



TEXAS A&M
UNIVERSITY

2021

J. MIKE WALKER '66 DEPARTMENT OF

MECHANICAL ENGINEERING

LETTER FROM THE DEPARTMENT HEAD



The faculty of the J. Mike Walker '66 Department of Mechanical Engineering continue to enhance their education and mentorship of students and the reputation of our department by obtaining major research grants in areas of national importance and earning recognition from their peers as recipients of prestigious awards.

I am honored to be joining such a prestigious department comprised of incredible faculty, students and staff. I look forward to working with all the department's stakeholders to continue guiding it along its trajectory of increasing prominence and national reputation for excellence. I would also like to thank and acknowledge my predecessor, Dr. Andreas Polycarpou, for his years of service to the department and the great strides that were achieved under his leadership.

Over the last year our faculty helped our undergraduate program achieve a No. 7 ranking and our graduate program reach No. 9, both maintaining their top ranking among public institutions by *U.S. News and World Report*; our department also maintains its top ranking worldwide according to the ShanghaiRanking's global rankings in

mechanical engineering at No. 3 internationally.

Our faculty — including Dr. Srikanth Saripalli, Dr. James Hubbard Jr., Dr. Dion Antao and Dr. Vinayak Krishnamurthy — are leveraging their expertise to pursue innovative and collaborative research projects to help meet new challenges and build a brighter future.

In addition to myself, the department welcomes several new faculty, including Dr. Robert Ambrose, Dr. Marcia Cooper, Dr. Rebecca Friesen, Dr. Pablo Tarazaga, Dr. Tracy Fullerton, Dr. Jeremy Kolansky, Dr. Vanessa Restrepo, Dr. James Thomas and Dr. Jonathan Weaver-Rosen. The department also extends congratulations to several faculty who have been successful in their tenure and promotion cases.

We are proud to induct Brenda Ransom Hightower '81, senior advisor and project manager at Soloman Associates, and Dr. Jimmy Williams '83, executive director and distinguished professor of the Engineering and Technology Innovation Management program at Carnegie Mellon University, into the J. Mike Walker '66 Department of Mechanical Engineering Academy of Distinguished Graduates. We are certainly proud of all our stellar current and former students' contributions in all corners of the world.

And, of course, our success would not be possible without the ever-generous support of our donors, whose contributions to scholarship and development funds help us continue to advance the quality and breadth of education we provide.

Sincerely,

Guillermo Aguilar

Department Head
Professor, Mechanical Engineering
James and Ada Forsyth Professor



TEXAS A&M UNIVERSITY
J. Mike Walker '66
Department of
Mechanical Engineering

BY THE NUMBERS

RANKINGS

#9 Graduate Program
Ranked No. 9 (Public)
(U.S. News & World Report, 2022)

#7 Undergraduate Program
Ranked No. 7 (Public)
(U.S. News & World Report, 2022)

#3 Mechanical Engineering
in World Ranking
*(Academic Ranking of World Universities
from ShanghaiRanking, 2021)*

ENROLLMENT*

(FALL 2021)

1,490

Undergraduates

173

M.S.

**preliminary,
5th class day*

83

M.Eng.

277

Ph.D.

ENDOWMENTS

\$88.8 MILLION

RESEARCH EXPENDITURES

\$29.4 MILLION

FACULTY

67 Tenured/
Tenure Track

37 Full Professors

19 Associate Professors

11 Assistant Professors

11 Texas A&M at
Qatar Faculty

21 Emeritus
Faculty

23 Academic
Professional Track

5 Professors of Practice

11 Teaching Faculty

7 Research Faculty

7 NAE Members

20 Affiliated
Faculty

ENDOWED POSITIONS

11 Chairs

13 Professorships

14 Faculty Fellowships

5 Career Development Professorships

AUTONOMOUS VEHICLE PROVING GROUNDS



The Texas A&M Engineering Experiment Station received a proposed five-year, up to \$24 million contract from the Army Research Laboratory (ARL) to conduct research in establishing a collaborative distributed proving ground that will support autonomous vehicle research across various environments and domains at the George H.W. Bush Combat Development Complex on The Texas A&M University System RELLIS Campus.

The Distributed Autonomous Robotic Experiments and Simulations (DARES) research project will be conducted in collaboration with ARL researchers at the Robotics Research Collaboration Campus (R2C2) in Graces Quarters at the Aberdeen Proving Ground in Maryland.

The research will focus on developing virtual proving grounds designed to enable researchers to develop, test and demonstrate artificial intelligence and machine-learning algorithms for autonomous vehicles.

"We are excited to partner with the Texas A&M System and utilize their state-of-the-art campus, in addition to the lab's facilities and assets, to take this research to the next level and have them involved in the ARL Distributed Virtual Proving Ground," said ARL program manager Andrew Ladas. "We look forward to the partnership and enhancing the capabilities of our soldiers in the future operational environment."

The project, led by Dr. Srikanth Saripalli, includes 20 faculty members from the mechanical, electrical, aerospace and computer science departments at Texas A&M. Among the team members includes Dr. James Hubbard Jr., founder of StarLab, who provided the vision for the project.

"The ability to connect R2C2 with StarLab at the RELLIS Campus through the DARES program enables us to rapidly test and validate autonomous vehicle capabilities at multiple locations simultaneously, which will accelerate the ability to incorporate research results into synthetic environments," Saripalli said. "This will improve the quality of virtual simulations and ultimately increase resilience in autonomous vehicle capabilities." ▼



FEATURED RESEARCHERS

Dr. Srikanth Saripalli

Professor



Dr. James Hubbard Jr.

Oscar S. Wyatt Jr. '45 Chair I Professor
National Academy of Engineering Member

2021 NSF CAREER AWARD RECIPIENTS



Dr. Dion Antao

Associate Professor and J. Mike Walker '66 Faculty Fellow

Antao is researching a non-contact method of measuring temperature in the vapor phase during a phase-change process through optical diagnostic techniques, potentially avoiding the negative impacts of current practices.

The phase-change process is used in a broad range of areas, including power generation, buildings, communications systems, food processing systems and the chemical processing industry.

"The current state-of-the-art uses physical probes, like thermocouples, to measure the temperature in the vapor phase, however, such a probe affects, disturbs or biases near-interface transport processes," Antao said. "A non-contact temperature measurement in the vapor phase will enable us to probe some of these fundamental near-interface transport phenomena in a spatially resolved manner."

Antao looks forward to implementing his research plan to develop theory and tools to better understand these phase-change phenomena with the ultimate goal of manipulating and enhancing the process in energy conversion and water treatment technology.

Dr. Vinayak Krishnamurthy

Assistant Professor and Morris E. Foster Faculty Fellow II

Krishnamurthy is developing a new approach to geometric modeling that could have applications in a breadth of products ranging from prosthetic devices and protective equipment to automotive parts and miniaturized electronics.

His research introduces a new type of geometric modeling paradigm, called partitive solid geometry, which is expected to enable the intuitive and interactive design of complex 2D and 3D patterns known as space-filling shapes.

When paired with others of the same shape, these geometric shapes could potentially fill a space completely — leaving it watertight and gapless.

"Imagine a computer tool where a designer could simply sketch out a shape to design a complex 3D jigsaw puzzle that has special mechanical, thermal, acoustic or optical properties," he said. "The research specifically focuses on developing the basic mathematical principles and subsequently new algorithms and interactive software workflows to enable such design." ▼



CHASING A NEW FRONTIER



Dr. Robert Ambrose comes to Texas A&M from NASA, where he served as chief of the software, robotics and simulation division at the Johnson Space Center. Along with his appointment, Ambrose is the recipient of the Governor's University Research Initiative grant program and The Texas A&M University System Chancellor's Research Initiative.

A member of the National Academy of Engineering, Ambrose will serve as a professor in the department, a staff member of the Texas A&M Engineering Experiment Station and also work in collaboration with the George H.W. Bush Combat Development Complex.

"Investments in our faculty, particularly the recruitment of National Academy members, is vital to a university's pursuit of excellence," said Texas A&M System Chancellor John Sharp. "I am proud that we have more than tripled our National Academy members in recent years, and the

university has benefitted so much from their contributions to teaching and research."

Ambrose's research focuses on robotic manipulation and mobility, specifically in relation to space robotics — a rapidly growing field. Ambrose said he is excited to bring his decades of experience to Texas A&M to explore and address new and emerging challenges in this area.

"The energy we see in space today is exciting, with new companies, new approaches and new challenges," Ambrose said. "We intend for Texas A&M to become the premier university for space robotics at a time when the field is breaking out." ▼



FEATURED RESEARCHER

Dr. Robert Ambrose

Professor
J. Mike Walker '66 Chair
National Academy of Engineering Member

NEW FACULTY

TENURED AND TENURE TRACK



Dr. Guillermo Aguilar

*Professor and Department Head
James and Ada Forsyth Professor*

Aguilar earned a Ph.D. in mechanical engineering from the University of California, Santa Barbara. His research interests include cryogen spray cooling, laser-tissue interactions, biomedical optics and medical lasers. He joins the department as its new department head.



Dr. Robert Ambrose

*Professor, J. Mike Walker '66 Chair
National Academy of Engineering Member*

Ambrose earned a Ph.D. in mechanical engineering from The University of Texas at Austin. His research interests include robotic manipulation and mobility, specifically in relation to space robotics. He is the recipient of the Governor's University Research Initiative grant and the A&M System Chancellor's Research Initiative.



Dr. Marcia A. Cooper

Associate Professor

Cooper earned a Ph.D. in mechanical engineering from the California Institute of Technology. Her research interests include shock and detonation physics, energetic material behavior, optical science, novel experimental design and diagnostic development.



Dr. Rebecca Friesen

Assistant Professor

Friesen earned a Ph.D. in mechanical engineering from Northwestern University. Her research interests include virtual interaction and prosthetic control, friction-modulated haptic displays and the relationship between biomechanical properties of the body and tactile perception.



Dr. Pablo A. Tarazaga

Professor

Tarazaga earned a Ph.D. in mechanical engineering from Virginia Polytechnic Institute and State University. His research interests include structural mechanics, power and energy harvesting, structural health monitoring, smart biomedical devices, infrastructure and buildings, and the internet of things.

ACADEMIC PROFESSIONAL TRACK



Dr. Tracy Fullerton

Associate Professor of Practice

Fullerton earned a Ph.D. in mechanical engineering from Texas A&M University.



Dr. Jeremy Kolansky

Research Assistant Professor

Kolansky earned a Ph.D. in mechanical engineering from Virginia Polytechnic Institute and State University.



Dr. Vanessa Restrepo

Visiting Assistant Professor

Restrepo earned a Ph.D. in mechanical engineering from Purdue University.



Dr. James Thomas

Research Assistant Professor

Thomas earned a Ph.D. in mechanical engineering from Texas A&M University.



Dr. Jonathan Weaver-Rosen

Instructional Assistant Professor

Weaver-Rosen earned a Ph.D. in mechanical engineering from Texas A&M University. ▀



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engineering.tamu.edu/mechanical

J. MIKE WALKER '66 DEPARTMENT OF MECHANICAL ENGINEERING

FIELDS OF APPLICATION

Advanced Manufacturing

Biomechanics and Human Health

Energy and Environment

Micro and Nanosystems

Robotics and Mechatronics

Turbomachinery