



ERIK JONSSON SCHOOL OF ENGINEERING AND COMPUTER SCIENCE

BIOENGINEERING

2022 ANNUAL REPORT

THE UNIVERSITY OF TEXAS AT DALLAS



Table of Contents

1. Message From the Department Head
2. 2021 –2022 Highlights
3. Research Excellence
4. Student Success
5. Outreach and Community Engagement
6. Closing Remarks

Department Head Welcome

The 2021-22 academic year was a time to propel forward as we engaged in new initiatives aimed toward achieving the goals in our 5-year strategic plan. We celebrated diversity, equity and inclusion as we returned to normal operations post-pandemic.

This year rang in transformational change to our department. We implemented several initiatives to address our goals defined in our strategic plan focused in three areas: research excellence, student success, and outreach and community engagement. Woven throughout is diversity, equity and inclusion.

One focal point this year was enhancing student and academic success through two new initiatives – Convergence Grants and our Summer Undergraduate Research Scholar program. Convergence grants were designed to drive doctoral research projects from seed to fruition. The undergraduate research program was implemented to create pipelines from undergraduate to doctoral studies.

Returning to normal operations was a welcome change post-pandemic. Finally, we celebrated the achievements of our students, faculty and staff in person at our first annual Spring Celebration. We look forward to welcoming our largest graduate cohort in Fall 22.

Onwards and upwards,

Dr. Shalini Prasad

Head of the Department of Bioengineering
Cecil H. and Ida Green Professor of Systems
Biology Science



2021-2022 HIGHLIGHTS



Department Highlights

Distinguished Bioengineering Seminar Series

During the 2021-22 academic year, the UT Dallas Bioengineering seminar series featured speakers from across the globe. Students, faculty and staff gained insight into the latest research innovations advancing biomedical engineering and healthcare.

Annual Spring Celebration

This spring semester, the department hosted its first ever Spring Celebration in the Davidson-Gundy Alumni Center. The department celebrated and recognized the accomplishments of our outstanding Alumni, Students, Faculty, Staff, and Friends of Bioengineering!

Commencements

Fall 2021 and Spring 2022 graduates celebrated their commencement ceremonies in person! This academic year, we awarded 114 Bachelor of Science, 29 Master of Science and 11 Doctor of Philosophy degrees in Biomedical Engineering.

BIOENGINEERING QUICK FACTS



20 Tenure System Faculty
9 Instructional Faculty



\$10 Million
FY2021 Research
Expenditures



113
2021 Peer-Reviewed
Faculty Publications



84 PhD
53 MS
495 BS



150+
BS, MS, PhD Degrees
Awarded in Biomedical
Engineering



#3 Biomedical Engineering program
among TX Public Universities
#33 Among Public Universities Nation
Wide

Faculty Recognition



Faculty from left to right include Dr. Danieli Rodrigues, Dr. Kenneth Hoyt, Dr. Shashank Sirsi, Dr. Baowei Fei, Dr. Girgis Obaid and Dr. Shalini Prasad.

Dr. Danieli Rodrigues, Associate Professor
2021 TI Distinguished Bioengineering Faculty
Fellow

Dr. Kenneth Hoyt, Associate Professor
2021 TI Distinguished Bioengineering Faculty
Fellow

Dr. Shashank Sirsi, Assistant Professor
2021 TI Distinguished Bioengineering Faculty
Fellow

Dr. Baowei Fei, Professor, Jonsson School Research
Award at the Rank of Full Professor

Dr. Girgis Obaid, Assistant Professor
2021 Outstanding Bioengineering Assistant Professor
and the Best Teacher Award for Bioengineering

Dr. Shalini Prasad, Professor
President's Teaching Excellence Award in
Graduate/Professional Instruction and AIMBE
Inductee

Faculty Recognition

Continued



Faculty from left to right include Dr. Seth Hays, Dr. Stuart Cogan, Dr. Fang Bian, Dr. Tariq Ali and Dr. Ben Porter.

Dr. Seth Hays, Associate Professor
2021 Outstanding Bioengineering Associate
Professor

Dr. Stuart Cogan, Professor
2021 Outstanding Bioengineering Professor

Dr. Fang Bian, Research Scientist
Bioengineering Instructional Fellow

Dr. Tariq Ali, Associate Professor of Instruction
2021 Outstanding Bioengineering Lab Instructor

Dr. Ben Porter, Assistant Professor of Instruction
2021 Outstanding Bioengineering Lecture Instructor

WELCOME NEW FACULTY

The Department of Bioengineering welcomed two assistant professors of instruction who are teaching bioimaging and biomechanics courses. The department also welcomed two assistant professors whose research focuses on biomechanics and system biology. The interdisciplinary

nature of their work provides opportunities for collaboration with researchers at UT Southwestern Medical Center





WELCOME NEW FACULTY

Dr. Gu Eon Kang, Assistant Professor

Dr. Gu Eon Kang's research seeks to develop a comprehensive evaluation of balance and mobility in individuals with peripheral nervous system dysfunction due to diabetes and cancer and to develop home-based therapies to reduce fall risks in individuals with peripheral nervous system dysfunction.

Kang holds a PhD in movement science from the University of Michigan, a MS in mechanical engineering and biomedical engineering from the University of Michigan, and a BS in mechanical engineering from Korea University in Seoul, South Korea.

During his postdoctoral studies at Baylor College of Medicine, Dr. Kang's research focused on understanding the biomechanics in individuals with diabetic peripheral neuropathy and chemotherapy-induced peripheral neuropathy, and on developing and evaluating home-based, self-manageable interventions to improve balance and mobility.



WELCOME NEW FACULTY

Dr. Dave Dingal, Assistant Profess

Dr. Dave Dingal's research interests lie at the intersection of molecular biology, cell and developmental biology, and systems and synthetic biology.

Dingal holds a PhD in chemical and biomolecular engineering from the University of Pennsylvania, and a Bachelor of Engineering degree in chemical and biomolecular engineering from Nanyang Technological University in Singapore.

Before joining UT Dallas in January 2022, Dingal was a postdoctoral fellow in the Department of Molecular and Cellular Biology at Harvard University, where he developed molecular tools to control signaling during early embryo development.



WELCOME NEW FACULTY

Dr. Katherine Brown, Assistant Professor of Instruction

Dr. Katherine Brown joined the instructional faculty with a focus on teaching bioinstrumentation, MATLAB programming and digital image processing. She brings real world examples into the classroom from her ongoing research interests in super-resolution ultrasound imaging of cancer working towards wearable ultrasound devices for continuous monitoring and therapy.

Brown holds a PhD in biomedical engineering from The University of Texas at Dallas, an MBA from Southern Methodist University, an MS in electrical engineering from the University of Washington and a BS in electrical engineering from Stanford University.



WELCOME NEW FACULTY

Dr. Christian Rivera , Assistant Professor of Instruction

Dr. Christian Rivera is an assistant professor of instruction whose goal is to improve the design experience for undergraduate students.

Rivera holds a PhD in biomedical engineering from the Georgia Institute of Technology in a joint program with Emory University and Peking University and a BS in biomedical engineering from Purdue University.

Rivera currently teaches statics, junior design, fluid mechanics and introductory biomechanics.



FACULTY

The Department of Bioengineering attracts top researchers and instructors. Full time tenure system faculty lead robust, comprehensive research laboratories and collaborate with affiliated faculty within UT Dallas as well as adjunct faculty at other institutions and in industry. The department has 20 tenure system faculty, 9 instructional faculty, 19 affiliated faculty and 25 adjunct faculty.

TENURE-SYSTEM FACULTY



Orlando Auciello
Professor
Distinguished Chair
in Engineering



Leonidas Bleris
Professor
Fellow,
Cecil H. and Ida Green Professor
in Systems Biology Science



Stuart Cogan
Professor



Dave Dingal
Assistant Professor



Yichen Ding
Assistant Professor



Baowei Fei
Professor
Cecil H. and Ida Green Chair
in Systems Biology Science



Jacopo Ferruzzi
Assistant Professor



Heather Hayenga
Assistant Professor



Seth Hays
Associate Professor
Fellow,
Eugene McDermott Professor



Kenneth Hoyt
Associate Professor

TENURE-SYSTEM FACULTY

CONTINUED



Caroline Jones
Assistant Professor



Gu Eon Kang
Assistant Professor



Stephen Levene
Professor



Girgis Obaid
Assistant Professor



Joseph Pancrazio
Vice President for Research
Professor



Shalini Prasad
Department Head
Professor

Cecil H. and Ida Green Professor
in Systems Biology Science



Danieli Rodrigues
Associate Professor



David Schmidtke
Professor



Shashank Sirsi
Assistant Professor



Victor Varner
Assistant Professor

INSTRUCTIONAL FACULTY



Tariq Ali
Associate Professor
of Instruction



Fang Bian
Research Scientist



Katherine Brown
Assistant Professor
of Instruction



**Soudheh Ardestani
Khoubrouy**
Associate Professor
of Instruction



Clark Meyer
Associate Professor of
Instruction



Kathleen Myers
Assistant Professor
of Instruction



Todd Polk
Associate Professor
of Practice



Ben Porter
Assistant Professor
of Instruction



Christian Rivera
Assistant Professor
of Instruction

AFFILIATED FACULTY

Dinesh Bhatia

Professor
Electrical Engineering

Carlos Busso

Professor
Electrical and Computer
Engineering

Xianming (Simon) Dai

Assistant Professor
Mechanical Engineering

Crystal Engineer

Assistant Professor
School of Behavioral and Brain
Sciences

Francesca Filbey

Associate Provost, Professor
and Neuroscience; School of
Behavioral and Brain Sciences

Jeremiah Gassensmith

Associate Professor
Chemistry and Biochemistry



John Hart Jr

Distinguished Chair in
Neuroscience, Professor
Behavioral and Brain Sciences

Fatemeh Hassanipour

Associate Professor
Mechanical Engineering

Mahadevan (Devan) Iyer

Research Professor
Electrical and Computer
Engineering

Michael Kilgard

Margaret Fonde Johnson
Professor
Behavioral and Brain Sciences

David Lary

Professor
Physics

Yi Li

Research Scientist
Bioengineering

Faruck Morcos

Assistant Professor
Biological Sciences

Issa Panahi

Professor
Electrical and Computer
Engineering

Balakrishnan Prabhakaran

Professor
Computer Science

Zhenpeng Qin

Assistant Professor
Mechanical Engineering

Mihaela Stefan

Eugene McDermott Professor
Chemistry and Biochemistry

Yonas Tadesse

Associate Professor
Mechanical Engineering

Jie Zheng

Professor
Chemistry and Biochemistry

ADJUNCT FACULTY

Spencer Bowen

Assistant Professor
Radiology,
UT Southwestern

Isaac Chan

Assistant Professor
Division of Hematology and
Oncology, Simmons
Comprehensive Cancer Center,
UT Southwestern

Avneesh Chhabra

Professor
Radiology and Orthopedic
Surgery,
UT Southwestern

Yasin Dhafer

R. Wofford Cain Distinguished
Chair in Bone and Joint Disease
Research
Physical Medicine &
Rehabilitation and Orthopaedic
Surgery,
UT Southwestern

Nick Fey

Assistant Professor
Mechanical Engineering,
UT Austin

Ibrahim Hashim

Professor
Department of Pathology,
UT Southwestern

Anke Henning

Professor, Arthur J Gill Professorship
in Pathology, Chief of Clinical
Pathology, Clinical Chemistry
Director
Bioengineering,
UT Southwestern

Karanjit Kooner

Associate Professor
Ophthalmology,
UT Southwestern

Nan Li

Assistant Professor
Advanced Imaging Research Center,
UT Southwestern

Jiaen Liu

Assistant Professor
Advanced Imaging Research Center,
UT Southwestern

Ananth Madhuranthakam

Assistant Professor
Departments of Biomedical
Engineering, Radiology, Advanced
Imaging Research Center,
UT Southwestern

Vinay Nagaraj

Medical Science Liaison
Angio Dynamics

Hyun-Joo Nam

Ad-interim Assistant Professor
Texas A&M Commerce

Alexander Pertsemlidis

Associate Professor
Greehey Children's Cancer Research
Institution, Departments of Pediatrics
and Cell Systems & Anatomy, Joe R.
and Teresa Lozano Long School of
Medicine,
The University of Texas Health Science
Center at San Antonio

Matthew Petroll

Chair, Graduate Program in
Biomedical Engineering
Professor and Associate Vice Chair of
Research, Department of
Ophthalmology
UT Southwestern

Manasi Reardon

Head of Advanced Development
Abbott Neuromodulation

Erika Ross

Director,
R&D Applied Research,
Abbott Neuromodulation

Ganesh Sankaranarayanan

Associate Professor
Department of Surgery,
UT Southwestern

Jennifer Seifert

Senior Director of Research and
Development
TissueGen, Inc.

Jay Shah

Assistant Professor
Department of Orthopaedic Surgery,
UT Southwestern

Chad Swank

Research Scientist
Rehabilitation Research,
Baylor Scott & White Institute for
Rehabilitation

Elena Vinogradov

Associate Professor
Departments of Radiology and Advanced
Imaging Research Center,
UT Southwestern

Tre Welch

Assistant Professor
Cardio Thoracic Surgery,
UT Southwestern

Joel Wells

Assistant Professor
Department of Orthopedic Surgery,
UT Southwestern

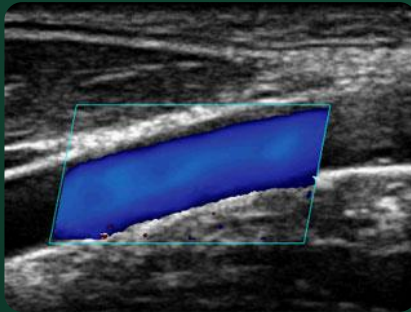
RESEARCH EXCELLENCE



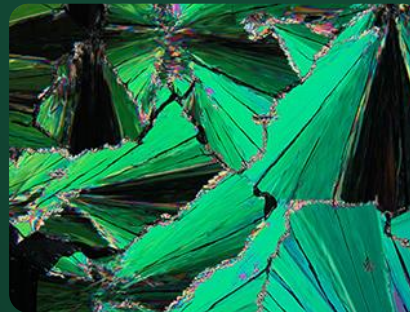
RESEARCH

Biomedical engineering is a broad field and includes virtually any application of engineering to medicine, biology or health care. UT Dallas has chosen to focus its biomedical research in the following areas:

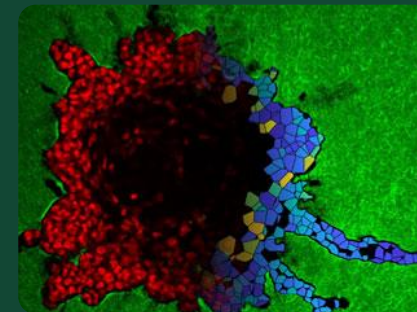
Bioimaging



Biomaterials



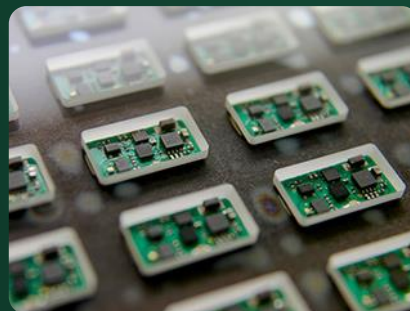
Biomechanics



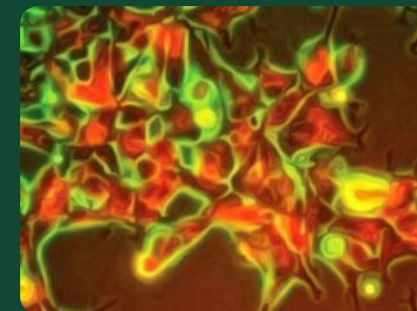
Biosensors and Bioelectronics



Neural Engineering



Systems Biology

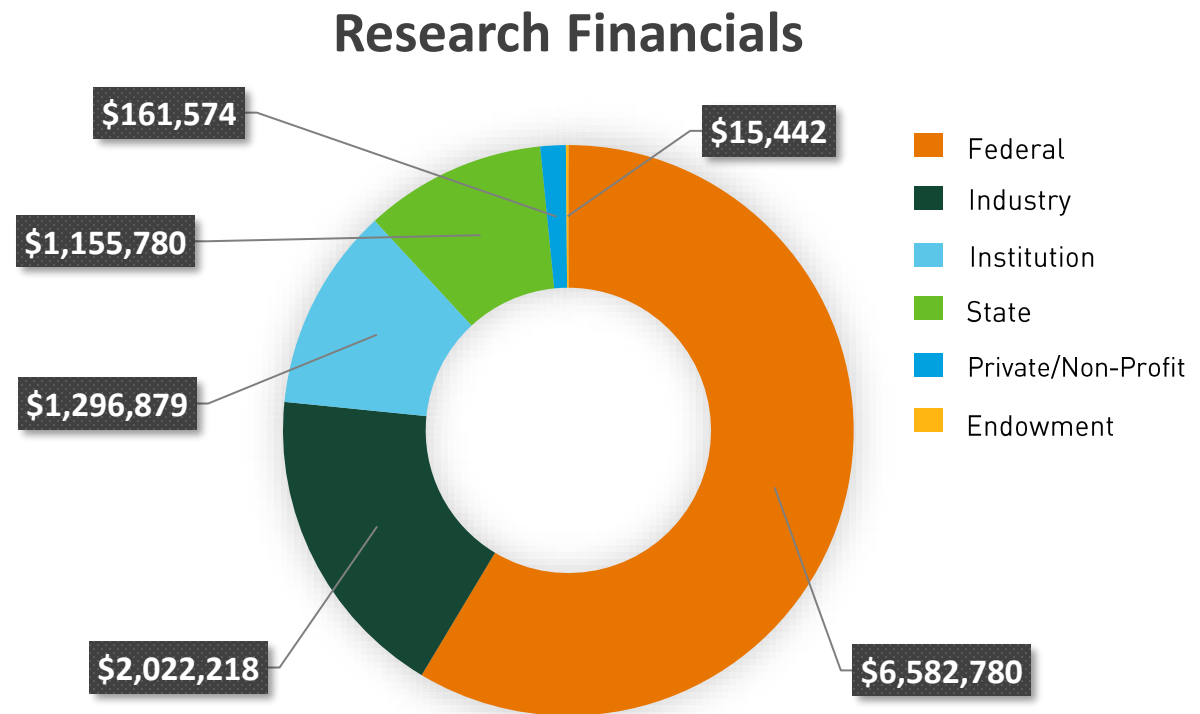


RESEARCH FINANCIALS

In 2021,

■ Average number of RAs supported per TTT faculty was **4**

■ Average number of peer reviewed publications per TTT faculty was **6.3**

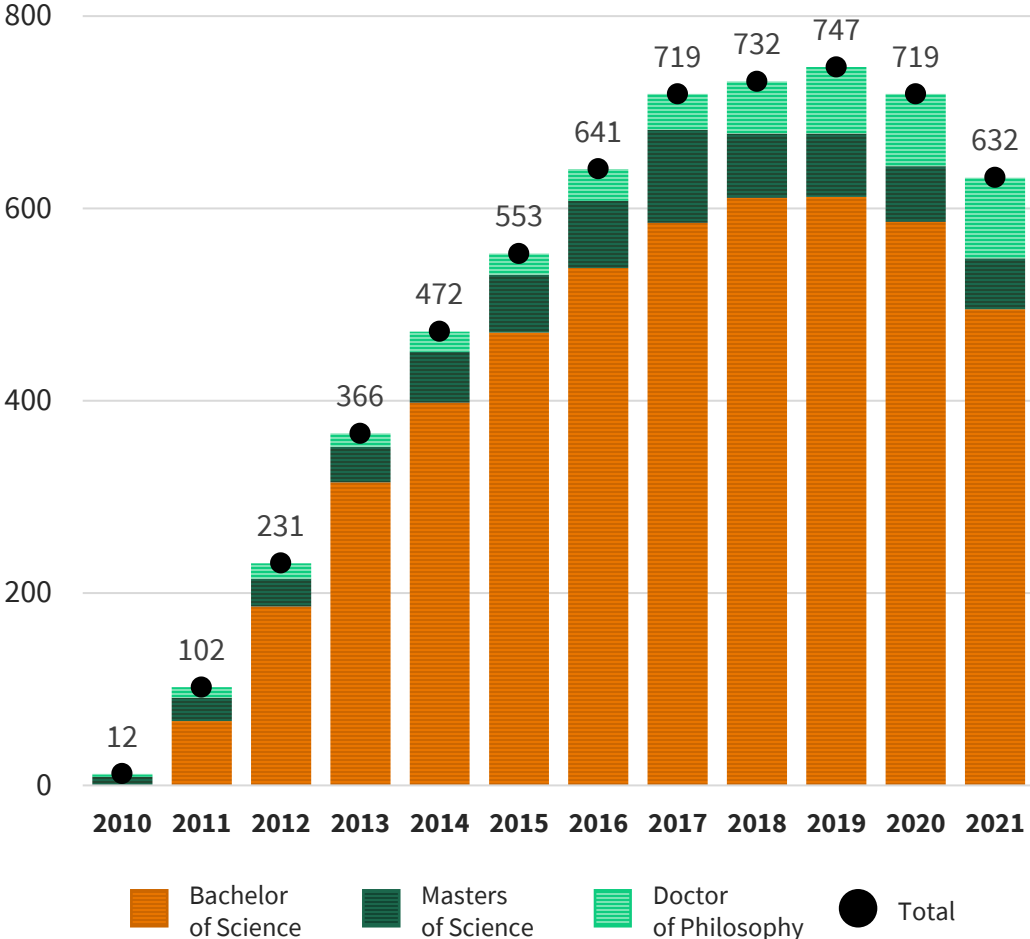


STUDENT SUCCESS

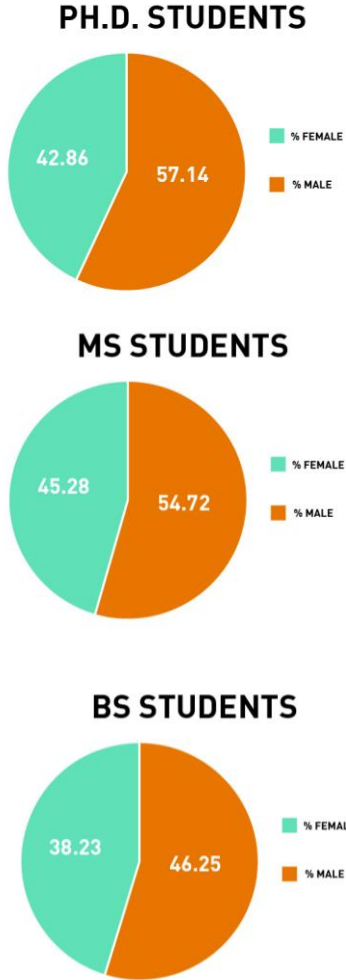


ENROLLMENT AND DEGREES

HISTORICAL ENROLLMENT



BIOENGINEERING STUDENT DIVERSITY





STUDENTS

Bioengineering students have unique opportunities to excel in research, as well as participate in the Jonsson School's signature UTDesign[®] Capstone program where they put their expertise to work toward solving real-world problems.

BIOENGINEERING STUDENT AWARDS

Our students received numerous awards at the local and national levels. UT Dallas Bioengineering continues to attract students committed to pursuing excellence in research and education.



STUDENT AWARDS

Fall 2021 – 6th Annual BMEN Undergraduate Poster Competition

1st: Evelin Rios

2nd: Teresa Thai

3rd: Andres Miramontes

Erik Jonsson School Undergraduate Research Awards

Ted Shi

Evelin Rios

Haider Ali

Manish Samson

2022 Convergence Grant Recipients

Joe Epperson

Bhuvana Lakkasetter

Tarik Shihabeddin

Alexandra Arteaga

Arvin Honari

Divya Subramanian

2021 - 2022 Undergraduate Research Scholars

Ananya Kumaresh

Andres Miramontes

Crisvin Kadambathil

Ian Okidhain

Jeff Young

Ritika Nayak

Sohail Hassan

Teresa Thai

STUDENT AWARDS

2021 Baxter Young Investigator Award

Badrinath Jagannath

Diversity Supplement from the National Institute of Neurological Disorders and Stroke

Ana Hernandez Reynoso

Erik Jonsson School David Daniel

Thesis Award

Badrinath Jagannath

UT System Jess Hay Fellowship

Ambalika Tanak

STUDENT ORGANIZATIONS



BMES Officers

President: Nareen Anwar
Vice President: David Girata
Treasurer: Sohail Hassan
Secretary: Zaina Rida

AEMB Officers

President: Megan Zachariah
Vice President: Nicholas Ho
Treasurer: Vishvani Patel
Secretary: Karel Lirazan

BMES Graduate Student Association

President: Krithika Iyer
Vice President: Ryan Margolis
Treasurer: Jude Franklin Sundar
Alumni Outreach: Divya Subramanian
Public Relations: Vedashree Bhide
Historian: Suhashine Sukumar

STUDENT ORGANIZATIONS



BMEN Graduate Student Association

In its third year of operation, the BMEN Graduate Student Association seamlessly adapted to an all-virtual format and continued to host workshops, seminars and other socials for Bioengineering MS and PhD students.

The BMEN GSA kicked off its fall semester by arranging multiple rounds of peer-led practice sessions for first year PhD students preparing for their qualifying exams. The students gained valuable public speaking experience in a low-pressure environment and obtained feedback from a friendly but tenacious audience. Next, the group commenced its seminar series with Jenny Boothby PhD'19, UT Dallas Bioengineering alum, who shared insight on what to look for in a post-doc position. OsteoMed then joined us on campus to share insight on industry opportunities. Finally, the fall semester ended with our graduate students showing off their painting skills with a pumpkin painting contest.

The spring semester started with a series of lab tours for students to learn about biomedical engineering research on campus. The GSA also hosted its first town hall meeting. Finally, the year ended with an "Open Mic" hour featuring graduate students from UT Dallas and UT Southwestern Medical Center, who gave talks on hobbies cultivated outside the scientific arena.

UTDESIGN® CAPSTONE

The UTDesign® Capstone program is designed to provide a hands-on learning opportunity for students.

The UT Design Capstone experience is a two-semester course sequence in which biomedical engineering majors in teams with other engineering majors design solutions to real world problems for corporate and university sponsors. UT Design is housed in a 40,000 square foot facility for student teams to ideate, create, assemble, test devices, and meet. Dr. Todd Polk, associate professor of practice and UTDesign director, noted, “We strive to provide our students with a real-world engineering experience and have organized UT Design® Capstone like a company.” Polk added, “We treat them (the students) like working engineers from day one, and the overall experience has proved to be highly beneficial to them as they enter the professional world after graduation.”



UT DESIGN[®] CAPSTONE At A Glance

Fall 2021 winners and information

22 bioengineering
students participated

12 teams with
bioengineering students

Teams sponsors include

Abbott Laboratories, AMY Resuscitation, Anikona, HoboLoco Inc., Dallas Center for Sleep Disorders, Eisana Corp., Texas Instruments Inc., UT Dallas, UT Southwestern Medical Center

Award Winners

1st Place: Ventilator Splitting by UT Southwestern Medical Center

Students developed a device capable of splitting breaths from a single ventilator and deliver air to two patients using solenoids, mass airflow sensors and pressure sensors. The device allows different air rates and volumes to be delivered to each patient.

2nd Place: Magic Feet: Shoe Mounted Locomotion Controller for Virtual Reality and Telerobotics by HoboLoco Inc..

Students developed and refined a foot-based locomotion controller that can deliver an immersive VR experience while minimizing movement in real space.

Design Challenge: Healthcare Workplace Violence Prevention Simulator by UT Southwestern Medical Center

The team created a healthcare workplace violence mitigation simulator that combines virtual reality and haptic elements on the arms, the face, the chest and the back to simulate physical sensations during the lesson.



UT DESIGN[®] CAPSTONE At A Glance

Spring 2022 winners and information

80 bioengineering students participated **19** teams with bioengineering students

Teams sponsors include

Daniel Maxwell, Encore Wire Corp., Global Diagnostic Imaging Solutions, JGI Holdings, MAX-IR Labs, Micropac, Othro8, Solenic, UT Dallas, UT Southwestern Medical Center

Award Winners

1st Place: Instrumented Deep Vein Thrombosis (DVT) Surrogate Leg by Ortho8

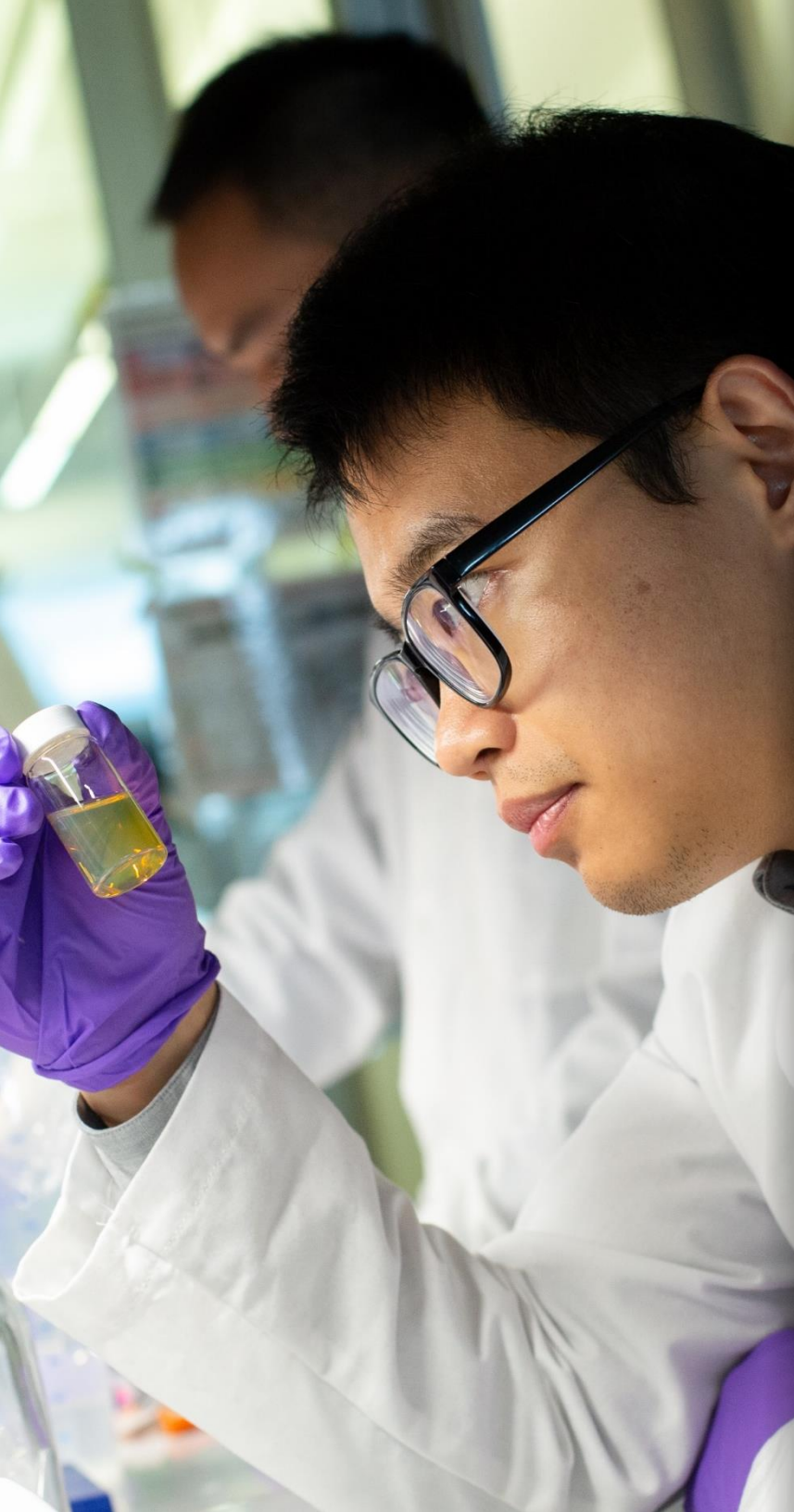
Students created a surrogate leg that measures externally applied pressure from one of PMP's Circul8 product and provides live digital visualization of said pressure. The pressure will be displayed in a two-dimensional grid-like structure that updates live to accurately reflect pressures and pressure concentration applied externally to the mannequin leg.

2nd Place: Clinical Pain Assessment Using the Thermal Grilling Illusion by UT Southwestern Medical Center

The team developed a device that produces the Thermal Grill Illusion (TGI) for a temperature range of 5°C to 50°C using thermoelectric devices and temperature sensors within a feedback control system; the device also measures a patient's contact time using force sensors. Clinicians will use the device to identify a patient's unique pain mechanisms.

3rd Place: Non-Invasive Anchor for Air Occlusive Chest Tubes by UT Southwestern Medical Center

The team designed a non-invasive and fluid occlusive device to securely anchor a chest tube to a patient. It can be applied faster than the time it takes to suture the chest tube, and the tube will be more securely attached to allow for easier movement and transportation of the patient. The device's non-invasive and fluid occlusive nature will also prevent any leaks or potential infections.



OUTREACH AND COMMUNITY ENGAGEMENT



GEARED TOWARD STUDENT SUCCESS

The department hosted various events throughout the year to promote student success and engage with industry leaders including talks with companies such as Ronawk, Metabolon and Medtronic.

Along with industry talks, the department also hosted workshops focused on career development, including career fairs, internship prep workshops and a series of resume-building talks where students could turn what they have learned in the lab into workplace experience.

Bioengineering students and alums even teamed up to host a Q&A panel about their experience and advice about success in the industry.



TEXAS INSTRUMENTS BIOMEDICAL ENGINEERING AND SCIENCES BUILDING



In October 2021, University leaders broke ground for the construction of a new building that will catalyze a unique partnership between UT Southwestern Medical Center and The University of Texas at Dallas, bringing their biomedical engineering programs together to foster innovative solutions for unmet medical needs.

This 150,000-square-foot building, located on the east campus of UT Southwestern Medical Center, is made possible by a transformative gift from Texas Instruments and funds from the Permanent University Fund of the University of Texas System.

The new facility has been named the Texas Instruments Biomedical Engineering and Sciences Building. Scheduled for completion in 2023, the new five-story building will support the work of dozens of faculty and their teams with both wet and dry laboratory space, as well as areas designated specifically to promote multidisciplinary interactions. A Bidesign Center will feature a large assembly and design studio, a metal fabrication shop and rooms for 3D printing.

UT SOUTHWESTERN MEDICAL CENTER CONNECTION

Faculty and students in the Department of Bioengineering at UT Dallas collaborate with UT Southwestern Medical Center researchers and clinicians to bring groundbreaking discoveries into practice.

Currently, nine UT Dallas Bioengineering graduate students conduct research in UT Southwestern faculty members' labs. Over 30% of UT Dallas Bioengineering faculty have research collaborations with UT Southwestern faculty and clinicians. UT Dallas Bioengineering faculty have fourteen grants totaling \$6.9M to support collaborative research with UT Southwestern.



ENGINEERING EXCELLENCE IN BIOENGINEERING

Throughout the 2021-22 academic year, we embarked upon new initiatives towards achieving the goals set forth in our strategic plan focusing on Research Excellence, Student Success, and Outreach and Community Engagement.

We celebrated the successes of our faculty, staff, students and alumni. In the upcoming 2022-23 academic year, the Department of Bioengineering will continue to move towards achieving our strategic goals with the launch of additional new initiatives



ERIK JONSSON SCHOOL OF ENGINEERING AND COMPUTER SCIENCE

BIOENGINEERING

THE UNIVERSITY OF TEXAS AT DALLAS

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