined to make him especially humbled by receiving this award. A native of Poland, he was thankful for the immigration path to the United States available to him. His homeland borders Ukraine, and he realizes how fraught the situation is in that country, and how courageous people in that region are currently. ⚙️

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*Pictured: Craig Glennie*

CIVIL AND ENVIRONMENTAL ENGINEERING

## UH CEE PROFESSOR TO LEAD \$63.5 MILLION PROJECT FUNDED BY U.S. DEPARTMENT OF DEFENSE

The University of Houston has been awarded a \$63.5 million contract by the U.S. Department of Defense to help the Army make effective and timely decisions with a strong analytical foundation to gain dominance over adversaries today and into the future. It is the largest contract or grant ever awarded to the University of Houston, a Carnegie-designated Tier One research university located in the fourth largest city in the nation.

**Craig Glennie**, professor of civil and environmental engineering and director of engineering defense research initiatives at the UH Cullen College of Engineering, is leading the project team that includes the University of Massachusetts Amherst and New Mexico State University, among others.

The team will explore and innovate in the realm of analytical modeling and simulation to enhance the Army's decision making during long-term strategic competition or struggles among nations that occur when pursuing incompatible interests without necessarily being engaged in armed conflict.

Contemporary Army decision-making bears little resemblance to its historical counterparts. The Army is undergoing

the most significant reorganization and technical innovation since the end of the Cold War — ensuring that adversaries cannot outrange or outpace America on traditional battlefields, or the new frontiers of space and cyberspace.

Glennie's team will work with the U.S. Army Combat Capabilities Development Command (DEVCOM) Analysis Center (known as DAC) to build realistic modeling, analysis and simulation tools for new technologies that the Army is responsible for integrating into the future battlefield. ⚙️



*Photo courtesy: DVIDS*

### UH RESEARCHERS AWARDED \$250K GRANT TO CHART A SUSTAINABLE COURSE IN **OCEANIC CARBON CAPTURE**

**Mim Rahimi**, assistant professor of environmental engineering at UH's Cullen College of Engineering is leading the development of an emerging NET called electrochemical direct ocean capture (eDOC), which helps the ocean cleanse itself of harmful carbon dioxide. The concept is detailed in a paper published in the journal *Energy @ Environmental Science*.

"Electrochemical direct ocean capture amplifies the ocean's ability to absorb carbon, sidestepping the expensive sorption process typical in many current strategies," Rahimi said. "The promise of eDOC is undeniable, but scaling it, optimizing costs and achieving peak efficiency remain challenges we're actively addressing."

Funded by a \$250,000 grant from the U.S. Department of Energy, Rahimi and his team are working to create electrochemical tubes to remove dissolved inorganic carbon from synthetic seawater. Preliminary research on the project was sponsored by UH's Center for Carbon Management in Energy.

Current efforts to remove carbon dioxide from the ocean mainly involve complex processes like electrolysis, which attempt to either turn dissolved inorganic carbon into gas or convert it into magnesium or calcium carbonates. However, these techniques are energy-intensive and costly due to the use of rare and expensive materials, such as platinum and specialized membranes that easily clog, degrading their performance. ⚙️



*Pictured: Mim Rahimi, assistant professor (center) with his doctoral students (left to right) Prince Aleta, Mohsen Afshari, Abdelrahman Refaie and Ahmad Hassan.*

NEW

FACULTY

KRISHNA RISHI  
VIJAY SALADI



**Krishna Rishi Vijay Saladi** joined the department as a lecturer in June 2023. Saladi earned his doctorate in Environmental Engineering from UH in 2018, followed by a M.S. in Statistics and Data Science in 2022. For the past two years, he has been a graduate instructional assistant at UH. He has also worked as an engineer for KIT Professionals and AECOM Technical Services.

NEW

FACULTY

YUNTIAN WU



**Yuntian Wu** joined the department as a senior lecturer in Fall 2023. Wu earned his doctorate in Civil Engineering from the University of Southern California in 2008. Since Sept. 2017, he has been a professor at Chongqing University in China. He also served as a visiting scholar at the State University of New York at Buffalo for the Spring 2023 semester.

NEW

FACULTY

## SIAVASH ZAMIRAN



**Siavash Zamiran** joined the department as a senior lecturer in July 2023. Zamiran earned his doctorate in Civil Engineering-Geotechnical from Southern Illinois in 2017. For the past four years, he has worked as an adjunct professor at Missouri University.

NEW

PROMOTION

## MAHDI SAFA



**Mahdi Safa** joined the department in January 2023 as an instructional assistant professor. Safa was promoted from his role as senior lecturer, which he has held since 2021. He earned his doctorate in 2013 from the University of Waterloo in Ontario.



*Pictured: Juan Carlos Fernandez-Diaz, co-principal investigator of NCALM*

## UH RESEARCHERS FIND LOST MAYA CITY DEEP IN MEXICAN JUNGLE

In the ongoing quest to unearth the world's hidden mysteries, University of Houston researchers and archaeology partners have discovered a lost Maya city deep in the jungles of Campeche, on the Yucatan Peninsula, in Mexico.

Notable among the findings were several 50-foot-tall structures, resembling pyramids, and pottery that dates the city to the Late Classic period, between the years 600 and 800.

Though undeniably rare and incredibly fascinating, finding the city, now dubbed Ocomtún, or stone column in Maya, is all in a day's work for **Juan Carlos Fernandez-Diaz**, co-principal investigator of the National Center for Airborne Laser Mapping (NCALM) at UH. "For Mexico and Central America, we are the premier research center that has been able to do this quickly and affordably. We have over ten years of these kinds of these discoveries," says Fernandez-Diaz. ⚙️



## STUDENT SUCCESS

*Pictured: Kripa Adhikari*



CIVIL AND ENVIRONMENTAL ENGINEERING

## CEE PH.D. STUDENT USNCCM TRAVEL AWARD, SEAOT SCHOLARSHIP

**Kripa Adhikari**, a doctoral candidate at the Cullen College of Engineering, traveled to New Mexico in July to present her research on thermal cooling, after earning a travel award for the 17th U. S. National Congress on Computational Mechanics (USNCCM).

Adhikari earned her B.E. in Civil Engineering from Tribhuvan University in Nepal. She worked as a civil engineer for the government of Nepal following her graduation, but she decided to further her education from there.

When asked how her research has impacted her career plans, Adhikari spoke about the ideal career path would be working in the research and development at a technology company.

“Given that my research focuses on optimization of materials using multi-physics simulation and computational heat transfer, whose application is relevant in addressing system’s overheating, my ideal career path would be working in research and development at a prestigious technology company,” she said. 🌟

## ALUMNI SPOTLIGHT

*Pictured: Mackrena L. Ramos, P.E.,*

CIVIL AND ENVIRONMENTAL ENGINEERING

## CEE ALUM APPOINTED TO CITY PARK REDEVELOPMENT AUTHORITY BOARD

The Houston Mayor and the City Council have appointed **Mackrena L. Ramos, P.E.**, to the City Park Redevelopment Authority and Tax Reinvestment Zone #12 Board of Directors.

Ramos is a Vice President with Lockwood, Andrews & Newnam, Inc. (LAN), which is a planning, engineering and program management firm headquartered in Houston. She is also a graduate of the Civil Engineering program at the University of Houston's Cullen College of Engineering.

At LAN, Ramos leads the Surface Water Transmission Program (SWTP). She has extensive experience with capital improvement planning, design quality, cost reduction reviews and optimal phasing of improvements for infrastructure projects. A licensed professional engineer, she is a graduate of the University of Houston and holds a bachelor's degree in civil engineering.

Ramos is an active member of the American Water Works Association, American Society of Civil Engineers, Texas Water Conservation Association, and Houston Hispanic Architects & Engineers. ⚙️

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# 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.



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