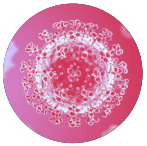







RESEARCH

THE FUTURE IS WHAT WE DO

MILESTONES

IN ELECTRICAL AND COMPUTER ENGINEERING

UNIVERSITY of HOUSTON
CULLEN COLLEGE of ENGINEERING
Department of Electrical & Computer Engineering

Letter from the Chair

Dear Colleagues,

I hope that this message finds you safe and in good health. Despite the challenges presented by the novel coronavirus, our department has been hard at work in our continued pursuit of excellence in academia and research. I invite you to read through the following research breakthroughs, academic success stories and newly funded projects.

If you would like to learn more about how to support a project or collaborate with our department, do not hesitate to let me know.

Warm Regards,

Badri Roysam, Ph.D
Hugh Roy and Lillie Cranz Cullen University Professor Chair
Electrical & Computer Engineering Department
Cullen College of Engineering
University of Houston

UH ECE **BY THE NUMBERS**

#75
BEST ELECTRICAL ENGINEERING PROGRAM IN THE U.S.
**Source: US News & World Report*

2 NAI MEMBERS

2 CPRIT SCHOLARS

1 APS FELLOW

1 SAE FELLOW

1 DISTINGUISHED ACM MEMBER

1 AIMBE FELLOW

7 CAREER AWARDEES

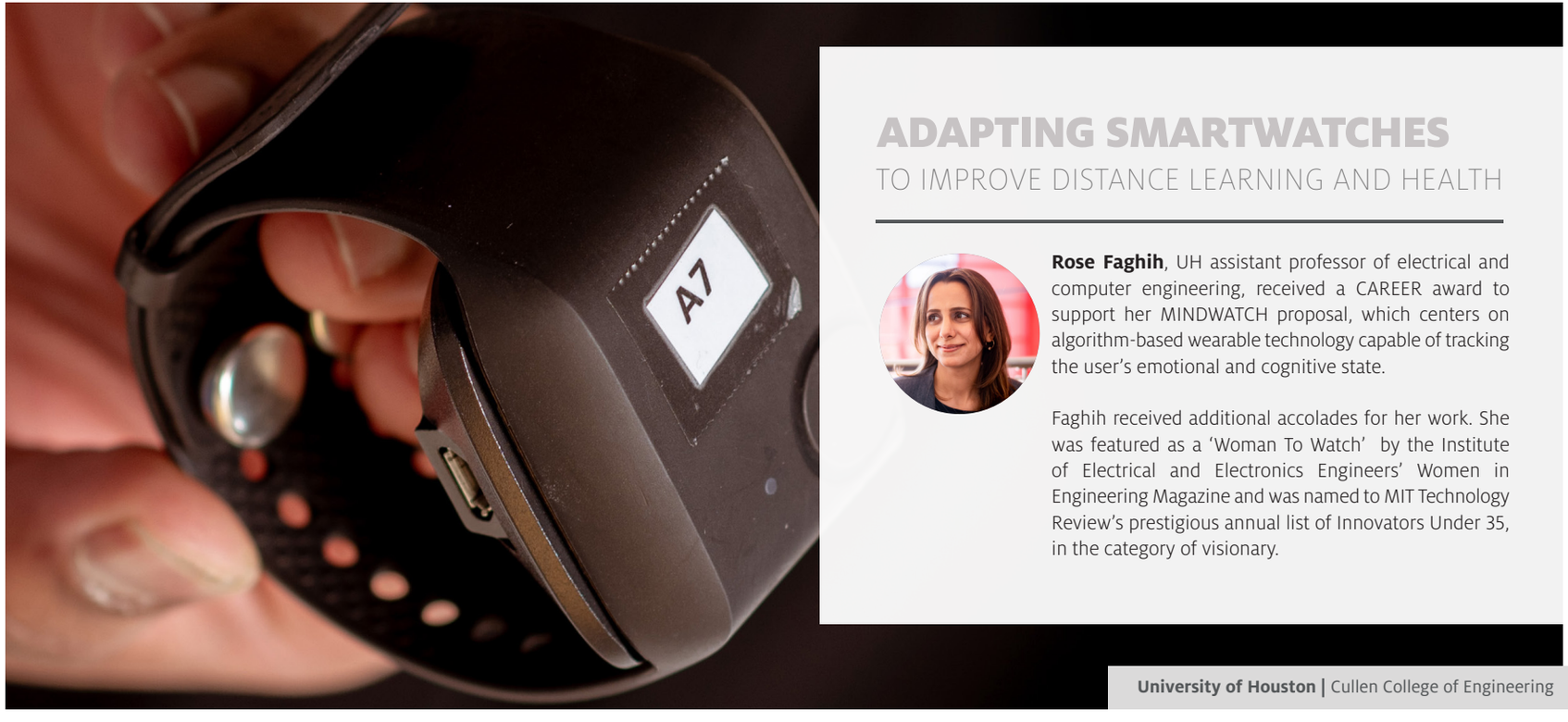
1 NAE MEMBER

1 OSA FELLOW

7 IEEE FELLOWS

SEARCHABLE ATLASES OF HIGH-RESOLUTION 3-D IMAGES WOULD OFFER **NEW TOOL FOR RESEARCHERS, CLINICIANS**

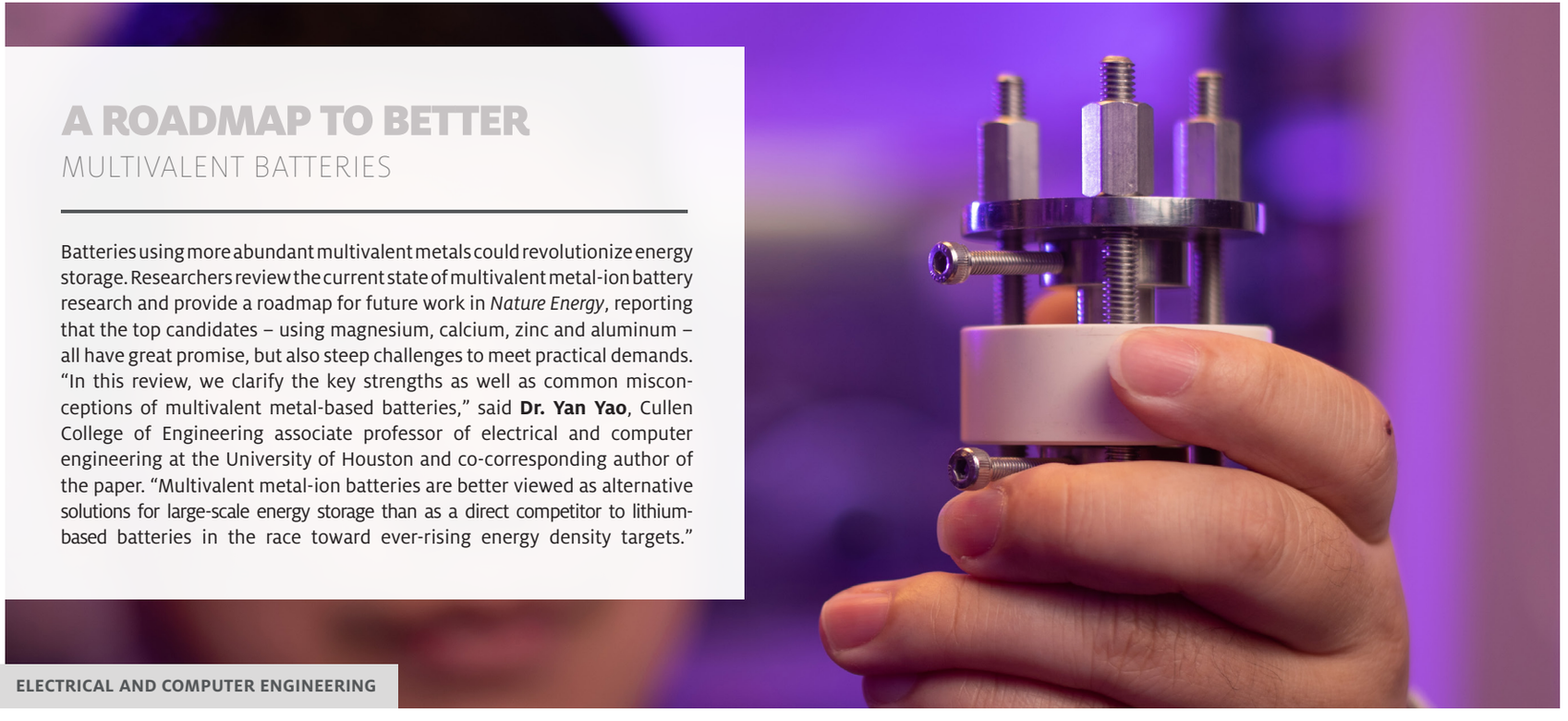
David Mayerich, an assistant professor of electrical and computer engineering, has received a CAREER award from the National Science Foundation to develop a software platform to produce searchable digital atlases of whole organs at the cellular level. Mayerich describes the project as a Google Maps-style platform, offering both searchability and context for high-resolution 3-D images of whole organs. This platform would allow researchers – and ultimately, clinicians, students and others – to easily search normal and diseased organs to track change over time in animal models and determine how widespread a disease might be at the subcellular level.



ADAPTING SMARTWATCHES TO IMPROVE DISTANCE LEARNING AND HEALTH

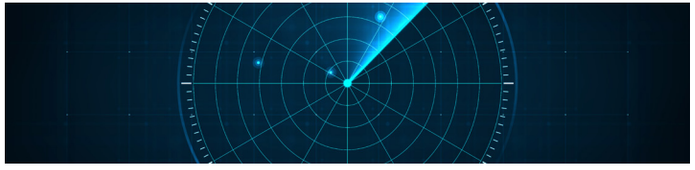
Rose Faghih, UH assistant professor of electrical and computer engineering, received a CAREER award to support her MINDWATCH proposal, which centers on algorithm-based wearable technology capable of tracking the user's emotional and cognitive state.

Faghih received additional accolades for her work. She was featured as a 'Woman To Watch' by the Institute of Electrical and Electronics Engineers' Women in Engineering Magazine and was named to MIT Technology Review's prestigious annual list of Innovators Under 35, in the category of visionary.



A ROADMAP TO BETTER
MULTIVALENT BATTERIES

Batteries using more abundant multivalent metals could revolutionize energy storage. Researchers review the current state of multivalent metal-ion battery research and provide a roadmap for future work in *Nature Energy*, reporting that the top candidates – using magnesium, calcium, zinc and aluminum – all have great promise, but also steep challenges to meet practical demands. "In this review, we clarify the key strengths as well as common misconceptions of multivalent metal-based batteries," said **Dr. Yan Yao**, Cullen College of Engineering associate professor of electrical and computer engineering at the University of Houston and co-corresponding author of the paper. "Multivalent metal-ion batteries are better viewed as alternative solutions for large-scale energy storage than as a direct competitor to lithium-based batteries in the race toward ever-rising energy density targets."



HARNESSING THE POWER OF GALLIUM NITRIDE AND MACHINE LEARNING

Military installations, especially on ships and aircraft, require robust power electronics systems to operate radar and other equipment, but there is limited space onboard. Researchers from the University of Houston will use a $2.5 million grant from the U.S. Department of Defense to develop compact electronic power systems to address the issue. **Harish Krishnamoorthy**, assistant professor of electrical and computer engineering and principal investigator for the project, said he will focus on developing power converters using gallium nitride (GaN) devices, capable of quickly storing and discharging energy to operate the radar systems. He is working with co-PI **Kaushik Rajashekara**, professor of electrical and computer engineering, and Tagore Technology, a semiconductor company based in Arlington Heights, Ill. The work has potential commercial applications, in addition to military use, he said.

JIEFU CHEN RECEIVES FUNDING FOR **CARBON MANAGEMENT PROJECT**

The Center for Carbon Management in Energy at the University of Houston has awarded $275,000 in research funding for projects focused on carbon management and the energy transition. The projects cover a range of topics, from converting carbon to fuel and other useful products to a proposed new wireless monitoring system for carbon capture storage. The Center for Carbon Management in Energy was launched as a University research center in 2019 to form an academic-industry consortium to reduce industry's carbon footprint and find new business opportunities for carbon dioxide, methane and other greenhouse gas emissions. The projects were drawn from 19 proposals and selected by a panel comprised of UH experts and industry representatives from Shell, Chevron, BP, Kiewit and Baker Hughes. **Jiefu Chen**, assistant professor of electrical and computer engineering, will be leading a project focused on real-time subsurface wireless communication and sensing for CO_2 storage.

$200,000 FOR CORONAVIRUS RESPONSE MAP

Miao Pan, an associate professor of electrical and computer engineering at the University of Houston is among a group of four that have been awarded nearly $200,000 from the National Science Foundation to develop a map for coronavirus response via crowdsourcing. In a summary, the authors for the grant proposal argued that the development of a mapping tool to identify potential COVID-19 hot spots is needed. Current methods for testing might be inefficient, since testing centers are often at fixed locations with people requesting tests with little to no symptoms or risk factors, and better mapping could allow for better allocation of resources.

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 $35 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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UH Cullen College of Engineering
Department of Electrical and Computer Engineering
Engineering Building 1
4726 Calhoun Road, Suite N308
Houston, Texas 77204-4005
@UHEngineering

Research MILESTONES