



UNIVERSITY OF HOUSTON

SPRING/SUMMER 2024

Protecting America's Roadways

UH's CYBER-CARE works to prevent threats from becoming catastrophes.

UNIVERSITY OF HOUSTON



SPRING/SUMMER 2024



The University of Houston's architecture is as distinctive as the city it calls home.

LETTER FROM THE PRESIDENT



DEAR COUGARS AND FRIENDS,

Grit and optimism ... those are the words that resonated with me as I read the remarkable life story of former student Eddy Goldfarb on page 48. They perfectly describe the fortitude and relentless positivity that drove the famed inventor to create over 800 children's toys and the spirit of what has driven the University of Houston's meteoric rise. Within the past year, fueled by grit and optimism (and a lot of hard work), we've jumped 21 positions to the No. 70 ranking among all U.S. public universities. Plus, this past November, we gained voters' approval of a game-changing \$1 billion-plus state-funded endowment to expand our research and help drive our economy forward.

It's grit and optimism that propel us to pursue our passions and reach our full potential. They are necessary companions for anyone who dares to think big and break boundaries, like our undergraduate students who have made novel research discoveries that could lead to better treatments for breast cancer and Alzheimer's disease (page 30). It's grit and optimism that enable our faculty to tackle the tough and high-stakes quest of helping secure our nation's infrastructure against cyberattacks. In our cover story (page 40), you can learn how our CYBER-CARE team is making public transportation safer through AI, advanced algorithms and high-tech innovations.

To maintain momentum, sometimes your grit and optimism need a reboot. For rejuvenation and solace, I retreat to my garden or paint. I'm humbled to share my passion projects with you and how they keep me balanced (page 24). Throughout the pages of this magazine, you'll find intriguing and inspiring stories of a UH community whose inner grit and optimism are driving them to transform lives and society. Let them inspire you to reach your next level.

Your dream may be just that spark of joy, life-changing invention or discovery someone has been waiting for. As you embrace the spring season, take time to renew your inner strength and outlook on life.

As this issue shows, a little faith and determination can go the distance. Excelsior!

With warm regards,

Renu Khator

President, University of Houston

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Check out his best-selling playful inventions.

THE BIG QUESTION

What makes you proud to be a Coog?

In the hustle and bustle of daily life, it's easy to take certain things for granted. Sometimes, we need to be reminded of our blessings and for those of us associated with the University of Houston, we have quite a few! That's why we took to our Facebook group to ask, "What makes you proud to be a Coog?" As you'll see, our university makes an indelible mark on its students, which they carry with them through their lives. Whose house? Coogs' house!



UH GAVE ME MORE THAN JUST A PLACE TO BE ME — IT GAVE ME A HOME.

Emily S. Chambers ('17)



Immigrating to the USA at the age of 27 with no English and only middle school, I will be 52 in April and planning to graduate in May 2024 with my bachelor's! Thanks to the amazing professors and the University of Houston for allowing my dream to come true!

Flora Y Ariel Salene



I am proud of the university for being Houston's university. Thousands upon thousands of students, instructors, administrators and alumni have worked hard with an unwavering commitment to ensure that our school was and will be top notch with an outstanding reputation.

Jodi Cox Guerra ('88)

I am proud to be a UH alum because anyone of the faculty [who] taught me treated me with dignity and respect even though I was a poor-performing student. I learned to grow from their nurture. That's what the medieval concept of universities is all about ... drinking in knowledge at the feet of great masters. God bless UH.

George Pavia ('74)

THE CHOSEN FAMILY I FOUND IN THE HONORS COLLEGE.

Wes Gryder ('04, J.D. '15)



UH President Renu Khator has done truly AMAZING things at UH. Hope she stays there forever.

Frank Colbourn ('93)



CAMPUS BULLETIN



IN THE SPOTLIGHT

UH keeps climbing up national rankings.



ONE OF FOUR

Last fall, Texas voters overwhelmingly approved Proposition 5 to establish a \$3.9 billion endowment, the Texas University Fund (TUF), designed to position UH and three other Texas universities as national leaders in academic excellence and research preeminence. Through TUF, UH will receive funding to increase its already robust research programs and help position Texas as a global leader in the energy and technology sectors.



DEVELOPING TOMORROW'S LEADERS

The University has been recognized among the top 100 private or public colleges on TIME magazine's inaugural list of The Best Colleges for Future Leaders. UH was one of only three public institutions in Texas to make the list, based on TIME partner Statista's comprehensive review of resumes of the nation's 2,000 most influential leaders from myriad industries. TIME and Statista ranked institutions that excel in cultivating future leaders.



LEADING INNOVATION

The National Academy of Inventors' (NAI) new list of the Top 100 U.S. Universities Granted U.S. Utility Patents included UH, which had 32 utility patents granted in 2022 and more than 200 granted since 2015. These patents represent valuable assets because they give inventors exclusive commercial rights to produce and use the technologies they develop. Currently, UH is one of the nation's top 25 royalty-earning universities.



SING IT FROM THE ROOFTOPS

Under the direction of Betsy Cook Weber, the world-renowned Moores School Concert Chorale was recently named one of the nation's "20 Most Impressive College Choirs" by College Rank. Taking into consideration "competition results, world rankings, touring, historical significance, performance schedule and audition competitiveness," the UH Concert Chorale, consisting of 45 singers, earned the No. 10 spot. 



UBER ... FLEETS?

The University of Houston was the first institution in Texas to use robots to deliver food across campus. Almost four years later, they've become an on-campus staple.

By Gabrielle Cottraux

Nearly every university seems to have a collective understanding that its campus critters, be they squirrels or cats, hold a certain air of prestige among their student bodies.

The University of Houston is no exception, though their honorary mascots look a bit different than most.

Almost four years after UH introduced the Starship fleet of 30 six-wheeled, white, rectangular robotic vehicles, the novelty of the new “campus pets” still delights the UH community.

These high-performing autonomous marvels average 165 deliveries daily. In 2023, the robots delivered 28,476 food orders, most of which were from McAlister's Deli, Panda Express and Mondo Subs.

“From my office window, I see these robots running around delivering food ... students take photos, talk to them and find them quite amusing,” UH President Renu Khator posted on X, formerly known as Twitter.

Celebrating the robots' fourth birthday this year, students and employees are just as eager to receive their food orders from their robot runners. And unlike most campus creatures, these guys have delivered far more treats than they've accepted. 🍷



AHEAD OF THE CURVE, UNDER PAR

Cougars' Women's Golf program finished fall '23 on a strong note. What does the future hold?

Shortly after the 2023 season began, the Women's Golf team set a UH record for a team low round. Then, the next day, they broke their own record.

It all took place at the Sam Golden Invitational, where freshman athletes Ellen Yates and Maelynn Kim got off to a scorching start in their respective debuts. The former posted a 69 in the first 18 holes, while Kim notched a 70. Meanwhile, senior Nicole Abelar tied the best finish of her career, thanks to her uncanny ability to score birdies (an ability shared by sophomore All-American Moa Svedenskiold).

It was the kind of performance that put the golf world on notice — and earned head coach Lydia Gumm her first tournament trophy at the helm of the Cougars.

Now, they have their sights set on the future — a future in which new signings Chiara Brambilla and Annika Ishiyama will play a major role.

As Gumm puts it: "The future of our program remains bright." 



A WINNER AT EVERY TURN

The Cougars' new football coach has earned enviable success with every team he's led.

Champion. Veteran. King of the rebuild.

There are many words you could use to describe Coach Willie Fritz, and any of the above will do. But they would only tell part of the story — because Fritz, a head coach for more than three decades, believes his best chapters are still ahead of him. Fortunately for the University of Houston, those chapters will take place here on campus.

“It took me a long time to get around the bases. I finally got my home run by getting this job,” Fritz said at a press conference in December, where he was announced as the Cougars' new football coach. “It's a dream [for me to be] here at the University of Houston.”

The highly decorated Fritz arrives at the perfect time for UH. The new-look Big 12 Conference includes plenty of room for a young and hungry team to make its mark, and the new man at the helm has a habit of taking teams to the top of their respective leagues. He began his head coaching career by taking Blinn College's football team from five wins in three previous years to two national junior college championships, and in his most recent gig, at Tulane University, he led the Green Wave to a 12-win season and a bowl game victory just one year after Hurricane Ida displaced the football team and much of the campus.

“I can't tell you the number of coaches that I have worked with [who] have reached out and said: ‘You got the right guy,’” Chris Pezman, vice president for athletics, said at that same press conference. “It was clear who that person was, and it was Coach Fritz.” **UH**



GET IN THE (NEW) ZONE

The refurbished, reopened Fitness Zone is the perfect complement to the college experience.

When you think of the University of Houston, what comes to mind?

Top-tier academics? Certainly. Premier athletic teams? Most definitely. A superior student life experience? Of course.

None of that is possible without a campus-wide commitment to health and wellness — and the newly renovated Fitness Zone is at the center of that commitment.

Now open after a three-phase refurbishing project, the Fitness Zone includes a robust roster of unrivalled amenities, including arc trainers, treadmills and ellipticals alongside specialized equipment for weightlifting and abdominal workouts.

The UH community can use the same type of equipment enjoyed by Olympic athletes across the country or enlist the help of a personal trainer via the Functional Training Studio — where ropes, rollers and tires will have them feeling like an action star.

Of course, they can — and should — take things at their own pace. That's why the Fitness Zone is loaded with so many options — so casual users and fitness enthusiasts can find the workout that works for them. It helps that a climbing wall, swimming pool and a range of basketball courts are also nearby, allowing guests to enjoy the joys of a pick-up game or a new hobby.

And no matter how students choose to get into the Zone (pun intended), one thing is clear: Exercise benefits practically everything they do. Study after study shows students who are physically active tend to earn higher grades and enjoy improved focus and concentration, so it's only right that Cougars have a comprehensive facility to improve their health.

After all, taking care of our own is the UH way. 





GREAT FOOD, GREATER PEOPLE

The RAD, UH's new food fall, has a secret ingredient — and it's not the delicious dining.

When the University of Houston broke ground on a new food hall in spring 2022, graduate student Christopher Caldwell had a prediction.

“This will not just be another food court,” said Caldwell, the chair of the Food Services Advisory Committee, “but rather a student-centered space on campus that is comfortable and welcoming to everyone.”

In fact, community was one of the core design concepts of the Retail Auxiliary and Dining Center (RAD Center), courtesy of the global design practice Perkins&Will.

Within the two-story, 41,000-foot facility, which stands on the site of the former Student Center Satellite building, the designers planned for large community tables where friends can gather en masse. For those seeking a bit of serenity, there is an outdoor patio where students and patrons can enjoy views of the campus’ trees and public art. And for those who want to see how the magic happens, the design team incorporated “action seats,” providing unparalleled views of how fresh food is turned into savory meals.

“Your home is your first place, school is your second place and we want the food hall to be a student’s third space,” Caldwell continued.

Now, roughly two years later, the RAD Center opened its doors to campus with a coffee bar and a convenience store, and by fall

2024, the facility will feature diverse food concepts for different palates and diets. Once fully operational, it will have the capacity to serve up to 400 customers at a time; the new addition is well on its way to becoming that “third place” for Cougars across campus.

If the new addition to campus feels a little familiar, that, too, is by design.

From the start, the University and the designers wanted to create a building that blended with — and respected — its surroundings. That’s why, for example, the construction team prioritized sustainability in their purchasing decisions and their building materials. Further, the color palette reflects the vibrant colors that were already present on campus, while touches like the patio and the reflective glass on the second story provide visitors with another way to admire the UH campus.

Of course, the RAD Center includes plenty of structural flourishes, too. The vertical facade rhythms reflect popular design aesthetic of the 20th century while also giving the building a decidedly contemporary look. Additionally, the upper part of the rooftop seamlessly transitions into lanterns in the evening — giving the space a cozy, homey feel.

Each of these choices help deliver on designer Diana Davis’ promise to “set the bar” for how buildings should interact with their environment.

“It’s a space that will ignite the senses,” she says, “while fostering a sense of community.”

In other words, the new RAD’s secret ingredient isn’t the food alone; it’s the unity it creates. 



‘YOU BELONG WITH ME’ (IN THIS T. SWIFT CLASS)

UH students study a billion-dollar celebrity’s business playbook.

By Sam Eifling

Last spring, Kelly McCormick attended the second of three performances Taylor Swift gave in Houston, just the fifth city on the artist’s epic Eras Tour. McCormick, a professor of practice at the University of Houston C. T. Bauer College of Business, considered herself merely a casual Taylor Swift fan; the tickets were a gift. But the show made an immediate impression.

The professor began studying Swift’s career, analyzing the star’s business and marketing moves over the years. Meanwhile, Swift was blazing her way through a 100-plus shows on two continents — a tour that, by the time it wrapped in December, had earned a world-record \$1 billion, landed her on the cover of *TIME* as the “Person of the Year” and affirmed her as a global business titan.

McCormick was captivated and spent much of 2023 designing an undergraduate class she’s teaching this spring, “The Entrepreneurial Genius of Taylor Swift.” She aims to entice business students as well as those from other disciplines to consider the music mogul’s case study as they chase their own “wildest dreams.”

“I’m really interested in how she runs her brand as a business,” McCormick says.

Those key components include how Swift creates relationships, how she builds and compensates her team, how she controls her creative work and how she always makes her fans feel seen and appreciated.

“Fan engagement encompasses a lot: understanding your customers, providing val-

ue and then having a brand that speaks to the customers,” McCormick explains. “How can you do these things in other spaces? It’s really about how this could be applied in other businesses.”

Students may figure out how to apply Swift’s savvy tactics to their own careers. For instance: Having signed over the master recordings of her first six albums to the record label she joined as a teen — a move now seen as a blow for artists’ rights in the music industry — she has been re-recording new tracks of those records to regain financial and creative control of her music.

Not every budding entrepreneur will get the chance to upend economic power structures. But Swift, who’s now 34, also manages her brand and business in ways students can emulate. She routinely navigates thorny politics — such as her efforts to encourage voter registration and when she stumped for the removal of Confederate monuments in 2020. And she takes exceptional care of the people who work for her. At the end of the U.S. leg of her 2023 tour, she surprised her team with more than \$55 million in bonuses to those working on her show — most notably each of the truck drivers on the Eras Tour received \$100,000 bonus checks.

“Students do relate when they see people who are more authentic and more genuine,” McCormick says. “People can say what they want about giving those bonuses, but it’s truly showing how much she’s thinking of every component of her business and the people around her.”



IF IT GLOWS, THEY KNOW

Researchers are using the humble glow stick to develop rapid diagnostic tests for the U.S. Navy to detect and diagnose biothreats.

University of Houston researchers have adapted glow stick technology used in military signaling to develop lateral flow immunoassays (LFIs) — rapid diagnostic tests — that can identify potentially dangerous particles.

The team — which includes Richard Willson, Huffington-Woestemeyer Professor of chemical and biomolecular engineering; Binh Vu, research assistant professor; and Katerina Kourentzi, research associate professor — in collaboration with Tango Biosciences of Chicago has entered into an agreement with the U.S. Navy to develop



improved rapid detection technology for emerging biothreats, with the potential to receive task orders of \$1.3 million.

With climate change, a growing number of environmental niches are developing, creating welcoming spaces for threat-producing species to reside. As the number of environmental biothreats grows, so does the need to detect and diagnose them early. 



COOKING FOR A CAUSE AT WOLFFEST

This unique event from the acclaimed Wolff Center for Entrepreneurship gets better (and, somehow, tastier) each year.

Imagine a bazaar of unique culinary creations, where sumptuous crawfish, savory tamales and delicate empanadas vie to see which can bring your taste buds greater satisfaction — all in the name of a notable cause.

That's the essence of Wolfffest, an annual three-day competition that has taken place at University of Houston each spring since 2002. Before they earn their degrees, rising entrepreneurs from the Cyvia and Melvyn Wolff Center for Entrepreneurship engage in a spirited contest to see who can create the high-stress-grossing pop-up restaurant.

The participants spend months designing the look, feel and taste of their pop-up experience, pouring everything they've learned about business into a friendly head-to-head competition. They plan product offerings, line up vendors and branding partners, create marketing strategies, plan operations and set prices. In addition to the hands-on experience students get in operating a business, proceeds are funneled back into scholarships for students and student activities. In 2023, Wolfffest and Wolff Gala raised more than \$530,000.

Experiential programs like this are a key reason why The Princeton Review named the Wolff Center the No. 1 undergraduate program of its kind. Wolfffest transcends any single industry. From the earliest steps of researching products, negotiating contracts and recruiting volunteers, each team decides how to deploy valuable resources and follow business plans.

For instance, Luan Nguyen, a recent graduate, told the Houston Chronicle that Wolfffest gave him the confidence he needed to be an entrepreneur. It also equipped him with the skills to create and launch "Downtime," an app that helps students make friends outside of their classes or extracurriculars.

"You can go a lot of places and study entrepreneurship," says David Cook, executive director of the Wolff Center, "but if you want to be an entrepreneur, there is no better place than UH." 🍷



ANOTHER YEAR OF ENTREPRENEURIAL EXCELLENCE

UH holds five straight years at the No. 1 spot.

2023 marked the fifth consecutive year that The Princeton Review has named the Cyvia and Melvyn Wolff Center of Entrepreneurship at the University of Houston the top American undergraduate entrepreneurship program. Diana Z. Chase, senior vice president for academic affairs and provost, is pleased but not surprised.

“Recent rankings are proof that UH and the C. T. Bauer College of Business are committed to supporting the achievements of aspiring entrepreneurs and contributing to the economic growth of our nation,” Chase says.

Even before its first-place streak, UH had made it into Princeton’s Top 10 every year since 2007. Institutions are evaluated based on factors like their programming, mentorships and graduates’ business success rates. The Wolff Center offers 38 entrepreneurship courses, and its graduates have gone on to found more than 6,000 businesses in the past decade.

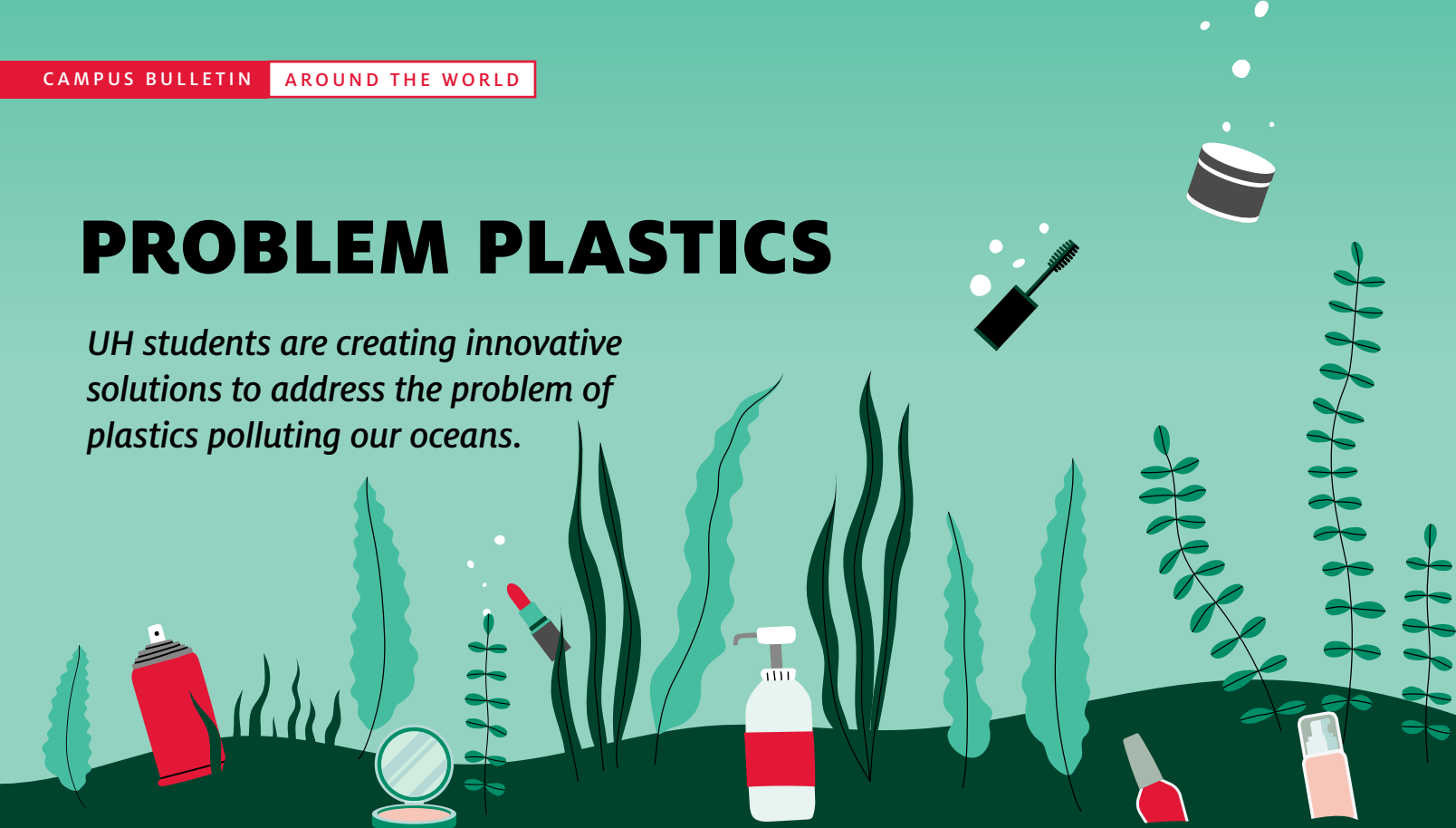
Established in 1991, the program has focused on continuous improvement. Executive Director Dave Cook describes a vision of the near future: “You will be able to come to the Wolff Center and not only be assigned a mentor; you will be able to speak to a patent attorney, obtain help with website design and social media, receive a stipend to get your prototype made.”

All of this is made possible by the continued generosity of the Wolff family and supporters like the Wayne Duddleston Foundation, which recently donated \$5 million for the expansion of the program. 



PROBLEM PLASTICS

UH students are creating innovative solutions to address the problem of plastics polluting our oceans.



One morning last fall, Sarah Grace Kimberly, a student at the University of Houston C. T. Bauer College of Business, was beginning her day like any other, methodically applying her makeup. At the time, she was unaware of the hidden complexities in her routine and the global challenge that lies behind it: the pervasive presence of plastics in our daily lives, often in ways we don't even realize.

According to the latest estimates, our oceans bear the burden of 75 million to 199 million tons of plastic waste, with a projected 23-37 million tons per year by 2040, according to the United Nations Environment Programme. As they do so often, UH students and faculty are tackling this problem with their Cougar ingenuity. The University's Energy Transition Institute challenged students to develop sustainable solutions for a circular plastics economy: a system by which plastic is responsibly reused so it does not leak into the natural environment.

Last semester, more than 60 students participated in the inaugural Circular Plastics Challenge. From this group, six teams emerged to present their ideas at the UH Energy Coalition's Energy Night. Each proposal exemplified a knack for creative problem-solving that has become synonymous with the University.

Among the diverse proposals were ideas for limiting excess packaging and replacing plastic products with more sustainable materials. But one stood out. Kimberly and Emma Nicholas tackled a nefarious byproduct of the plastic crisis: the prevalence of microplastics in personal care products, like makeup. They proposed using a liquid-based membrane functioning like a magnet to capture these tiny, indiscernible plastics that go down our household drains every day.

Their goal is ambitious but vital: to significantly reduce the 5.4 million metric tons of microplastics that enter the natural world each year.

Their goal is ambitious but vital: to significantly reduce the 5.4 million metric tons of microplastics that enter the natural world each year.

"We wanted to provide a simple solution to a growing problem," says Kimberly. "Before we did this project, we didn't know that microplastics existed, let alone in our makeup. I didn't know I was basically putting plastic on my face every single day and washing it off into our drains. Because it's an unseen problem, it's hard to address."

Joe Powell, ETI's founding executive director, was inspired by what the future could look like with UH students using their skills and intellect to improve the world.

"If you look at the wide variety of proposals and approaches, you can see the complexity of the problem and all the different things that society must consider to find solutions," he says. "I think circularity in plastics and chemicals is as difficult to address as the net-zero issue within the energy sector, if not more. We have a unique opportunity here to tackle both, and it's really great to see our students thinking ahead." 



DEPARTMENTS

GET YOUR WEIRD ON!

Explore some of Houston's more eccentric destinations.

By Tyler Hicks

Houston is known for many things: the culture, the food, the thrilling sports teams and, of course, the world-class rodeo. But many folks may not know Houston is also home to a bevy of unique experiences you'd be hard-pressed to find anywhere else.

Here's a rundown of some of Houston's most exciting, eclectic and unusual attractions — all of which are a short trip from UH.

National Museum of Funeral History

This museum houses the nation's largest collection of funeral service artifacts, and it doubles as a celebration of unique cultural traditions such as papal funerals and post-mortem New Orleans parades.

Eclectic Menagerie Park

This collection of steel and metal creatures and creations has been known to bewilder many a passerby. Located off Highway 288, this park is the stomping ground for artist Ron Lee's approximately two dozen animal sculptures, all made from recycled pipes and metals.

The Eclectic Menagerie Park features handmade metal sculptures by local and famous artists. Long-time art lovers, the Rubenstein Family, established the park on the edge of their 108-acre Houston pipe yard to display a selection of unique metallic creatures.



Downtown Houston Tunnel System

Never before has a city's underbelly been so delicious. What began in the 1930s as a tunnel between two movie theaters has turned into an underground network connecting 95 city blocks. Venture downward for a diverse tapestry of shops and eateries.

The Orange Show

Originally inspired by the sculpture garden created by a local mail carrier, the Orange Show Center for Visionary Art has become a creative cornucopia, offering monthly programming and a one-stop shop for lovers of metalwork, papier-mâché creations and visual art demonstrations of essentially every kind.

David Adickes Studio

You may be familiar with the massive Sam Houston statue heralding your arrival into H-Town territory, but did you know there's a studio — less than 10 minutes from campus — where other similarly massive statues reside? Step inside the studio of David Adickes to see the looming figures (or sometimes just the heads) of other state and national luminaries.



Feeling a bit prickly? Cactus King is the place for you, complete with all things cact-tastic.

Cactus King

Just off I-45, a giant cactus sculpture oversees a yard of eclectic art and collections of tiny cacti. A series of comical signs warns you about entering this effigy's kingdom, but there's nothing to fear: Entry is free, and once inside, you can peruse an abundance of junkyard creations proving the old adage, "One man's trash is another man's treasure."

Hobbit Cafe

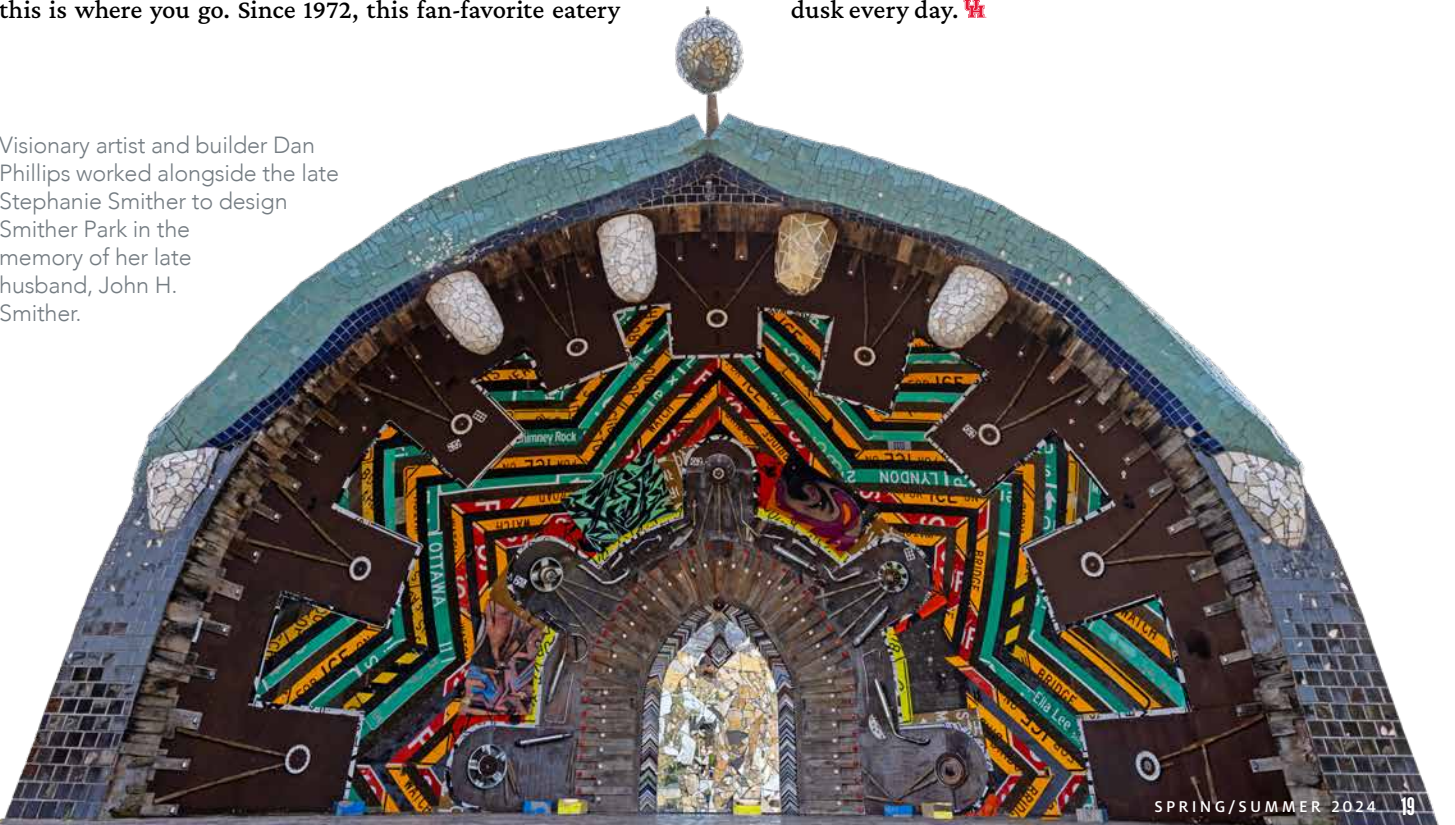
Once you get hungry after all these unique explorations, this is where you go. Since 1972, this fan-favorite eatery

has been serving delicious sandwiches, tasty burgers and lovely vegetarian fare beneath a giant oak tree — all just 10 or so minutes from campus. You read that right: Even Middle Earth is a short drive away.

Smither Park

This expansive, always-free space is the result of more than 300 people coming together to celebrate the beauty of self-taught art. These artists have contributed an array of original mosaic pieces, all of which can be viewed from dawn till dusk every day. 

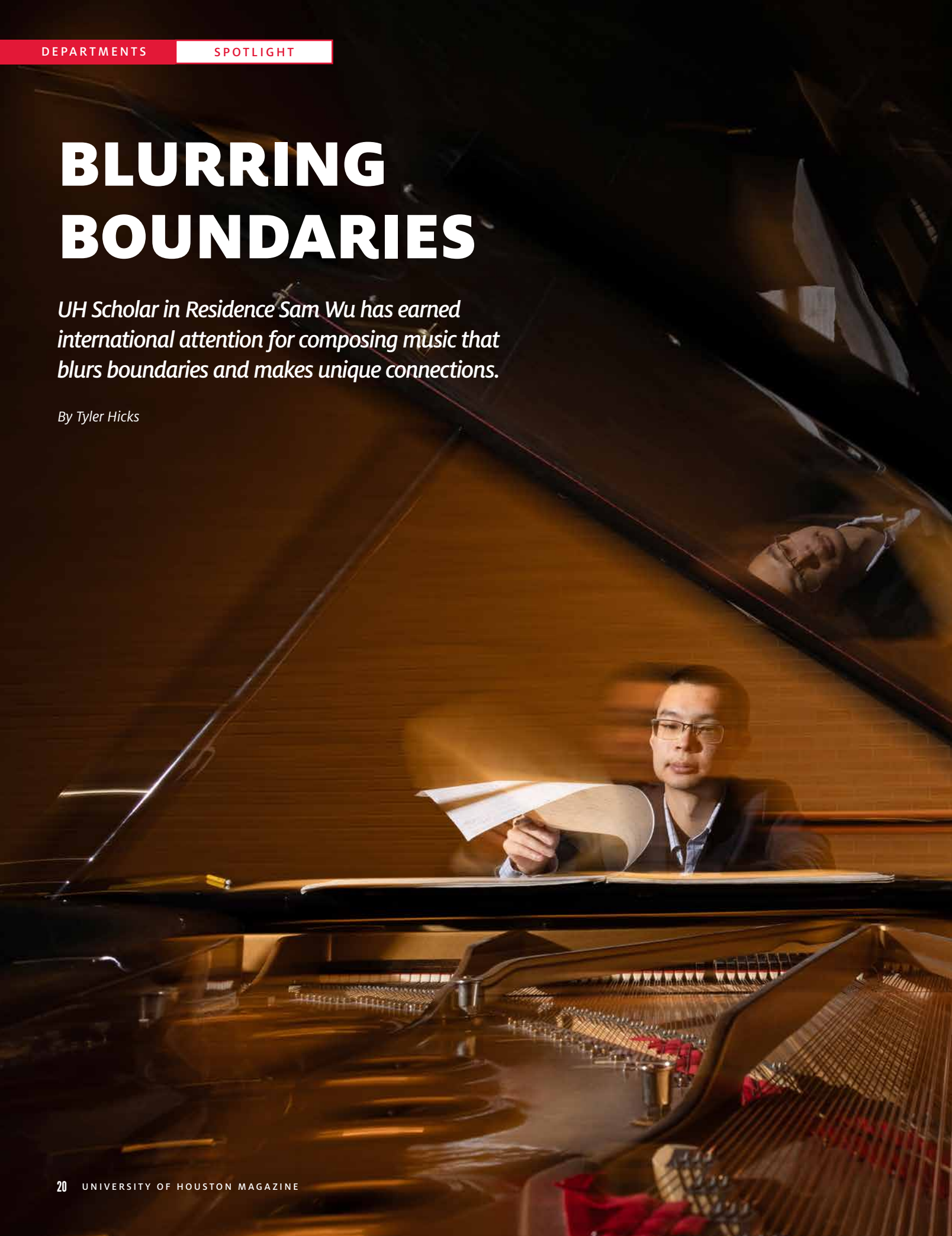
Visionary artist and builder Dan Phillips worked alongside the late Stephanie Smither to design Smither Park in the memory of her late husband, John H. Smither.



BLURRING BOUNDARIES

UH Scholar in Residence Sam Wu has earned international attention for composing music that blurs boundaries and makes unique connections.

By Tyler Hicks



As a child, when boredom would strike amid Shanghai traffic, Sam Wu would gaze out the car window and marvel at what he saw above.

“I think a lot of people have this idea of China as an ancient country with pagodas, mountains and temples,” says the 28-year-old composer. “But it’s really quite a futuristic-looking city, with lots of skyscrapers and highways — much like Houston.”

Looking at the intricate designs of different buildings sparked his love for urban planning and architecture — two loves he now nurtures and conveys in exciting ways.

Wu, a University of Houston Scholar in Residence, is an internationally acclaimed composer with degrees from Harvard University and The Juilliard School. His compositions have been performed in Philadelphia, Minnesota, Tasmania and Melbourne — to name just a few — and in his words, these creations evoke “the beauty in blurred boundaries,” connections between buildings and the earth, or music and time itself. His subject could be anything from a cityscape to a planet to the wind.

Originally composed in 2018, “Wind Map,” was born from Wu realizing that a visualization of a global wind map closely resembled brushstrokes by Vincent van Gogh. Other entries in his catalog include “Mass Transit” — a piano quintet that takes listeners on a musical voyage a la a train journey through a city — and “Sheng Sheng Man,” a haunting rendition of a rainstorm.

All three pieces won prestigious international awards, and each is the kind of achingly mellifluous music that can

“The only solution is to dive in and begin.”

only be conjured by someone uniquely in touch with both the world around them and their own creative process.

Wu’s ideas begin when something — it could be anything — inspires him. Then, he lets the idea take control.

“Once I start writing, I’m not even thinking about the concept,” he says. “I’m feeling where the music wants to go from there, and sometimes, I’m listening more than I’m driving it. That’s where music feels the most interesting, like a discovery process.”

He knows this is easier said than done, but he wants to help students and aspiring composers create their own connections. Much like he nurtured his nascent love of the Shanghai skyline until it became a burgeoning passion for the intricacies of design, Wu encourages any musician or artist to focus on what interests them outside of their craft — then see where that interest takes their work.

“I think people tend to feel inspired when they think of how to visually capture what really excites them,” he says. “But, sometimes, you find your inspiration as you go or from creating with others. The only solution is to dive in and begin.” 🎹

UNLOCKING POTENTIAL

Venkatesh Balan sees a climate hero in an unlikely little creature: microalgae that have proven remarkably effective at removing carbon dioxide from the atmosphere.

By Peter Simek

In the Microbiome and Genomics Lab at the University of Houston at Sugar Land, Venkatesh Balan produces a glass flask containing a putrid green liquid. The contents resemble the aftermath of a clogged sink, but Balan believes it could be a secret weapon in the fight against climate change.

The cloudy mixture contains a culture of microalgae — millions of microscopic phototropic organisms that, like plants, pull carbon dioxide out of the air and release oxygen. In recent years, Balan and other researchers have developed new ways to put these little creatures to work at an industrial scale.

Balan, an associate professor of biotechnology in UH's Cullen College of Engineering's Technology Division, spent his career researching industrial applications of microbiomes. His research focused on how microbiomes, through the process of biomass conversion and fermentation, can be used to produce ethanol and organic acids used in various chemical products. After arriving at UH in 2017, he decided to shift his attention to the planet.

"The biggest threat of the world is global warming, climate change, carbon emissions," Balan says. "So, I started thinking, 'Why don't we use our same knowledge on fermentation and biomass conversion in a different area?' So, I started working on algae."

THE POWER OF CONVERSION

Researchers and corporations have been exploring methods to remove carbon dioxide from the atmosphere for years. The most popular mitigation strategies involve direct air capture — industrial-sized plants which can "scrub" carbon dioxide out of the air and pump into large storage reservoirs underground. The problem, Balan argues, is that these methods are energy intensive and expensive, and they don't adequately account for the long-range storage of recaptured CO₂.

"We are thinking about the next 50 years," he says. "But we're not thinking about beyond 50 years."

Algae, on the other hand, doesn't require solving for storage of captured carbon. In fact, algae removes carbon by processing it into

"Why don't we use algae to our advantage and make it much more sustainable?"



other compounds — carbohydrates, lipids and proteins — that can be used to make other useful products like biofuel and fertilizer, thus helping to reduce the carbon emissions of those industries.

“We are working on technologies to capture the CO₂ using algae that has 90% efficiency,” Balan says. “The bioproducts produced by processing algae could displace fossil fuel and satisfy growing bioproducts needs.”

THE ORIGINAL GREEN SOLUTION

If you are wondering how a microscopic organism could possibly play a role in the fight against a global challenge, Balan urges a close look at the history of the Earth’s atmosphere. Hundreds of millions of years ago, the atmosphere mostly consisted of carbon. Then came the algae. Massive ancient blooms of algae in the prehistoric oceans kick-started a process of oxygenating the atmosphere, changing the trajectory of the emergence of life on earth.

“Algae has been doing this for millions of years,” Balan says. “So, why don’t we use algae to our advantage and make it much more sustainable?”

The challenge, however, is figuring out how to make algae-driven carbon capture scalable. Scientists have been experimenting with methods of cultivating algae for biomass conversion and fermentation for several years. But their methods are expensive, which has kept algae production commercially viable only for use in high-value products like biofuels or ingredients used in pharmaceuticals.

ALGAE: POWERFUL AND ADAPTABLE

Balan believes his cultivation method could be deployed at a greater scale. Rotating Algal Biofilm (RAB) grows algae on a “biofilm” that circulates in a vat of water. These machines re-

semble an upturned treadmill submerged in sludgy water with algae growing on the spinning band. The advantage to this cultivation method is that it is relatively cheap and simplifies the harvesting of the algae to simply scraping the algae from the biofilm. Another advantage is that RABs can be incorporated into existing systems that are already working with processing water, like wastewater treatment facilities.

Balan conducted a study that evaluates how much algae could be grown if RAB reactors were installed at Texas’ three largest wastewater treatment facilities. The results show the potential of scaling algae production by retrofitting wastewater treatment plants with RABs to cut down on the overhead costs of the cultivation. The algae clean wastewater and sequester carbon. And the natural bioproducts produced through algae biomass conversion can be used to create more eco-friendly versions of products like fertilizer, animal feed, biofuels and bioplastics.

NEXT STEPS: CULTIVATING COLLABORATION

Balan is now collaborating with a company in Iowa on a U.S. Department of Energy-funded project that uses an RAB algae cultivation system at a wastewater treatment plant, which will both sequester carbon and create biomass fertilizers for Iowa farmers.

The challenge is convincing investors and policymakers to support the solution. The largest investments into carbon sequestration strategies have been in the direct air “scrubbing” and storage technologies, largely because the oil and gas companies that are investing heavily in the technology are heavily subsidized by the federal government. Balan hopes his research can help push government regulators to see the potential of investing in a “greener” form of greenhouse gas emissions capture.

“If the government plays a role, they can drive it much faster.” 🇺🇸

Left: Drashti Mojindra, Research Assistant/TE, Engineering Technology, Right: Aaron Martinez, Research Tech 2, Engineering Technology

PURSUIING HER PASSIONS

UH President Renu Khator's private pastimes provide rejuvenation, life balance.

As told to Shawn Shinneman

University of Houston students know Renu Khator as the president of their school, the ever-present face at games and events, or around campus. But in her spare time, Khator unwinds by picking up a paintbrush or digging her hands in the soil. We caught up with Khator to hear more about how she finds time for her passion projects.

HOW DID YOU FIRST BECOME INTERESTED IN PAINTING?

I started in April 2020. I had so many Zoom meetings, sometimes eight to 10 hours a day, and my brain was just getting tired. I needed something to release the pressure. I went on Amazon and ordered two canvases, two paint brushes and five tubes of paint — three primary colors and black and white. I didn't know anything about acrylic paint. I'd certainly never painted on canvas before. In ninth grade, I took an art class. That was about it.

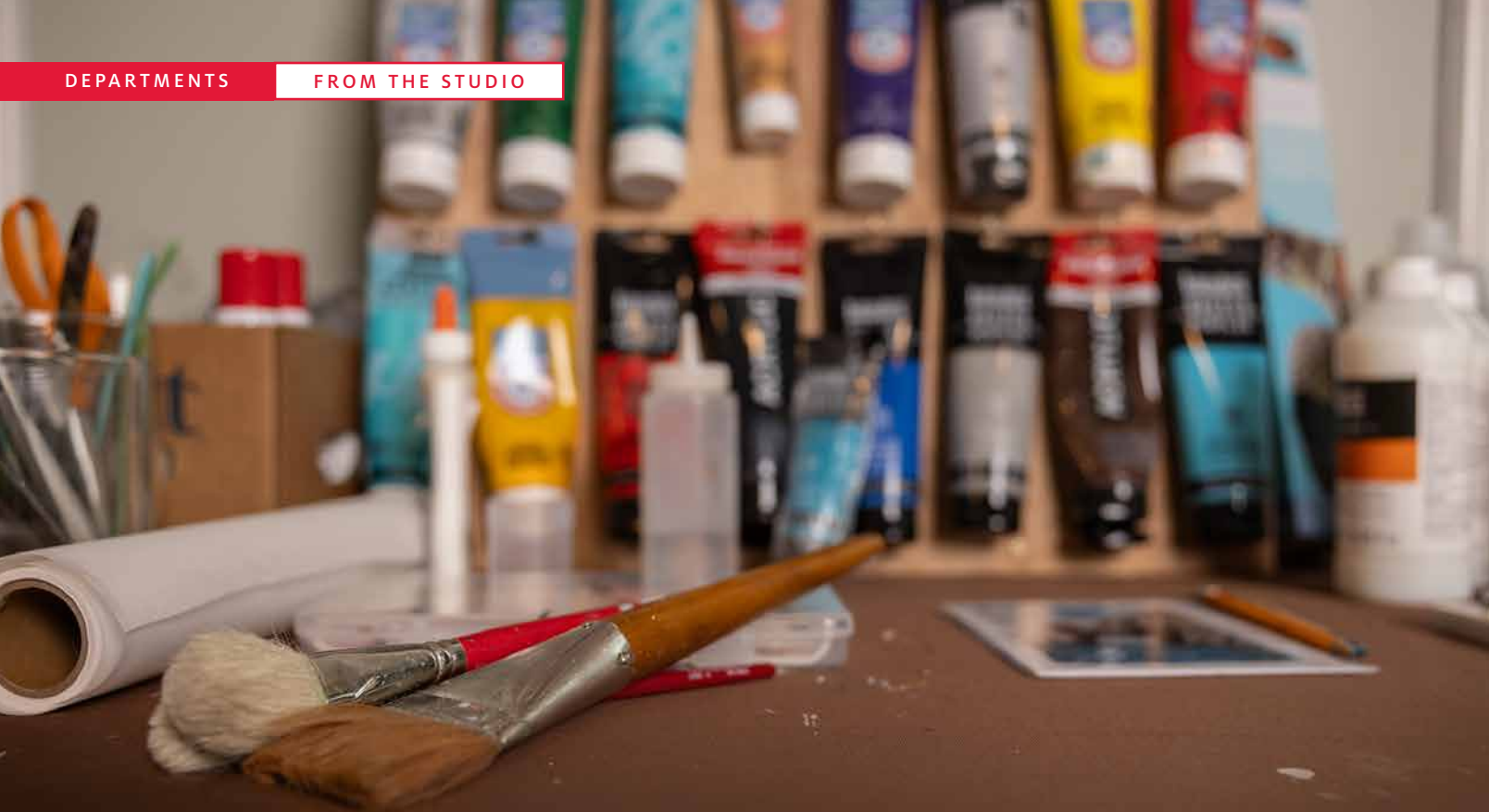
I just started painting. I have never taken any kind of formal class, and I still don't have my own style. Whatever pleases me, I paint. You will find my paintings as being abstract, semiabstract, but also impressionistic, realism and sometimes fluid art, too.

WHAT ARE YOUR FAVORITE KINDS OF PIECES TO CREATE?

At any given time, I have at least three canvases in my studio that I'm working on, depending on what mood I am in and how much time I have. There is generally one very large abstract piece. I hesitated for at least 18 months before I got into abstract, but now I find them just very, very relaxing. It lets me fly without boundaries.

Then, there is always a realism painting. I may use a photograph I have taken somewhere or I may find a photograph that I like and want to recreate. The third kind of painting is something Cougar-based, something to do with the University of Houston. Many of these paintings have gone up for auction in different galas. Any money that is raised goes to student scholarship funds.





HOW HAS NURTURING THIS INTEREST IN ART MADE A DIFFERENCE IN YOUR LIFE?

Slowly, it became therapy. Sunday morning is the time I go to my studio. If I am traveling on Sunday, I honestly can't tell you how much I miss my paint — it is to the point of aching. I just want to be back in my studio. Sometimes if I have 10 minutes, say I got ready early or I'm waiting for something else, I'll just go and give a tiny little touch to something. To me, it is part of my rejuvenation.

YOU'RE KNOWN TO HAVE A GREEN THUMB, AS WELL. HOW DID YOU GET INTO GARDENING?

I never thought about it until I visited my daughter in Atlanta, and she was showing me her tomatoes. I thought, "Whoa, that seems so fascinating." I had no clue about the different soil types, fertilizer, pH balance, potassium or nitrogen. I had zero knowledge. To me, it became a research project.

I put up four wooden planters and put some soil in it. It started from there. Slowly, it just became something that I love and enjoy. Again, it's a part of my therapy. I do a summer garden and a winter garden. In the morning when I get up, I do my yoga and meditation, and then I go out to my garden. I spend half an hour in the morning. Saturdays, I spend a lot more time pruning, cutting, giving them protection.

WHAT ARE YOU GROWING THESE DAYS?

Right now, it's time for the winter garden. I have carrots. I have beets, and, of course, radishes. Then, I also have cabbage, cauliflower, Broccolini, broccoli. I have bok choy, lettuce and spinach, green beans and every kind of herb.



I KNOW YOU SHARE A LOT OF IT. IS THERE ANYTHING THAT'S PARTICULARLY PRECIOUS TO YOU, THAT YOU KEEP FOR YOURSELF?

I just grow so much of it that even though they're precious, there's no way I can eat it all. So, I bring them to the office, I send them to my friends. I let the children from the neighborhood come and pluck their own tomatoes.

There are some things I really haven't been successful with, and one of those things is potatoes. I've tried to grow potatoes in so many different ways. If anybody is growing potatoes, I would love to take some lessons and get some tips.

YOU HAVE YOUR HANDS IN SO MUCH AROUND CAMPUS, PLUS YOU'RE A MOM AND A GRANDMOTHER. HOW DO YOU SKETCH OUT THE TIME FOR THIS?

When you enjoy something, you don't really think about finding time for it. Somehow, time finds you. That's how I feel. I can always squeeze two hours for my art on Sundays. I can always squeeze two hours for my garden on Saturdays. I really don't have any other kinds of habits. I don't watch too much television.

DO YOU SEE YOUR PURSUIT OF THESE HOBBIES AS PUTTING YOUR WORDS INTO ACTION WHEN IT COMES TO YOUR APPRECIATION FOR CONTINUOUS LEARNING?

I believe very strongly that you should take on a new challenge every few years, if not every year. Right now, I'm learning Spanish, but I don't have time for formal classes, so I got Duolingo on my phone. By now, I have something like a 1,100-day streak of at least a lesson. I'm a very disciplined person. Once I decide on something, I will stay at it. I don't start and stop. Anything that brings me equilibrium, makes me a better person mentally, physically, emotionally, I'll do it.

WHAT MIGHT YOU SAY TO OTHER BUSY LEADERS OR BUSY PROFESSIONALS WHO MAY NOT BELIEVE THEY HAVE THE TIME TO CARVE OUT FOR PERSONAL INTERESTS?

I think if people say they don't have time, they haven't found something that they're truly passionate about. It is so important. You cannot burn your candle from both ends. You do have to pause and find your passion. 



“When you enjoy something, you don't really think about finding time for it. Somehow, time finds you.”

REACHING FOR THE STARS

Students share their future aspirations.

When it comes to long-term dreams, University of Houston Coogs are thinking big! See how students responded to an Instagram question asking, "Where do you see yourself in 10 years?"



**RUNNING
MY OWN
PRACTICE AS
A SUCCESSFUL
ESTATE
PLANNING
ATTORNEY!**



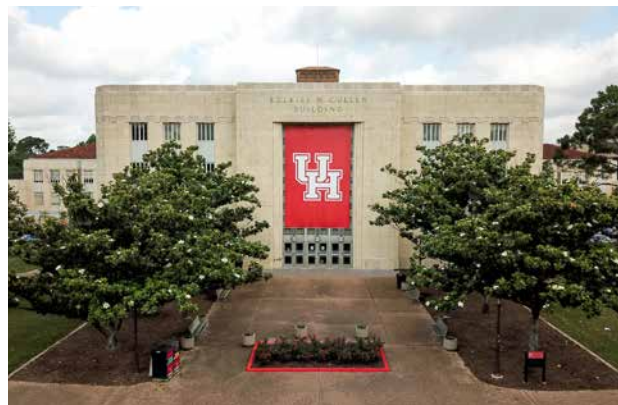
**Forbes 30 Under 30
for being well-known in
the architecture field.**



Being a successful musician.

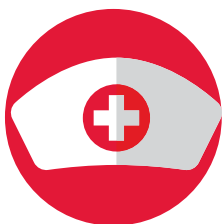


**WORKING AT THE
MEXICAN EMBASSY.**



My name on a building at UH.

**Working in a nursing
field, living in my
dream home and giving
back to my parents!**



**WORKING
IN THEATER
PROFESSIONALLY.**

*Making short films for YouTube
and being able to have
YouTube as a job.*





FEATURES



INQUIRING MINDS

This innovative UH program cultivates undergraduate researchers from all academic disciplines.

By Peter Simek

On June 17, 2012, a press release crossed the wire with a science story destined to go viral. A new study examining biological samples taken from hotel rooms throughout the Houston area attempted to locate which surfaces were most contaminated with bacteria. The surprising reveal: the dirtiest surfaces in hotels aren't in the bathroom, on the door handles or around the bed. Rather, the most likely spreader of disease in your hotel is the television remote.

The story packed a powerful blend of familiarity, fear and serious ick, and it was picked up by dozens of news outlets. The study's lead researcher was invited to appear on "The Ellen DeGeneres Show." Perhaps as surprising as its findings: that researcher was Katie Kirsch, an undergraduate student at the University of Houston who had conceived, conducted and published the study through UH's innovative SURF program.

SURF, which stands for Summer Undergraduate Research Fellowship, launched during the 2005-2006 academic year, and it allows students entering their sophomore, junior or senior years the opportunity to conduct independent research alongside an academic mentor. The program has several distinguishing features. Students work on real research projects that often result — as in the case of the bacteria-covered TV remotes — in significant findings. After Kirsch's research was released, hotels said they would address how they approach sanitizing these devices.

SURF also accepts students from all of UH's undergraduate colleges, which establishes a unique, cross-disciplinary research atmosphere on campus each summer. This combination of active research across disciplines led by undergraduates mentored by professors has produced important results. SURF projects have helped UH undergraduates win Fulbright scholarships, contribute to groundbreaking scientific breakthroughs and earn prestigious internships on Capitol Hill.



INDEPENDENT RESEARCH, BUOYED BY COMMUNITY

Since its launch, Stuart Long, Moores Professor and associate dean for undergraduate research and the Honors College, has overseen the SURF program. Long is considered a UH institution unto himself. He began teaching at the University after receiving his Ph.D. in electrical engineering from Harvard in 1974, and this semester marks his 50th year with UH. Long said the vision from the outset was to create research opportunities for undergraduate students, distinguished by their hands-on collaboration with faculty.

“For undergraduates, SURF was the first time we had a full-time, major opportunity for students,” he says. “It’s not one of these things where a student gets involved in undergraduate research with a class of 300 students. Instead, it is a one-on-one interaction between the faculty member and the student.”

**“For undergraduates,
SURF was the first
time we had a full-time,
major opportunity
for students.”**

Each spring semester, students entering their sophomore, junior or senior year the following fall can submit a proposal for a research project they would like to pursue that summer. Each student must secure a faculty mentor, and abstract proposals are reviewed by faculty. Once approved, they are on their own. Students spend 10 weeks during the summer on the UH campus conducting research as if they were graduate students or already minted Ph.Ds.

Although the research is independent, the program tries to foster community among SURF participants through brown-bag lunches, research presentations and faculty discussions. When SURF launched, the program had 18 students. It has since grown to about 70-90 students per year, including both Honors and non-Honors College students. In 2023, student participants represented seven colleges.

It’s that cross-disciplinary approach Long believes is the special ingredient driving SURF’s success.

“It is not just for students in applied electromagnetics or students in electrical engineering or students in engineering and science. We made concerted efforts to open this to the whole campus,” Long says.

TANGIBLE OUTCOMES, VERIFIABLE BENEFITS

The results speak for themselves.

In 2008, history major Ronnie Turner investigated the personal files of a politically active director of the YMCA in Houston’s Third Ward, revealing new insight into the history of integration in Houston. That work was eventually featured on the television news interview show “Dan Rather Reports.” In 2022, biology major Gabrille Kostecki researched the development of an effective anti-fentanyl vaccine, as well as a SARS-CoV-2 vaccine against new variants. She would go on to earn a Goldwater Scholarship and special recognition from Texas Gov. Greg Abbott. In 2023, political science major David Paul Hilton looked at the impact of sanctions on bilateral trade between Russia and nearby non-sanctioned countries. He went on to study in Uzbekistan on a Fulbright grant.

“English major, history major, psychology major or a business major — we’ve really worked to get a diverse range of students involved,” Long says. “It really gets them much more competitive for what we call major awards that get you entry into grad school or med school or whatever their next goals are.”

The SURF program helps to uniquely position UH undergrads for some of the most prestigious awards, he adds, because students come out of their 10 weeks with their names on academic research projects they led themselves.

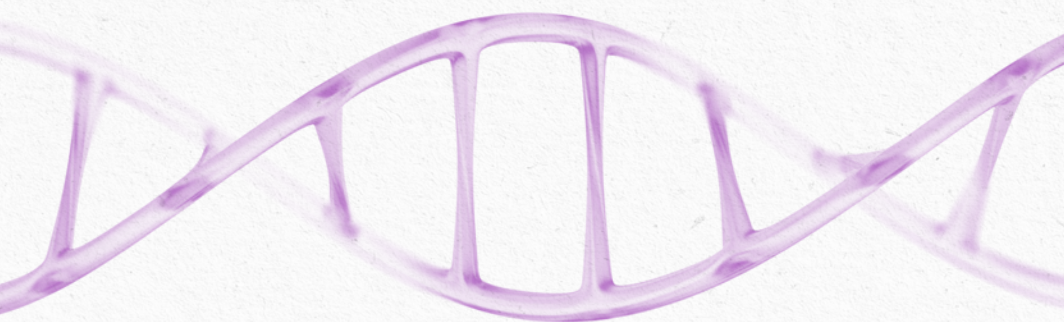
“Those go a long way when you’re looking at getting into a good grad school or applying for a prestigious major award. We know if we are trying to groom these students for Fulbright applications or Goldwater Scholarships, they need to have these experiences to make them competitive.”

Long points out that many of UH’s students are the first in their families to go to college. For these students, merely attending UH may have seemed like an unattainable dream. Conducting academic research that could lead to a Fulbright scholarship ... that was unimaginable.

Long also knows firsthand the effect a strong mentor can have on the life trajectory of an undergraduate student. His 50 years at the University have been driven by his numerous experiences watching these kinds of student transformations. But he can also remember when he was an undergraduate who found a mentor who helped shape his own life’s path.

“When I was an undergraduate at Rice, I got involved working with a particular faculty member named Lionel Davis,” he says. “And he got me involved in some work with some new kinds of antennas that were being developed. And I didn’t know it at the time, but looking back, that’s what my research has been for the last 50 years.”

As the 2024 SURF application season kicks off, we look back at four of the notable research projects conducted last summer at UH.



Funmi Babajide

BIOLOGY

Funmi Babajide first began working with her SURF program mentor, Tasneem Bawa-Khalfe, associate professor of biology and biochemistry, when she was chosen for the UH Pharmacological and Pharmaceutical Sciences Cougars in Cancer Research internship. That experience evolved into research she proposed for a SURF project. Babajide studied the impact of a particular strain of protein — a small ubiquitin-like modifier — on breast cancer development and breast cancer progression.

It was a subject she admits she didn't know much about when Bawa-Khalfe first directed her toward it. But her research was part of broader UH research into breast cancer treatments that eventually isolated a protein that could prove a potential drug target for breast cancer treatment.

Babajide presented her research at the Cougars in Cancer Research Symposium, the American Association of Cancer Research Annual Meeting and the Annual Biomedical Research Conference for Minoritized Scientists. Babajide cites the core role her mentor has played in guiding her toward some of these opportunities, citing opportunities like SURF for enabling her to dive into the hard science and research in her field.

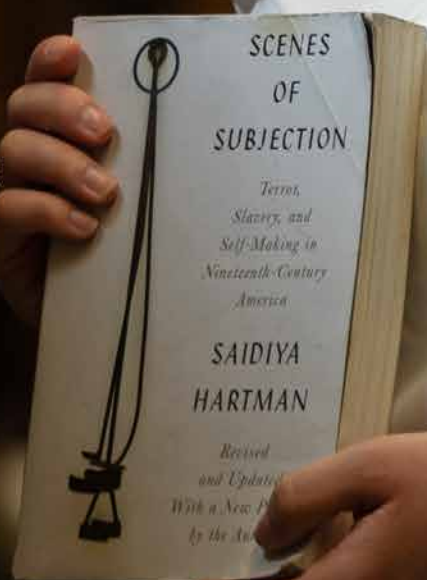
"I love Dr. Bawa-Khalfe," she says. "She is the type to push me to go to things and do things and even apply for things I would never have applied for. I learned how to design experiments, how to write papers and how to apply for grants."



A Black woman with short, curly hair, wearing a white lab coat over a purple shirt and a purple headband, is smiling while working in a laboratory. She is wearing blue nitrile gloves and using a pipette to transfer liquid into a small vial. The background is a blurred laboratory setting with shelves and equipment. A large purple circle is overlaid on the right side of the image, containing a quote.

**“I learned how
to design
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to apply for
grants.”**

**“I’m also really
interested in
the idea of art
and writing as a
means of healing
and healing
yourself.”**



Alissa Boxleitner

ENGLISH LITERATURE

By the time Alissa Boxleitner transferred to UH before her junior year, she had already proven herself as a precocious and imaginative researcher. At Lone Star College, Boxleitner published award-winning research on hypersexualization at middle school dances and was invited to present at the Johns Hopkins' Richard Macksey Humanities Symposium. At UH, she decided to pursue English literature and found a mentor in Haylee Harrell, assistant professor of Black studies.

Harrell, who sponsored Boxleitner for the SURF program, is the kind of mentor Long had in mind when he established the program's format. She has helped Boxleitner receive a Provost Undergraduate Research Scholarship and invited her to join a graduate-level English class.

For her SURF proposal, Boxleitner wanted to expand on themes central to her previous undergraduate research. Looking at the work of the queer Chicano musical artist Myriam Gurba and her memoir on gender violence, "Mean," as well as the body art of Cuban American performer and sculptor Ana Mendieta, Boxleitner set out to look at how the body is represented in art at a time when ever-present threats of sexual violence have become increasingly visible and acknowledged.

"I'm also really interested in the idea of art and writing as a means of healing and healing yourself," Boxleitner told FORWARD, the English department newsletter. "I love the memoir as genre. That's the kind of stuff I'm drawn to — how we deal with ourselves and put ourselves back together after surviving gender-based violence."

Julio Cacho-Bravo

CHEMISTRY

Julio Cacho-Bravo has been working with his mentor, Jeremy May, professor of chemistry, since 2021 when he reached out to express his interest in pursuing a doctoral degree in chemistry instead of applying to medical school. For Cacho-Bravo, it was his work in organic chemistry that lit the fire and the desire to do more hands-on research in the cures doctors could use to treat their patients.

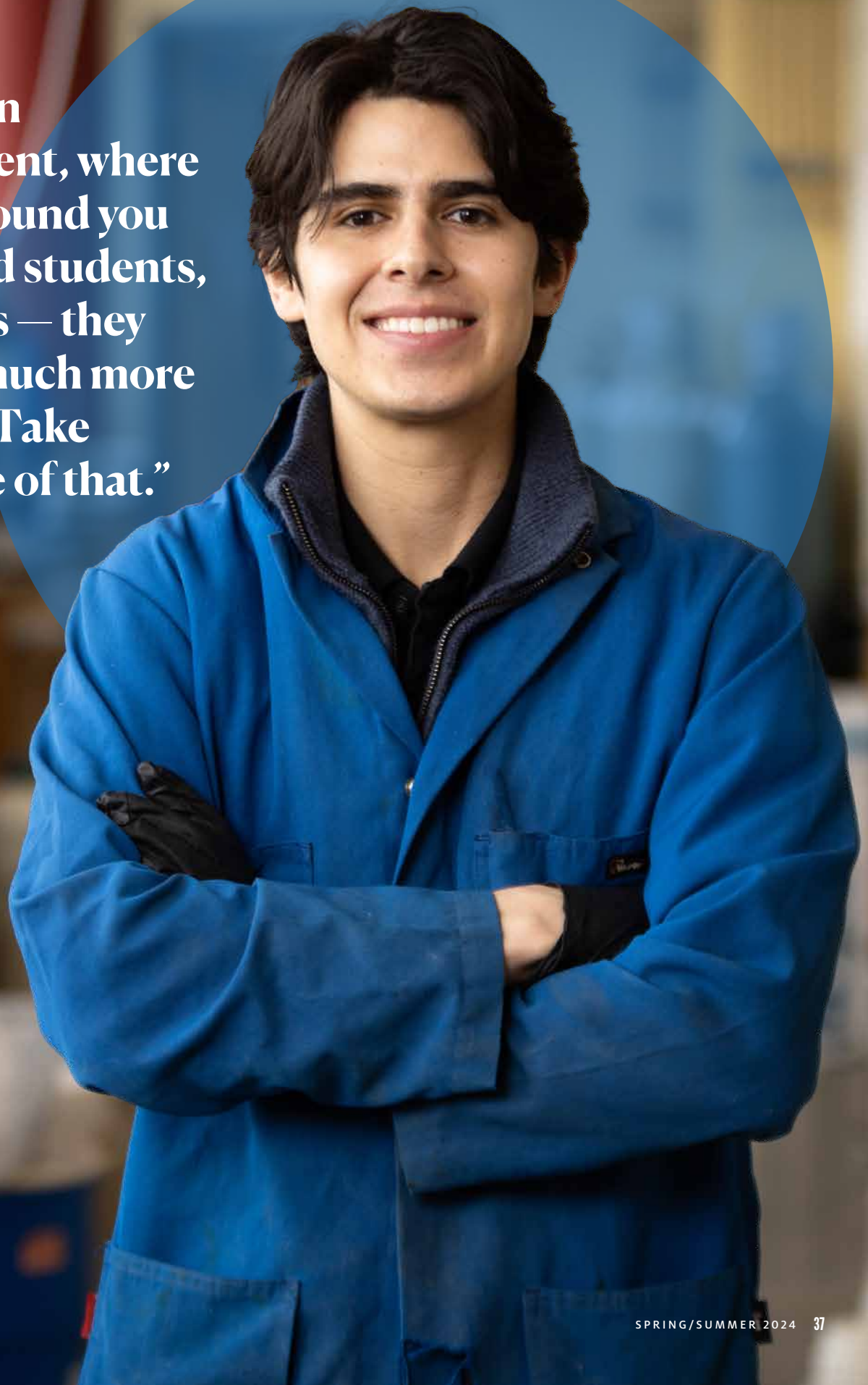
For his SURF research, he worked with May to learn how to complete the synthesis of mutanobactins A and B. These molecules have been found to have properties that can serve as effective treatments for Alzheimer's and Parkinson's disease.

The project afforded Cacho-Bravo the opportunity to spend 10 weeks acquiring the valuable lab skills and techniques required to synthesize the molecules. For Cacho-Bravo, the combination of learning these hands-on lab skills and engaging with the SURF program community confirmed his desire to continue pursuing advanced studies in chemistry.

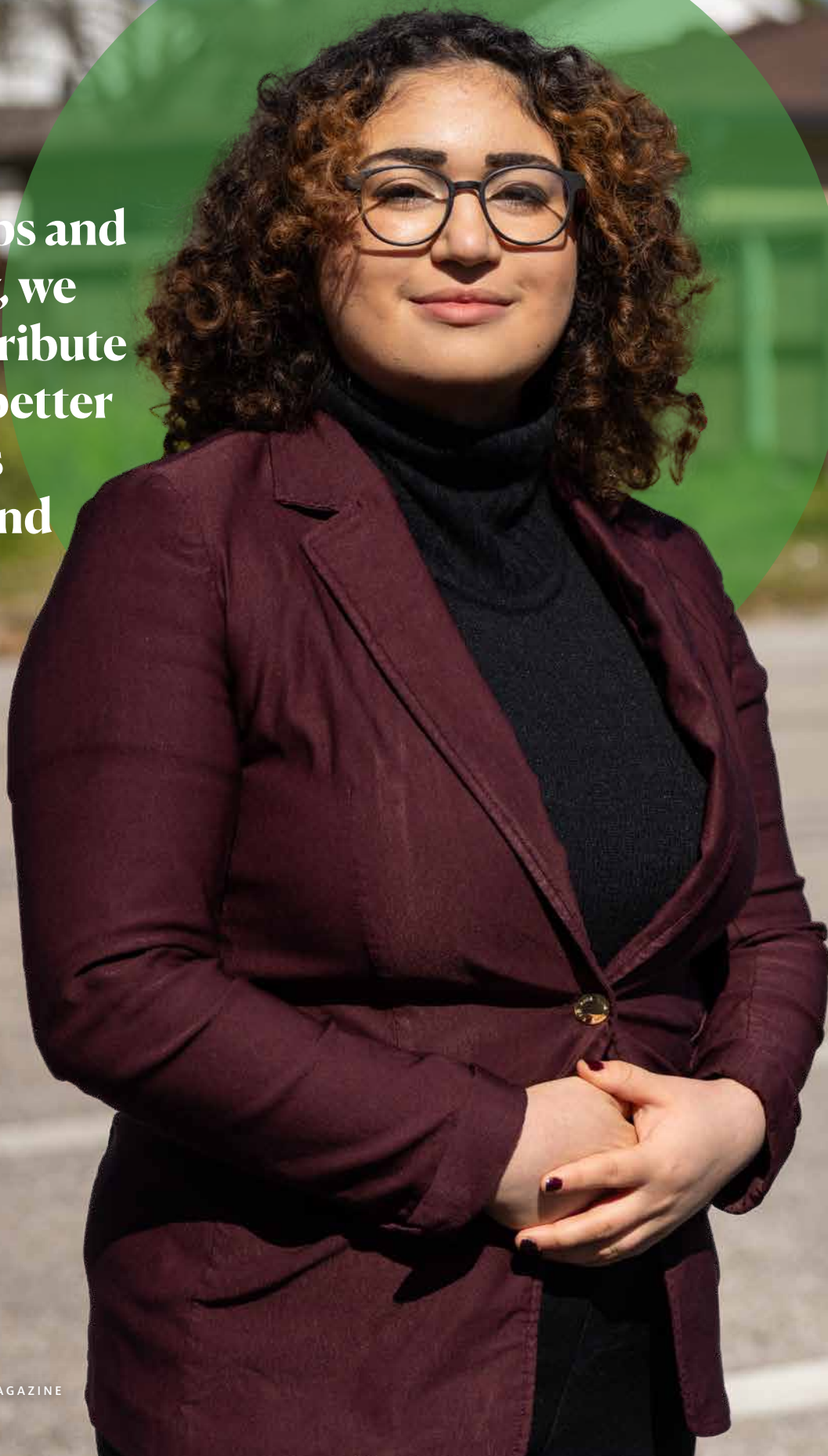
"My mentor guided me through the process of working with compounds like these," Cacho-Bravo says in a UH Honors College video reflecting on his SURF experience. "Being in an environment, where people around you — like grad students, professors — they know so much more than you. Take advantage of that."



“Being in an environment, where people around you — like grad students, professors — they know so much more than you. Take advantage of that.”



**“Through
relationships and
community, we
can all contribute
to create a better
space for us
to inhabit and
thrive in.”**



Gabriela Hamdieh

PUBLIC POLICY

Under the guidance of Sarah Munawar, the Elizabeth D. Rockwell Visiting Professor on Ethics and Leadership, Gabriela Hamdieh dedicated her 10 weeks during SURF to assessing Houston's housing issues. She documented housing displacement and discrimination experienced by racialized and migrant communities. The work built on Hamdieh's active roles in justice issues both on and off campus, offering a critical lens through which to view the challenges confronting one of America's most dynamic and diverse cities.

"Through relationships and community, we can all contribute to create a better space for us to inhabit and thrive in," says Hamdieh.

The project has opened many doors for Hamdieh.

Since participating in SURF, Hamdieh has begun working toward a Nonprofit Leadership Alliance certification, engaged in the Houston Scholars program and served on the Undergraduate Student Advisory Council at the Hobby School of Public Affairs. Outside of campus, she was a Civic Houston intern in the City of Houston Mayor's Office of Economic Development and a member of the Next Generations Academy. Most recently, she was selected as a Leland Fellow, providing her a paid, full-time internship on Capitol Hill in Washington, D.C. 

Protecting America's Roadways

Led by UH, CYBER-CARE is an elite, multi-institutional, multidisciplinary group of computer scientists committed to preventing threats from becoming real-world catastrophes.

By Chris Street



ILLUSTRATIONS BY OLEG BORODIN



If You Have

a connectivity feature in your car like GPS or Bluetooth, you could unknowingly help hackers infiltrate America's transportation system and become an integral part of a cyberattack.

Blueprint for Cyberterrorism

The alpha and the omega for any hacker is access. To damage America's critical infrastructure, hackers look for areas of vulnerability — low-hanging fruit — where networks can be easily breached. Once the door opens, cyberterrorists insert code to disrupt the network itself, alter the function of connected computers and, in some cases, their hacking transcends the virtual to become physical, real-world acts of violence.

A cyberattack on our transportation infrastructure has this kind of cyber-to-physical spillover potential. The crossover point from cyberspace to terrestrial space could be your car's computer.

While this may seem like the script of the latest "Jack Ryan" episode on Prime Video, there's a three-fold reason internet-connected automobiles are attractive targets for transportation cyberterrorists. First, they are easy pickings. Second, cars present hackers with a large attack surface (millions are on American roads each day). Finally, an automobile is basically a computerized bomb on wheels.

Houston ... We Have a Problem

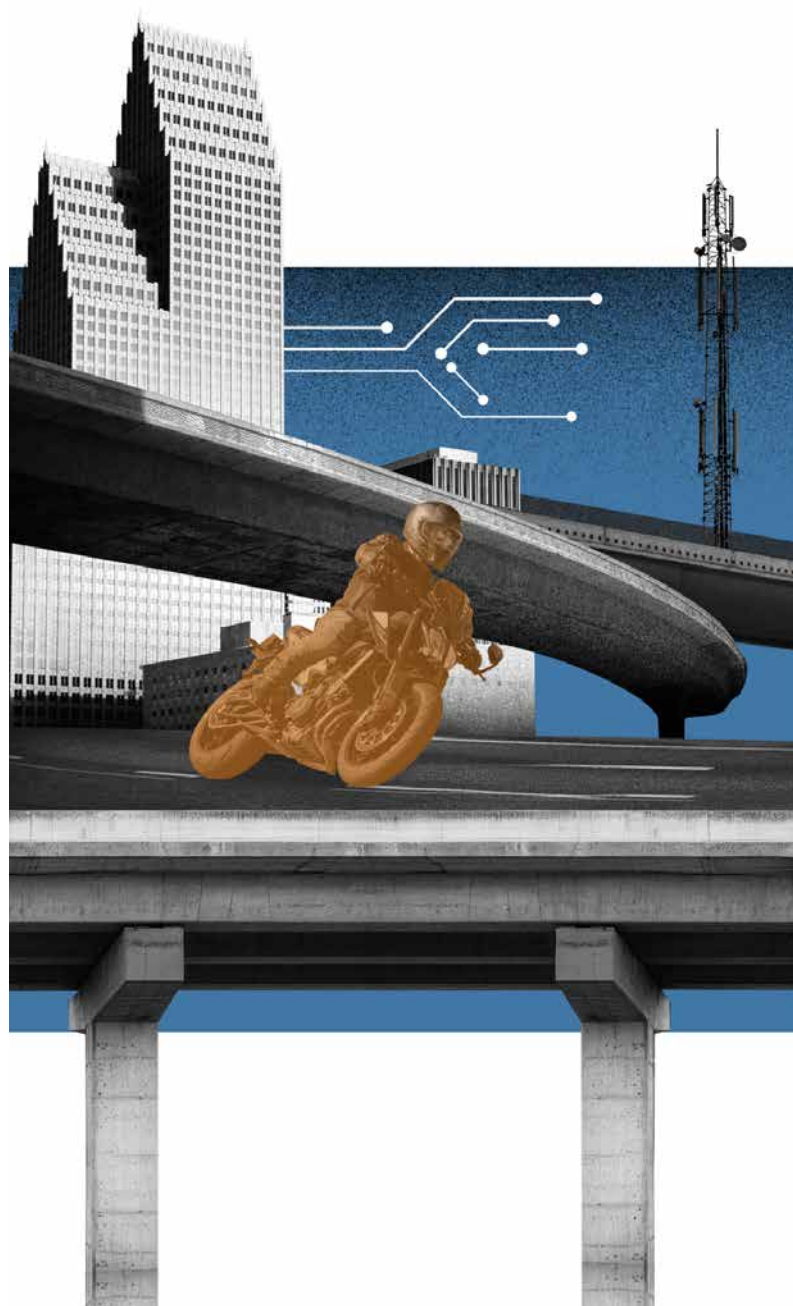
In Houston, a coordinated transportation cyberattack might look like this: It begins at 6:30 a.m. when you get inside your car, put that steaming thermos of coffee into the cup holder, toss your purse or computer bag into the passenger seat, insert your phone into the dashboard clip, key the ignition, then flip on the radio — your normal daily work commute has begun — down the road you go to get on the Katy Freeway.

At the I-10 and 610 West Loop interchange, you're going 60 miles per hour when suddenly the cruise control kicks on, the engine guns as if you just put the pedal to the floor, the speedometer inches past 100 miles per hour — pressing the brake doesn't slow anything down. When you try the emergency brake, and it's a big zero, panic sets in and your gut tells you something really bad is about to happen — because it is.

The steering feature you love that normally allows you hands-free driving turns the wheel: hard right. You collide with a car the next lane over, then at top speed smash into the highway's concrete barrier. Vehicles in other lanes meet a similar fate.

By 7 a.m., cars on both the Katy Freeway and the West Loop are piled up, destroyed, some are flipped or on fire, air bags deployed and people are screaming. Below the overpass a tanker truck carrying hazardous material has flipped. Its toxic contents gurgle out onto the road. Every artery into, out of and around the city has halted. Emergency responders cannot get to the multiple scenes of devastation because the freeways are in gridlock.

In other parts of the city, hackers had set up mobile teams of terrorists speeding around on motorcycles — one driving and one on the back of the bike with a laptop. The group breached the traffic light network the night before, inserted malware and, with the bike teams racing around the city, they were ready to



initiate a simultaneous attack to cripple all intersection traffic lights within a five-mile radius of the main attack.

All this occurs just as peak morning traffic begins when more than a million vehicles enter Houston's highway system.

This is not only fictitious Jack Ryan's world. Meet Yunpeng "Jack" Zhang, associate professor of computer information systems and information system security at the University of Houston Cullen College of Engineering and director of the CYBER-CARE consortium. You can think of Zhang and members of the consortium as the computer world's version of the special forces. Each member institution has its own specialty, and they all work together for one mission: Outthink the bad guys.

You can think of Zhang and members of the consortium as the computer world's version of the special forces.



“It’s a chess match of sorts, requiring the consortium to predict the future moves of transportation cyberterrorists.”

—Yunpeng “Jack” Zhang, director of the CYBER-CARE consortium

What is CYBER-CARE?

CYBER-CARE is an elite, multi-institutional, multidisciplinary group of computer scientists working to keep cyber threats from becoming real-world attacks on America’s transportation system. The acronym stands for Transportation Cybersecurity Center for Advanced Research and Education. The center is located at UH, which is the team lead, and its six members include UH, Embry-Riddle Aeronautical University, Rice University, Texas A&M University-Corpus Christi, University of Cincinnati and the University of Hawai‘i at Mānoa.

The group has been given a special designation by the U.S. Department of Transportation (USDOT) as a Tier 1 university center, of which there are only 10 in the entire country. According to the USDOT, it’s the best of the best, so much so that Tier 1 centers get top priority for grant funding. This includes around \$12 million to CYBER-CARE, which has 20 different research projects currently underway.

The scope of the consortium’s research is to shape the future of transportation safety. The implications to America’s national security are profound. CYBER-CARE’s research is directed toward the USDOT’s primary objective: Protect the world’s leading transportation system, while keeping people and the economy moving. With each member contributing a unique set of skills, the CYBER-CARE consortium has four collective strike points.

Strike Point One: Prevent a cyberattack from destabilizing both human operated and driverless cars connected to the internet.

Strike Point Two: Utilize AI, protect open networks, secure storage sites for privacy data and coordinate the distribution of life-saving data if a cyber emergency does occur.

Strike Point Three: Develop decentralized computer frameworks to prevent system-wide destruction if major control centers are attacked.

The fourth and final strike point for CYBER-CARE is perhaps the most challenging, according to Zhang.

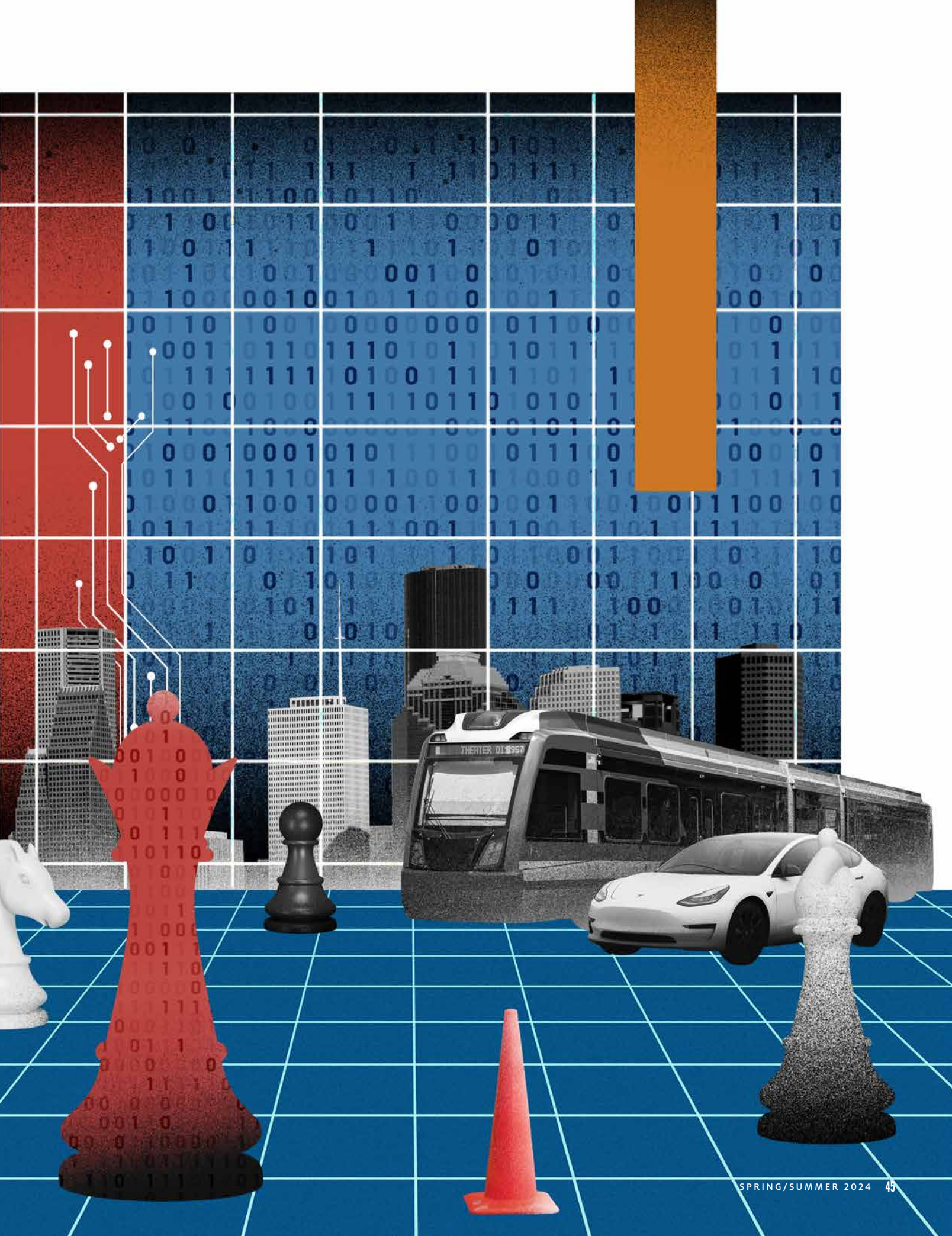
“It’s a chess match of sorts, requiring the consortium to predict the future moves of transportation cyberterrorists. To do this, we definitely explore advanced hacking tactics as well as potential attack patterns,” he says. “Our goal is to find and detect hostile infiltration to critical infrastructure before it happens and design applications that prevent acts of mass casualty and property damage.”

To this end, UH is leading five research projects and collaborating with consortium partners on eight others. Kailai Wang, assistant professor of supply chain and logistics technology, is creating a plan to understand how connected and automated vehicles (CAVs) fit into different kinds of streets and areas. Additionally, he is developing a standardized safety assessment framework for ensuring their safe coexistence with conventional vehicles as well as vulnerable road users.

A project led by Lu Gao, associate professor of construction management, delves into the analysis of the vulnerability landscape of connected vehicle-enabled traffic systems. He is focusing on the role of positioning, navigation and timing (PNT) in their security architecture, particularly when hackers target the communication channels of multiple interconnected vehicles. The research aims to establish a comprehensive understanding of the potential cascading effects that could arise from such security breaches.

Zhang has two studies underway. The first aims to develop a detection algorithm that can quickly spot







and stop hackers trying to jam traffic by flooding the advanced traffic management systems (ATMs) with too much data. It works on several levels to keep traffic control systems safe and uses a mix of research, new ideas and lots of real-time data to make this happen.

His second project is building a powerful security system that works well with different tech in traffic systems to stop different types of cyberattacks. It catalogues the history of past attacks to learn from them and creates a special model to control who can access important traffic data, making sure it's safe.

Zhu Han, Moores Professor of Electrical Engineering, is leading a research effort to improve the safety and intelligence of CAVs using blockchain and federated learning. It involves a central server coordinating with smart cars, each equipped with sensors, to collect and share data. The project aims to selectively combine the best data from these cars to create a more efficient and accurate overall system. Early results show promise for enhancing smart car collaboration and security.

The Front Line for Cyber Safety

CYBER-CARE's task has taken on greater meaning than what we've seen from those security efforts previously reported in the media about preventing ransomware attacks for things like personal data theft. Why? Because with the current state of the world, infrastructure cyberterrorism and the possibility of a hybrid attack, human lives are at stake.

"Due to the number of people using transportation, an infrastructure security failure is a matter of public safety. There's no questioning that anymore nor that there is a clear and present danger with new cyber threats," Zhang says.

The Department of Homeland Security appears to agree with Zhang, because they've identified cyber threats to critical infrastructure to be one of the significant strategic risks going forward for the United States.

The first published reports of worldwide threats to transportation infrastructure began in the early 2000s. Since then, the attacks have grown in severity due to hostilities toward the U.S. from abroad coupled with the increased connectivity of critical infrastructure and our dependence on network communication. In fact, it's now computers running control functions once managed by a person in a control center, along with human support staff out in the field.

Computer scientists like Zhang and members of the CYBER-CARE consortium are up against an ever-evolving, everchanging technological beast that never stops advancing. As quickly as hackers develop new attacks, Zhang and his colleagues develop counter technology to fortify infrastructure networks, hackers then move and shift again.

"It never stops," Zhang said. "24/7/365, the consortium is studying and creating the newest technology to make transportation safe for everyone."

For those of us noncomputer science experts who are on the outside looking in, we're seeing technology change faster than anything humans have ever seen. Zhang acknowledges this, as well as the dangers ahead and the amazing possibilities to make positive changes to make the world a better, safer place.

"There's uncharted territory we, as a society, are moving into. As a computer scientist and as a person who uses the transportation system, I see both sides," shares Zhang. "What gives me confidence for the future is that the consortium is solid, and we, as the members of CYBER-CARE, are unquestionably ready for what lies ahead." 🇺🇸

"Due to the number of people using transportation, an infrastructure security failure is a matter of public safety."

—Yunpeng "Jack" Zhang, director of the CYBER-CARE consortium

Eddy Goldfarb's **Toy Story**





Before he became a veteran, Eddy Goldfarb, author and inventor of more than 800 toys, was enrolled in a unique program at UH.

By Tyler Hicks

When young Eddy was 6 years old,

a man who would change his life visited the Goldfarb house for dinner. This man had an unusual occupation, and the more he shared, the more he fascinated the precocious youngster from Chicago.

At that point, Eddy Goldfarb had already exhibited the distinctive creative streak that would shape his entire life.

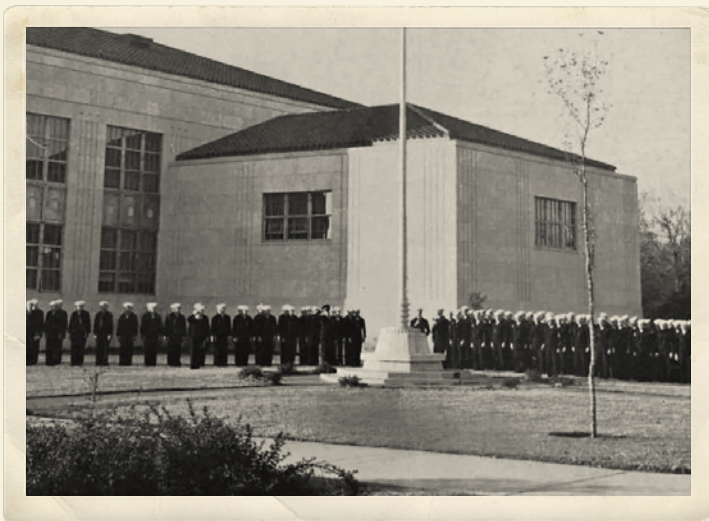
"I bothered my mother with ideas when I was young, but I would not take the quarter she would offer me to stop talking," Goldfarb, now 102, says with a laugh. "I was always creative and inventive; I think I was lucky in that way."

It might be kismet, then, that a man with a most creative occupation stepped into his life that fateful day nearly a century ago. The man was an inventor, and as he explained his profession, Goldfarb hung on his every word. He knew right then that he, too, wanted to be an inventor — specifically an independent inventor.

"Companies have wonderful R&D departments and wonderful inventors, but I knew I wanted to be independent," he says.

Goldfarb fulfilled that dream ... and many others. In fact, the 102-year-old is still creating thanks to a 3D printer and a penchant for writing.

But remember: At the time of his fateful meeting with the investor, Goldfarb was just 6 years old. The year was 1927, and in the decades between then and now, he would grow up to become one of the most revered toy inventors of all time. But first, he would become many other things — including a student at the University of Houston during one of the most challenging periods in U.S. history.



EDDY'S MILITARY CAREER SETS SAIL AT UH

On Dec. 7, 1941, Goldfarb heard a special news bulletin crackling through the radio in his apartment. Pearl Harbor had been the victim of a surprise attack, and it was clear the United States was now officially involved in World War II. Eager to serve his country, Goldfarb volunteered for the Navy. His ultimate destination was the Pacific, but first, he moved into the Navy's barracks at the University of Houston, where he studied electrical engineering and entered an in-depth program for radar technicians.

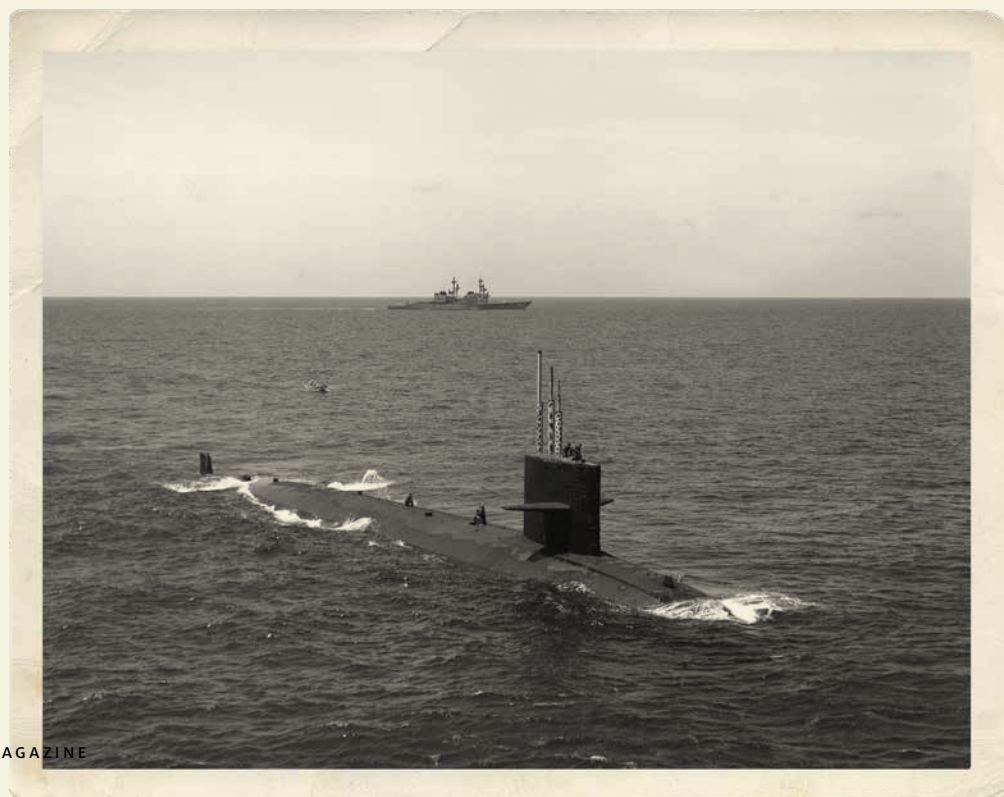
"We marched from our barracks to the classroom every day," he recalls. It may not sound like the right fit for a creative spirit, but Goldfarb relished everything about the experience.

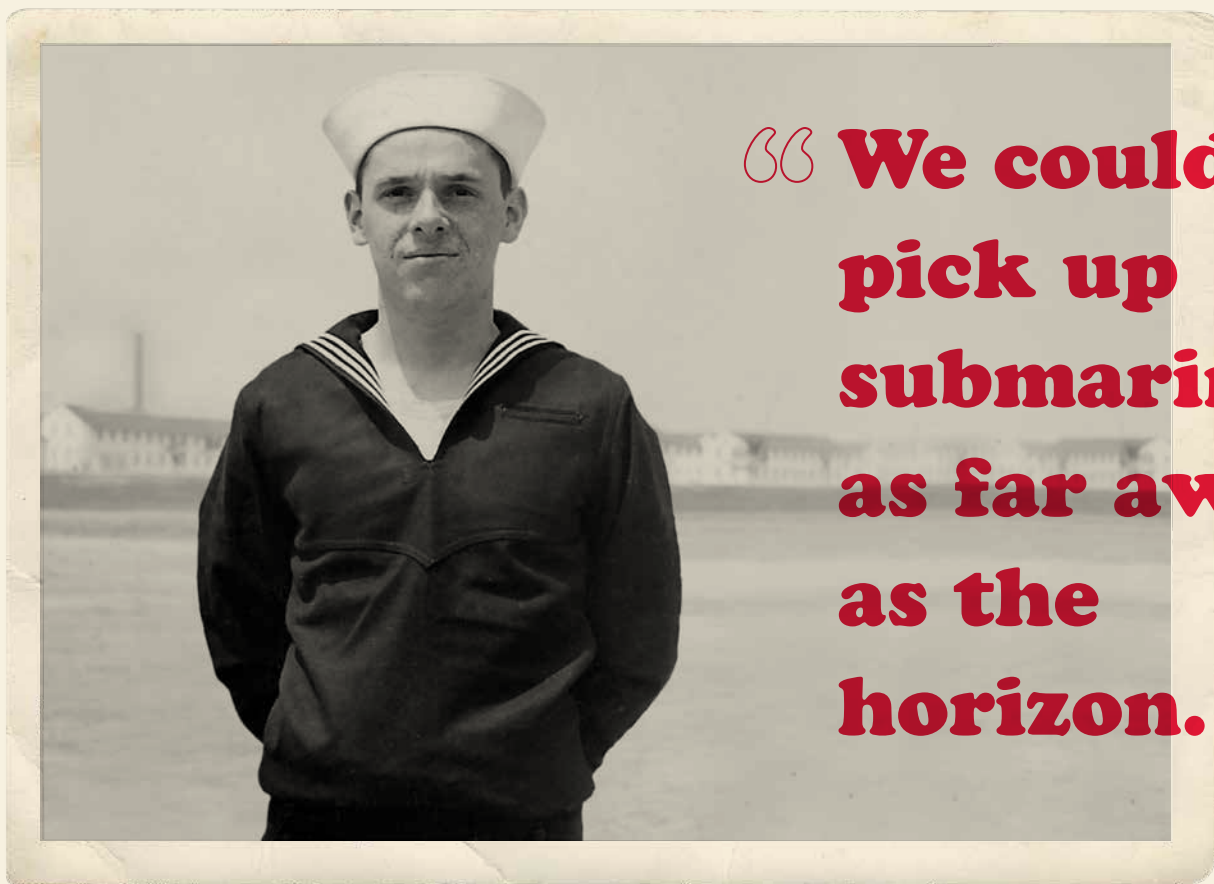
The University was still open to the general public, so he and his fellow naval trainees met and befriended plenty of students, even if they were far removed from life in the barracks. He fell in love with the campus community and the community off campus, too. In one instance, a family near campus provided a perfect example of Texas hospitality.



Top Left: Naval trainees at the University of Houston line up for morning roll call.

Below: Pictured in the foreground is the USS Batfish with the guided missile destroyer USS Scott in the background.





“We could pick up submarines as far away as the horizon.”

“My mother wanted to come visit me; she was so worried, and I wanted her close,” he says.

His mother couldn’t stay with him in the barracks, though, and Goldfarb figured he’d have to look far and wide until he found a family that would welcome a visitor.

“So, I went to a few houses next to the University and asked them if they could rent out a room for a few days, and it only took me three or four,” he says. “This wonderful family agreed to take my mother in.”

When he wasn’t making friends — sometimes in unexpected places — Goldfarb was immersed in his studies. It may have been a 12-month program, but he says the knowledge they imparted was enough to fill a multiyear curriculum. This rigor had a clear purpose and was both exciting and daunting: The Chicagoan and his contemporaries were learning nascent technology that would fuel their efforts on the battlefield. Or to be more specific, at sea.

After his time at UH, Goldfarb decamped to a secretive radio lab at “Treasure Island” in San Francisco. If you scored high enough on the assessment tests at this secretive, final

program, you could choose your posting in the armed forces. That’s how Goldfarb, an excellent student, went to work on submarines with two of his friends.

“We could pick up submarines as far away as the horizon,” he says, still marveling at what he and his team could achieve.

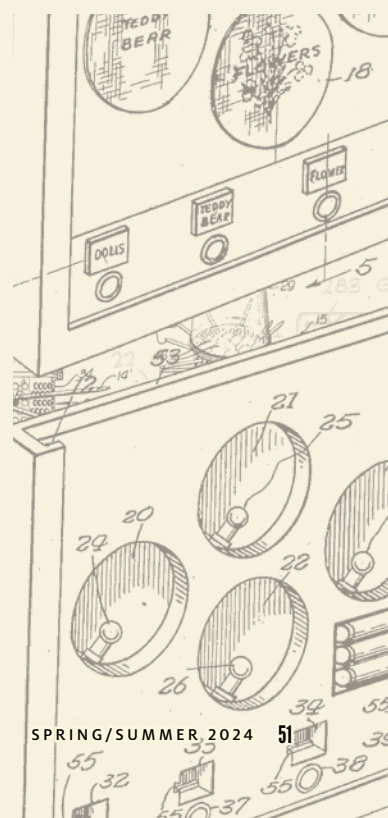
His seven patrols took him near Midway, to Guam, Palau and beyond, and in total, his submarine—the USS Batfish—is credited with sinking nine Japanese ships, including three within a four-day span. These engagements came at a cost; one of Goldfarb’s closest friends died in combat. No matter how much time has passed, those years are tinged with pain and hard-won lessons.

“It was a horrible time, but I made some friends for life, and I realized what was really important,” he recalls.

Those years of service taught him to not sweat the small things and, when possible, find a silver lining.

“I was lucky enough to make it, come home, meet my wife and have a family,” he says, “So, I appreciated that very much.”

Above: Naval trainee Eddy Goldfarb juggled his academic journey while preparing to serve in the United States Navy.





EIGHT DECADES OF INVENTION

During his submarine duty, Goldfarb used his downtime to fill notebooks with ideas and sketches, including dreams of self-landing helicopters. His years in school had fostered a love of physics and engineering, but he still held onto the aspiration he'd had since age 6.

"I enjoyed working with children, so at one time I had to choose: 'Should I go into physics, or should I stay an inventor?'" he says. "I liked the idea of working with toys because toys bring families together. If you invent a game and they sell a million of 'em, you know a million families. I think that's very important."

That's not to say his toy career was always smooth sailing — quite the opposite. After returning from the war at the end of 1945, he became familiar with the habitual rejection that's a staple of every creative career. He had plenty of ideas, but each one was met with a "no" by the manufacturers he pitched.

Around that time, he met Anita, his future wife. The pair were married just nine months after a chance encounter at a veterans' dance, and to save money, Goldfarb moved into Anita's bedroom in her parents' apartment. Both families had reservations about the ambitious inventor's toy aspirations, but his big break was around the corner — and it was in the form of teeth.

You've undoubtedly seen the toy that was originally called "Yakity-Yak Talking Teeth"; it's been in "The Office," "The Goonies," "A Christmas Story" and possibly even your home. The iconic chattering teeth toy was originally made by Goldfarb, sitting alone at the kitchen table, using a set of false teeth, some casting and a repurposed motor. That invention ultimately landed him a spot at the 1949 Toy Show in New York, and he was off to the races, using one opportunity after another to gradually build a legendary career.

“There is always rejection and disappointment, so my advice to anyone is to always do as much research as you can and keep going.”





There were still setbacks, of course; pursuing an independent career is never easy. Yet Goldfarb's combination of grit and optimism laid the foundation for a storied, decades-long run that includes toys and games like the bubble gun, Battling Tops, KerPlunk, Vac-U-Form and many, many more. The initial sale and success of his chattering teeth creation taught him he should always license his creations rather than sell them outright. And one of his licensing deals has a rather unusual origin story.

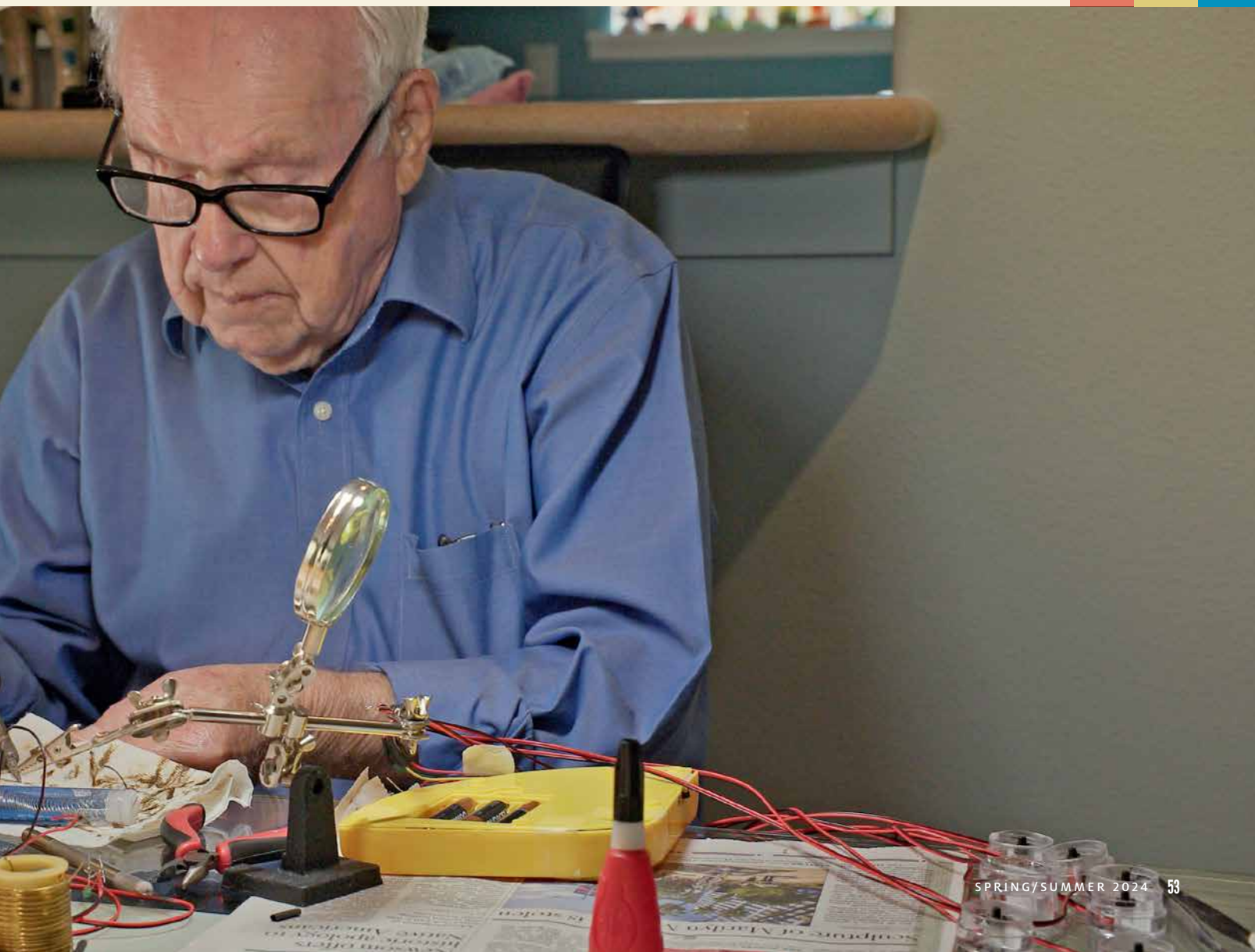
During a rough patch early in his career, he booked a one-way ticket to a Chicago toy show to which he was — technically speaking — not invited. When he couldn't get in through the front, Goldfarb checked every door until finding one that opened. He eventually apologized for his persistence, but Ideal Toy Company

saw something they liked — and they liked his toys even more. That same company would license more than 50 of his 800-plus inventions which, in turn, paved the way for his work with Mattel.

This is one of the central lessons Goldfarb would like to share with aspiring creators, businesspeople and entrepreneurs of every kind: Don't give up and use one success to get to another.

"There is always rejection and disappointment, so my advice to anyone is to always do as much research as you can and keep going," he says.

It also helps to surround yourself with talented and passionate people. Over the years, he has worked with respected toy creators like Del Everitt, René Soriano and his son, Martin Goldfarb, who has been his collaborator for the past three decades.





“ Every item
we ever
invented,
I knew it
was going
to be an
amazing
item. ”





"I started alone, but I ended up with 39 people on my staff: artists, engineers, what have you. I did not do it alone."

Someone would bring an idea to the table, and the team would kick it around, seeing what would stick, what didn't and how they could toy around with it (pun intended) until it became a viable model.

"Every item we ever invented, I knew it was going to be an amazing item," he says. "And it wasn't. Very few were amazing because we came up with so many ideas. I'm still very optimistic, and I'm very lucky to have that trait."

Now, at an age few people reach and at which even fewer people are still working, Goldfarb is still honing his creative chops.

He uses a 3D printer to make lithophane: transparent materials typically constructed from porcelain. He writes, too. Goldfarb recently published a book of 101 100-word

stories, some of which date back to a story contest he entered as a teenager. That story, "The Perfect Twenty Dollar Bill," is about a man who thinks he makes an immaculate counterfeit bill — until he gets caught buying a cheeseburger.

"How did you know?" the man asks the boy who calls the police.

As it turns out, the man had indeed made a perfect bill, but it was a perfect copy of a counterfeit bill.

"I didn't win the contest," Goldfarb recalls with a chuckle, his hallmark optimism shining through. "But I kept writing." 

Learn more about
Eddy Goldfarb at
www.eddysworld.net.



EARLY DETECTION OF COLORECTAL CANCER IS ABOUT TO GET EASIER

UH researcher Zhengwei Li is developing a wearable biosensor for long-term health monitoring.

By Sam Eifling

The mortality for people with colorectal cancer is extremely high, making it the second-leading cause of cancer deaths in America. But Zhengwei Li, assistant professor of biomedical engineering in the Cullen College of Engineering at the University of Houston, has found a potentially groundbreaking way to catch the disease early.

The solution? A tiny sensor that alerts you when it detects the unusually stiff tissue of a tumor. Increasing evidence demonstrates biophysical signaling such as tissue stiffness can be used as a marker for colorectal cancer prognosis. The discovery has the potential to add novel anti-metastasis therapeutics to the current diagnostics arsenal.

The device he is developing would be wearable — perhaps a centimeter wide, effective when embedded in a piece of clothing or a watch and making long-term monitoring easy. A diagnosis might take about two minutes. It would remotely sense and measure the biophysical properties of tissues in the body, and then send data to a smartphone app that would alert you if it detected tissue with a stiffness consistent with a solid-state cancer (such as colorectal cancer, breast cancer, pancreatic cancer, etc.).

“Colorectal cancer is a very deadly cancer, because when you find it, it’s already metastasized,” Li says. “Early detection is very important. I hope to make this device affordable, so every family can get access to this device quite cheap.”

Early detection is especially important for populations disproportionately affected by the disease. African Americans have a 20% higher likelihood of getting colorectal cancer and a 40% higher death rate — the highest incidence and mortality rates of all racial groups. Li’s study is being supported by the National Institute on Minority Health and Health Disparities and by the Research Centers in Minority Institutions at UH’s HEALTH Center for Addictions Research and Cancer Prevention. Li says he hopes to have the monitoring system finished and on the market within a few years.

Li’s centimeter-wide, wearable device would remotely sense and measure the biophysical properties of tissues in the body and then send the data to a smartphone app.





COLUMNS

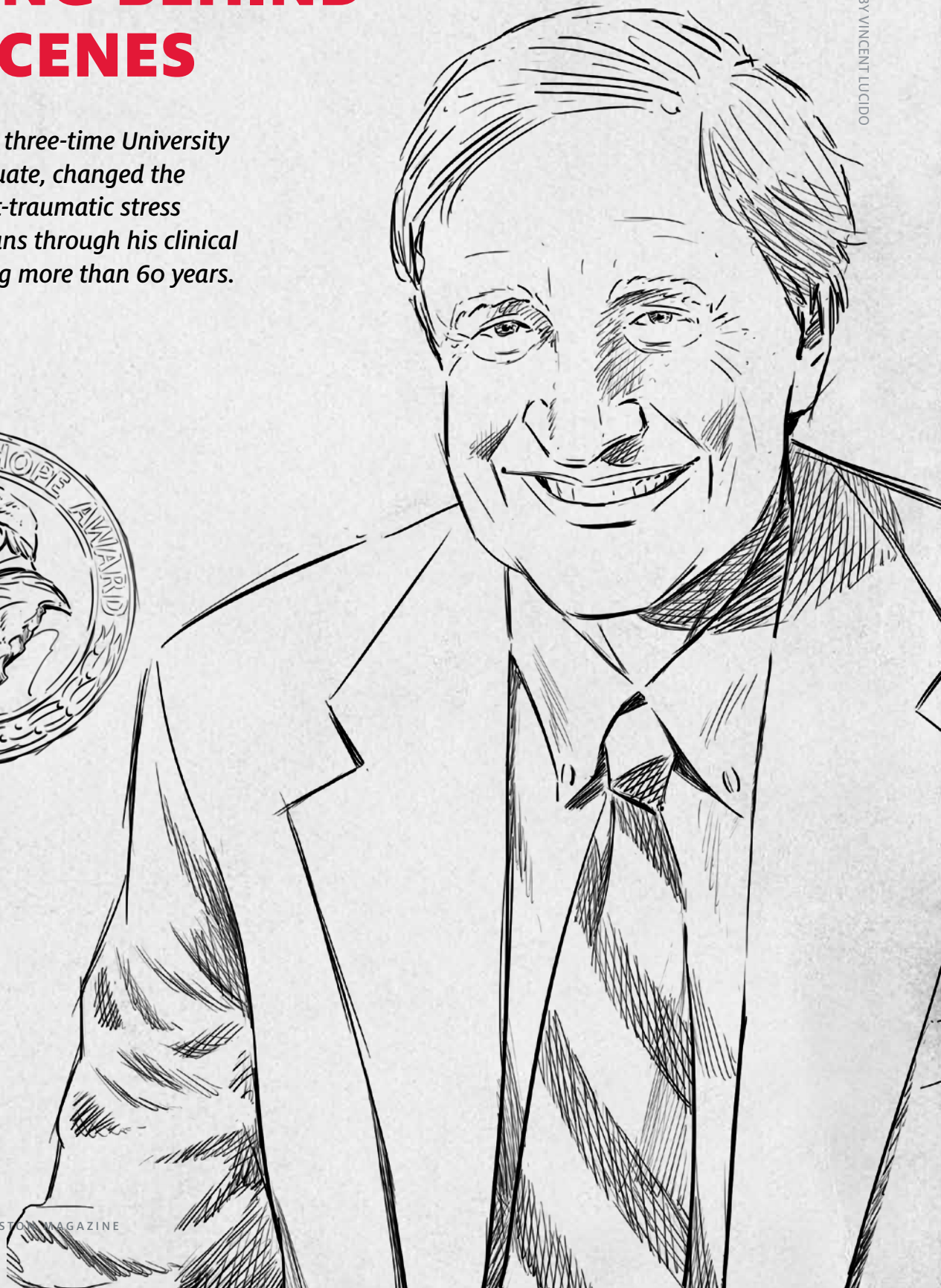
SERVING BEHIND THE SCENES

Walter E. Penk, a three-time University of Houston graduate, changed the way we view post-traumatic stress disorder in veterans through his clinical research spanning more than 60 years.

*By Walter E. Penk, Ph.D.,
as told to Carrie Kent.*



ILLUSTRATION BY VINCENT LUCIDO



Attempting to describe Walter E. Penk, (B.A. '54, M.A. '64, Ph.D. '65) and his contributions to the field of clinical psychology is daunting. Consider his numerous accomplishments, the many letters after his name and his track record of being published in more than 100 industry publications. Then, set those aside, because Penk's dedication to his life's work, his grateful acknowledgment of mentors along the path to success and his quick wit helped guide his journey. As Penk says, "It's not about me; it's about the VA," and the people who provided guidance and support along the way.

AN INTRODUCTION TO PSYCHOLOGY AND A NEW PASSION

Born in Houston, Texas, in 1933, I earned a Bachelor of Arts in History and German at the University of Houston but felt a personal lack of focus in both disciplines. I changed course and pursued seminary studies at Concordia Seminary and then graduate courses in education at Washington University in St. Louis, Missouri, where I stumbled upon psychology. The last course I took in my post-graduate studies was on mental health, and that really turned me around to studying psychology.

I returned to UH to focus my education on psychology, and I encountered professors who were *powerful*, *powerful* teachers. Many were war veterans working to establish a connection between the University's psychology department and the Houston office of the United States Department of Veterans Affairs (VA). Their mission was securing psychological and therapeutic services for fellow service members returning from war and encouraging psychology department students to learn about a unique population with mental health disorders.

As I earned my master's in Houston and worked toward a Ph.D., I participated in early training for a clinical psychology internship at the Houston VA, but I eventually accepted a position with the Dallas VA. They [the Dallas VA] never had any full-time internships, so that was attractive to me. I liked the challenge and became the first clinical psychology intern at the Dallas VA, with full support from my University of Houston mentors.

I continued work with the Dallas VA from 1963 to 1984, rising from the first-ever intern to staff member and then, research psychologist. I left Texas for the Boston VA after I met my late wife, Dolores Mae Little Penk, Ph.D. Dolores was also a psychologist, and we shared a commitment to the VA. We always worked in different VA medical centers in the Boston area, but we studied and published together before retiring to New Braunfels, Texas in 2003.

PSYCHOSOCIAL REHABILITATION LEADS ME TO IDENTIFICATION OF POST-TRAUMATIC STRESS DISORDER

I am best known among clinical psychologists for development of *psychosocial rehabilitation* and the American Psychological Association's formal recognition of post-traumatic stress disorder (PTSD) as a mental disorder. My early work with veterans at VA centers in Houston and Dallas influenced my research to develop a new concept: psychosocial rehabilitation, an approach particularly effective with veterans.

Generally speaking, psychosocial rehabilitation emphasizes

techniques of intervention when treating people to become self-sufficient and self-regulating in their activities. The approach combines traditional treatment for veterans, such as addiction treatment and cognitive behavioral therapy, with added support for housing, education, employment, substance use disorders and family reintegration post-deployment. After publishing numerous articles on psychosocial rehabilitation studies with positive outcome-driven results, I identified a missing piece of the puzzle. I became interested in stress disorders.

During the late 1970s and early 1980s, rehabilitation within the VA system primarily was focused on and funded for substance abuse, but I began to recognize that stress disorders often are the underlying cause of addiction, particularly for veterans. There's a lot of self-treatment with addictive behaviors. PTSD is hidden among people who drink heavily or abuse other substances. A challenge in professional treatment is overcoming avoidance, a major characteristic of those with PTSD. They tend to avoid memories of trauma and remain hidden.

"I began to recognize that stress disorders often are the underlying cause of addiction, particularly for veterans."

THE FIRST EMPIRICALLY VALIDATED STUDY OF PTSD

I was intrigued by stress disorders both as researcher and clinician, but found no available guidance in traditional literature, including the "Diagnostic and Statistical Manual of Mental Disorders" (DSM). So, I began my independent research by focusing on Vietnam veterans through my work with the VA. In October 1981, I published the first formal validation study of PTSD to appear in a journal published by the American Psychological Association. Also in 1981, the APA published the DSM-III, identifying PTSD as a mental health disorder, although I take no credit for the timing.

I'm proud and honored by the numerous commendations for my work during 60-plus years of service to this country, its veterans and their families. In September 2023, I received the U.S. Department of Defense Spirit of Hope Award.

FUTURE PLANS

Currently, I consult with the DOD focusing on active-duty service members, but I'm also taking more time to enjoy my family. Among my many children and grandchildren, all have interesting careers, ranging from park service to cancer research to digital media to law enforcement. Some are Aggies like my wife. But I am totally University of Houston!

One son is working in geriatric psychiatry for the VA. Whenever he visits me, I have to listen on how to live because I'm now very old. But I did renew my license as a psychologist in August 2023.

There's always more to do. 🍷



JOINT EFFORT

A recent UH grad developed a life-altering prosthesis; he plans to make free.

By Tyler Hicks

David Edquilang ('22) was an undergraduate in the University of Houston Gerald D. Hines College of Architecture and Design when he sketched a device that could change hundreds of thousands of lives.

What's more, he didn't initially plan to create the now prize-winning device.

Rather, the story of Lunet — an easy-to-use, 3D finger prosthesis that doesn't require metal fasteners or pricey tools to assemble — is a story of ingenuity, hard work and a student and professor racing to meet a patient's need. It's also the story of that student opting to make his design free to the public, rather than pursue the private market.

It begins in 2021, with Edquilang's side project.

"I was working on a prosthetic arm while another student was designing the hand," Edquilang says. "Then, I started experimenting with some finger mechanisms in my free time, just to see what I could come up with."

The humble Edquilang speaks in a soft voice, with every word seemingly chosen for a specific purpose. As he talks about his meticulous design process, his passion is evident.

After completing a design that he liked, he used a 3D printer to produce a prosthetic prototype and test its range of motion. With each iteration, he was pushing for more mobility, not settling for anything less than the 90-degree curvature human fingers can achieve.

That curvature is difficult to attain with a simple mechanism



“Helping people has always been the primary goal.”

like the one he was trying to build; as he notes, some of the finger prostheses on the market have many more moving parts.

“At the end of two weeks,” Edquilang says, “I was pretty close.”

But he didn’t know all this work — a side project, mind you — was about to mean the world to one person. While Edquilang was busy iterating multiple finger prosthesis designs, his mentor, Associate Professor Jeff Feng, heard about a woman who had three fingers amputated due to frostbite. Feng is the co-director of UH’s industrial design program, and he took it upon himself to build the prosthesis this patient needed. The process was taxing: Roughly five months in, Feng and his original team didn’t have a working solution.

Enter Edquilang.

“My professor thought the project was in jeopardy,” he recalls. “As a last resort, he told me, ‘Just do whatever you need to do to make it work.’ So, I did.”

Edquilang, then a junior at UH, tested three sets of fully assembled prototype prostheses alongside the patient. They would meet so the patient could try on the device and test how it felt, then Edquilang would take her feedback and return to his work, making tweaks to fine-tune what would eventually become Lunet.

In total, they went through 60 different takes on the prosthesis, at one point even intentionally breaking the device to determine its weak point. (Spoiler alert: It was the distal knuckle, which connects the bones at the fingertips.) The break turned out to be exactly what Edquilang, the professors and the patient needed.

Even now, more than two years later, the memory is still fresh for Edquilang: the patient, trying on his creation and realizing they'd found a solution that worked perfectly. He was always confident, but he can't deny that having his confidence validated was a weight off his shoulders.

"In those tests, you're trying to solve fit, comfort and clearance," he says. "I knew it was gonna work, so when it works, you just feel relief."

Something happens when Edquilang reflects on his experience working with the patient. It's not just passion; he comes alight in a way that even exceeds his clear love for the design process.

"Helping people," he notes, "has always been the primary goal."

Perhaps that's why he couldn't stop fine-tuning Lunet, even after he graduated. By October 2022, Edquilang was a fresh UH graduate looking for his next big opportunity. He was reviewing his design portfolio one day when he started thinking about Lunet and how, in his eyes, it could be even better. He resumed his tweaks, and in fact, he is still refining more than a year later, even as this story is being written — and even after he's won numerous awards.

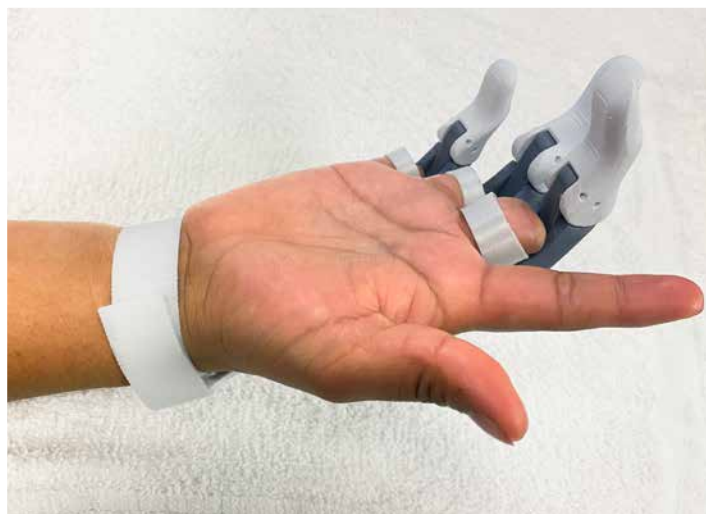
In fall 2023, Edquilang and his mentor were recognized with a Red Dot: Luminary 2023 award, a prestigious design prize handed out in Singapore. Their product also received a Red Dot: Best of the Best award, along with two Paris Design awards and a Gold designation at the 2023 Spark Design Awards. As if that wasn't enough, Edquilang's creation is a runner-up for the 2023 James Dyson award, another preeminent design honor.

"David's recent success in winning the most prestigious design awards across the world is the best manifestation of the unparalleled education and training students experience in our industrial design program," Feng says.

For his part, Edquilang is deeply grateful for the recognition. These feats represent something far more important to him, though.

"Winning the awards is a way to protect the idea without patenting it," he says. He has no plans to turn Lunet into a company or product, as doing so would only drive up the price for the people who need it most. Instead, after just a few more adjustments here and there, he plans to release the 3D files so anyone can download it, modify it and share their changes.

"Not every good idea has to be a business," he says. "I want this to be eternal, and this way, it can be." 🌸





STEP BY STEP

UH flamenco instructor nurtures students' individuality and fosters a spirit of community by integrating art, history, geography and culture in dance.

By Ginni Beam





Gabriela Estrada encourages her students' self-expression.

Gabriela Estrada was stunned when the University of Houston's school of dance director invited her to teach flamenco in 2022, a rare opportunity in U.S. higher education. This marked a transformative phase for Estrada and Houston's arts community.

Estrada's family loved the arts. "When my mom listens to music, her body transforms," she explains. "I am that way as well."

Music, in a way, is Estrada's first love, and dance is simply a vehicle to embody it. She talks at length about the many benefits of dance — strength, flexibility, dexterity, cognitive development — but they all come back to sheer joy.

Estrada learned ballet and modern dance from dance pioneers in her hometown of Hermosillo, Mexico. After graduating from high school, she had private voice training, performed solo pieces, sang in musical theatre productions, joined a performing group in Mexico City and majored in dance at the University of California, Irvine.

UC Irvine's Spanish Dance Ensemble was Estrada's first introduction to flamenco dance, and a few weeks after learning the very basics — "this is an arm; this is a foot" — she joined the company, diving headfirst into flamenco's complex rhythms and subgenres and performing and choreographing local shows. Estrada returned to Mexico after graduating, joined the University of Sonora dance faculty and accomplished her dream of founding a dance college.

When she returned to UC Irvine for her MFA, she was offered the opportunity to teach flamenco and lead the Spanish Dance Ensemble. Once she completed the master's program, she moved

to Seville, Spain — the "heart of flamenco" — to earn her doctorate in Flamenco Interdisciplinary Studies. One of the only people in the cohort who was not a local flamenco professional, Estrada was advised to keep quiet about her studies. After teaching and choreographing flamenco for 15 years, she still felt like a beginner.

"It was very humbling, but I was determined to learn," she says. Estrada analyzed the poetic lyrics and octosyllabic verses. She watched professional flamenco artists sweat to perfect their timing. She absorbed documentaries on Spanish history. Her understanding of dance, art, tradition, culture and learning was shifting.

Estrada's dissertation focused on the contributions of flamenco to ballet, tracing historical exchanges all connected by colonization, travel and artistic collaboration. The first ballet company in the court of King Louis XIV included Spanish folk dancers, whose movements became part of ballet vocabulary. Flamenco was influenced by the African diaspora and various forms of the tango — African, Cuban, flamenco and Argentinian.

"We don't need to 'decolonize' ballet," she says. "We need to acknowledge its roots."

She realized focusing on shape and eye line — elements emphasized in ballet — fundamentally misrepresents flamenco.

"My mindset, now, is to enter a space knowing that people have the basic element of flamenco, which is an attitude and a rhythm, in their breath and in their heartbeat."

Estrada says she was drawn to UH — a Hispanic-serving tier-one institution — by the leadership of President Renu Khator and Andrew Davis, dean of the Kathrine G. McGovern College of Arts, and their enthusiasm for interdisciplinary instruction.

“Flamenco is a hybrid multi-cultural art form that integrates a mosaic of historic cultural references from diverse peoples, lands, traditions and artistic expressions,” she says, so the approach “felt like a ring to a finger.”

Estrada’s classes incorporate the Spanish language, cultural and geographical references, anecdotes, and discussions about the mutual influence of global cultures in dance development. She recently invited José Galán, director of Flamenco Inclusivo in Seville, to teach her students remotely about adapting the art form for dancers with different bodies and abilities.

“When you think of flamenco, you think of serious footwork,” Estrada says. “You would never think of somebody in a wheelchair doing flamenco, right? It is a mind-shift.” Many of her students will go on to teach their own classes, now prepared to include and empower people long

excluded from traditional dance. One of the marks of a transformative teacher, Estrada says, is that they can see the artistry within you and draw it out “like magic.”

In addition to teaching, Estrada collaborates as a choreographer for the UH opera and plans to eventually develop a documentary to honor her late mentor, Héctor Zaraspe. She’s thrilled to be reconstructing “Felipe ‘El Loco,’” a lost performance from the 1950s based on the legend of Felix Fernandez. Artists from all parts of Estrada’s life are involved, including her students and fellow faculty at UH and highly regarded Spanish composer Juan Parrilla.

“All this because of the immense support and vision of Dean Davis,” she says.

Things come full circle. Her daughter continues the dance legacy by touring with Ballet Hispanico. Estrada believes in inclusivity and the importance of arts in education.



“The key ‘gatekeeper’ of any learning is the lack of opportunities to learn,” says Estrada. The opposite of gatekeeping is inclusion. “Education matters. The arts matter. 

The Heartfelt Expression of Human Emotion

Flamenco comprises three major elements: cante (singing), toque (instruments) and baile (dance). Although dance is what flamenco is generally known for, flamenco began as singing, and singing remains the essence of the art form. The song types (palos) range from profound to lighthearted and determine the complexity of the rhythm and the themes or general mood. Often, these songs convey stories and traditional folklore.

Dancers, in turn, respond with their own emotional interpretation, showing their connection to the music through body and facial expressions. Typically, female dancers incorporate fluid and flirtatious movement and male dancers employ an exaggerated sense of machismo; all flamenco dancing is characterized by intense emotional expression. Movements and steps are diverse and range from stomps and shuffles to flourishes and twirls.

Though instrumentation — primarily guitar playing — was a later addition to the art of flamenco, tocaors (guitar players) are now considered indispensable. Flamenco guitars differ from classical guitars both in their make and in the way they are played. Musicians typically take a cross-legged stance and combine strumming and percussive ele-

ments. Less fundamental, but still popular, are instruments like tambourines, castanets and box-shaped cajons. Improvisation is an important part of flamenco toque.

Flamenco was influenced by multiple people groups and cultures, such as the Sephardic Jews and the Moors, but its origin as a genre can be primarily traced back to the Gitano (Roma) of 18th-century Andalusia, Spain. It has been both celebrated as a symbol of Spanish culture and decried as crass and theatrical, stigmatized because of its sensuality and association with marginalized people.

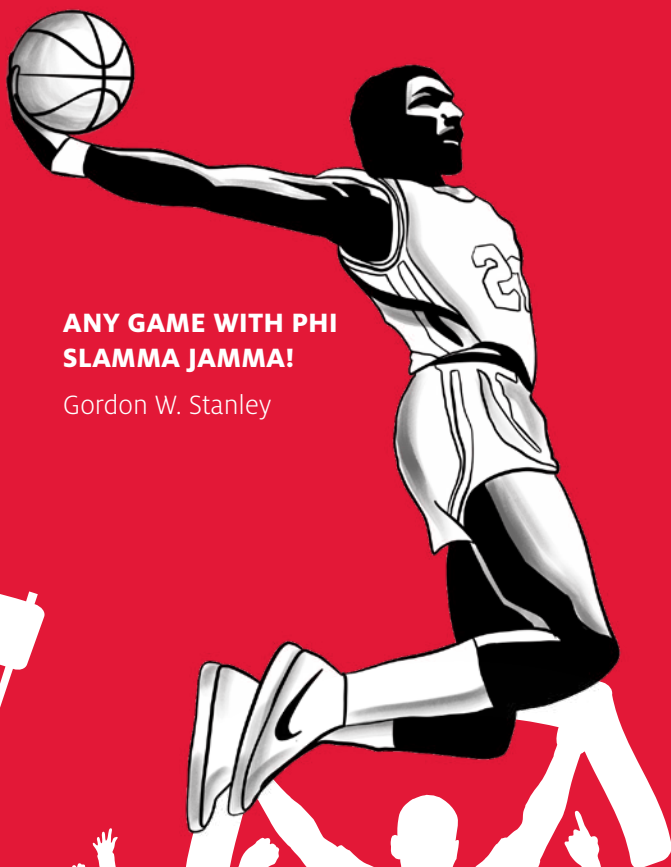
Flamenco experienced a revival in the 1950s and has evolved into a formal art form that UNESCO declared a “masterpiece of the oral and intangible history of humanity” in 2010. While it has certainly been commercialized to attract tourists, many people have dedicated their lives to its art simply out of personal passion.

As time and globalization wield their influence on the art form, the heart of flamenco remains the heartfelt expression of human emotion. Modern flamenco artists and teachers face the exciting challenge of holding onto the essence of the tradition while also rediscovering it for a contemporary audience.



SPORTS MEMORIES FOR A LIFETIME

University of Houston Cougar fans share their most memorable Cougar sports moments.



**ANY GAME WITH PHI
SLAMMA JAMMA!**

Gordon W. Stanley



**Beating OU in NRG! The
Brandon Wilson return
and ROAR of the crowd
still give me chills.**

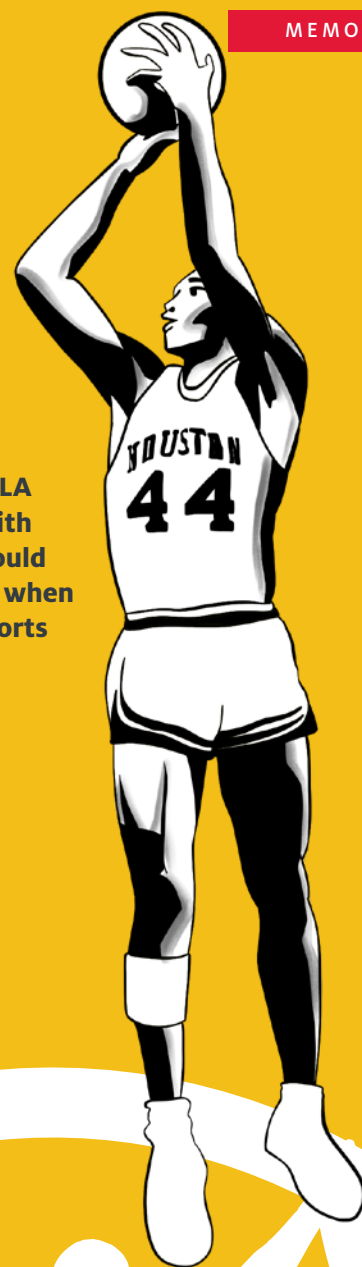
Edward Jones II

**SEEING LEROY BURRELL SET
THE WORLD RECORD OF 9.90
IN THE 100 METERS.**

Christopher Brian Cotton

**Watching us beat UCLA
71-69 in the Dome with
my Pop in 68'. You could
feel the Dome shake when
we won! Greatest sports
memory of my life!**

Peter Cruickshank



**When it was announced
they'd have a UH Ice
Hockey Club.**

Austøn Bilbrey



A GRAND PROCESSION!

A lot has happened at the University of Houston since the community gathered to celebrate our first graduating class of 80 students in 1935. Now, more than 11,000 students graduate annually, and each celebration reminds us why it is so special to be a UH Cougar.



1930s-1940s

In August 1934, Ora D. "O.D." Brown (pictured in 1969) became UH's first graduate, and the only one that year. He waited until May 1935 to walk with fellow graduates at the first annual commencement, which was held at Miller Memorial Theater, better known today as Miller Outdoor Theater. Commencement ceremonies moved to campus in front of the Roy G. Cullen Building in 1940 and UH conferred 15 master's degrees to the first cohort of graduate students that same year.



1960s

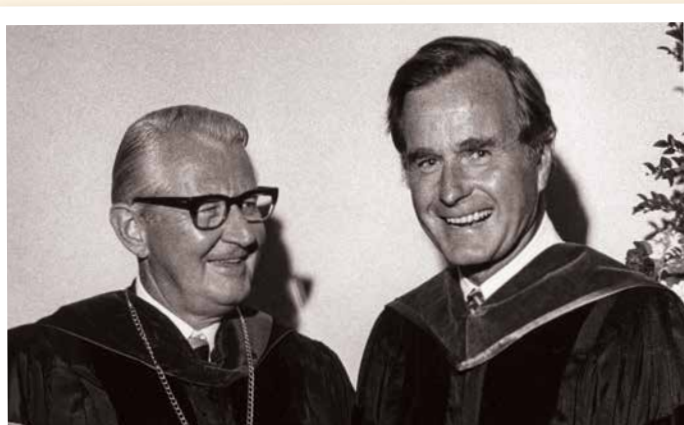
Ceremonies for UH's 27th graduating class were televised by KUHT, the nation's first educational television station. On June 3, 1961, more than 1,000 graduates began their processional under bright lights as commencement was broadcast live to viewers at home.

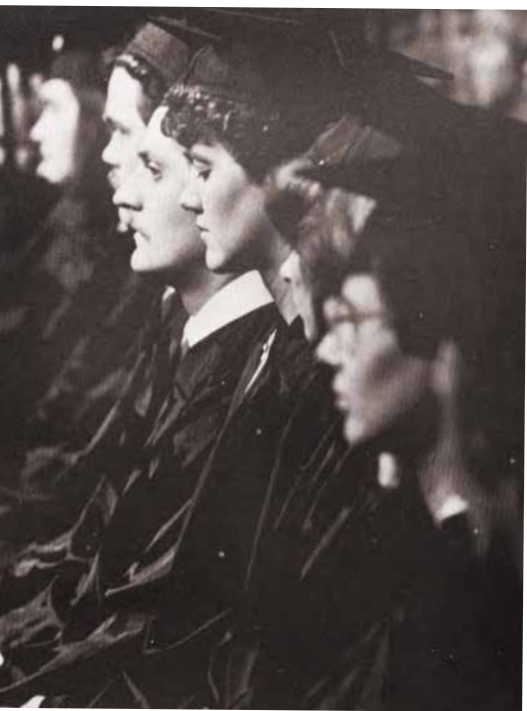
1950s

Enrollment nearly doubled after World War II, and it remained steady at approximately 13,000 students during the 1950s. Commencement ceremonies were traditionally held in early June near the reflection pool, in the area that is now the Cullen Family Plaza. The Class of 1952 included 1,992 graduates.

1970s

In 1937, UH's first president, E. E. Oberholtzer (1927-1950), began an effort to secure support from the local business community by seeking speakers from within the ranks of Houston's power structure. In 1977, George H. W. Bush joined UH's fifth president, Philip G. Hoffman (1961-1977), at the summer commencement.





1980s

In 1980, UH eclipsed an enrollment of more than 30,000 students for the first time in its history, and more than 4,000 students graduated each year. In 1982, commencement ceremonies were transitioned from a university-wide ceremony to college-based ceremonies, a tradition that continues today.



2000s

In the 2000s, social media began to influence commencement trends on campus. Students let their personalities shine in graduation photos. Graduation caps, also known as mortarboards, became a vibrant canvas for students to express their individuality, creativity and personal achievements as they celebrate the culmination of their academic journey.



2020s

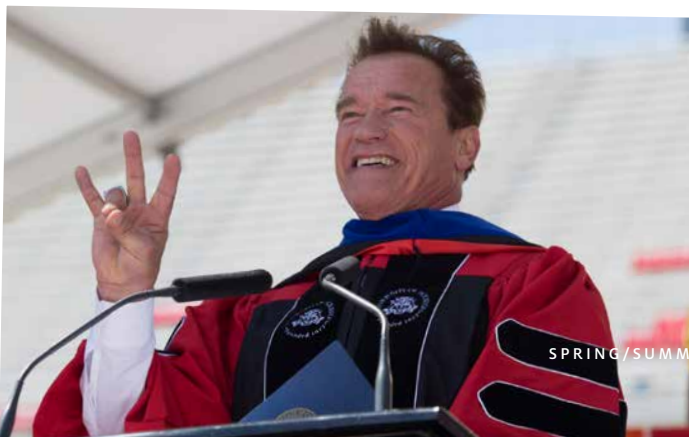
Today, Cougar pride continues to show itself in fun and surprising ways. While graduation ceremonies are bigger than ever, one thing remains ever true — students will always find ways to make the celebration their own. During their ceremony, the official Shasta mascots enjoy a grand reveal of the person behind the costume.

1990s

By the late 1990s, UH was home to 13 colleges. Humanities, Fine Arts & Communication had the highest enrollment followed by the College of Business Administration, and the College of Natural Sciences and Mathematics. Graduating classes grew to nearly 6,000, requiring most ceremonies to be held in Hofheinz Pavilion and Cullen Performance Hall.

2010s

Upon completion of TDECU Stadium, UH briefly returned to a university-wide commencement during the 2010s. High profile commencement speakers included Matthew McConaughey (2015), Astronaut Scott Kelly (2016) and Arnold Schwarzenegger (2017).



The Fabulous Inventions of Eddy Goldfarb

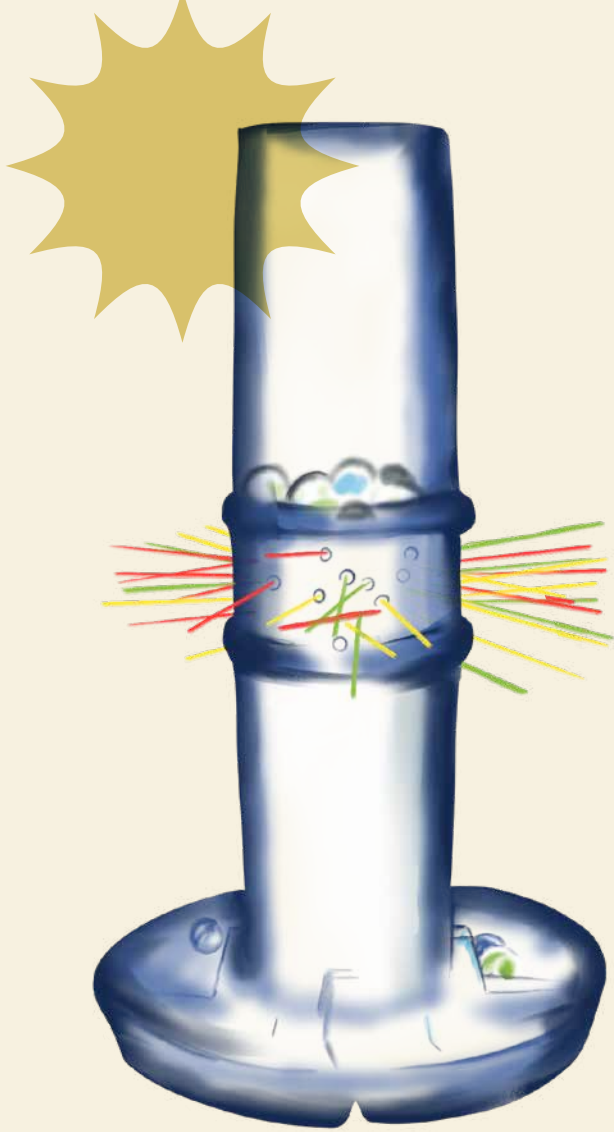
Toy genius Eddy Goldfarb invented more than 800 games and toys during his lifetime. Here are just a few of his clever creations that imprinted on the memories of children worldwide.



**Yakity Yak
Talking
Teeth, 1949**



**Giant Bubble
Gun, 1994**



KerPlunk, 1967



**Poppin
Hoppies,
1968**



**Shark Attack,
1988**



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