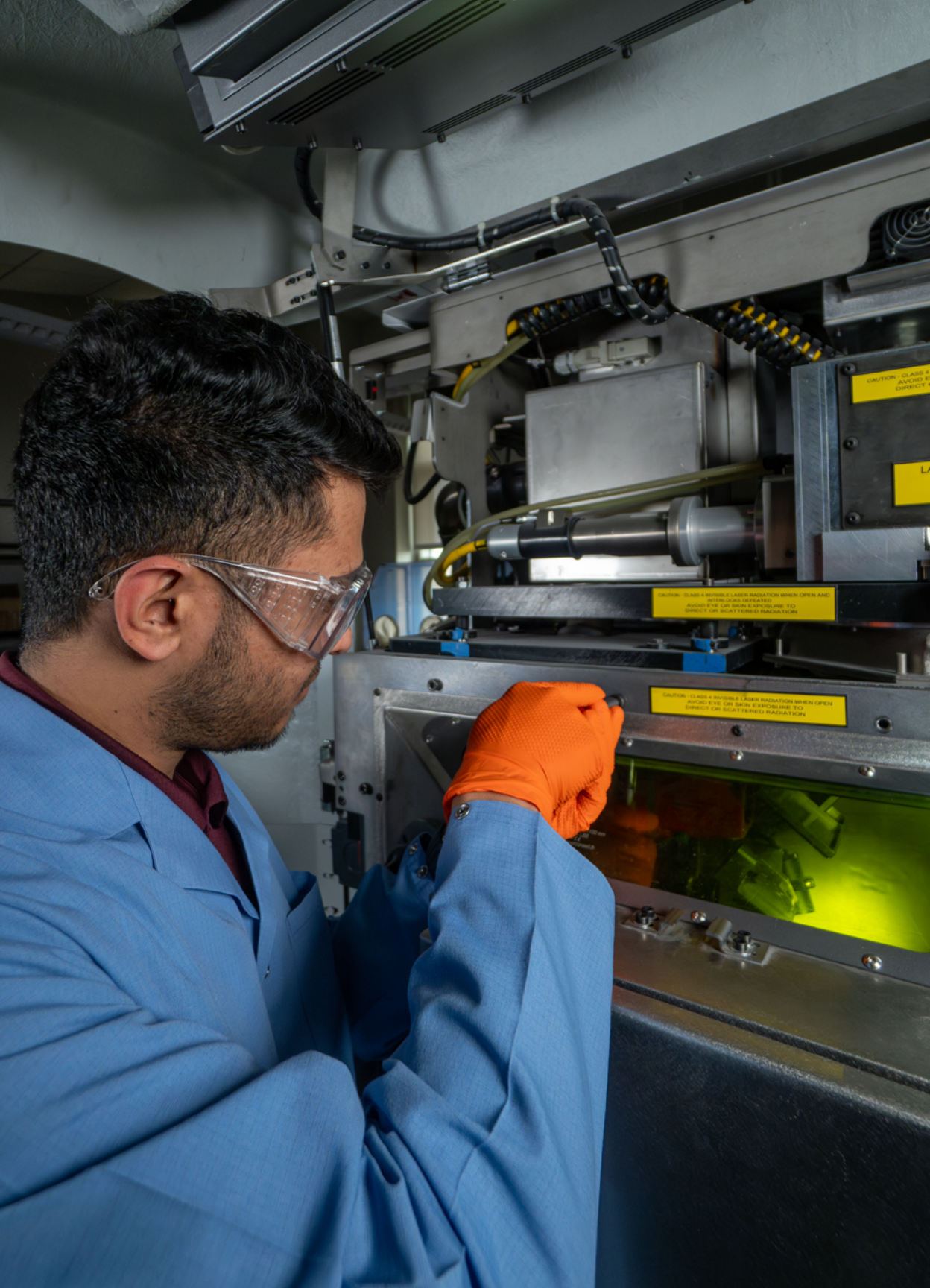
TEXAS A&M UNIVERSITY
Engineering

STRATEGIC PLAN

2025-2030

ACHIEVING EXCELLENCE AT SCALE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ABOUT THE COLLEGE OF ENGINEERING

Since its founding in 1876 as the Agricultural and Mechanical College of Texas, engineering has been a cornerstone of Texas A&M University. Today, the College of Engineering provides top-tier education to undergraduate and graduate students, preparing them to meet the growing demand for engineers across the state and nation while empowering them to make a global impact.

The College of Engineering is home to exceptional students, renowned faculty and excellent staff who embody the values of Texas A&M University and achieve excellence at an extraordinary scale. Through strong collaborative partnerships with industry and the steadfast support of the Aggie Network, the college offers unique education and research opportunities, providing students with valuable hands-on experience while exposing them to the latest developments in the field. This ensures our graduates emerge as leaders in their profession as our college continues innovative research tackling today's challenges while shaping tomorrow's future.

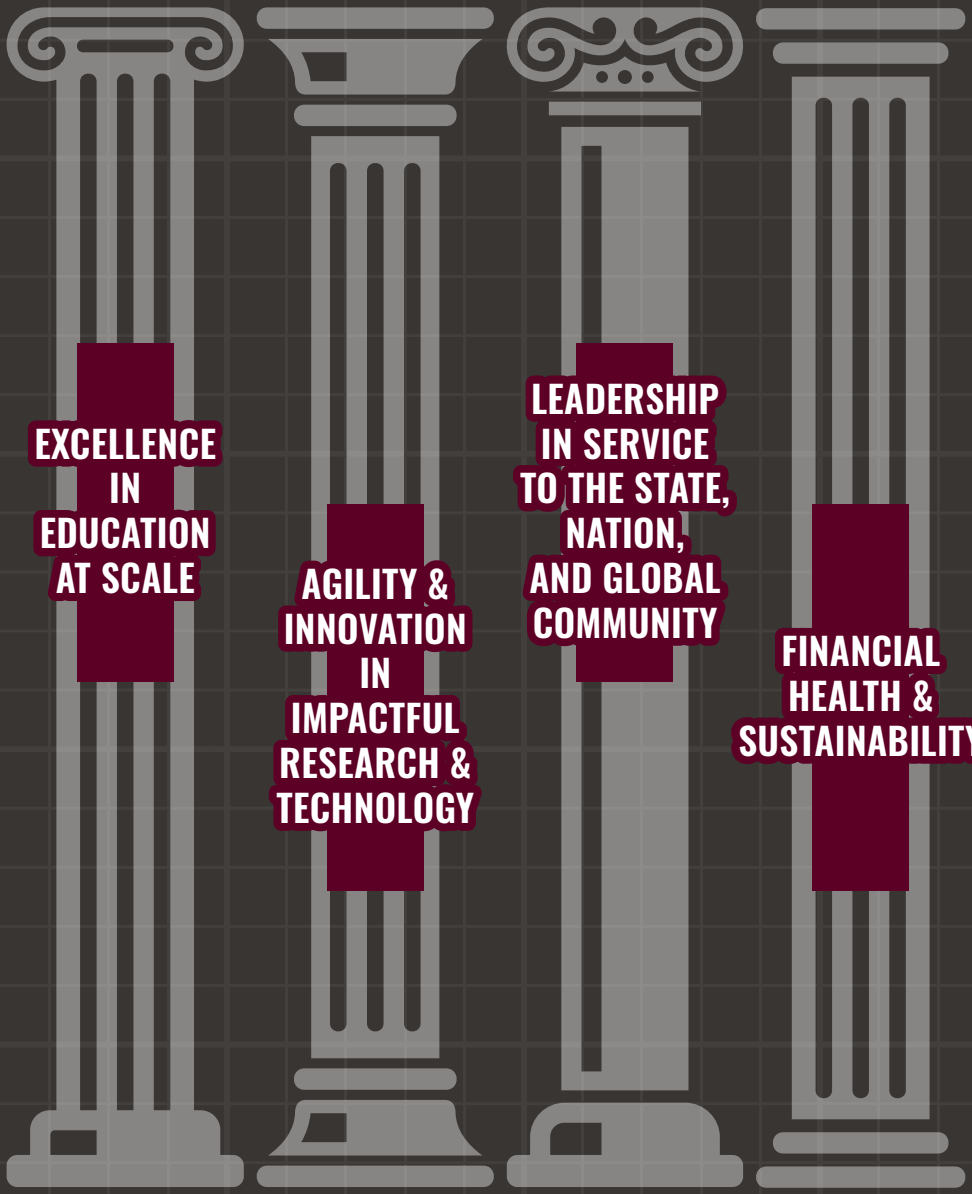
VISION

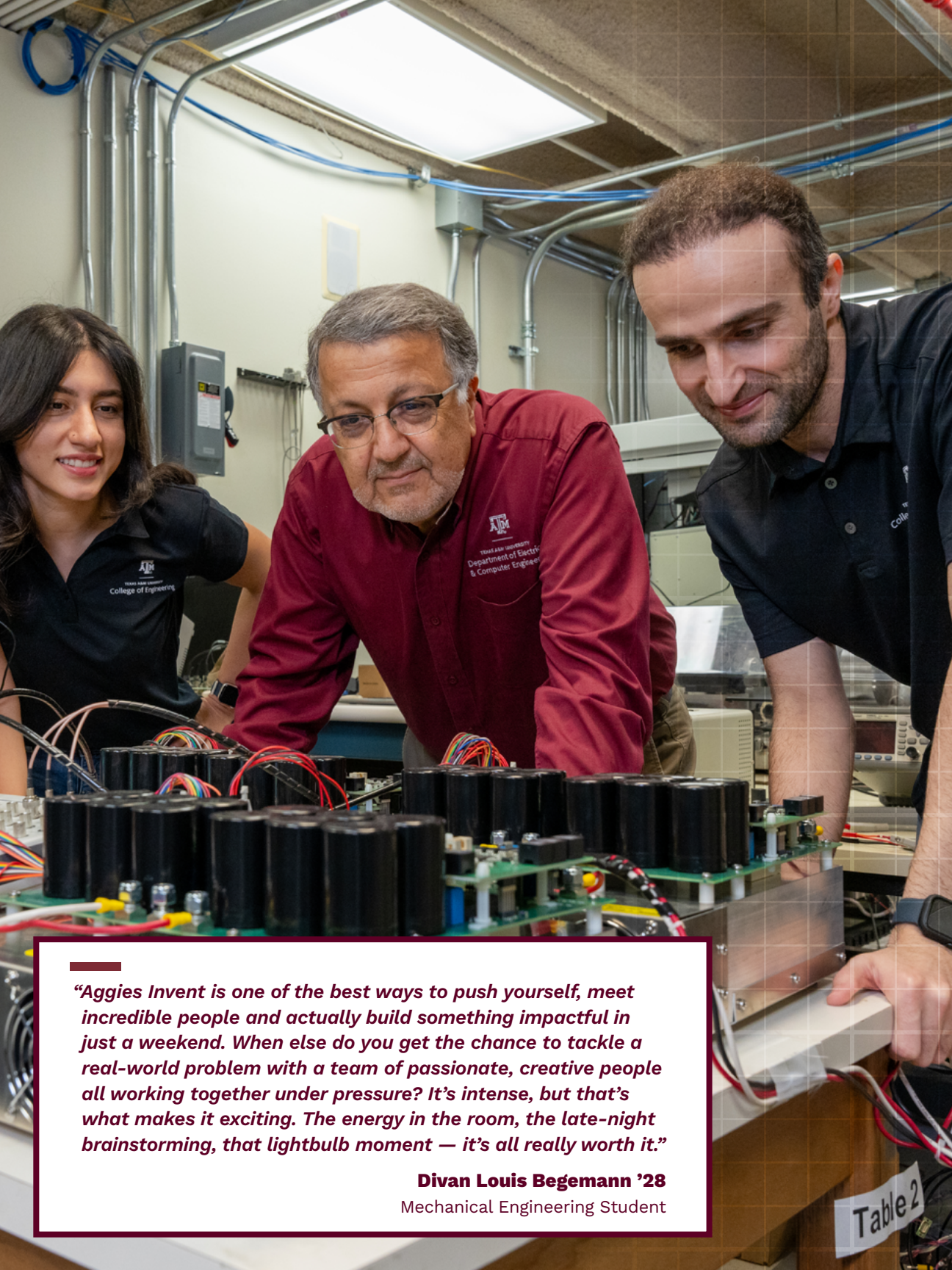
Define and lead transformative innovation at scale in engineering education and research to solve important real-world problems and address future societal challenges.

MISSION

The mission of the College of Engineering is to empower students and faculty to excel in a multidisciplinary environment, fostering lifelong learning, driving cutting-edge research, and developing innovative solutions for the betterment of Texas, the nation, and the global community. We educate students in strong engineering fundamentals and instill in them the highest ethical and professional standards to prepare them to solve society's complex technical challenges.

PILLARS OF EXCELLENCE





"Aggies Invent is one of the best ways to push yourself, meet incredible people and actually build something impactful in just a weekend. When else do you get the chance to tackle a real-world problem with a team of passionate, creative people all working together under pressure? It's intense, but that's what makes it exciting. The energy in the room, the late-night brainstorming, that lightbulb moment — it's all really worth it."

Divan Louis Begemann '28
Mechanical Engineering Student

STUDENTS FUEL THE FUTURE OF SECURE NUCLEAR ENERGY

A College of Engineering team developed a security system for nuclear microreactors, securing first place at Aggies Invent.

As the global push for carbon-neutral energy intensifies, Small Modular Reactors (SMRs) are emerging as a promising solution, offering consistent, low-carbon power with a modular design that facilitates streamlined deployment in remote communities, disaster relief zones and industrial sites.

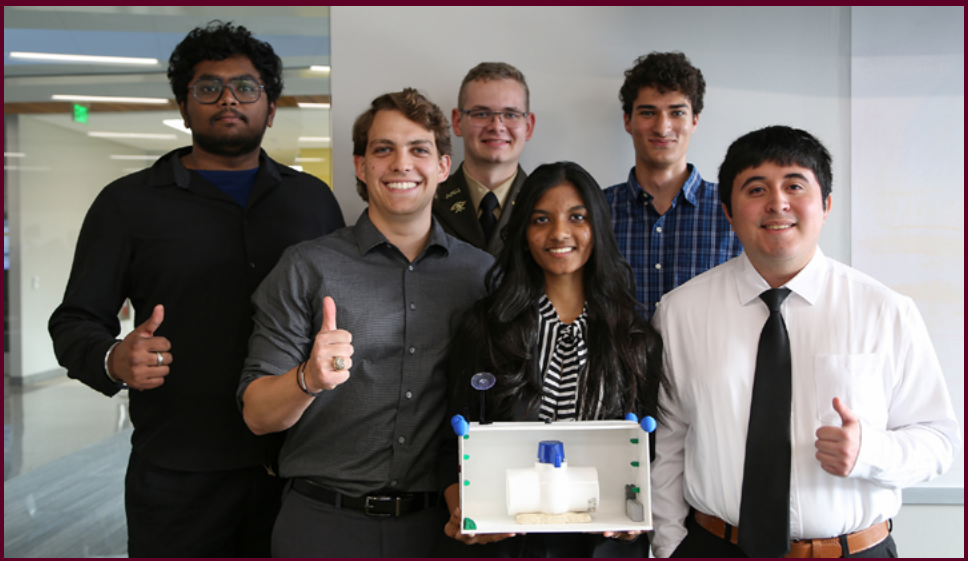
However, their mobility and accessibility introduce security risks that must be addressed before widespread adoption. Given the high value of nuclear materials, SMRs deployed in unstable regions are vulnerable to theft, sabotage and cyber threats. To mitigate these risks and build trust in nuclear energy, SMR security must incorporate advanced surveillance, real-time monitoring, and robust containment strategies.

Los Alamos National Laboratories presented this challenge to student teams at Aggies Invent, an intensive design competition hosted by the College of Engineering's Meloy Program, where one team secured first place with their innovative security framework to safeguard microreactors, ensuring they can fulfill their promise as a safe energy source.

Intrux developed an advanced system designed to prevent unauthorized access and protect valuable nuclear fuel. With the tagline, "Protecting the Future of Energy", their solution integrates RFID tracking, thermal and standard cameras and AI-driven monitoring within the reactor's transport container to detect potential threats. A network of six LiDAR sensors, door access sensors and GPS tracking ensures continuous surveillance, with real-time communication to remote response teams via satellite.

"We realized that many existing security approaches face challenges like environmental limitations, accuracy trade-offs and scalability issues. This shaped our approach by emphasizing the need for multi-layered verification, sensor fusion and real-time adaptability," explained Vobugari Raja Karthik, computer science graduate student and team member.

"Instead of relying on a single method, we explored how combining different technologies could enhance reliability and performance," said Karthik.



Team Intrux earned first place and $5,000 for their solution to enhance the safety of microreactor deployment.

The team prioritized commercial viability, presenting a detailed cost breakdown with a projected cost of just $17,000.

Intrux recognizes the potential of their innovation and is exploring opportunities to refine it further and implement it in real-world scenarios.

“Our solution is highly feasible,” remarked Alex Alcott, general engineering student and team member. “Intrux combines existing technology in a novel way, ensuring adaptability and holding the potential to significantly improve microreactor safety while expanding access to secure nuclear energy.”

Through the Meloy Program’s partnerships with industry, engineering students are given the invaluable opportunity to collaborate for 48 hours with multidisciplinary teams to tackle real-world engineering challenges. This unique environment fosters constructive feedback and valuable connections, enabling students to refine their ideas with expert guidance from faculty and professionals.

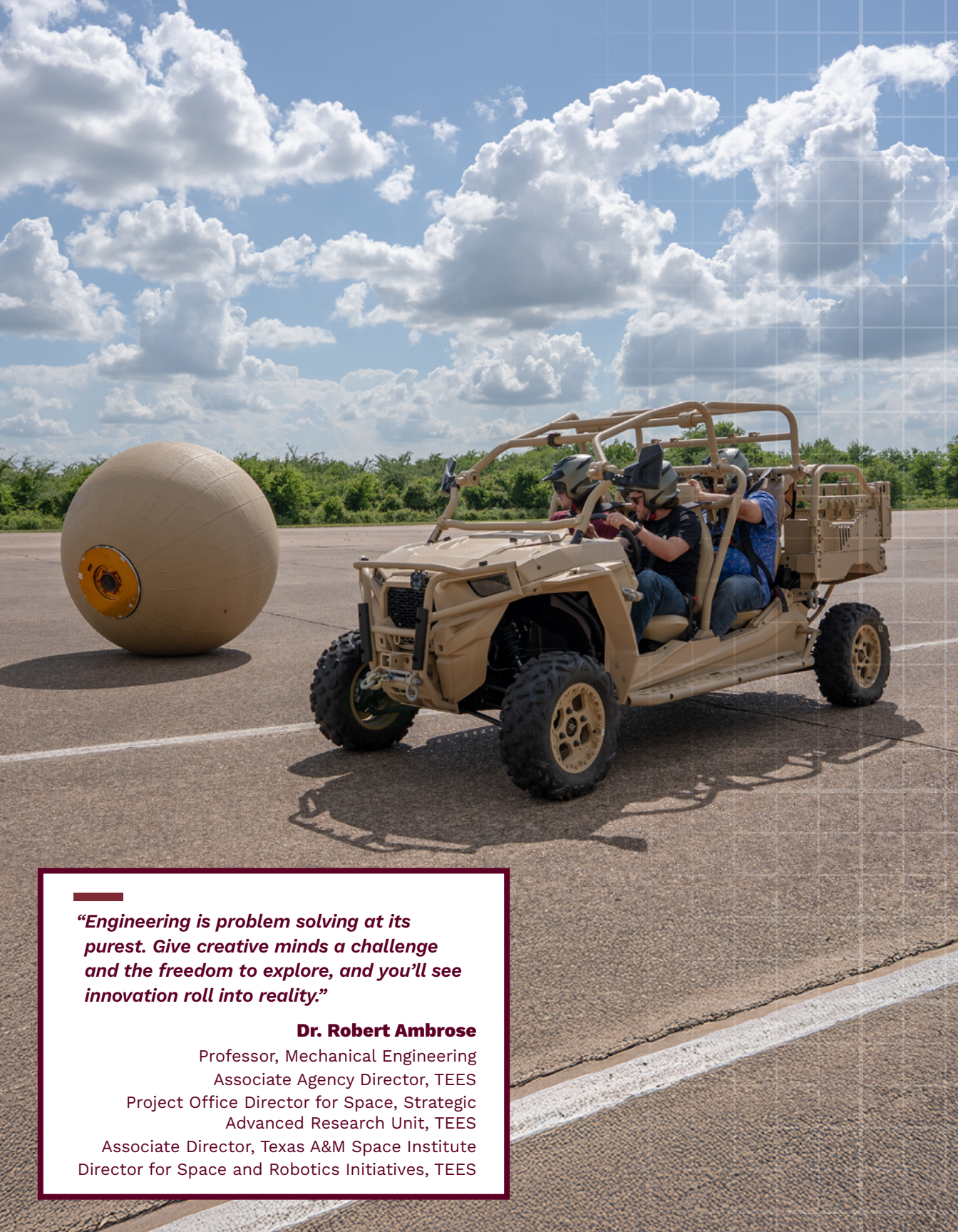
“Aggies Invent is one of the best ways to push yourself, meet incredible people and actually build something impactful in just a weekend,” explained sophomore mechanical engineering student Divan Louis Begemann.

“When else do you get the chance to tackle a real-world problem with a team of passionate, creative people all working together under pressure? It’s intense, but that’s what makes it exciting. The energy in the room, the late-night brainstorming, that lightbulb moment — it’s all really worth it.”

PILLAR 1: EXCELLENCE IN EDUCATION AT SCALE

Provide high-quality engineering education at scale to meet undergraduate and graduate student needs and the evolving engineering landscape.

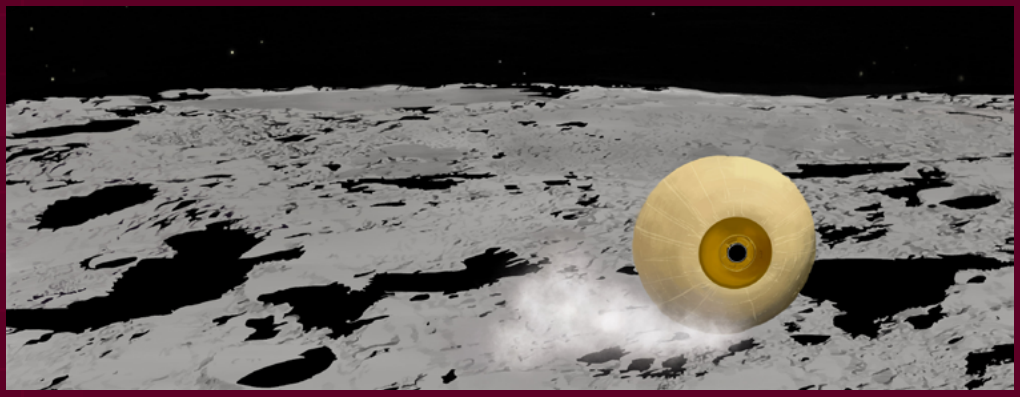
Objective 1.1.1	Equip students with strong fundamentals to adapt and lead in a rapidly changing technological environment.
Blueprint 1.2.1	Increase exposure to emerging fields like Artificial Intelligence (AI) through integration within the curriculum and sprint courses.
Metric 1.3.1	Invest at least $10 million annually to modernize existing teaching facilities and build instructional facilities to provide training in emerging areas.
Objective 1.1.2	Offer advising that combines proven practices with data-driven innovation, helping students accelerate time to graduation.
Blueprint 1.2.2	Embed advanced predictive analytics in advising workflows to guide students, while enabling targeted human interventions that improve outcomes.
Metric 1.3.2	Reach a 275-to-1 student-to-advisor ratio and raise 4- and 6-year graduation rates to 45% and 75%.
Objective 1.1.3	Build student expertise in algorithmic thinking and experiential learning to promote complex problem solving.
Blueprint 1.2.3	Provide training opportunities on innovative teaching methods and pedagogical approaches through the Institute for Engineering Education & Innovation (IEEI) and the Academy of Eminent Educators (AE2).
Metric 1.3.3	Introduce new courses that incorporate the latest developments in AI to students, and support project-based learning initiatives.
Objective 1.1.4	Create flexible pathways for non-traditional learners.
Blueprint 1.2.4	Expand hybrid, online, and adaptive offerings with stackable credentials.
Metric 1.3.4	Launch an Engineering Professional Education Office (ePEO) that is self-funded within five years and serves 10,000 learners annually.
Objective 1.1.5	Partner with industry to embed entrepreneurship and IP literacy in the curriculum.
Blueprint 1.2.5	Strengthen programs such as the Meloy Entrepreneurship Program and launch programs to develop an entrepreneurship culture among graduate students.
Metric 1.3.5	Achieve participation in entrepreneurship programs by 20% of graduate and undergraduate students.
Objective 1.1.6	Expand statewide access to engineering education.
Blueprint 1.2.6	Establish a new Engineering Access Office to develop hubs for Engineering and enhance the Engineering Academies.
Metric 1.3.6	Offer degree programs in different locations based on local workforce needs and provide Engineering Academy pathways for up to 15% of first-year students.
Objective 1.1.7	Elevate Computer Science into a School that broadens participation across disciplines.
Blueprint 1.2.7	Create a School of Computing within the College of Engineering.
Metric 1.3.7	Inaugurate and house the school within the College of Engineering in 2 years.



"Engineering is problem solving at its purest. Give creative minds a challenge and the freedom to explore, and you'll see innovation roll into reality."

Dr. Robert Ambrose

Professor, Mechanical Engineering
Associate Agency Director, TEES
Project Office Director for Space, Strategic Advanced Research Unit, TEES
Associate Director, Texas A&M Space Institute
Director for Space and Robotics Initiatives, TEES



FROM SEA TO SPACE, THIS ROBOT IS ON A ROLL

While working at NASA in 2003, Dr. Robert Ambrose, director of the Robotics and Automation Design Lab (RAD Lab), designed a robot with no fixed top or bottom. A perfect sphere, the RoboBall could not flip over, and its shape promised access to places wheeled or legged machines could not reach — from the deepest lunar crater to the uneven sands of a beach. Two of his students built the first prototype, but then Ambrose shelved the idea to focus on drivable rovers for astronauts.

When Ambrose arrived at Texas A&M University in 2021, he saw a chance to reignite his idea. With funding from the Chancellor's Research Initiative and Governor's University Research Initiative, Ambrose brought RoboBall back to life.

Now, two decades after the original idea, RoboBall is rolling across Texas A&M University.

Driven by graduate students Rishi Jangale and Derek Pravecek, the RAD Lab is intent on sending RoboBall, a novel spherical robot, into uncharted terrain.

Jangale and Pravecek, both Ph.D. students in the J. Mike Walker '66 Department of Mechanical Engineering, have played a significant part in getting the ball rolling once again.

"Dr. Ambrose has given us such a cool opportunity. He gives us the chance to work on RoboBall however we want," said Jangale, who began work on RoboBall in 2022. "We manage ourselves, and we get to take RoboBall in any direction we want."

Pravecek echoed that sense of freedom. "We get to work as actual engineers doing engineering tasks. This research teaches us things beyond what we read in textbooks," he said. "It really is the best of both worlds."

At the heart of the project is the simple concept of a "robot in an airbag." Two versions now exist in tandem. RoboBall II, a 2-foot-diameter prototype, is tuned for trial runs, monitoring power output

and control algorithms. RoboBall III has a diameter of 6 feet across and is built with plans to carry payloads such as sensors, cameras or sampling tools, for real-world missions.

Upcoming tests will continue to take RoboBall into outdoor environments. RAD Lab researchers are planning field trials on the beaches of Galveston to demonstrate a water-to-land transition, testing the robot's buoyancy and terrain adaptability in a real-world setting.

"Traditional vehicles stall or tip over in abrupt transitions," Jangale explained. "This robot can roll out of water onto sand without worrying about orientation. It's going where other robots can't."

The factors that create the versatility of RoboBall also lead to some of its challenges. Once sealed inside its protective shell, the robot can only be accessed electronically. Any mechanical failure means disassembly and digging through layers of wiring and actuators.

"Diagnostics can be a headache," said Pravacek. "If a motor fails or a sensor disconnects, you can't just pop open a panel. You have to take apart the whole robot and rebuild. It's like open-heart surgery on a rolling ball."

RoboBall's novelty means the team often operates without a blueprint.

"Every task is new," Jangale said. "We're very much on our own. There's no literature on soft-shelled spherical robots of this size that roll themselves."

Despite those hurdles, the students find themselves surprised every time the robot outperforms expectations.

"When it does something we didn't think was possible, I'm always surprised," Pravecek said. "It still feels like magic."

The team set a new record when RoboBall II reached 20 miles per hour, roughly half its theoretical power output. "We didn't anticipate hitting that speed so soon," Pravecek said. "It was thrilling, and it opened up new targets. Now we're pushing even further."

Ambrose sees these reactions as proof that student-led innovation thrives when engineers have room to explore.

"The autonomy Rishi and Derek have is exactly what a project like this needs," he said. "They're not just following instructions — they're inventing the next generation of exploration tools."

Long-term goals include autonomous navigation and remote deployment. The team hopes to see RoboBall dispatched from a lunar lander to chart steep crater walls or launched from an unmanned drone to survey post-disaster landscapes on Earth. Each ball could map terrain, transmit data back to operators, and even deploy instruments in hard-to-reach spots.

"Imagine a swarm of these balls deployed after a hurricane," Jangale said. "They could map flooded areas, find survivors and bring back essential data — all without risking human lives."

As the RoboBall project rolls on, student-driven research stands on full display.

"Engineering is problem solving at its purest," Ambrose said. "Give creative minds a challenge and the freedom to explore, and you'll see innovation roll into reality."

PILLAR 2: AGILITY AND INNOVATION IN IMPACTFUL RESEARCH AND TECHNOLOGY

Empower faculty and students to pursue bold ideas that lead to discoveries benefiting society.

Objective 2.1.1	Advance research by hiring outstanding faculty and students.
Blueprint 2.2.1	Recruit world-class faculty and exceptional graduate students.
Metric 2.3.1	Add 200 tenure-track faculty, maintain a 4:1 T/TT-to-APT ratio and a 25:1 faculty-to-student ratio, grow graduate enrollment to 40% of total students over 10 years and engage 40% of our undergraduates in research experiences.
Objective 2.1.2	Strengthen leadership in nationally significant research.
Blueprint 2.2.2	Create an Engineering Research Office to coordinate and enable research.
Metric 2.3.2	Grow annual research expenditures to $1 billion over 10 years and place 20% of Ph.D. graduates in academia or national labs.
Objective 2.1.3	Stimulate interdisciplinary research in emerging areas.
Blueprint 2.2.3	Expand shared facilities and elevate funding opportunities for cross-disciplinary projects or as seed funding for large collaborative initiatives.
Metric 2.3.3	Increase shared space by 50% and provide matching funds for at least 20 projects at up to $50K each.
Objective 2.1.4	Provide world-class infrastructure for transformative research.
Blueprint 2.2.4	Construct a new research complex, modernize existing labs, and deploy high-powered computing facilities.
Metric 2.3.4	Deliver a 200,000 sq. ft. complex, invest $50 million in research infrastructure upgrades, and leverage the $55 million TEES IGNITE computing initiative.
Objective 2.1.5	Lead nationally in entrepreneurship and technology commercialization.
Blueprint 2.2.5	Expand the IP portfolio and enhance start-up support.
Metric 2.3.5	Increase IP holdings by 25% and launch 25 new start-ups.
Objective 2.1.6	Expand global research leadership.
Blueprint 2.2.6	Deepen international collaborations that address global challenges.
Metric 2.3.6	Grow global research partnerships by 50% and double international collaborative projects.

"We are setting the stage for advancements that will redefine what is possible in space exploration and technology. This institute represents our commitment to pushing the boundaries of knowledge, and I can't wait to see the breakthroughs that lie ahead."

Dr. Nancy Currie-Gregg
Director, Texas A&M Space Institute
Professor of Practice, Industrial and Systems Engineering and Aerospace Engineering
Don Lummus '58 Professorship of Practice in Engineering

TEXAS A&M CELEBRATES GROUNDBREAKING OF NEW SPACE INSTITUTE

Texas A&M University breaks ground on new space institute, paving the way for the next generation of space engineering research.

A groundbreaking ceremony for the Texas A&M University Space Institute was celebrated on Nov. 15, 2024, marked by the planting of the institute's flag by Dr. Nancy Currie-Gregg, director of the institute, professor of engineering practice at Texas A&M and a former NASA astronaut.

"This new $200 million facility, here next to NASA's Johnson Space Center in Houston, will support training for missions, including simulated landings on the moon and Mars, as well as advanced research and development in aeronautics, robotics, and other fields," said Bill Mahomes '69, chairman of The Texas A&M University System Board of Regents. "The facility will be vital for partnerships, both research and commercial, that help Texas businesses as well as NASA stay at the forefront of the final frontier."

The Texas A&M Space Institute positions the university as a national leader in the critical and expanding field of space engineering. The institute is uniquely positioned to train the next generation of space experts by equipping students with the skills needed for a rapidly expanding space industry. With this new opportunity, Texas A&M is pioneering the future of space exploration, securing the safety of our ventures beyond Earth, and ensuring that Texas remains at the forefront of this new space age.

"As space exploration expands, there will be a growing demand for highly skilled engineers, scientists, and professionals. Texas A&M is ready," said Texas A&M University System Chancellor John Sharp '72. "With this new facility, A&M will create workforce development opportunities in space-related fields."

Texas House Bill 3447, authored by Rep. Greg Bonnen, M.D. '88 and sponsored in the Senate by Sen. Joan Huffman, received the support of Governor Greg Abbott, Lt. Gov. Dan Patrick, Speaker of the House Dade Phelan and the entire Texas Legislature. The $350 million investment, including $200 million allocated for the new facility at Johnson Space Center's Exploration Park, will propel Texas to the forefront of the space economy. This has laid the foundation for advancements that will benefit not just Texas, but the entire nation.

"Texas A&M officially added 'space-grant university' to our mission 35 years ago and we're proud of all that has been accomplished by our world-class faculty over the years since then," said Texas A&M President General (Ret.) Mark A. Welsh III. "Thanks to generous support from the state legislature, this new institute will significantly elevate the university's reputation as a global leader in space research, aeronautics

Texas A&M University Space Institute Director Dr. Nancy Currie-Gregg plants a flag for the new institute during a groundbreaking ceremony. (Credit: NASA/Robert Markowitz)

and innovation, drawing attention from academia, government and private industry worldwide."

Texas A&M University, a space-grant university, employs four astronauts. Scientists and engineers from Texas A&M have participated in all NASA rover missions to Mars with two scientists active on NASA's Perseverance Rover Team. Plus, more than 280 faculty and investigators from Texas A&M, the Texas A&M Engineering Experiment Station, and Texas A&M AgriLife Research are involved in space-related research.

"With the new facility at Exploration Park, Texas A&M will play a pivotal role in lunar missions, Mars exploration, and simulations for living on the Moon and Mars," said Dr. Robert Bishop, dean of the Texas A&M College of Engineering. "This site will foster the development of innovative technologies like landers, space suits, rovers and other essential equipment."

In 2024, Abbott called on Texas universities to lead the charge in preparing the next generation of engineers for lunar and Martian missions. The space institute groundbreaking marks significant progress towards answering the call.

"I am excited to embark on this journey alongside Dr. Rob Ambrose, the associate director of the institute and a professor of mechanical engineering," Currie-Gregg said. "Together, we are setting the stage for advancements that will redefine what is possible in space exploration and technology. This institute represents our commitment to pushing the boundaries of knowledge, and I can't wait to see the breakthroughs that lie ahead."

PILLAR 3: LEADERSHIP IN SERVICE TO THE STATE, NATION, AND GLOBAL COMMUNITY

Identify societal needs and develop actionable roadmaps to address them.

Objective 3.1.1	Strengthen partnerships with former students and stakeholders.
Blueprint 3.2.1	Increase public engagement and highlight engineering's societal impact.
Metric 3.3.1	Boost outreach activities by 20% annually.
Objective 3.1.2	Become the destination college for students committed to national leadership and service.
Blueprint 3.2.2	Enhance leadership programs such as the Zachry Leadership Program and participation in the Corps of Cadets.
Metric 3.3.2	Exceed 25% student participation in leadership and service programs.
Objective 3.1.3	Establish global leadership in engineering education and innovation.
Blueprint 3.2.3	Accelerate international partnerships and exchanges tackling urgent challenges.
Metric 3.3.3	Establish academic partnerships with two peer and two aspirational peer international institutions each year. Increase the global experience of our students to 50%.

“The endowment establishing the Engineering Honors Enhancing the Development of Global Engineers (EH EDGE) allows for this wonderful program to be fully merit-based and accessible to students regardless of socioeconomic background. I am extremely grateful to our generous sponsor for funding four years’ worth of our global competency and leadership education, and I am certain that the lessons we learn in this program will remain with us throughout our professional careers.”

Janice Thomas ’27
Computer Science Student
and Member of EH EDGE

The inaugural EH EDGE cohort attends their first of many monthly meetings.

ENGINEERING HONORS COHORT SHAPES GLOBAL LEADERS

Students in the inaugural EH EDGE cohort reflect on the significant opportunities provided by an Aggie's generosity.

Through a recent endowment, Melinda Grace '87 committed to supporting the establishment of EH EDGE (Engineering Honors Enhancing the Development of Global Engineers), a cohort-based program within the Craig and Galen Brown Engineering Honors Program.

Honors scholars in the College of Engineering are offered opportunities to elevate their education through rigorous coursework, regular engagement with honors faculty and professional development events. The EH EDGE cohort is designed to further

empower engineers to be successful, particularly as leaders in a global work environment.

Directed by associate professor Dr. Kristi Shryock, this four-year program aims to cultivate global engineering leaders from Texas A&M University. Through immersive field trips, interactions with industry professionals, study abroad opportunities and exclusive networking events, EDGE seeks to bolster scholars' confidence in addressing society's most pressing challenges.

"When Dr. Shryock first proposed the idea of a four-year cohort-based program for engineering honors students, her enthusiasm and vision were contagious," Grace said. "It was an easy decision, and we feel blessed to be a small part of it."

In just one semester, students in the inaugural cohort have begun framing lessons learned in the classroom around key competencies such as communication, teamwork, self-awareness and critical thinking.

"EH EDGE has already given me the unique opportunity to reflect on what kind of engineer, leader and person I want to become," explained Shruti Oruganti, a sophomore computer engineering student and member of the program's first cohort. "This self-reflection and discourse on the values and skills successful engineers possess has given me a much clearer view of my professional goals."

Prioritizing leadership development, students in their fourth year will be encouraged to apply their knowledge as EDGE members by serving as facilitators, hosting student development workshops for the entire program, mentoring the next generation of budding engineers.

"Dr. Shryock is really trying to develop leaders within EDGE," Grace said. "When individuals know what they're doing, are passionate and have a vision, we just want to add fuel to their fire."

Scholars in the cohort emphasize the value of being provided with opportunities they may not have had access to otherwise, such as one-on-one mentorship from engineering professionals and a fully funded study abroad trip.

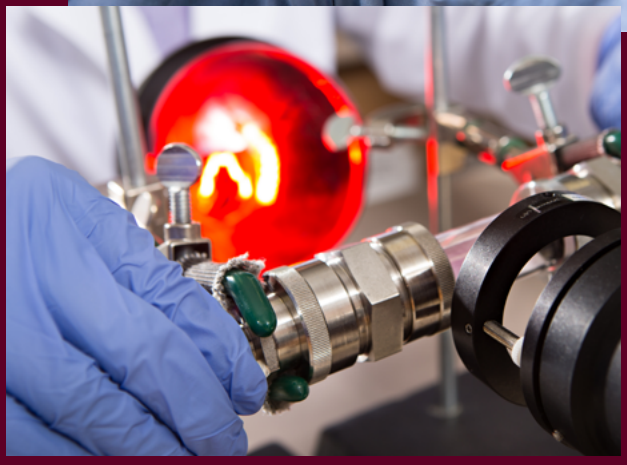
"[The endowment] allows for this wonderful program to be fully merit-based and accessible to students regardless of socioeconomic background," remarked Janice Thomas, a sophomore computer science major and member of EDGE.

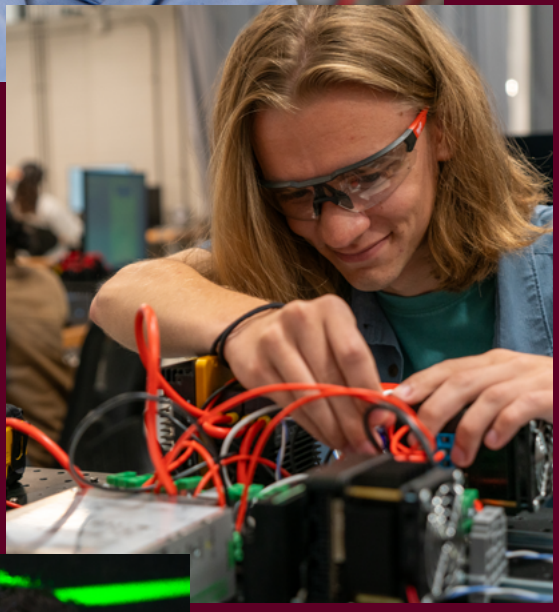
"I am extremely grateful to our generous sponsor for funding four years' worth of our global competency and leadership education, and I am certain that the lessons we learn in this program will remain with us throughout our professional careers."

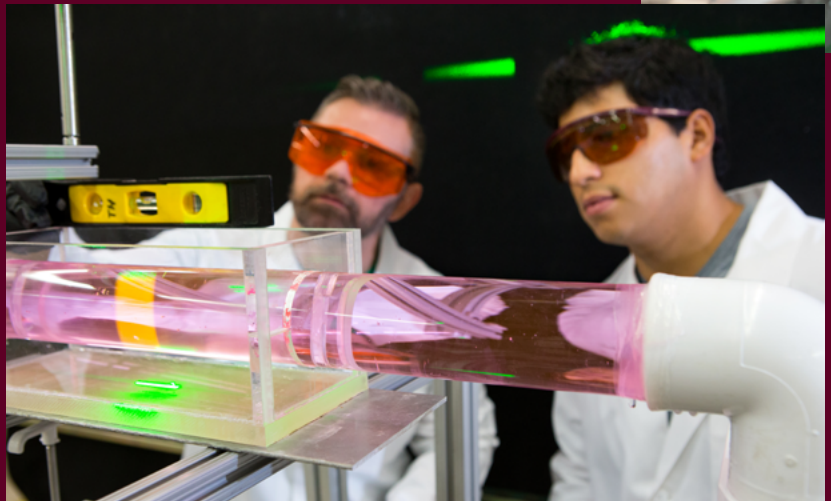
PILLAR 4: FINANCIAL HEALTH AND SUSTAINABILITY

Maintain financial strength while advancing academic and research excellence.

Objective 4.1.1	Ensure strong financial stewardship.
Blueprint 4.2.1	Align college and TEES finances, build reserves, and support strategic initiatives.
Metric 4.3.1	Maintain a balanced budget with a 10% discretionary fund for strategic initiatives and 10% reserves.
Objective 4.1.2	Attract and retain high-performing professional staff.
Blueprint 4.2.2	Transform TEES HR into a People Office focused on engagement and professional development.
Metric 4.3.2	Establish the People Office and offer at least three staff development programs each year.
Objective 4.1.3	Develop effective academic leaders.
Blueprint 4.2.3	Provide mentoring and leadership programs for current department heads and directors, as well as develop future academic leaders.
Metric 4.3.3	Conduct at least two leadership workshops per year.
Objective 4.1.4	Grow philanthropic support for strategic priorities.
Blueprint 4.2.4	Engage former students and donors to fund bold initiatives.
Metric 4.3.4	Increase fundraising by 20% annually toward a $100 million target.
Objective 4.1.5	Enhance visibility to achieve a positive national reputation.
Blueprint 4.2.5	Modernize the Engineering Communications office to leverage digital storytelling and analytics.
Metric 4.3.5	Increase national visibility through a 15% year-over-year growth in digital engagement (media placements, social reach, and story engagement) as measured through analytics.







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TEXAS A&M UNIVERSITY

Engineering

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MESSAGE FROM **THE DEAN**

The College of Engineering at Texas A&M University has the intellectual firepower to achieve excellence at scale, and this strategic plan puts the college on that path toward excellence for the next five years. These pages highlight our commitment to excellence in education, impactful research, leadership in service, and financial sustainability. And, it shares the stories of people whose incredible efforts are the reason for our success.

Achieving excellence also means focusing on exceptional financial stewardship, recruiting and retaining professional staff, and investing in programs and infrastructure that meet evolving needs while adhering to the core values embodied by Aggies everywhere — excellence, integrity, leadership, loyalty, respect, and selfless service.

Gig 'em,

Robert H. Bishop

Dr. Robert H. Bishop '79, P.E.

Vice Chancellor for Engineering, The Texas A&M University System
Dean of Engineering, Texas A&M University
Director, Texas A&M Engineering Experiment Station
Harold J. Haynes Dean's Chair in Engineering

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Engineering

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